NATIONAL COOPERATIVE SOIL SURVEY

Reports from State Soil Scientist Workshop

Reno, Nevada
April 7-10, 1997

Action Taken to date.....3

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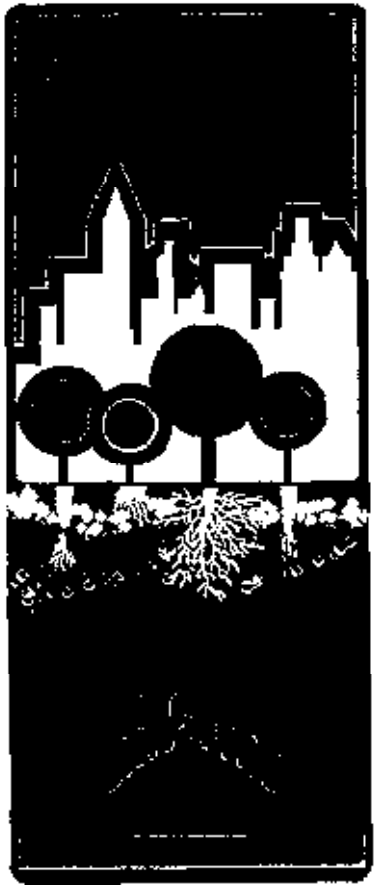

REPORTS FROM THE STATE SOIL SCIENTIST WORKSHOP

April 7-10, 1997
Reno, NV

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ACTIONS TAKEN TO DATE - Oct. 1997

Group #1

1. Proposals for Natural Resource Survey Pilots were solicited. Funding was recommended in the 1998 allowance recommendations for IL, NV, SC, SD, WY.

Group #2

1. QIT on quality joins and on digital map finishing has provided it's recommendations.
2. SSURGO Forum has been developed to interact on technical SSURGO issues with the soil development infrastructure.
3. Key players involved in SSURGO development have been identified in the soil business infrastructure.
4. NCG has provided training in advanced SSURGO review using ARC/INFO. Staff representing all the digitizing units and most of the MLRA offices and states have attended. The classes will continue into 1998.
5. Several MLRA offices have coordinated compilation workshops for staff in their region.
6. Digitizing units participate in regularly scheduled teleconferences on both technical and management related issues. Entering their second year of production, the units are beginning to emphasize less formal technical communication between each other on an as need basis.
7. All of the units are looking at creative partnerships with local, state, and other federal agencies to cost share and cooperate to develop digital surveys. All the units have very strong state partnerships and most work closely with local universities for both expertise and a source of labor.
8. The SSURGO forum was developed to ensure consistent, timely, universally accessible data development procedures and specifications. There are over 100 NRCS and cooperator staff who monitor the forum. Some SSURGO documentation has been posted on the web for FTP download.
9. Six of the seven digitizing units have full web browsing capability and email. All MLRA offices have web browsing capability. The status of data development locations outside of a state office, digitizing unit, and MLRA offices is unknown.
10. Six of the seven digitizing units were visited and reports developed. Cooperators were included in

the visits where feasible. Final reports distributed to cooperators and NRCS staff.

11. Funding and accountability issues have been discussed with State Conservationists in states with digitizing units, and recommendations have been provided. Additional discussions are planned for the agency business meeting.
12. There have been conversations and technical information exchange with private companies and universities regarding this digitizing initiative. Alternative procedures are being evaluated to expedite the digitizing process.
13. Contract mechanisms are being investigated to develop partnerships with non-NRCS sources to expedite the digitizing process.
14. Preliminary discussions with FGDC have been held on approving the digitizing standards. There is support on this from the federal geographic community.
15. NCG has been assigned the responsibility for and is currently developing the workload analysis tool.
16. To assist in status reporting and documentation for top management, the seven digitizing units are monitoring and reporting status to support development of a national map. The five traditionally reported products are now broken into seven and the map is posted on the WWW. This is an interim process only until the Soil Survey Schedule is redone. The ultimate responsibility for this reporting will then return to the states.
17. Funding has been provided to clear up the backlog requests of 1997 compilation materials and to order as many of the 1998 funded survey materials as funds will allow.
18. In the 1998 funding strategy, MO leaders were encouraged to submit surveys which had available DOQ as a high priority.
19. NSSH has been amended to address changing infrastructure roles and responsibilities.
20. NSSH amendments addressing specific SSURGO issues continue to evolve.

Group #3

1. QIT on Technical Services has provided its recommendations
2. Currently under consideration at the NSSC is a lead for Technical Services, for Product Development and Marketing, and for Technology Transfer.

Group #4

1. Developed presentation for the agency business meeting
2. Scheduled soil data quality workshop for January 1998
3. Deputy Chief for Soil Survey and Resource Assessment continues to discuss the MLRA structure with the Regional Conservationists and State Conservationists.
4. NASIS hardware is currently included in the USDA Common Computing Environment initiative for all Project and Field Service Center offices.
5. LAN/WAN/Voice communications installation for Soil Survey Project offices to support NASIS is currently to be given agency priority as the moratorium is lifted. (Sept. 24, 1997)
6. Some geospatial aspects of NASIS are included in the items being considered for NASIS 4.0 however they are quite a ways down the list. Other work in the SSRA Deputy Area on STATSGO and SSURGO browsers and geospatial interfaces is more generic but will enhance all geospatial capabilities.

Group #5

1. An NCSS Advisory group recommended revising the guidelines in the NSSH on quality assurance and MOU development to better address their applicability to the MLRA structure. This is currently being initiated.
2. Marketing and explaining the MLRA concept continues at the Division and at the Deputy level. The Chief has reinforced the agency's commitment to the concept.
3. STATSGO Browser is now available
4. Interpretations Generator in NASIS 3.1 is now available and accommodates local criteria.

Group #6

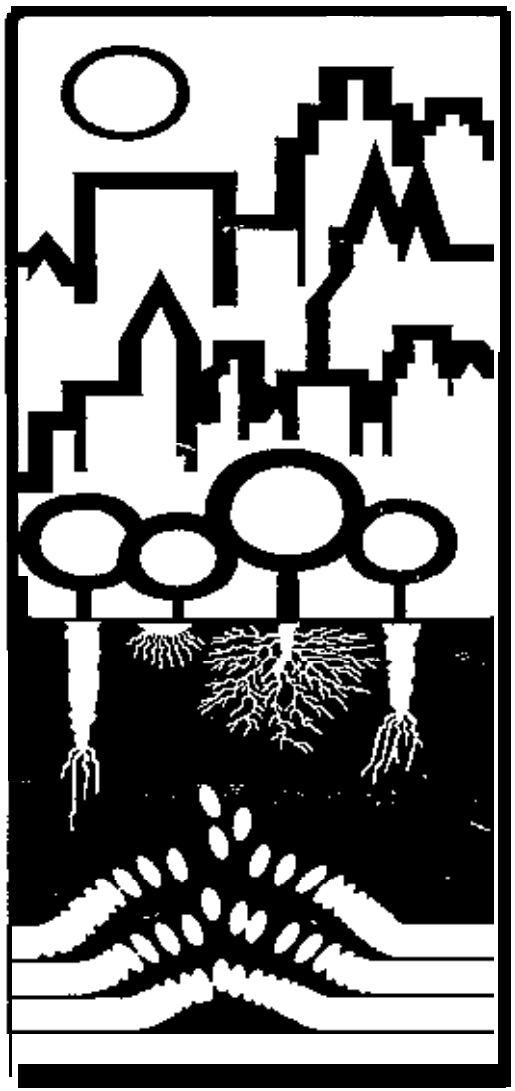
1. QIT on quality joins has provided recommendations
2. NASIS data ownership issue has been clarified.
3. Funding recommendations to Regional Conservationists for Soil Survey were

13% higher overall than last year.

4. QFT on digital map finishing has provided its recommendations.

State Soil Scientist Workshop

April 7-10 1997
Atlantis Hotel, Reno, NV



United States Department of Agriculture

All participants in the meeting will help in identifying opportunities for the Soil Survey Division Director in 6 topic areas during breakout sessions. These are:

1. What are the major opportunities that exist in creating an integrated natural resources survey, and what are three options for implementing these options?

2. What are the issues impeding the accomplishment of the soil survey digitizing initiative, including SSURGO certification? What are the suggested resolutions to those issues?

3. How do we establish in each state a robust technical soil services program that encourages free flow of information, ideas, new interpretations, customer assessment, etc. across state and regional boundaries?

4. What critical processes are missing or poorly understood with the MLRA approach to soil survey mapping using NASIS? For instance who has ownership and can make changes to data? What does data ownership entail? How are changes in data and interpretations reviewed, and who reviews them? What is the role of AES and others?

5. What barriers exist that prevent the establishment of MLRA project offices and prevent the conversion of current soil survey projects to the MLRA basis? What are your recommendations for overcoming these barriers?

6. What 0 portunities exist for MLRA office - State o&ice coordination on product development, program guidance, traming, database management and support, etc. What barriers exist to implementing this coordination, and what recommendations do you have for overcoming these barriers?

Monday, April 7, 1997 Ballroom B

Moderator	**Bill Dollarhide**
1:00 - 1:15 p.m.	*Welcome* Bill Goddard
1:15 - 2:45 p.m.	*Soil Survey Vision and Program Direction* Carole Jett/ Gene Andreucetti Horace Smith
2:45 - 3: 10 p.m.	*An Assistant State Conservationist's Perspective* Melvin Womack
3:10 - 3:30 p.m.	*Break*
3:30 - 4:45 p.m.	*ARPACS Certification* Margie Faber
3:45 - 4:40 p.m.	*Soil Survey Reports* *Stan* Anderson/ Patty West/ Jimmy Todd • how we package soil survey information • agency standards • electronic printing • congressional notification
4:40 - 5:00 p.m.	*Hydric Soil Indicators* Wade Hurt

Tuesday, April 8, 1997 Ballroom B

Moderator **Tyrone Goddard**

8:00 - 9:30 a.m. *SSURGO presentations*
Tommie Parham/
Hof Owen/ Craig Ditzler/
Jim Ware
- ordering ortho
- archiving by quad
- quality joins
  (acs's, hel, c factors,
  r factors, K, T, Soils etc.
- map compilation
- Digitizing QIT
- certification (base,
  scale, etc.)

9:30 - 10:00 a.m. *Break*

10:00 - 11:30 a.m. *NASIS presentations*
Russ Kelsea/
Ken Harward
- report on special
  NASIS team
- database population
- interp modules
- field concepts/tng/
  implementation
- software training
- schedule for
  development

11:30 - 12:00 a.m. *Some thoughts on the role of the Soils Division in Meeting the Challenges of the 21st. Century*
Hari Eswaran

12:00 - 1:00 p.m. *Lunch*

1:00 - 4:30 p.m. *Break out groups*
Instructions Dennis Lytle

Break out Session
Number One

Groups l-5 in Ballroom B
Group 6 on Coral Reef

DEMOS - in Coral Reef until 8:00 pm, come in and socialize, see demos, then go for dinner

Wednesday, April 9, 1997

8:00 - 12:00 a.m. *Break out session*
Number Two

Groups l-6 in Tradewinds
I, II, III

12:00 - 1:00 p.m. *Lunch*

1:00 - 4:30 p.m. *Develop Topic Presentations*

DEMOS - in Tradewinds I until 8:00 pm, come in and socialize, see demos, then go for dinner

Thursday, April 10, 1997 Ballroom A

Moderator **Neil Peterson**

8:00 - 10:00 a.m. *Topic Reports from Break out Groups*

10:00 - 10:30 a.m. *Break*

10:30 - 11:00 a.m. *Cont. Topic Reports from Break out Groups*

11:00 - 11:30 a.m. *Soil Survey Handbook and the Centennial*
Gary Muckel

11:30 - 12:00 p.m. *Soil Survey Program Evaluation*
Maxine Levine/
Gregg Schellentrager

12:00 - 1:00 p.m. *Lunch*

Moderator **Tom Reedy**

1:00 - 3:00 p.m. *Recommendation of Conference on Group Reports/open discussion*

3:00 - 3:30 p.m. *Break*

3:30 - 4:30 p.m. *Wrap up*
Horace Smith

Possible Demos showing after the session on Tuesday and Wednesday include:

- ALPs symbols
  placement software
- NASIS 3.1
- ARGIS
- ARC VIEW

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Integrated Natural Resources Surveys

- Opportunities for Creating

Definition

- A core of geospatial layers and attributes that may include from the following:

Processes for an Integrated Natural Resources Survey

- Develop a Framework via MOU, Cooperative Agreements, etc.
- Develop Customer Needs and Requirements
- Inventory Available Themes
- Solicit Partner Involvement

Processes for an Integrated Natural Resources Survey

- Utilize Interdisciplinary and Interagency Input for New or Update Inventorys
- Develop a Natural Resources Gateway for One Point Access
- Utilize Current and Uniform Technology

Results of Integrated Natural Resources Surveys

- Wide Area Access to Data and Information
  - Can get the same information from multiple agencies, institutions, cooperators, industry partners, etc.
- Improve Customer Service

Results of Integrated Natural Resources Surveys

- NRCS will be Data and Information Rich$!
- Reduces Duplication and Saves Resources
- Provides an Opportunity to Communicate Landscape Interrelationships
- Results in a Holistic View of Natural Resources
  - Supports holistic management

Recommendations

- Pilot / Demonstrate Natural Resources Surveys in Various Geographic Locations
- Utilize Results from Past / Current Efforts
- Secure Agency / Partnership Consensus, Support, and Resources to Implement Natural Resources Surveys

Group 2 State Soil Scientist Meeting April 8, 1997

- Tommie Parham NCG -Team Leader, Hof Owen NCG, Nathan McCaleb NE, Jimmy Ford OK, Jerry Daigle LA, Travis Neely IN, Hayes Dye AZ, Chad McGrath OR, Chris Clarke WV, Greg Schellentrager NE, Bill Cradick KY, Bill Fredrick MI, Charlie Fultz AR

Primary Objective

- Identify barriers to accomplishing soil survey digitizing initiative

Training, communication and feedback

- Designate SSURGO specialist at each MO and state office and DU
- Evaluate DU products and provide feedback to refine and improve agency expertise.
- Develop training for MO and state office SSURGO specialist to include compilation, digitizing., MUIR and metadata, advanced SSURGO and arc/info

Training, communication and feedback: cont.

- Coordinate internship with DU and all infrastructure personnel including partners involved in the process
- Promote site visits to other DU to expand experiences
- Provide standards and specifications on the web site so they are available to potential contractors.(NOTE: not all NRCS offices have access to web site)

Training, communication and feedback: cont.

- Network accessibility crucial to success to success of initiative in providing updates of specifications and standards via websites.
- Oversight and evaluation of soil survey digitizing initiative at all levels(REGIONAL, STATE, MO, SSPO, NCG, DU)
- Information briefing paper all office distribution including partners and private sector

Accountability and funding

- Brief top staff and regional boards at agency business meetings, Board of Directors, etc….. to inform them on the
  - a) status of initiative,
  - b) barriers/risks,
  - c) resolutions/options
  - d) needs
- Market initiative with outside agencies and key professional societies and solicit funding support and partnerships.ie..

Accountability and funding

- Oversight and evaluation of funding inputs and production levels(output)
- Increased buy-in at the federal level (ie. FSA/USFS/BLM/BIA/NPS/USGS)
- Ascertain IRM support at all infrastructure levels for 'atypical' HW/SW such as SUN and HP

Workload analysis tools

- Develop SSURGO inventory workload analyzing tool to assist SO/MO/RO and DU operations in analyzing workload and staff needs (QIT recommendation #9)

Base materials

- Work with USGS to speed up DOQ acquisition
- Timely NCG turn-around for DOQ film positives and source materials
- Base priorities:
  a) DOQ - encourage for future field office
  b) analog ortho
  c) mylar topos
- Funding off the top for base and source material

Roles and Responsibilities

- Support SSD QIT and Quality Join QIT recommendations
- Amend NSSH to reflect roles and responsibilities and clearly communicate such to all levels

Incomplete Infrastructure

- Develop inventory of expertise both inside and outside NRCS to complete the initiative(ex.. tribal units)
- Target funding to where expertise and capability is located

Research and Development

- Utilize pen-based technology in field to eliminate future compilation(QIT recommendation #12).
- Investigate present methods of compilation for areas of streamlining

Issue Paper
NRCS - National Cooperative Soil Survey
Technical Soil Services

ISSUE STATEMENT

NRCS needs a nationally coordinated, proactive Technical Soils Services (TSS) Program. The current NRCS TSS Program lacks national coordination, is ad-hoc and reactive, and is based largely on the initiative and enthusiasm of a few individual soil scientists. TSS needs to be an integral part of NRCS technical conservation programs, the National Soil Survey Program, NRCS outreach and marketing, and overall agency mission. A renewed national focus which includes adequate multilevel support and appropriate training are necessary to ensure quality products and services are delivered to all customers in a timely manner. NRCS must be visionary while developing a TSS program that addresses current and anticipated soil data needs.

The skills of soil scientists and the services and products they offer must be consistently utilized and incorporated into internal program and policy development **and** delivery. Because our current TSS approach is commonly reactive, a strong **need** exists for a multilevel strategy to ensure a planned approach to TSS exists that ensures both internal and external customers are provided with quality service, products, and training.

TSS must strengthen it's outreach and marketing to provide quality training for all users of existing soils data and must be proactive in developing new data and interpretations for technical resource programs and special uses by cooperators? partners, and other customers. We must continue TSS support for all internal NRCS programs. To summarize, as the result of a planned, nationally coordinate!, balanced TSS program, our agency will be more effective in applying and interpreting soil data to address all land management concerns including soil, air, and water quality? watershed and rangeland health, and urban land issues.

BACKGROUND

The NRCS Soil Survey program emphasis has traditionally produced soil maps, soil data and soil interpretations for use by other NRCS employees or by other governmental agencies involved in resource management. Traditional accomplishments are measured as acres mapped and manuscripts completed. Another vital portion of soil survey program outputs include collecting technical soil information during the mapping process and transferring it through TSS activities to both internal and external customers.

Many states have area or resource soil scientists who provide internal program coordination for areas with published soil surveys and also provide some level of TSS to mostly internal users. These positions have been successful due to the soil scientist's creativity and initiative, ability to locate and acquire needed training, personal skills in sales and marketing, and desire and ability to find time, equipment, and higher-level support for providing soil training and specialized interpretations designed to meet local customer needs. In many states, a large percentage of soil scientists are focused on completing initial soil surveys. In these states, the needed resources for a fully functioning TSS program are not available. With the current CO-02 funding formulas, the number of project soil surveys and acres produced are major factors in deriving CO-02 state fund allocations. Some states, like Florida, that have "once over" soil surveys completed, have built successful, creative TSS programs based on financial partnerships with state agencies and/or other partners..

NRCS reorganization was designed to enhance and expand TSS within each state while centralizing and managing soil survey activities by Major Land Resource Areas (MOs). This change remains in an embryonic stage and it's success depends upon strong national leadership, careful program design and the implementation of an effective multilevel TSS plan.

PRESENT SITUATION

Recent NRCS budget constraints have caused the NRCS TSS program to focus inward, away from serving, training, and providing data to external customers. As a result of reorganization, soil scientist positions at the State Office (SO) level and above were reduced with anticipated gains in the number of soil scientists at the field level. However, due to reducing the number of SO soil scientists, acceptance of the early retirement option by soil scientists, and demands of soil survey digitizing and farmbill support activities, no net gains have been realized in TSS staff years. Major Land Resource Area Offices (MOs) have assumed a larger portion of soil survey, correlation, and manuscript activities but again, no net gain in TSS staff years was achieved. TSS activities within NRCS SOs and field offices (FOs) are now focused as support for National Resource Inventory, Wetland Reserve and Conservation Reserve Programs, National Soils Information System (NASIS), National Digitizing Initiative, Field Office Computer System (FOCS) modules, wetland determination and delineation activities , and other internal NRCS program support. These activities preclude developing outreach and marketing programs to effectively interact and build support with external customers and to collect new soils data needed to support scientific models or new soil interpretations. External customer and/or partner support may become vitally important as budgets, and the personnel they support, continue to shrink.

Leadership

Re-establishing the National Leader for TSS and a support staff will provide leadership to the critically emerging TSS program. The National Leader for TSS will provide leadership and coordination to effectively market soil survey information, provide guidance for an effective special interpretation delivery system, develop consistent agency policy that ensures soils data is fully utilized in NRCS program delivery, and assures the adequate testing of proposed technologies and programs that use soil data prior to their release. The National Leader for TSS would focus on the development and delivery of a TSS training program that provides training to its own soil scientists, to other NRCS personnel, and to other users of soil survey and soil interpretation data so they can successfully use it. The State Soil Scientist or State Soils Liaison is the manager of the TSS program in their state. In order to focus state level TSS and to obtain and develop needed training for TSS soil scientists, it is recommended that the State Soil Scientist or equivalent supervise field level TSS staff.

Training

NRCS training, in the past few years, has not met the need for technical and on-the-job soils training. Many field office employees would benefit tremendously from spending a day in the field with a soil scientist as he or she described and classified a soil, discussed the site specific interpretations of a soil, communicated the uses and limitations of the county soil survey, discussed aspects of soil quality, or answered the employee's questions regarding relationships among soil properties and nitrate or pesticide leaching, drainage class, or land capability class. Additionally, untrained employees are more likely to know under which circumstances they should request soil scientist assistance for technical projects or recommendations. It is recommended that NRCS establish a stronger technical training program for District Conservationists and other non-soil scientist, field office staff. This training will equip them with the basic tools to provide technical assistance that protects natural resources, meets customer needs and expectations, and fits within NRCS policies. This includes on-the-job and formal training on soils-related subjects.

that protects natural resources, meets customer needs and expectations, and fits within NRCS policies. This includes on-the-job and formal training on soils-related subjects.

Proficient TSS soil scientists must have already mastered basic soil survey skills. Soil mapping, identifying landscapes, soil data entry, air photo interpretation, observing, describing, and classifying soils, describing and quantifying soil patterns within a soil map unit, and other fundamental soil survey skills must be learned and developed. Therefore, basic soil survey experience, developed over a 2 to 5 year period, initiates and becomes TSS core training. Training for TSS begins with a regulated amount of time spent in TSS activities, directed by the soil survey project leader, while completing soil surveys and it continues as on-the-job training while assisting and working with a resource/area soil scientist. It is supplemented by timely formal TSS training courses in identified areas that support national, state, and local TSS needs and activities. TSS soil scientists must intimately know the inputs and requirements of the product they use and market.

Presently, most formal soil scientist training provided by National Education and Development Center (NEDC) is centered around project soil surveys. TSS soil scientists must possess adequate skills and knowledge to deliver quality products and service. The Soil Survey Division Training Coordinator (SSDTC) must work with NEDC, national, regional, institute, and state staffs to develop TSS training courses focused on existing TSS needs. It is recommended that the SSDTC coordinate the development of a clear TSS training vision and be proactive in course development. A training framework and delivery mechanisms are required along with the development of a cadre of skilled, talented instructors to deliver TSS training. Effective partnerships with universities, institutes, local extension groups may be required lo produce the quality TSS training needed by soil scientists and NRCS field office employees.

Monitoring/Reporting Deliverables

Presently an adequate method of capturing and quantifying data on the kind, amount, and value of TSS products delivered by NRCS to customers does not exist. TSS deliverables and products are valuable to our customers and vary by geographic area, status of "once over" soil surveys, strategic partnerships, marketing and salesmanship, and state and local law requirements. It seems prudent for the NRCS to accurately report to Congress the kind and amount of services delivered to our customers to assist in supporting annual budget requests. These reports will undoubtedly influence our budget which in turn directly affects our ability to deliver TSS. However, a TSS reporting system must be flexible, (in order to reflect state and local differences), simple, and easily maintained so that it, in and of itself, does not reduce time available to produce TSS products and services. It is recommended that a Quality Improvement Team (QIT) be established to determine the feasibility, desirability, need, and methodology required to produce an accurate logical reporting system and to make recommendations to the Director of the Soil Survey Division regarding a TSS reporting system that joins it to the Government Performance Review Act (GPRA).

Skills File

It is recommended that a national soil scientist skills file be developed. It will provide a list of skilled trainers that can assist in developing training courses and position descriptions that represent and support activities of NRCS TSS soil scientists. A national skills file will also provide a reservoir of expertise and experience useful for all levels and complexities of TSS projects within the nation. It will permit NRCS to effectively use and maximize the skills of all soil scientists.

SUMMARY OF RECOMMENDATIONS

1. Reestablish National Leader and support staff for Technical Soil Services
2. Establish QIT to review importance and value of establishing a national TSS reporting system and to provide recommendations to Director of Soil Survey Division
3. Develop a similar career ladder for TSS and soil survey soil scientists, within the 470 series
4. Develop a catalog of current and potential TSS products and services (Appendix A)
5. Develop a "skills file" for NRCS soil scientists (eventually includes soil scientists from Universities, other agencies, etc.) that provides a "gene pool" of experience and expertise for TSS, soil interpretations, GIS, and soil survey programs
6. As TSS program leader, the State Soil Scientist or State Soil Liaison should supervise TSS field staff
7. Establish a strong TSS training program for NRCS soil scientists and for all NRCS field level employees and external customers

Appendix A

Technical Soil Services Provided to Customers

Food Security Act/Resource Inventory:

- Hydric soils determinations/delineations (FSA)
- PSU data collection (NRI)
- Special NRI sampling and data collection (NRI)
- Soil data validation and representative values generation (FAIRA)
- Wetland reserve program eligibility determinations
- Maintenance of FOCS soils data for field office planning activities
- Soil resource expert for FSA
- Support soil-related modules for Field Office Computer System (FOCS)
- Oversight and support as team members for state program appraisals

Water Quality:

- Seasonal high water table determinations
- Hazardous waste siting
- Waste water spray field siting
- Irrigation guide development/update assistance

Water Quantity:

- Anomaly investigations (sinkholes)
- Storm water retention pond siting
- Support in irrigation water management for water savings
- Waste management support in structure siting (dairy/livestock operations)

Soil Quality:

- Highly Erodible/Potentially Highly erodible land determinations
- Soil pesticide loss and leaching determination tables from soil data
- Land fill siting
- Collect soil quality data for 1996 Special NRI sampling
- Oversight and support to air quality program dealing with PM<10
- Provide data for conservation planning activities
- Assistance to state and local governments on secondary land use issues
- Assistance to general public on use and management of soils
- Oversite and assistance to Field Office Technical Guide
- Identify soil quality resource concerns
- Determine effectiveness of applied practices to improve soil health

Soils Training and Workshops:

- Land judging training and coaching
- Envirothon assistance and training
- Presentations to high school/college job fairs
- Basic photo interpretation training to field office staff
- Site assessment training for local government groups
- Assistance and soils training for elementary, junior high and high schools
- Civil rights activities
- Soils training to university soil genesis, classification, mapping classes
- Soils training for state conservation planning

Group 4 Report

- What critical processes are missing or poorly understood with the MLRA approach using NASIS?

NASIS Concepts are not clearly understood

- Functions fit in with MLRA mapping concepts
- Communications with SSPO
- Equipment and Operation
- Policy and Procedures
- Coordination with Field Offices (DCs)
- Data Ownership/Availability

Better Clarity - Low Apples

- Use Division Director's Quarterly Newsletter for getting word out
- Use existing networks to promote better understanding--consortium, MO meetings
- Have the Deputy Chief, the Division Director, and the NASIS Coordinator speak to Regional and State Conservationists

Better Clarity - Low Apples

- Use existing resources to create a consistent visual presentation that covers key points, e.g., data ownership, legends for use by MOs, states, etc., that can be tailored to a specific audience
- Convey to STC the importance and value of NASIS implementation by linking it to critical resource issues, programs, and higher quality data

Clarity - Higher Apples

- Get Soil Data Quality Specialists together for a national workshop
- Establish certification guidelines for data ownership
- Implement NASIS at all locations with the appropriate hardware and software
- Implement recommendations of telecommunications consultant

High Apple

- Do not lose sight of the need for geospatial aspect of NASIS

Barriers to Establishment of MLRA Project Offices

- Group # 5

Administrative and Management Related Barriers.

Issue #1 - Funding

- Traditional sources of funding have been county based.
- Sharing of resources across administrative boundaries has not traditionally been done.

Issue #1 - Solutions

- Seek broader, non traditional sources.
- Local funds can be dedicated to local areas while federal funds can be used MLRA-wide.
- Creativity in funding agreements.
  - Avoid unrealistic expectations through use of longer term agreements and incremental updates.
  - Short term targeted projects.

Funding Creativity Continued

- Pass up funding that doesn’t fit MLRA objectives.
- Take personnel/equipment, not $.

- MLRA and States work together to educate management regarding benefits of sharing resources.

Issue #2 --Management and Organizational Structure.

- Supervision from states for offices with multi-state responsibilities.
- State & County employees restricted to funded work area.
- Who takes initiative to implement?
- Size of MLRA's & travel distances.

Issue #2 - Solutions

- MO/States prepare plan for resource sharing and present to B.O.D.
- Consider team or other alternative supervision styles.
- Ensure complete and effective communication with all players.
- States & partners initiate and lead process with support and coordination from the MO.

Issue #3 - Priorities

- Difficulty of setting up county-based projects while simultaneously transitioning to MLRA-based survey areas.

Issue #3 - Solutions

- Team correlation approach as bridge to full implementation.
- Blend once over with MLRA-wide projects (satellite office or stand alone office using MLRA concept.)
- Plan ahead for transition before once over is completed.

Issue #4 - MOU's

- Existing MOU's need to be fulfilled.
- MLRA-wide MOU's are difficult and time consuming to develop.

Issue #4 - Solutions

- Implement existing MOU "as is" or revise as needed to fit MLRA concept.
- Expand MLRA-wide MOU's to encompass groups of MLRA's or entire MO area.

Issue #5 - Commitment

- Management commitment to the MLRA approach may be lacking.

Issue #5 - Solutions

- Don't assume commitment is not there.
- Develop plans for implementation and sell to managers.
- Educate decision makers about benefits.
- Highlight success stories.

Barriers resulting from a lack of understanding.

Issue #1 - Fear of losing control of program.

- Demonstrate "win-win" nature of reorganization.
  - Significant control is maintained while achieving greater efficiency.

Issue #2 - Marketing efforts are needed

- There is still not a clear understanding of the reasons for, and benefits of, the MLRA approach to soil survey .

Issue #2 - Solutions.

- Define current state of the existing soil surveys.
- Define the vision of the desired state.
- Capitalize on the concept of building upon the current product.
- Emphasize continuing nature of soil survey (concept of maintenance).

Barriers related to technical issues.

Issue #1 - Boundaries.

- MLRA boundaries are a moving target and s○mewhat “fuzzy" in places.

Issue #1 - Solutions.

- Perfectly defined boundaries are not needed to get started. Can be refined as mapping progresses.
- Pilot software based on STATSGO.
- MLRA is not the only only acceptable physiographic boundary to use to organize work.
- Coordinate between projects for the transition areas.

Issue #2 - Data.

- Past data and interpretations were gathered by political boundaries. Anomalies in elements such as **K, T,** capability class, etc. exist.

Issue #2 - Solutions.

- Seek out sources of existing data and summarize and use it in NASIS development.
- Continue to work to coordinate interpretations regionally.
- Utilize national guides and develop training on their use.
- Project offices need standardized methods of data collection and analysis in order to be able to share data.

Issue #3 - Customer needs.

- Customer needs may vary within a defined project area.
  - Local regulations.
  - Differences in land use.
- Varying scales have legitimate use, but will impact on the join issue.

Issue # 3 - Solutions.

- Pay close attention to customer needs.
  - critical role for State Soil Scientists and Resource Soil Scientists.
- Allow flexibility in choosing scale.
  - Scale change could occur at change in land use or physiographic boundary rather than county boundary.

Group 6 Report

- MLRA Office and State Office Coordination

Disclaimer

- Group felt that most things are working good and we are getting there.
- Identified some issues and concerns that need addtional or continued attention

Concerns

- 1. Lack of consistent guidance & direction
- 2. MO's developing own guides - duplication
- 3. Some state boundaries still to hard
- 4. Funding accountability integrity
- 5. Some MO staffs at least preceived to be doing host state work

Concerns

- 6. Quaility joins for SSURGO
- 7. Understanding and agreement of ownership of NASIS data
- 8. Some states feel they don’t have adequate input on MO guidance documents

Barriers

- Limited funding
- Reduced travel funds
- Lack of understanding of multi-state responsibilities by other state managment staff

Opportunities

- 1. Share development and use of TSS
- 2. New interpretations
- 3. GIS
- 4. Digital map finishing
- 5. Compilation
- 6. Soil business for SSURGO

Opportunities

- 7. Marketing
- 8. Training
- 9. Manuscript review/processing
- 10. Sharing of specialist
- 11. Sharing development of new technology

Mechanisms to carry out -opportunities

- Single MLRA Technical team
- (Field SS and MO, SDQS for a single MLRA)
- Regional Soil Consortiums, SSS etc
- (SSS within a region)
- Regional Technical Advisory Group - Multi-discipline
- (Multi-disciplinary regional)

Mechanisms to carry out opportunities

- MLRA Office Board of directors or Management Team
- (STC, & some case Partnership Leads)
- National & Regional Data Quality Specialist & MLRA Office Leaders meetings
- Training by MLRA Office staff

Mechanisms to carry out opportunities

- National Technical Soils Consortiums
- (6 Technical Soil Specialist - 1 from each region, SSS, MO Leaders).

Mechanisms to carry out opportunities

- National Technical Soils Consortiums
- (6 Technical Soil Specialist - 1 from each region, SSS, MO Leaders).

National Cooperative Soil Survey

State Soil Scientist National Workshop
Scottsdale, Arizona
February, 1994

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#1 SSSoC

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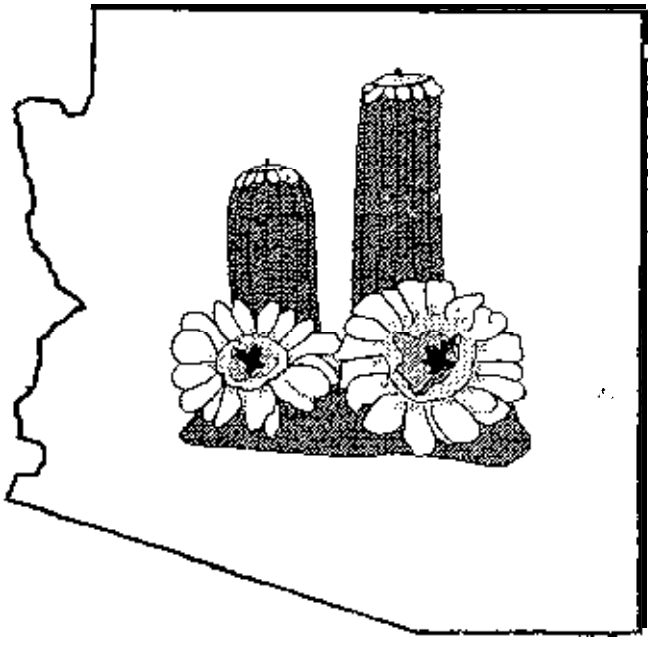
State Soil Scientist National Workshop

Scottsdale, Arizona

February 14-18, 1994



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Item #1

Stare Soil Scientists National Workshop
Ramada Hotel - Valley Ho
Scottsdale, Arizona
February 14-18, 1994

AGENDA

Monday. February 14.1994

10:00 am - 4:00 p.m.	Registration - Arizona State Office Personnel
Chairperson	James H. Ware, Soil Scientist, Washington, D.C.
1:00 p.m. - 1:15 p.m.	Meeting Logistics -James H. Ware, Soil Scientist Washington, D.C.
1:15 p.m. - 1:30p.m.	Welcome, Barton E. Ambrose, Assistant State Conservationist for Programs Phoenix, Arizona
1:30 p.m. - 2:15 p.m.	Role of Quality in the Search for Sustainability Richard W. Arnold, Director for Soil Survey Division Washington, D.C.
2:15 p.m. - 3:15 p.m.	Restructuring the Soil Survey Division C. Steven Holzhey, Assistant Director for Soil Survey Division Lincoln, Nebraska
3:15 p.m. - 3:45 p.m.	Break
3:45 p.m. - 4:15 p.m.	Global Climate Change and LTER Activities Ellis G. Knox, National Leader for Soil Survey Research Lincoln, Nebraska
4:15 p.m. - 4:45 p.m	RCA and STATSGO Database Lawrence E. Brown, Soil Scientist (RCA Liaison) Lincoln, Nebraska

Tuesday. February 15.1994

Chairperson	Roy L. Vick, Staff Soil Scientist, Hato Rey, Puerto Rico
8:00 am. - 8:30 am.	Montana GIS and Manuscripts Special Projects Gordon Decker, State Soil Scientist Bozeman, Montana
8:30 am. - 9:00 am.	T Factors and other FSA Criteria H. Raymond Sinclair, Lead Scientist, Applications Lincoln, Nebraska
9:00 am. - 10:00 am.	Keeping Survey Above the Law Stuart L. Shelton, Senior Counsel, Office of General Council Washington, D. C.
10:00 am. - 10:30 am.	Break

10:30 am. - 11:15 am.	*National Cartographic and GIS Center Topics* *Hugh Allcon, NCSS Branch Chief, National Cartographic Center* *Fort Worth, Texas*
11:15 a.m. - 11:45 am	*SSURGO and Map Finishing Standards* *Hof Owen, Soil Scientist, National Cartographic Center* *Fort Worth, Texas*
11:45 am. - l:OOp.m.	*Lunch*
Chairperson	*Tommie L. Parham, State Soil Scientist* *Albuquerque, New Mexico*
1:00 p.m. - 1:30 p.m.	*Ecosystem Management in SCS* *J. Marc Safley, Assistant Director for Ecological Sciences Division* *Washington, D. C.*
1:30 p.m. - 2:30 p.m.	*Fort Collins Overview/NASIS Update* *Ken Hat-ward, NASIS Project Manager* *Fort Collins, Colorado*
2:30 p.m. - 3:00 p.m.	*FGDC and National Spatial Data Standards* *Dennis J. Lytle, Assistant Director for Soil Survey Division* *Lincoln, Nebraska*
3:00 p.m. - 3:30 p.m.	*Break*
3:30 p.m. - 4:00 p.m.	*Strategic Planning and GPRA* *Thomas E. Calhoun, Assistant Director for Soil Survey Division* *Washington, D. C.*
4:00 p.m. - 4:30 p.m.	*Open Forum* *Wade Hurt, State Soil Scientist* *Gainesville, Florida*
4:30 p.m. - until	*Demonstrations and Displays*
	Montana GIS and Manuscripts Special Projects *Michael J. Hansen, Dataset Manager, Bozeman, Montana* *LeeAnn Mena, Soil Survey Technician, Bozeman, Montana* *Robert Lund, Cartographic Technician, Bozeman, Montana* *Thomas Potter, Cartographic Technician, Bozeman, Montana*
	NASIS Operation *Ken Harward, NASIS Project Manager, Fort Collins, Colorado*

Wednesday. February 16, 1994

8:00 am. - 8:15 am.	*Morning Session Logistics* *Thomas E. Calhoun, Assistant Director for Soil Survey Division* *Washington, D. C.*
8:15 am. - 9:45 am.	*Strategic Planning Topics: Brainstorming and Problem Solving* *Small Group Sessions - Facilitators* *Karl H. Langlois, Head Soils Staff, NNTC, Chester, Pennsylvania* *Arlene J. Tugel, Soil Scientist, WNTC, Portland, Oregon* *Robert L. McLeese, State Soil Scientist, Champaign, Illinois*

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9:45 a.m. - 10:00 a.m.	Break
10:00 am. - 11:30 am.	Small Group Sessions Continued: Strategic Planning Topics
11:30 am. - 11:45 am.	Board Buses for Field Trip
11:45 am. - 5:00 p.m.	Box Lunch and Field Trip Phillip D. Camp and William W. Johnson, Assistant State Soil Scientists, Phoenix, Arizona
5:30 p.m. - until	Demonstrations and Displays
	Montana GIS and Manuscripts Special Projects Michael J. Hansen, Dataset Manager, Bozeman, Montana LeeAnn Mena, Soil Survey Technician, Bozeman, Montana Robert Lund Cartographic Technician, Bozeman, Montana Thomas Potter, Cartographic Technician, Bozeman, Montana
	NASIS Operation' Ken Harward, NASIS Project Manager, Fort Collins, Colorado

Thursday. February 17.1994

Chairperson	Carol A. Wettstein, State Soil Scientist, Lakewood, Colorado
8:00 am. - 9:00 am.	GIS, NRI, and other Topics Gale W. TeSelle, Director for Resource Inventory and GIS Division Washington, D. C.
9:00 am. - 10:00 am.	NAPP, DOQ, and other Topics George M. Rohaley, National Leader for GIS and Remote Sensing, RIGIS Division Washington, D. C.
10:00 a.m. - 10:30 a.m.	Break
10:30 am. - 11:15 am.	Soil Survey Schedule Overview James H. Ware, Soil Scientist, Washington, D.C.
	Using Soil Survey Schedule for State Management Operations Lawrence A. Tomes, State Soil Scientist, East Lansing, Michigan
	National Digital Soil Survey Area Coverage and Soil Survey Schedule Sharon W. Waltman, Soil Scientist, Lincoln, Nebraska
11:15 am. - 12:00 noon	Soil Classification Changes/OSD Updates James R Culver, Assistant Director for Soil Survey Division Lincoln, Nebraska

12:00 noon - 1:00 p.m.	Lunch
Chairperson	Jerry J. Daigle, State Soil Scientist, Alexandria, Louisiana
1:00 p.m. - 1:30 p.m.	NHQ Reorganization Richard W. Arnold, Director for Soil Survey Division Washington, D. C.
1:30 p.m. - 2:00 p.m.	Associaton of American State Geologists and Things Geologic Larry Fellows, State Geologist, Arizona Geological Survey Tuscon, Arizona
2:00 p.m. - 2:45 p.m.	Interagency MOA Concerning the Delineation of Wetlands on Agricultural Lands Billy M. Teels, Wetlands Staff Leader and National Biologist Washington, D.C.
2:45 p.m. - 3:15 p.m.	Technical Soil Services Highlights Lawson D. Spivey, Soil Scientist, Technical Soil Services Washington, D. C.
3:15 p.m. - 3:45 p.m.	Break
3:45 p.m. - 4:30 p.m.	Open Forum Dick Babcock, State Soil Scientist Temple, Texas
6:00 p.m. - 6:30 p.m.	Hospitality Hour (Cash Bar)
6:30 p.m. - 8:30 p.m.	Evening Meal and Guest Speaker Richard L. Duesterhaus, Assistant Chief, Northeast Washington, D. C.

Friday. February 18.1994

Chairperson	Lawson D. Spivey, Soil Scientist, Washington, D.C.
8:00 am- - 8:30 am.	Summary of Strategic Planning Work Groups and Budget Formula Committee Report Thomas E. Calhoun, Assistant Director for Soil Survey Division Washington, D. C.
8:30 am. - 9:00 am.	Quality Assurance Overview James R. Culver, Assistant Director for Soil Survey Division Lincoln, Nebraska
9:00 am. - 9:30 am	Open Forum Gregg W. Schellentrager, State Soil Scientist, Des Moines, Iowa
9:30 am. - 10:00 am.	Closing Comments Richard W. Arnold, Director for Soil Survey Division Washington, D. C.
10:00 am.	Adjourn

Item 2

FIELD TRIP
WEDNESDAY, FEBRUARY 16, 1994

11:30 AM	Depart from Ramada Valley Ho to Papago Park
NOON	Lunch and discussion of area geology and brief walk-through with Mario Lluria, Salt River Project (SRP) Geohydrologist
1:00 PM	Depart for Salt River Project Administration Building
1:15 PM	Meeting in the Mohave Conference Room
	Presentation by Dallas Reigle, Hydrologist on SRP's watershed management including the telemetry system
2:00 PM	Split the group into two groups. One half will tour Association Dispatching Center (A.D.C.) with Joe Rauch, Superintendent. During this time the second group will remain in the conference room and meet with Dr. Judy Brunson-Hadley, SRP Archeologist
2:30 PM	Groups will switch
3:00 PM	Depart from SRP to Pueblo Grande
3:15 PM	Tour Pueblo Grande ruins
	Pueblo Grande is a prehistoric Hohokam Indian site occupied from about A.D. 1 to 1450
4:30 PM	Leave for Ramada Valley Ho
5:00 PM	Arrive Ramada Valley Ho

Item 3

Why Restructure the Soil Survey Division?

Create an Organizational Structure That:

- **Provides Focused Leadership Based on a Mission, Vision, and Strategic Plan**
- **Identifies and Sets Unified Priorities for the Division**
- **Is Customer-Focused to Listen and be Receptive to New Ideas and Concerns**
- **Is Flexible and Proactive and Can Quickly and Effectively Identify and Seize Opportunities**
- **Establishes and Empowers Teams According to Priorities to Obtain Improved Results**

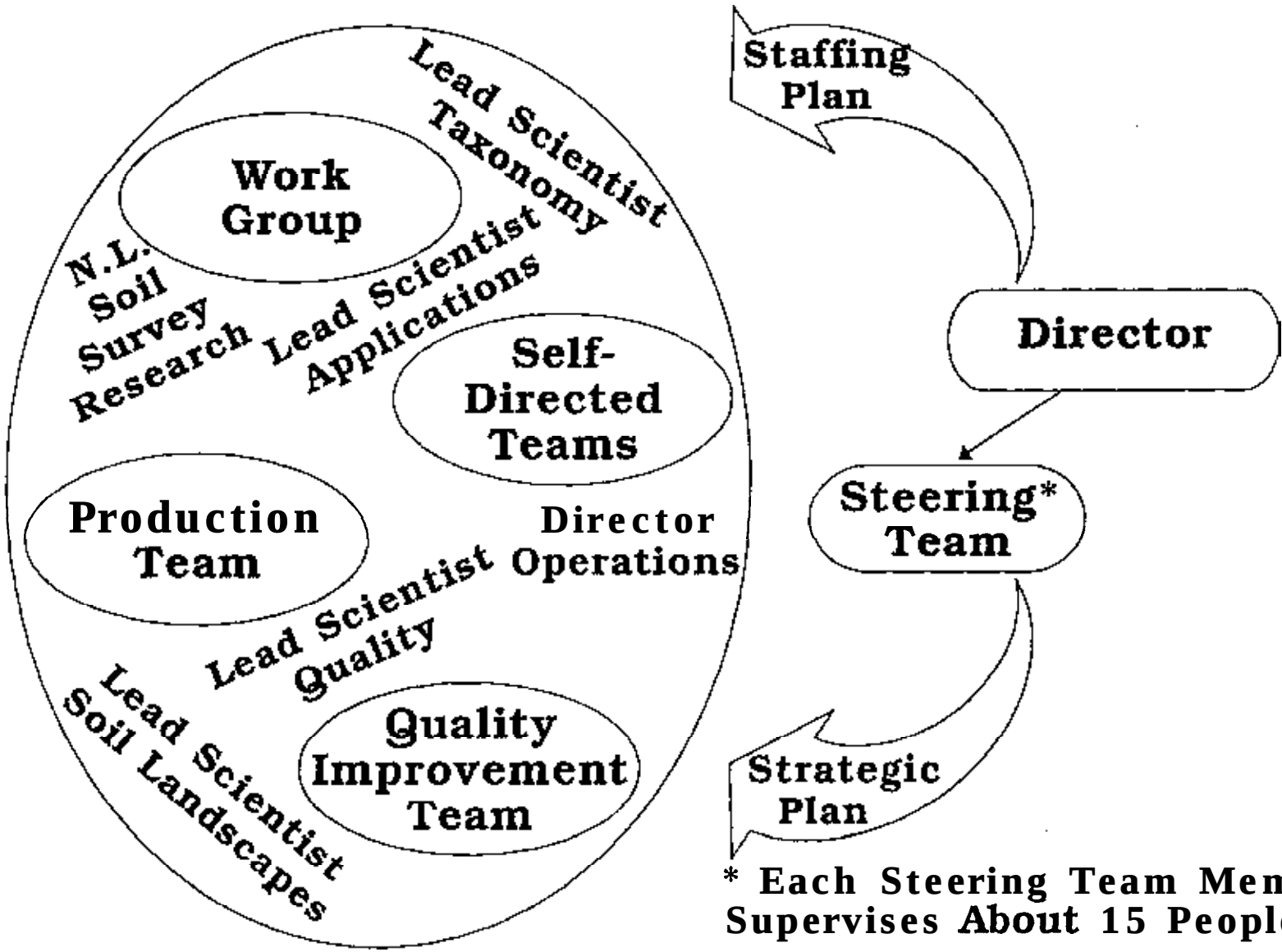
Soil Survey Division Restructuring

- **Began Process About 2.5 Years Ago**
- **Employee Input (NSSC Climate Survey)**
- **Customer Input**
  - **State Soil Scientist Meetings**
  - **Agricultural Experiment Stations Advisory Committee**
  - **State Conservationists Advisory Committee**
  - **Regional SCS Meetings**
  - **Regional and National NCSS Meetings**
  - **SCS Top Staff**
- **Soil Survey Division National Leaders Developed the Framework**

Soil Survey Division: . Three Broad Areas of Work

- **Program Development (R&D)**
- **Program Implementation (Production)**
- **User Support (Customer Services)**

Soil Survey Division Organization



* Each Steering Team Member Supervises About 15 People

Soil Survey Division Restructuring

- Richard Arnold, Director Program Direction
- August Dornbusch, NTC Director - Administrative
- Steering Team
  - C. Steven Holzhey, Assistant Director
  - Maurice Mausbach, Assistant Director
  - Dennis Lytle, Assistant Director
  - William Roth, Assistant Director
  - Jim Culver, Assistant Director
  - Tom Calhoun, Soil Survey Program Manager
- Technical Leaders
  - Hari Eswaran, Natl. Leader, World Soil Resources
  - Ellis Knox, Natl. Leader, Soil Survey Research
  - Carolyn Olson, Lead Scientist, Soil Landscapes
  - Bob Ahrens, Lead Scientist, Soil Taxonomy
  - Larry Ratliff, Lead Scientist, Quality
  - Roger Haberman, Lead Scientist, Quality
  - H. Raymond Sinclair, Lead Scientist, Applications

Steering Team Responsibilities

- **Strategic Planning / Program Management - 35%**
  - **Sponsor**
  - **Coach**
  - **Priority setting**
  - **Policy**
- **Supervisory - 15%**
- **Outreach (Liaison) - 25%**
- **Communicating with Customers - 25%**

Soil Survey Division Restructuring: The Future

- **Periodic Evaluation and Rotation of Steering Team Members - Based on Results**
- **Evaluation of New Structure Annually**
- **Can Expect Changes to Continue**
- **Bottom Line: Must Be Customer, Product, and Quality Oriented Results**

Item 4

A PARTIAL LIST OF STRATEGIC PLANNING TOPICS

1. A nationwide electronic network of information, with stated reliabilities, customer-orientated, accessible through INTERNET and/or equivalents, supported and utilized by a nationwide network of soil survey outlets with the capacity to create hard copies of any part on demand.

2. Sufficiently uniform and complete documentation and standards, and accessible data to allow private firms and others to provide value-added services.

3. Information and documentation readily transferable over electronic networks through the use of the Soil Spatial Data Transfer Standard.

4. Descriptions of soil landscape-wide processes, including soil landscape hydrology, that explain the interrelationships of soil series and map units over these large areas and provide the ability to assess the consequences of human activities over these areas.

5. Information with sufficient uniformity that the public can depend on quality remaining uniform across political boundaries.

6. Detailed information that can be correctly generalized to smaller scales across regions and the nation without fear of errors caused by variable quality or misinterpretation.

7. Soil maps customized to particular users and delivered with customized interpretations to the user within minutes.

8. Flexible versions of the present publications that are delivered to the user within 6 months to 1 year of completion of mapping.

9. A soil data base that provides soil properties that can be used to quantify the quality of the soils in a map unit.

10. A soil data base that provides use dependent and temporal soil properties.

11. A reevaluation of the cooperative partnerships within the NCSS with an assessment of services offered by the NCSS, the present partners and their roles and the future of the NCSS.

12. A long-term "Staffing Strategy" that insures staffing in the soil survey to meet changing technological needs and environmental and global issues. A Strategy that includes needs at the National Soil Survey Center, the National Technical Centers, state offices and project offices. This strategy must address the MLRA concept and the need for inventory leadership across political boundaries.

13. A biannual "state of the soil survey" publication that identifies nationwide soil scientist staffing, expertise and office locations in the SCS with consideration to the NCSS.

14. A process to link soil scientists at various locations into a natural work group (interdependent, but free to function as the soil's part of teams).

15. Ensure that soil scientists are skilled in the science of recognizing, mapping and explaining soil and its relationship in the landscape.

16. A research program that develops the science of recognizing, mapping and explaining soil and its relationship in the landscape.

c. Provide soil scientists who are well trained and equipped to assist in the use of soil surveys

d. Promote the development of teams for solving resource problems and developing program alternatives and provide soil scientist expertise in support of those teams

e, Fulfill the role of international leaders in soil survey and the use of soil survey information

f. Evaluate the soil scientist training program and propose new coordinated training for soil scientists and other dissciplines (SCS and others) in effective use and interpretation of soils information

COMPARISON OF SCS NATIONAL STRATEGIES WITH THE SOIL SURVEY PROGRAM PLAN STRATEGIES

The Soil Survey Program Plan Strategies are intended to fully support those strategies identified in the SCS Strategic Plan. For example, SCS Strategy 1: Anticipate Key Natural Resource Issues and Propose Effective Policies to Address Them relates to the following strategies in the Soil Survey Program Plan:

1. Improve the quality and kinds of soil dam - so that more and better resource analyses can be made or predictive models requiring soil information can be used;

2. Make available a National Soil Information System - to provide spatial and attribute soil information that is available to and meets the needs of Federal and non-Federal resource planners and managers as they investigate and evaluate alternatives that impact the key natural resources.

3. Provide a basic inventory - so that a reliable comprehensive base of information is available for the entire country in order to make judgements on the condition and trends of the resource and to predict its reaction to alternative managements;

4. Provide skilled professionals - who have in-depth knowledge of how the soil resource influences and interacts with the other resources (SWAPPA) under differing management alternatives;

SCS Strategy 2: Encourage Voluntary Solutions to Natural Resource Problems. Fairly and Efficiently Administer Regulatory Roles is equally addressed by the Soil Survey Program Plan Strategies. For example:

1. Improve the quality and kinds of soil data - enables resource planners to make better analyses and evaluate alternatives to use in encouraging voluntary solutions to problems. Also better data, meeting federal standards, in more usable formats provides a more equitable, sound basis for regulatory programs;

2. Make available a National Soil Information System - provides better access and use of more soils information that meets national standards to those making resource decisions.

3. Provide a basic inventory - enables resource planners to make comparisons and judgements on a nationai basis and provides a nationally consistent data base;

4. Provide skilled professionals - makes available to those making decisions the knowledge about the inter-relationships and interactions between the SWAPPA resources;

These comparisons deal with only two of the SCS National Strategies, but similar comparisons can be made for all five. The Soil Survey Program Plan was developed to fully support and facilitate the SCS Strategic Plan.

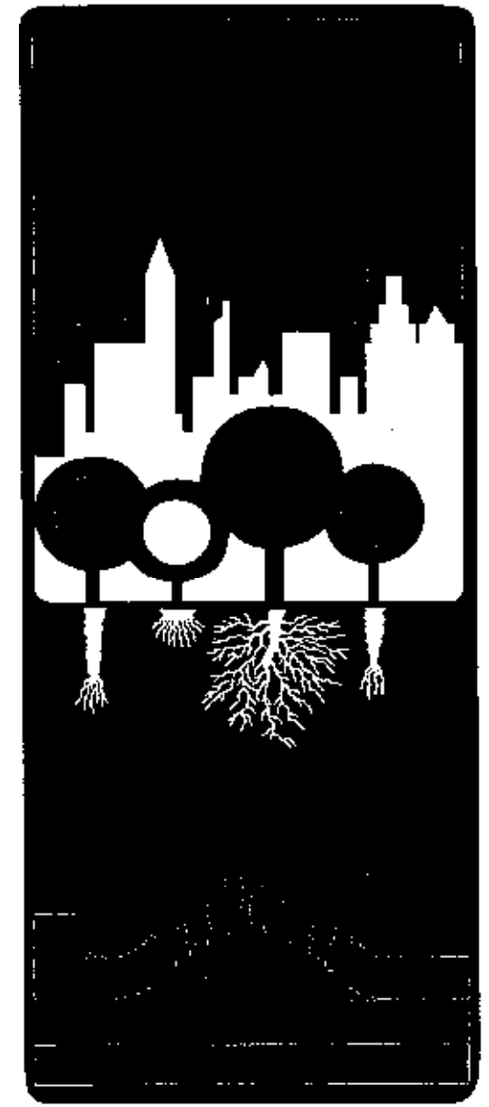
Equal Employment Opportunity

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

United States Department of Agriculture

Soil Conservation Service

November 1993



Soil Survey Division

Program Plan

SOIL SURVEY PROGRAM PLAN

The Federal Government recognizes soil as a strategic natural resource that must be understood, managed, and conserved for the health of the nation, and it has charged the Soil Conservation Service (SCS) with leading that effort.

The SCS Stratigic Plan recognizes that charge by defining the agency mission as providing leadership and administering programs to help people conserve, improve, and sustain our natural resources and environment. The SCS Vision is: A Productive Nation in Harmony With a Quality Environment.

The Soil Survey Division's Program Plan focuses on continuous improvement of a quality product and has identified a mission and vision that support those of the agency.

The Mission

To Provide Leadership and Service to Produce and Deliver Scientifically-based Soil Information to Help Society Understand, Value, and Wisely Manage Soil Resources.

This mission is, of course, narrower in scope than that of the agency. It concentrates on the job of providing resource data and technical assistance to help people conserve, improve, and sustain our natural resources and environment.

The Vision

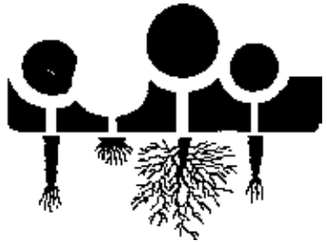
A Dynamic Program Responsible to Customers, Consisting of Internationally Recognized Soil Scientists and Support Staff Who Understand and Promote Wise Use of Soil Resources, Provide Global Standards, and Are of Service to Science and Our Nation.

Again, although narrower in scope than the SCS vision, the vision of the Soil Survey program is one that includes the roles of an international leader in the soil survey process and in assisting global customers in understanding the application of soil information to solve resource problems. This vision also recognizes the leadership role of SCS soil scientists in developing the science of pedology.

Although developed independently, both the SCS Strategic Plan and the Soil Survey Program Plan stress the value we place on our employees, colleagues, customers, partners, volunteers, resources and science. In the Soil Survey plan the values of the agency research authority, employee innovation, creativity, professionalism and reputation, SCS information products, and the commitment to the program are also emphasized.

Strategic planning is a dynamic process for the Soil Survey Program, and through it future organization and staffing will be developed. Principle strategies are already becoming apparent.

STRATEGY DEVELOPMENT



STRATEGY 1

Improve the Quality and Kinds of Soil Data for Existing and Future Soil Surveys to Meet the Customers Needs.

Supporting Goals

a. Emphasize environmental concerns of agricultural sustainability, soil management implications, soil health and soil quality

b. Implement methodology to provide for modernization and maintenance of all soil surveys based on natural landscapes rather than on political boundaries in order to improve their usability in GIS by SCS and others who may be using sub sets of natural landscapes such as hydrologic units, watersheds, or ecoregions.

c. Increase basic understanding and knowledge of soil processes, soil-landscape relationships, and soil-use interactions

STRATEGY 2

Develop, Support, and Make Available a National Soil Information System (NASIS) Capable of Storing, Manipulating, and Providing Tailored Soil Information Meeting National Cooperative Soil Survey, Federal Geographic Data Committee., and Other Agency Needs and Standards.

Supporting Goals

a. Structure the system to more effectively utilize all soil data (point and non-point) to better address customer needs

b. Integrate soil survey management and production through the use of NASIS

c. Provide the ability to capture information on soil landscape relationships and data reliability

d. Establish a structure that encourages and captures information on soil performance and behavior

e. Foster the development of national standards for data dictionaries and soil survey procedures

f. Develop examples for a variety of new products and techniques to present soil spatial and attribute data

STRATEGY 3

Provide a Basic Inventory of Soil Information For the Entire Country, Produced According to National Cooperative Soil Survey (NCSS) Standards and Procedures.

Supporting Goals

a Actively pursue all options for providing basic soil survey information in digital format

b. Continue to encourage other agencies to adopt and apply NCSS standards to their soil survey activities

c. Aggressively encourage, through NCSS, other land management agencies to provide a basic inventory of their lands nation wide

d. Continue to evaluate and provide the best tools for collecting and providing soil survey information

e. Periodically evaluate and report on the status of the soil survey

STRATEGY 4

Provide a Highly Skilled, Professional, Diversified, Cadre of Soil Scientists and Support Staff Capable of Producing and Delivering Soil Information to Meet Agency and National Needs.

Supporting Goals

a. Proactively bridge the gap between soil survey information (data) and the customer (soil data users)

b. Actively integrate soil survey expertise into and develop linkages with other SCS programs

The National Performance Review

Summary Briefing

Reinventing the Federal Government

19

Item 6

Mission Statement

We will create a government that works better and costs less

Mandate for Reinvention

60% of Americans believe that making government more efficient should be a top priority for the Administration and Congress (Wall Street Journal/NBC News poll, 10/29/93).

Yet, nearly half of all Americans still believe the government will never be able to provide services without a lot of waste.

President's Message

People want change because the government suffers from four deficits:

- **Budget**
- **Investment**
- **Performance**
- **Trust**

Different *by Design*

NPR is different than past reform efforts because:

- **Used the knowledge and expertise of federal employees**
- **Searched for successes and built upon them**
- **Ensured the integrity of the numbers**
- **Has strong support and commitment from the President and Vice President**

The Problem

Industrial-Era Bureaucracies in an Information Age

- **Top-down**
- **Centralized**
- **Preoccupied with standard operating procedures**
- **Mistrustful**
- **Can't even buy a steam trap, hire an intern, or save money**
- **Suffers from a "performance deficit"**

The government is broke and broken, and the people know it.

The *Solution*

Creatina Entreareneurial Oruanizations

We searched for and found successes:

- Air Combat Command doubled productivity
- IRS centers compete against each other using customer service performance standards
- Forest Service streamlined itself
- Australia, Canada, New Zealand, and Great Britain are reinventing themselves, as are Phoenix, Sunnyvale, and others

Winners had these common characteristics:

- Cutting red tape
- Putting the customer first
- Empowering employees to get results
- Cutting back to basics

Cutting Red Tape (I)

- Rewrite the Federal Acquisition Regulations (FAR) -- shifting from rigid rules to guidelines
- Cut by half the annual cost of headquarters staff, supervisors, and specialists in personnel, procurement, and budget (should reduce federal government staff by 252,000)
- Institute biennial budgets and appropriations, and minimize restrictions such as line items, earmarks, and FTE floors
- OMB will stop using FTE ceilings -- instead use caps on operations costs

Cutting Red Tape (2)

- Decentralize personnel authority to departments and agencies to conduct their own recruiting and examinations -- abolish all central registers and standard application forms
- Simplify personnel classification system -- switch to pay bands
- Reduce by half the time it takes to terminate employees
- Let agencies roll over 50% of what they save on operations costs to the next year
- Establish a process by which agencies can more widely obtain waivers from regulations
- Establish a Cabinet-level community empowerment working group

Putting the Customer First

- Executive Order requiring departments and agencies to create customer service programs equal to the best in business
- Eliminate GPO and GSA monopolies
- Create competitive, one-stop, career development centers
- Restructure the air traffic control system into a corporation
- Issue new accounting standards to identify the true unit cost of all government activities
- Cross-government collaborative efforts to empower communities and strengthen families

Empowering Employees to Get Results

- Establish President's Management Council
- Establish performance agreements between the President and cabinet secretaries
- Reduce the ratio of managers to employees from 1 : 7 to 1 : 15
- Initiate training at all levels -- starting at the top
  - Strategic, quality, and IT training for all employees, including political appointees
- Form a labor-management partnership
- Create a coherent financial management system
- Make the workplace family friendly

Cutting Back to Basics (1)

- Develop report in 18 months on closing and consolidating federal facilities
- Use more negotiated rule making and alternative dispute resolution techniques
- Give President enhanced rescission authority
- Allow all agencies greater freedom in setting fees for service
- End price supports for wool and mohair and end the honey subsidy

Cutting Back to Basics (2)

- Make it a felony to knowingly falsify an application for federal employee workers' compensation benefits -- those convicted of fraud will be ineligible for continued benefits
- Improve the process for removing people who are no longer disabled from disability insurance rolls
- Sell Alaska Power
- Simplify the compliance certification process
- Create National Spatial Data Infrastructure in cooperation with states and localities

Accomplishments So Far (1)

Executive Orders

- Customer Service
- Eliminate Internal Regulations
- Labor Management Partnerships
- Regulatory Planning Review
- Enhancing the Intergovernmental Partnership
- National Information Infrastructure
- National Science and Technology Council/ Advisory Committee

Presidential Memoranda

- Streamlining the Bureaucracy
- Community Empowerment
- Management Reform
- Agency Rulemaking Procedures
- Negotiated Rulemaking
- Streamlining Procurement through Electronic Commerce

Accomplishments So Far (2)

Legislation

- Procurement Reform/October Package
- Government Reform and Savings Act (H.R. 3400)
- Separation Incentives
- Government Employee Training Act Amendments

Other

- President's Management Council
- Appropriations Actions
- Customer Service Conferences
- Sunset of Federal Personnel Manual

Coming Soon

Presidential Memoranda

- Family Friendly Workplace

Legislation

- Financial Management Reform

Other

- Performance Agreements
- Quality Management Training

NetResults

To serve as a communication vehicle and catalyst to facilitate continuous government improvement

- **Network of networks -- person-to-person communications enhanced by computers**
- **A series of targeted teams, linking people from all levels of government and private and non-profit sectors**
- **Team functions include systematic problem solving, experimentation with new approaches, learning from experiences, identifying best practices, transferring knowledge quickly and efficiently, building new alliances and coalitions**
- **State/Local Net, People Net, Social Services Web, etc.**

It's time we took out of our bureaucracy the words, " We 've always done it this way. "

Vice President Al Gore,
March *3, 1993*

There are a lot of places in [the NPR] report where it says "the President should". . . Well' let me tell you something, I've read it, and where it says, "the President should," the President will.

President Bill Clinton
September 7, 1993

ITEM 7

United States Department of Agriculture

Soil Conservation Service

P.O. Box 2890
Washington, D.C.
20013

28 OCT 1993

SUBJECT: Taking a Fresh Look at Conservation

TO: All Employees

Conservation is our middle name. But what is conservation? Or, more importantly, what has it become?

More and more, conservation is being defined by the public and in the law in the broadest terms related to soil, water, air, plants, and animals (SWAPA) and their interactions. SCS has begun to consider these five resources in our planning assistance. How, then, can we move to consider these resources and their interactions in the context of human needs effectively and efficiently? If we limit our technical assistance to (SWAPA) + human considerations (I-I), we are very likely to remain oriented toward single-resource planning which can result in multiple plans per planning unit that often conflict with each other.

A Quality Improvement Team has recently prepared an action plan at the request of Chiefs Staff to implement the total resource management strategy in the SCS Strategic Plan. In order to have a science-based foundation and to be in alignment with Presidential and Departmental initiatives, the term "total resource management? has been further developed and renamed "Ecosystem-Based Assistance for Management of Natural Resources (or EBA)." This term is used because SCS is not the manager of ecosystem resources. The private citizen is the manager. SCS provides assistance to the private sector to improve and regenerate natural resources.

Ecosystem-Based Assistance for Management of Natural Resources

People manage ecosystems because they are part of ecosystems. A good working definition of "ecosystem" is "a biological community and its interactions with its environment" It is through management of those interactions that we and our clients derive benefits from nature whether those benefits are food, clothing, shelter, or aesthetic enjoyment

In response to Executive Branch initiatives, the USDA Working Group on Ecosystem Management has developed a definition of ecosystem management under which SCS has developed its corresponding definition. Within the SCS mission, ecosystem-based assistance for management of natural resources is defined as "the appropriate application of integrated ecological, economic and social factors through

the SCS Planning Process in order to maintain and enhance the quality of the environment to best meet our current and future needs."

What Are We Going To Do?

SCS will shift its technical assistance focus from individual resources to management of ecosystem processes (such as nutrient budgeting, energy flow, hydrologic regime, resource competition) that establish good quality in the resource base. Our planning assistance will emphasize human actions and the whole resource base, not just its parts.

SCS has increasingly been given responsibilities regarding planning assistance for simple and complex ecosystems. By incorporating ecosystem theory and knowledge into our planning delivery, we can do a better job. Through planning assistance geared to help landowners manage ecosystem processes, SCS can help clients reduce harmful off-site and on-site effects of management systems, sustain ecosystem resources, improve or regenerate adversely impacted systems, maintain income, enhance the quality of life, and improve conditions for future generations.

What Are Our EBA Principles?

- We are committed to a productive Nation in harmony with a high quality environment
- We shall use the SCS Planning Process and the Field Office Technical Guide.
- We shall use an ecosystem-based approach to provide land users and decisionmakers with natural resource management alternatives.
- We shall continue to use the best scientific and field-tested knowledge available in our technical assistance.
- We shall promote grass-roots participation.
- We shall form partnerships to achieve shared goals.

What Are the Benefits of EBA?

Here are some reasons why SCS is moving toward this more inclusive approach in technical planning assistance:

- It is complementary to the SCS mission and our Strategic Plan.
- It reflects the way the world is arranged.
- It helps SCS accomplish effective, integrated resource planning.
- It can lead to reduction of paperwork for land owners and SCS.
- It improves documentation.
- It can let us take advantage of recent advances in geographic information systems and the Field Office Computing System (FOCS).
- It allows us to move toward the goal of sustaining our natural resources for generations to come.
- It can help us meet clean water and soil quality goals.
- It is the right thing to do.
- It can help to disclose more fully the effects of management decisions, thereby enhancing land user decisionmaking.

How Will We Implement EBA?

We cannot make this changeover immediately. The Quality Improvement Team has developed an action plan for leading our activities for the coming years as we implement EBA. Each State will need to develop an action plan to implement EBA that is consistent with ecosystem principles, existing SCS planning procedures, and client needs. Further guidance material will be distributed in the next few months regarding our shared and individual responsibilities in this action. We intend to have this new approach to planning implemented by January 1, 1996.

Many States are already working on the beginnings of ecosystem-based management of natural resources. These beginnings come under different names: total resource conservation planning total resource management, ecosystem management, and "one plan." What they all have in common is that through them we are taking a broader look at the interrelationships of SWAPA + H, ecological processes associated with them, and effects of resource management both on- and off-site. States are expected to continue to develop pilot projects and to incorporate this planning philosophy in all of their technical assistance activities.

In March of this year, I spoke at the Soil and Water Conservation Society's conference on "The Next Generation of U.S. Agricultural Conservation Policy." In my remarks on balancing the short-term and long-term needs of our environment and our economy, I stated that we have to start addressing our concerns for what they are-an interlocking system of natural resources and land management practices. At that time we were *not sure* what to call this approach; however, we knew *then* that it would be holistic and realistic. I am encouraged by the fact that EBA will provide the philosophy and the science to meet the needs I outlined in March

I encourage all of you to be open to this new concept, make yourselves aware of its potential for your job, and give it full license in your *work*. We shall be releasing more information in the following weeks and months. The Nation and the agency count upon your personal commitment and creativity to take us into the 21st century.

SCS has increasingly been given responsibilities regarding planning assistance on simple and complex ecosystems. By incorporating ecosystem theory and knowledge into our planning delivery, we can do a better job. Through planning assistance geared to help landowners manage ecosystem processes, SCS can help clients reduce harmful off-site and on-site effects of management systems, sustain ecosystem resources, improve or regenerate adversely impacted systems, maintain income, enhance the quality of life, and improve conditions for generations to *come*.

Galen S. Bridge

GALEN S. BRIDGE
Acting Chief

OFFICE OF THE GENERAL COUNSEL.
Field Offices serving the Soil Conservation Service

Southern Region (Atlanta)

Atlanta, GA.	Florida, Georgia, Kentucky, North Carolina, South Caroiina and Tennessee.
Hato Rey, PR.	Puerto Rico and Virgin Islands.
Montgomery, AL.	Alabama
Jackson, MI.	
Raleigh, NC.	

Mountain Region (Denver)

Denver, CO.	Colorado. North Dakota. South Dakota and Wyoming
Missoula, MT.	Montana
Albuquerque, NM	New Mexico and Arizona.
Ogden, UT.	Utah

Northern Region (Harrisburg)

Harrisburg, PA.	Connecticut. Delaware, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, New York, Pennsyivania, RhodeIsland, Vermont and West Virginia
Chicago, ii.	
Columbus, OH.	Ohio
Milwaukee, WI.	Wisconsin. Illinois, Minnesota, Michigan and Indiana
Richmond, VA.	Virginia

Central Region (Kansas City)

Kansas City. MO.	Kansas. Missouri and ....
Lincoln, NB.	Nebraska
Little Rock, AR.	Arkansas, Louisiana and Mississippi
Stillwater, OK.	Oklahoma OK
Temple, TX.	Texas

Pacific Region (San Pranciscoj

San Francisco, CA.	California, Nevada and Hawaii
Juneau, AK.	
Portland, OR.	Alaska. Idaho. Oregon and Washington

ITEM 9

>From steve Fri Feb 4 11:30 CST 1994 remote from nssc386
FYI FYI FYI FYI

Sharon

Below is the mail message I sent out with the corrected 'digstatq' and 'digstats' tables and a list of states whose tables were corrected.

Steve Speidel
****

AL AR AZ CO CT DE FL GA HI IA IL IN KS KY LA MA MD ME MO MS
MT NC ND NH NJ NM NY OK OR PA RI SD TN TX UT VA VT WY
=38
****

Subject: Updated 'digstatq' and 'digstats' tables
Date: 2/4/94

To: State Soil Scientist
Dataset Manager

Your 1st quarter progress for the Soil Survey Schedule was received here in Lincoln, your tables were checked for database integrity errors in the 'basedata' column in the 'digstatq' table and for multiple records per survey in the 'digstats' table. a.SoilNet message from Cameron Loerch dated 1/5/94 mentioned that this would be done and any problems found would be corrected.

The 'digstatq' and 'digstats' tables for your state have been checked and the database integrity problems have been'corrected. The master database tables at NSSC will be updated with the corrected tables. I am sending your corrected tables back to you in an arced file named 'NSSCxxxxxx.arc'.

The 'digstatq' and 'digstats' tables within the arced file will have your state ID attached to the table names. Please review the tables before removing the state ID and overwriting your existing 'digstatq' and 'digstats' tables in $SSS.

To retreive your corrected tables, follow these steps:

1. Use SoilNet, option D, to receive the arced file.

2. Move the file to $T. While in SSSD, exit to a UNIX prompt.

3. Copy the corrected tables to $SSS.

4. Review the corrected tables before overwriting your existing tables with the next step.

5. Overwrite your existing tables with the following commands: ('??' is your state ID)

```
mv ??digstatq digstatq
mv ??digstats digstats
```

If you have any questions or problems with the data or the procedures above, don't hesitate to give me a call or send a SoilNet message.

Steve Speidel
SSSD Hotline
nssc2!steve

Examples for handling changes in the status and/or boundaries of soil survey areas. **1/25/94** J.C. **Loerch**

Situation 1: A published soil survey is considered out of date and is currently being updated. Survey status is going from F (published) or D (out of date) to U (update).

Alternative A: ***Keeping the same ssa number.***

1) Save data from the following tables for the subject soil survey area and record date (tape or separate archive directory).

ssarea
ssaprog
ssadates
ssamou
digstatq
digstats
ssaudit

2) Change status of survey to U (update) and begin entering new dates and progress. From this point on all reports will reflect the current update staus.

3) In this case there is no affect to the soil survey area boundaries.

Example:

	stssaid:c	ssaname:c	ssacres:i	cordate:c	status:c
before	IN039	ELKHART COUNTY, INDIANA	299635	0468	F (or D)
after	IN039	ELKHART COUNTY, INDIANA	299635		U

Alternative B: ***Adding a new ssa number.***

1) Change the status of the survey using the original ssa number from F (published) to D (out of date).
2) Reduce the total acres in the ssarea and ssaprog tables to 1 (for the reports to work a value other than zero must be entered) (also, this avoids doubling the total acres of the survey in the state).
3) Add a new ssa number with the status code of U (update) and enter total soil survey area acres in the ssarea and ssaprog tables. Populate other data for the update survey using SSS.
4) In this case there is no affect to the soil survey area boundaries.

Example:

	stssaid:c	ssaname:c	ssacres:i	cordate:c	status:c
B	WV025	GREENBRIAR COUNTY, WEST VIRGINIA	134000	0168	F (or D)
A	WV025	GREENBRIAR COUNTY, WEST VIRGINIA	1	0168	D
"	WV725	GREENBRIAR COUNTY, WV UPDATE	134000		U

Situation 2: Existing soil survey is split into two update soil survey in separate MLRA's resulting in changes to ssa numbers and boundaries.

Proposed solution:

1) change the status of the survey using the original ssa number from F (published) to D (out of date).
2) Reduce the total acres in the ssarea and ssaprog tables to 1.
3) Add two new ssa numbers to accomodate the two new surveys and enter a status code of U (update). The sum of the ssacres for the two surveys should equal the total acres for the ssa.
4) Draw a sketch of the new boundaries showing relationship to old boundaries and lable. Send this information to the NSSC contact.

Example:

	stssaid:c	ssaname:c	ssacres:i	cordate:c	status:c
B	OK059	HARPER COUNTY, OKLAHOMA	664858	1057	F
A	OK059	HARPER COUNTY, OKLAHOMA	1	1057	D
"	OK601	HARPER COUNTY MAINTENANCE, MLRA 77E	80000		U
"	OK602	HARPER COUNTY MAINTENANCE, MLRA 78C	584858		U

Situation 3: Two soil surveys that are separate parts of a county (or larger area) are combined into one survey area.

Proposed solution:

1) Save, date and store the data from the tables listed in situation 1.
2) Add a ssa number (preferably county fips code, if a county survey), and enter appropriate status code.
3) Join the data from the two original soil survey tables and use to populate the new soil survey area data.
4) Draw a sketch of the new boundaries showing relationship to old boundaries and lable. Send this information to the NSSC contact.

Example:

	stssaid:c	ssaname:c	ssacres:i	cordate:c	status:c
B	NY603	FRANKLIN COUNTY SOUTHERN PART, NY	774800		N
"	NY604	FRANKLIN COUNTY NORTHERN PART, NY	312600	0355	D
A	NY033	FRANKLIN COUNTY, NEW YORK	1087400		P

ITEM 11

RESOURCE CONSERVATION ACT (RCA)

A N D

STATSGO DATABASE

1994 National State Soil Scientist Workshop
Ramada Hotel - Valley Ho, Scottsdale, Arizona
February 14-18, 1994

Larry Brown
Soil Survey Liaison, RCA
National Soil Survey Center
Federal Building, Room 152
100 Centennial Mall North
Lincoln, NE 68508-3866

Telephone 402-437-5659
FAX 402-437-5336

STATSGO
elastic
entire country
NRI
no available on
Fed land

SOIL AND WATER ASSESSMENT TOOL (SWAT)
IMPACT OF SOILS

The Resources Conservation Act of 1977 (RCA) requires the Department of Agriculture to appraise the status, condition, and trend in the uses and conservation of soil and water related natural resources. As part of the RCA effort, the SWAT model was developed to predict the effect of alternative management decisions on water, sediment, and chemical yield with reasonable accuracy for ungaged rural basins.

A study was made to test the impact that soils have on the SWAT model. The model employed 4 different soils with 2 land uses and with 2 slopes. The following runoff and sediment results demonstrate the sensitivity of the model to soil, slope, and land use.

RAINFALL: 1335.9 mm

SOIL	SURF TEXT	HYD GP	SURF K FAC	RUNOFF FOR 2% SLOPE mm	RUNOFF FOR 8% SLOPE mm	SED FOR 2% SLOPE t/ha	SED FOR 8% SLOPE t/ha	LAND USE
Kenney	fs	A	0.17	218.4	235.7	0.1	0.6	Pasture
Klump	fsl	B	0.24	315.2	318.5	0.2	1.4	Pasture
Brenham	cl	C	0.32	273.9	285.9	0.3	1.9	Pasture
Crockett	sil	D	0.43	380.9	396.1	0.4	3.3	Pasture
Kenney	fs	A	0.17	245.4	256.4	0.8	5.8	Corn
Klump	fsl	B	0.24	345.0	351.5	1.7	11.6	Corn
Brenham	cl	C	0.32	314.8	325.8	2.2	15.5	Corn
Crockett	sil	D	0.43	445.1	451.0	4.1	29.1	Corn

There appears to be a discrepancy between the runoff of the soils representing B and C hydrologic groups. Klump is a moderately deep soil. With the high precipitation used to run the model, runoff probably began as soon as the soil above bedrock was saturated,

STRATEGY FOR SELECTING STATSGO SOIL COMPONENTS
FOR THE RCA SOILS DATABASE

January 14, 1994
Laurence E. Brown and Lawson D. Spivey, Jr.

This strategy is based on two key assumptions. The first is that the principal RCA applications of a special soils database are focused on:

-water relations with soils,
-characteristics of land cover, and
-production and erosion aspects of agricultural land.

Therefore, the soil properties that have been selected by Larry Brown and others to use in selecting STATSGO soil components are used in this strategy.

The second assumption is that the most reliable and most easily assembled data on land use of STATSGO map units can be obtained by professional assessments by the State Soils staffs. It is further assumed that these assessments can be made with a few days work and without detailed sampling strategies.

This strategy proposal contains protocols to limit the number of soil components for a specific STATSGO map unit to 7 soils (3 for cropland, 2 for pasture and range, and 2 for forest and woodland). Modellers could also choose to use 1 soil per land use for a total of 3. Model runs on fewer than 3 **soil components for million acres plus hydrologic units is considered intolerable.**

This strategy also illustrates methods of arithmetic to build the database for RCA **electronically.**

The first step would be to furnish the State Soil Staffs with the following STATSGO data per map unit.

STATSGO map unit DC-1 23 (hypothetical)

Components	% of m. u.	EST LAND USE CRP	PAS	FOR
Alpha sil 0-2%	10			
Beta cob 1 13-22%	15			
Gamma fsl 6-l 0%	15			
Delta sl 8-15%	20			
Zeta ch 1 35-70%	40			

The State Soil Staffs and/or Resource Soil Scientists would be requested to estimate the probable land use for each component (percent cultivated crops, percent pasture, range, or sod crops, percent forest or woodland, totaled to 100 percent with no minor or miscellaneous land uses. This would not be a detailed sampling project. It would consist of the best personal estimates by knowledgeable, experienced staff.

The percentages would be estimated for each component rather than for the map unit as a whole. When finished (a few minutes to an hour), the worksheet would look like the following:

STATSGO map unit DC-l 23 (hypothetical)

Components	% of m. u.	EST LAND USE CRP	PAS	FOR
Alpha sil 0-2%	10	20	30	50
Beta cob 1 13-22%	15	10	50	40
Gamma fsl 6-10%	15	40	40	20
Delta sl 8-l 5%	20	30	40	30
Zeta ch 1 35-70%	40	2	8	90

The data would be entered into a database and the following computations derived from the data to give a composite estimate of landuse for the map unit on a component base. The computation is obtained by multiplying the land use percentage times the percent of the map unit (e.g. alpha 20 [crops] x 10 [component % of m.u.] = 2 [percent of the m.u. that is Alpha crops]). The following illustrates the result.

STATSGO map unit DC-I 23 (hypothetical)

Components	% of m. u.	EST LAND USE CRP	PAS	FOR	Land Use % of m.u. CRP	PAS	FOR
Alpha sil 0-2%	10	20	30	50	2	3	5
Beta cob 1 13-22%	15	10	50	40	1.5	7.5	6
Gamma fsl 6-I 0%	15	40	40	20	6	6	3
Delta sl 8-I 5%	20	30	40	30	6	8	6
Zeta ch 1 35-70%	40	2	8	90	0.8	3.2	36
	Total - DC-I 23				16.3	27.7	56.0

The next step is to extract data from the soil database to produce a matrix for soils used for crop production based on several key properties. These properties are:

3 classes of hydrologic group (basically A, B&C, D)
3 classes of k factor (<.17, .17-.32, >.32)
2 classes of slope (<6%, > = 6%)

The crop matrix might look as follows:

Crop Matrix

Hydrologic group	k factor	Slope class
A	<.17	<6
		>=6
	.17-.32	<6
		>=6
	.32	<6
		>=6
B&C	<.17	<6
		>=6
	.17-.32	<6
		>=6
	>.32	<6
		>=6
D	<.17	<6
		>=6
	.17-.32	<6
		>=6
	.32	<6
		>=6

The data on hydrologic group, k factor, and slope might look like the following:

STATSGO map unit DC-I 23 (hypothetical)

Components	Hydrologic group	k factor	Slope class median
Alpha sil, 0-2%	A	.12	1
Beta cob I, 13-22%	C	.12	18
Gamma fsl, 6-10%	B	.28	8
Delta sl, 8-15%	C	.24	12
Zeta ch I, 35-70%	D	.36	53

After the other data is merged into the crop matrix it might look as follows:

Crop Matrix

Hydrologic group	k factor	slope class	m.u. %	m.u. component	Matrix class %
A	<.17	<6	2	Alpha sil	2 (2)
		>=6			
	.17-.32	<6			
		>=6			
	>.32	<6			
		>=6			
B&C	<.17	<6			
		>=6	1.5	Beta cob 1	1.5 {3}
	.17-.32	<6			
		>=6	6	Gamma fsl	12
			6	Delta sl	{I}
	>.32	<6			
		>=6			
D	<.17	<6			
		>=6			
	.17-.32	<6			
		>=6			
	>.32	<6			
		>=6	0.8	Zeta ch 1	0.8

Protocol é Select a maximum of 3 matrix classes (if there are 3). The dominant component in each of the 3 matrix classes is designated {). Where several components have the same percentage, select in alphabetical order. These are the only soils for which soil property data will be entered in the database.

For the example, the following soils are selected:
{I} Delta sl 8-l 5 % slopes representing 12 % of the map unit
{2} Alpha sil O-2 % slopes representing 2 % of the map unit
{3} Beta cob 1 13-22 % slopes representing 1.5 % of the unit

These percentages total to 15.5%. However, the map unit is 16.3% cropland. Therefore, we adjust the 3 representative soils to equal the total cropland in the map unit.

[Calculation - 16.3 divided by 15.5 = 1.5016]
(factor to increase class percentages by)

The result is as follows:
{I) 12 x 1.0516 = 12.6
{2} 2 x 1.0516 = 2.1
{3} 1.5 x 1.0516 = 1.6

15.5 16.3

Finally, for STATSGO unit DC-l 23, the 3 cropland modelling soil components for which soil property data will be placed in the database are:

Cropland	{1} Delta sl, 8-l 5% slopes	12.6% of the map unit
	{2} Alpha sil, 0-2% slopes	2.1% of the map unit
	{3} Beta cob 1, 13-22% slopes	1.6% of the map unit

The matrix is intended to create contrasting classes of components based on the 3 soil properties of cropland soils. The modeller has the option to choose the most extensive matrixeidentified component to represent all of the map unit cropland or to use the 3 most extensive matrix--identified components to represent the adjusted percentages listed above.

The same procedure outlined here can be used to aggregate STATSGO map unit data up to hydrologic units.

The following example illustrates a pasture matrix, which is similar to the crop matrix. It only has one soil property to sort. That property is hydrologic unit. The final pasture matrix might look as follows:

Pasture Matrix

Hydrologic Group	Map Unit %	Mao Unit Comoonent	Matrix %Class
A	3	Alpha sil, 0-2%	3
B&C	7.5	Beta cob 1, 13-22%	21.5
	8	Delta sl, 8-15%	{1}
	6	Gamma fsl, 6-l 0%	
D	3.2	Zeta ch 1, 35-70%	3.2 {2}

Protocol - Select a maximum of 2 matrix classes (if there are 2). Procedures are similar to those outlined in the crop matrix. The dominant soil component for each matrix class is used. Soil property data is entered in the database for that soil only. Model runs for that soil are expected to be representative of other soils that were included in that matrix class. The following illustrates the selection:

{l} Delta sl 8-l 5% slopes representing 21.5% of the map unit
{2} Zeta ch 1 35-70% slopes representing 3.2% of the map unit

These 2 soils represent matrix classes with a total of 24.7% of the map unit. However, the map unit is 27.7% pasture. The adjustment factor is computed.
(27.7 divided by 24.7 = 1.1215).

Finally, for STATSGO unit DC-1 23, the 2 pasture modelling soil components for which soil property data will be placed in the database are:

Pasture { l} Delta sl, 8-l 5% slopes 24.1% of the map unit
{2} Zeta ch 1, 3-70% slopes 3.6% of the map unit

In this example, the same soil component (Delta) is selected for modelling both crops and pasture. Separate runs would be made using the respective percentages.

An example for forest use would be like the one for pasture. Sorting would be based on 3 classes of hydrologic group and the protocol would be a maximum of two forest matrix classes being selected.

Crops and Occurance of Crop Yield by Soil Series

cropname	No. of Soil Series
AFRICAN STARGRASS	99
ALFALFAHAY	3936
ALFALFA SEED	69
ALMONDS	60
APPLES	158
APRICOTS	37
ARTICHOKES	4
ASPARAGUS	28
AVOCADOS	25
BAHIAGRASS	705
BANANAS	15
BARLEY	2928
BEANS, DRY LIMA	10
BEANS, DRY PINTO	90
BEANS, OTHER DRY	216
BEANS, SNAP	91
BEANS, UNSHELLED LIMA	1
BENTGRASS SEED	12
BIG BLUESTEM	3
BLACKBERRIES	36
BLUEBERRIES	4
BLUEGRASS SEED	14
BLUEGRASS-LADINO	15
BLUEGRASS-TREFOIL HAY	2
BLUEGRASS-WHITE CLOVER	1
BROCCOLI	4
BROMEGRASS HAY	29
BROMEGRASS-ALFALFA	916
BROMEGRASS-ALFALFA HAY	1079
BROMEGRASS-ALSIKE	5
BROMEGRASS-ALSIKE HAY	15
BROMEGRASS-LADINO	13
BRUSSEL SPROUTS	6
BUFFEL GRASS	44
CABBAGE	131
CABBAGE, MUSTARD	1
CANARYGRASS HAY	55
CANARYGRASS-ALSIKE	32
CANARYGRASS-ALSIKE HAY	78
CANARYGRASS-LADINO	68
CANARYGRASS-LADINO HAY	30
CANOLA, SPRING	25
CANTALOUPE	50
CARROTS	42
CASSAVA	6
CAULIFLOWER	9

cropname	No. of Soil Series
CELERY	35
CHERRIES	72
CLOVER SEED	15
COCONUTS	13
COFFEE	26
COMMON BERMUDAGRASS	501
COMMON RYEGRASS SEED	10
COOL SEASON GRASS	105
CORN	4584
CORN SILAGE	2328
CORN, SWEET	260
COTTON LINT	1145
COTTON LINT, PIMA	23
CRANBERRIES	10
CRESTED WHEATGRASS	6
CRESTED WHEATGRASS-ALFALFA HAY	123
CUCUMBERS	46
FESCUE	8
FILBERTS	27
FLAX	269
GARLIC	22
GRAIN SORGHUM	1606
GRAPEFRUIT	126
GRAPES, TABLE	16
GRAPES, WINE	100
GRASS HAY	1142
GRASS, SEED	30
GRASS-CLOVER	374
GRASS-LEGUME HAY	2569
GREEN CHOP	98
GUINEA GRASS	118
HAY CROPS, ANNUALS	166
HOPS	10
IMPROVED BERMUDAGRASS	1186
INTRODUCED BLUESTEM	8
JOHNSONGRASS	1
KENTUCKY BLUEGRASS	1014
KLEINGRASS	3
LEGUME HAY	69
LEMONS	25
LENTILS, DRY	32
LETTUCE	79
LOGANBERRIES	4
MACADAMIANUTS	3
MANGOS	8
MERKERGRASS	53
MILLET	14
MINT, DISTILLATE	31
OATS	3816

cropname	No. of Soil Series
OLIVES	10
ONIONS	87
ORANGES	178
ORCHARDGRASS	79
ORCHARDGRASS HAY	9
ORCHARDGRASS-ALFALFA	35
ORCHARDGRASS-ALFALFA HAY	480
ORCHARDGRASS-LADINO	1
ORCHARDGRASS-RED CLOVER	21
ORCHARDGRASS-RED CLOVER HAY	70
ORCHARDGRASS-TREFOIL	35
ORCHARDGRASS-TREFOIL HAY	25
PANGOLAGRASS	123
PAPAYA	6
PARAGRASS	34
PASTURE	4253
PEACHES	72
PEANUTS	269
PEARS	117
PEARS, WINTER	6
PEAS, CANNING	30
PEAS, DRY	80
PEAS, GREEN	33
PECANS	3
PEPPER, BLACK	1
PEPPERS	20
PEPPERS, DRY CHILI	1
PEPPERS, FRESH CHILI	12
PEPPERS, GREEN	5
PERENNIAL RYEGRASS SEED	19
PIGEONPEAS	19
PINEAPPLE	29
PINEAPPLE, RATOON	21
PISTACHIOS	3
PLANTAINS	46
PLUMS	11
POTATOES, IRISH	707
PRUNES	14
PRUNES, DRY	18
PUMPKINS	12
RASPBERRIES	42
RED CLOVER HAY	111
RED CLOVER SEED	8
REED CANARYGRASS	113
RICE	177
RYE	28
SAFFLOWER	48
SMALL GRAINS GRAZEOUT	36
SMOOTH BROMEGRASS	434

cropname	No. of Soil Series
SORGHUM HAY	11
SORGHUM SILAGE	88
SOYBEANS	2933
SPINACH	2
STRAWBERRIES	100
SUGAR BEETS	649
SUGARCANE	80
SUGARCANE, 18 MONTH	55
SUGARCANE, RATOON	56
SUGARCANE, SPRING	57
SUNFLOWER	209
SWEET POTATOES	36
SWITCHGRASS	7
TALL FESCUE	874
TALL FESCUE HAY	12
TALL FESCUE SEED	6
TALL FESCUE-ALFALFA	1
TALL FESCUE-ALFALFA HAY	4
TALL FESCUE-ALSIKE	6
TALL FESCUE-ALSIKE HAY	4
TALL FESCUE-LADINO	42
TALL FESCUE-LADINO HAY	3
TALL FESCUE-LESPEDEZA	1
TALL FESCUE-RED CLOVER	7
TALL FESCUE-RED CLOVER HAY	20
TALL WHEATGRASS	51
TANIERS	24
TIMOTHY-ALSIKE	5
TIMOTHY-ALSIKE HAY	7
TIMOTHY-RED CLOVER HAY	314
TOBACCO	364
TOMATOES	322
TREFOIL HAY	30
TREFOIL-GRASS	4
TREFOIL-GRASS HAY	38
WALNUTS	57
WARM SEASON GRASS	18
WATERMELONS	121
WEEPING LOVEGRASS	81
WHEAT	2534
WHEAT GRAZEOUT	2
WHEAT, SPRING	1298
WHEAT, WINTER	2893
YAMS	16
TOTAL	54959

F. LAND COVER/USE

Enter the code for land cover/use.

For cropland, the crop is the one currently growing or most recently harvested crop. For example, if a crop of wheat has just been removed from land surrounding a point, the code for wheat would be entered for that point. For land that is double-cropped, enter the code for the first crop grown and make sure that item J "Double-cropped?" is answered "YES."

Use appropriate land cover/use codes for all rural parks, parks greater than 10 acres in size within Urban and Built-up, shooting ranges, greenbelts, wildlife habitats? game refuges, ski courses, etc. Sample codes for such areas are forest (not grazed), cool or warm season grasses, rangeland, barren land. Use of the land (item G) would be coded as recreation (designated), wildlife (designated), etc.

In determining the land cover/use the point may fall on a land cover/use boundary. If so, face north and identify the land cover/use to the north of the point. If this does not work, identify the land cover/use to the east of the point. This same rule should be used if the point falls on a fence row or narrow waterway.

If code "650" must be used, explain below item G on the worksheet.

Enter one of the following codes to show land cover/use for the current year.

<u>Cropland</u>

Horticulture
- 001 Fruit
- 002 Nut
- 003 Vineyard
- 004 Bush fruit
- 005 Berries
- 006 Other horticulture

Row and Close Grown
- 011 Corn
- 012 Sorghum
- 013 Soybeans
- 014 Cotton
- 015 Peanuts
- 016 Tobacco
- 017 Sugar beets
- 018 Potatoes
- 019 Other vegetables
- 020 All other row crops
- 021 Sunflowers
- 111 Wheat
- 112 Oats
- 113 Rice
- 114 Barley
- 115 Flax
- 116 All other close grown

Barren Land

611 Dry salt flats
612 Bare exposed rock
613 Strip mines, quarries, gravel pits, borrow pits
614 Beaches
615 Sand dunes
616 Mixed barren lands
617 Mud flats

Other Lands

630 Permanent snow and ice fields
650 All other land (if this code must be used, explain on the worksheet).

Built-up (See part C of Section I for the definition)

Impervious is hard coven such ah *roads, roofs, sidewalks, etc. Determine the percent impervious for a circular area with a radius of 120 feet surrounding the point.*

Urban and Built-up land in a unit larger than 40 acres
711 Less than 1/3 impervious'
712 1/3 to 2/3 impervious
713 Greater than 2/3 impervious

Urban and Built-up land 10 to 40 acres
721 Less than 1/3 impervious
722 1/3 to 2/3 impervious
723 Greater than 2/3 impervious

Small Built-up area (0.25 to 10 acres)
731 Less than 1/3 impervious
732 1/3 to 2/3 impervious
733 Greater than 2/3 impervious

Rural Transportation

800 Rural transportation (includes all roads and railroads outside Urban and Built-up areas - also include farm lanes, logging roads, wood roads, and other private roads)

Water

Water body less than 40 acres
901 Water body 2'to 40 acres
902 Water body less than 2 acres

Streams
911' Perennial stream less than 66 feet wide
912 Perennial stream 66 to 660 feet wide
913 Perennial stream greater than 1/8 mile

Water body greater than 40 acres
921 Lake
922 Reservoir
923 Bay or gulf
924 Estuary

Other Cropland

120 Summer fallow

140 Other cropland not planted (include cropland that 'is idle; cropland in set-de or similar programs should be coded as "151" through "154" and the use shown in item G as idle, code "14").

Hayland

151 Cool season grass/hay

152 Warm season grass/hay

153 Legume/hay

154 Legume-grass/hay

Pastureland'and Native Pasture

221 Cool season grass

222 Warm season grass

223 Legume

224 Legume-grass mixed

225 Grass-forbs mixed

226 Grass-forbs-legumes mixed

Rangeland and Tundra

250 Rangeland (includes land on which the natural potential plant cover is composed principally of native grasses, forbs, and shrubs valuable for forage).

Forest Land

347 Forest, grazed (includes land stocked by forest trees, or bearing evidence of such tree cover, and not currently developed for nonforest use and grazed by livestock).

342 Forest, not grazed (includes land stocked by forest trees, or bearing evidence of such tree cover, and not currently developed for nonforest use and not grazed by livestock).

Other Land in Farms

400 Farmsteads and ranch headquarters (see part D of Section I for the definition; farmsteads should be coded "99" for part G, Use of land).

401 Other land in farms (includes 'field windbreaks, commercial feedlots, greenhouses, nurseries, broiler facilities, etc., not associated with farmsteads; windbreaks should be coded as "99" for part G, Use of land, and commercial feedlots, greenhouses, etc., should be coded "22," commercial; farm lanes and logging roads should be coded "800," rural transportation, with an "87" code for Use of land in part G.)

ITEM 12

STATE SOIL SCIENTIST MEETING

FEBRUARY 14-18,1994

SSURGO UPDATE

- Revised Specifications Status
- Soil Geographic Data Development Handbook
- SSURGO Review Procedures
- GRASS and LTPLUS Issues
- NAD83

COMPILATION AND MAP FINISHING

- Revised Specifications Status
- NCSS/NCG Contracting
    - *Materials to be Submitted
    - *Review Procedure
- Contracting Specifications

SOIL MAP DEVELOPMENT WORKSHOPS

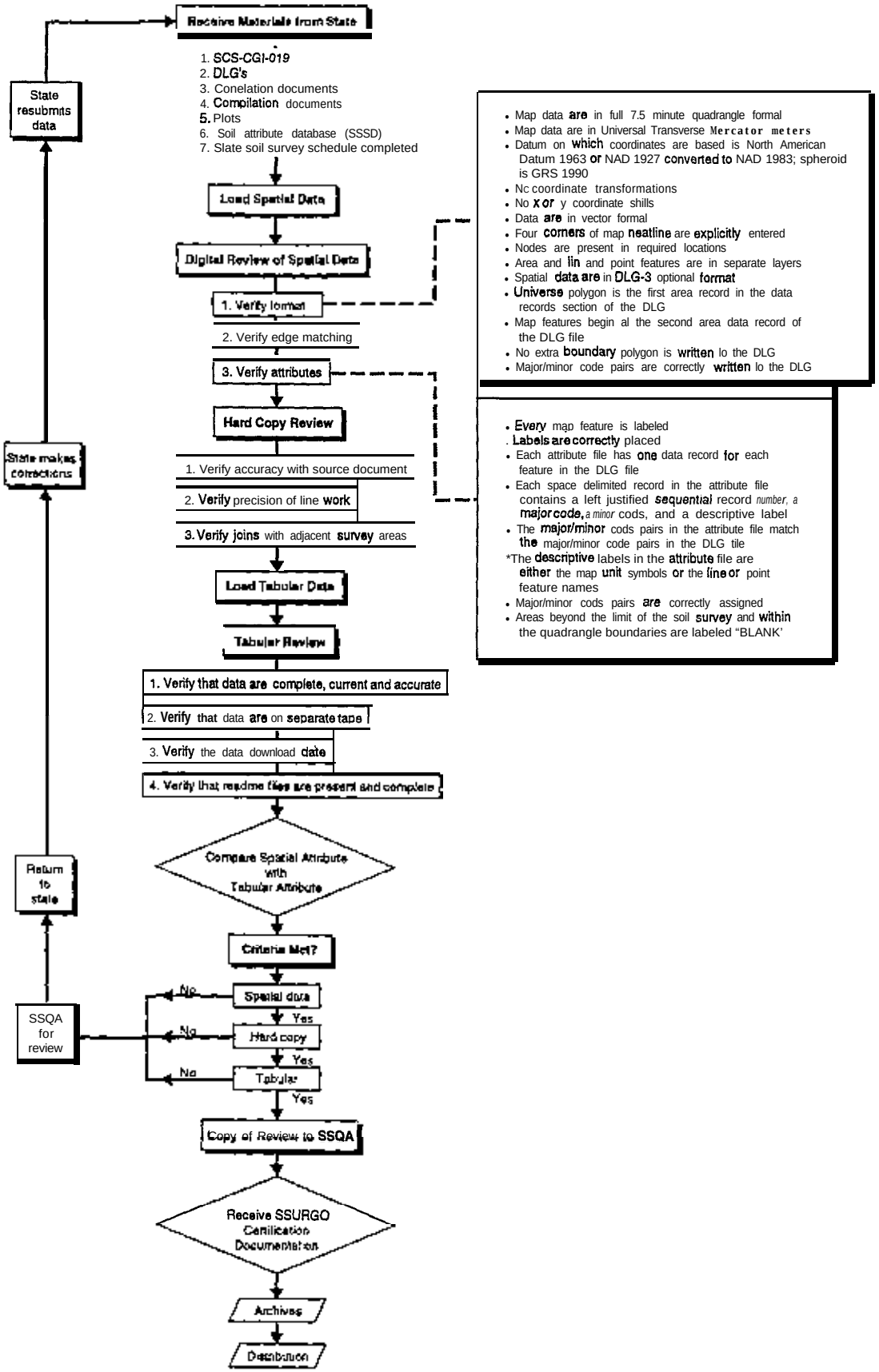
- Purpose
- Schedule

QUESTIONNAIRE

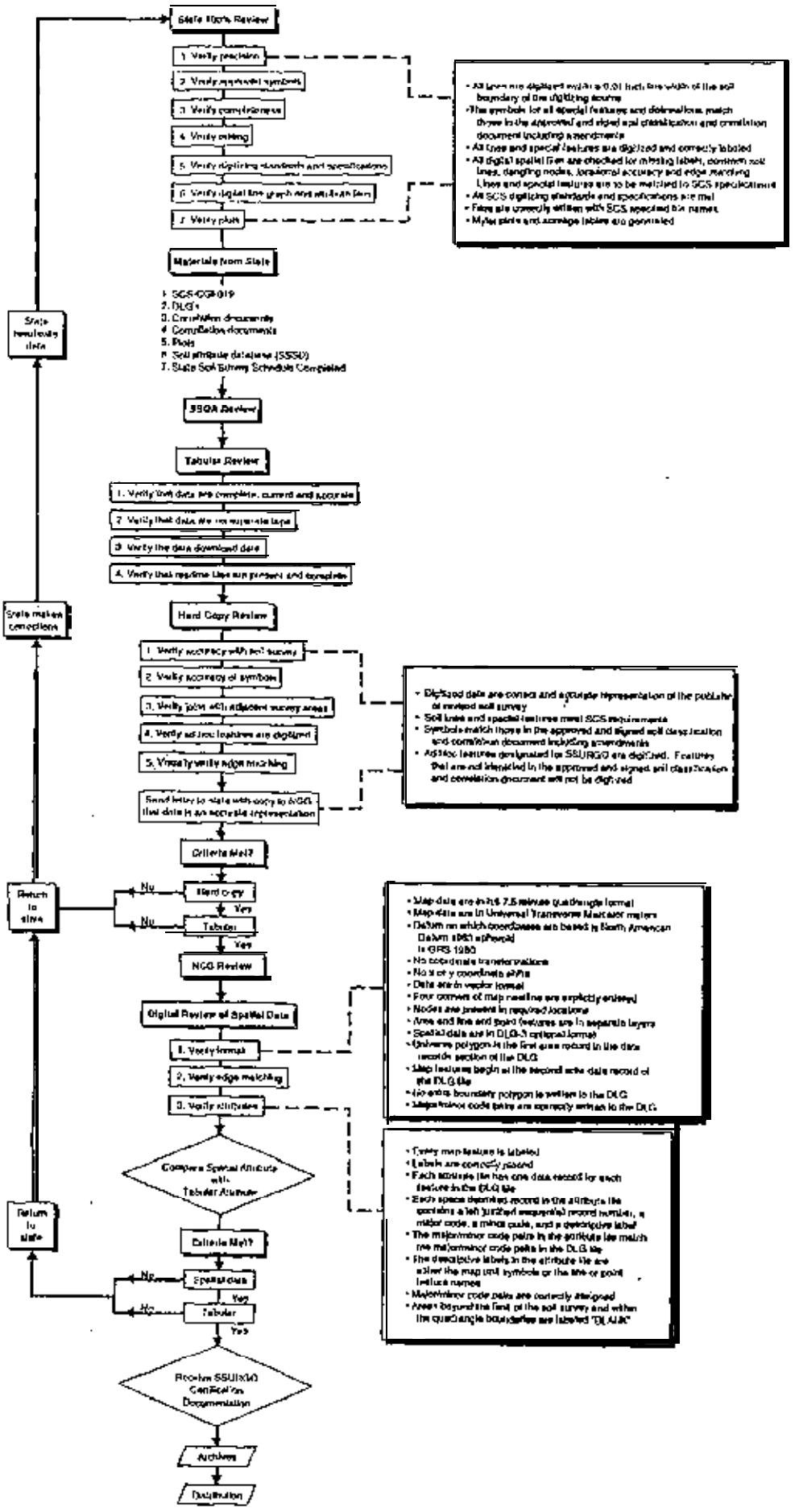
NCSSSoil Geographic Data Development

Chapter 1	NCSS Maps
Chapter 2	Map Planning
Chapter 3	Map Aquisition
Chapter 4	Map Compilation
Chapter 5	Digital Data Capture
Chapter 6	Map Finishing
Chapter 7	Map Printing
Chapter 8	General Soil and Index Maps and Block Diagrams
Chapter 9	Soil Geographic Data Bases
Chapter 10	Archiving
Chapter 11	Map Reproduction
Chapter 12	Map Distribution
Chapter 13	Contracting
	Glossary

Current NCSS Digital Review Procedures



Proposed NCSS Digital Review Procedures **2/94**



Appendix 5E—Checklist for SSURGO data

Accuracy:

- ❑ Digital data matches the source documents.
- ❑ Soil survey area boundaries and map unit composition match across soil survey area boundaries
- ❑ Digital data meets map accuracy standards.

Digitizing:

- ❑ Meets SCS standards.
- Cl Data are in vector format
- ❑ Data are edge matched to adjoining quads.
- ❑ Four corners of map neatline are explicitly entered
- ❑ Nodes are present in required locations.
- ❑ Area features and lime and point features are in separate layers.

Labelings

- Cl Every map feature is labeled.
- ❑ Descriptive labels match the publication or approved updated legend.
- Cl Labels are correctly placed.

Formatting:

- ❑ Map data are in full 7.5 minute quadrangle format.
- Cl Map data are in Universal Transverse Mercator meters
- ❑ Datum on which coordinates are based is North American Datum 1983 with a spheroid of GRS 1980
- ❑ X_ or y_ coordinate shifts.

Attributing:

- ❑ Each feature data layer has a corresponding attribute file.
- ❑ Each attribute file has one data record for each feature in the DLG file.
- ❑ Each space delimited record in the attribute file contains a left justified sequential record number, a major code, a minor code, and a descriptive label.
- ❑ The major/minor code pairs in the attribute file match the major/minor code pairs in the DLG file.
- ❑ The descriptive labels in the attribute file are either the map unit symbols or the line and point feature names.
- ❑ Major/minor code pairs are correctly assigned
- 0 Areas beyond the limit of the soil survey and within the quadrangle boundaries are labeled "BLANK".

Spatial Data:

- ❑ Spatial data are in DLG-3 Optional Format.
- ❑ Universe polygon is the first area record in the data records section of the DLG.
- ❑ Map features begin at the second area data record of the DLG file.
- ❑ No extra boundary polygon is written to the DLG.
- ❑ Major/minor code pairs are correctly written to the DLG.
- ❑ Readme file is correctly written.

Tabular Data:

- ❑ The "eddate" element of the "ssarea" table has the date of the data download.
- ❑ Data base tables are current and accurate.
- ❑ Data base tables are on a separate tape from the spatial data
- ❑ Only one soil survey area is written to a tape.
- ❑ Readme file is correctly written.

Quality Control Reviews:

- ❑ Review has been completed by the state soil scientist.
- Cl Review has been completed by the Soil Survey Quality Assurance.
- ❑ Preliminary review has been completed by the National Cartography and GIS Center.
- ❑ All material has been sent to NCG for final review.

Archiving:

- ❑ Readme files have been created and have been written to tape.
- ❑ Method and format used to write the tapes are documented.
- ❑ Each tape is properly labeled

Datum Conversions

The use of satellites and other technologic improvements in first order surveying have allowed geodesists to refine the knowledge of the shape of the Earth. Along with these refinements came the inevitable process of standardizing the definition of the approximating ellipsoid and establishing an international reference datum. Prior to this, the ellipsoids and datums were established by long line precision surveying and astronomical observation. The processing of the measurements of these surveys let to establishment of ellipsoids which were best fits to local conditions and not the entire Earth and datums which were arbitrary to the surveyor's network. But because this surveying relied upon the use of the spirit level for alignment of instruments with the horizontal plane (the geoid) they were susceptible to perturbations of the gravity field and thus only useful for local purposes.

Until recently, the reference system for North America has been the North American Datum of 1927 (NAD27) which used Clarke's 1866 ellipsoid and had its origin at Meade's Ranch in Kansas. But because of technical geodetic surveying problems with NAD27 and an interest in standardizing the reference system on an international basis, the North American Datum of 1983 reference system NAD83 has been chosen to replace NAD27. This system is based upon the Geodetic Reference System of 1930 (GRS80) which is geocentric (origin is the center of the Earth's mass) and uses an ellipsoid approximating the entire Earth.

There are several methods for conversion of geographic data between datums but the most convenient and perhaps common are the Molodensky formula and the NADCON (Dewhurst, 1990) used for North American Datum conversions. The Molodensky method is often used for international conversions but is considered to only have a conversion accuracy of 5–10m in United States regions. The NADCON method uses of a grid of longitude-latitude corrections from which a correction value can be interpolated for any non-nodal point. The correction grid is determined by minimum curvature gridding of corrections for control points whose location had been accurately determined by both NAD27 and NAD83 surveying methods. Error in conversion with NADCON is generally considered to be less than a meter (0.15m for most of the corms region) but may suffer in regions of poor control. Table 1 is a summary of the NADCON grid regions.

Table 1: NADCON correction regions.

Region	nad2nad -r region	Extent East	West	South	North
Conterminous U.S.	conus	131° w	63° W	20° N	50° N
Alaska	al aska	166° E	128" W	46° N	77° N
Hawaii	hawaii	161° W	154° W	18" N	23° N
Puerto Rico and virgin Islands	prvi	68° w	64" W	17° N	19° N
St. George Is., AK	stgeorge	171° W	169° W	56° N	57° N
St. Lawrence Is., AK	srlrnc	172° w	68° W	62' N	64° N
St. Paul Is., AK	stpaul	171° W	169° W	57° N	58° N
	High Precision GPS Network				
Florida	FL	88° w	80° W	24° N	32" N
Maryland	MD	80° W	74° W	37° N	41° N
Tennessee	TN	91° w	81° W	34° N	38° N
Washington-Oregon	WO	125° W	116° W	41° N	50° N
Wisconsin	WI	94° w	88° W	42" N	48° N

Recent releases (circa July, 1993) of NADCON tables also include tables for con-

version between the High Precision GPS Networks (HPGN) and NAD83. Little information about the HPGN was distributed with the tables so usage is available but not defined at the moment. These tables are for state regions.

Program nad2nad.

For conversion of data between NAD27 and NAD83 datums the software distribution now includes the program **nad2nad.** It performs in a manner similar to program **proj** and has several of the same **runline** options so users familiar with proj should have little trouble with learning **nad2nad.** Besides performing datum conversions it will perform SPCS and UTM conversions for both input and output thus allowing both geographic as well as grid data to be processed.

The internal functioning of **nad2nad** is a three step process:

1. process input data and, if selected, convert data from grid system coordinates to geographic coordinates,
2. if NADCON region selected, convert geographic data between datums, and
3. process output data and, if selected, convert to grid system coordinates.

Control of the input and output steps are by means of the respective -i and **-o runline** options which have an identical list of arguments:

27 — data is in NAD27 datum. Thii is the default state.

83 — data is in NAD83 datum.

utm=*zone* — data in UTM coordinates for identified zone (numeric value between 1 and 60).

spcs=*zone* — data in SPCS coordinates for identified State zone (see Table 2).

bin — data in binary form.

rev — reverse normal longitude-latitude or x-y order of data.

feet — data is in U.S. Surveyor's feet, otherwise in meters. Must be used in conjunction with spcs option.

hpgn=*zone* — data is in HPGN datum for zone listed in Table 1.

These options represent the state of the data at respective input and output of steps 1 and 3 and thus determine the necessary actions to be taken to convert the information to intermediate geographic coordinates required for datum shift. More than one option can be used and in this case they may be in a comma separated list or separate -i or **-b** options as shown by the following:

```
# nad2nad -i 83 -i spcs=1001 -i feet ...
# nad2nad -i 83,spcs=1001,feet ...
```

Option order is not important.

Step 2 of **nad2nad** is controlled by the -r <*region*> option which determines which NAD27–NAD83 zone listed in Table 1 is to be used. When this option is specified the the **-i** and **-o** must indicate different datums, thus

```
# nad2nad -i 27 -o 83 -r conus . . .
```

is correct usage, while

```
# nad2nad -i 27 -o 27 -r conus . . .
# nad2nad -r conus . . .
```

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are incorrect usage. The following is an example where geographic NAD27 coordinates are to be converted to geographic NAD83 coordinates:

```
# nad2nad -i 27 -o 83 -r conus <<EOF
-71d15 44d20'15
120W 30N
87d30 52d14
EOF
```

which produces the output:

```
71d14'58.27"W   44d20'15.227"N
120d0'3.181"W   30d0'0.348"N
*       *
```

Note that the last coordinate is outside the **conus** region.

Because **changing datums of grid system** data is **common,** the **nad2nad utm** and **spcs** options may be used to process these systems. In this case, **Massachussetts** Mainland zone **NAD27** coordinates in feet are converted to **NAD83 values** in **meters by:**

```
# nad2nad -i 27,spcs=2001,feet -o 83,spcs=2001 -r conus <<EOF
840000  230000
EOF
```

with the results being:

```
273193.78       820117.57
```

Similarly, the same data can be converted to UTM, *zone* 19 *coordinates* **by:**

```
# nad2nad -i 27,spcs=2001,feet -o 83,utm=19 -r conus <<EOF
840000  230000
EOF
```

resulting in output of:

```
364916.74    4609733.79
```

The -r option may be omitted so that there is no datum transformation. This allows **nad2nad** to be used for purposes such as converting **SPCS** grid coordinates to and from **UTM** grid coordinates, conversion of grid coordinates **from** one zone to an adjacent zone, or simply converting geographic coordinates to and from DMS and decimal degrees formats. The previous example could be a simple conversion from SPCS **to UTM in** the NAD27 datum as performed by:

```
# nad2nad -i 27,spcs=2001,feet -o 27,utm=19 <<EOF
840000  230000
EOF
```

with the results:

```
364869.08       4609509.76
```

To do this operation with **proj** would create **considerably** more system overhead due to two copies of the program executing and data piping operations.

Table 2: List of State Plane Coordinate System Zones (SPCS) and identification numbers for 1927 and 1983 North American Datums.

State Zone	'27	'83
Alabama East	101	101
west	102	102
Alaska Zone 1	5001	5001
Zone 2	5002	5002
Zone 3	5003	5003
Zone4	5004	5004
Zone 5	5005	5005
Zone6	5006	5006
Zone 7	5007	5007
Zone 8	5008	5008
Zone 9	5009	5009
Zone10	5010	5010
Arizona East	201	201
Central	202	202
west	203	203
Arkansas North	301	301
South	302	302
California I	401	401
II	402	402
III	403	403
IV	404	404
V	405	405
VI	406	406
VII	407	
Colorado North	501	501
Central	502	502
South	503	503
Connecticut	600	600
Delaware	700	700
Florida East	901	901
west	902	902
North	903	903
Georgia East	1001	1001
west	1002	1002
Hawaii 1	5101	5101
2	5102	5102
3	5103	5103
4	5104	5104
5	5105	5105
Idaho East	1101	1101
Central	1102	1102
west	1103	1103
Illinois East	1201	1201
West	1202	1202
Indiana East	1301	1301
West	1302	1302
Iowa North	1401	1401
South	1402	1402
Kansas North	1501	1501
South	1502	1502
Kentucky North	1601	1601
South	1602	1602
Louisiana North	1701	1701
South	1702	1702
Offshore	1703	1703
Maine East	1801	1801
west	1802	1802
Maryland	1900	1900
Massachusetts Mainland	2001	2001
Islands	2002	2002
Michigan East	2101	
Central/m	2102	
west	2103	
North	2111	2111
Central/l	2112	2112
South	2113	2113
Minnesota North	2201	2201
Central	2202	2202
South	2203	2203
Mississippi East	2301	2301
west	2302	2302
Missouri East	2401	2401
Central	2402	2402
west	2403	2403
Montana		2500
North	2501	
Central	2502	
South	2503	
Nebraska		2600
North	2601	
South	2602	
Nevada East	2701	2701
Central	2702	2702
west	2703	2703
New Hampshire	2800	2800
New Jersey	2900	2900
New Mexico East	3001	3001
Central	3002	3002
west	3003	3003
New York East	3101	3101
Central	3102	3102
West	3103	3103
long island	3104	3104
North Carolina	3200	3200
North Dakota North	3301	3301
South	3302	3302
Ohio North	3401	3401
South	3402	3402
Oklahoma North	3501	3501
South	3502	3502
Oregon North	3601	3601
South	3602	3602
Pennsylvania North	3701	3701
South	3702	3702
Rhode Island	3800	3800
South Carolina		3900
North	3901	
South	3902	
South Dakota North	4001	4001
South	4002	4002
Tennessee	4100	4100
Texas North	4201	4201
North Central	4202	4202
Central	4203	4203
South Central	4204	4204
South	4205	4205
Utah North	4301	4301
Central	4302	4302
South	4303	4303
Vermont	4400	4400
Virginia North	4501	4501
South	4502	4502
Washington North	4601	4601
South	4602	4602
West Virginia North	4701	4701
South	4702	4702
Wisconsin North	4801	4801
Central	4802	4802
South	4803	4803
Wyoming East	4901	4901
East Central	4902	4902
West Central	4903	4903
West	4904	4904
American Samoa	5300	
Guam Island	5400	
Puerto Rico, Virgin Is.		5200
1	5201	
(St. Croix) 2	5202	

COMPILATION REVIEW

Materials:

field sheets or copies of them

SCS compilation photobase

index to map sheets (field, comp. and quads)

USGS topoquads

County highway map

Final signed correlation document (including SCS-SOI-37A)

Acreage table

Approved soil legend in digital form (for digitizing contracts)

Type overlays

Purpose:

To assist the SSQA by providing an evaluation of the cartographic quality of compilation materials.

To verify that the states have performed a quality edit and assist them in improving the quality of compilation through a quality review.

Review Procedure:

1. Verify that all necessary materials have been received.

2. Perform the review to evaluate cartographic accuracy and quality using "REVIEW LIST" and review overlays to document findings.

3, Prepare review report.

4. Forward the reviewed materials to SSQA.

5. SSQA performs review and either returns the materials to NCG for contracting or returns materials to state for additional work.

6. If materials are returned to state, the state makes the corrections and forwards the corrected materials to NCG.

7. NCG reviews the corrections and:
   - forwards materials to SSQA if corrections have not been completed
   - or prepares the contract.

8. If the contract is for digitizing, upon completion of the digitizing, the state will receive a copy of the digital data and checkplots indicating author errors. The state will have 45 days to make the corrections and resubmit the corrected digital data to NCG for map finishing contracting. If NCG does not receive the corrected data by the 45 day due date, the map finishing contract will be let with the author errors.

FY94 STATE SOIL SCIENTIST MEETING QUESTIONNAIRE

1. Are you currently or planning to digitize **ALL** soil survey map information?
[I **YES** [ ] **NO**
comments: _____

2. If yes to No.1, will **ALL** digital data be used in map finishing for the soil survey publication?
[I **YES** [I **NO**
comments: _____

3. If yes to No.3, what software are you using to produce the fonts,, line patterns and symbols for the map finishing materials?
[ ]**MAPGEN** [ ]**ARC/INFO** [ ]**LTPLUS** [ ]**ATLASGIS** [ ]**OTHER** _____
comments: _____

4. If yes to No.2, would you consider publishing all single line streams (perennial, intermittent, ditches, etc) as a solid blue line without distinguishing their classifications?
[I **YES** [I **NO** [] **MAYBE**
comments: _____

5. Would you want a copy of the NCG contracting specifications for digitizing?
[I **YES** [I **NO**
comments: _____

6. How would you prefer to receive new information regarding digitizing, compilation, map finishing and NCG products/ services?
[ ] **Internet** [ ]**soilnet** [ ]**gisbulletin board** [ ]**memo** [ ]**other** _____
comments _____

7. How satisfied are you with NCSS branch products/services at NCG?
[ ]**Very satisfied** [ ]**Satisfied** [ ]**Somewhat satisfied**
[ ]**Dissatisfied** [ ] **Don't use**
comments _____

8. Check reason(s) for response in No. 7.
[ ]**Turnaround time** [ ]**Quality** [ ]**Consistency** [ ]**Courtesy** of **staff**
comments _____

9. How'satisfied are you with products/services provided by NCG?
[ ]**Very satisfied** [ ]**Satisfied** [ ]**Somewhat satisfied**
[ ]**Dissatisfied** [ ] **Don't use**
comments _____

10.Check reason(s) for response in No. 9.
[ ]**Turn around time** [ ]**Quality** [ ]**Consistency** [ ]**Courtesy of staff**
comments _____

Please give your name if you are willing to discuss this in more detail with NCG personnel. _____

Thanks!!!

WORKSHOP SCHEDULES

APRIL 5-8, 1994 SSQA Staff, MNTC, Lincoln, NE

APRIL 18-22, 1994 Midwest Region, MNTC, Lincoln, NE

APRIL 25-29, 1994 Midwest and West Regions, MNTC, Lincoln, NE

MAY 9-13, 1994 Northeast Region, NENTC, Chester, PA

MAY 16-21, 1994 South Region, SNTC, Fort Worth, TX

NATIONAL STATE SOIL SCIENTIST WORKSHOP[1/]
Scottsdale, Arizona
February 14-18, 1994

I appreciate the opportunity to share with you some of the current quality assurance activities within the National Cooperative Soil Survey. The five areas of interest I would like to emphasize are: 1) NASIS, 2) soil series classification, 3) Major Land Resource Area (MLRA) activity, 4) training, and 5) publication of soil surveys.

NASIS

Our national workshop directed toward the conversion to NASIS at the NSSC last fall set the stage for much of our current work to improve the quality of our data. The completion of the work identified in your NASIS conversion plan will have a significant impact on improving the quality of our data. This is a matrix item in our progress reporting, with a projected completion by the end of FY94.

Soil scientists in the NSSC have been designated by MLRA to assist your state staffs in answering questions, interpreting current guides, etc., pertaining to this national priority activity. Please take the time to use these resource people when appropriate.

Soil Series Classification

We have used soil series for almost 100 years as a vehicle to assist us in how we name and classify soils. Tyrone Goddard, Assistant State Soil Scientist in New York, was in the National Soil Survey Center about three weeks ago on a soil interpretation training project. Several states are currently documenting the history of soil surveys in their state. I had the opportunity to review a draft of some of the material Tyrone is preparing on the early history of soil survey in New York. It was interesting to note that the concept of soil series was first used in New York in producing the soil survey of Orange County in 1912. Also, soil type, as used and defined, was similar to our present definitions of soil phase.

We use our system of Soil Taxonomy to classify soils nationally and internationally. We classify soil series. We delineate and show geographic distribution of map units which are commonly named as a phase of soil series. We interpret phases of soil series. Through the years our users have requested more complete soil information with a subsequent increase in the intensity of soil mapping and the number of soil series. For example, Lancaster County, Nebraska, where the National Soil Survey Center is located, has had three soil surveys published over the past 90 years. The first survey in 1904 used 4 map units. The 1938 soil survey contained 33 map units, and the 1980 survey was expanded to include 67 map units.

Collectively, I feel the states and the National Soil Survey Center staffs, working together, have a responsibility to maintain a current classification of our soil series as part of the National Cooperative Soil Survey. All of us are aware of recent amendments in Soil Taxonomy that have changed the classification of many soil series. Presently, we are using about 17,800 soil series. Our review of current approved amendments in Soil Taxonomy indicate about 1,500 soil series need reclassification.

[1/] James R. Culver, Assistant Director, Soil Survey Division, National Soil Survey Center

Current classification of our soil series is important to: 1) support our field operations, 2) provide data to select kinds or aggregation of similar soils in databases, and 3) use in teaching soil genesis and morphology at the University level.

An Official Soil Series Team at the National Soil Survey Center is available to work with your state staffs as needed to assist you in reclassifying selected soil series. Members of this team are Dick Base - team leader, Lester Brockmann, Bob Ahrens, Bob Engel, Rex Mapes, and myself as sponsor.

I would compliment the significant number of states that are in the process or are planning to review the classification of their soil series. Some examples of activities are plans to review all OSEDs in Idaho, Maine, Massachusetts, Nebraska, New Hampshire, New York, and Vermont. Texas has reviewed their Vertisols and wet soils. Land Resource Regions F, G, and K plan to review wet soils and vertic subgroups. Several multi-state work sessions are planned. A recent joint work session of several states in New York was very productive.

Major Land Resource Area Activity

On a national perspective, the concept and progress of using the physiographic approach of producing soil survey products has been outstanding. I have been extremely pleased with the cooperation and work each of you and your cooperators have put forth in moving this work forward.

There are 60 MLRAs in a planning stage, 55 MLRAs that have had organizational meetings, 23 MLRAs that have developed a MOU and project plan, and 11 MLRAs that have been approved.

Considerable interest has centered on funding by MLRA. Currently, a group of State Soil Scientists and State Conservationists in the Northeast, chaired by Dawn Genes, State Conservationist, New Hampshire is reviewing options and opportunities for funding and staffing by physiographic area. A FY 1996 budget initiative for MLRA 105 funding has been submitted.

Training

Training continues to be a major activity. We are pleased with the quality and experiences of the soil scientists you selected to attend the recently completed Soil Correlation Course. We also conduct a Basic Soil Survey - Field and Lab Course for newer soil scientists. We are in the process of reevaluation of the Soil Laboratory Data Course. This past fall we worked with the NTC Soils Staff in conducting a Soil Interpretation Pilot Course.

Several workshop activities are of interest. A series of three or four Soil Compilation and Digitizing workshops are planned this spring. Last week a soil manuscript workshop was conducted for California and Nevada. Last summer a field workshop on describing soils in North Dakota was a great success.

A pedon description guide that can be used as an insert in the color book has been drafted will be tested this year. Soil Scientists in the NSSC plan to develop a field guide for describing soils that provides more descriptive information than the reference material designed for use with the color book.

Publication Guides

The Guide to Authors has been completed and is included in the National Soil Survey Handbook. Several pages have considerable white space; however, this will allow us to easily amend or add appropriate new information to each section.

The prewritten material has been updated, and copies will be sent to each state.

Some current activity toward timely production of quality products are a project on manuscript preparation in Montana, plans for producing map and interpretive products with a West Virginia project, and development of CD ROM technology for publication at the NSSC.

Montana Project

In October 1993, members of the Quality Assurance Staff traveled to Montana where they provided assistance in the development of computer-generated map unit descriptions and in the development of a format for a three-part soil survey report. They edited database elements and the semitabular format of the map unit descriptions.

The report that they worked on is designed for interim use and for eventual publication. It uses tables that are generated using the newest FOCS programs. The map unit descriptions are created by a UNIX/Prelude program that selects data from the SSSD, modifies the raw data elements into statements that are appropriate for text, and inserts the statements into a form document in Microsoft Word.

Because the tables and the map unit descriptions are created directly from the SSSD, the State Office personnel have unprecedented control over updating the data in the reports and the amount of cross-checking involved in preparing the report is minimized. The time required for the English edit of manuscripts for publication using this system should be considerably shorter than that required for traditional manuscripts because much of the editing is done once during the development of the system and then replicated on successive manuscripts.

CD-ROM

Jennifer Allen, Kathy Teske, and Ralph Luke, NSSC staff members, have been studying the feasibility of using CD-ROM technology to provide soil surveys on CD. The NSSC already has the hardware available to master CD's. The committee is currently evaluating various CD-ROM authoring software packages in order to select a package that will meet the needs of the average reader. Hypertext, an authoring software that is being evaluated by the committee, can provide search capabilities and links between various sections of text or between text and photos. Preliminary indications are that the inclusion of digitized maps on the CD's could be a problem.

Soil Survey Publications

The rate at which soil surveys are being published by the Government Printing Office is a concern to us all. Two teams are being initiated to 1) develop a system to release quality soil surveys one year after the completion of the classification and correlation report and 2) develop a system to clear out the backlog.

A number of factors have contributed to the timeliness of soil survey publications. These include: 1. The large number of surveys completed as a result of FSA; 2. Several states nearing the completion of the first physical coverage of soil surveys; 3. Few editors of the NTCs moved to the NSSC; 4. Reduction of the number of

editors; 5. Several new editors employed 2 to 3 years ago; 6. We now typeset and prepare the final product for final publication by GPO. Several years ago the staffing plan identified the need for a sufficient editorial staff to edit 80 soil surveys per year.

Current shifts in operations directed toward increased capacity are newer editors who are now in a production mode, less proofreading, team activity, and editing of manuscripts by groups of editors such as is being done with a number of manuscripts from North Carolina.

Soil survey manuscripts are put on the publication schedule when both the manuscript is received for English edit and the soil maps are in Cartographic. Currently, 135 manuscripts are ready for English edit thus far this fiscal year. There are 74 manuscripts assigned to editors and 61 manuscripts that as yet have not been assigned to an editor.

There are a variety of reasons for delays throughout the system. These include the length of time from correlation to technical review, the time from technical review to English edit, the availability of soil maps, the editorial production capability, and available resources.

Policy on Reorintina Soil Surveys

Funds for soil survey publication will be allocated first to publishing those surveys of areas that have not been previously published. Exceptions are possible in such cases as accidental destruction of all copies of a relatively recent publication. States are also free to substitute soil surveys for reprinting in place of scheduled new publications. In such cases, the substitution would affect the timing of new publications from that state but not from other states.

Other items

The soil survey schedule is being used by a wider variety of customers. It is a ready source of data to prepare many kinds of maps showing progress of soil survey work. I would encourage each of you to give timely attention to the data elements that are the responsibility of the state.

We have sent our revised schedule of travel assistance to states. Because of limited travel funds, a number of scheduled trips have been canceled. Each of our soil scientists has been given an individual travel allowance. You may wish to substitute some current travel. We still plan to review the required documents before final field reviews, etc. There will be opportunities to have some involvement by way of telconferences.

The national soil-moisture map is near completion. I feel this map will be popular and be widely used. I compliment the manner in which the states, NCSS cooperators, and the National Soils and Cartographic units have collectively worked on this project. Some field studies and work is being planned with selected states this year to better define the approximations used in preparing this map.

Each of you from time to time develop some excellent new and innovative ways to help us do our jobs in an easier, and more productive manner. For example, I am not on the routing or review of the field review reports you prepare. Recently, I personally received a review report from the state soil scientist in Virginia. During this review an excellent evaluation was made on the quality of mapping. I really appreciated the frank and honest comments made on each observation. I recall the

last statement on the notes of one observation was -- Junk Unit. That in itself tells a lot about the complexity of the soils and landscapes. We will be glad to assist you in making distribution of new technology to all states.

As we look into the future, an increased emphasis of the NSSC will be directed toward the quality of our data. We will appreciate your assistance and continued communication on issues. We feel our new organization will provide an improved vehicle and atmosphere to deliver improved service to all our customers, of which you are number one.

ITEM 14

University of Wisconsin-Madison

Department of Soil Science
263 Soils Building
1525 Observatory Drive
Madison, WI 53706-1299
608-262-2633

College of Agricultural and Life Sciences

DATE: January 18, 1994

TO: Soil Scientists

FROM; James G. Bockheim
Chair, ICOMPAS

SUBJECT: New proposed soil order, the Gelisols

Enclosed is a proposal for a new order in *Soil Taxonomy* dealing with permafrost-affected soils, the Gelisols. Also enclosed are preliminary keys that enable classification.of Gelisols to the great-group level.

We invite your comments on this proposal and the keys. Please feel free to circulate copies to interested colleagues who are not listed in Appendix 1.' If you wish to remain on the mailing, please complete the mailer on the last page.

Comments will be included in the second circular.

All correspondence should be directed to:

Dr. James G. Bockheim
Chair, ICOMPAS
Department of Soil Science
1525 Observatory Drive
University of Wisconsin
Madison, WI 53706-1299 U.S.A.
Phone: (608) 263-5903
FAX: (608) 265-2595
E-mail: bockheim@calshp.cals.wisc.edu

Thank you in advance for your interest and cooperation.

University of Wisconsin-Madison provides equal opportunities for admission and employment

needs to be recognized at a higher level in ST.

Pergelic soils should be identified on the basis of the presence of permafrost rather than on soil temperature measurements. This suggestion is consistent with the emphasis in ST on readily measurable soil properties. Soil temperature measurements are difficult to obtain in remote regions, should, be taken for two or more years to adequately identify a pergelic soil temperature regime, and cannot be inferred from air temperature measurements with any reliability, especially in areas with discontinuous or sporadic permafrost. The relationship between soil and air temperatures in cold soils is dependent on vegetation cover, the thickness of the organic mat, snow cover, soil texture and organic matter content, and soil moisture, all of which vary considerably within an area containing permafrost. Not all soils that have a pergelic soil temperature regime contain permafrost in the upper 200 cm.

Pergelic and cryic refer to different soil temperature regimes and often are used in the same taxonomic unit, which leads to confusion and redundancy (e.g., Pergelic Cryoborolls). In other cases (e.g., Cryic Rendolls and lithic subgroups), soil taxa do not distinguish between soils with cryic and pergelic soil temperature regimes.

Soil Taxonomy does not adequately separate cryoturbated soils from the more stable soils containing permafrost. In view of the abundance of cryoturbated soils throughout the permafrost region (about 60% of the Cryosols mapped in Canada are placed in Turbic great groups), greater attention must be given to differentiating cryoturbated from the more stable soils, preferably at a high level in the classification. Soils with dry permafrost and an "aridic" soil moisture regime should be differentiated from those with ice-cemented permafrost and more abundant soil moisture, as they would respond differently to management practices and environmental changes.

The Concept of Cryopedogenesis

Cryopedogenetic processes are soil-forming processes characteristic of soils with permafrost. These processes include solifluction, frost stirring, freezing and thawing, and mounding and fissuring (Rieger, 1983). Cryogenic soils commonly feature thermokarst, ground-ice formation, and patterned ground. The most common cryogenic macroscopic soil features are due to cryoturbation and include irregular or broken horizons and incorporation of organic matter in lower horizons, especially along the top of the permafrost table. Oriented stones and displacement of soil materials are common in cryogenic soils. Freezing and thawing produce granular, platy, and vesicular structures in surface mineral horizons and blocky or prismatic and massive structures in subsurface horizons. The massive structure is due to cryostatic pressure and desiccation that develop when the two freezing fronts, one from the surface and the other from the permafrost, merge during freeze-back. The perennially frozen layer commonly is associated with ground-ice in the form of segregated ice crystals, vein ice, ice lenses, ice wedges, and thick ground-ice.

When viewed in thin-sections, cryogenic soils contain a variety of fabrics resulting from desiccation and displacement due to alignment, rotation, sorting, and inclusions (Smith et al., 1991). These features are accompanied by planar voids, cracks and vesicles during pore formation.

Recommendations for Revising *Soil Taxonomy* for Permafrost-Affected Soils

A flow chart for classifying Gelisols to the great-group level is given in Figure 1. Table 1 shows recommended soil taxa, including provisional subgroups.

In this proposal we recommend that a new order be created for soils with permafrost, the Gelisols. The term Gelisols is derived from the Greek gelid, meaning very cold. A precedent has been set for using this term, e.g., pergelic soil temperature regime, Gelicryands, and the use of Gelic sub-units in the FAO/UNESCO map ledger. The formative element "el" can be taken from Gelisol in constructing soil

International Committee on Permafrost Affected Soils (ICOMPAS)

Circular Letter No. 1 January 18, 1994

Backaround

For many years cryopedologists have been dissatisfied with the classification of permafrost-affected soils in Soil *Taxonomy (ST).* The suggestion that permafrost be used as a criterion at the order level was considered by Guy Smith in his "Rationale for Concepts in Soil Taxonomy:"

"There is nothing sacred about the number of soil orders in *Soil Taxonomy.* It merely reflects what knowledge we had at the time we developed the system and we may have made a serious mistake. This is not a matter for the judgement of one person, rather a group judgement as to the importance of permafrost, cryoturbation as compared to the distinction between organic Histosols and the various mineral soils and so on." (p. 133)

Serious discussion of a new order for permafrost-affected soils took place during the First International Conference on Cryopedology, held Nov. 1 O-14, 1992, in Pushchino, Russia among 100 cryopedologists from 12 countries and personnel from the National Soil Survey Center (NSSC). Following the meeting a proposal was prepared by J.G. Bockheim, C.L. Ping (Univ. of Alaska), J.P. Moore (USDA-SCS, Anchorage, AK), and J.M. Kimble (NSSC, Lincoln, NE) entitled "Gelisols: a New Proposed Order for Permafrost-Affected Soils." This proposal and keys were used to classify 20 pedons for which detailed soil descriptions and analytical data were available in the Northwest and Yukon Territories and Alaska during the International Correlation Meeting on Permafrost Affected Soils (Tarnocai et al., 1993; Moore et al., 1993). The pedons also were classified in the current ST, the Canadian system, and the Russian system. Following the meeting, J.G. Bockheim was appointed chair of ICOMPAS.

Grounds for a New Order. the Gelisols

The rationale for proposing a new soil order, the Gelisols, includes: (1) permafrost is a pervasive feature on the earth's surface and is present in 13% of the world's soils (18 million km2); (2) cryopedogenesis, which includes cryoturbation (a collective term used to describe all soil movements due to frost action), is the dominant soil-forming process in soils with permafrost; (3) permafrost is a manifestation of the soil climate, i.e., soil temperature; (4) environmental changes will have profound effects on permafrost and planned and unplanned land uses; and (5) the existing approach in ST is unsuitable for adequately differentiating permafrost-affected soils.

Recognition of Permafrost in *Soil Taxonomv*

Pergelic soils are defined in ST as those soils with a pergelic soil temperature regime, i.e., a mean annual temperature <0°C. These soils have ice-cemented permafrost if they are moist or dry frost if there is insufficient water to cause cementation. In ST pergelic soils are recognized as extragrades of soils with a cryic soil temperature regime (mean annual soil temperature at 50 cm of 0 to <8°C). An exception to this rule is the Gelicryands great group. Seven of the 11 orders in ST have cryic great groups with pergelic extragrades.

Problems with *Soil Taxonomy* in Classifying Soils with Permafrost

A main problem with ST is that pergelic soils are differentiated primarily at the subgroup (extragrade) level. In ST extragrades were intended to address local conditions. Although permafrost may be sporadic near its southern boundary (Northern Hemisphere), it is a regionally pervasive feature at the high latitudes and altitudes. In that cryopedogenesis is an important process in these soils, the presence of permafrost

taxonomic units. Permafrost-affected soils are recognized in the Canadian system as Cryosols. While this term is appealing, its use in ST would necessitate redefining the cryic soil temperature regime. A further complication is that lower categories would end with "cry," thereby creating names that would be difficult to pronounce and would deviate from the use of order constructs beginning with a vowel.

Gelisols are recognized on the basis of the presence of permafrost. The bottom of the control section for the identification of permafrost is set at 200 cm from the soil surface. In the United States, soil mappers are required to examine soils to this depth for classification at the series level and for giving detailed interpretations. Examination of permafrost-bearing soils to 200 cm may be difficult in many parent materials. Moreover, the use of 200 cm for the bottom of the control section may lead to problems in the zone of discontinous permafrost where wildfires and land-clearing may cause temporary recession of the permafrost table below 200 cm. This concern will be dealt with in this proposal at the family level.

Suborders. Five suborders are recognized within the Gelisol order. Histels include organic soils with permafrost. The remaining four suborders contain mineral soils. Turbels have more than one-third of the active layer (i.e., the top layer of ground subject to annual thawing and freezing in areas underlain by permafrost) portion of the pedon disrupted by cryoturbation. The remaining three suborders have less than one-third of the pedon subject to cryoturbation and include Aquels (aquic soil moisture regime accompanied by strong gleying and/or abundant redoximorphic features), Aridels (an "aridic" soil moisture regime and dry permafrost), and Statels (other soils). The terms "Stati" (Greek statikos, meaning stationary) and "Turbi" (Latin turbidus, meaning disturbed) are borrowed from the Canadian system.

In ST soils with an aquic soil moisture regime generally are differentiated first at the suborder level. Because of the importance of cryoturbation (a manifestation of soil climate), we chose to differentiate suborders within the Gelisols primarily on the basis of the proportion of the pedon reflecting cryoturbation. Therefore, soils with aquic conditions are identified both within the Aquels (less than one-third of the pedon disrupted by cryoturbation) and as a great group with the Turbels (Hydriturbels). An alternative approach to that used here would be to establish a great group within the Statels, i.e., Hydristatels, for soils with minimal cryoturbation but with aquic conditions. This would reduce the number of suborders to four and would provide parallelism between the treatment of Turbels and Statels.

A major consideration was whether cold desert soils of Antarctica and other regions should be separated at the suborder or great-group level. Although these soils have a limited distribution (-200,000 km^2), they are sufficiently different from other Gelisols that they warrant separation at the suborder level, e.g., Aridels. In this proposal we recommend that an aridic soil moisture regime be recognized in conjunction with a pergelic soil temperature regime, which is not done in the present ST. Cold deserts receive 25 to 30 mm of annual precipitation (water equivalent). An alternative approach to that used here would be to recognize cold desert soils at the great-group level within the Turbels and Statels.

Geat Groups. Great groups are differentiated in Gelisols on the basis of diagnostic horizons, materials, and features, e.g., Spodi-, Argi-, Humi-, Andi-, etc. This approach assumes that permafrost and the accompanying cryopedogenic processes are of greater importance than those processes leading to the development of these diagnostic horizons and materials. Organic soils with permafrost are differentiated as is currently done in ST: Foli-, Fibri-, Hemi-, and Sapri-. For the Aridels, great groups are distinguished on the basis of the composition of salts in the profile as is done in.ST for Aridisols. In addition to salic, gypsic and calcic horizons, we recommend that a nitric horizon be recognized. A nitric horizon is defined as a salt-enriched layer that is 15 cm or more in thickness and contains secondary enrichment of nitrates. The nitrate concentration in a 1:5 soil:water extract must be greater than 118 mmol/L throughout, and the product of its thickness (in centimeters) and concentration is 3,500 or more. Soils containing nitric horizons are common in the southern Transantarctic Mountains.

We provisionally identify 25 great groups within the five proposed suborders (Fig. 1, Table 1). **Our approach necessitates that the Gelisols key out first in ST so that a soil meeting .the criteria of a particular order but containing permafrost within 200 cm of the surface is not placed in that order.**

Subgroups Subgroups are differentiated on the basis of conventional intragrade and extragrade features. Glacic subgroups are used for Histosols underlain by materials ≥30 cm with more than 95% ice, following the convention used in the Canadian system. Turbic subgroups are identified in Aquels where some cryoturbation is evident, i.e., less than one-third of the active-layer portion of the pedon. Salic, Gypsic, Calcic, and Nitric subgroups are recognized within Haplaridels that contain a distinct salt-enriched horizon meeting the salt concentration requirement but failing to meet the thickness requirement of salic, gypsic, calcic, or nitric horizons.

Families We recommend adding a new family differentia and revising the soil temperature classes for classifying Gelisols. Patterned ground (a general term for any ground surface exhibiting a discernibly ordered, *more-or-less* symmetrical, morphological pattern of ground and, where present, vegetation) is ubiquitous in areas underlain by permafrost. Patterned ground classes recognized in this proposal follow the terminology of Washburn (1980) and include earth hummocks, sorted circles, non-sorted circles, sorted polygons, non-sorted polygons, sorted nets, non-sorted nets, sorted steps, sorted stripes, and non-sorted stripes (Table 2).

Soils in the zone of sporadic or discontinuous may cycle between what currently is recognized in ST as cryic and pergelic soil temperature regimes (Moore and Ping, 1989). In contrast the permafrost table in soils of the highest latitudes with very cold temperatures will cycle in shorter intervals. To show these differences in responses to disturbance, we tentatively recognize six soil temperature classes in permafrost-affected soils (Table 3). Hypergelic soils have a mean annual soil temperature at 50 cm colder than -70C and occur in the zone of continuous permafrost. Pergelic soils have a mean annual soil temperature that ranges between colder than -2 and -70C and occur within the discontinous and southern portions of the continuous permafrost zone (Note: the southern limit of the zone of continuous permafrost in North America corresponds roughly with the -8.5°C mean annual air temperature isotherm and the -50C mean annual soil temperature isotherm). Gelic soils have a mean annual soil temperature ranging between 0 and -20C. Soils with a gelic soil temperature regime are those with "warm" permafrost (Moore and Ping, 1989) and are most likely to become cryic given a disturbance to the vegetation and/or organic mat. The "iso" prefix is used for these soil temperature classes where the difference between the mean summer soil temperature and mean winter soil temperature is less than 5oC.

The Pedon Concept as Applied to Gelisols.

The pedon for cryoturbated soils is defined so as to encompass the full-cycle of patterned ground with a 7-m linear interval (Figs. 2 and 3). This interval is suitable for most patterned ground features such as earth hummocks and non-sorted polygons. In the case of large-scale (30-m) low-centered, sorted polygons such as occur along the Alaskan Coastal Plain, two pedons are established: one within the center of the polygon and the other within the stone-filled crack.

We recommend that scaled sketches of a pedon showing soil horizons including patches of cryoturbated material be drawn on graph paper in the field (Fig. 2). Samples should be collected from each diagnostic horizon across the full-cycle of the pedon and cornposited for subsequent laboratory characterization. In the case of highly cryoturbated soils, ranges of horizon thicknesses rather than depth intervals should be shown in soil descriptions.

Soil Horizon Nomenclature

A lower-case letter is needed to identify horizons that are cryoturbated. The only small-case letters available for use are "j", "l", and "u". We favor use of "j" for cryoturbated horizons. This symbol could be expanded in its definition and used for horizons that are mixed due to processes other than cryoturbation, e.g., tree-throw. There also is a need for symbols that distinguish between ice-cemented and dry permafrost. In ST the symbol "f" is restricted to wet, permanently frozen soils. We favor use of "fm" for soils with ice-cemented permafrost and "f" for soils with dry permafrost. We recommend that permafrost with more than 95% ice be designated "Wfm". The symbol "W" becomes a master horizon and could be used for water beneath floating bogs. Silt caps and silt-enriched horizons have been identified in soils of the High Arctic. This feature could be identified by the symbol "si", which could be confused with the abbreviation for silt or silicon and could create problems in date-base management, i.e., "s" (illuvial accumulation of sesquioxides and organic matter), plus "i" (slightly decomposed organic matter). The committee has reserved judgment as to the need for a subordinate symbol to designate silt accumulation and invite your comments.

Alternative Aonroaches to Modifvina Soil *Taxonomy*

We examined other options for recognizing permafrost at higher levels than currently is done in ST. Differentiation of permafrost at the great-group level would leave an insufficient number of levels to allow separation of cryoturbated and stable soils, except possibly at the subgroup level where additional criteria are needed to differentiate the soils. The same argument applies to differentiation of soils with permafrost at the suborder level. Finally, the formative element "geli" could appear at different levels in ST as currently is done with the cryic soil temperature regime (e.g., Cryods and Cryorthents). However, this approach would minimize the importance of permafrost and cryopedogenesis and would require soil temperature data to differentiate cryic and pergelic soil temperature regimes in areas of discontinuous or sporadic permafrost.

Conclusions

The introduction of a Gelisol order into ST is necessary to facilitate soil-based technology transfer in circumpolar and alpine regions of the world. Gelisols would constitute a twelfth order in ST and would include soils covering an area of 18 million km2, exceeded only by the Aridisols (24.7 million km2). The require'ment that permafrost be present within the 200-cm control section eliminates the need for soil temperature measurements in classifying soils of cold regions except possibly at the family level. Our approach follows established principles used in developing ST and recognizes the unique soil-forming processes and morphologies of soils with permafrost. Cryogenic processes are considered to be pedogenic and characteristic of high-latitude soils.

The establishment of five suborders, Histels, Turbels, Aquels, Aridels, and Statels, within the Gelisol order expands upon the Canadian system which has evolved over the past 20 years and has proven to be useful in that country. Differentiation of soils at the great-group level on the basis of diagnostic horizons, materials, and features is consistent with the current approach in ST and preserves the genetic relationships between Gelisols and soils of warmer climates. Conventional subgroups are employed, along with a glacic subgroup for Histels with ground-ice layers. Family differentiae are the same as currently used in ST except that patterned ground classes are employed and revised soil temperature classes are used to emphasize the character of the permafrost.

Accompanying this proposal are preliminary keys for classifying Gelisols to the great-group level.

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Keys to Classifying Gelisols to the Great-Group Level

(modified January 18, 1994)

Gelisols must have ice-cemented or "dry" permafrost within 200 cm of the soil surface. The surface of the permafrost control section begins at the surface of the organic mat, or where it is absent, at the surface of the mineral soil. "Dry" permafrost refers to materials that remain <0°C for two or more years in succession but that have insufficient interstitial moisture to cause consolidation. Although "dry" permafrost is pervasive in Antarctica, soil temperature measurements may be required to detect it in other areas such as the High Arctic and alpine regions of Asia.

Gelisols key out before other soil orders. Therefore, a soil derived from organic materials and containing permafrost within 200 cm of the surface is placed in the Gelisol order (Histels) and not the Histosol order. The flow chart in Figure 1 should be used in conjunction with this key for classifying Gelisols to the great-group level. A provisional list of subgroups is given in Table 1. Family differentiae for Gelisols are the same as for other soil orders except that patterned ground is included (Table 2) and revised soil temperature classes are proposed (Table 3).

KEYS TO SUBORDERS

A. Gelisols that are derived principally from organic materials, i.e., the surface layer contains more than 17 percent organiccarbon (30 percent organic matter) and has organic plus fragmental materials totaling 80% or more of the upper 50 cm of the pedon, or is more than 10 cm thick over a lithic contact or over an ice layer that is at least 30 cm thick.

Histels, p. 8

B. Other Gelisols that show marked evidence of cryoturbation as evidenced by broken horizons and displaced material in more than one-third of the active-layer portion of the pedon (see Figs. 2 and 3).

Turbels, p. 9

C. Other Gelisols that have the following:

1. Redox depletions with a chroma of 2 or less in one or more horizons within an average depth of 50 cm of the mineral soil surface; and

2. Aquic conditions within an average depth of 50 cm of the mineral soil surface for some time in most years (or artificial drainage).

Aquels, p. **9**

D. Other Gelisols that have the following:

1. An aridic† soil moisture regime; *and*

2. "Dry" permafrost within 200 cm of the surface.

Ariciels, p. 10

E. Other Gelisols.

Statels, p. 10

HISTELS

Key to great groups

AA. Histels which are never saturated with water except for a few days following heavy rains, *and* which have *both:*

1. A lithic or paralithic contact within **100** cm of the soil surface, and/or fragmental materials resting on a lithic or paralithic contact; *and*

2. Less than three fourths (by volume) *Sphagnum* fibers in the organic soil materials.

Folistels

AB. Other Histels which *either:*

1. Are dominantly fibric in the sursurface tier if that tier is wholly organic except for a thin mineral layer or layers, or the organic parts of the surface and subsurface tiers are dominantly fibric if a continuous mineral layer 40 cm or more thick begins within the depth limit of the subsurface tier; *or*

2. Have a surface mantle that has three-fourths or more of its volume consisting of fibers derived from *Sphagnum* and that rests on a lithic or paralithic contact, fragmental materials, or mineral soil, or on frozen materials within the limits in depth of the surface or subsurface tier.

Fibristels

AC. Other Histels that are dominantly hemic *either:*

1. In the surbsurface tier if that tier is wholly organic except for a thin mineral layer or layers; of

2. In the organic parts of the surface and subsurface tiers if there is a continuous

mineral layer 40 cm or more thick that has its upper boundary within the subsurface tier.

Hemistels

AD. Other Histels.

Sapristek

TURBELS

Key to great groups

BA. 'Turbels that have organic soil material comprising 40 to 60% of the upper 50 cm of the pedon.

Histiturbels

BB. Other Turbels that have redox depletions with a chroma of 2 or less in one or more horizons within an average depth of 50 cm from the mineral soil surface and aquic conditions within an average depth of 50 cm from the mineral soil surface for some time in most years (or artificial drainage).

Hydriturbels

BC. Other Turbels that have an aridic† soil moisture regime and ice-cemented permafrost.

Ariditurbels

BD. Other Turbels that have a surface mineral horizon more than 10 cm thick that otherwise meets with requirements of a mollic or an umbric epipedon.

Humiturbels

BE. Other Turbels.

Ochriturbels

AQUELS

Key to great groups

CA. Aquels that have organic soil material comprising 40 to 80% of the upper 50 cm of the pedon.

Histaquels

CB. Other Aquels that have andic properties in 60 percent or more within the upper 60

cm of the mineral soil surface, or of the top of an organic layer with andic properties, whichever is shallower.

Andaquels

CC. Other Aquels that have a surface mineral horizon more than 10 cm thick that otherwise meets with requirements of a mollic or an umbric epipedon.

Humaquels

CD. Other Aquels that have below the Ap horizon or below a depth of 25 cm, whichever is deeper, less than 35 percent (by volume) of rock fragments and have a texture of loamy fine sand or coarser in all subhorizons either to a depth of 100 cm or to a lithic contact or an ice layer, whichever is shallower.

Psammaquels

CE. Other Aquels.

Ochraquels

ARIDELS

Key to great groups

DA. Aridels that have a gypsic horizon within 50 cm of the soil surface.

Gypsiaridels

DB. Other Aridels that have a salic horizon within 50 cm of the soil surface.

Salaridels

DC. Other Aridels that have a nitric horizon* within 50 cm of the soil surface.

Nitriaridels

DD. Other Aridels that have a calcic horizon within 50 cm of the soil surface.

Calciaridels

DE. Other Aridels.

Haplaridels

STATELS

Key to great groups

EA. Statels that have a spodic horizon within 100 cm of the mineral soil surface.

Spodistatels

EB. Other Statels that have andic properties in 60 percent or more within the upper 60 cm of the mineral soil surface, or of the top of an organic layer with andic properties, whichever is shallower.

Andistatels

EC. Other Statels that have a surface mineral horizon more than 10 cm thick that otherwise meets with requirements of a mollic or an umbric epipedon.

Humistatels

ED. Other Statels that have an argillic horizon within 100 cm of the mineral soil surface.

Argistatels

EE. Other Statels that have below the Ap horizon or below a depth of 25 cm, whichever is deeper, less than 35 percent (by volume) of rock fragments and have a texture of loamy fine sand or coarser in all subhorizons either to a depth of 100 cm or to a lithic contact or an ice layer, whichever is shallower.

Psammistatels

EF. Other Statels.

Ochristatels

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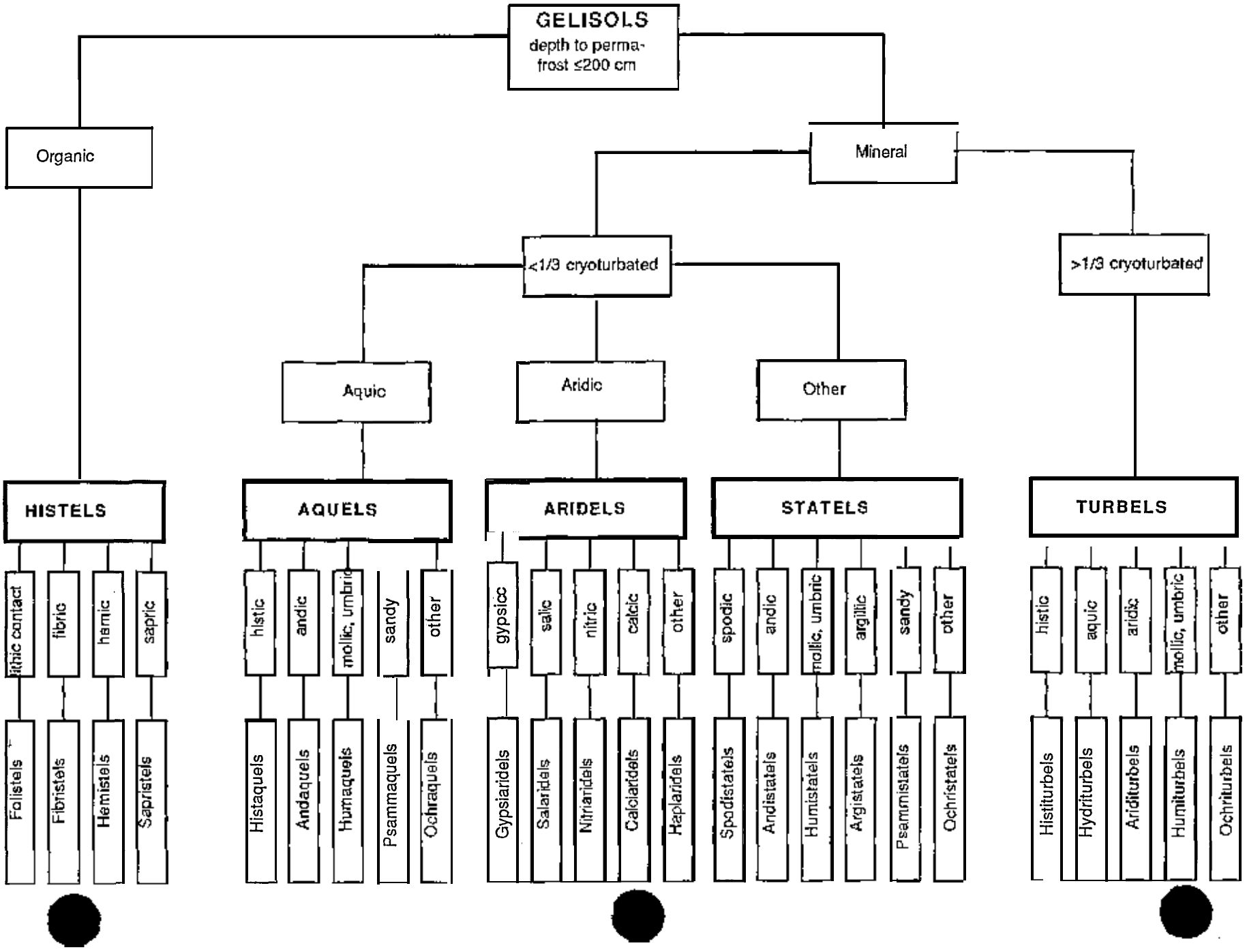
† An aridic soil moisture regime is not recognized in Soil Taxonomy to occur in conjunction with a pergelic soil temperature regime.

‡ A nitric horizon is hereby defined as a salt-cemented horizon 10 cm or more thick containing secondary enrichment of nitrates. The nitrate concentration in 1:5 soil:water extracts is greater than 118 mmol/L throughout; and the product of its thickness (in centimeters) multiplied by its nitrate concentration is 3,500 or more.

Fig. 1. FLOW CHART FOR CLASSIFYING GELISOLS TO THE GREAT GROUP LEVEL



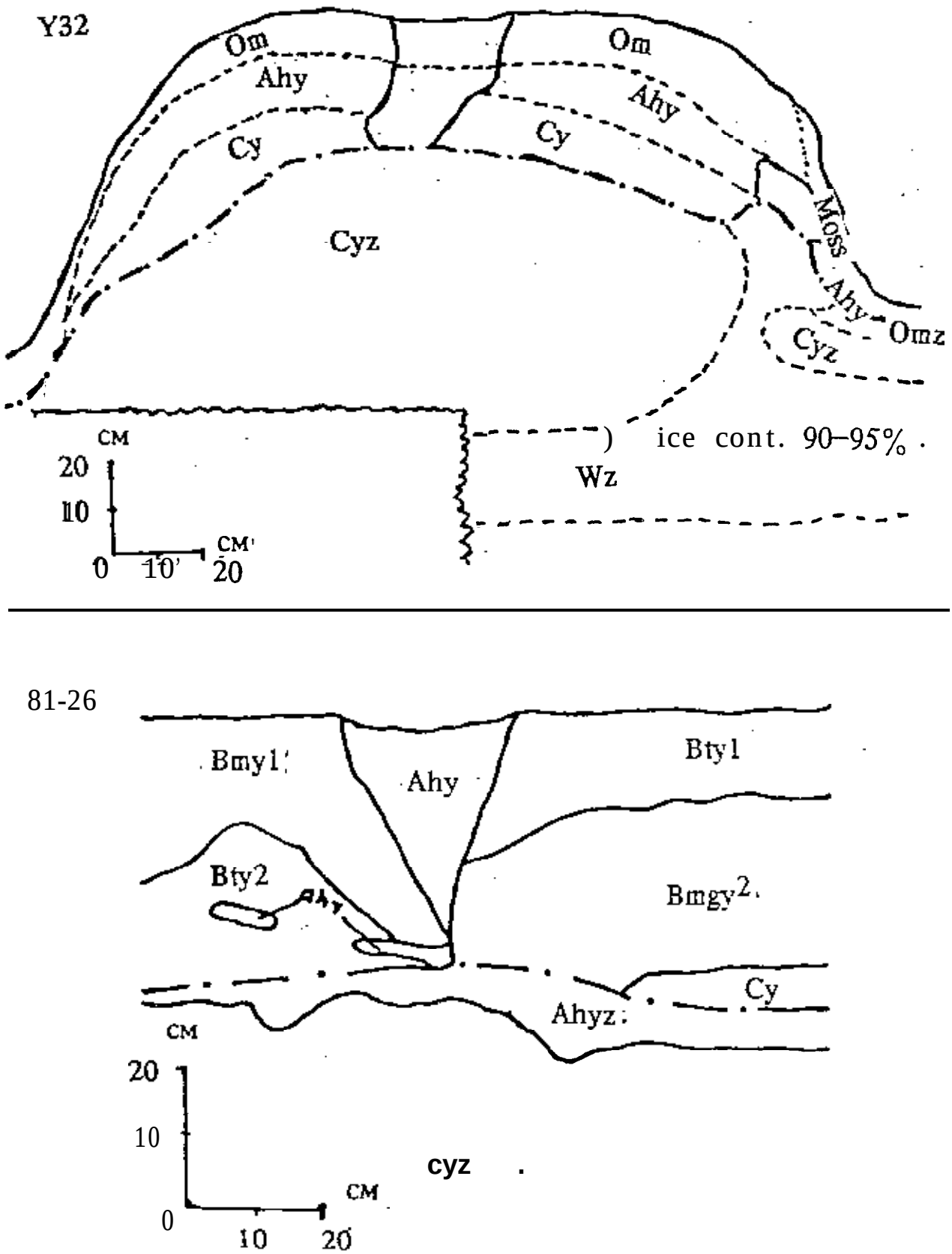


Figure 2. Cross sections of cryoturbated pedons from Canada. Profile Y32 is on an earth hummock and 81-26 is on a nonsorted circle (from Tarnocai and Smith, 1992). Soil horizon nomenclature follows the Canadian system.

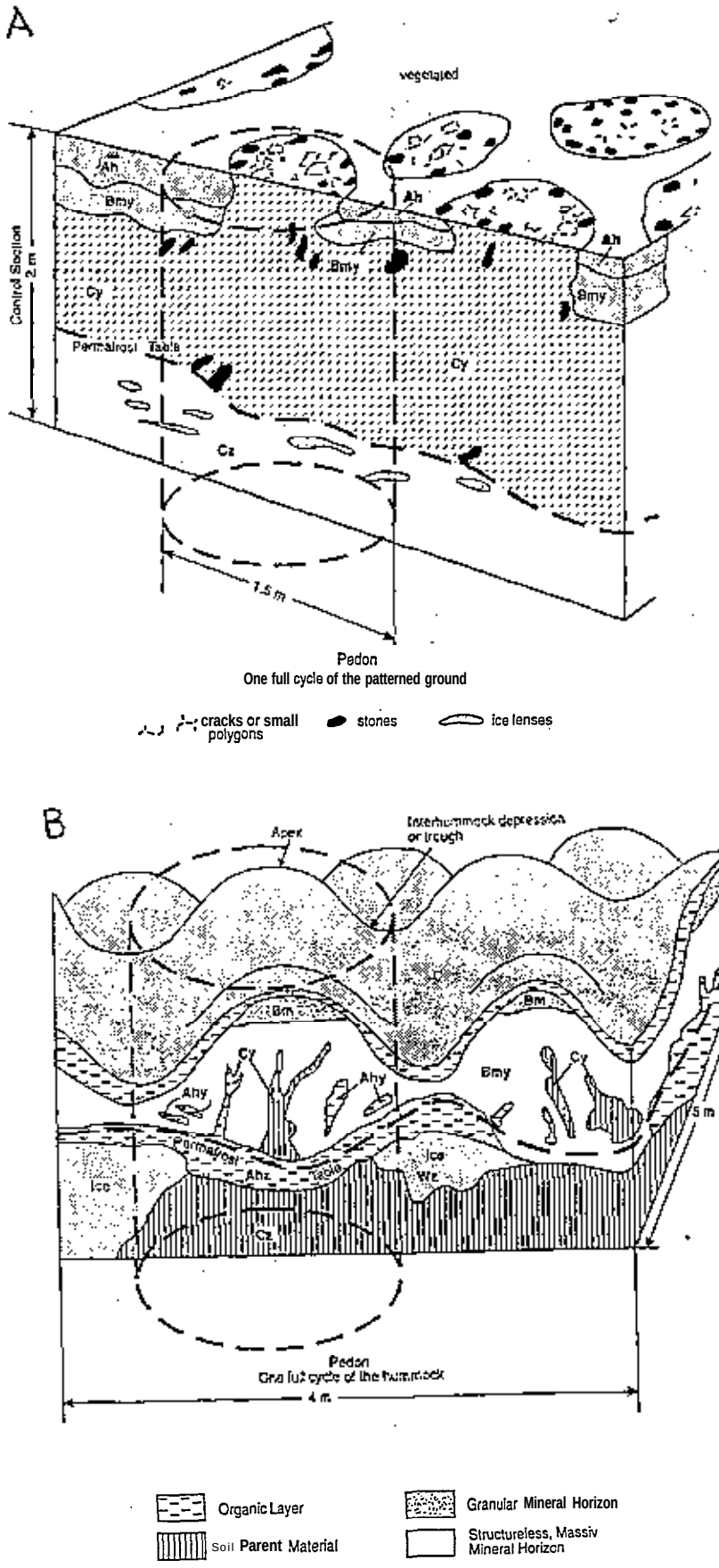


Figure 3. Pedons of Orthic Turbic Cryosols in (A) a nonsorted circle and (B) an earth-hummock type of patterned ground (Tarnocai, 1992). Soil horizon nomenclature follows the Canadian system.

Table 1. Recommended taxa within the Gelisol order.

Suborder	Great Group	Provisional Subgroups
Histels	Folistels	Lithic, Glacic, Typic
	Fibristels	Lithic, Glacic, Terric, Fluvaquentic, Sphagnic, Typic
	Hemistels	Lithic, Glacic, Terric, Fluvaquentic, Typic
	Sapristels	Lithic, Glacic, Terric, Fluvaquentic, Typic
Turbels	Histiturbels	Lithic, Fibric, Sphagnic, Hemic, Sapric, (Ruptic), Typic
	Hydriturbels	Lithic, Histic, Ruptic-Histic, Andic, Humic, Spodic, Fluventic, Typic
	Ariditurbels	Gypsic, Salic, Nitric, Typic
	Humiturbels	Lithic, Vet-tic, Andic, Vitrandic, Cumulic, Fluventic, Aquic, Typic
	Ochriturbels	Lithic, Fluventic, Aquic, Typic
Aquels	Histaquels	Fibric, Hemic, Sapric, Sphagnic, Lithic, Turbic, (Ruptic), Typic
	Andaquels	Lithic, Humic, Spodic, Turbic, Typic
	Humaquels	Lithic, Turbic, Typic
	Psammaquels	Lithic, Spodic, Humaqueptic, Typic
	Ochraquels	Lithic, Fluventic, Spodic, Turbic, Typic
Aridels	Gypsiaridels	Petrogypsic, Entic, Typic
	Salaridels	Petrosalic, Entic, Typic
	Nitriaridels	Entic, Typic
	Calciaridels	Petrocalcic; Entic, Typic
	Haplaridels	Salic, Gypsic, Calcic, Nitric, Entic, Typic

continued

Table 1, continued

Suborder	Great Group	Provisional Subgroups1
Statels	Spodistatels	Lithic, Humic, Andic, Aquic, Entic, Typic
	Andistatels	Lithic, Humic, Spodic, Typic
	Humistatels	Lithic, Andic, Vitrandic, Cumulic, Fluventic, Aquic, Typic
	Argistatels	Lithic, Humic, Typic
	Psammistatels	Lithic, Aquic, Spodic, Typic
	Ochristatels	Lithic, Fluventic, Aquic, Typic

Table 2. Patterned ground family differentiae for Gelisols.

Patterned ground is ubiquitous in soils with permafrost. Patterned ground features are used to differentiate Gelisols at the family level. The introduction of patterned ground classes in the Gelisol order enables better comniunication between cryopedologists and cryogeologists. The terms used here follow Washburn (1980).

Definition of classes

Earth hummocks. -- These features are nonsorted patterned ground which have a knob-like shape and are vegetated. Earth hummocks may have a high ice content or pure ice layers below the organic mat. They are usually 30 to 60 cm high and 0.8 to 1.6 m in diameter.

Sorted circles. -- These features are patterned ground whose mesh is dominantly circular and has a sorted appearance commonly due to a border of coarse fragments surrounding finer material. The coarse fragments may range from gravel to boulders in size. The central areas of most sorted circles contain abundant fines. The interior of the circles ranges from 0.8 to over 3 m in diameter.

Nonsorted circles. -- These features are patterned ground whose mesh is dominantly circular and has a nonsorted appearance due to the absence of a border of coarse fragments such as that characterizing sorted circles'. The border of these features is delineated by vegetation. Well-developed nonsorted circles tend to have central areas that are distinctly domed, the local relief varying from 7.5 to 15 cm. As with sorted circles, nonsorted circles develop singly or in groups.

Sorted polygons. -- These features are patterned ground whose mesh is dominantly polygonal and has a sorted'appearance commonly due to a border of coarse fragments surrounding the finer material. In contrast to circles, sorted polygons apparently never develop singly. Sorted polygons range in size from a few centimeters in diameter to large forms. Size range and sorting of coarse fragments are similar to sorted circles.

Nonsorted polygons. -- These features are patterned ground whose mesh is dominantly polygonal and has a nonsorted appearance due to the absence of a border of coarse fragments such as that characterizing sorted polygons. They never develop singly and range in diameter from a few centimeters to many many meters across.

Sorted nets. -- These features are patterned ground whose mesh is intermediate between that of a sorted circle and a sorted polygon and has a sorted appearance commonly due to a border of coarse fragments surrounding finer material.

Nonsorted nets. -- These features are patterned ground whose mesh is intermediate between that of a nonsorted circle and a nonsorted polygon and has a nonsorted appearance due to the absence of a border of coarse fragments such as that characterizing a sorted net.

Sorted steps. -- These features are patterned ground with a steplike form and a sorted appearance due to a downslope border of coarse fragments embanking an area of finer material upslope. Sorted steps form in groups, and rarely, if ever, occur singly. The treads of sorted steps consist of gravelly sand, silt and clay within stone borders.

Nonsorted steps. -- These features are patterned ground with a steplike form and a nonsorted appearance due to a downslope border of vegetation embanking an area of relatively bare ground upslope. Like sorted steps, nonsorted steps form in groups and have lower borders (risers) that tend to be convex downslope. Nonsorted steps lack a stone border.

Sorted stripes. -- These features are patterned ground with a striped pattern and a sorted appearance due to parallel lines of stones and intervening strips of dominantly finer material oriented down the steepest available slope. Sorted stripes never form singly; they are essentially parallel and may be sinuous. The width of individual stony stripes ranges from a few centimeters to 1.5 meters, and the intervening stripes of finer material may be two to four times wider.

Nonsorted stripes. -- These features are patterned ground with a striped pattern and a nonsorted appearance due to parallel lines of vegetation-covered ground and intervening strips of relatively bare ground oriented down the steepest available slope. Nonsorted stripes lack lines of stones and the stripes are outlined by vegetation.

Table 3. Provisional soil temperature classes for Gelisols.

Class:	MAST (oC)*	MSST-MWST (oC)**	Permafrost Zone
Hypergelic	<-7	>5	continuous
Isohypergelic	c-7	<5	continuous
Pergelic	>-2 to -7	>5	discontinuous
Isopergelic	>-2 to -7	<5	discontinuous
Gelic	0 to -2	>5	sporadic
Isogelic	0 to -2	<5	sporadic

* The mean annual air temperature is approximately 3.5°C colder than the mean annual soil temperature, depending on relief, vegetation, hydrology, snowcover, fire history, texture and organic matter content of the soil, etc. The symbol "<" means "colder than," and the symbol ">" means "warmer than."

** MAST = mean annual soil temperature at 50 cm. MSST = mean summer soil temperature, including June, July, August in the Northern Hemisphere. In some areas, September may be warmer than June and should be used in the calculation. MWST = mean winter soil temperature, including December, January, and February in the Northern Hemisphere.

Appendix 1: Recipients of ICOMPAS 1st circular

Ahrens, Robert, U.S.A.
Arnold, Richard, U.S.A.
Asselin, Richard, Canada
Base, Dick, U.S.A.
Bauer, Ronald, U.S.A.
Bigelow, Nancy, U.S.A.
Bognar, Andrija, Croatia
Brolle, Gabrielle, Germany
Brown, Jerry, U.S.A.
Clark, Mark, U.S.A.
Ditzler, Craig, U.S.A.
Doolittle, James, U.S.A.
Edland, Larry, U.S.A.
Engel, Robert, U.S.A.
Eswaran, Hari, U.S.A.
Everett, Kaye, U.S.A.
Fanning, Del, U.S.A.
Fenton, Tom, U.S.A.
Fox, Catherine, Canada
Gardner, Charles, U.S.A.
Giiichinsky, David, Russia
Gubin, Stanislav, Russia
Heil, Dennis, U.S.A.
Huber, Larry, U.S.A.
Jakobsen, Bjarne, Denmark
Kennedy, Kathleen, Canada
Kimble, John, U.S.A.
Konyushkov, Dmitri, Russia
Kroetsch, Dave, Canada
Langlois, Kark, U.S.A.
Lewis, David, U.S.A.
Lichvar, Robert, U.S.A.
Lynn, Warren, U.S.A.
Makeev, Oleg, Russia
Mazhitova, Galena, Russia
McKenna, Karen, Canada
Miles, Randy, U.S.A.
Moore, Joseph, U.S.A.
Mougeot, Charlotte, Canada
Njastad, Birgit, Norway
Naumov, Yevgeny, Russia
Oldeman, L.R., The Netherlands
Olson, Carolyn, U.S.A.
Pfeiff er, Eva-Marie, Germany
Ping, Chien-Lu, U.S.A.
Pringle, Russ, U.S.A.
Raisanen, Marja-Liisa, Finland
Rieger, Sam, U.S.A.

Roarke, Robert, U.S.A.
Schweitzer, Ferenc, Hungary
Sletten, Ronald, U.S.A.
Smith, Scott, Canada
Sokolov, Ilya, Russia
Sombroek, Wim, Italy
Swanson, Dave, U.S.A.
Tarnocai,, Charles, Canada
Tugel, Arlene
Tursina, Tatyana, Russia
Ugolini, Fio, Italy
VanPatten, Doug, U.S.A.
Veldhuis, Hugo, Canada
Wang, Hao-Qing, China
Wang, Jesse, U.S.A.
Weston, Michelle, U.S.A. (Canada)
Wilding, Larry, U.S.A.
Williams, Dewayne, U.S.A.
Wilson, Michael, U.S.A.
White, Joe, U.S.A.
Whitman, Carol, U.S.A.
Zhou, Qi-Guo, China

Please check one of the following:

I wish to remain on the mailing list

Please: mail this page along with your comments on the proposal on the backside of this page to:

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*February 20, 1993

AASG

Association of American State Geologists

Representing 50 States and the Commonwealth of Puerto Rico

ITEM 15

164

ASSOCIATION OF AMERICAN STATE GEOLOGISTS

Who Are We?

We represent the state geological surveys in all 50 states and Puerto Rico. The responsibilities of various state geological surveys differ from state to state, depending upon the enabling legislation and the traditions under which each survey evolved. Almost all state surveys function as a basic information source for their state governments' executive, legislative, and judicial branches. Some surveys have regulatory responsibilities for water, oil and gas, or land reclamation.

What Do We Do?

State geologists and their staffs serve both the public and private sectors. They prepare geologic maps showing the distribution of rock formations; mineral resource maps identifying the locations of potentially economic mineral deposits; and a variety of other maps useful to environmental management (coastal zone, slope, potential hazards, etc.). Furthermore, state geologists and their staffs serve in an advisory capacity to governmental groups; conduct projects aiding earth-science education in the public schools; maintain repositories of subsurface rock cores and samples; assist in siting of public and private institutional and industrial facilities; and provide a host of other services to the public and private sectors.

Our Heritage

The first state geological survey was established in 1823 in North Carolina. By 1840, a total of *15* state surveys, most of which were charged with the discovery of mineral, land, and water resources in their state or territory, were in existence. The earliest organization of state geologists began in 1906 when Foster Bain, State Geologist of Illinois, invited state geologists in the Mississippi Valley area to a luncheon at the Quadrangle Club in Chicago. E. R. Buckley of Missouri was elected president of the new Mississippi Valley Association of State Geologists. In 1908, that group disbanded in favor of its successor, the Association of American State Geologists. AASG was organized on May 12, 1908, in Washington, D.C., at a special meeting with officials of the U.S. Geological *Survey.* State geologists from 23 states attended. On the second day of that meeting a brief constitution and bylaws were adopted, and Henry B. Kummel, State Geologist of New Jersey, was elected president.

Annual Meetings

State geologists and senior staff members, along with invited guest speakers, attend an annual business meeting that is held in a different state each year for the purposes of exchanging information, developing new initiatives, and considering other topics related to state survey operations and budgets. Members of AASG discuss issues of common interest and initiate united actions when warranted.

Liaison Committee

The AASG Liaison Committee, composed of the executive committee and four regional representative members appointed for 3-year staggered terms, meets in Washington, D.C., twice annually to confer with officials of Federal agencies, members of Congress, and staff members of Congressional committees who have responsibility for matters relating to mineral, water, and energy resources and the surrounding environment. Liaison Committee members serve as regional communicators to inform other state geologists about matters of special interest to their states.

Publications

The State Geological Surveys, A History, edited by Arthur Socolow (State Geologist of Pennsylvania, 1961–1986), was published by the Association in 1988. This book is a compendium of historical records, anecdotes, and photographs for each of the individual state geological surveys. Hardbound copies are available for $20.00 each, postpaid, from the current Secretary-Treasurer of AASG.

The State Geologists Journal is devoted to the dissemination of information concerning the organization, facilities, activities, accomplishments, and publications of the various geological surveys and mining bureaus of the states, and other information of interest to those agencies pursuing research in the natural resources field. The Journal is issued once a year in a limited edition. Copies may be purchased for $10.00 each from the current Secretary-Treasurer of AASG.

The AASG Fact Book provides pertinent information about the programs for each of the state geological surveys. Also included in this publication is a listing of program managers with their telephone numbers. The **Fact Book** is updated annually. Copies may be purchased for $15.00 each from the current Secretary/Treasurer of AASG.

AASG Secretary/Treasurer

Walter Schmidt, Director
Florida Geological Survey
903 West Tennessee Street
Tallahassee, FL 32304-7700

ITEM 16

NASIS - General

Topics

- Publication of Soil Survey Reports from NASIS
- Soil-Landscape Relationships in NASIS
- Soil Properties to Quantify Soil Quality in NASIS
- Use Dependant & Temporal Data in NASIS
- National Soil Data Access System
- State of the Soil Survey

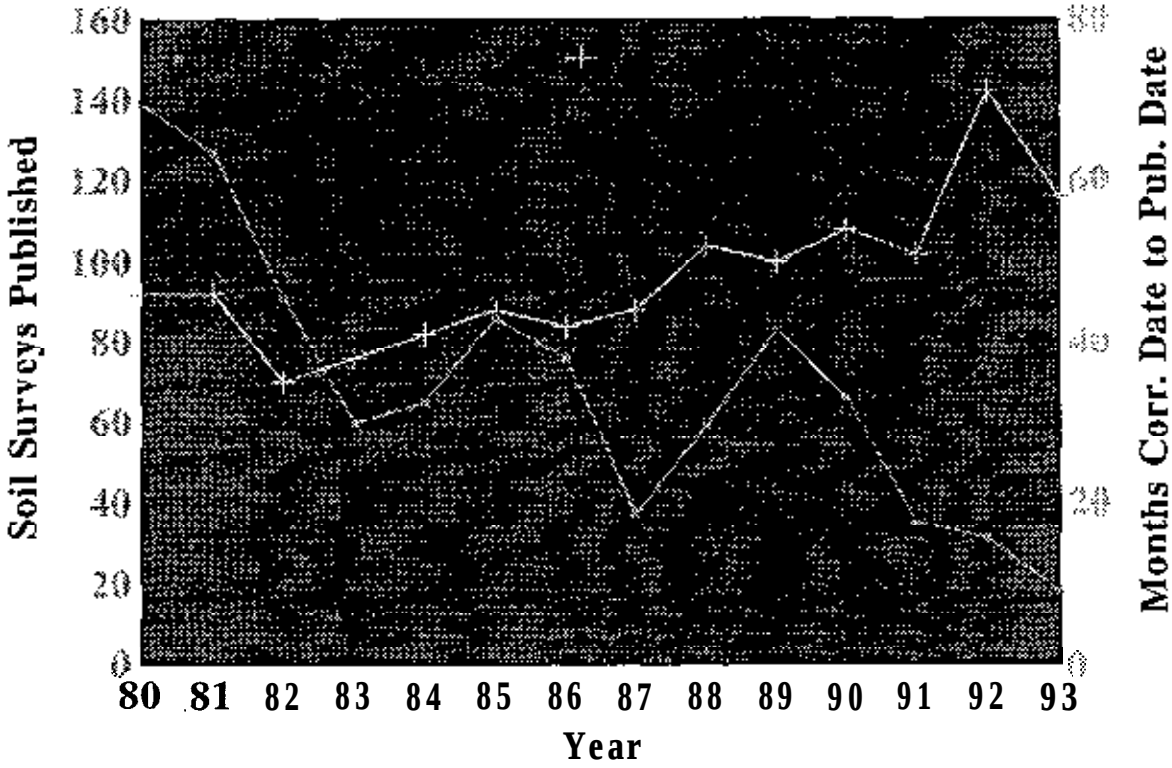
Publication of Soil Survey

Soil Survey Publication Streamlining Quality Improvement Team

Reports from NASIS

- **Complete Report by September 1994**
- **Montana Project**
- **IQ Reportwriter - NASIS Team**
- **State Conservationist Meetings**

Soil Surveys Published



Soil Surveys Published

Year	Num. Surveys	Min. Months*	Max. Months*	Avg. Months*
93	18	13	94	58
92	31	35	136	71
91	35	23	91	51
90	66	24	89	54
89	83	24	113	50
88	59	31	177	52
87	37	26	104	44
86	76	20	113	42
85	86	20	100	44
84	65	9	118	41
83'	60	16	81	38
82	91	14	115	35
81	127	15	151	46
80	139	15	161	46

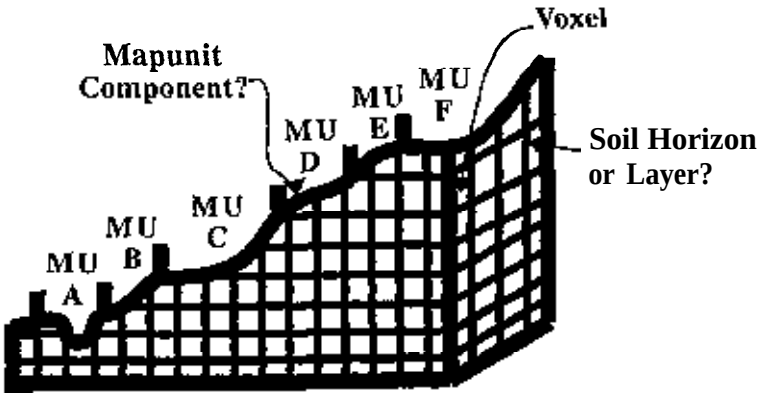
* From Final Correlation to Publication

We Have Several Excellent Excuses - However ...

Soil-Landscape Relationships in NASIS

- **How to model the landscape?**
- **How to capture on a database?**

One Answer May Be Voxels



- 3 dimensional
- Use and time dependant properties
- GIS Systems will now do analysis of voxels

Soil Properties to Quantify

Soil Quality in NASIS

- What new properties are required?
- -What existing properties do we have in NASIS that we can use?

Use Dependant & Temporal Data in NASIS

- **NASIS Release 1.0 allows Use Dependant Properties.**
- **Use Dependant & Temporal Requirements are Driven by Model Needs**
- **15 Models at TISD use Soil Data**

Strategies for a National Soil Data Access System (NSDAS)

1. **An Electronic Network**
2. **Data Collection Software**
3. **Federal Standards**
4. **National Soil Data Access Facility**
5. **Grant Criteria**
6. **Publication Criteria**
7. **Multiagency Commitment**
8. **Educating the Scientific Community**

Strategy No. 1
An Electronic Network

- FGDC Clearinghouse
- FGDC Metadata Standard
- WAIS
- Internet
- High Speed Fiber Optic Lines

Strategy No. 2
Data Collection Software

- DOS PC Version of Pedon 4.0
  SCS users = 100
  Non-SCS users = 500 U.S.
  = 500 Int.

Strategy No. 3
Federal Standards
FGDC Soil Subcommittee

Categories

- **Reference Model**
- **Definitions, Terminology and Content**
- **Feature Delineation and Representation Rules**
- **Data Collection Rules and Procedures**

Strategy No. 3 (Cont.)
Federal Standards
FGDC Soil Subcommittee

Categories

- **Georeferencing**
- **Data Quality Description**
- **Metadata**
- **Data Exchange and Transfer**

Strategy No. 4
National Soil Data Access Facility

Current Plans

- Planitor (Prototype) - ISU
- Strategic Database Team
- SCS Facility Location March 1994

Strategy No. 6
Publication Criteria

Require/encourage contribution of soil data that is collected during research and published in journals to be added to NSDAS.

Strategy No. 5
Grant Criteria

- **Requirements from granting agencies to create soil data to FGDC Standards and populate the NSDAS.**

Strategy No. 7
Multiagency Commitment

- **Establish policy internal to each agency relating to the NSDAS**

Strategy No. 8
Educating the Scientific Community

- Create symposia at conferences
- Special publications

State of the Soil Survey

There are:

164 Area Offices with Soil Scientists

59 Field Offices with Soil Scientists

242 Project Offices with Soil Scientists

79 State Offices with Soil Scientists

State of the Soil Survey

Grade		#'s	Grade		#'s
5	–	11	12	=	170
7	=	30	13	=	88
9	–	228	14	=	25
11	=	500	15	=	12
			SES	=	1
Total		769	Total		296
Total		1065			

Our numbers are not going to increase. We must take care of those things that count the most.

We must protect quality and customer service.

We need to take some risks! New Products, Ideas!

You have more opportunities now than ever before.

Don’t let NSSC or NSH guidelines become excuses or killers of Innovation.

Technology Transition

From	To
Analog	Digital
Centralized	Decentralized
Non-networked	Networked
Component Process	Landscape Process
Single Models	Integrated Models
Separate Resources	Multiple Resource
Uncle Wiggley	Ninetendo

Briefing Paper

Current Status of Soil Data Bases, the Facilities That House Them and Interactions With These Facilities

Dennis J. Lytle
11-4-93

This paper describes the current state of the SCS and National Cooperative Soil Survey soil data bases and the facilities that house them. It is written to provide background information for the current SCS discussion on coordinated data base access, distribution, management, and archives. It describes the complexity of the current system and the infrastructure that supports it. It will aid in discussions of whether one central physical location for soil data is practical, and it provides information on the costs that may be associated with creating and maintaining such a facility.

Iowa State University (ISU) Ames Iowa. The soil data bases at ISU were developed to generate tables for soil survey publications and to provide for the coordination of estimated chemical and physical properties, interpretations and soil performance data. They are used for many purposes today. They have been stored at ISU since 1974. ISU still provides the mechanisms to create the soil data bases for the soil survey areas in the U.S. Since 1974 one person, Harvey Terpstra, has provided leadership at ISU. Five other permanent staff and several data entry staff are necessary to support this facility. The system here houses the Soil Interpretation Record (SIR) or Soil 5 data base, Map Unit Use File (MUUF) created from Soil 6's, the Official Series Description Data Base (OSED) and the Soil Classification (SC) file. Most of the software that accesses and manipulates the data at ISU is written PL1 language. State offices staff interact with the SIR and MUUF via modems to maintain the SIR and MUUF and to create the Map Unit Interpretation Record (MUIR) data in the State Soil Survey Data Base. The National Soil Survey Center interacts with the SIR, MUUF, OSED and SC file. The NSSC updates the OSED and SC files electronically from the NSSC. The SCS part of the costs in the cooperative agreement that exists with the ISU Agricultural Experiment Station were about $550,000 in FY93. The ISU share of the costs were about $200,000 in FY93. About $230,000 of the SCS costs, which are ISU mainframe computer costs, will disappear when NASIS has been implemented in FY95, because it will no longer be necessary for states to interact with the SIR and MUUF or for ISU to manually enter SIR data. The other cost ($220,000) will continue where ever these data are located. ISU supplies soil data to numerous external customers and some internal customers. ISU charges for the computer and personnel time to fill the request unless instructed otherwise by the NSSC. The NSSC clears all data distributed. Recently ISU has been experimenting with putting the MUIR data on their UNIX/workstation system called project Vincent. As part of INFOSHARE we have agreed to develop and INTERNET access to the MUIR data on Vincent in order to allow the Cooperative Extension Service access to the MUIR data for their PLANITOR project. We will also provide NSSC, ARS, BLM, Forest Service and others access the MUIR data through this system. This effort will eventually provide access to the Map Unit Record (MUR) data from NASIS.

Army Corp of Engineers, Construction Engineering Research Laboratory (CERL), Champaign Illinois. Data have been stored and distributed from CERL since the early 1980's. s developed several programs within its Environmental Technical Information System (ETIS) to query soil data, and through the Computer-Aided Land Evaluation System (CALES) to develop the land evaluation (LE) portion of the Land Evaluation and Site Assessment (LESA) urban program. Through a cooperative agreement with SCS CERL receives the SIR and MUUF from ISU every other month. Software has been written by CERL that combines the SIR and MUUF. Anyone can contact CERL to obtain a login and with a login can dial a l-800 number to get into CERL via a modem and query the soil data or generate the LE part of LESA. SCS users though cooperative agreement are charged a lower rate, $70 versus $90 per hour, than outside users. SCS receives the lower rate because they are supplying CERL with the data for other uses. In FY93 SCS users logged around 300 hours of use and thus SCS paid CERL about $21,000. CERL trains about 25 to 35 persons per year on the use of ETIS and includes a 2 hour session on the use of

soil data. Lloyd Wright very strongly supports the continuation of this arrangement, especially because of an anticipated increase in urban emphasis in SCS. It cannot continue with its present processes though, because of changes that will take place when the NASIS software is released in October 1994. After that date in order for CERL to continue to provide access to soil data, the software that CERL has written to access the soil data will have to be rewritten either at SCS or CERL expense. SCS must maintain the capabilities that CERL provides somewhere. Kim Majerus manages the soil data base at CERL has been doing it for about 6 years. Jim Danley at CERL wrote most of the software that accesses the SIR and MUUF. This software is written in C language. CERL is very interested in continuing the arrangement.

State of Nebraska Computer System. Lincoln Nebraska. The State of Nebraska houses the Soil Survey Laboratory Research Data base(SSLRDB), which consists of the analytical characterization data base, and a corresponding pedon description data base and SCS-Soil-8 data base, and several special data bases such as a soil moisture data base. Data has been housed on this computer since the late 1970's. The SCS reimburses the State of Nebraska about $40,000 per year for housing these data. The National Soil Survey Laboratory (NSSL) at Lincoln interacts via direct line with this main frame computer to input, manipulate and retrieve soil description and characterization data that are generated from the NSSL. One computer specialist, two soil scientists working part time, and several other WAE's maintain these data bases and related NSSL developed software. The software that accesses and manipulates the data in this system is written in FORTRAN. Most of the data evaluation is done in SAS. The 150 or so programs, primarily data processing programs, that are written in Fortran would need to be rewritten if this system were moved to a SCS mainframe computer. These programs could be rewritten and moved under the tutelage of the National Soil Survey Lab over a period of time if the system were at the NSSC in Lincoln. It could take 3 to 5 years of non-soil scientist programmer time to rewrite these routines in "C".

National Cartographic and GIS Center (NCG), Fort Worth Texas. NCG has archived and distributed the soil geographic data bases (SSURGO, STATSGO, NATSGO) since about 1989. NCG has the authority to recover the cost of preparing the data for distribution. The SCS charges $500 per SSURGO, STATSGO or NATSGO data set. States work with NCG through various arrangements to digitize soil surveys. Some are done in house at state offices, some are done at NCG, some are contracted in state, and some are contracted through NCG. NCG normally reviews all digital data before states submit certified data sets to NCG. NCG notifies states when, and indicate to whom they distribute data. NCG has expertise in digital spatial data, especially in relation to soils, that is not duplicated anywhere. NCG has plans to obtain sufficient disk storage to provide on line access to soil geographic data bases. NCG is also restructuring its staff to handle the increased workload associated with the review of soil digital spatial data.

National Soil Survey Center (NSSC), Lincoln Nebraska. The NSSC maintains a duplicate copy of the SIR data base on a 3B2 600 computer in INFORMIX. The NSSC staff use this data base for research and development and quality assurance. The NSSC needs INTERNET access to all of the soil data bases.

The attachments provide more information about these data bases. The MUIR data base will be replaced when NASIS is released in October of 1994 with the Map Unit Record (MUR) data base. The OSED and SIR data base will be replaced with the National Standard Data Base (NSDB). The MUR, SSLRDB, NSDB and the three soil geographic data bases are what SCS will distribute to the public after NASIS is released. This paper does not provide specifics about the costs of moving each of these "systems" to a central location, nor does it provide specifics about the cost of maintaining these systems on a new central system. However based on current staffing it will easily take a staff 6 to 8 computer scientists (programmers, engineers, specialists and systems maintenance personnel) to make such a system work for the soil data bases. In addition it would take 3 to 5 soil scientists. It will not necessarily be more economical to house these system on a central SCS owned system. SCS currently does not have any of the overhead associated with maintaining or "keeping up" a mainframe computer. We are normally small players on all these systems and thus receive good value for these system costs. Any scheme for consolidation must be well conceived, planned and funded.

U.S. Department of Agriculture
Soil Conservation Service

National Soil Geographic Database (NATSGO)

Data Product Keywords

Soils, land resource regions, major land resource area

Summary

The area boundaries of the National Geographic Database (NATSGO) are formed from the major land resource area (MLRA) and land resource region (LRR) boundaries. The NATSGO map was digitized at a scale of 1:7,500,000. The digital data is designed to be used for national, regional, and multi-state resource appraisal, planning, and monitoring.

Extent of Program

National

Available Product Coverage

A single data unit is distributed for the United States and the Caribbean area. A hard copy (color) of the NATSGO data is available.

Information Content

Digitizing is done by line segment (vector) format. The base map used is a 1970 Census Bureau state and county digital data base, Albers Equal Area projection.

Map unit composition for NATSGO was determined by sampling done as part of the 1982 National Resources Inventory (NRI). Sample data were expanded for these MLRAs, with sample design being statistically significant to state parts of the MLRAs.

NATSGO is linked to a Soil Interpretations Record (SIR) attribute data base through the NRI data base. The soil mapping units contain many components. Soil property or interpretative maps can be developed to reflect the percentage of the map unit having the queried properties or interpretations. For example, two soil informational or interpretational maps that can be made from the data bases are percentage of soils with less than 20 inches to bedrock and occurrence of hydric soils.

Product Delivery Format

NATSGO data is available in either the USGS Digital Line Graph (DLG-3) Optional Distribution Format or-the SCS Geographic Exchange Format.

Distribution media for NATSGO data is g-track magnetic tape at 1,600 bpi. The cost of spatial and attribute data for complete U.S. coverage is $500.

The Soil Interpretations Record (SIR) data are stored in a relational data base. This format is nonfixed length, tab delimited, ASCII file, and distributed on magnetic or cartridge tape.

Technical, Ordering, and Availability Information

To obtain NATSGO soil spatial and attribute data contact:

National Cartographic and Geographic
Information Systems Center
USDA - Soil Conservation Service
P.O. Box 6567
Fort Worth, TX 76115
Telephone: (817) 334-5559
FAX: (817) 334-5290

To obtain technical information about the use of soils data, please contact the SCS State Soil Scientist in your state, or contact the National Soil Survey Database Coordinator at:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5423
FAX: (402) 437-5336

U.S. Department of Agriculture
Soil Conservation Service

State Soil Geographic Database (STATSGO)

Data Product Keywords

Soils, land resource regions, major land resource area, properties, interpretations

Summary

Soil maps for the State Geographic Database (STATSGO) are made by generalizing the detailed soil survey data. The mapping scale for STATSGO map is 1:250,000. The level of mapping is designed to be used for broad planning and management uses covering state, regional, and multi-state areas.

Extent of Program

National

Available Product Coverage

STATSGO data is available for most states. Development of a STATSGO is planned for each state. A STATSGO digitizing status map is available.

Information Content

Digitizing is done by line segment (vector) format in accordance with Soil Conservation Service (SCS) digitizing standards. The base map used is the U.S. Geological Survey 1:250,000 topographic quadrangles. The number of soil polygons per quadrangle map is between 100 and 400. The minimum area mapped is 1,544 acres.

STATSGO data are collected in 1:250,000 quadrangle units. Map unit delineation units match at state boundaries. States have been joined as one complete seamless data base to form statewide coverage. Composition of soil map units was coordinated across state boundaries, so that component identities and relative extents would match.

Each STATSGO is linked to Map Unit Interpretation Record (MUIR) attribute data base. The attribute data base gives the proportionate extent of the component soils and their properties for each map unit. The STATSGO map units consist of 1 to 21 components each. The Map Unit Interpretation Record data base includes over 25 soil,m physical, and chemical properties, interpretations, and productivity. Examples of information that can be queried from the data base are available water capacity, soil reaction, salinity, flooding, water table, bedrock, and interpretations for engineering uses, cropland, woodland, rangeland, pastureland, widlife, and recreation development.

Product Delivery Format

STATSGO data is available in either the USGS Digital Line Graph (DLG-3) Optional Distribution Format or the SCS Geographic Exchange Format. SCS soil map symbols are not normally carried within the DLG3 Optional Format; however, these map symbols are made available as a unique ASCII file when SCS soils data are distributed in the DLG format.

Distribution media for STATSGO data is 9-track magnetic tape at 1,600 bpi. The cost of spatial and attribute data for one county or soil survey area is $500.

Technical, Ordering, and Availability Information

To obtain STATSGO soil spatial and attribute data, contact:

National Cartographic and Geographic
Information Systems Center
USDA - Soil Conservation Service
P.O. Box 6567
Fort Worth, TX 76115
Telephone: (817) 334-5559
FAX: (817) 334-5290

To obtain technical information about the use of soils data, please contact the SCS State Soil Scientist in your state, or contact the National Soil Survey Database Coordinator at:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5423
FAX: (402) 437-5336

U.S. Department of Agriculture
Soil Conservation Service

Soil Survey Geographic Database (SSURGO)

Data Product Keywords

Soils, soil survey area, map units, components, properties, interpretations, productivity

Summary

Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic Database (SSURGO). Mapping scales generally range from 1: 12,000 to 1:31,680; SSURGO is the most detailed level of soil mapping done by the Soil Conservation Service (SCS). SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships, and county natural resource planning and management. The use should be knowledgeable of soils data and their characteristics.

Extent of Program

National

Available Product Coverage

SSTJRGO data is available for selected counties and areas throughout the United States and its territories. A soil survey digitizing status map and list of soil survey digitized is available.

Information Content

Digitizing is done by line segment (vector) format in accordance with Soil Conservation Service (SCS) digitizing standards. The mapping bases used meet national map accuracy standards and are either orthophotoquads or 7.5-minute quadrangles. SSURGO data is collected and archived in 7.5-minute quadrangle unites, and distributed as complete coverage for a county or area usually consisting of 10 or more quad units. Soil boundaries ending at quad neatlines are joined by computer to adjoining orthophotoquad maps to achieve an exact match.

SSURGO is linked to Map Unit Interpretation Record (MUIR) attribute data base. The attribute data base gives the proportionate extent of the component soils and their properties for each map unit. The SSURGO map units consist of 1 to 21 components each. The Map Unit Interpretation Record data base includes over 25 soil,m physical, and chemical properties. Examples of information that can be queried from the data base are available water capacity, soil reaction, salinity, flooding, water table, bedrock, and interpretations for septic tank absorption fields, engineering uses; cropland, woodland, rangeland, pastureland, and wildlife; and recreational development.

Product Delivery Format

SSURGO data is available in either the USGS Digital Line Graph (DLG-3) Optional Distribution Format or the SCS Geographic Exchange Format. SCS soil map symbols (e.g. AbC) are not normally carried within the DLG-3 Optional Format; however, these map symbols are made available as a unique ASCII file when SCS soils data are distributed in the DLG format.

Distribution media for SSURGO data is g-track magnetic tape at 1,600 bpi. The cost of spatial and attribute data for one county or soil survey area is $500.

The MUIR attribute soils data are stored in a relational data base. This format is nonfixed length, tab delimited, ASCII file, and distributed on magnetic or cartridge tape.

Distribution media for the MUIR attribute soils data is normally a g-track tape at 1,600 bpi. The cost of spatial and attribute data for one county or soil survey area is $500.

Technical, Ordering, and Availability Information

To obtain SSURGO soil spatial and attribute data, contact:

National Cartographic and Geographic
Information Systems Center
USDA - Soil Conservation Service
P.O. Box 6567
Fort Worth, TX 76115
Telephone: (817) 334-5559
FAX: (817) 334-5290

To obtain technical information about the use of soils data, please contact the SCS State Soil Scientist in your state, or contact the National Soil Survey Database Coordinator at:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5423
FAX: (402) 437-5336

U.S. Department of Agriculture
Soil Conservation Service

Soil Survey Laboratory Research Database (SSLRDB)

Data Product Keywords

Soils, soil survey investigations, soil characterization data, soil laboratory data, soil research data, physical soil data, chemical soil data, mineralogical soil data, pedon descriptions.

Summary

The database of the Soil Survey Laboratory (SSL), National Soil Survey Center, currently contains analytical data for more than 20,000 pedons of U.S. soils and about 1,100 pedons from other countries. Standard morphological pedon descriptions are available for about 15,000 of these pedons. Partial data for pedons currently being analyzed may be unavailable. Soil fertility measurements, such as those made by Agricultural Experiment Stations, were not made. Most of the data were obtained over the last 40 years. About 3/4 of the data is less than 20 years old. Analytical data for most of the pedons is fairly complete, according to the prevailing view of the research and characterization needs when the pedon was sampled. Generally, the kinds of analyses have increased over time.

Extent of Program

International

Available Product Coverage

Single data unit. State and Major Land Resource Area (MLRA) data are available to SCS users by special arrangement.

Information Content

Sample site selection, morphological pedon descriptions, and sample collection were by experienced soil scientists. Sample preparation and analytical procedures are described in Soil Survey Investigations Report, No. 42, Soil Conservation Service, 1992. Analytical determinations were either made by soil scientists or by analysts supervised by soil scientists. Computer data handling techniques and calculations of primary and derived data were developed by experienced SSL soil scientists, competent in laboratory operations and computer programming.

The SSL database is composed of the SSL working computer files. It includes pedons that may or may not represent the central concept of a soil series or map unit and pedons sampled to bracket a range of soil properties within a series or a landscape. For research purposes, all such data are retained in the database. Users unfamiliar with a given soil may want to consult a knowledgeable soil scientist to determine how well a given pedon represents a soil series. Furthermore, the database has not been edited for erroneous or sometimes misleading data, and users are responsible for the assessment of the accuracy and applicability of the data.

Product Delivery Format

The data can be made available on

- Nine-track computer tape reel in EBCDIC or ASCII
- IBM 3480 tape cartridge in EBCDIC or ASCII
- Micro-computer DOS/Windows system compatible High Density (1.44mg) 3 1/2 inch floppy diskette in ASCII.

The data can be formatted in sequential column positional files with or without column delimiters.

Technical, Ordering, and Availability Information

To obtain SSLRDB data or technical information about the use of soils data, contact the National Soil Survey Database Coordinator at:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5363

U.S. Department of Agriculture
Soil Conservation Service

Soil Interpretation Record Database (SIR)

Data Product Keywords

Soils, attribute data, soil properties, soil survey, soil series, phases

Summary

SIR is a database of the national values and ranges of soil and non-soil properties, interpretations, and performance data for soil series and their phases. Its primary use currently is two-fold. The SIR, in concert with the Official Soil Series Database (OSD), sets the standards or limits and definitions for soil series and their phases. The SIR is used to generate the initial unedited version of the Map Unit Interpretation Record (MUIR) database. The SIR database is not intended to be used for site-specific land use suitability determinations, such as approval, siting, and sizing of septic tank absorption fields nor is it intended for county-level soils information and interpretations. It is not intended to be used in lieu of the MUIR for county-level specific soils information. The MUIR data is more suitable, when used in conjuction with soil survey maps, for basic land use planning.

SIR data exists in the database as a range of soil properties, depicting the total range for the soil series for the geographic area of the United States. Data is obtained from a combination of field observations, site descriptions, and transects, and laboratory analyses.

Extent of Program

National

Available Product Coverage

SIR data is available for all recognized soils and miscellaneous areas in the United States. Though the information is soil series- or phase-specific, it is not location-specific. Its ranges are an aggregation of ranges of soil properties of all observations of a given soil series.

Information Content

SIR data is a collection of soil and soil-related properties, interpretations, and performance data for a soil series and its phases. Information is stored for the whole soil and its layers. Information contained within the SIR database have been reviewed and certified in accordance with national SCS data quality standards.

The Soil Interpretation Record contains about 88 estimated soil physical and chemical properties, interpretations, and performance data. These include available water capacity; soil reaction; soil erodibility factors (K, Kf, and T); hydric soil ratings; ponding, flooding, water table depth and duration; bedrock; interpretations for sanitary facilities, building site development, engineering, cropland, woodland, and recreational development; and yields for common crops, site indices of common trees, and potential production of rangeland plants.

Product Delivery Format

SIR data is stored in a relational database. This format is nonfixed length, tab delimited, ASCII file and distributed on magnetic or cartridge tape.

Technical, Ordering, and Availability Information

To obtain SIR data or technical information about the use of soils data, contact the National Soil Survey Database Coordinator:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5423
FAX: (402) 437-5336

U.S. Department of Agriculture
Soil Conservation Service

Map Unit Interpretation Record Database (MUIR)

Data Product Keywords

Soils, attribute data, soil properties, soil survey, interpretations, performance data

Summary

MUIR data should be used in conjunction with soil survey maps. The soil survey maps indicate the geographic location and extent of the soil map units within the soil survey area. Mapping scales generally range from 1: 12000 to 1:31680. The maps meet or exceed the national SCS mapping specifications. MUIR data is intended to be used by landowners, county and local governments, and other natural resource managers for basic land use planning. It is not intended to be used for site-specific land use suitability determinations, such as approval, siting, and sizing of septic tank absorption fields.

Most MUIR data exists in the database as a range of soil properties, depicting the range for the soil survey area. Data is obtained from a combination of field observations, site descriptions and transects, and laboratory analyses.

In making the soil survey; soil scientists observed landforms and landscape features, such as the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They observed and studied many soil profiles. Samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil boundaries were drawn on the soil maps and a locally tailored MUIR data base was constructed, based on those observations and the resulting landscape model the soil scientist developed.

Extent of Program

National (by soil survey area)

Available Product Coverage

MUIR data are available for most counties in the United States. A status map and list of counties having MUIR data is available.

Information Content

MUIR data is a collection of soil and soil-related properties, interpretations, and performance data for a soil survey area and its map units, map unit components, and component layers. Information contained within the MUIR database have been reviewed and certified in accordance with National Cooperative Soil Survey data quality standards.

MUIR data contains about 88 estimated soil physical and chemical properties, interpretations, and performance data. These include available water capacity; soil reaction; soil erodibility factors (K, Kf, and T); hydric soil ratings; ponding, flooding, water table depth and duration; bedrock; interpretations for sanitary facilities, building site development, engineering, cropland, woodland, and recreational development; and yields for common crops, site indices of common trees, and potential production of rangeland plants.

Product Delivery Format

MUIR data is stored in a relational database. This format is a nonfixed length, tab delimited, ASCII file. It is distributed on magnetic or cartridge tape or on $5^{1/4}$ or $3^{1/2}$ inch diskettes.

Technical, Ordering, and Availability Information

To obtain MUIR data contact the SCS State Soil Scientist at the USDA - SCS. State Office in your state. This office can be located by calling any county SCS office.

To obtain technical information about the use of soils data, please contact the SCS State Soil Scientist in your state or contact the National Soil Survey Database Coordinator at:

National Soil Survey Center
USDA - Soil Conservation Service
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
Telephone: (402) 437-5423
FAX: (402) 437-5336

Developing Federal Standards for Digital Soil Data

D.J. Lytle, Soil Scientist, U.S. Department of Agriculture, Soil Conservation Service, National Soil Survey Center, Lincoln Nebraska. Presented at the Soil Science Society of America annual conference November 8 to 12, 1993, Cincinnati, OH.

ABSTRACT

Recent Federal policy directs cooperative efforts in soil data collection, processing, storage and distribution. This policy also directs agencies to conduct these activities in accordance with federal standards. The Federal Geographic Data Committee (FGDC) Soil Subcommittee is charged with developing standards for soil digital spatial data. Standards categories include; Geographic Reference; Information Content; Data Quality; Procedures and Rules; Geospatial Data Management, including Access, Archive and Metadata; and Data Transfer. Additional activities involve developing a National Soil Data Access Facility (NSDAF). This facility is currently envisioned as a centralized storage and retrieval system for anyone producing or requiring digital soil data. These standards and the NSDAF will accelerate the use of soil data by researchers, modelers and land managers and planners.

INTRODUCTION

The National Performance Review (NPR) (Gore, 1993) states "Federal agencies must treat the data they compile and process as potentially valuable resources." NPR directs federal agencies to develop and market data bases to the public. At the same time because of the costs associated with the creation and management of these data and the increasing demands for it agencies are recognizing the need for standards, reduced duplication and cooperative efforts. The same documents states "Dozens of agencies collect spatial data--for example, geophysical, environmental, land use and transportation data. They spend $1 to 3 biion a year on these efforts." NPR says the administration will create a

> "...National Spatial Data Infrastructure, (NSDI) to integrate all of these data sources in to a single digital resource accessible to anyone with a personal computer. This resource will help laud developers and conservationists, transportation planners and those concerned with mineral resources, and farmers and city water departments.
>
> Because of the value of the data, it will be possible to attract private sector funding for its collection, processing, and distribution. The Federal Geographic Data Committee, which operates under the auspices of OMB, plans to raise enough non-federal funding to pay for at least 50 percent of the projects cost. It will set the standards for data collection and processing by all agencies to ensure that NSDI can be developed as economically as possible.

The Federal Geographic Data Committee was established by Office of Management and Budget (OMB) Circular No. A-16. (OMB, 1991) It assigned responsibility for coordination of surveying, mapping and related spatial data activities for soil data to the U.S. Department of Agriculture and subsequently to the Soil Conservation Service. This circular established a Federal Geographic Data Committee (FGDC) which subsequently formed and charged a soil subcommittee with responsibilities (FGDC, Soil Subcommittee, 1991) to; 1) work with and through members of the National Cooperative Soil Survey to develop, adopt and maintain common standards of content, format, and accuracy for soil digital spatial data for use by, all Federal agencies and to encourage use by non-Federal organizations, and to increase its interchangeability and enhance its potential for multiple use. 2) Assist the SCS in publishing

standards and specifications for the data, and assist in establishing priorities for soil digital spatial data production. 3) Promote governmentwide use of defmed and published spatial data transfer standards for soil digital spatial data. 4) Collect and compile information on Federal agencies' soil digital spatial data activities. 5) Determine which categories of soil digital spatial data are to be included in the National Digital Soil Data Base and recommend the addition of other categories of soil digital spatial data not currently being collected.
6) Establish and maintain mechanisms and reports to interface with data bases of other agencies participating in the National Geographic Data System. 7) Ensure that the disposition of soil digital spatial data is carried out in coordination with the National Archives and Records Administration in order to provide for the permanent preservation of historically valuable data and timely disposal of data lacking historical value. 8) Facilitate the economic and efficient application of soil digital spatial data through the sharing of experiences involving applications. 9) Facilitate the coordination of agencies' activities and the exchange of data, by formal and informal means. 10) Evaluate data definitions and standards used by United Nations' and other international organizations. With these charges the FGDC Soil Subcommittee has begun the development of standards for soil data.

DISCUSSION

The FGDC developed the following categories for standards, Geographical Reference, Information Content, Data Quality, Procedures and Rules, Geospatial Data Management including Access, Archive, and Metadata, and Transfer.

The Geographical Reference category describes the reference coordinate system used to describe the location of soil data on the earth. The North American Datum (NAD) 27 and 83 are both used as standard references for soil digital spatial data.

The Information Content category includes definitions, data dictionaries, terminology and coding schemes. A National Cooperative Soil Survey (NCSS) Data Management committee is developing the first draft for this category. They are concentrating on defining a minimum data set, forming a common data dictionary, and a common data structure. Current plans also call for labeling each soil data element (ex. pH, CEC, clay, water table depth) with indicators of both the method used to gather the data and the precision of the data. Plans call for this category to be complete by April of 1994.

Data Quality includes means of estimating various aspects of accuracy of soil data. Standards do not exist for this category. The Soil Conservation Service has proposals for documenting data quality, but they have not been circulated for review by the NCSS or the FGDC Soil Subcommittee. Plans call for this category to be complete by December, 1994.

The standards for the Procedures and Rules Category will be provided by NCSS standards that have been in place and applied for about 40 years. Standards are in numerous references, but two to the major ones are the Soil Survey Manual, and Soil Taxonomy. These standards have been developed and applied through the NCSS. Compliance with these standards is reviewed, usually in the field, by NCSS cooperators at least yearly in the process of completing a soil survey. Compliance with standards of soil description and classification outside of the NCSS is through peer review of papers on soil or soil related research. The NCSS Standards Committee is currently reconfirming the entire set of standards. Plans call for this process to be complete by December, 1994.

The Geospatial Data Management category is subdivided into several subcategories. Access is the means of providing metadata and geospatial data to users. Plans call for the creation of a National Soil Data Access Facility to physically house all soil geographic data. This facility would be linked to other repositories of soil data at universities and other locations and would

also be linked to the geodata Clearinghouse being prototyped by agencies on the FGDC. Archive is the means of retaining data that are not required for current operations for future use. Standards for this subcategory are being developed by an FGDC archive work group. The FGDC Soil Subcommittee will evaluate this standard and develop a proposal for the archive of soil data. Metadata describes the content of a set of data, or data about data. The FGDC Soil Subcommittee anticipates using the FGDC Metadata standard when it is available. This standard was developed by the FGDC Standards Work group. It has had wide review both inside and outside of the federal government. A final standard is to be complete by December, 1993.

The last category is Transfer. Transfer is the means of encoding for the purpose of transmitting the data between computers. The FGDC Soil Subcommittee will use the SDTS FIPS 173 (NIST, 1992) template for data transfer. More specifically a Topological Vector Profile of the SDTS has been developed and this format of the standard will be used for soil data. Federal agencies are required to use this standard beginning in February, 1994.

CONCLUSION

Dwindling budgets, and increasing demands for information and services at all levels of government, increasing populations and complexity of problems, increased environmental awareness and recognition of problems, increase of computer technology, and increasing demand on natural resources are encouraging agencies and institutions to cooperate on a wide range of matters. Federal policies are in place that require agencies to cooperate and soon standards will exist. Federal policy and standards for digital soil data will allow people to easily acquire and exchange soil information. With easy access to the large amount of digital soil data that exists we will be better equiped to make wise decisions about the use of land.

REFERENCES

FGDC, Soil Subcommittee (1991) Soil Digital Spatial Data (Exhibit A), Washington, DC: Federal Geographic Data Committee.

Gore, A. (1993) Creating a Government that Works Better & Costs Less, Report of the National Performance Review. Washington, DC p. 116

OMB (1991) Office of Management and Budget Circular No. A-16, Revised October 19, 1992 Washington, DC

NIST (1992) Approval of Federal Information Processing Standards Publication 173. Spatial Data Transfer Standard (SDTS). Federal Register Vol. 57., No. 168, Friday, August 28, 1992, Notices: 39185-39186

FGDC SOIL SUBCOMMITTEE STANDARDS DEVELOPMENT

Summary

An inter-departmental and inter-agency team that includes representatives from the U.S. Forest Service, Agriculture Research Service, Bureau of Land Management and Soil Conservation Service, is currently developing a common data dictionary and data structure for soil data. A schedule for finalizing the FGDC categories of standards has been developed, and standards for several categories are complete. SCS will meet the deadlines set in the schedule provided additional resources are available. We have been limited in our ability to redirect staff to this effort. We now have one person working full time and four people working part time on standards, and one person detailed to the FGDC secretariats office to assist both USGS and SCS in standards development and coordination.

Issue: Data coordination activities and standards development are extremely important, and are recognized by some as paying long term benefits to the taxpayers. It is however, very difficult to redirect agency resources from legislatively mandated efforts. As the lead agency for soil data in the federal government we accepted the responsibility for the coordination of this layer of thematic data, but feel that additional resources must be provided if we are to fulfil those responsibilities in a reasonable time.

In a 1993 FGDC coordinated request the Soil Conservation Service asked for $250,000 per year over a 3 year period to complete these activities.

Other Activities: The Soil Subcommittee is currently reviewing a draft strategic plan that when implemented, would lead to the development of a National Soil Data Access System. A draft summary of this strategic plan is attached.

The Soil Subcommittee has also undertaken an effort to educate the soil scientific community on standards and other FGDC activities in symposia at the GRASS GIS Conference and at the Soil Science Society of America Conference. These activities will continue.

SCHEDULE FOR DEVELOPING STANDARDS FOR SOIL GEOGRAPHIC DATA

Background: OMB Bulletin No. 93-14 requires that "No later than ninety days after the date of issue of this Bulletin (May 20, 1993) the FGDC should submit to OMB a schedule for developing standards for geographic data, including those needed of each data category as described in 3(a)." In 3(a) under the subject of Digital Data Standards the bulletin says "OMB expects the agencies assigned lead responsibility by Circular A-16 for particular categories of digital data will work through the FGDC to complete data standards for those categories. Development of digital data standards is essential to avoid unnecessary and wasteful duplication of effort across all levels of Government. The final standards should allow the easy integration of multiple data layers from different sources."

Standards for soil geographic data are subdivided into the following categories. Reference Model; Definitions, Terminology, Content (features, attributes, attribute values): Feature Delineation and Representation Rules; Data Collection Rules and Procedures: Geo-Referencing (geodetic and altimetric datums, projection transformations): Data Quality Descriptions; Metadata; and Data Exchange and Transfer.

Standards are clearly defined for some categories and uniformly applied by those agencies producing soil data. For other categories standards are not clearly defined and agreed upon, but there is usually a defacto standard that producers are applying. In general, standards exist for creating analog soil geographic data, but are not agreed upon for digital soil geographic data. Standards are being developed by the FGDC Soil Subcommittee working through the National Cooperative Soil Survey (NCSS). The process and schedule the FGDC Soil Subcommittee is following in standards development is as follows.

For each category a draft is being or has been developed by the Soil Conservation Service. This first draft is then reviewed and revised by the NCSS Data Management Subcommittee. Their final draft is then reviewed by the NCSS Standards Committee before it is reviewed and approved by the FGDC Soils Subcommittee. The NCSS Data Management Subcommittee's initial efforts have concentrated on documenting and agreeing upon Definitions, Terminology and Content. The schedule for each standards category is as follows.

Categories

Reference Model: Standards for this category are not clearly defined and agreed upon, but the USGS Digital Line Graph Optional format is a defacto standard. Data are stored in a topological structure. Nearly all soil digital spatial data are stored in this format.

Schedule: Review and agree upon the standard - 1/94 to 6/94.

Who: Fred Minzenmayer, SCS and Soil Subcommittee.

Definitions, Terminology and Content: Standards for this category are being developed through the National Cooperative Soil Survey (NCSS) Data Management Subcommittee.

Schedule: Complete draft of standards - 10/94, NCSS Standards Subcommittee review - 10/94 to 2/95, FGDC Soil Subcommittee Review 2/95 to 4/95.

Who: Jim Fortner, SCS and NCSS Data Management Subcommittee.

Feature Delineation and Representation Rules, and the Data Collection Rules and Procedures: Standards have been in place and applied for about 40 years. Standards are in numerous references, but two of the major ones are the Soil Survey Manual, and Soil Taxonomy. These standards have been developed and applied through the NCSS. Compliance with these standards is reviewed, usually in the field, by NCSS cooperators at least yearly in the process of completing a soil survey. compliance with standards for soil description and classification outside of the NCSS is through peer review of papers on soil or soil related research. The NCSS Standards Committee is currently reconfirming the entire set of standards.

Georeferencinu: Standards for this category have not been formally reviewed for agreement, but UTM is the defacto projection and point data are referenced by latitude and longitude. The NAD83 datum has been written in to SCS standards as the base for future data collection.

Schedule: Review and agree upon standard - 1/94 to 12/94.

Who: Fred Minzenmayer, SCS and Soil Subcommittee.

Data Quality Descriptions: Standards for this category do not exist. The Soil Conservation Service has proposals for documenting data quality, but they have not been circulated for review by the NCSS or the FGDC Soil Subcommittee.

Schedule: Review proposals and agree upon standard - 1/94 to 12/94.

Who: Not determined.

Metadata: The FGDC Soil Subcommittee anticipates using the FGDC Metadata standard when it is available. The Soils subcommittee has provided copies to each member agency for review and comment. The Soil Conservation Service has a team responsible for the review and adoption of a metadata standard.

Schedule: Review proposals and agree upon standard - 1/94 to 12/94.

Who: Fred Minzenmayer, Kip Kolesinskas and George Rohaley SCS and Soil Subcommittee.

Data Exchancre and Transfer: The FGDC Soil Subcommittee will use the SDTS FIPS 173 template for data exchange and transfer. The other categories of standards have to be defined and agree upon before the Soil version of SDTS can be completed.

Schedule: Circulate for review - 1/95 to 12/95, Adopt and implement - 1/96

Who: Not determined.

STRATEGIES FOR A NATIONAL SOIL DATA ACCESS SYSTEM

Summary

Background: There are two categories of soil data that are collected in the United States.- Soil map or **"area"** data and soil site or **"point"** data. These data have been collected for over 100 years, and represent a very large national investment.

Soil data collected though the National Cooperative Soil Survey (NCSS) are both area and point data. NCSS data for about 90 percent of the U.S. are available in a standard published report format. These data represent about a 50 billion dollar investment. Nearly all of the attribute or **"tabular"** data for the NCSS soil data are in an electronic format. Only about 15 percent of the spatial data **are in** an electronic format. The majority of these data are in county level soil survey maps that must be digitized. There is limited electronic access to these data. There is only limited information available to the public about what digital data exists.

Soil point data are also collected in research projects by numerous scientists in organizations at nearly all levels of government, and in private industry.. If these are made available, they are normally only available in published journals or reports. Few data are available in an electronic format, little is known about where these data are or how to obtain access to these data. Searches for these data require time consuming efforts to locate and then judge the appropriateness of the data for a particular use. They represent a very large public investment.

Strategy #1. An Electronic Network. Establish an electronic network with a clearinghouse and a common means of accessing the data. The FGDC clearinghouse prototype over INTERNET with the Wide Area Information Service (WAIS) software could be used, pending the outcome of the pilot study.

Strategy #2. Data Collection Software. Develop a DOS-PC soil data collection software that collects soil point data to FGDC Soil Subcommittee national standards and provides the ability to export these data using the Spatial Data Transfer Standard.

Strategy #3. Federal Standards. Complete the development of the FGCD Soil Subcommittee Standards categories:

Reference Model; Definitions, Terminology and Content: Feature Delineation and Representation Rules: Data Collection Rules and Procedures; Georeferencing; Data Quality Descriptions: Metadata; and Data Exchange and Transfer.

Strategy #4. A National Soil Data Access Facility. Create a National Soil Data Access Facility (NSDAF) within the Soil Conservation Service-that anyone (federal, state or local) who creates electronic soil data can contribute to, and from which any one can retrieve data.

Strategy #5. Grant Criteria. Establish criteria that requires those obtaining grants from federal agencies for soil related research to collect data to national standards and contribute the data to the NSDAS.

Strategy #6. Develop Agency Policy. Establish a joint strategy in the Agricultural Research Service, the Cooperative Extension Service, the Cooperative States Research Service, the Environmental Protection Agency, the Soil Conservation Service, the Forest Service, the Bureau of Land Management, the National Aeronautical and Space Administration and possibly others for the electronic collection of soil data to national standards, and the serving up of that data to the NSDAS. Establish a federally consistent internal policy in each agency relating to the NSDAS.

strategy #7. Publication Criteria. Through the American Society of Agronomy (ASA) editorial board, and possibly other journals, establish criteria that encourages scientists to publish data collected as part of research to a data base and to make it available through the National Soil Data Access System (NSDAS).

Strategy #8. Educating the Scientific Community. Create symposia and develop publications in journals and other special publications. Develop internal agency publications..

Strategy #9. Funding for Digitizing Soil Surveys. Work through the FGDC to develop a budget crosscut for fiscal year 1996 that enables NCSS cooperators to digitize all soil surveys within 10 years.

Soil Survey Publication Streamlining
Quality Improvement Team

Charge: Develop a system that will streamline the current NCSS publication process and ensure a quality NCSS soil survey publication, and other products necessary to deliver NCSS information, can be delivered to the public within one year from the date of the signature in the final classification and correlation report for the soil survey.

Assumptions:

1. Additional funds or staffing will not be available at any level of the organization.

2. Current guidelines, regulations, staff and staff functions should not be limitations or constraints in the system design.

3. **Funds** and staffing are inadequate to handle the current number of publications produced and we expect funds to continue to decrease.

Products: Develop a detailed set of options, and a recommended option, that documents the steps that the process will follow. Develop a list of constraints that prevent each option from working and the steps leadership must take to overcome them.

Process: Your team should prepare a plan of work for completing the charge, including the specific steps for completing the assignment, your time table, key check points, and how progress will be reviewed with the team sponsor and the soil survey division leadership. Following your initial meeting, you should meet with your sponsor to review the assignment, your plan for completing the assignment, and further guidance you may find necessary to complete the task. Once you and your sponsor agree on the purpose, scope and guidance of the assignment, you should move expeditiously to complete it on time.

You should obtain and utilize a facilitator to help you with this. assignment. Your facilitator can help plan and conduct the activities required for success. We recommend you contact Carol Lit&field for this important job.

Your team can make a extremely important contribution to the SCS and its partners by providing solutions to the long standing issue of the long time required from completion of soil survey mapping to publication. The attached print out from the soil survey schedule documents our current and past time lines.

Much of your work will need to be done through the mail. Limited funds will be available for team meetings that involve travel. You will need to work with the NASIS Soil Reports team, David Achen at the NSSC is the team leader, to coordinate and obtain information on their progress and products. We also recommend that you get input from other agencies and institutions.

Timeline: **You** should begin as soon a possible and complete your work no later than September 30, 1994.

Team Members:

Robert McLeese, Team Leader
Dean Rector
Hugh Alcon
Jim Carley
William Broderson
Lawson Spivey
Robin D'Agostino

Team Sponsor: Dermis Lytle

THE NATIONAL SOIL INFORMATION SYSTEM

BACKGROUND

The SCS and its National Cooperative Soil Survey (NCSS) partners have maintained a soil survey database at Iowa State University (ISU) since about 1975. Starting in about 1985 the SCS began an effort to reevaluate the soil data base. That effort has led to the development of a National Soil Information System (NASIS).

WHAT IS NASIS?

NASIS is a system that provides for the collection, storage, manipulation and dissemination of soil survey information within the National Cooperative Soil Survey.

NASIS is also the umbrella project name under which the SCS Soil Survey Division is developing automated systems, and much of the talk lately has been about NASIS in this context, but the overall NASIS will continue to have both manual and automated processes.

An information system such as NASIS is not simply a collection of computer programs that operate on data files. It is a means to achieve organizational objectives by coordinating computer hardware, software, data, process logic, policy and operating procedures to implement organizational objectives.

Much of the work that has been done to date has involved mapping out the current system and then settling on the organizational objectives mentioned earlier. A Soil Business Area Analysis Group (SBAAG) and other teams from the field, state and national staffs are continuing this effort. We will form many new teams as we continually strive to enhance and improve our NASIS into the year 2000 and beyond.

The first software to be released under the NASIS umbrella, was the Pedon Description Program. It provides the foundation on which we will build. The next release will deal with the storage, manipulation, and dissemination of soil survey information. We plan to make this release in October 1994. It will address many of the inadequacies we have with the current system and it is designed based on a new logic for soil survey data that was developed in the analysis mentioned earlier

WHAT WILL HAPPEN TO THE SOIL FORM 5?

The Soil Form 5, Form 6 and the data base structure that it created will be replaced by the NASIS data base. NASIS software will provide the new means to input data into the data base.

WHAT WILL HAPPEN TO THE OFFICIAL SERIES DESCRIPTION (OSED)?

The OSED will remain at ISU for now. There is a National Soil Survey Center team involved in the design of what has been called the "National Standard". This team is looking at the possible combination of the OSED or parts of it and the Soil Form 5 or parts of it into a relational data base that might be used for correlation or comparing soil described in the field to existing series.

WHAT WILL HAPPEN TO THE DATA BASE AT ISU?

We will continue to house the NCSS soil data bases at ISU for now. The SCS is evaluating the options for storage of all of its data bases. The results of that evaluation will indicate whether the data base will stay at ISU or be moved to another location.

WHAT ABOUT ALLOWING NON-SCSERS **TO ACCESS AND CONTRIBUTE DATA TO THE SOIL DATA BASE AT ISU?**

We have recently begun a project to put all of the map unit data or the data that is created from the Soil Form 5 and 6 data, up in an ORACLE relational data base on Project Vincent, a UNIX workstation network at ISU. We are creating a capability to access this data over INTERNET. We also have a National Cooperative Soil Survey Data Management Team that is designing a common soil data dictionary and data structure that will eventually allow non-SCSers to contribute soil data to the ISU data base. These efforts will feed a federal government interdepartmental effort being lead by the Federal Geographic Data Committee to provide easy access to all natural resource and other data. The soil data may eventually become available over electronic networks with software that tells what's available, where it's at, what it costs, and maybe eventually a means for on-line ordering and retrieval.

WHAT ABOUT ACCESS TO THE DIGITIZED COUNTY LEVEL (SSURGO) SOIL MAPS AND STATSGO DATA?

These data will continue to be available from the SCS National Cartographic and GIS Center at Fort Worth Texas. They may eventually be made available over the same network previously mentioned.

WHAT ABOUT THE AVAILABILITY OF NASIS SOFTWARE TO NON-SCSERS?

The NASIS software will be available to any non-SCSer. It will be distributed from the National Soil Survey Center at Lincoln Nebraska.

WHAT KIND OF COMPUTER HARDWARE AND SOFTWARE WILL NASIS REQUIRE?

Except for a DOS personal computer version of the Pedon Description Program which is being developed, all of the NASIS software will require a 486 or workstation computer and UNIX and INFORMIX software. Specifics can be obtained from the National Soil Survey Center.

FOR MORE INFORMATION CONTACT:

Ricky J. Bigler
National Soil Survey Center
Mail Stop 36
Federal Bldg. Room 152
100 Centennial Mall N.
Lincoln, NE 68508-3866

SCS NHQ Units In Fort Collins, CO

Team USDA

SCS NHQ Ft. Collins

Technology Information Systems Division (85 Positions)

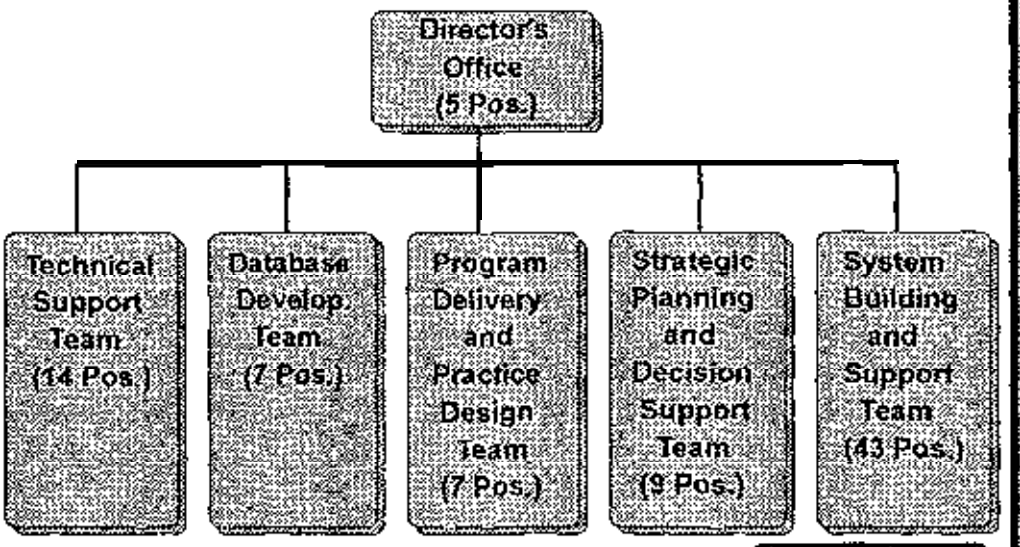
Information Resources Management Division (42 Positions)

FIP Contracts Branch and Administrative Services Staff (7 Positions)

Support Services Contract Personnel (100 Technical Specialists)

Team USDA

TISD Organization



Team USDA

TISD Responsibilities

- ✓ Business Area Analysis
- ✓ Application System Planning, Anal., Design, Dev.
- ✓ Information System Integration & Coordination
- ✓ Software Maintenance & Hotline Support
- ✓ Documentation & Training Materials Development
- ✓ Database Design & Data Modeling
- ✓ GRASS Development & Enhancement
- ✓ Software Quality Assurance
- ✓ Info Share Participation
- ✓ Water Quality Technology Development

Team USDA

Release 2.0 Features

- Export to FOCS, external users
- Aggregate PEDON & Lab Data
  - Help create mapunits
  - Statistically determine RIC
- Edit PEDON Data
- Exchange Data'between NASIS Sites

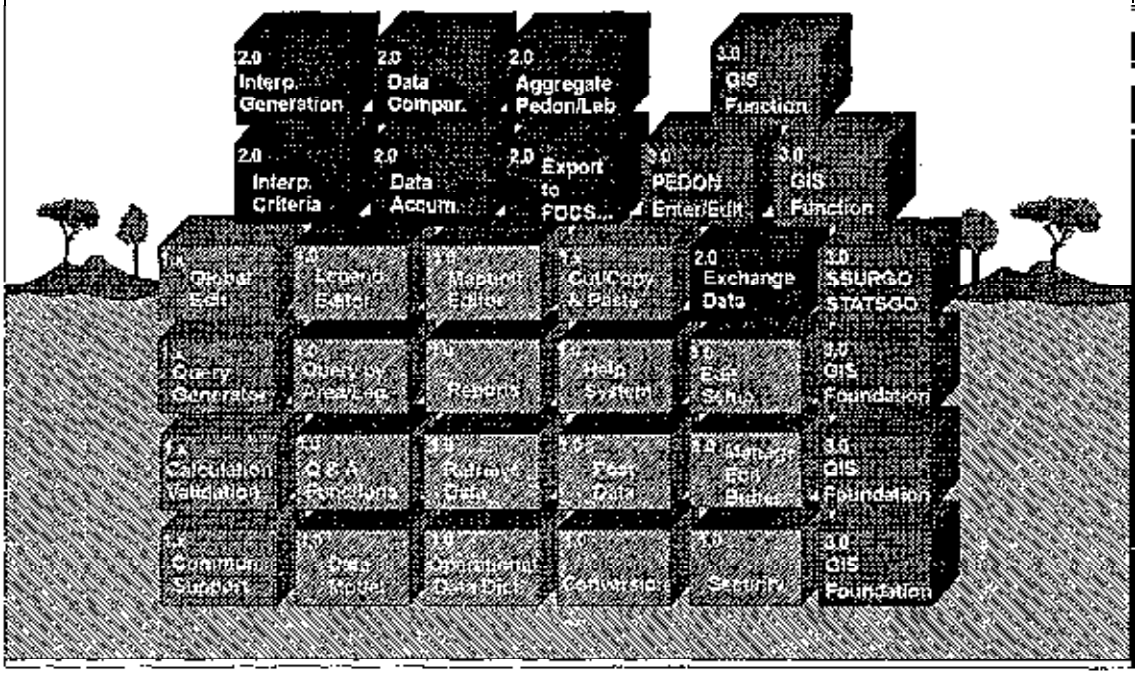
Release 3.0 Features

- Add GIS capabilities to NASIS
- Manage SSURGO, STATSGO, NATSGO
- True Survey Area Editor
  - Coincident areas
  - Acreage tabulation

Enter/Edit PEDON Data

Incorporate "Fuzzy" Logic

Release 3.0



Thanks

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Release 1.0 Features

- On-line Help System
  - Hypertext
  - Print individual topics
- Q & A Functions
  - Automated internal testing
  - Code reviews
  - Standards enforcement
- Reports (primarily for DSM)
  - Duplicate Data Mapunits
  - Unlinked Data Mapunits
  - Data dump

Release 1.x Features

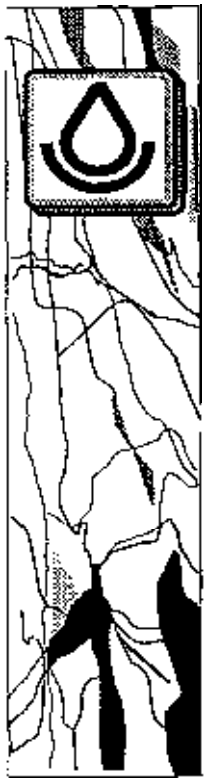
- Cut/Copy and Paste Function
  - Select object to cut or copy
  - Paste into new or existing object
- Query Generator (Select)
  - Select by legend or data mapunits
  - Select by attribute criteria
  - Name & save queries
- Global edit function
  - Changes work on entire selected set

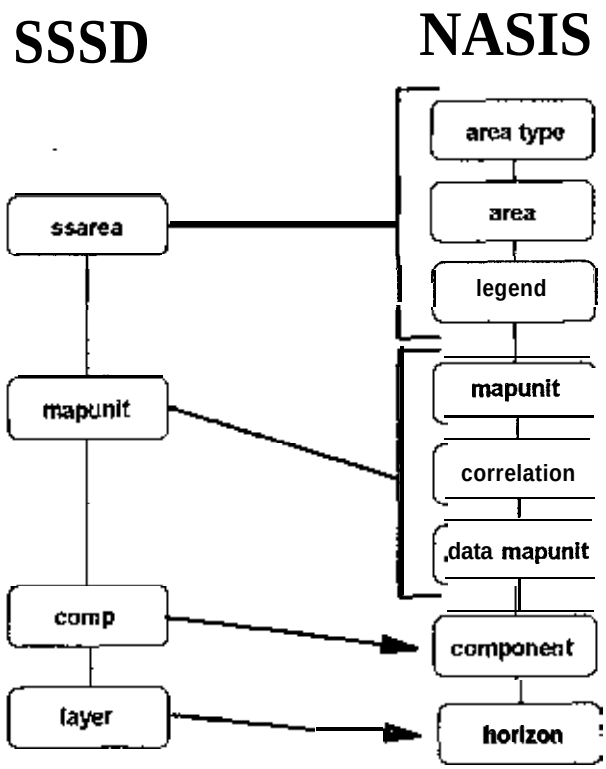
Release 1.x Features

- Communication Support
  - SoilNet capabilities
  - Facilitate Data Exchange with Security Features
- Calculation & Validation
  - Provides for derivation of data elements
  - Facilitates interpretation generation
- Interpretation Criteria Maintenance

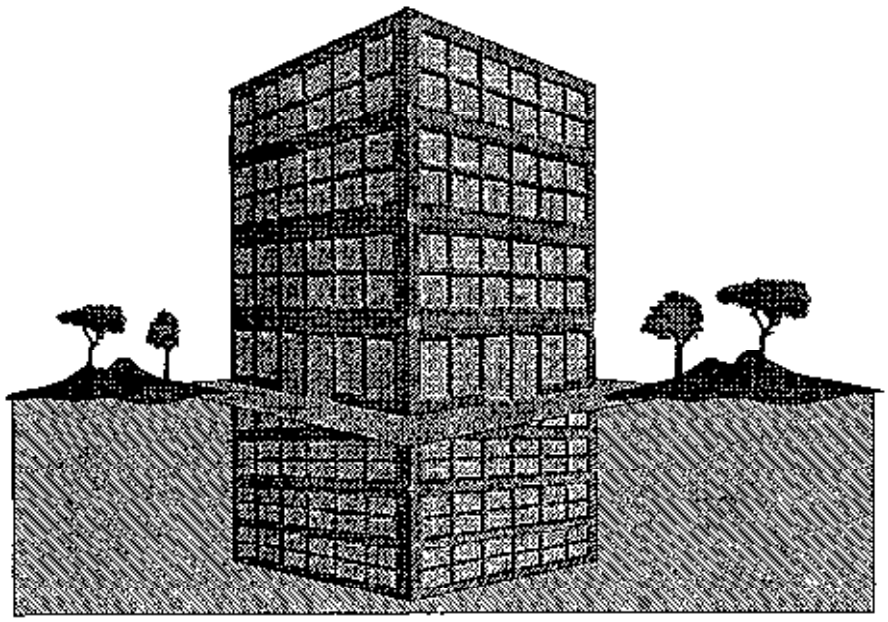
Release 2.0 Features

- Interpretation Generation
- Data Accumulation
  - Site Characterization Data (SCR)
  - Map Unit Data (MUR)
  - Taxonomic Unit Data (TUR)
- Generalized Data Comparison
  - Pedon or Component RV vs. RIC for Series (National Standard)
  - Pedon vs. Component, Series vs. Series, . . .





The NASIS House

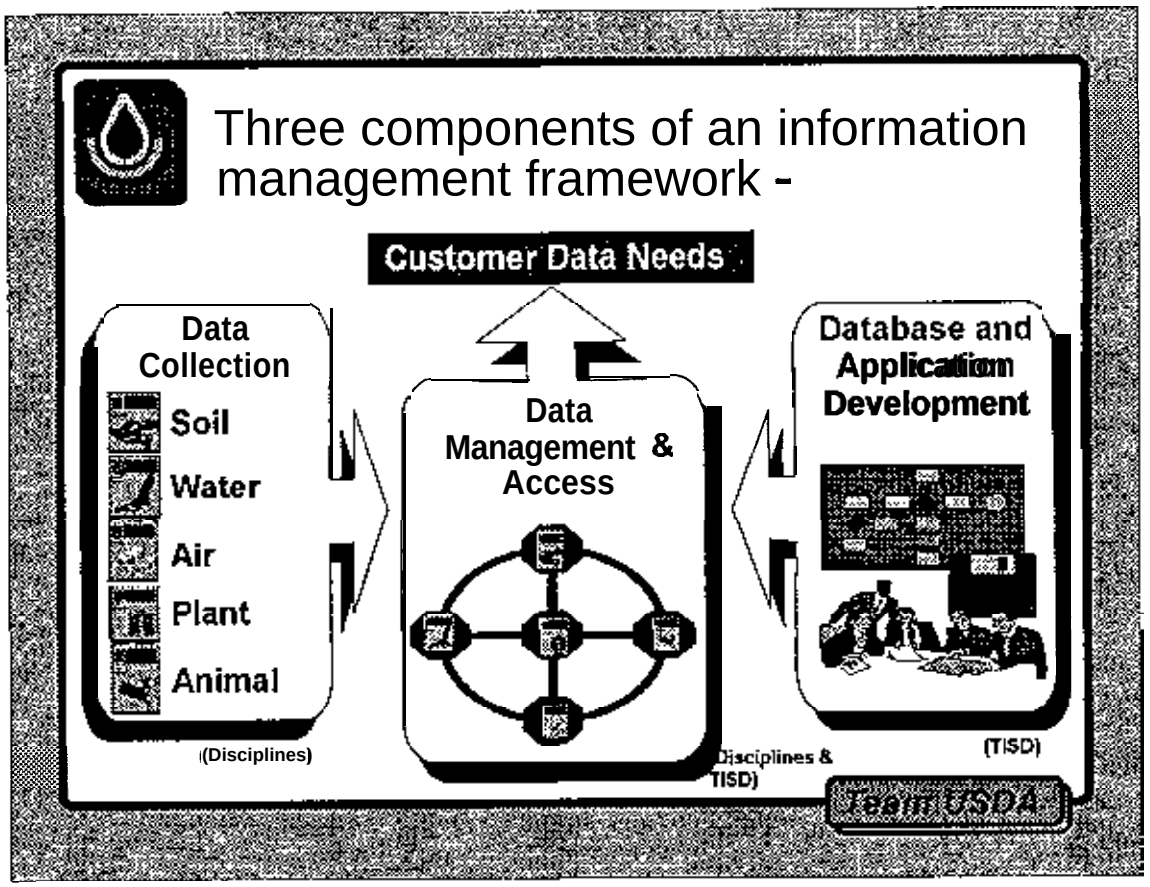


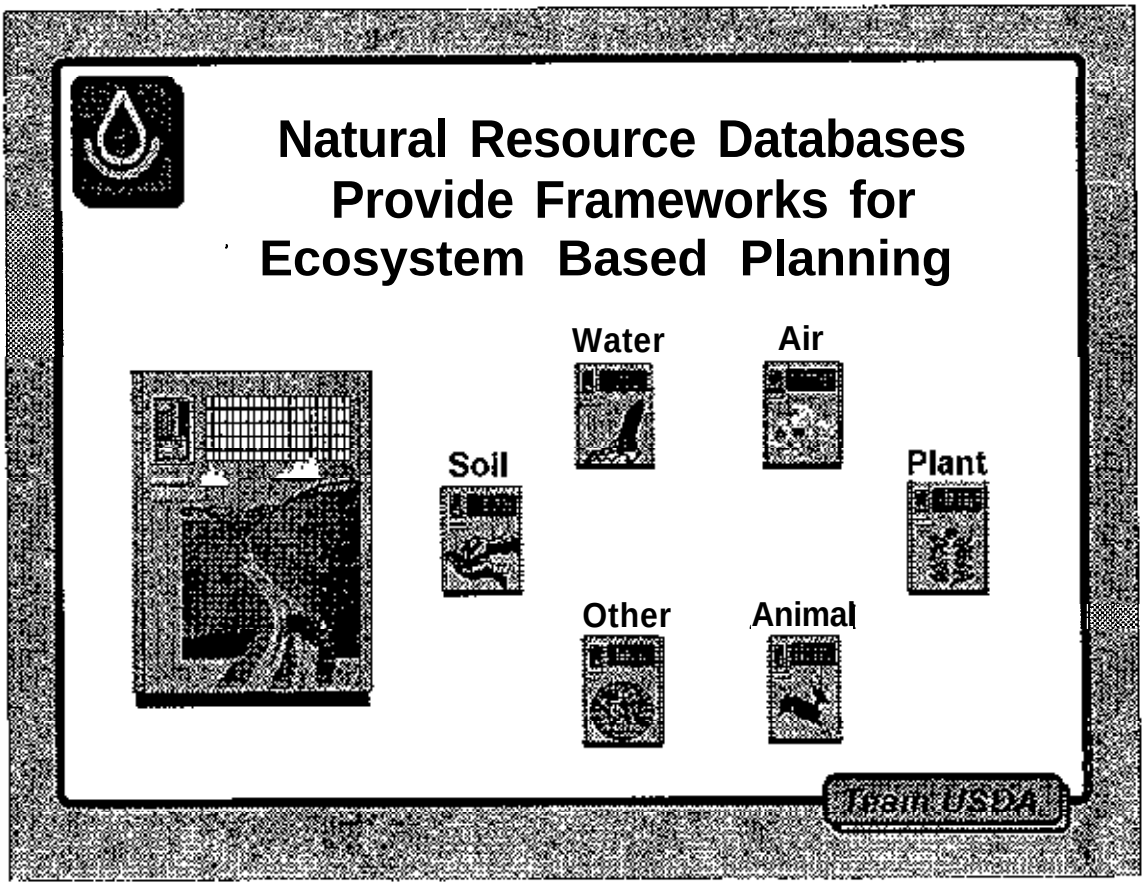
Release 1.0 Features

- Conversion of SSSD to NASIS
  - Selective by Soil Survey Area
  - Insures clean data loaded into NASIS
- Security System & Controls
  - Database ID
  - Group ID
  - User ID
- Operational Data Dictionary
  - Tables & Attributes
  - Dynamic

Release 1.0 Features

- Database Interactions
  - Retrieve & translate data
  - Manage edit buffer
  - Post changes back to database
- NASIS Editors (Area, Legend, & Mapunit)
  - Table oriented
  - Context oriented
- Configurable Edit Screen Setup
  - Choose columns (attributes) to edit
  - Specify order for columns
  - Name & save edit setups


Three components of an information management framework -
Customer Data Needs
Data Collection
Soil
Water
Air
Plant
Animal
(Disciplines)
Data Management & Access
Disciplines & TISD)
Database and Application Development
(TISD)
Team USDA


Natural Resource Databases Provide Frameworks for Ecosystem Based Planning
Water
Air
Soil
Plant
Other
Animal
Team USDA

National Soil Information System

NASIS Overview

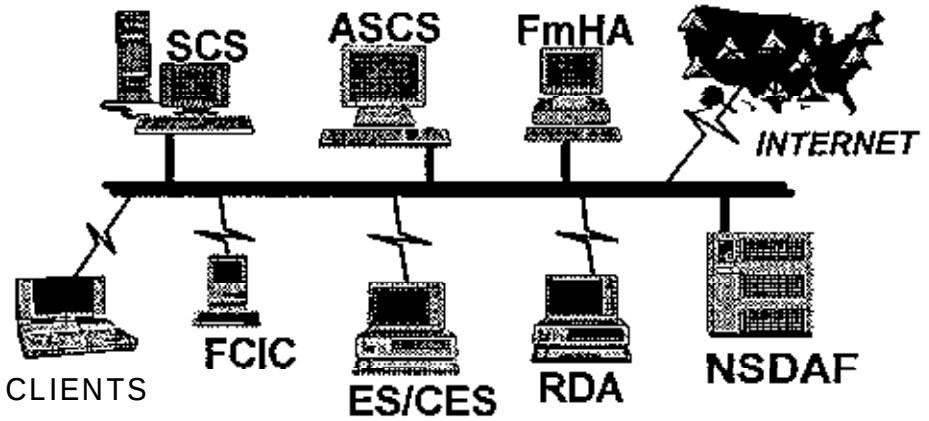
Implementation Timeline
Release 1.0 to 3.0 Features

Ken Harward, NASIS Project Manager
TISD, Ft. Collins, Colorado

Implementation Timeline

- Alpha Test of Conversion & NASIS Editors ➡ Feb 14-25, 1994: Colorado State Office
- Training for Beta Test ➡ May 23-27, 1994: Ft. Collins
- NASIS 1.0 Beta Test ➡ Jun-Aug 1994
  - Phase 1 — Jun: AR, KS, MT, VA
  - Phase 2 — Aug: same + 4 new sites
- Release NASIS 1.0 ➡ Oct 1994
- Release NASIS 1.x ➡ Mar 1995
- Release NASIS 2.0 ➡ Oct 1995
- Release NASIS 3.0 ➡ Oct 1996

- Prototype a National Soil Data Access Facility (NSDAF) with access to the National MUIR database via INTERNET.



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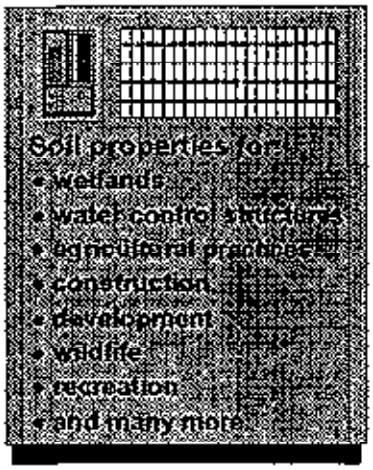
- Acceleration of computer generated interpretations from NASIS MUR data.



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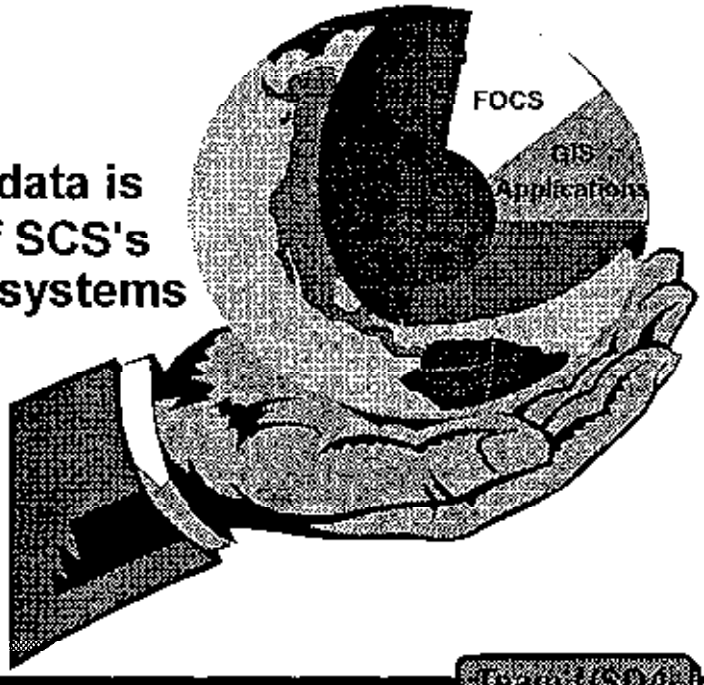
Resource data is the core of SCS's information systems



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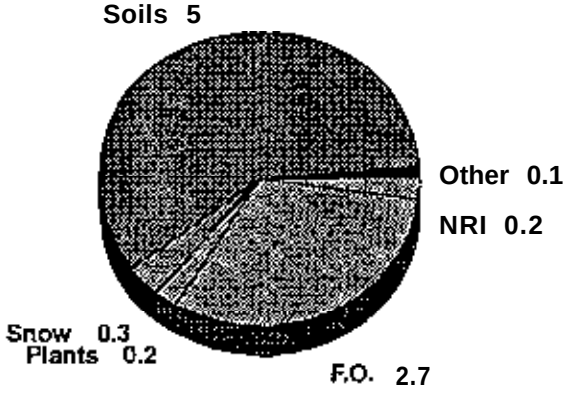
Corporate Database Value

Strategic Database Value in $Billions
(Total = $8.5)



Barter Value Worth at Least Another $88

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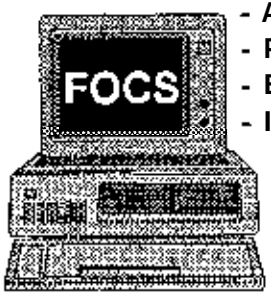
Soils Data is Currently Providing Information for the Following Applications

- Water Quality models
- Water Balance/Budget
- RUSLE
- Ag Waste Mgt.
- Pesticide Mgt.
- Engineering Practices
- Interpretive Maps
- Conservation Practices
- Conservation Practice Effects
- Wind Erosion Equations
- Grazing Lands Application
- Grazing Lands Data System
- Environmental Planning
- National Resource Inventory



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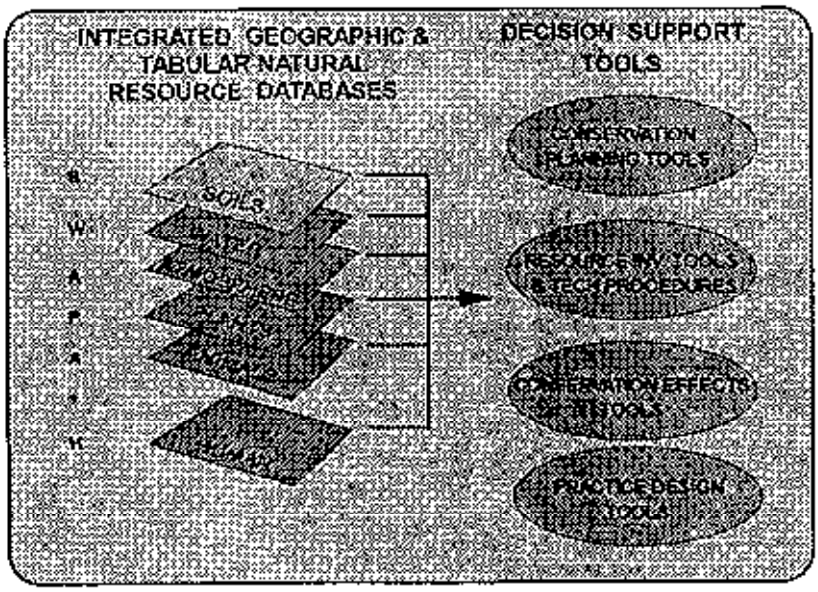

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SCS Info Share
Fast Track Initiatives

- **Geographic Information System (GIS)**
  Spatial definition of common land unit, establishes GIS environment for the Info Share Field Office of the Future
- **Soils Information (attribute & spatial)**
  Shared soils information for Info Share agencies & public
- **Soils Information for PLANETOR**
  Provide soils data for Extension Service PLANETOR software
- **Conservation Reporting & Evaluation System (AD-862)**

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- **Provide Access to the FOCS/SOILS database at SCS field offices for the Info Share Agencies**

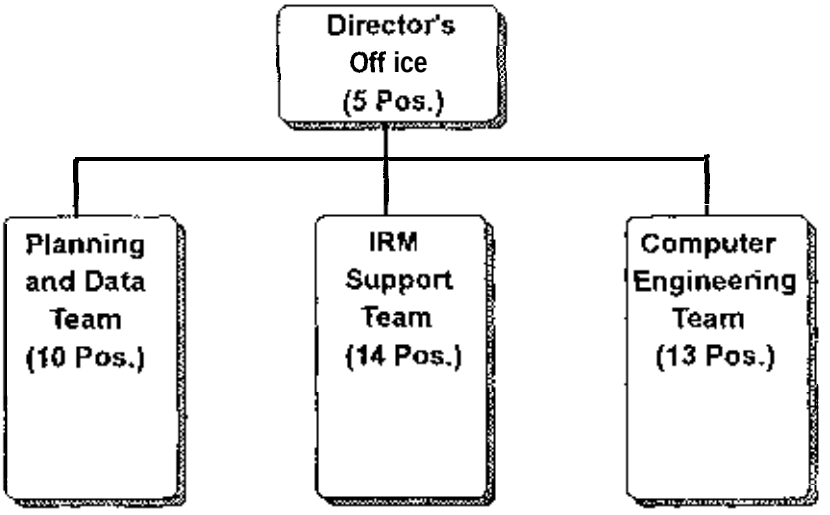
Info Share Agencies

ASCS
CES
ES
FCIC
FMHA
RDA

Network, Modem, or Direct connect

Team USDA

IRMD Organization



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IRMD Responsibilities

- ✓ IRM Policy Development
- ✓ IRM Standards
- ✓ Telecommunications
- ✓ Information System Security
- ✓ FIP Acquisitions - Technical Approval
- ✓ IRM Oversight
- ✓ Software Testing
- ✓ Hardware and Software Integration Testing
- ✓ Info Share Coordination and Leadership
- ✓ IRM Long Range Planning

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FIP Contracting and Administrative Services Responsibilities

- ✓ FIP Contract Development
- ✓ FIP Contract Administration
- ✓ CQTR and GPM Training
- ✓ Procurement Integrity
- ✓ DPA Administration
- ✓ FIP Procurement Coordination
- ✓ Small Procurements
- ✓ Space Management
- ✓ Human Resource Management

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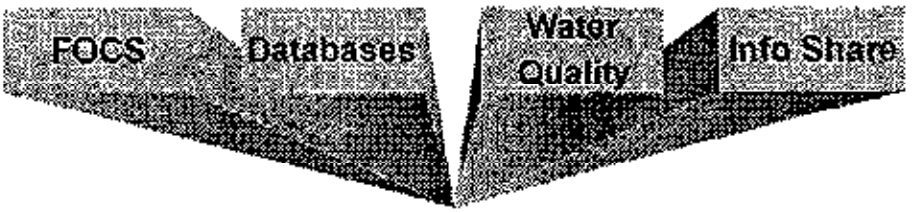
Information Management SCS Priorities

Current major thrusts for Technology Information Systems Division



Infrastructure

Team USDA

ITEM 23

DRAFT

"T" VALUE CRITERIA

February 10, 1994

DEFINITION OF RENEWABLE, NONRENEWABLE, ETC. 2/3/1994

October 15, 1993

Soil Depth (IN)	Nonrenewable	Renewable		Renewable Plus	
Category	(4)	(5)	(1)	(2)	(3)
<10	1	1	2	3	
10-20	1	2	2	3	3
20-40	2	3	3	4	4
40-60	3	4	4	4	4
>60	5	5	5	5	5
Times Used	8	3	8	7	1

RELATIONSHIP OF RENEWABLE, NONRENEWABLE, ETC.
February 10, 1994

Category	Nonrenewable (4)	Renewable (5)	Renewable (1)	Renewable Plus (2)	Renewable Plus (3)
Soil Property					
Bedrock					
A		X			
B	X				
C	X				
Cemented Pans					
A					
B	X				
C	X				
Fragmental/Cindery					
A		X			
B	X				
Fragipan				X	
Natric					
A			X		
B			X		
C				X	
D			X		
Sandy/Sandy Skeletal Substratum					
A					X
B		X			
C	X				
Abrupt Textural Change					
A					
B					
Dense Layer					
A					
B	X				
C			X		
D			X		
Rock Fragements					
A					
B	X				
High Gypsum			X		
High Carbonates					
A			X		
B				X	
Times Used		3	8	7	1

SUMMARY OF "T" VALUE CRITERIA PROPOSAL
February 10, 1994

Category - 1 (Renewable)

Soil Depth (IN)	Cem. Pans a	Natric A	Natric B	Natric D	Gypsum	Carbon-nates A	Dense Layer C	Dense Layer D
<20	2	2	2	2	2	2	2	2
20-40	3	3	3	3	3	3	3	3
40-60	4	4	4	4	4	4	4	4
>60	5	5	5	5	5	5	5	5

Category - 2 (Renewable Plus)

Soil Depth (IN)	Fragi-pans	Natric C	Abrupt Tex.Chan. A	Abrupt Tex.Chan. B	Carbon-nates B	Rock Fragments A	Dense Layer A
<20	3	3	3	3	3	3	3
20-60	4	4	4	4	4	4	4
>60	5	5	5	5	5	5	5

Category - 4 (Nonrewable)

Soil Depth (IN)	Bedrock B	Bedrock C	Cem. Pans B	Cem. Pans C	Frag-mental B	Sandy/Sandy Skeletal C	Rock Fragments B	Dense Layer B
<20	1	1	1	1	1	<10 is 1	1	1
20-40	2	2	2	2	2	2	2	2
40-60	3	3	3	3	3	3	3	3
>60	5	5	5	5	5	5	5	5

Category - 5 (Renewable)

Soil Depth (IN)	Bedrock A	Frag-mental A	Sandy/Sandy Skeletai B
<10	1	1	
10-20	2	2	2
20-40	3	3	3
40-60	4	4	4
>60	5	5	5

Category - 3 (Renewable Plus)

Sandy/Sandy Skeletal A
3
4
4
5

Soil properties grouped in the five categories
February 10, 1994

Category- - 1 (Renewable)

Cemented Pans: A. Soils in all Land Resource Regions except W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THIN in Cemented Pan block, and CEM in lieu of texture OR THIN or THICK if IND or CEM are not shown in lieu of texture with the beginning depth of:

Natric: A. Soils designated in great groups of Natraquolls or Natraqualfs or subgroups of Natric Duraquolls but exclude subgroups of Glossic in the great group of Natraqualfs; and have a natric horizon (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] above a layer, if present, with UWB, WB, CEM, or IND and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:

B. Use criterion B in MLRA's 48A, 48B, 49, 52, 53A, 53B, 53C, 54, 55A, 55B, 55C, 56, 58A, 58B, 58C, 58D, 60A, 60B, 61, 62, 63A, 63B, 64 through 79, 80A, 80B, 81, 82, 83A, 83B, 83C, 83D, 84A, 84B, 84C, 85, 86, 87, 102A, and 102B. Soils designated in great groups of Natralbolls, Natriborolls, Natrustolls, Natriboralfs, Natrustalfs Natrargids, Nadurargids, or subgroups of Natric Durustolls but exclude subgroups of Glossic in great groups of Natriborolls, Natrustolls, Natriboralfs, Natrustalfs, and Natrarsids; and have a natric horizon (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] above a layer, if present, with UWB, WB, CEM, or IND and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:

D. Soils in Land Resource Regions A, B, C, D, and E except MRLA's 48A, 48B, and 49 having a subsurface natric horizon with equal to or greater than 35 percent clay; slow or very slow permeability (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour and equal to or more than 35 percent clay] and use the upper depth of that layer to assign depth to natric horizon); and with aridic or xeric soil moisture regime and in great groups designated as Nadurargids, Natrargids, Natrixerolls, or Natrixeralfs or subgroups of Natric Durixeralfs or Aridic Natrixerolls with the slow or very slow permeability beginning at a depth of:

High Gypsum: Soils having a gypsiferous material layer designated as GYP at a beginning depth of:

High Carbonates: A. Soils in Land Resource Regions B, C, D, E, W, X, and Y having a surface layer with less than 10 percent calcium carbonate (CaC03) equivalent and have a subsurface layer with greater than 30 percent CaC03 equivalent, beginning at a depth of:

++ Continued on back of this sheet ++

Category - 1 (Renewable)

Dense Layer: C. Soils in Region R and MRLA's 100 and 101 having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(es):

D. Soils in Region R and MRLA' 100 and 101 having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(es):

Depth Limit (inches)	T Value
<20	2
20-40	3
40-60	4
>60	5

Soil properties grouped in the five categories
February 10, 1994

Category - 2 (Renewable Plus)

Fragipan: Soils having a FRAGI great group. Layer selected has the greatest bulk density inflection, (layer selected has the maximum change which was determined by evaluating all adjacent layers that change from a lower bulk density to a higher bulk density) beginning at a depth of:

Natric: C. Soils designated in great group with "NA" and suborder "UD" and a subsurface natric horizon with a slow or very slow permeability (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:

Abrupt Textural Change: A. Soils in orders of Alfisols, Aridisols, Mollisols, or Ultisols and (1) all Pale great groups of those orders, Albaqualfs or Argialbolls; or (2) soils in xer, bor, alb, arg, aqu, or argi suborders with great groups of alb, argi, eutro, dur, or cry with subgroups of Abruptic, Abruptic Aridic, Abruptic Cryic or Abruptic Xerollic; or (3) Alfic Haploxerands or Alfic Vitrixerands with an argillic horizon with equal to or greater than 35 percent clay; AND having an adjacent upper layer with a permeability of more than 0.6 inches/hour overlying and adjacent to a lower layer having more than 35 percent clay with a permeability of less than 0.2 inches/hour beginning at a depth of:
Criteria A. will be used in the following MLRA's 1, 2, 6, 8 through 10, 10A, 11, 11A, 11B, 12 through 15, 17 through 27, 28A, 28B, 29 through 32, 34, 35, 37, 39, 40, 41, 43, 44, 47, 48A, 48B, 52, 53A, 54, 58A, 58B, 60A, 60B, and 67.

B. Soils in orders of Alfisols, Mollisols, or Ultisols and; (1) Albaqualfs with subgroups of Udollic, Aeric, Mollic, or Typic; or (2) Hapludalfs with subgroups of Albaquultic or Albaquic; or (3) Typic Argialbolls; or (4) Albaquults with subgroups of Typic or Aeric with an argillic horizon with equal to or more than 35 percent clay; AND having an adjacent upper layer with a permeability of more than 0.6 inches/hour overlying and adjacent to a lower layer having more than 35 percent clay with a permeability of less than 0.2 inches/hour beginning at a depth of:
Criteria B. will be used in the following MRLA's: 71, 73, 74, 75, 76, 102B, 106, 107, 108, 109, 111, 112, 113, 114, 115, 144A, 148, and 149A.

C. Same as criteria A but will be rewritten to include moderately slow over very slow.

D. Same as criteria B but will be rewritten to include moderately slow over very slow.

++ Continued on back of this sheet ++

Category - 2 (Renewable Plus)

High Carbonates: B. Soils (excludes Land Resource Regions B, C, D, E, W, X, and Y) having a subsurface layer with more than 30 percent CaC03 equivalent, beginning at a depth of:

Rock Fragments: A. Soils in all Land Resource Regions except W, X, and Y having layer(s) with a combined thickness of more than 10 inches with (1) Texture with no rock fragment modifier, or (2) texture modified by BY, CB, GR, ST, CN, OR FL (in the Northeast states, this layer has 0 to 50 percent rock fragments by weight; texture modifiers are not used.), or (3) CE, DE, FB, HM, MPT, MUCK, PEAT, SP, VAR over a layer that extends to a depth of 60 inches or more that has a texture (exclude SG, COS, S, LS, FS, or LCOS) modified by BYX, CBX, GRX, STX, CNX, or FLX or over bedrock, CEM, or IND if texture modified by BYX, CBX, GRX, STX, CNX, or FLX extends to less than 60 inches, beginning at a depth of:

C. Same as criteria A but will be rewritten to include non rock fragment modified textures over "very" rock fragment modified textures.

Dense Laver: A. Soils having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(s); and with permeability difference of 2 classes between dense layer and upper adjacent layer. (excluding Vertisols, and Vertic subgroups) (not used in Land Resource Regions R, W, X, and Y and MLRA's 100 and 101):

Depth Limit (inches)	T Values
<20	3
20-60	4
>60	5

Soil properties grouped in the five categories
February 10, 1994

Category 3 (Renewable Plus)

Sandy/Sandy Skeletal: A. Soils in all Land Resource Regions except A, B, C, D, E, W, X, and Y having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour, (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and (2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of:

Depth Limit (inches)	T Value
<10	
10-20	3
20-60	4
>60	5

Soil properties grouped in the five categories
February 10, 1994

Category - 4 and 4A (Nonrenewable)

Bedrock: B. Soils having HARD identified in the Bedrock soil property block or layers identified as ICE with the beginning depth of:

C. Soils in only Land Resource Regions W, X, and Y having SOFT identified in the Bedrock soil property block or MARL (marl layers) with the beginning depth of:

Cemented Pans: B. Soils in all Land Resource Regions except W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THICK in Cemented Pan block and CEM and/or IND in lieu of texture or THIN in Cemented Pan block and IND in lieu of texture with the beginning depth of:

C. Soils in only Land Resource Regions W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THIN in Cemented Pan block and CEM in lieu of texture OR THIN or THICK if IND or CEM are not shown in lieu of texture with the beginning depth of:

Fragmental/Cindery: B. Soils in Land Resource Regions W, X, and Y having an upper layer that has a texture term other than SG, G, FRAG, or CIND immediately above a layer of G, FRAG or CIND beginning at depth of:

Sandy/Sandy Skeletal Substratum: C. Soils in Land Resource Regions W, X, and Y having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and (2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of: Category 4A

Rock Frasments: B. Soils in Land Resource Regions W, X, and Y having layer(s) with a combined thickness of more than 10 inches with (1) Texture with no rock fragment modifier, or (2) texture modified by BY, CB, GR, ST, CN, OR FL (in the Northeast states, this layer has 0 to 50 percent rock fragments by weight; texture modifiers are not used.), or (3) CE, DE, FB, HM, MPT, MUCK, PEAT, SP, VAR over a layer that extends to a depth of 60 inches or more that has a texture (exclude COS, S, SG, LS, FS, or LCOS) modified by BYX, CBX, GRX, STX, CNX, or FLX or over bedrock, CEM, or IND if texture modified by BYX, CBX, GRX, STX, CNX, or FLX extends to less than 60 inches, beginning at a depth of:

++ Continued on back of this sheet ++

Catesorv - 4 and 4A (Nonrenewable)

D. Same as criteria B but will be rewritten to include non rock fragment modified textures over "very" rock fragment modified textures.

Dense Lavers: B. Soils in Land Resource Regions W, X, and Y for soils having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(s) · and with permeability difference of 2 classes between dense layer and upper adjacent layer. (excluding Vertisols, and Vertic subgroups):

Depth Limit (inches)	T Value	
	Categorv 4	Categorv 4A
<10	1	
10-20	1	1
20-40	2	2
40-60	3	3
>60	5	5

Soil properties grouped in the five categories
February 10, 1994

Category - 5 and 5A (Renewable)

Bedrock: A. Soils in all Land Resource Regions except W, X, and Y having SOFT identified in the Bedrock soil property block or MARL (marl layers) with the beginning depth of:

Fragmental/Cindery: A. Soils in all Land Resource Regions except W, X, and Y having an upper layer that has a texture term other than SG, G, FRAG, or CIND immediately above a layer of G, FRAG or CIND beginning at depth of:

Sandy/Sandy skeletal: B. Soils in Land Resource Regions A, B, C, D, and E having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour, (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and (2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of: Category 5A.

Depth Limit (inches)	T Value	
	Catesory 5	Category 5A
<10	1	
10-20	2	2
20-40	3	3
40-60	4	4
>60	5	5

"T" Criteria Proposal
February 10, 1994

DRAFT

Soil Characteristic		Definition	Depth Limit (inches)	T Value
1. Bedrock	A.	Soils in all Land Resource Regions except W, X, and Y having SOFT identified in the Bedrock soil property block or MARL (marl layers) with the beginning depth of:	<10 10-20 20-40 40-60 >60	1 2 3 4 5
		OR		
	B.	Soils having HARD identified in the Bedrock soil property block or layers identified as ICE with the beginning depth of:	<20 20-40 40-60 >60	1 2 3 5
		OR		
	C.	Soils in only Land Resource Regions W, X, and Y having SOFT identified in the Bedrock soil property block or MARL (marl layers) with the beginning depth of:	<20 20-40 40-60 >60	1 2 3 5
2. Cemented pans 1/	A.	Soils in all Land Resource Regions except W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THIN in Cemented Pan block and CEM in lieu of texture OR THIN or THICK if IND or CEM are not shown in lieu of texture with the beginning depth of:	<20 20-40 40-60 >60	2 3 4 5
		OR		
	B.	Soils in all Land Resource Regions except W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THICK in Cemented Pan block and CEM and/or IND in lieu of texture or THIN in Cemented Pan block and IND in lieu of texture with the beginning depth of:	<20 20-40 40-60 >60	1 2 3 5

1/ Where cemented pan is effectively ripped causing an increase in rooting depth, assign T according to new depth to restrictive material, if present (e.g., any restrictive underlying material).

	C.	Soils in only Land Resource Regions W, X, and Y having duripan, petrocalcic, petrogypsic, petroferric with THIN in Cemented Pan block and CEM in lieu of texture OR THIN or THICK if IND or CEM are not shown in lieu of texture with the beginning depth of:	<20 20-40 40-60 >60	1 2 3 5
3.	Fragmental/Cindery			
	A.	Soils in all Land Resource Regions except W, X, and Y having an upper layer that has a texture term other than SG, G, FRAG, or CIND immediately above a layer of G, FRAG or CIND beginning at depth of:	<10 10-20 20-40 40-60 >60	1 2 3 4 5
	B.	Soils in Land Resource Regions W, X, and Y having an upper layer that has a texture term other than SG, G, FRAG, or CIND immediately above a layer of G, FRAG or CIND beginning at depth of:	<20 20-40 40-60 >60	1 2 3 5
4.	Fragipan	Soils having a FRAGI great group. Layer selected has the greatest bulk density inflection, (layer selected has the maximum change which was determined by evaluating all adjacent layers that change from a lower bulk density to a higher bulk density) beginning at a depth of:	<20 20-60 >60	3 4 5
5.	Natric	A. Soils designated in great groups of Natraquolls or Natraqualfs or subgroups of Natric Duraquolls but exclude subgroups of Glossic in the great group of Natraqualfs; and have a natric horizon (to find the natric horizon: search for a	<20 20-40 40-60 >60	2 3 4 5

	subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] above a layer, if present, with UWB, WB, CEM, or IND and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:		
B.	Use criterion B in MLRA's 48A, 48B, 49, 52, 53A, 53B, 53C, 54, 55A, 55B, 55C, 56, 58A, 58B, 58C, 58D, 60A, 60B, 61, 62, 63A, 63B, 64 through 79, 80A, 80B, 81, 82, 83A, 83B, 83C, 83D, 84A, 84B, 84C, 85, 86, 87, 102A, and 102B. Soils designated in great groups of Natralbolls, Natriborolls, Natrustolls, *Natriboralfs, Natrustalfs Natrargids, Nadurargids, or subgroups of Natric Durustolls but exclude subgroups of Glossic in great groups of Natriborolls, Natrustolls, Natriboralfs, Natrustalfs, and Natrargids; and have a natric horizon (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] above a layer, if present, with UWB, WB, CEM, or IND and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:	<20 20-40 40-60 >60	2 3 4 5
	*At present, Natriboralfs are rare in the United States, and subgroups have not been developed.		
C.	Soils designated in great group with "NA" and suborder "UD" and a subsurface natric horizon with a slow or very slow permeability (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour] and use the upper depth of that layer to assign depth to natric horizon) beginning at a depth of:	<20 20-60 >60	3 4 5

	D.	Soils in Land Resource Regions A, B, C, D, and E except MRLA's 48A, 48B, and 49 having a subsurface natric horizon with equal to or greater than 35 percent clay; slow or very slow permeability (to find the natric horizon: search for a subsoil, subsurface, layer with the slowest permeability [<0.2 inches/hour and equal to or more than 35 percent clay] and use the upper depth of that layer to assign depth to natric horizon); and with aridic or xeric soil moisture regime and in great groups designated as Nadurargids, Natrixerolls, Natrargids, or Natrixeralfs or subgroups of Natric Durixeralfs or Aridic Natrixerolls with the slow or very slow permeability beginning at a depth of:	<20 20-40 40-60 >60	2 3 4 5
6. Sandy or Sandy Skeletal Substratum	A.	Soils in all Land Resoure Regions except A, B, C, D, E, W, X, and Y having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour, (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and	10-20 20-60 >60	3 4 5

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	(2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of:		
	OR		
B.	Soils in Land Resource Regions A, B, C, D, and E having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour, (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and (2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of:	10-20 20-40 40-60 >60	2 3 4 5
	OR		
C.	Soils in Land Resource Regions W, X, and Y having sandy substratum layer(s) of SG, COS, S, LS, FS, or LCOS (with or without rock fragment modifiers); or SR with these textures; that extend to a depth of 60 inches or more; with a permeability equal to or greater than 6 inches per hour (A) immediately below a layer or layers that have (1) a permeability of less than 6 inches per hour, (2) less than 50 percent fine or coarser sand separates in the fine earth fraction, and (3) a combined thickness of equal to or more than 10 inches; OR (B) immediately below a layer	10-20 20-40 40-60 >60	1 2 3 5

	or layers that have (1) CE, DE, FB, HM, MPT, MUCK, PEAT, or SP in lieu of texture, and (2) a combined thickness of equal to or more than 10 inches. With a substratum beginning at a depth of:		
7. Abrupt Textural Change	A. Soils in orders of Alfisols, Aridisols, Mollisols, or Ultisols and (1) all Pale great groups of those orders, Albaqualfs or Argialbolls; or (2) soils in xer, bor, alb, arg, aqu, or argi suborders with great groups of alb, argi, eutro, dur, or cry with subgroups of Abruptic, Abruptic Aridic, Abruptic Cryic or Abruptic Xerollic; or (3) Alfic Haploxerands or Alfic Vitrixerands with an argillic horizon with equal to or greater than 35 percent clay; AND having an adjacent upper layer with a permeability of more than 0.6 inches/hour overlying and adjacent to a lower layer having more than 35 percent clay with a permeability of less than 0.2 inches/hour beginning at a depth of: (NOTE: This definition will be rewritten to include moderately slow over very slow.) Criteria A. will be used in the following MLRA's 1, 2, 6, 8 through 10, 10A, 11, 11A, 11B, 12 through 15, 17 through 27, 28A, 28B, 29 through 32, 34, 35, 37, 39, 40, 41, 43, 44, 47, 48A, 48B, 52, 53A, 54, 58A, 58B, 60A, 60B, and 67.	<20 20-60 >60	3 4 5
	B. Soils in orders of Alfisols, Mollisols, or Ultisols and; (1) Albaqualfs with subgroups of Udollic, Aeric, Mollic, or Typic; or (2) Hapludalfs with subgroups of Albaquultic or Albaquic; or (3) Typic Argialbolls; or (4) Albaquults with subgroups of Typic or Aeric with	<20 20-60 >60	3 4 5

an argillic horizon with equal to or more than 35 percent clay; AND having an adjacent upper layer with a permeability of more than 0.6 inches/hour overlying and adjacent to a lower layer having more than 35 percent clay with a permeability of less than 0.2 inches/hour beginning at a depth of: (NOTE: This definition will be rewritten to include moderately slow over very slow.)

Criteria B. will be used in the following MRLA's: 71, 73, 74, 75, 76, 102B, 106, 107, 108, 109, 111, 112, 113, 114, 115, 144A, 148, and 149B.

8. Dense Layer

NOTE - Criteria A, C, and E will not be used after October 1, 1994. Criteria B, D, and F will be used after October 1, 1994. States will need to review and possibly need to update soil properties to generate appropriate "T" value using Criteria B, D and F.

A. Soils having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(s); and with permeability difference of 2 classes between dense layer and upper adjacent layer. (excluding Vertisols, and Vertic subgroups) (not used in Land Resource Regions R, W, X, and Y and MLRA's 100 and 101):

Laver Soil Textural Class 1/	Moist Avq.BD	Layer Depth	T Value
COS, S, LCOS, LS, FS, LFS	>1.80	<20	3
		20-60	4
		>60	5
VFS, LVFS, FSL, COSL VFSL, SL, SCL with average <18 percent clay.	>1.75	<20	3
		20-60	4
		>60	5
SCL, CL and average 18 to 35 percent clay or L.	>1.7	<20	3
		20-60	4
		>60	5

SI, SIL, or SICL and average <35 percent clay.	>1.6	<20 20-60 >60	3 4 5
CL, SC, c, SICL, SIC and clay average within 35 to 60 percent clay.	>1.55	<20 20-60 >60	3 4 5
C with average clay value 60 percent or more clay (exclude Soil Orders of Andisols and Oxisols).	>1.35	<20 20-60 >60	3 4 5

OR

B. Soils in Land Resource Regions W, X, and Y for soils having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(s) ; and with permeability difference of 2 classes between dense layer and upper adjacent layer. (excluding Vertisols, and Vertic subgroups):

Laver Soil Textural Class 1/	Moist Avg.BD	Layer Depth	Value
cos, s, LCOS, LS, FS, LFS	>1.80	<20 20-40 40-60 >60	1 2 3 5
VFS, LVFS, FSL, COSL VFSL, SL, SCL with average <18 percent clay.	>1.75	<20 20-40 40-60 >60	1 2 3 5
SCL, CL and average 18 to 35 percent clay or L.	>1.7	<20 20-40 40-60 >60	1 2 3 5
SI, SIL, or SICL and average <35 percent clay.	>1.6	<20 20-40 40-60 >60	1 2 3 5
CL, SC, c, SICL, SIC and average within 35 to 60 percent clay.	>1.55	<20 20-40 40-60 >60	1 2 3 5

C with average clay value 60 percent or more clay (exclude Soil Orders of Andisols and Oxisols).	>1.35	<20 20-40 40-60 >60	1 2 3 5

c. Soils in Region R and MRLA's 100 and 101 having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(es):

Layer Soil Textural Class 1/	Moist Avg.BD	Layer Depth	T Value
COS, S, LCOS, LS, FS, LFS	>1.75	<20 20-40 40-60 >60	2 3 4 5
VFS, LVFS, FSL, COSL VFSL, SL, SCL with average <18 percent clay.	>1.75	<20 20-40 40-60 >60	2 3 4 5
SCL, CL and average 18 to 35 percent clay or L.	>1.7	<20 20-40 40-60 >60	2 3 4 5
SI, SIL, or SICL and average <35 percent clay.	>1.6	<20 20-40 40-60 >60	2 3 4 5
CL, SC, c, SICL, SIC and average 35 to 60 percent clay.	>1.55	<20 20-40 40-60 >60	2 3 4 5
C with average 60 percent or more clay	>1.35	<20 20-40 40-60 >60	2 3 4 5

D. Soils in Land Resource Region R and MLRA's 100 and 101 having a layer whose upper boundary begins at the depths indicated and has the following average bulk density for layer soil textural class(es):

Laver Soil Textural Class 1/	Moist Avg.BD	Layer Depth	T Value
COS, s, LCOS, LS, FS, LFS	>1.75	<20	2
		20-40	3
		40-60	4
		>60	5
VFS, LVFS, FSL, COSL VFSL, SL, SCL with average <18 percent clay.	>1.75	<20	2
		20-40	3
		40-60	4
		>60	5
SCL, CL and average within 18 to 35 percent clay or L.	>1.7	<20	2
		20-40	3
		40-60	4
		>60	5
SI, SIL, or SICL and average <35 percent clay.	>1.6	<20	2
		20-40	3
		40-60	4
		>60	5
CL, SC, c, SICL, SIC and average 35 to 60 percent clay.	>1.55	<20	2
		20-40	3
		40-60	4
		>60	5
C with average 60 percent or more clay	>1.35	<20	2
		20-40	3
		40-60	4
		>60	5

1/ Layer soil textural class - excludes the surface layer.

9. Rock Fragments

If state equals CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT VA, and WV, use only the 2mm - 10 inch rock fragment fraction for the surface layer.

A. Soils in all Land Resource Regions except W, X, and Y having layer(s) with a combined thickness of more than 10 inches with (1) Texture with no rock fragment modifier, or (2) texture modified by BY, CB, GR, ST, CN, OR FL (in the Northeast states, this layer has 0 to 50 percent rock

<20	3
20-60	4
>60	5

		fragments by weight; texture modifiers are not used.), or (3) CE, DE, FB, HM, MPT, MUCK, PEAT, SP, VAR over a layer that extends to a depth of 60 inches or more that has a texture (exclude SG, COS, S, LS, FS, or LCOS) modified by BYX, CBX, GRX, STX, CNX, or FLX or over bedrock, CEM, or IND if texture modified by BYX, CBX, GRX, STX, CNX, or FLX extends to less than 60 inches, beginning at a depth of:		
		OR		
	B.	Soils in Land Resource Regions W, X, and Y having layer(s) with a combined thickness of more than 10 inches with (1) Texture with no rock fragment modifier, or (2) texture modified by BY, CB, GR, ST, CN, OR FL (in the Northeast states, this layer has 0 to 50 percent rock fragments by weight; texture modifiers are not used.), or (3) CE, DE, FB, HM, MPT, MUCK, PEAT, SP, VAR over a layer that extends to a depth of 60 inches or more that has a texture (exclude COS, S, SG, LS, F'S, or LCOS) modified by BYX, CBX, GRX, STX, CNX, or FLX or over bedrock, CEM, or IND if texture modified by BYX, CBX, GRX, STX, CNX, or FLX extends to less than 60 inches, beginning at a depth of:	<20 20-40 40-60 >60	1 2 3 '5
	C.	Same as A. and add non rock fragment modified textures over "very" rock fragment modified textures.		
	D.	Same as A. and add non rock fragment modified textures over "very" rock fragment modified textures.		
10. High gypsum		Soils having a gypsiferous material layer designated as GYP at a beginning depth of:	<20 20-40 40-60 >60	2 3 4 5

11.	Organic	A.	Soils that are Histosols having organic soil material; and not lithic or limnic or terric or hydric subgroup (e.g., Terric, Hemic Terric, etc.), then "T" is	3
			OR	
		B.	Soils that are Histosols having a lithic, hydric, or limnic subgroup, then "T" is	1
			OR	
		C.	Soils that are Histosols having a terric subgroup (e.g., Terric, Hemic Terric, etc.), then "T" is	2
			OR	
		D.	Soils in Land Resource Regions W, X, and Y that are Histosols having organic soil material; and not lithic or limnic or terric or hydric subgroup (e.g., Terric, Hemic Terric, etc.), then "T" is	5
12.	High Carbonates	Criteria will be used after October 1, 1994. States will need to review and possibly need to update soil properties to generate appropriate "T" value using Criteria A and B.		
		A.	Soils in Land Resource Regions B, C, D, E, W, X, and Y having a surface layer with less than 10 percent calcium carbonate (CaC03) equivalent and have a subsurface layer with greater than 30 percent CaC03 equivalent, beginning at a depth of:	<20 → 2 20-40 → 3 40-60 → 4 >60 → 5
		B.	Soils (excludes Land Resource Regions B, C, D, E, W, X, and Y) having a surface layer with with more than 30 percent CAC03 equivalent, beginning at a depth of:	<20 → 3 20-60 → 4 >60 → 5
13.	Severely Eroded		Soils designated on the Soil Interpretations Record (SIR) as having a severely eroded unit modifier or have severely	

eroded shown in Class Determining Phase in Capability and Yields Per Acre of Crops and Pasture and have reduced productivity. These SIR's manually are adjusted 1 class of "T" value lower than the non-eroded SIR or Class Determining Phase.

Draft I

Information Pertaining to Interpretive Soil Property Reliability From Standard Soil Survey Operations

INTRODUCTION

The NCSS has generated 5 x 10^5 estimates for each of about 20 interpretive properties, or 1 x 10^7 in total. The impending placement of these estimates in the computer, accessible to our customers generally, increases the need to provide an evaluation of reliability.

It should be feasible to attach to each interpretive soil property independently a statement about relative reliability based on general information about the specific soil survey, not actual evaluation through measurement. Such an evaluation should include an assessment of inherent area1 uniformity. The evaluation should encompass the field observations in terms of relevance to the property under consideration, personnel quality, area1 density of the field observations, and the applicability and quantity of laboratory data. The evaluation should be summarizable numerically as a whole, in addition to each of the considerations. Table 1 and the associated explanation is an initial attempt.

The approach in no way diminishes the need for numerical statistical evaluation based on field and laboratory measurements and observations. Instead the approach start from the premise that we know a lot, which our customers should have made available to them.

METHOD

Table 1 is an example. An explanation of the columns follows.

Column 1. Self-explanatory. Incomplete list of interpretive properties.

Column 2. Self-explanatory. Use depth?

Column 3. Hypothetical values of interpretive properties. The soil is a Typic Argiudoll developed in loess which overlies glacial till. Not necessary in practice.

Column4. Information about the interpretive property derivable from the combined taxonomic and non-taxonomic criteria. Not complete and not directly relevant. Could delete.

Columns 5-7 to be discussed are descriptive of the inherent uniformity of the interpretive property.

Column 5. This is class placement of the uniformity excluding the effect of use dependence. Here and elsewhere classes 1 to 5 are employed, with 5 the most favorable and 1 the lowest. The classes are in table 2.

Table 2. Definition Of uniformity class exclusive of the effect of soil use.

Uniformity Class	Areal Proportion Outside Interpretive Property Mean ±1SD pct	±2SD pct
5	<10	<5
4	10-20	5-10
3	20-30	10-15
2	30-50	15-25
1	≥50	≥25

Table 3 is an example of some possible guidelines for entry into table 2. The attempt is not a serious exploration!

Table 3. Example of guidelines to inherent uniformity class.

Class	Description
<5	(1) Ap horizons, slight or no accelerated erosion, lacks a natric horizon beneath, ≥18% clay and slope <2%, or (2) aeolian parent material, horizons are defined taxonomically and are not C horizons, and if the near surface, slight of no accelerated erosion and the slope <2%.
4	Aeolian parent material or parent materials conceived to have the uniformity of aeolian materials that otherwise fail class 5, but which are not surface horizons that are moderately eroded
3	Not class 5 or 4 and not below taxonomically defined horizons. Surface horizons other than aeolian and moderate or less erosion.
2	Below taxonomically defined horizons but stratification not indicated, or surface horizons that are strongly eroded.
	Below taxonomically defined horizons and stratification indicated.

Columns 6, 7. This is a class placement inclusive of the effect of use dependency. Column 6 is a placement of the area1 heterogeneity, which is influenced by the area1 proportion of the vegetative classes and the differences in the interpretive property among the vegetative classes. To complete column 6, first the kinds of soil uses are established. A reference use is selected for the map unit component to which the other uses are referred. If the reference use occupies 0-10 or 90-100 percent of the area, then the uniformity is class 5. Otherwise, the uniformity is as given in tables 4 and 5 to follow for the listed uses.

Table 4. An illustrative set of uses.

1. Woodland: >30 years old, not grazed.
2. Woodland; other than 1 and continuous bushland.
3. Rangeland and Permanent Pasture; excellent, moderate.
4. Rangeland and Permanent Pasture: poor.
5. Cropland; conventional and continuous.
6. Cropland; no-till ≥3 years.
7. Cropland; ≥5 years grass, hayland, pasture
8. Cropland; grass-cropland rotation and not 7.
9. Cropland; no-till 1 year.
10. Cropland; other.

Table 5. Definition of uniformity classes as determined by distribution of soil uses.

Use Class		Proportion of Reference Use(s)	
Reference	Other	10-25, 75-90 Pct	25-75 Pct
1	5-10	3	1
1	3, 4	3	1
1	2	5	4
3	4	4	3
3, 4	5	3	2
3, 4	6-10	4	3
5	6-10	3	2
6	7, 8	5	4
6	9	4	3
10	7-9	4	3

Column 7 is defined in table 2 except that the uniformity inclusive of soil use is inclusive in the evaluated.

Columns 8-11 pertain to the amount and quality of the information available to make the decision about each interpretive soil property taken separately.

Column 8. This is the inherent pertinence of field observations to evaluation of the individual interpretive soil properties. Clay percentage can be evaluated more closely by field obsewation, assuming the clay is dispersible, than can organic matter, at least by most of us.

Column 9. This pertains to an integration of experience, grade level structure, quality of supervision, and prior performance. It would be developed and applied by the Quality Assurance natural group. The criteria would need to be developed. There are non-technical (read political) considerations. We should give this a real shot before deletion.

Column 10. The relative area1 density of field observations for the interpretive properties are dependent on (1) the density of point sites, (2) the frequency with which the horizon is examined at a given point site, and (3) the frequency that an observation is made on (or directly related to) the interpretive soil property. The survey order is used to stratify for (1). For (2), the subsurface taxonomic control section is taken as the norm with departures towards more common for the surface horizon and towards less common beneath the subsurface taxonomic zones. Three classes are suggested for the frequency of observation (<20, 20-80, and ≥80 percent) based on the assumed percentage of the opportunities that the interpretive soil property would be evaluated in the course of the description of the zone. Table 6 presents the scheme.

Table 6. Relative density of observation based on survey order, horizon, and likelihood of observation.

Survey Order	Surface horizon			Subsurface Taxonomic Zone			Beneath Taxonomic Zone		
	<20%	20-80%	≥80%	<20%	20-80%	≥80%	<20%	20-80%	≥80%
1	4	5	5	3	4	5	2	3	4
2	3	4	4	2	3	4	1	2	3
3	2	3	3	1	2	3	1	1	2
4	1	2	2	1	1	2	1	1	1

Column 11. This is an evaluation of the laboratory point data available (table 7).

Table 7. Classes of relevant laboratory data.

Class	Criteria
5	≥5 pedons of series with S-8's
4	3 to 5 pedons of series with S-8's or ≥5 pedons of similar soils plus pedons sampled as the series but S-8's not completed.
3	2 pedons of series or 3 to 5 pedons of similar series plus pedons sampled as series but S-8's not completed.
2	1 pedon of series or 1 or 2 pedons of similar series plus pedons sampled as series but S-8's not completed.
1	No pedons of series and none of similar series plus pedons sampled as series but S-8's not completed.

The assumption is that the analyses that pertain to the interpretive property have been determined.

Columns 12 and 13. These are index number for each interpretive soil property and horizon combination. Separates indices are calculated on the assumption that different major soil uses are distinguished and for the situation where soil use is not distinguished.

Column 12.

$$\frac{\text{Col 6} + \text{Col 7}}{2} + \frac{\text{Cols 8, 9, 10, 11}}{4}$$

or, the same as column 13.

Column 13.

$$\text{Col 5} + \frac{\text{Cols 8, 9. 10, 11}}{4}$$

The calculation gives equal weight to inherent uniformity and to observations of quantity and quality. The uniformity related to soil use is envoked only if the interpretive property is sensitive to use. The maximum possible range would be from 1 to 10.

DISCTJSSION

It is conceived that the separate placements as well as the integral numbers for the reliability of each observation would be available for each interpretive soil property in a survey. Much of the information required would be assigned globally. The completion would be less complicated than might be assumed. The presentation is an initial attempt to entice consideration. The approach is part of a general need to assign what is known about a soil survey to the evaluation of reliability of the interpretive soil property estimates. Presently we have no vehicle for introduction of inherent differences in soil properties or the quality of the soil survey in terms of the information base, and we lack a means of giving numerical expression to the effect of use dependency. Introduction of RV's may compound the problem. The availability of a single value in place of a sample may tend to increase the assumed uniformity by our customers. Natural complexity would be removed.

Some further discussion of columns 5, 6, and 7 may be helpful. Column 5 is a rating on the assumption that use dependency is not a factor. The truth is that much of soil survey has turned a blind eye to the effect of use on uniformity. Column 5 is for what we do presently. Columns 6 and 7 address the conceived uniformity assuming that use is considered. The resulting uniformity is reduced. If in the future use dependency is introduced as a basis for stratification of interpretive properties to our customers, then the reduction in uniformity because of the consideration of use is removed. Columns 5-7 would be replaced by columns that differ in the use considered. The uniformity of the concepts would be increased.

Brasher and Benham (1993, ASA Agronomy Abst., p. 31) have presented an overall scheme for the quality of soil survey information. The presentation here addresses a portion of soil survey information. The approach should be subsumable within the scheme by Brasher and Benham.

We should be able to introduce transect data into the evaluation of inherent uniformity. Someone who has a good grasp of the field control program should be able to make large improvements.

Finally, the approach should be useful in the allocation of resources in the soil survey generally. We would have on paper what is done well and what less well which could be evaluated relative to utility of the interpretive property.

RBG
1/27/94

Table 1. Uniformity analysis of interpretive properties of an Argiudoll developed in loess over glacial till.

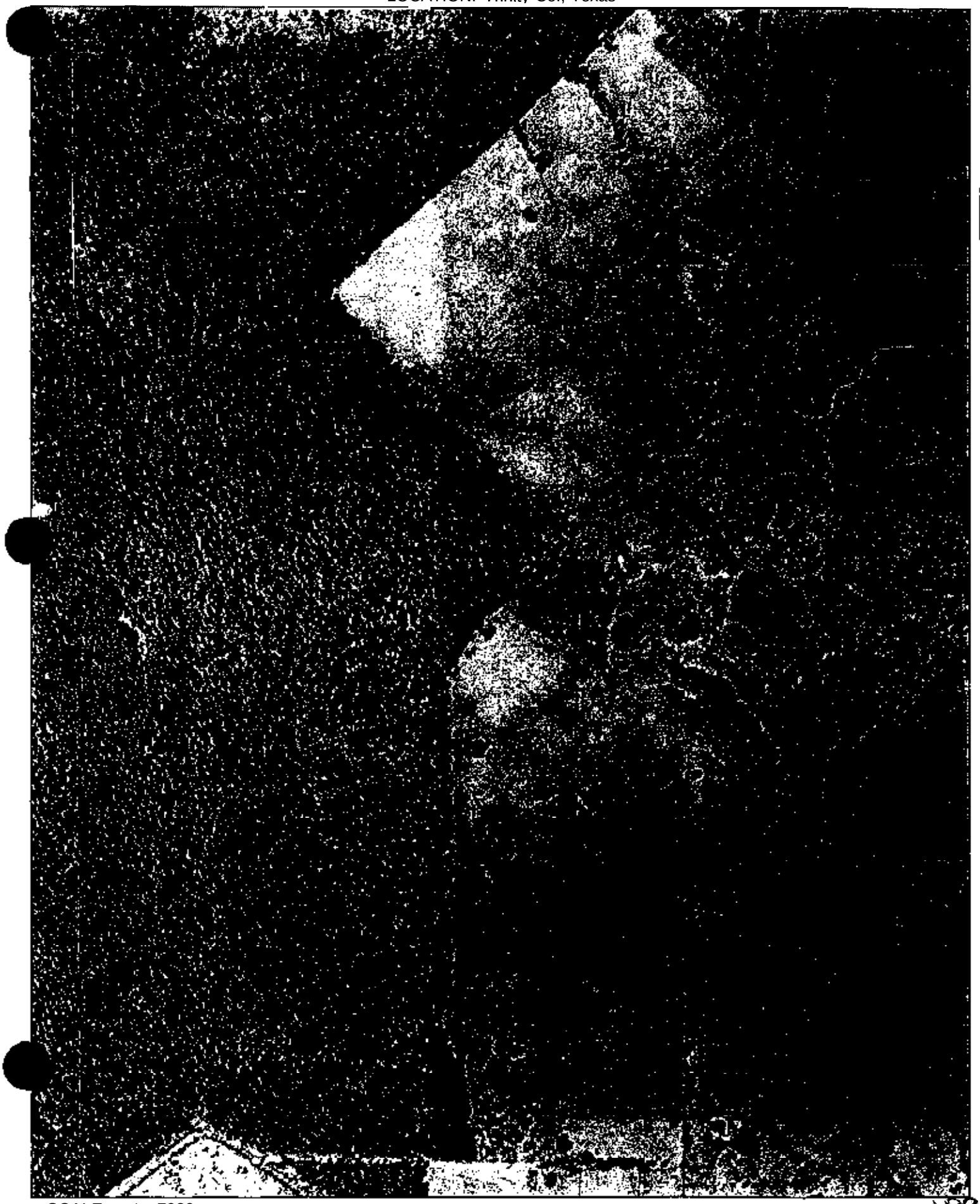
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
				Inherent Uniformity			Observations				Index	
				Not Use								
Interpretive Property	Horizon (Depth?)	Assigned Values	Systematics Constraints	Dependent Internal	Use Deoendent Areal	Use Deoendent Internal	Field Utility	Personnel	Areal	Laboratory Data	Use-Dependency With	Use-Dependency Without
> 3"	A	0		5		5	5	3 (Global)	5	5	9.5	9.5
	B	0	<50%	5		5	5		4	4	9.5	9.5
	C	10		3		3	5		3	3	6.5	6.5
Pass 10	A	100		5		5	5		5	5	9.5	9.5
	B	100	>50%	5		5	5		5	4	9.3	9.3
	C	80		4		4	5		3	3	7.5	7.5
Pass 40	A	100		5		5	4		5	5	9.3	9.3
	B	100		5		5	4		5	4	9.0	9.0
	C	70		4		4	4		3	3	7.3	7.3
Pass 200	A	100		5		5	4		5	5	9.3	9.3
	B	100		5		5	4		5	4	9.0	9.0
	C	50		3		3	4		3	3	6.3	6.3
Clay	A	12-20	<27%	4		4	4		5	5	8.3	8.3
	B	20-30	18-35%	5		5	4		5	4	9.0	9.0
	C	15-25	<27%	3		3	3		3	3	6.0	6.0
Organic Matter	A	2-4	> 1%	3	1	1	2		2	5	4.0	6.0
	B	1-2		3	1	2	1		1	4	3.8	5.3
	C	<1		5		5	1		1	2	6.8	6.8
Permeability	A	0.6-2		3	1	1	2		1	1	2.8	4.8
	B	0.6-2		3	1	1	4		2	1	3.5	5.5
	C	0.2-0.6		3		3	3		1	1	5.0	5:o
CEC	A	10-15		3	1	2	3		3	3	4.5	6.0
	B	12-18	11-21	4	1	3	4		3	3	5.3	7.3
	C	9-15	≤16	3		3	4		3	2	6.0	6.0

Table i. Uniformity anaiysis of interpretive properties of an Argiudoll developed in loess over glacial till (continued).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
				Inherent Uniformity			Observations				Index	
				Not Use Dependent	Use Dependent							
Interpretive Property	Horizon (Depth?)	Assigned Values	Systematics Constraints	Internal	Areal	Internal	Field Utility	Personnel	Areal Density	Laboratory Data	Use-Dependency With	Without
Bulk Density	A	1.20-1.40		4	1	1	2		3	1	...3.3	...6.3
	B	1.35-1.55		4	1	2	3		2	2	4.84.0	4.86.5
	C	1.50-1.70		3		3	2		1	1		
				4								
AWC	A	0.15-0.20		4	1	2	2		2	1	3.5	6.0
	B	0.15-0.20				3	3		2	2	4.5	6.5
	C	0.05-0.10		3'	1	3	3		1	1	5.0	5.0
				4								
pH	A			4	1	1	5		4	5		8.3
	B					4	5		3	4	7.8	7.8
	C			5		5	5		2	2	8.0	8:0

ITEM 25 a

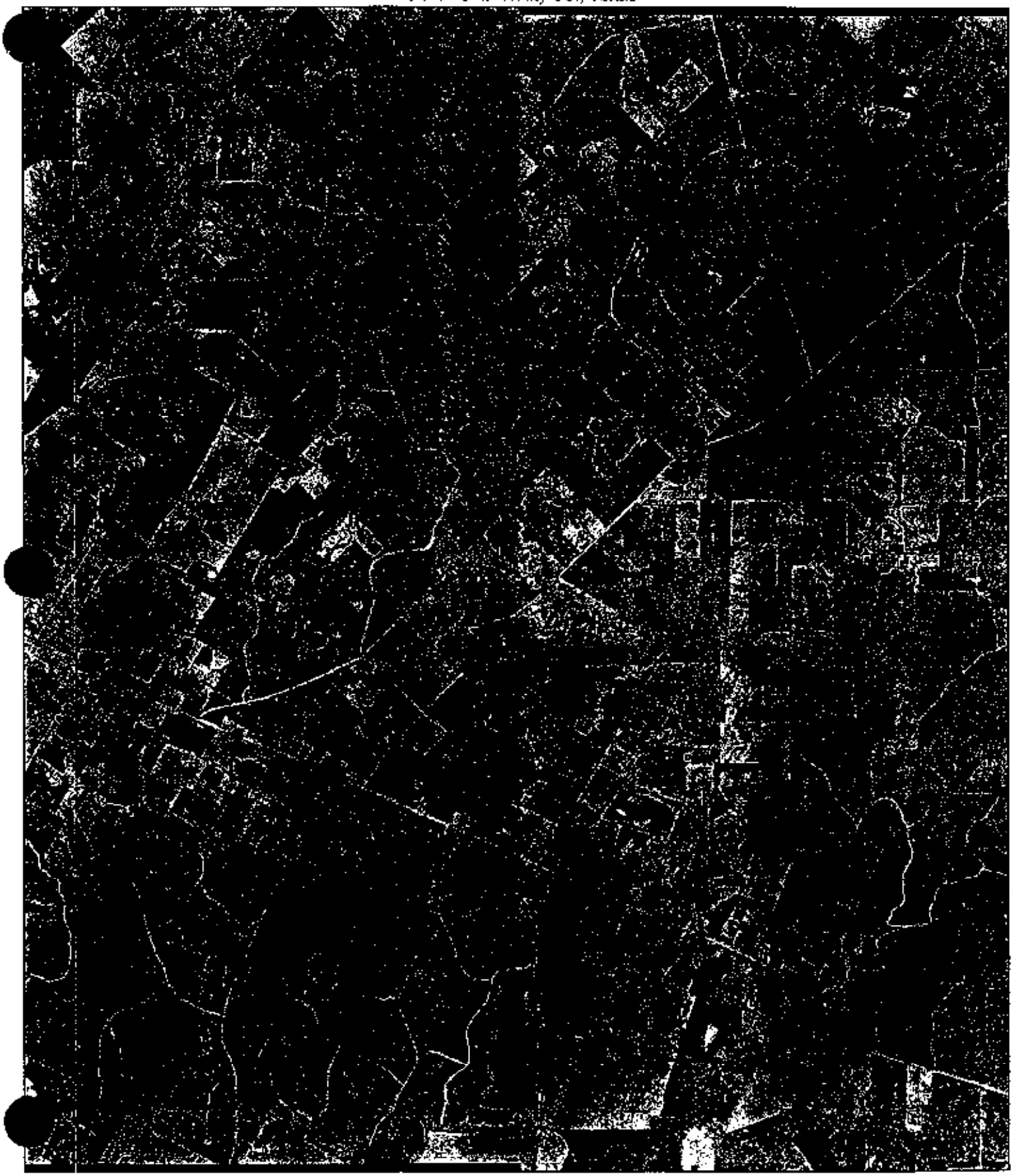
TITLE: Groveton east, Trinity Co.,Texas
LOCATION: Trinity Co., Texas



SCALE: 1 : 7920 1" = 660'

ITEM 256

TITLE: Groveton east, Trinity Co.,Texas
LOCATION: Trinity Co., **Texas**



SCALE: 1 : 63360

REGION: 296936.5 3445732.5 309408.5 3431008.5

190

ITEM 26

United States
Department of
Agriculture

Soil
Conservation
Service

WATERSHED APPROACH

NONPOINT SOURCE POLLUTION PREVENTION AND CONTROL

Review Draft for
State Conservationists

(Distributed January 31, 1994, at
NACD's *Annual Meeting in Phoenix,* ***AZ)***

State Conservationists should FAX their comments to Ed Riekert at 202-690-1462 by February 11.

EXECUTIVE SUMMARY

The watershed approach is proposed as a component of the Administration's policy far natural resources management. This document explains the watershed assistance process used by the U.S. Department of Agriculture's (USDA's) Soil Conservation Service (SCS) and its application to nonpoint source pollution prevention. The agency's Water Management Action Plan identifies actions SCS will take to implement the watershed approach for national priorities, such as water conservation, flood control, riparian areas, wetland restoration and enhancement, water management. and soil quality protection and improvement.

The Watershed Approach

A watershed approach is most effective when the resources, needs, and treatments are addreased in an integrated, holistic manner in the watershed. SCS uses an ecosystem-based planning process for watersheds that looks at all the natural resources in the watershed—soil, water, air, plants, and animals—in relation to social, cultural, and economic considerations. The process leads to workable solutions, based on scientific principles, to area-wide needs through the participation and leadership of stakeholders.

The ecosystem-based watershed approach follows the established SCS planning process, which empowers local people to recognize problems and opportunities, find workable solutions for resolving issues, and attain goals related to watersheds. The watershed provides a forum for successful planning, conflict resolution and decision making. The result is the natural resources plan for the watershed.

A watershed is a generally understood, easily definable geographic area that provides a logical basis for planning. The united states has been divided into successively smaller watersheds. These are arranged within each other from the smallest to the largest. The watershed process described in this paper puts emphasis on local leadership. For this to be effective, the basic watershed planning unit must be small, generally ranging from 10,000 to 250,000 acres.

The Watershed Plan

The plan contains a clear description of resource problems; goals to be attained; systems to be applied; and sources for technical, educational, and funding assistance from Federal, State, and local entities for implementing solutions.

The ecological planning process, as it is applied in watersheds by USDA's SCS and Forest Service (FS), is progressive and reiterative. Planning can be performed at different levels of intensity, depending on the scope and complexity of the problems and the scientific technology available. The process begins with general descriptions of problems, opportunities, and resource concerns, including ideas far solutions, and ultimately moves to the development of plans that are explicit and highly specific.

Site-specific Plans

Site-specific management plans are developed by each landowner, operator, stakeholder, or other interested party to address natural resource problems on a specific site to solve or mitigate the problems. Each site-specific plan, when implemented, is an integral part of the solution for the whole watershed.

Conclusion

The watershed approach is a recognized process for involving local people, interests, and agencies in identifying problems and solutions in a watershed area to address resource goals, such as surface and ground water quality. The site-specific plan serves as the implementation mechanism for applying these solutions.

Nonpoint source water quality needs can be most effectively met through an ecosystem-based watershed approach.

Actions SCS Will Take

1. Support a science-based, watershed approach to addressing nonpoint source pollution.
2. Support setting reasonable implementation schedules for site-specific plans and putting responsibility for ensuring participation in achieving watershed goals at the local level.
3. Foster a coordinated partnership and local leadership process.
4. Identify resources needed to support technical assistance for a watershed approach to prevent and control nonpoint source pollution.
5. Redirect existing programs to achieve nonpoint source pollution prevention and control in watersheds.
6. Provide training to enable employees and partners to provide ecosystem-based assistance in watersheds to prevent and control nonpoint source pollution.
7. Support development of technical tools such as expert systems and geographic information systems.

WATERSHED APPROACH TO NONPOINT SOURCE POLLUTION PREVENTION AND CONTROL

Introduction

USDA assists people with managing surface and ground water quality and quantity to meet society's changing needs and sustain healthy ecosystems. To accomplish its mission to conserve and protect natural resources, SCS has developed a watershed approach to ecosystem planning and management.

A watershed approach, or process, enables USDA to assist local leaders to develop and implement watershed plans that address all resource concerns in a watershed in an integrated and - w a y . This process is particularly well suited to preventing and reducing nonpoint source pollution of both surface andgroundwater. This paper describes how a watershed approach can be applied to addressing nonpoint source pollution.

Nonpoint source pollution occurs when rainfall or snow melt moves over the soil surface and through the soil profile, carrying natural and synthetic pollutants to rivers, lakes, wetlands, coastal waters, or ground water. Nonpoint source pollution is a growing concuntothepublic.

A National Watershed Framework

The watershed approach provides a national framework for developing tailored, integrated, natural resource-oriented goals and solutions. It bases planning and implementation on logical geographical units defined by the natural hydrologic system.. The U.S. Geological survey (USGS) and scs have mapped the country's numerous hydrologic units, or watersheds. These maps provide universally recognized watershed boundaries.

Conceptually, watersheds occur on the landscape in a nested arrangement.. Watersheds occur in all different sizes, and big watersheds contain smaller ones. USGS and SCS have mapped watersheds at different scales of size. This systematic framework is easily adapted for use with geographic information sys tans and other technology.

The Watershed Approach

A watershed approach to planning helps focus the way Federal partners assist States and stakeholders at the local level. USDA has the integrated resource expertise, field organizatio[illegible]uc-ture, and delivery system to help local leaders form w[illegible]d committees and to educate, train, and empower them to direct the process of organizing local, State, and Federal resources to address ecosystem problems identified in watersheds.

A water&cd approach follows an established planning process that involves local people in identifying problems and opportunities and developing workable solutions. These solutions then become the watershed implementation plan. The process is progressive and reiterative. Planning can be performed at different levels of intensity, depending on the scope and complexity of the problems and the scientific technology available. The process begins with factual information about problems, opportunities, and resource concerns including some discussion of solutions and moves to plans that are explicit and highly specific.

Federal staffs at the local level act as coordinators, facilitators, and change agents to empower local people to take *charge* of the environmental concerns in their watersheds, identify problems and opportunities, and develop workable solutions. This involves a science-based approach to ecosystem management on a watershed basis of identifying problems, formulating strategic& and implanenting solutions. Local leadership trained in consensus building, problem-solving techniques. and public participation processes are effective. The partners must be able to facilitate a coordinated resource management planning [illegible]ss that will lead to sound decision making to solve envir[illegible]al problems. As local people and stakeholders recognize their ability to improve environmental quality, they *maintain* partnerships and coordinate among:

- Those who own or manage the resources;
- Thosewhohaveorwilldevelcpinfi.3m&onon how to contribute to the implementation of solutions to watershed problems;
- Thosewhowritethenllts;and
- Those who have different visions of the outcome.

Definitions

- **Ecosystem**—A biological community (inclu[illegible] people) and its interactions within its environment.
- **Ecosystem management**—The appropriate integration of ecological, economic, and social factors in order to maintain and enhance the quality of the environment to best meet current and future needs.
- **Ecosystem-based assistance**—The appropriate integration of ecological, economic, and social factors through the SCS planning and assistance process to maintain and enhance the quality of the environment to best meet our current and future needs.
- **Site-specific plan**—A comprehensive, site-specific natural resource management plan developed cooperatively with a landowner, operator, stakeholder, or other interested individual or group to address resource concerns on an individual land unit. The site-specific plan will address economic, social, and cultural concerns as well as concerns identified by stakeholders for the watersheds for which the plans are written.
- **Watershed**—A defined planning area using hydrologic boundaries adjusted as needed to accommodate ground water conditions and other locally identified needs.
- **Watershed approach**—An organized, rational process for planning and implementation to solve resource problems and achieve resource protection in watersheds. The watershed approach empowers local stakeholders to identify and analyze resource problems and their consequences, formulate and evaluate alternative solutions, implement corrective actions, and monitor results as a basis for further steps. This is done through coordinated, cooperative actions at the Federal, State, and local levels. The product of this process is effective watershed management through the [illegible]mentation of the watershed plan.
- **Watershed management**—Actions needed to conserve, dis[illegible], develop, protect, restore, and use natural resources to achieve sustainable conditions for a specific watershed.

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A watershed approach to ecosystem planning is a comprehensive process that considers all the natural resources in the watershed—soil, water, air, plants, and animals—as well as social, cultural, and economic conditions. Through the participation and leadership of stakeholders, the watershed approach leads to workable solutions that meet ecosystem needs.

Local Leadership Coordination

Local leadership and coordination are the key to effectively solving nonpoint source pollution problems in watersheds. US:DA works with committees of State and Federal agencies, landowners, interest groups, and the general public to identify the needs of the watershed ecosystem. Functions include determining priorities, proposing policy, establishing watershed boundaries, fostering partnerships, and meeting future needs.

When constituted, local watershed committees serve as catalysts to provide an added thrust to conservation organizations and groups that are striving for social, economic, and environmental improvement. A watershed approach ensures that local people are the primary forum for identifying problems and opportunities as well as resolving issues and conflicts related to ecosystem planning and management. A watershed approach provides a non-threatening environment for successful planning and conflict resolution.

Communication, the use of public participation techniques to ensure publk involvement memorandums of understanding, and partnerships are all tools used in coordination. It also involves sharing data, setting priorities, and focusing on results.

SCS Assistance

SCS has the expertise, knowledge, structure, and legislative authority to effectively integrate a national resource conservation effort. Within the scope of the watershed approach there are several techniques and technologies that SCS can bring to the effort. SCS administers programs and provides assistance to private landowners and land users in the areas of:

- Watershed and site-specific planning assistance,
- Environmental evaluation,
- Assessments of water quality and quantity,
- Erosion prediction,
- Wetland restoration
- Forestry/agroforestry,
- W i i
- Conflict resolution,
- Ecanomk8naly&
- Qnnpsyst#nmanagement,
- Range/grazing management,
- Outdoor recreation planning,
- Habitat management,
- Techmladoption/diffusion,
- Agricultural waste management,
- Nutrient/pesticide management,
- Construction engineering,
- Design engineering, and
- Water management.

SCS employs discipline expertise in biology, forestry, engineering, agronomy. soil science, geology, landscape architecture, communications, economics, sociology, hydrology, plant materials, range management, archeology, planning, and program management at the local, State, regional, and national levels.

Working with the FS, research agencies, and other partners, SCS has access to the latest research and a system for transferring up-to-date science-based technology to the solution of water-, soil-, and air-related problems.

Criteria

Watershed ecosystems operate on a larger scale than the sum of their parts. Problems at the field level may not be problems when larger scales of reference are used, such as when a wet area serves as part of a larger wetland ecosystem. Criteria must then be selected to fit the scale of planning. Since humans are part of the ecosystems they live in and manage, criteria must be focused on natural resource quality as well as social, cultural, and economic considerations. SCS uses the following criteria in the watershed approach to ecosystem planning and management:

- Soil erosion and deposition and soil quality;
- Surface and ground water quality and quantity;
- Floodsancldmugbts
- Air quality and condition;
- Plant suitability, condition, and management;
- Animal habitat and management;
- weuandxestamtialandcnhancMlcnx;
- Economic viability;
- Social issues (health, safety. community, and so forth); and
- Cultural resources issues.

Because natural resource conditions vary greatly across the country, SCS bas developed Field Office Technical Guides, usually at the county level, to provide local information on resource conditions and systems for resource protection. The guides conform to national guidelines for content, procedures, standards, and format and are based upon the latest technology. Criteria are included in Field Office Technical Guides.

USDA follows a comprehensive conservation planning process that is documented in the SCS General Manual and National Planning Procedures Handbook. These documents, along with the SCS Field Office Technical Guide and other technical materials and releases, form the basis for a holistic approach to site-specific ecosystem planning and management, which leads to the implementation of sound resource management systems.

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Delivery System

USDA agencies, in cooperation with conservation districts and other State and local entities, have the expertise, local delivery systems, and program authorities to support a national program to meet the Nation's water and other ecosystem planning and management needs on a watershed basis.

Nearly 63 percent of all non-federal land in the United States is used for agricultural purposes, inchlding crop and livestock production. USDA delivers technical assistance to the Nation's farmers, ranchers, and other land users through 3,000 local conservation districts. Through cooperative working relationships, USDA works with local people to implement ecosystem planning and management on a watershed basis.

scs is implementing the watershed protection approach through coalition building at the State level and in geographically defined watersheds to establish local, State, and Federal partnerships to ensure public involvement, develop stakeholders awareness, and achieve effective use of all available financial assistance. As a result, SCS has an established system to develop comprehensive site-specific resource management plans for agricultural lands that are environmentally sound and economically feasible. Benefits Of this approach include more efficient delivery of government services that meet customers' needs.

To apply a watershed approach to a nonpoint source water quality initiative, SCS will:

- Utilize staff expertise, local delivery system, and program authorities to support tbc national nonpoint source pollution program based on the watershed approach;
- Support cross-agency coordination through local, state, and Federal partnerships to focus on a watershed approach to ecosystem planning and management; and
- Promote cross-agency coordination for technology transfer, data base access and development, and technology development.

USDA will facilitate ecosystem management on a watershed basis to address nonpoint source pollution. This effort will be on a cooperative basis with State and regional water quality agencies who have by law been given the authority and responsibility to prepare and implement State strategic plans for water quality issues. The watershed protection approach will become an element of the State Plans.

Focusing ecosystem planning and management on watersheds through cross-agency coordination is one of the most effective ways to foster effective local, state, and Federal partnerships and end the current fragmented approach to addressing environmental and water-related issues, including surface and ground water quality.

Cross-agency coordination ensures compliance with present and future farm and conservation programs, facilitates technology transfer, aids the utilization of existing data bases, and enables agencies to better deal with evolving water quality issues.

Watershed Plan

A locally led watershed planning process includes the following steps:

- Identifying problems from an ecosystem point of view to solicit, document, and verify stakeholders' concerns.
- Determining the objectives of stakeholders in the watershed considering individual and community values, expectations, capabilities, and limitations.
- Taking an inventory of resources to establish baseline conditions to define the dimension and scope of problems and opportunities and develop alternative solutions.
- Analyzing resources and problems to determine cause and effect and understand relationships among resources and ecosystems inside and outside of the watershed area.
- Formulating alternatives to solving identified problems and addressing stakeholders' objectives.
- Evaluating alternatives to determine the merits of each as they relate to stakeholders' objectives; the ecosystem; and social, cultural, and economic considerations.
- Selecting a plan for implementation from among a set of alternatives. Each alternative is environmentally sound; ensures shared responsibility; and identifies the education. technical, and financial assistance available from Federal, State, and local agencies for implementing the selected watershed plan.
- Implementing the locally developed watershed plan through site-specific plans that address identified problems.
- Periodically evaluating implementation of the watershed plan, which is an open-ended guide, to ensure that it meets stakeholders' changing objectives and solves the identified ecosystem problems.

A watershed plan is a progressive plan requiring periodic reviews to evaluate success and implementation effectiveness. Plan development provides an integrated approach to both the regulatory process and cooperative restoration and protection of the resource base.

Site-specific Plan

Site-specific ecosystem management plans are developed with each landowner, operator, stakeholder, or other interested individual or group to address natural resource problems on a specific site, and, once fully implemented, solve or mitigate the problems.

- Site-specific plans arc developed to solve or mitigate the problems identified in the watershed plan. This ensures that as each site-specific plan is implemented, it is an integral part of the whole.
- The process of developing the site-specific plan ensures that the stakeholder commits to the full implementation of planned actions.
- Site-specific plans are flexible and can be revised to reflect improved technology and changing goals.
- The site-specific plan will adhere to Federal, State, and local regulations.

SCS assistance at the local watershed level offers an efficient and effective method of accomplishing science-based, integrated, comprehensive watershed planning and management to maintain healthy ecosystems. Ecosystem-based management of natural resources is essential to achieving sustainable agricultural production, ensuring environmental quality, and meeting society's changing needs.

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ACTIONS SCS WILL TAKE

1. Support using a science-based, watershed approach to addressing nonpoint source pollution prevention and control.

Through the Secretary of Agriculture, contribute to development of rules and regulations for the nonpoint source pollution program based on the watershed approach .

Coordinate with EPA and other agencies to recommend a watershed-based time frame for implementation. The program should allow far flexibility to account far characteristics of the problems and complexity of solutions included in the implementation plan.

Help revise site-specific plans as needed to incorporate new technology on water pollution prevention and control in order to fully attain watershed goals.

2. Support placing responsibility for ensuring participation in achieving watershed goals at the local level.

- When levels of resource protection established as goals during the watershed planning effort are not attained, a process will be implemented at the local kvel to identify additional actions needed to revise site-specific plans.
- Even in watersheds that have attained initial resource protection goals, SCS will develop procedures to identify land areas that are significant contributors to resource problems and determine actions that will reduce or eliminate the problems and prevent future natural resource deterioration.

3. Foster a coordinated partnership and local leadership process.

- Establish partnerships that will focus the combined technical, financial, informational, and managerial resources of all parties on cooperatively addressing nonpoint source pollution al a watershed basis.
- In cooperation with conservation districts and private interest group& contribute to the development of Federal, state, and local partnerships necessary to forge a new integrated, cooperative watershed approach to addressing nonpoint source pollution prevention and control.
- Initiate, or amend, inter-governmental and tribal agreements and memos of understanding at national, State, and local levels to identify agency watershed assistance roles.
- Actively solicit and integrate inputs from local, State, and Federal agencies and other cooperating groups throughout the watershed assistance process.
- Emphasize the need to establish water quality goals in the watershed plan and to establish priorities for action in watershed areas that contribute significantly to impairments.
- Assure that plans provide realistic time schedules for participatory actions.

Include in plans the process to be used by State and local governments to assure that participatory of "voluntary" implementation of watershed and site-specific plans is on schedule.

4. Identify resources needed to support technical assistance for a watershed approach to prevent and control nonpoint source pollution.

- Within its capability, SCS will redirect resources to provide accelerated technical assistance to control nonpoint source pollution through the watershed approach consistent with water quality goals.
- SCS will develop cooperative agreements with State and local agencies and conservation districts to provide coordinated technical assistance for controlling nonpoint source pollution on a watershed basis.
- SCS will use its Earth Team volunteer program and the national Voluntary Service Corps as sources of technical assistance for implementing the watershed approach to preventing and controlling nonpoint source pollution.

5. Redirect existing programs to achieve nonpoint source pollution prevention and control in watersheds.

- Advocate the use of cooperative programs that comply with applicable laws to address nonpoint source pollution prevention and control in watersheds.
- Involve non-Federal partners in more flexible planning and financing arrangements.
- Commit SCS resources to encourage the development and implementation of watershed plans to achieve nonpoint source pollution prevention and control.

6. Provide training to enable employees and partners to provide ecosystem-based assistance in watersheds to prevent and control nonpoint source pollution.

- Provide training to SCS employees, conservation district employees, and volunteers on technical assistance for the watershed approach to nonpoint source pollution prevention and control.
- Develop partnerships with universities, private corporations, and agencies such as USDA's Forest Service and Agricultural Research Service, the U.S. Geological Survey, EPA, and the Cooperative Extension System for research and employee training to meet current and future needs in the science-based, ecosystem approach to nonpoint source pollution prevention and caltrol.

7. Support development of technical tools such as expert systems and geographic information systems,

- Accelerate use of process simulation models far hydrology and chemical movement.
- Use expert systems and geographic information systems in planning and implementing nonpoint source pollution prevention and control.
- Implement a water resource data management system for collecting, organizing, and evaluating water quantity and quality conditions in watersheds.
- Establish, in cooperation with conservation districts and other technical agencies, compatible water resource data bases and management systems for watersheds based on local inventories and needs.

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SUPPORTING INFORMATION

Nonpoint Source Pollution: The Water Quality Problem

Nonpoint source pollution comes from many sources. These include:

- Excess fertilizers and pesticides from agricultural and urban areas;
- Oil, grease, and toxic chemicals in runoff from urban and agricultural areas;
- Sediment from improperly managed construction sites; crop, pasture, range, and forest lands; and eroding stream banks;
- Salt and chemicals from improperly managed irrigation systems and acid drainage from mining activities: and
- Pathogens and animal wastes from all sources, including faulty septic systems.

Of all sources of nonpoint pollution, sediment makes up the greatest volume by weight of materials transported. It is carried off eroding land by runoff, snow melt, or heavy wind. The Second Resources Conservation Act (RCA) Appraisal estimates that each year 2.7 billion tons of sediment is deposited in small streams; another 500 million tons reaches the oceans. Sediment transports pesticides, phosphorus, and some nitrogen. Sediment also increases the turbidity of water, reduces light penetration, impairs photosynthesis, and gradually reduces the available supply of oxygen for aquatic aganians. It can destroy fish populations in areas where sediment deposits cover spawning beds.

Excess nitrate and phosphorus in surface water cause eutrophication, which leads to massive growths of algae and depletion of aquatic organisms. High concentrations of nitrate in drinking water can cause methemoglobinemia, or blue baby syndrome, which is fatal to infants. High concentrations are also harmful to livestock and wildlife.

Animal wastes degrade water quality when handled or stored improperly by allowing nutria@, organic matter, and pathogens to reach both surface and ground water. Inadditiontocausing serious health problems, it gives water an unpleasant odor, taste, and appearance. Fecal coliform bacteria is used as an indicator of disease-causing organisms.

Movement of pesticides into surface and ground water depends on crop absorption rates, slope, and soil type. The chemical properties of pesticides, such as solubility, absorption, and persistence, also strongly influence their fate. Pesticides can contaminate water sources when inadequately rinsed containers are disposed of improperly and when poor procedures are used in handling and mixing pesticides before spraying. Aerial spraying can also deposit pesticides directly onto surface waters.

In communities, sediment damage to water supplies goes beyond the need to dredge lakes and reservoirs and add chemicals to drinking water. It also adversely affaesthetic re-ational, industrial, and commercial values, causing sig economic hardship and affecting the quality of liffefor resi dents. Sediment raises the costs of interstate commerce by filling navigation channels and harbors, requiring expensive and frequent dredging operations.

The Federal Government has a critical role to play in providing a science-based, coordinated process for State and local gov ernments to use in addressing all aspects of the nonpoint source pollution problem.

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ITEM 27

United States
Department of
Agriculture
Soil
Conservation
Service

ACTION PLAN

ECOSYSTEM-BASED ASSISTANCE FOR THE MANAGEMENT OF NATURAL RESOURCES

A Soil Conservation Service Strategic Initiative for the 1990's

Draft

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Action Plan
Ecosystem-based Assistance for the Management of Natural Resources

Foreword

Soil Conservation Service (SCS) leadership formed a Quality Improvement Team (QIT) in May 1993 to develop an action plan for refining and implementing Strategy 3, "Advocate Total Resource Management," of the SCS strategic plan, "A ***Productive Nation in Harmony with a Quality Environment: Strategic Initiatives for the 1990's." The*** QIT has determined that instead of implementing Total Resource Management, which focuses on managing resources, the agency should implement Ecosystem-based Assistance for the Management of Natural Resources (EBANR), which focuses on managing the natural systems and processes that sustain resources. This creates a science-based approach to the integrated management of natural resources and aligns SCS activities more closely with those of other Federal agencies already taking this approach.

Ecosystem-based assistance for the management of natural resources is defined as the appropriate integration of ecological, economic, and social factors through the SCS planning and assistance process in order to maintain and enhance the quality of the environment to best meet our current and future needs.

SCS ecosystem-based assistance to clients will continue to use and build upon the SCS planning process and the Field Office Technical Guide, which address the interactions among natural resources-soil, water, air, plants, and animals-and human considerations.

SCS is adopting Ecosystem-based Assistance for the Management of Natural Resources (EBANR) for four reasons. First, it focuses on fundamental natural processes rather than resources. Second, it is consistent with the need to achieve sustainable use of the Nation's natural resources. Third, it is systems-oriented rather than single resource-oriented, enabling planners to address a broad range of interactions among the resources. Finally, it recognizes people as part of the ecosystem.

An ecosystem-based approach conforms to the way the world is arranged-as interrelated ecological, social, and economic systems. Thus, it provides a framework for integrating the knowledge and perspectives of the natural and social sciences into policy, planning, and decision making. Such an interdisciplinary approach is needed to simultaneously address the environmental, social, and economic impacts of agricultural policy. An ecosystem-based management approach also fits the multiplicity of resource goals and mandates in such statutes as the National Environmental Policy Act, the Endangered Species Act, the Clean Water Act, the Food Agriculture Conservation and Trade Act, the Coastal Zone Management Act, and the Watershed Protection and Flood Prevention Act.

Why Ecosystem-based Assistance for the Management of Natural Resources?

The Soil Conservation Service is preparing to deliver to its customers a new and better way of managing natural resources. It blends the sound fundamentals proven in previous years and strengthens them by incorporating principles derived from ecosystem science. Traditionally, we have focused on technical assistance that addressed managing the individual resources; EBANR focuses on managing the natural system, processes, and interrelationships that sustain the resources. This new ecosystem-based

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assistance for the management of natural resources will enable SCS to:

- Create awareness of the need for ecosystem-based management of natural resources;
- Stress the interaction among biological communities, the environment, and society;
- Focus on ecosystem principles, including cycling, diversity, and interdependence and address natural and human resources as a whole instead of incrementally;
- Consider the effects of planned actions over time and at interrelated scales (e.g., large and small watersheds, farms, fields, etc.);
- Consider interactions among the soil, water, air, plant, animal, and human resources to achieve environmentally and economically sustainable use of natural resources;
- Provide an interdisciplinary approach for planning to maintain the health of ecosystems; and
- Recognize risk or uncertainty and act upon the best available science and technology.

What Will be Different?

EBANR is a way of thinking about natural resource problems and opportunities. Hugh Hammond Bennett set forth conservation planning in SCS to consider a broad range of resources. This planning focus has become increasingly narrow over the past 10 years. EBANR calls for enhancing Bennett's basic approach to conservation planning. EBANR will fundamentally change how SCS recruits and trams personnel, develops technology, and works with clients. In all of its activities, SCS will focus on helping clients to sustain and/or enhance ecosystems in harmony with social, cultural, and economic considerations.

EBANR will enhance the way SCS and its clients perceive, approach, and carry out natural resourse management.

To achieve this change in our approach: (1) We must develop practical ways of measuring EBANR and identifying its value to SCS and our customers. (2) We must recognize that the transition will take time. **(3)** We must fill voids in our expertise. (4) We must work closely with other agencies and groups. The result will be a unified soil and water conservation program that relies on partnerships for implementing ecosystem-based assistance for the management of natural resources.

How Does EBANR Help?

As many as 14 different plans can be developed for each planning unit under current laws, regulations, and programs. Some of these can be contradictory due to lack of coordination. SCS is structured to manage individually legislated programs and activities as separate entities. Each program has its own objectives, rules, procedures, resource emphasis, time frame, and budget. EBANR provides a way to coordinate these programs into one planning vehicle.

How Does EBANR Relate to the Watershed Approach?

Ecosystems are defined in space and time. In either dimension, sub-systems can be defined that address processes, inputs, and outputs. This ability *to* conceptually nest ecosystems within ecosystems offers tremendous flexibility. One convenient method of nesting is along defined hydrologic boundaries. Within this framework, ecosystems can be nested from sub-field to field to large watershed.

EBANR requires a delivery mechanism and organizational framework that allow setting functional boundaries that recognize socioeconomic, political, and legal constraints. The watershed approach

provides a framework for analyzing ecosystem conditions and delivering technical and financial assistance to our clients. It uses ecosystem-based principles and encourages public involvement to identify problems and evaluate the effects of alternative solutions. This helps to formulate alternatives at various levels and implement actions at the appropriate level. Integrating the watershed approach and EBANR principles into the SCS planning process, forms a complementary mechanism for assisting our customers.

Implementing EBANR

This action plan will fully integrate EBANR into SCS operations by December 1995.

It presents a focus and technical assistance process with the flexibility to provide ecosystem-based assistance for the management of natural resources. It builds upon existing SCS technical delivery mechanisms. The SCS National Planning Manual, the National Planning Procedures Handbook, the Field Office Technical Guide, and other technical manuals and releases will provide the foundation for providing ecosystem-based assistance for the management of natural resources.

Several leadership actions are needed to achieve implementation of an ecosystem-based assistance approach. Some are short-term actions that can be accomplished or initiated immediately to set the stage for transition to EBANR. Others are actions that need to be placed in motion to identify, develop, or firm-up the specific position, process, and steps to be implemented.

Successful implementation of ecosystem-based assistance for the management of natural resources will require a fundamental change in attitudes and patterns of thinking in SCS. It will require taking specific actions at all levels of the agency and across many disciplines. This action plan, developed by the Quality Improvement Team (QIT), outlines the areas of concern that SCS must address. Thev are:

- Commitmerit
- Policy, Regulations, and Laws
- Technology
- Measurement and Reporting
- Marketing

Each area of concern includes a goal statement, desired condition, and recommended actions that include how, by whom, and when they should be carried out. This plan does not try to go into detail on all actions, but does identify areas where further actions need to be developed. Responsible persons will need to more closely define needed actions and ensure that they are completed. Action items are identified as critical (necessary for internal execution of EBANR), departmental support (enhances EBANR while strengthening TEAM USDA), or complementary (not critical, but enhances effectiveness of EBANR)

This plan is the beginning. As experience is gained with EBANR, action plans will need to evolve at NHQ, at National Technical Centers, and in states.

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Goals for the Action Plan to Implement EBANR

Commitment

SCS will implement ecosystem-based assistance for the management of natural resources through changes in organizational attitudes, structures, and processes.

To provide ecosystem-based assistance for the management of natural resources, SCS must commit to a flexible internal structure that provides for technology development and transfer process and staff diversity. SCS must foster an attitude that focuses on integrated effects and processes among the soil, water, air, plant, and animal resources as well as the social, economic, and cultural considerations. The organizational structure and leadership orientation must guarantee that use and treatment of individual management units are compatible with ecosystem functions within the watershed or larger area. SCS must adopt an attitude that fosters the management and allocation of human and physical resources to implement ecosystem-based assistance for the management of natural resources.

Policy, Regulation, and Law

SCS will develop an overall framework for policy, regulation and law that promotes an ecosystem-based approach to assistance for the management of natural resource management.

The success of EBANR depends on policy, regulations and laws that support ecosystem management through an interconnected set of programs and funding initiatives. This will require that we work with Congress as they examine their committee structure and legislation issues that affect ecosystem management. Legislation needs to focus on systems and integration of programs rather than single issues and initiatives USDA cost-share and commodity programs should encourage multi-year efforts that support EBANR. Field staff should provide the local view to help draft legislation, regulations, and policies. The EBANR approach requires a flexible management philosophy that allows managers to be innovative and to take risks in carrying out programs that fit local needs and situations.

Technology

SCS will support the development, use and adaptation of science-based tools to assist in the implementation of EBANR.

Technology development, transfer and application of new technology, and training of staff to use the technology are critical to the adoption of new procedures and processes. Technology for ecosystem-based assistance is just emerging with respect to the identification of biological, ecological, social, and economic indicators of ecosystem health. We must support continued research into these processes while adapting new technology for agency use. Technology transfer involves the development of application procedures and guidelines using current research; development of information systems to store necessary information, analyze it, and display it for the user; and the transfer of these procedures and knowledge to field staff. Demonstration projects should be used as both a marketing and training tool. The application of new technology must consider the appropriate level of precision for the scale of analysis, provide information on the value added for management decisions, and use adaptive application techniques. Adaptive application requires the establishment of measurable goals, monitoring of effects, and alteration of conservation treatment to achieve goals. This recognizes that situations exist for which standard designs and applications are not readily adaptable.

Measurement and Reporting

SCS will utilize key indicators that show results in terms of ecosystem ***health.***

Traditionally, SCS has reported progress in terms of practices applied or inputs. This does not provide the information needed to adequately monitor effects and ecosystem health. The reporting system must be flexible to capture activities that prevent problems and encourage creative, site-specific designs. Indicators should define what is different in the landscape or ecosystem in terms of the added value. They should define the capacity of the ecosystem and its relationship to the planning process. Indicators and results should be based on science to support decisions. Evaluation procedures should fit ecosystem-based management concepts.

Marketing

SCS will develop and implement a comprehensive strategy for marketing ecosystem-based assistance for the management of natural resources.

This marketing initiative will reach out to determine the needs of internal and external customers and provide an effective way to address those needs. The goal is to ensure that SCS continues to provide quality service. A restructured Issue Marketing Team will develop a marketing plan that identifies customers/audiences and theii needs, develops products, and carries out a series of interrelated activities to meet those needs.

Action Plan for Implementing Ecosystem-based Assistance for the Manaaement of Natural Resources

Critical Actions	Date
Adopt an aggressive, proactive, advocacy role for implementing ecosystem-based assistance for the management of natural resources (EBANR) by: • Issuing a letter from the Chief to all SCS employees to announce the agency's adoption of EBANR, • Supporting development of USDA policy on ecosystem management, · Initiating public outreach on the need to properly manage the natural processes and systems that sustain resources, recognizing people as part of the ecosystem. · Discussing the agency's adoption of EBANR in presentations to internal and external audiences.	ktober 1, 1993
Chief to send memorandum directing NHQ and NTC Directors and State Conservationists to incorporate EBANR, the watershed approach, and integration of programs into all policies, procedures, guidelines, manuals, and handbooks as they are revised and into strategic plans, quality plans, plans of operations, and the budgeting and allocation process.	ktober 1.1993
Chief, Deputy Chiefs, Assistant Chiefs, Division Directors, NTC Directors, and State Conservationists to delegate responsibilities for guiding and monitoring SCS implementation of EBANR.	ktober 1.1993
Charge NEDC to advise NEDS and course coordinators to implement a revised training program that emphasizes EBANR.	October 1.1993.
Chair of National Technical Guide Committee to assign responsibilities and establish schedule to review, revise, and develop policy and monitor progress to ensure that the General Manual, National Planning Manual, National Planning Procedures Handbook, and Field Office Technical Guide support EBANR.	October 1, 1993
Chief and OPA Director to re-charter issue marketing team with broadened membership to include representation from Programs, Technology, Legislative Affairs, and field office level. Change marketing focus from total resource management to ecosystem-based assistance for the management of natural resources.	October 1, 1993
Deputy Chief for Technology staff to develop and present ecosystem awareness training to agency leadership.	December 31.1993
Identify and appoint additional technical liaisons to public interest groups, coalitions, and professional societies that can have an impact on the drafting of legislative language relating to EBANR.	By January 1, 1994
Issue marketing team to identify customers, determine their needs, and develop and implement a comprehensive EBANR marketing plan to: · Gain understanding of and support for EBANR among customers and SCS employees at all levels; • Foster public and private partnerships in EBANR initiatives, especially at the local level; · Provide guidance on including EBANR in State marketing and outreach efforts; • Show linkages with agency's Water Management Action Plan: and · Overcome barriers to implementing EBANR.	Begin implementing by February 1, 1994

Action Plan for implementing Ecosystem-based Assistance for the Management of Natural Resources

Integrate EBANR indicators into the reporting system. Indicators are needed that: · Recognize changes in the landscape; · Recognize good management achieved by the avoidance of ecologically inappropriate actions; · Are locally adaptable; · Are real time (as changes occur, they are captured in the reporting system, data base, GIS, etc.); · Recognize and capture results that occur over time; · Allow innovation in monitoring ecosystem health; · Capture innovation and creativity rather than standard designs; · Measure outcomes or results as well as the inputs, be they preventive or remedial; · Utilize geographical information systems; · Link with other data bases; and · Are simple, friendly, and transparent to the field.	Develop and begin integrating into the reporting system by May 1.1994
In coordination with the SCS Performance Measurement Team and a Technology Interagency Team (to be formed), use key ecosystem health indicators to measure performance.	June 1, 1994
Expand charge of SCS Performance Measurement Team or a complementary team to use ecosystem health indicators in development and implementation of a management control system that: · Shows accountability and defensible expenditure of funds, · Can show efficiency gains and losses, • Is simple to complete and transparent to the field, and · Can be used to measure productivity.	June 1, 1994
Deputy Chief for Management to prepare criteria for EBANR awards, and circulate criteria to managers, and implement. Criteria are needed that: · Are based on ecosystem health indicators, · Recognize team work, · Reward good management achieved by the avoidance of ecologically inappropriate actions, · Reward holistic views, and · Reward innovation and creativity rather than standard designs and a one-size-fits-all approach.	Criteria prepared by February 1.1994, and implemented by September 1.1994
Establish a Quality Improvement Team to determine the appropriate mix of technical skills and provide staffing model guidefines for all levels of SCS to acquire proper technical diversity to implement EBANR.	Begin implementing staffing model guidelines October 1, 1994

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Action Plan for Implementing Ecosystem-based Assistance for the Manaaement of Natural Resources

Integrate EBANR into strategic plan for training and revise and implement curricula to reflect EBANR. Develop training, cross training, maintenance plans, and materials thar • Provide technically compete&, technically diverse skills based on need; • Cover ecosystem concepts; · Develop proficiency in the application of ecosystem guidelines, procedures, and tools; • Include the complex interaction of ecosystem processes; · Encourage an interdisciplinary approach; and · Define capabilities of computer models and where professional judgment should be exercised.	3y October 1994
Establish an interagency team to develop EBANR field application guidelines and procedures that: • Are science based; • Identify and utilize a technically current set of healthy ecosystem indicators that: - Are based on sound technology; - Stress biological, economic, and social factors; - Recognize short- and long-term changes; - Are accepted in the environmental and academic worlds; and - Are practical to attain. • Reflect interactions among associated biological, social, economic, and physical processes; • Are packaged in easy-to-use guidelines and procedures; · Allow for the imprecision of biological process data; · Reflect current research and technology; • Assure adequate soils surveys and soil interpretations; · Recognize risk and uncertainty; and · Recognize international accomplishments in technology. Assistant Chiefs to identify pilot states for each region to test and refine EBANR field application guidelines and procedures.	By June 1, 1995
Activate a technology development team to develop technical tools and information systems that: · Explain in simple terms the effects and advantages of EBANR, · Result in user friendly, knowledge-based, computer systems to facilitate ecosystem-based management planning, · Provide information on the value added from ecosystem-based assistance; · Maintain layers of geographically-based information for analysis by the planner and display for the user; · Are decision oriented systems that lead staff through ecosystem-based assistance planning, and · Maintain the necessary data bases to store monitored information.	Develop tools by December 1.1995
Coordinate and work with all appropriate agencies, institutions, and groups to implement EBANR.	Ingoing

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Action Plan for implementing Ecosystem-based Assistance for the Management of Natural Resources

Departmental Support Actions	Date
Develop a results-oriented partnership with the Forest Service (FS) in the spirit of TEAM USDA to establish the Department as the leader in EBANR, with FS focusing on public lands and SCS focusing on private lands.	October 1, 1993
RCA staff to incorporate EBANR principles into analytical process. Promote EBANR through' outreach and anal&al groups being formed in coordination with RCA activities.	Begin October 1.1993 and ongoing
Support USDA activities by establishing coalitions including Federal, State and local agencies and non-governmental organizations to develop and coordinate EBANR. Initiate interagency and interdepartmental MOU's and MOA's to improve cooperation and coordination in EBANR.	By January 1, 1994
To ensure that EBANR is part of the science base of legislation relating to natural resource management, use short-term details to Capitol Hill to expand legislative contacts to identify needs of and provide USDA staff support for congressional committees and subcommittees in addition to Agriculture, for example, Merchant Marine and Fisheries, Energy and Natural Resources, Environment and Public Works.	By March 1, 1994
Support Department in review of existing authorities, regulations, and natural resource conditions; and propose policy legislation to support EBANR. This will include: · Identifying needed legislation and policy in RCA to promote EBANR, · Analyzing existing regulations on cost-share and commodity programs with other USDA agencies and other appropriate partners to eliminate barriers to EBANR, · Proposing legislation for the administration that would reconcile cost-share and commodity programs with an ecosystem-based approach, · Establishing a team to evaluate need and propose legislation to combine all Federal conservation cost-share programs under one statutory authority, and · Drafting background materials and proposing legislative wording that reflects EBANR for the 1995 Farm Bill.	Ongoing

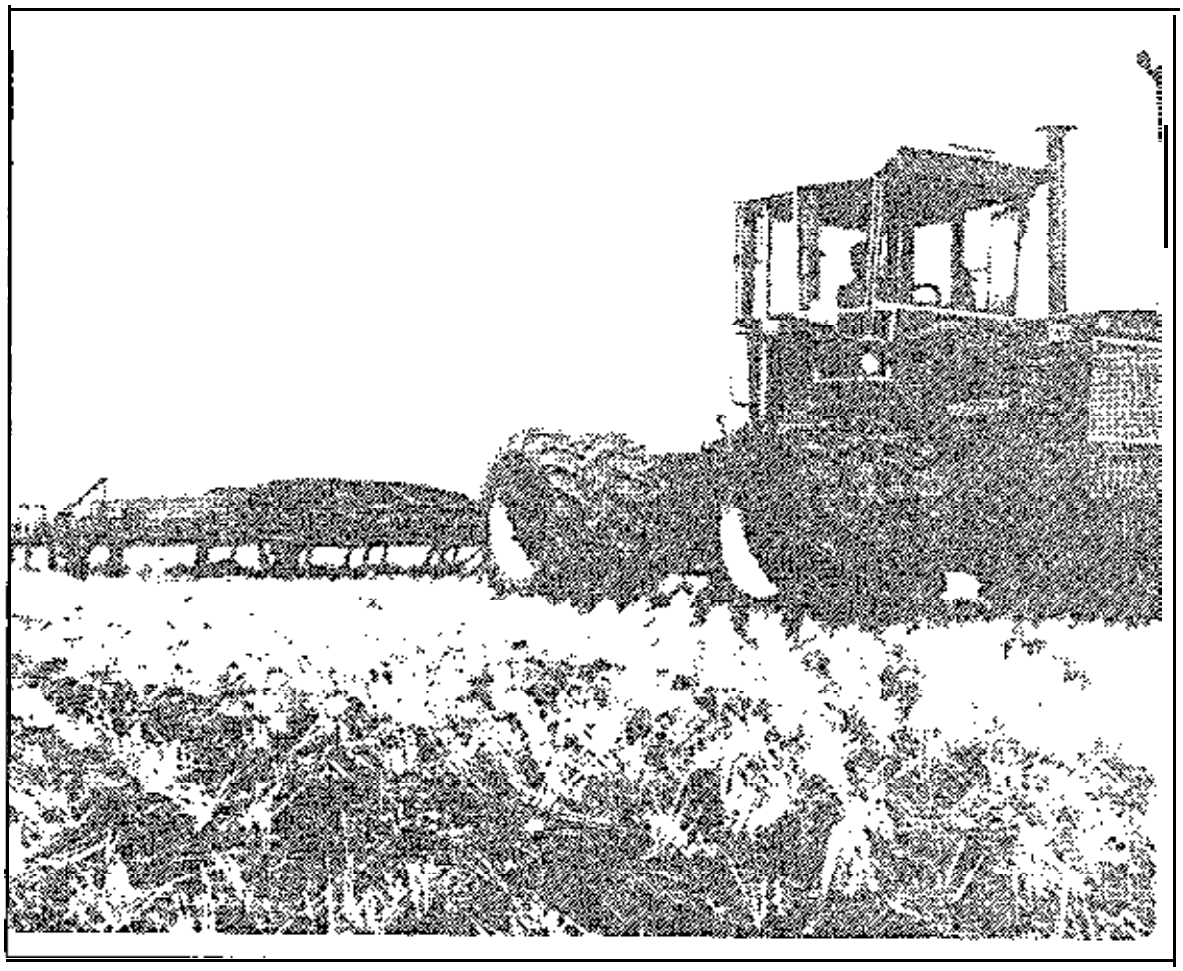
Complementary Actions	Date
Consider EBANR when evaluating lines of authoritv within SCS to determine the most effective structure for providing assistance that emphasizes: · Communications · Coordination • Conservation systems · Issue areas • Flexibility · Innovation · Needs of conservation districts, States, and other Federal agencies	Ongoing
Demonstrate application of EBANR to: • Help clients understand ecosystem-based technology, · Train staff, · Market ecosystem-based technology, • Show the value added through ecosystem-based approach, and · Show adaptive application.	Begin establishing demonstration projects immediately

ITEM 28

MONTANA

SOIL SURVEY

"MOVING AHEAD"



MONTANA SOIL SURVEY "MOVING AHEAD"

The Soil Survey Program in Montana currently has 16 soil surveys in different stages of completion. Accelerated FSA mapping, higher mapping priority, lower manuscript completion priority, and digitizing rather that scribing for map finishing are some of our excuses for being in this situation.

Three soil survey areas are correlated, the maps completed (scribed), and the manuscripts are waiting for English edit and publication.

Two soil survey areas are correlated, the digital map finishing materials nearly completed, and the manuscripts are scheduled for technical edit.

Six soil survey areas are correlated, the maps are being compiled or digitized, and the manuscripts are scheduled for English edit.

Three soil survey areas are ready for the correlation documents to be completed, the maps are waiting to be compiled and digitized, and the manuscripts are scheduled for English edit.

Two soil survey areas have the mapping completed, the finai field review and finai correlation are scheduled, the maps in one area are being digitized by the soil survey team, the maps in the other area is on hold, and the manuscripts are being completed.

Three soil survey areas are scheduled to complete the mapping this year, the maps in one area are being digitized by the soil survey team, the maps in the other areas are on hold, and the manuscripts are being maintained.

The map finishing acres to be completed in the above soil survey areas is about 18 million or about 600 full quads.

This situation has caused us to look at how we can do things faster and still maintain quality. These projects are going to help us obtain that goal.

MONTANA SOIL SURVEY
SPECIAL PROJECTS

There are three projects we would Bike to present and demonstrate;

I will give you an overview and the staff will be available this week to provide more detailed information, provide examples, and give some demonstrations.

THE THREE PROJECTS AWE:

☞ **The interim Part I and Part II soil survey manuscript.**

I will review the basic dara inputs. software, and data outputs of this project. The more detailed Montana developed software, use of prelude, use of MS-Word, and final interim manuscript will be described and demonstrated by Mike Hansen (Soil Scientist-Data Set Manager] and Lee Ann Mena {Soil Survey Assistant).

☞ **The use of GRASS GIS in a progressive soil survey.**

I will review the basic data inputs, databases, and data outputs of this project, The more detailed use of GIS in pre-mapping, progressive correlation, developing thematic maps will be described and demonstrated by Tom Potter (Cartographic Technician).

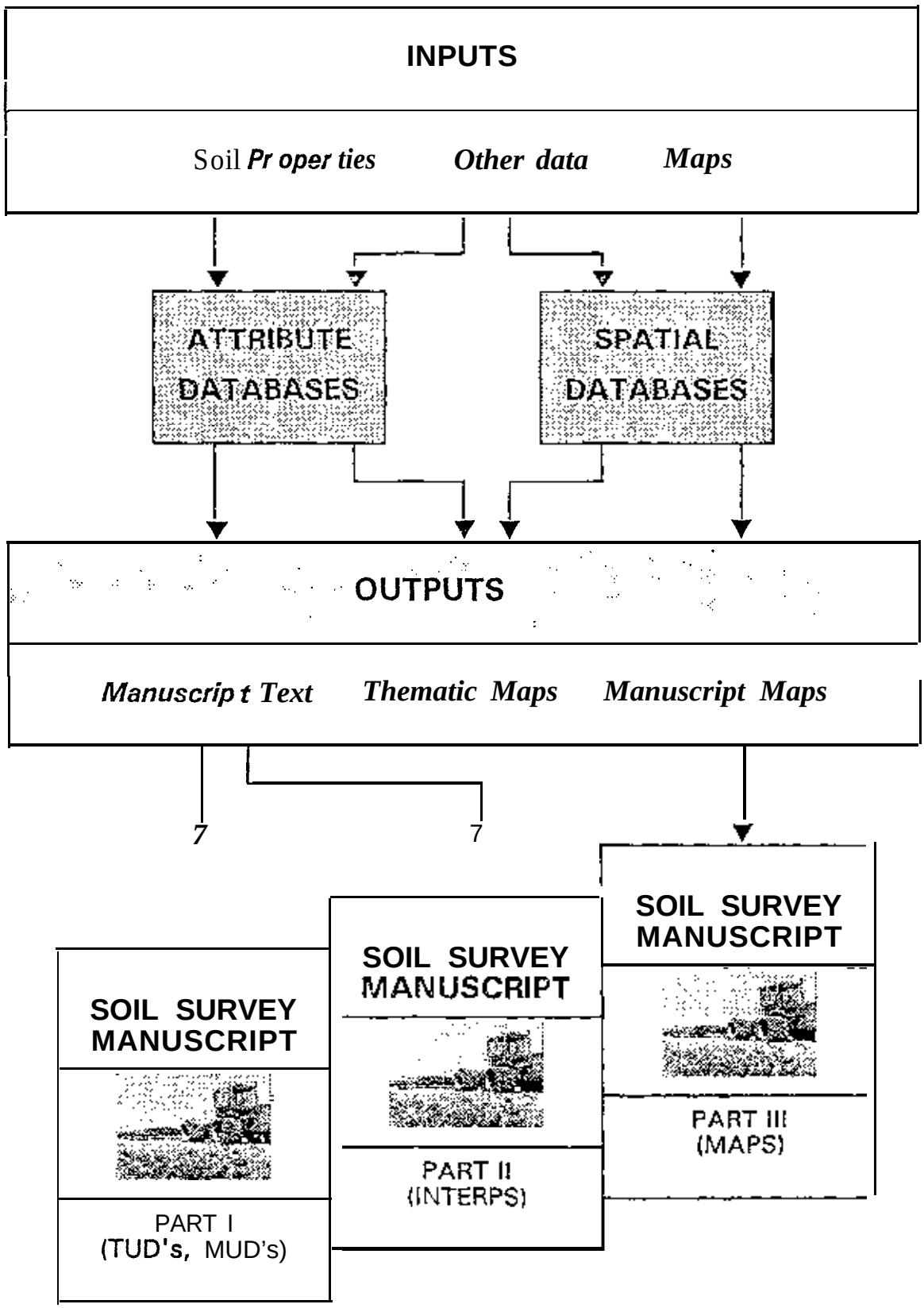
☞ **The use of GRASS GIS in the map finishing process.**

I will review the basic data inputs, databases, and data outputs of this project. The more derailed procedures, data layers prepared for the Gerber **Plotter,** and our proposed interim map publication will be described and demonstrated by Bob Lund (Cartographic Technician).

The purpose of all these projects is to improve the delivery of soil survey information to our users.

I would like to thank the National Headquarters Soil Survey, and Cartographic and Geographical information Systems Divisions; the National Soil Survey Center; and the National Cartographic Center for their support.

MONTANA SOIL SURVEY SPECIAL PROJECTS



SOIL SURVEY ATTRIBUTE DATABASE INPUTS

This diagram illustrates some of the relationships between the State, National, and ISU databases. They are all dependent on each other to make the system 'work.

The diagram also illustrates some of the data and computer software that we are using to maintain the attribute databases.

The OSED's data is input to the State Soil Survey Database (3SD), the National Soii Survey Center Database and rhe Iowa State University Database;

The EDIT-5 program was developed in Montana to help facilitate the editing of existing SOIL-5 data and the entering of new SOIL-5 data. We can extract existing data, edit it or create new data from similar data, print the data, and electronically transmit the data to wherever. The need for crop yield data for the last few CRP sign ups facilitated the need for this program.

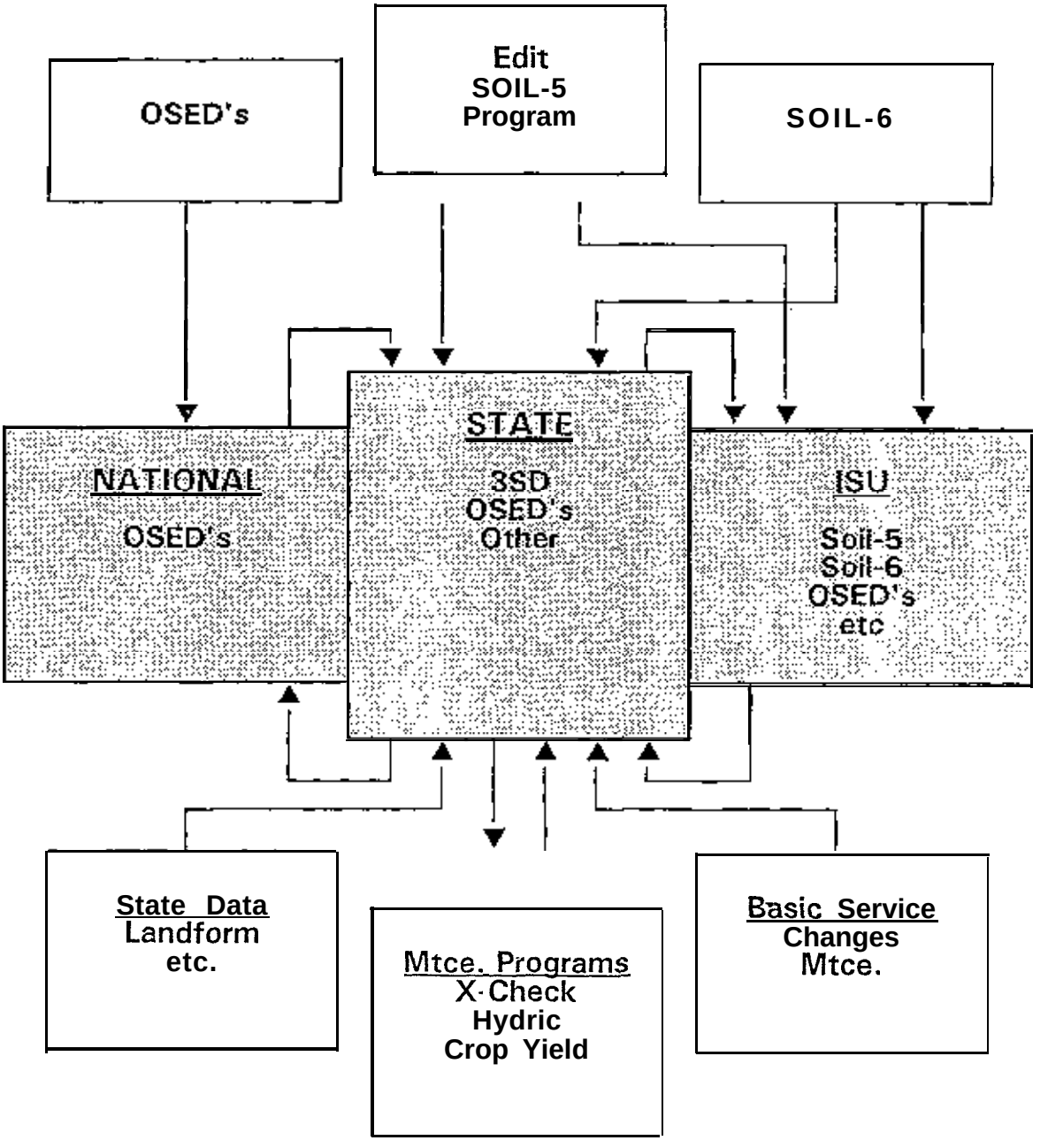
We are all familiar with the SOIL-6 data input to 3SD and ISU.

State data tables are being popuiared in order to facilitate other Montana developed software that will be describe later. An example is landscape and landform that is needed in order to electronically generate map unit descriptions,

Mtce. Programs were developed in Montana to help facilitate soil data quality checking, to prepare the data for NASIS conversion, and to prepare the data for the field office technical guide and CAMPS. The X-Check program was developed to display critical data that was checked against the published manuscript data and checked against current guides if there were differences. We used the Nationally distributed Hydric moduie to create our Hydric Soil lists and to populate our inclusions table. This exercise caused us to evaluate and tighten up some of our data. The Crop Yield model was then used to update all small grain yields in Montana. The CRP sign ups also facilitated the need to update our yields in order to make them more consistent and to provide yield data for soils being cropped that may not be well suited for cropping.

Basic Service activity has identified, in a few cases, the need to update a few soil properties in the 3SD.

SOIL SURVEY ATTRIBUTE DATABASE INPUTS



SOIL SURVEY
ATTRIBUTE DATABASE
OUTPUTS

This diagram illustrates how Montana is using the State Soil Survey Database to generate our interim Part I and Part II Manuscript,

The heart of the database is 3SD-MUIR, State Tables, and Pre-written Materials. The database also contains OSD's, survey area taxonomic unit descriptions (TUD's), and in some cases survey area map unit descriptions (MUD's).

The benefits of doing the data quality activity previousfy described is that the data in 3SD is the same as in the FOTG and CAMPS, and the soon to be NASIS and FOCS.

The TUD's Program is being dreamed about and will be developed in order to generate the soil survey TUD's from the Pedon Program stored data,

Tine MUD's Program, also called MUG, was developed in Montana and uses a combination of Prelude, Unix Sheiis, and MS-Word to generate a semi-tabular map unit description from 3SD and State populated tables. This procedure eliminates cross checks between MUD's and data in the tables. The procedure also helps validate the data because what appears to be incorrect map unit information causes re-evaluation of the data, We then either update the data or the criteria that is used to generate the map unit, These descriptions will reside in Part I.

The soil survey TUD's are stored as individual files in the State database. These still have to be manually cross checked with other data. These descriptions will reside in Parr I.

We are using the FOCS soils software to generate the manuscript tables, The data is from 3SD. These tables will reside in Part II.

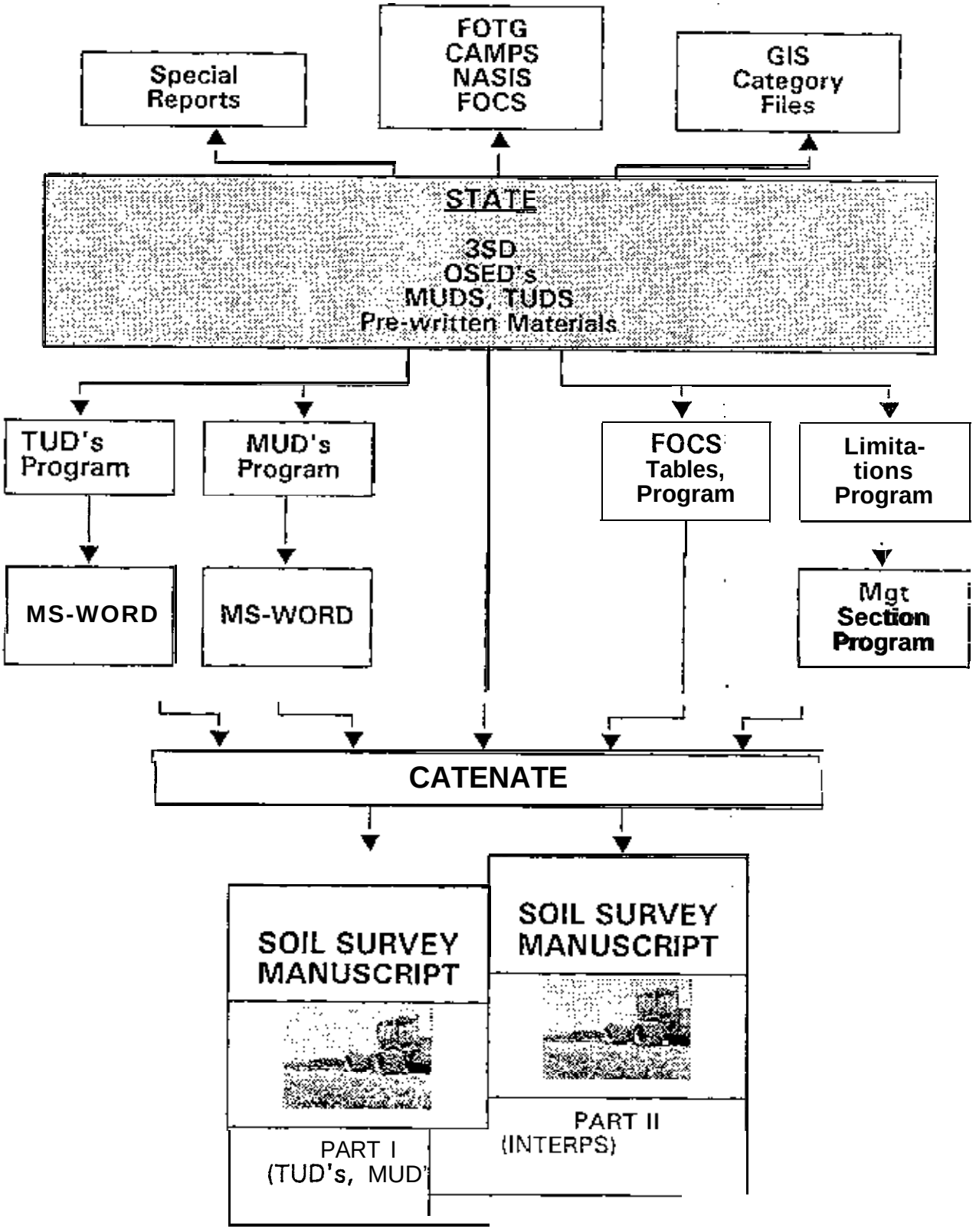
The Limitations Program was developed in Montana to electronically generate a soil limitation table from 3SD data. We reviewed, firmed up, and programmed criteria that we use to identify soii limitations. This table will reside in Part II.

The Mgt Section Program is being dreamed about and will be deveioped as time permits with other SCS disciplines. The idea here is to create a file of management alternatives that may be used to overcome limitations identified in the above tabie. This informations will reside in Part II.

The data we have discussed, and some I have forgotten, is catenated to form the interim Part I and Part II Soil Survey Manuscript. We are able to scan photographs or whatever and link them as graphic files into MS-WORD to improve the appearance of the Manuscript.

We have also developed a program that is a state and local option to CAMPS that will allow us to generate a client specific manuscript., This will be operational in offices with unpublished soil survevs as soon as we are able to set up all the TUD and MUD files, pre-written files, and management section files.

SOIL SURVEY ATTRIBUTE DATABASE OUTPUTS



PROGRESSIVE SOIL SURVEY SPATIAL DATABASE INPUTS

This diagram illustrates some of the data inputs and some of the processes used by the GIS staff in a progressive soil survey.

We are using the USGS 7.5 Minute Topographic Quad as our base to digitize the hydrography, cultural features, and Public hand Survey information. We have also looked into scanning rhese features if they are available from USGS or other sources, such as BLM. However, in many cases it is cost effective to do it ourselves rather that purchase the overlays to scan,

We have digitized other maps such as geology, water table maps, land cover, and other map information, These layers are added to the progressive soii survey spatial database.

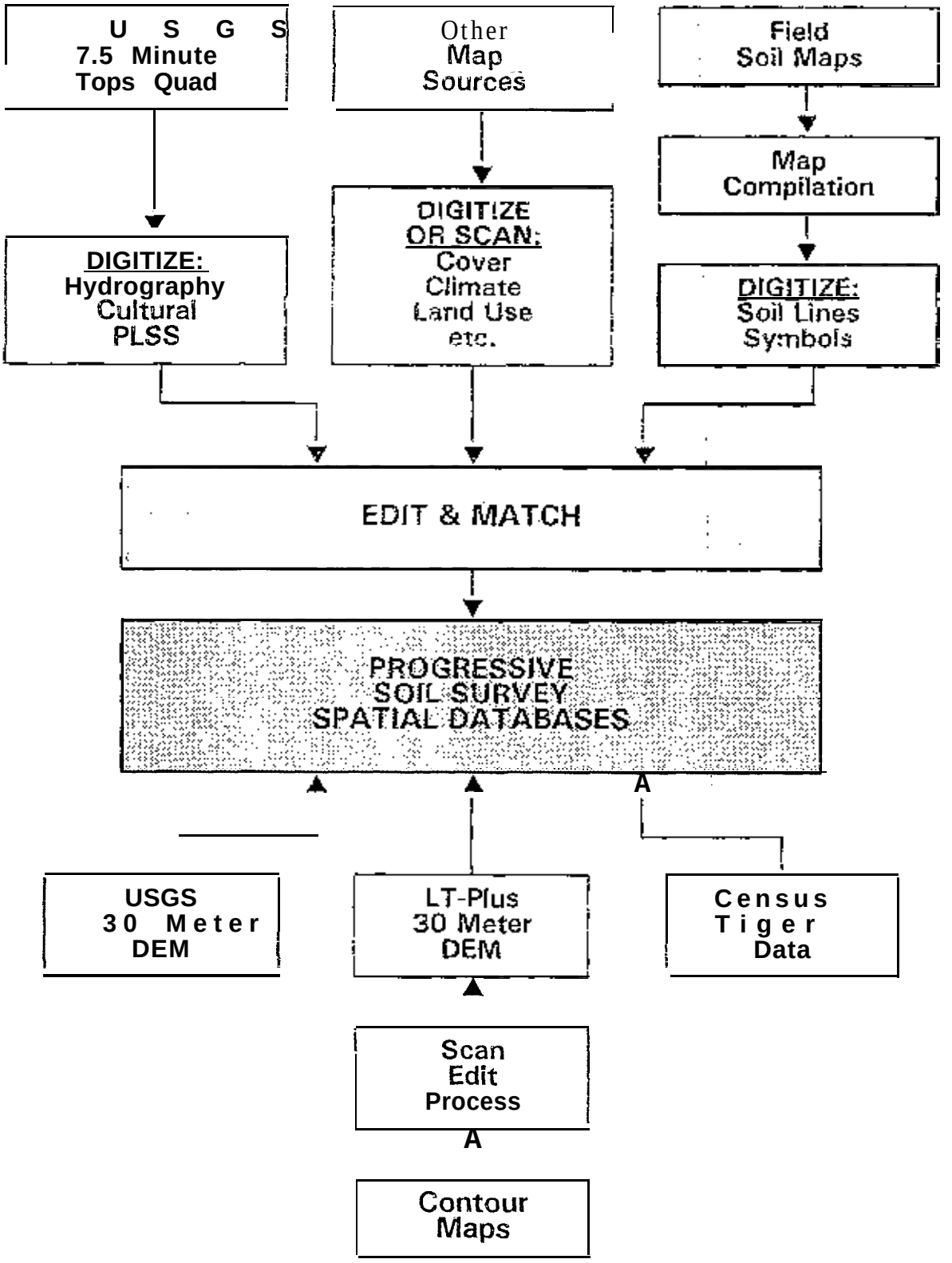
We are compiling and digitizing the soil survey map unit delineations and soil spot symbols as-field sheets are being completed.

We have purchased some USGS 30 Meter DEM data, Census Tiger Data, and obtained Contour Maps. The contour maps have been scanned, edited, and entered into the soil survey database.

The data layers are matched, edited and 'finalized 'in the progressive soils survey database.

As you can tell by now, I think I know more about some things than others !! That's why I have staff here to explain w&at I don't know and to correct what I thought I knew !!

PROGRESSIVE SOIL SURVEY SPATIAL DATABASE INPUTS



PROGRESSIVE SOIL SURVEY SPATIAL DATABASE OUTPUTS

This diagram illustrates data outputs, GIS analysis, and procedures used by the GIS staff in a progressive soil survey.

The main purpose of this project is to see how GIS can be used to assist, enhance, and/or accelerate a progressive soil survey.

We are using the attribute and spatial information to prepare thematic maps that assist the soil survey mappers before going to the field.

We have used a combination of elevation and aspect to generate thematic maps that help determine where frigid and cryic breaks could be delineated. The thresholds were established based on the soil scientists knowledge of plant communities, agricultural crops grown, observed snow lines, and other general knowledge of the area.

We added geology and climate to these factors to generate thematic maps showing where specific kinds of soils may be found. This has been a great benefit to soil scientists that are detailed in and not familiar with the survey area or the soils. This also helps the survey leader select more uniform areas so that detail mappers can be more productive.

We are able to view map component or kind of soil distribution in the survey area to help in soil correlation. Map units that appear to be out of place become very obvious and can be re-evaluated which improves the quality of the survey.

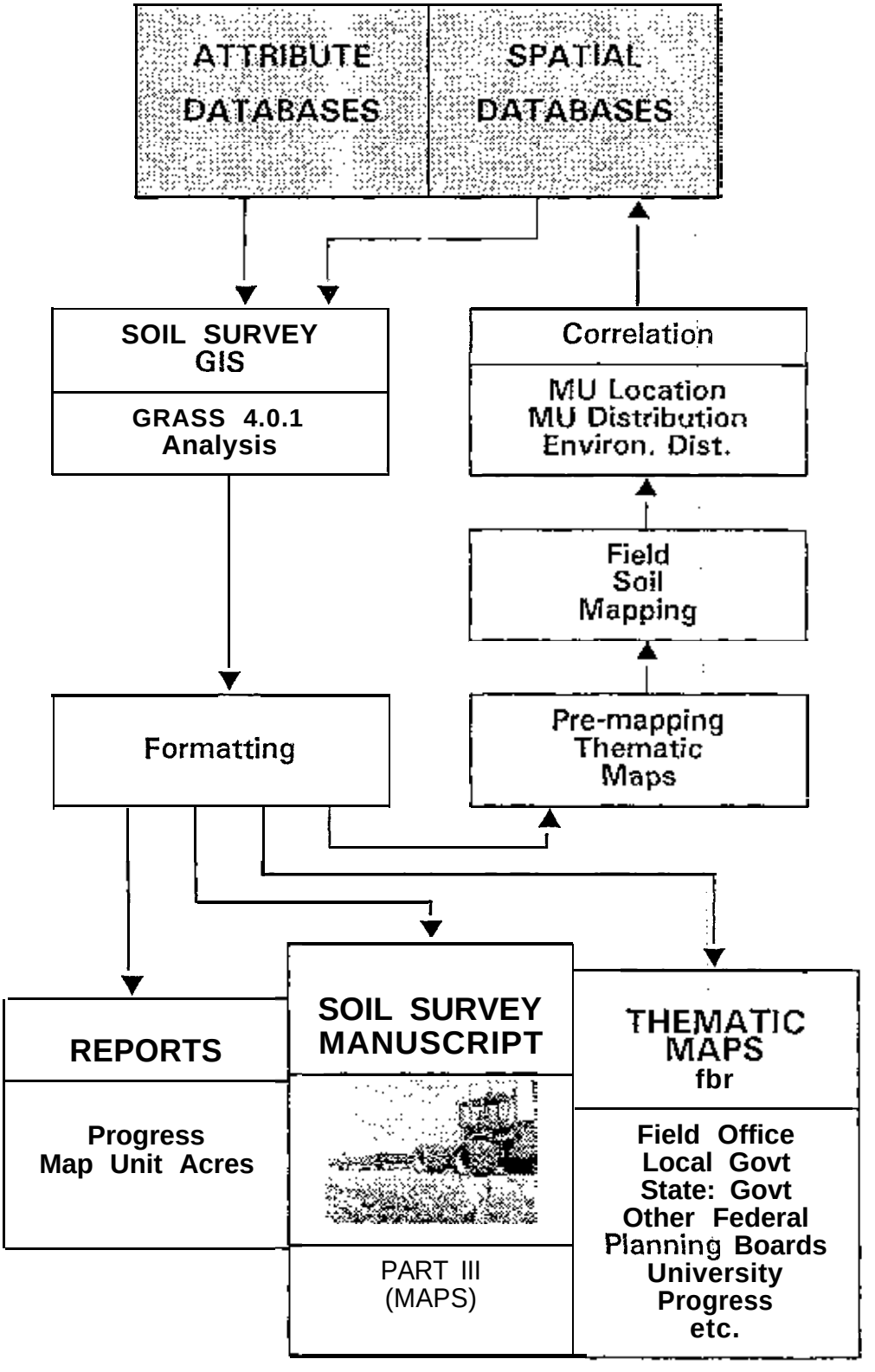
We are able to count acres and prepare the maps for publication as mapping proceeds. The maps will be ready to start through the publication steps within a few weeks after final correlation.

We have gotten a lot of good publicity from the local users because of the thematic maps we have been able to provide.

We are testing ways to attribute line segmenrs and spot symbols with soil property data. One possible approach is to attach map unit data to the line segment along with a line width attribute so thar small and narrow areas can be interpreted.

We will be looking at map unit and line segment reliability. We know that soil lines between some soils can be placed more accurately than between other soiis. How do we or do we want to capture that information? We will also be looking at map delineation size and shape to see if there is a reliability correlation.

PROGRESSIVE SOIL SURVEY
SPATIAL DATABASE
O U T P U T S



SOIL SURVEY
SPATIAL DATABASE
INPUTS

This diagram illustrates the data inputs, some of the processes and the databases created during our map finishing procedure.

The data input procedures are the same as we discussed with the progressive soil survey data inputs. We use the USGS Topographic Quad for the hydrography, cultural, and PLSS. The soil maps may be processed in different ways. Some of the maps are compiled to mylar overlays for scanning and other maps may be digitized directly,, This depends on the people and equipment resources available.

We have also utilized dara digitized by cooperators, but have had to spend a lot of time editing the data.

We learn short cuts as we go. One example is to have the hydrography layer visible as the soil lines are being compiled,, This will save a lot of machine editing time in the edit and match step.

The edit and match step is time consuming and very critical to the success of using digital data. However, it does nor take more time than the old scribing procedure.

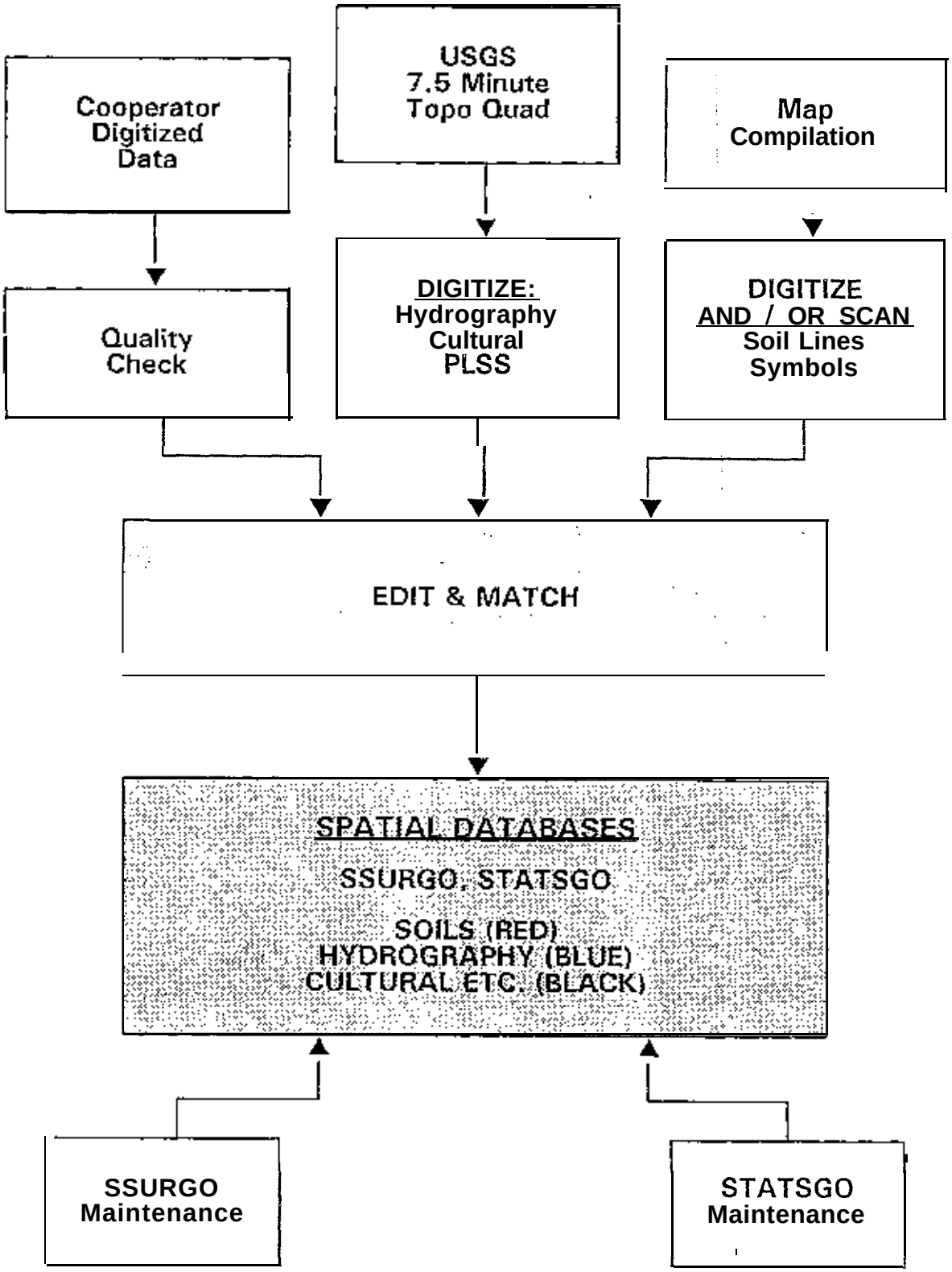
This procedure proposes that we publish using different color themes. The soil information will be printed in red, the hydrography in blue, and the cultural and other information in black. This will allow us to create color specific digital files that will go to Gerber or equivalent plotters to generate negatives that can be used to print soil survey quads suitable for publication and interim copies.

Printing the hydrography in biue with different line thickness will allow us to use the digitized hydrography directly and not have to create the two or three dot intermittent streams.

The GIS placed soil map unit symbols proposed in this project will reduce the amount of soil stick-up work. The additional stick-ups needed will be for additional symbois, place names, boundaries, and leader of symbois into small delineations.

The next priority should be a set of procedures to determine the most efficient way to maintain the SSURGO and STATSGO databases.

SOIL SURVEY
SPATIAL DATABASE
INPUTS



SOIL SURVEY SPATIAL DATABASE OUTPUTS

This diagram illustrates the database outputs and some of the procedures proposed to generate Part III of the soil survey manuscript .

The draft general soil map is extracted from the STATSGO database and sent to the field soil survey team. The soil survey team revises the general soil map as detailed mapping progresses in the survey area.

The field revised general soil map is used to update the previously extracted file and an updated map is generated for the manuscript. We have not, at this time, determined the best way to update rhe STATSGO database.

The various spatial SSURGO files are finalized, including the quad collar, cultural, soils, hydrography, PLSS, and other information. Paper plots are generated and files are sent to NCC for Plotting. We have fiies at NCC now to see if the plotter will accept the files. We do not anticipate any problems except maybe some formatting problems to resolve.

The NCC generated materials will be returned to the state for the final additions of place names, soil symbols, spot symbols, etc.

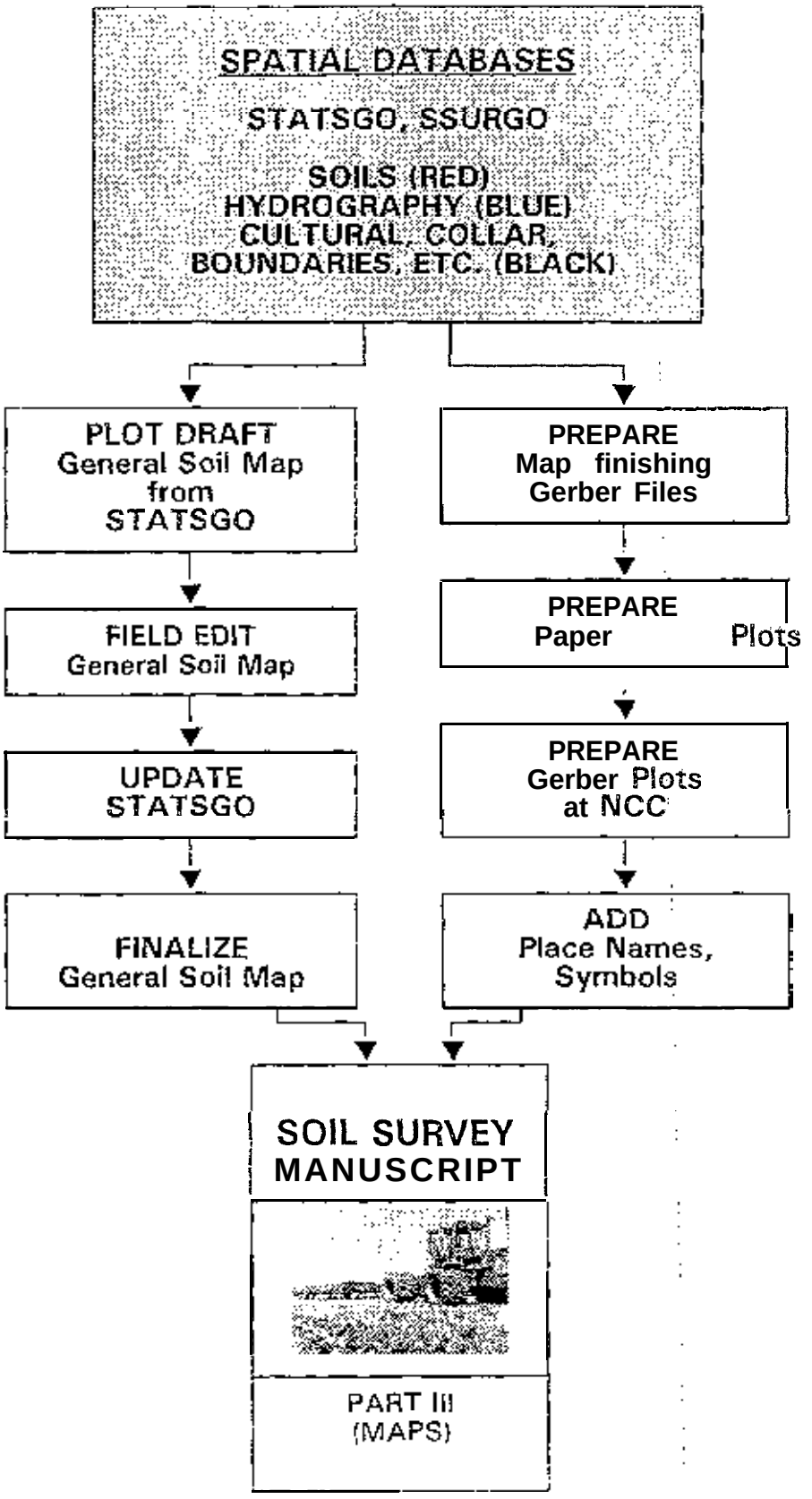
We anticipate that the maps will then be ready to go to GPO.

We also propose obtaining interim copies of rhe soil survey maps for distribution as Part III of the manuscript.

A "Procedures for Map Compilation and Digital Map Finishing of Detailed Soil Surveys' is being reviewed and should be available as soon as all the testing has been completed.

We are also proposing the possibility of getting interim copies of the soil survey map, quad by quad, rather than waiting until the survey is complete. This would allow us to process the most important quads, based on user priorities, and get maps to the user in a more timely manner.

SOIL SURVEY SPATIAL DATABASE OUTPUTS



ITEM 29

MUIR Driven Electronic Map Unit Generation

12/03/93

MUIR DRIVEN ELECTRONIC MAP UNIT GENERATION

12/03/93

This package serves as an **overview of the process of adopting a MUIR database driven electronically generated map unit. Background, implementation steps, and examples are included. If you are interested in pursuing this route, contact: Jim Culver, NSSC staff, Lincoln, NE, to arrange programming and editing assistance that is available to aid in setting up a system for your state.**

BACKGROUND:

Due to a very large manuscript backlog, caused in part by the FSA mapping activity, we in Montana were looking hard at electronic map unit generation as a tool to relieve some of the field, state office, and NSSC workload.

In the past we have utilized a template driven semitabular format, recently adopting the three-part manuscript approach. In moving to the MUIR data driven electronically generated map unit (MUG), we re-examined our format from a customer perspective in light of the three-part publication format. Significant additional changes resulted. The Montana System is illustrated in the examples enclosed.

It is very important that any state looking at this approach examine very closely their publication presentation format from a customer perspective.

The development of this program and the associated manuscript system was conducted in concert with the NSSC Quality Assurance Staff, especially the editorial staff. This close cooperation has enabled us to create a product that is not only ready for GPO processing but is editorially respectable and highly suitable for interim/desktop publication.

Please note the technical and editorial assistance through the NSSC to aid state implementation. This assistance will help ensure efficient adaptation and the highest level of utility for the product.

IMPLEMENTATION STEPS:

❶ Review this packet of information to determine if you might be interested in pursuing this approach.

❷ **If yes** to **step one, contact Jim** Culver, QA staff, NSSC, to indicate interest and line up assistance as needed.

❸ Perform detailed analysis of your map unit format in light of your vision for the survey publication of the future (desktop, client specific, interim publication, etc...).

❹ Following analysis, map out the data source and design the map unit format. This involves a mock-up of the format and the mapping of where information to populate that map unit might be obtained, or how it might be translated from the soils database. Depending on design, some data elements may need to be carried in state specific tables. Any elements Montana decided to carry can be used to populate new data elements that exist in NASIS.

❺ Following analysis, design and mapping, programing can begin. This is a two step process. First is to gather and translate the data as mapped in step four, yielding a MSWORD-5 data document. Second, the output format is set using MSWORD-5 forms as to the appearance of the final product. (NSSC technical assistance will be available for this step)

❻ Following the programing, testing needs to be done to ensure the criteria is functioning as desired and the format results are accurate and true to design.

❼ As the final step, the product is reviewed by the NSSC editorial staff to ensure accuracy of hidden GPO print codes and the editorial integrity of the results.

It is very important to note that no matter which approach is used in designing a map unit description, it needs to fit within the context of the rest of the publication. Virtually any format can be at least partially constructed using a MUIR database driven approach.

EXAMPLES:

Please find in this section the following materials:

- **Table of Contents--Part I and Part II of the Publication**
  included are indexes to series and map units, and summary of tables. These documents illustrate the arrangement and format of the different reports and sections within the three-part manuscript Montana has adopted.

- **A Sample of Map Units with Associated Series**
  The map units were electronically generated from MUIR with the series generated with MSWORD templates.

- **Samples of Maverick Manuscript Tables**
  These tables were developed to contain data formerly represented in the map unit description, but now included in the appropriate management section as a report in Part II of the publication.

Contents

Part I

Index to series ..... ?

Index to series and map units ..... ?

Summary of tables ..... ?

Foreword ..... ?

How this survey was made ..... ?

General nature of the survey area ..... ?
History ..... ?
Industry, transportation, and recreation ..... ?
Physiography, drainage, and geology ..... ?
Climate ..... ?

General soil map units ..... ?

Formation and classification of the soils ..... ?

Soil descriptions ..... ?

References ..... ?

Glossary ..... ?

Part II

Detailed soil map unit legend ..... ?

Summary of tables ..... ?

Agronomy ..... ?
Cropland limitations and hazards ..... ?
Crop yield estimates ..... ?
Land capability classification ..... ?
Prime farmland and other important farmland ..... ?
Windbreaks and environmental plantings ..... ?
Windbreak suitability groups ..... ?

Range ..... ?
Rangeland management ..... ?
Forest land understory vegetation ..... ?

Forest land ..... ?
Woodland ordination system ..... ?
Management and productivity ..... ?

Recreation ..... ?
Recreational development ..... ?
Recreational interpretations ..... ?

Wildlife habitat ..... ?

Engineering ..... ?
Building site development ..... ?
Sanitary facilities ..... ?
Construction materials ..... ?
Water management ..... ?

Soil properties ..... ?
Engineering index properties ..... ?
Physical and chemical properties ..... ?
Water features ..... ?
Soil features ..... ?

References ..... ?

Glossary ..... ?

Index to Series

?????? series .....
?????? series .....
?????? series .....
?????? series .....
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?????? series .....
?????? series .....

Index to Map Units

1--Absher clay, 0 to 4 percent slopes..... ?
2--Absher-Nobe complex, 0 to 2 percent slopes ..... ?
3--Acel silty clay loam, 0 to 2 percent slopes..... ?
4--Assinniboine fine sandy loam, 0 to 4 percent slopes ..... ?
5--Assinniboine fine sandy loam, 4 to 8 percent slopes ..... ?
6--Attewan loam, 0 to 4 percent slopes..... ?
7--Attewan sandy loam, 0 to 4 percent slopes. . . . . ..**.....*..... ?
8--Badland ..... ?
9--Bascovy clay loam, 2 to 8 percent slopes . . . . ..*..... ?
IO--Bascovy-Neldore clays, 8 to 15 percent slopes . . . . ..a...*..... ?
11--Bearpaw clay loam, 0 to 4 percent slopes.....?
12--Bearpaw-Daglum clay loams, 0 to 4 percent slopes . . ..?
13--Benz clay loam, 0 to 4 percent slopes . .....?
14--Bigsag silty clay, 0 to 2 percent slopes.....*...**.....*....?
15--Bigsandy silty clay loam, 0 to 1 percent slopes .....?
16--Brockway silt loam, 2 to 4 percent slopes . . . .*.*....*.....**..*.....*..... ?
17--Brockway silt loam, 4 to 8 percent slopes .....*.....a.... ?
18--Busby fine sandy loam, 2 to 8 percent slopes..... ?
19--Busby fine sandy loam, 8 to 15 percent slopes. .....?
20--Busby-Chinook fine sandy loams, 2 to 8 percent slopes ..... ?
21--Cabba loam, 4 to 8 percent slopes.... ?
22--Cabba loam, 8 to 15 percent slopes.. ?
23--Cabba-Dast fine sandy loams, 25 to 45 percent slopes ..... ?
24--Cabba-Doney clay loams, 8 to 25 percent slopes..... ?
25--Cabba-Rock Outcrop complex, 25 to 70 percent slopes ..... ?
26--Cabbart-Delpoint loams, 8 to 25 percent slopes..... ?
27--Cabbart-Hillon complex, 25 to 45 percent slopes . . . .*....*..... ?
28--Cabbart-Rock Outcrop complex, 25 to 70 percent slopes ..... ?
29--Chinook fine sandy loam, 0 to 8 percent slopes .....?
30--Chinook loam, 0 to 8 percent slopes ..... ?
31--Cozberg fine sandy loam, 2 to 8 percent slopes .....*. ?
32--Cozberg fine sandy loam, 8 to 15 percent slopes ..... ?
33--Cozberg-Lihen fine sandy loams, 0 to 2 percent slopes ..... ?
34--Cozberg-Lihen fine sandy loams, 2 to 8 percent slopes ..... ?
35--Creed-Gerdrum-Absher complex, 0 to 4 percent slopes ..... ?
36--Degrand loam, 0 to 4 percent slopes..... ?
37--Degrand sandy loam, 0 to 4 percent slopes ..... ?
38--Delpoint-Cabbart clay loams, 25 to 60 percent slopes ..... ?
39--Doney-Cabba complex, 4 to 15 percent slopes ..... ?
40--Elloam-Absher clay loams, 0 to 4 percent slopes .....*.....*..... ?
41 --Enbar-Bigsandy-Korchea loams, 0 to 4 percent slopes ..... ?
42--Ethridge clay loam, 0 to 4 percent slopes. . . ...*.....*.. ?
43--Ethridge silty clay loam, 0 to 4 percent slopes . . . ..*...*....*.....*..... ?
44--Ethridge-Evanston clay loams, 0 to 4 percent slopes ..... ?
45--Evanston clay loam, 0 to 4 percent slopes..... ?
46--Evanston clay loam, 4 to 8 percent slopes . .....?

Summary of Tables

Part I

Temperature and precipitation ..... ?

Freeze dates **in spring and fall** ..... ?

Growing season ..... ?

Classification of the soils ..... ?

Acreage and proportionate extent of the soils ..... ?

Part II

Prime farmland ..... ?

Classification of the soils ..... ?

Acreage and proportionate extent of the soils ..... ?

Main Cropland Limitations and Hazards **for** Use ..... ?

Crop yields per acre by **soil component name** ..... ?

Windbreaks and environmental plantings ..... ?

Rangeland productivity and characteristic plant communities . . . . . ?

Understory vegetation and habitat types ..... ?

Forest land management ..... ?

Forest land productivity ..... ?

Main Forest Access Road Limitations and Hazards for Use . . . . . ?

Recreational development ..... ?

Building site development ..... ?

Sanitary facilities ..... ?

Construction materials ..... ?

Water management ..... ?

Engineering index properties ..... ?

Physical properties of the soils ..... ?

Chemical properties of the soils ..... ?

Water features ..... ?

Soil features ..... ?

Busby **Series**

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Alluvial fans
Parent material: Alluvium or eolian deposits
Slope range: 2 to ***15*** percent
Annual precipitation: 10 to 14 inches
Annual air temperature: 42 to ***45*** degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Coarse-loamy, mixed Borollic Camborthids

Typical Pedon

Busby fine sandy loam, 2 to 8 percent slopes, in cropland, 1,200 feet north and 600 feet west of the southeast corner of sec. 27, T. 33 N., R. 3 W.

Ap--0 to 5 inches; grayish brown (1 OYR 5/3) fine sandy loam, brown 10YR 3/3) moist; weak fine granular structure: slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine pores; neutral; abrupt smooth boundary.

Bw--5 to 13 inches; grayish brown (1 OYR 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; slightly hard, friable, nonsticky and nonplastic: common very fine roots; common very fine pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bkl--13 to 24 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots: few very fine pores; common fine and medium soft masses of lime; violently effervescent: moderately alkaline; gradual smooth boundary.

Bk2--24 to 32 inches: grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; single grain: slightly hard, very friable, nonsticky and nonplastic: few very fine roots; few fine soft masses of lime: violently effervescent: moderately alkaline; gradual wavy boundary.

C--32 to 60 inches; grayish brown (2.5Y 5/2) loamy sand, very dark grayish brown (2.5Y 3/2) moist: single grain: loose, nonsticky and nonplastic; few fine roots; few fine tubular pores; moderately alkaline.

Range in Characteristics

Control section: 10 to **40 inches**
Con tent of clay in the control sec tion: 10 to 18 percent

Ap horizon
Hue: 10YR, 2.5Y
Value: 5, 6 dry; 3, 4 moist
Chroma: 2, 3, 4
Clay content: 10 to 18 percent
Reaction: pH 7.4 to 8.4
In some places the upper 3 inches of the soil has mollic colors but when mixed to 7 inches it does not meet the requirements for a mollic epipedon.

Bw horizon
Hue: 10YR, 2.5Y
Value: 5, 6 dry: 4, 5 moist
Chroma: 2, 3, 4
Texture: fine sandy loam, sandy loam, loam
Clay content: 10 to 18 percent
Reaction: pH 7.4 to 8.4
Effervescence: none to strongly

Bk horizons
Hue: 10YR, 2.5Y, 5Y
Value: 6, 7 dry: ***4, 5, 6*** moist
Chroma: 2, 3, 4
Textures: fine sandy loam, sandy loam
Clay content: 10 to 18 percent
Effervescence: strongly to violently
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

C ***horizon***
Hue: 10YR, 2.5Y
Value: 6, 7 dry: 5, 6 moist
Chroma: 2, 3, 4
Textures: fine sandy loam, sandy, loam, loamy fine sand, loamy sand, fine sand (The loamy fine sand, loamy sand, or fine sand textures are below depths of 40 inches)

Clay content: 3 to 18 percent
Reaction: pH 7.9 to 8.4
Effervescence: slightly to violently
Some pedons have a BCk horizon.

18--Busby fine sandy loam,, 2 to 8 percent slopes

Composition

Busby and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans
Slope: 2 to 8 percent
Elevation: 3,120 to *4,300* feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 105 to 120 days

Soil Properties

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 6.9 inches

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II, of this publication.

Inclusions

* Yetull and similar soils
* Yamac and similar soils

Major Uses of the Unit

* Cropland
* Rangeland

For general and detailed information concerning these uses, see Part II of this publication:

* Agronomy section
* Range section

Evanston Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans, stream terraces, small drainageways
Parent material; Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 10 to 14 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Evanston clay loam, 0 to 4 percent slopes, in cropland, 1,500 feet south and 2,200 feet east of the northwest corner of sec. 1, T. 33 N., R. 3 W.

Ap--0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (1 OYR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots: many fine pores; neutral; abrupt smooth boundary.

Bt--6 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong fine and medium prismatic structure parting to moderate medium subangular blocky: slightly hard, firm, slightly sticky and slightly plastic; many fine and medium roots; many fine pores; common distinct clay films on faces of peds; mildly alkaline; gradual wavy boundary.

Bkl--15 to 26 inches; pale brown (1 OYR 6/3) clay loam, light brownish gray (10YR 5/2) moist; weak fine and medium subangular blocky structure: slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; common fine pores; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2--26 to 32 inches; pale brown (1 OYR 6/3) clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure;

slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots: common fine pores: common soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C--32 to 60 inches; pale brown (10YR6/3) clay loam, brown (10YR5/3) moist: massive; slightly hard, firm, slightly sticky and slightly plastic; common fine roots: few fine pores: strongly effervescent: moderately alkaline.

Range in Characteristics

Control section: 6 to 15 inches
Mollic epipedon thickness: 7 to 15 inches
Content of clay in the control section: 25 to *35* percent
Depth to the Bk horizon: 8 to *20* inches
Ap horizon
Hue: 2.5Y through 7.5YR
Value: 3, 4, 5 dry; 2, 3 moist
Chroma: 2, 3 dry or moist
Texture: loam, clay loam, fine sandy loam
Reaction: pH 6.6 to 7.8
Bt horizon
Hue: 2.5Y through 7.5YR
Value: 3, 4, 5, 6 dry; 3, 4, 5 moist
Chroma: 2, 3, 4 dry or moist
Textures: clay loam, sandy clay loam, loam averaging 18 to 35 percent clay and more than 15 percent but less than 35 percent fine or coarser sand
Reaction: pH 7.4 to 8.4
Bk and C horizons
Hue: 2.5Y through 7.5YR
Value: 5, 6, 7 dry; 4, 5, 6 moist
Chroma: 3, 4 dry or moist
Texture: loam, clay loam, sandy clay loam
Reaction: pH 7.9 to 8.4
Calcium carbonate equivalent: 6 to 14 percent

50--Evanston loam, 4 to 8 percent slopes

Composition

Evanston and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans, stream terraces and drainageways
Slope: 4 to 8 percent

Soil Properties

Surface *layer texture:* Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 10.0 inches

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II, of this publication.

Inclusions

* Slopes more than 8 percent
* Evanston, calcareous

Major Uses of the Unit

* Cropland
* Rangeland

For general and detailed information concerning these uses, see Part II of this publication:

* Agronomy section
* Range section

Marvan Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Alluvial fans, lake plains
Parent material: Alluvium or glaciolacustrine deposits
Slope range: 0 to 8 percent
Annual precipitation: 10 to 14 inches
Annual air temperature: 42 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Fine, montmorillonitic, frigid Udorthentic Chromusterts

Typical Pedon

Marvan silty clay, 0 to 4 percent slopes, in cropland, 1,400 feet west and 2,400 feet south of the northeast corner of sec. 6, T. 33 N., R. 3 W.

Ap--0 to 7 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist: moderate fine granular structure; very hard, firm, very sticky and very plastic; many very fine and fine roots; many fine pores; strongly effervescent: moderately alkaline: abrupt wavy boundary.

Bss--7 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic: many very fine and fine roots; many very fine and fine pores: few slickensides intersecting at 40 degrees from horizontal; strongly effervescent; strongly alkaline: clear wavy boundary.

Bssyz--23 to 30 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure: very hard, firm, very sticky and very plastic; common fine roots; common fine pores; few slickensides intersecting at 40 degrees from horizontal; few fine soft masses and nests of gypsum and other salts; strongly effervescent; strongly alkaline; clear wavy boundary.

Bnyz--30 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, very sticky and very plastic; few fine roots; few very fine and fine pores; few common soft masses and nests of gypsum and other salts; strongly effervescent: strongly alkaline.

Range in **Characteristics**

Controlsection: 10 to ***40*** inches

Content of clay in the control section: 45 to 60 percent

Depth to the Bssyz horizon: 10 to ***24*** inches

Ap horizon

Hue: 2.5Y, 5Y
Value: 5, 6 dry; 4, 5 moist
Chroma: 2, 3, 4
Texture: clay, silty clay
Clay content: 40 to 60 percent
EC: 0 to 8 mmhos/cm; saline phase is 2 to 8 mmhos/cm
SAR: 8 to 18 above a depth of 24 inches and 13 to 38 below that depth (Where the SAR is 8 or less, the sodium plus magnesium is greater than calcium plus acidity)
Reaction: pH 7.4 to 9.0

Bss horizon

Hue: 2.5Y, 5Y
Value: 5, 6 dry; 4, 5 moist
Chroma: 2, 3, 4
Texture: clay, silty clay
Clay content: 45 to 60 percent
EC: 2 to 8 mmhos/cm
SAR: 8 to 18 (Where the SAR is below 8, the sodium plus magnesium is greater than calcium plus acidity)
Reaction: pH 7.9 ***to 9.0***

Bss yz horizon

Hue: 2.5Y, 5Y
Value: 5, 6 dry; 4, 5 moist
Chroma: 2, 3, 4
Texture: clay, silty clay
Clay content: 45 to 60 percent
Gypsum: 1 to 5 percent
EC: 2 to 8 mmhos/cm
SAR: 8 to 18 above a depth of 24 inches and 13 to 38 below that depth (Where the SAR is below 8, the sodium plus magnesium is greater than calcium plus acidity)
Reaction: pH 7.9 to 9.0

Bn yz horizon

Hue: 2.5, 5Y
Value: 5, 6 dry: 4, 5 moist
Chroma: 2, 3, 4
Texture: clay or silty clay that includes thin layers of silty clay loam and silt loam material
Clay content: 45 to 60 percent
Gypsum: 1 to 5 percent
EC: 8 to 16 mmhos/cm
SAR: 13 to 38
Reaction: pH 7.9 to 9.0
Some pedons have a Bssyz horizon in place of the Bnyz horizon.

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When dry the soil has 1/4- to l-inch cracks that extend to a depth of about 20 inches.

Stemple Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landfofm: Mountains
Parent material: Colluvium
Slope range: 25 to 70 percent
Annualpfecipitation: 18 to 22 inches
Annual air temperature: 38 to 42 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed Typic Paleoboralfs

Typical **Pedon**

Stemple very cobbly loam in an area of Stemple, low elevation-Rubble land complex, **25** to **70** percent slopes, in woodland, 1,700 feet 1,200 feet of the southwest corner of sec. 23, T. 37 N., R. 1 E.

O--Z to 0 inches: forest iitter of partially decomposed needles, twigs, roots, and forbs; abrupt smooth boundary.

A--O to 2 inches; dark gray (1 OYR 4/1) very cobbly loam, black (1 OYR 2/1) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; 15 percent pebbles, IO percent cobbles; medium acid; clear smooth boundary.

El--2 to 8 inches; pale brown (1 OYR 6/3) very cobbly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure parting to moderate very fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine pores; 25 percent pebbles, 20 percent cobbles; strongly acid; clear smooth boundary.

E2--8 to 25 inches; very pale brown (10YR 7/3) extremely cobbly loam, brown (10YR 5/3) moist: weak fine subangular blocky structure parting to moderate very fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine pores; 35 percent pebbles, 20 percent cobbles; medium acid; gradual wavy boundary.

E/Bt--25 to 32 inches; E part (60 percent), pale brown (10YR 7/3) extremely cobbly loam, brown (10YR 5/3) moist; Bt part (40 percent), brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic: common very fine and fine and few medium roots; many very fine pores; common faint clay films on ped **faces in Bt part;** 35 percent pebbles, 25 percent cobbles; medium acid: gradual wavy boundary.

Bt1--32 to 37 inches; light yellowish brown (1 OYR 6/4) extremely cobbly clay loam, yellowish brown (1 OYR 4/4) moist; very moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic: common very fine and fine roots: many very fine pores; few faint clay films on ped faces; 45 percent pebbles, 25 percent cobbles; slightly acid; gradual wavy boundary.

Bt2--37 to 60 inches; light yellowish brown (1 OYR 6/4) extremely cobbiy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; many very fine pores; common distinct clay films on ped faces; 40 percent pebbles, 30 percent cobbles; slightly acid.

Range in Characteristics

Controlsection: 25 to 40 inches
Content of clay in the control section: 27 to 35 percent
Depth to the Bt horizon: 25 to 50 inches

A and E horizons

Hue: 7.5YR through 2.5Y
Value: 6, 7 dry; 5, 6 moist
Chroma: 2, 3
Clay content: IO to 20 percent
Rock fragments: 35 to 60 percent--l 0 to 20 percent flagstones; 25 to 40 percent channers

Reaction: pH 5.1 to 6.5

E/B t horizon

Hue: 7.5YR through 2.5Y
Value: E part 6, 7, 8, B part 5, 6 dry; E part 4, 5, 6, B part 4, 5 moist
Chroma: E part 2, 3, 4; B part 4, 5, 6
Clay content: 15 to 27 percent
Rock fragments: 35 to 80 percent--O to 10 percent flagstones; 35 to 70 percent channers
Reaction: pH **5.1 to 6.5**

B t horizons

Hue: 7.5YR through 2.5Y
Value: 6, 7 dry; 4, 5 moist
Chroma: 4, 5, 6
Clay content: 27 to 35 percent
Rock fragments: 60 to 80 percent--l 0 to 20 percent flagstones; 50 to 60 percent channers
Reaction: pH 5.6 to 6.5

148--Stemple, high elevation-rubbleland complex, 25 to 70 percent slopes

Composition

Stemple and similar soils: 50 percent
Rubble land areas: 40 percent
Inclusions: 10 percent

Setting

Landform: Mountains
Position on landform: Back slopes
Slope: 25 to 70 percent, northeast aspect
Elevation: 4,500 to 5,200 ***feet***
Mean annual precipitation: 20 to 22 inches
Frost-free period: 50 to 70 days

Soil Properties

Surface layer texture: Very cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Flooding: None
Available water capacity to 60 inches or root-limiting layer: Mainly 3.6 inches

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II, of this publication.

Inclusions

* Slopes less than 25 percent
* Soils lacking coarse fragments

Major Uses of the Unit

* Grazed forest land
* Forest land

For general and detailed information concerning these uses, see Part II of this publication:

* Range section
* Forest Land section

Vanda Series

Depth class: Very deep (greater than 60 inches)
Drainage class: Well drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Alluvial fans
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 10 to 14 inches
Annualair temperature: 42 to 45 degrees F
Frost-free period: 105 to 125 days

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents

Typical Pedon

Vanda silty clay, 0 to 4 percent slopes, in rangeland, 700 feet north and 1,300 feet west of the southeast corner of sec. 22, T. 34 N., R. 2 W.

E--O to 1 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate very thin platy structure; soft, very friable, sticky and plastic; common very fine and fine roots: many very fine and fine pores; moderately alkaline; abrupt smooth boundary.

Bk--1 to 9 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist: moderate fine prismatic structure parting to moderate

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medium blocky; hard, firm, very sticky and plastic; many very fine and fine roots: many very fine and fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bknyz--9 to 18 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak fine angular blocky structure; very hard, very firm, very sticky and plastic; few very fine roots; common very fine pores; common fine irregularly shaped soft masses of lime; common fine soft masses and seams of gypsum and other salts; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bnyz1--18 to 52 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, very firm, very sticky and plastic; few very fine roots; common very fine pores; common medium irregularly shaped soft masses of gypsum and other salts; slightly effervescent: moderately alkaline; gradual wavy boundary.

Bnyz2--52 to 60 inches; dark grayish brown (2.5Y 5/2) silty clay, ***very*** dark grayish brown (2.5Y 4/2) moist; massive: extremely hard, very firm, very sticky and plastic: few very fine roots; few very fine pores; many medium and coarse irregularly shaped soft masses of gypsum and other salts; strongly effervescent; moderately alkaline.

Range **in Characteristics**

Controlsection: 10 to ***40*** inches
Content of clay in the control section: 35 **to** ***60*** percent
Depth to the Bknyz horizon: 7 to ***24*** inches

E horizon
Hue: 2.5Y, 5Y
Value: 5, 6, 7 dry; 4, 5 moist
Chroma: 1, 2, 3
Texture: clay, silty clay
Clay content: 40 to 60 percent
Hardness: very hard, extremely hard, massive crusts
EC: 8 to ***16*** mmhos/cm
Reaction: pH 7.8 to 9.6
SAR: 1 to 30

In some pedons the upper 6 inches of soil is noncalcareous unless mixed.

Bk horizon
Hue: 2.5Y, 5Y
Value: 5, 6 dry; ***4, 5*** moist
Chroma: 2, 3
Texture: clay, silty clay, silty clay loam
Clay content: 35 to 60 percent
Hardness: very hard, extremely hard
EC: 8 to 16 mmhos/cm
Reaction: pH **7.8 to 9.6**
SAR: 13 to 30

Bknyz and Bnyz horizons
Hue: 2.5Y, 5Y
Value: 5, 6 dry; 4, 5 moist
Chroma: 2, 3
Texture: clay, silty clay, silty clay loam
Clay content: 35 to 60 percent
Hardness: very hard, extremely hard
Gypsum: 1 to 5 percent with total gypsum less than 150
EC: 8 to' 16 mmhos/cm
SAR: 13 to 30
Gypsum: 1 to 5 percent
Reaction: pH 7.8 to 9.6

170--Vanda-Marvan, saline, clays, 0 to 2 percent slopes

Composition

Vanda and similar soils: 50 percent
Marvan and similar soils: 35 percent
Inclusions: 15 percent

Setting

Landform:
* Vanda--Alluvial fans
* Marvan--Alluvial fans

Position on landform:
* Vanda--Microlows
* Marvan--Microhighs

Slope:
* Vanda--0 to 2 percent
* Marvan--0 to 2 percent

Elevation: 2,900 to 3,500 feet
Mean annual precipitation: 10 to 12 inches
Frost-free period: 1 15 to 125 days

Soil Properties

Vanda
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity to 60 inches or root-limiting layer: Mainly 6.0 inches

M arvan
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity to 60 inches or root-limiting layer: Mainly 6.7 inches

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II, of this publication.

Inclusions

* Marias and similar soils
* Slopes more than 2 percent
* Marvan, nonsaline

Major Uses of the Unit

* Cropland
* Rangeland

For general and detailed information concerning these uses, see Part II of this publication:

* Agronomy section
* Range section

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INSERT MAVERICK TABLES HERE!

November 30, 1993

MAIN CROPLAND LIMITATIONS AND HAZARDS
TOOLE COUNTY, MONTANA

(Cropland limitations and hazards listed below are defined in the "Agronomy" section, Part II, of the soil survey manuscript. A C factor of 100 is reflected in the soil blowing limitations listed below)

Soil name and map symbol	Cropland limitations or hazards
18:	
Busby	Excessive permeability Soil blowing
50:	
Evanston	Erosion by water Lime content Soil blowing
148:	
Stemple	Erosion by water Limited available water capacity Short frost-free period Slope Soil blowing Surface coarse fragments
Rubble land	Nonsoil material
170:	
Vanda	Lime content Poor tilth Restricted permeability Salt content Sodium content Soil blowing Surface crusting
Marvan	Lime content Poor tilth Restricted permeability Salt content Sodium content Soil blowing Surface crusting

November 30, 1993

MAIN FOREST ACCESS ROAD LIMITATIONS AND HAZARDS
TOOLE COUNTY, MONTANA

(Forest access road limitations and hazards listed below are defined in the "Forest Land" section, Part II, of the soil survey manuscript)

Soil name and map symbol	Forest access road limitations or hazards
148:	
Stemple	Areas of rubble land Low soil strength Slope
Rubble land	Nonsoil material

UNDERSTORY VEGETATION AND HABITAT TYPES

(Absence of an entry indicates that information was not available)

Map Symbol and soil name	Total production		Characteristic vegetation	Compo- sition	Representative habitat type or phase
	Kind of year	Dry weight			
		Lb/acre		Pct	
148:					
Stemple	Favorable	350	Common beargrass	20	Douglas-fir-blue huckleberry
	Normal	300	Blue huckleberry	10	
	Unfavorable	250	Grouse whortleberry	10	
			Pinegrass	10	
			Common snowberry	5	
			Heartleaf arnica	5	
			Raceme pussytoes	5	
			Rusty menriesia	5	
			White spirea	5	
			Elk sedge	2	
			Oregongrape	2	
			Twinflower	2	

FOREST LAND PRODUCTIVITY

(Only soils suitable for production of commercial trees are listed. Abscence of an entry indicates that information was not available)

Map symbol and soil name	Common trees	Site index	Productivity	Board feet	Cubic feet	Trees commonly managed for
148:						
Stemple	Douglas-fir	35	4	131	45	Lodgepole pine, Douglas-fir
	Lodgepole pine	55	3	130	45	

NOTE:

information removed from the map unit was picked up with maverick publication reports if not already available in standard reports. items we chose to defer to data tables in Part II of the publication include: (examples of several of these tables are included above)

- Woodland productivity Board Ft. and Cubic Feet (Forest Land Section)
- Cropland Limitations (Agronomy Section)
- Forest Access Road Limitations (Forest Land Section)
- Windbreak Suitablility Groups (Agronomy Section)
- Rangesite, production and plant community (Range Section
- Understory production and Plant community (Range Section
- Forest Habitat Type

Through the process of segregating the more stable portion of the soils manuscript into Part I, with the more dynamic aspects of the material included in Part II, much of the duplication between the map unit and data tables was eliminated. The map unit is seen as playing a different role than it may have played in the past. We use it largely as a pointer to information rather than data for a specific use. The map unit description continues to help form a mental picture of the unit.

IN SUMMARY

Generating map unit descriptions from SSSD MUIR or from NASIS MUR data in the very near future, accomplishes several critical tasks.

- The data represented is absolutely consistent with the database.

- The descriptions can be regenerated in minutes to reflect updates in the data or format changes.

- Due to very quick generation speeds (less than 2 minutes for a 75 map unit survey) these descriptions would not need to be stored, but could be generated on the fly from current data in the field office commuter system for client specific access (Camps or FOCS).

- Field soil scientists and support staff can concentrate efforts on data quality issues rather than format and unnecessary cross-checking.

Your interest in this approach is appreciated as we all have much to gain from automation of the publication process.

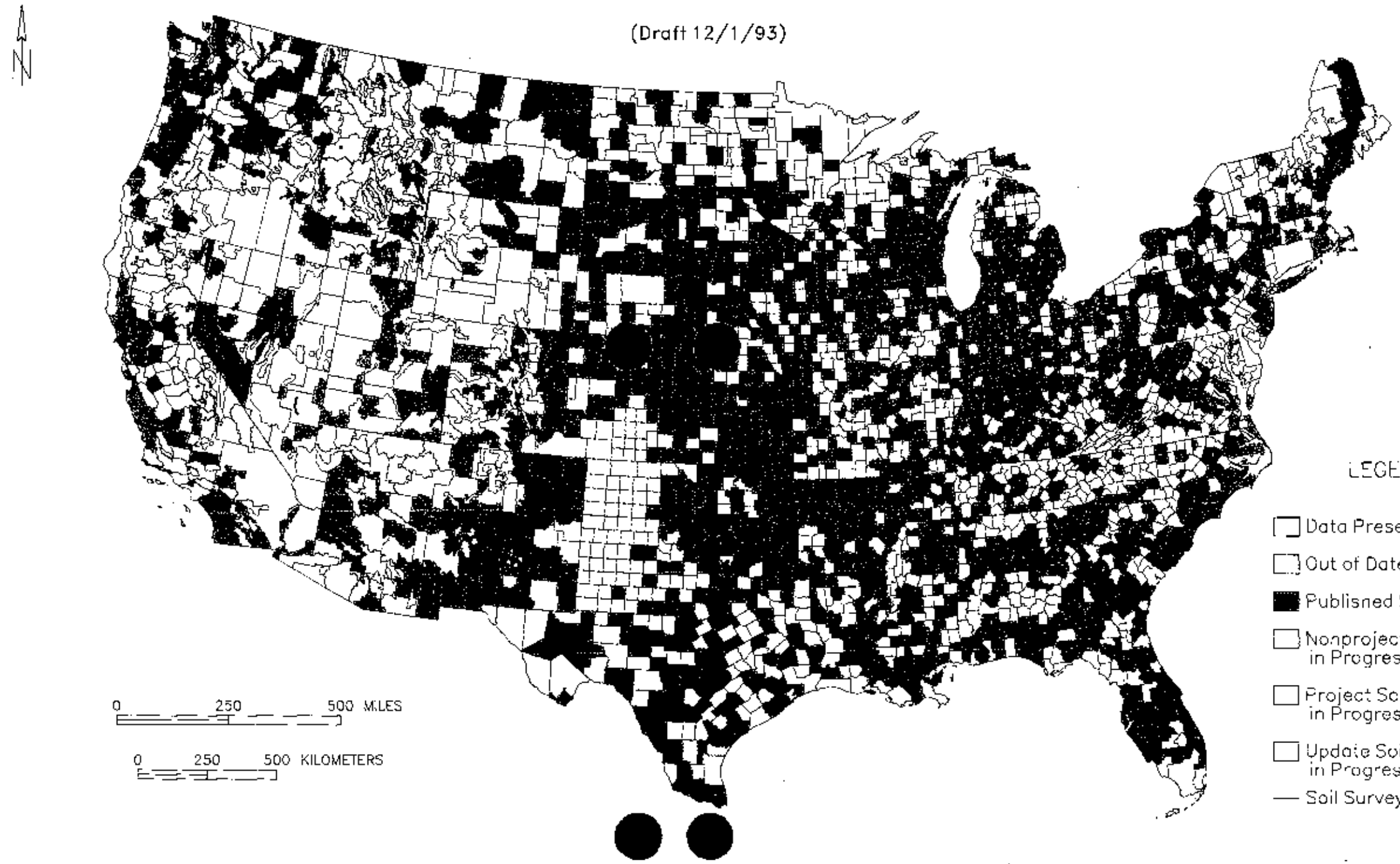
U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

STATUS OF SOIL SURVEY IN THE CONTERMINOUS U.S.

DECEMBER 1993

(Draft 12/1/93)



SOURCE: Status Data Element from Soil Survey Schedule 12/93
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln, NE December 1993

USDA, SCS NATIONAL CARTOGRAPHY & GIS CENTER FORT WORTH, TX. 1994

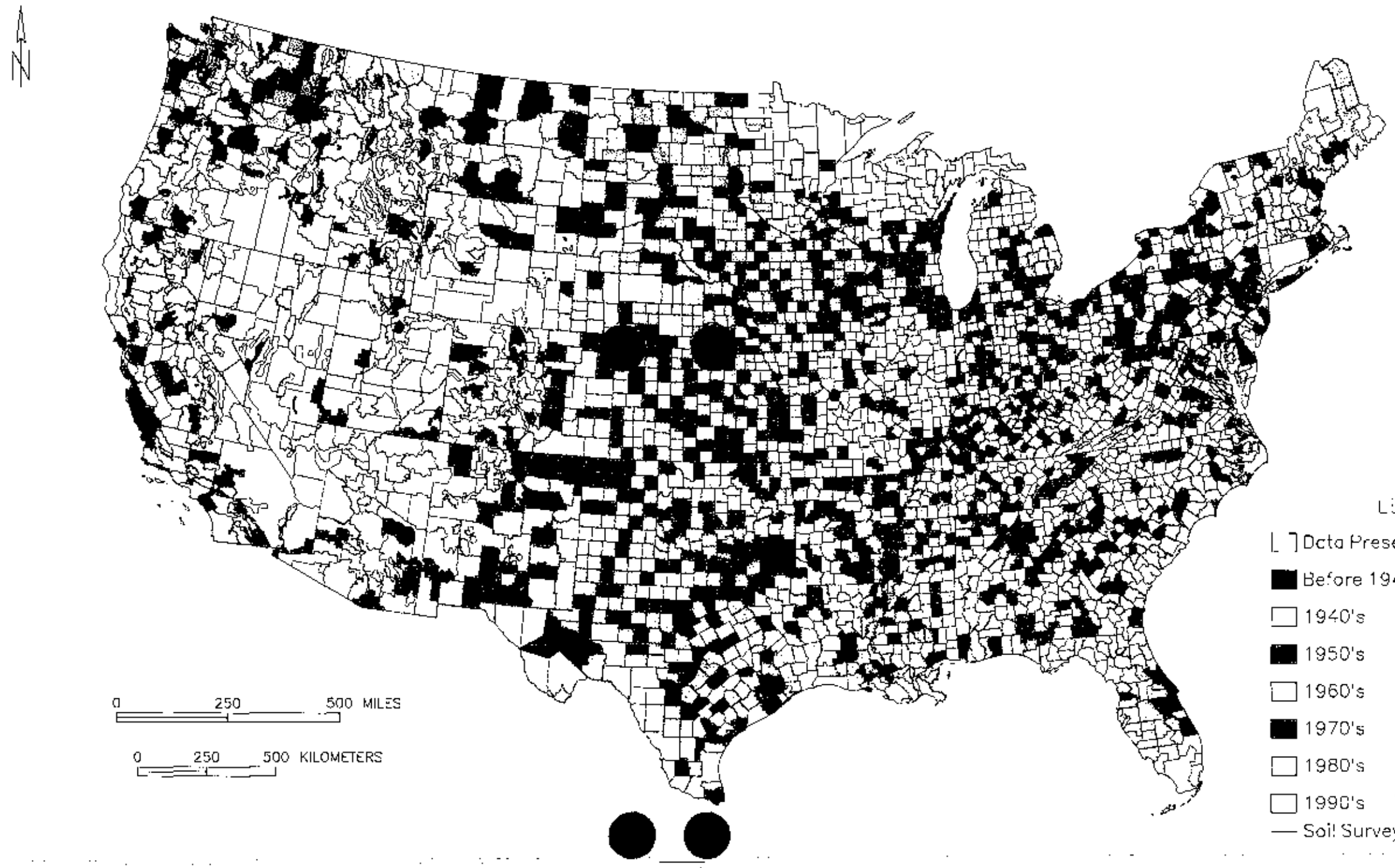
JANUARY 1994 1007882

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

AGE OF SOIL SURVEY CORRELATION IN THE CONTERMINOUS U.S.

(DRAFT 11/23/93)



SOURCE: Cordate Data Element from Soil Survey Schedule 10/93
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln, NE December 1993

JANUARY 1994 1007884

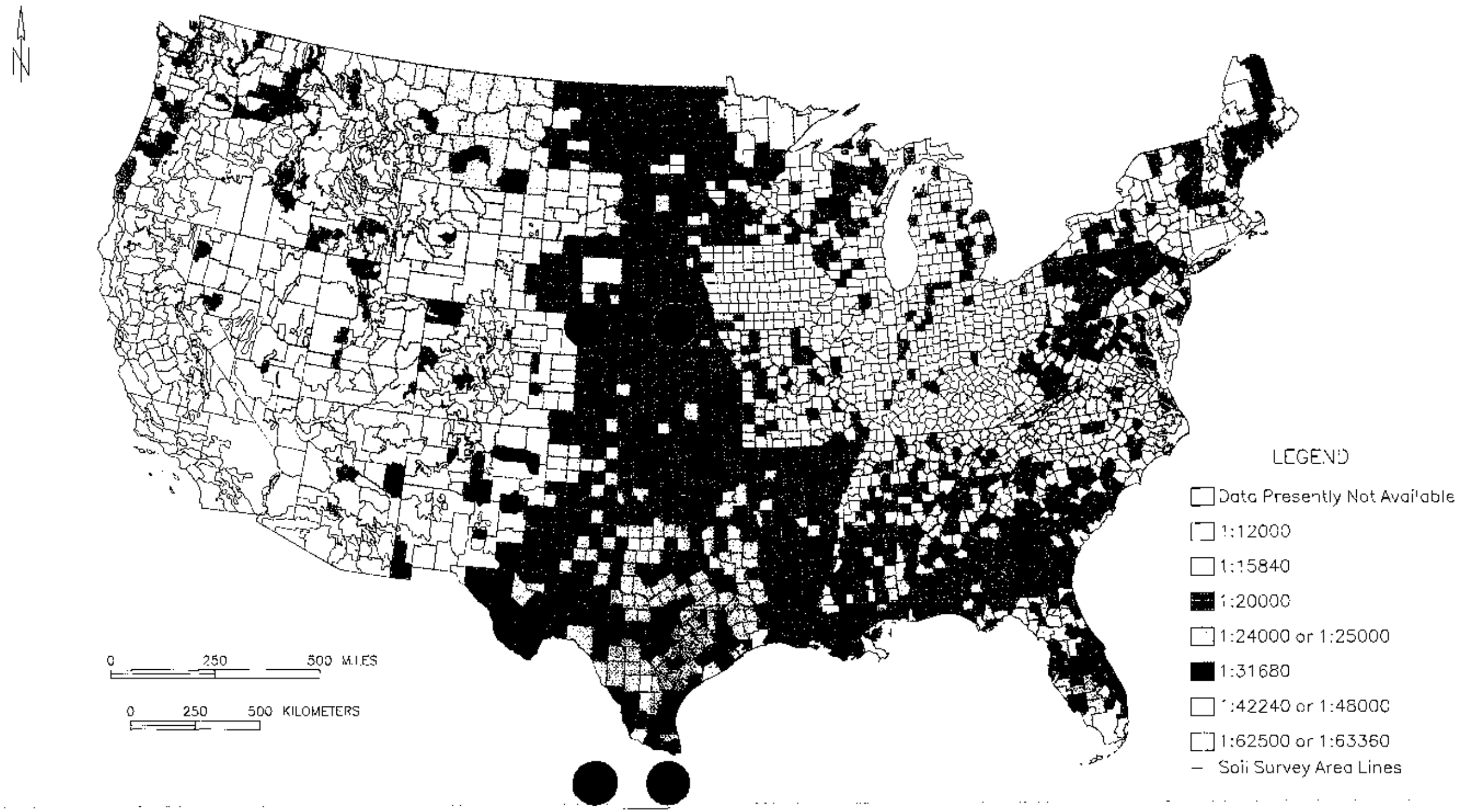
USDA, SCS, NATIONAL CARTOGRAPHY & GIS CENTER, FORT WORTH, TX. 1994

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SOIL SURVEY PUBLICATION SCALE IN THE CONTERMINOUS U.S.

(Draft 12/1/93)



SOURCE: Sursel Data Element from Soil Survey Schedule 10/93
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln, NE December 1993

JANUARY 1994 1007883

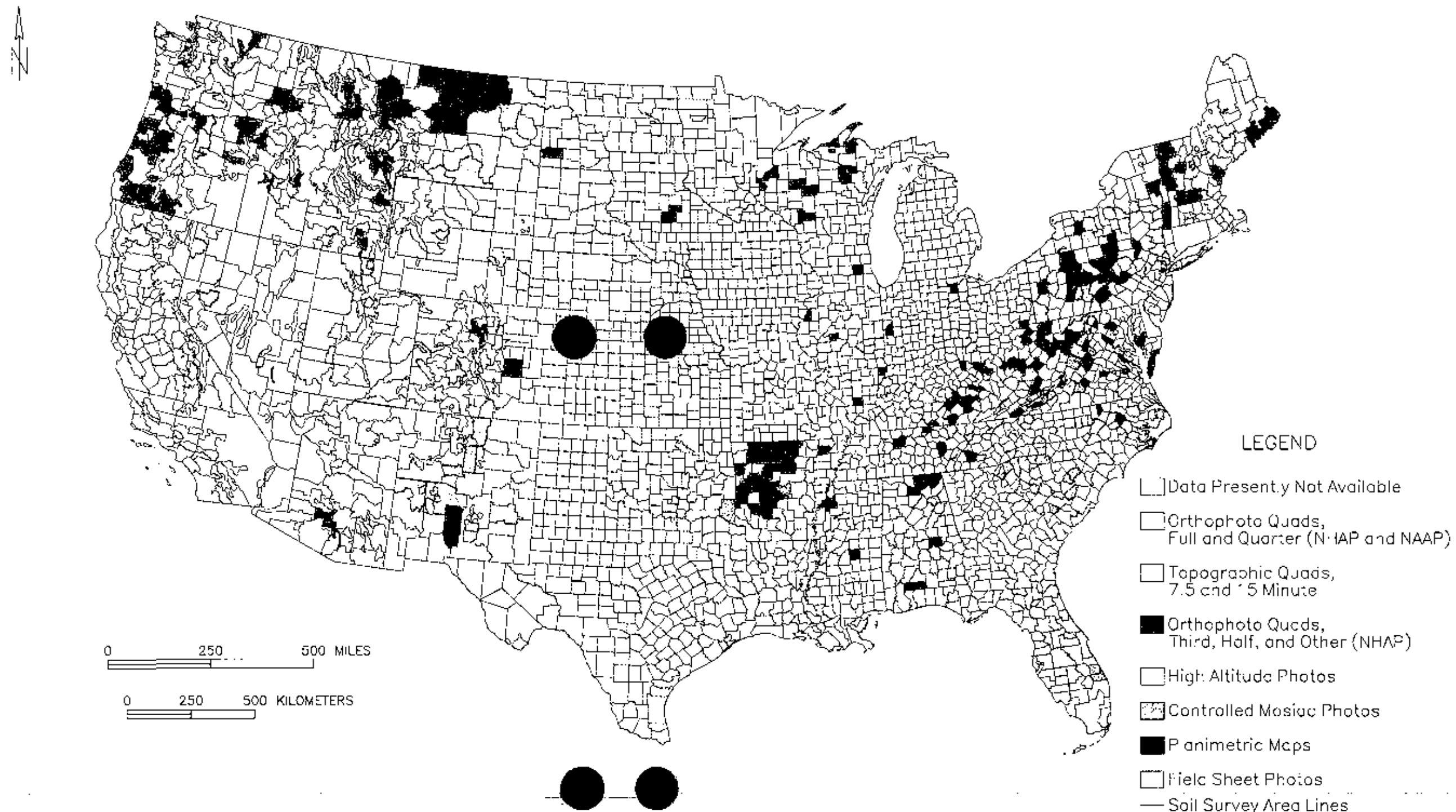
USDA, SCS, NATIONAL CARTOGRAPHY & GIS CENTER, FORT WORTH, TX, 1994

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

BASE MAPS OF PUBLISHED SOIL SURVEYS IN THE CONTERMINOUS U.S.

(Draft 12/1/93)



SOURCE: Basedata Element from Soil Survey Schedule 10/93
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC GIS, Lincoln, NE November 1993

JANUARY 1994 1007865

USDA SCS NATIONAL CARTOGRAPHY & GIS CENTER FORT WORTH TX 1994

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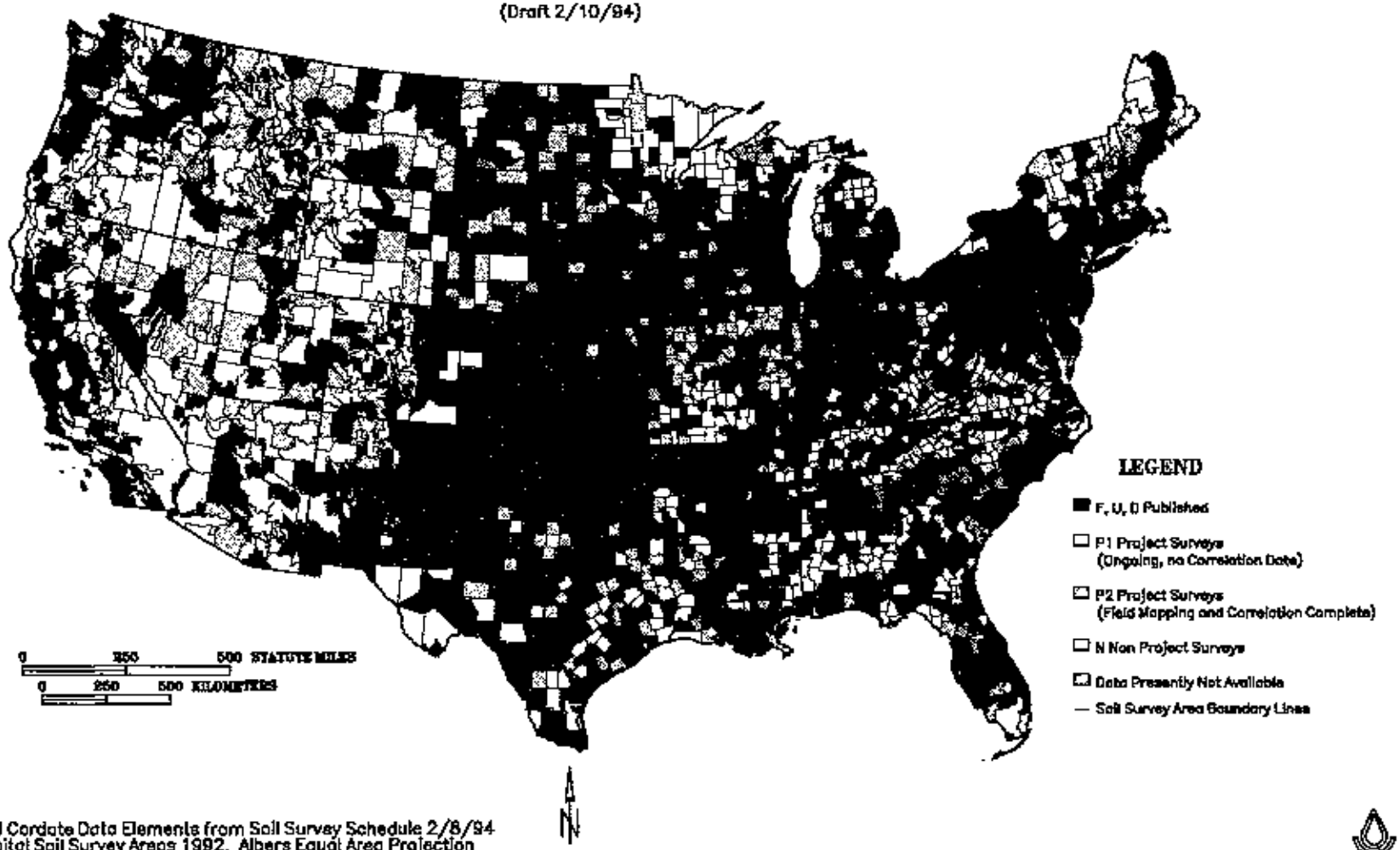
SOIL SURVEY STATUS OF THE CONTERMINOUS U.S. "ONCE OVER"

(Draft 2/10/94)

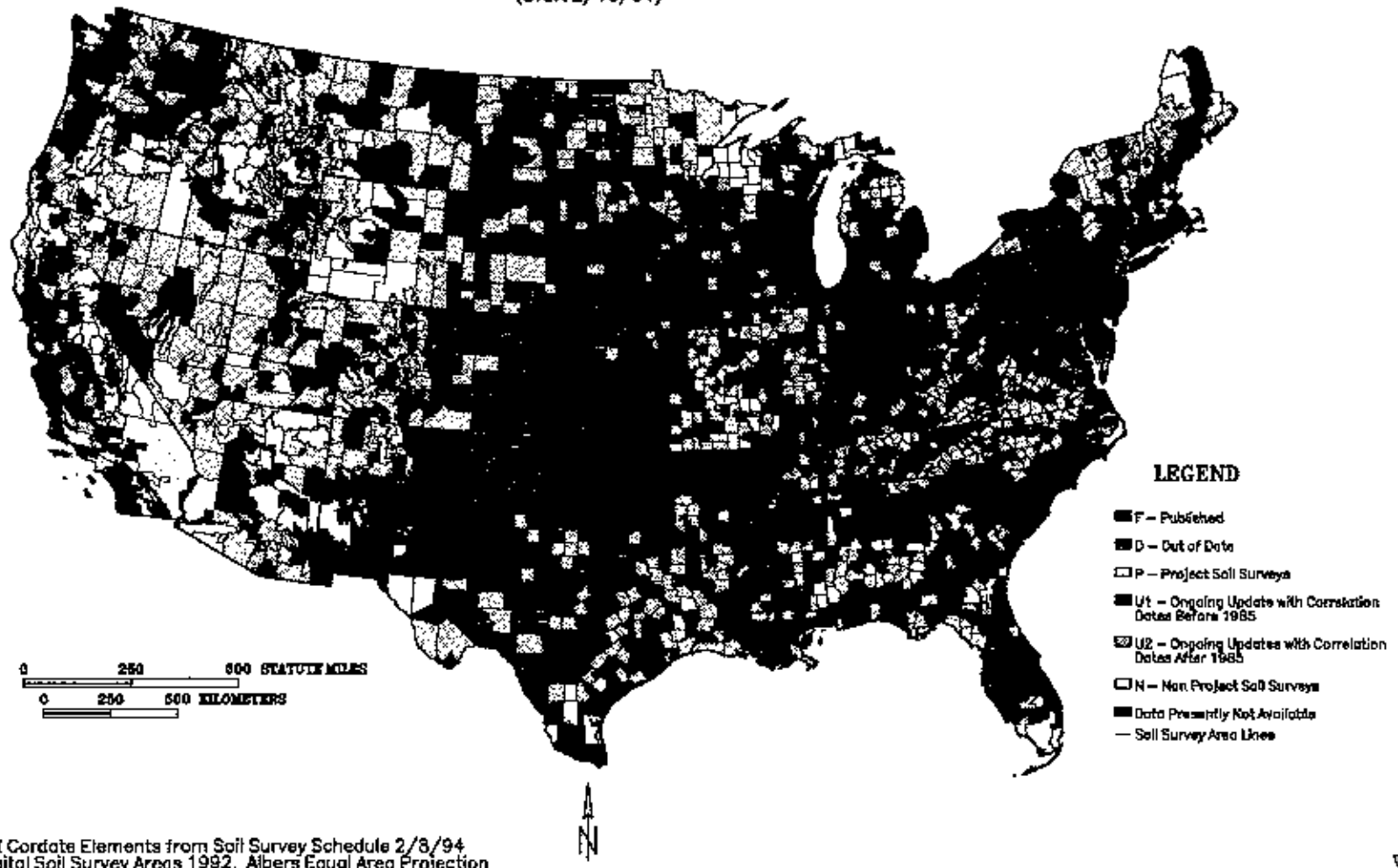


SOURCE: Status and Cordate Data Elements from Soil Survey Schedule 2/8/94
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln,NE February 1994

USDA SOIL CONSERVATION SERVICE

SOIL SURVEY STATUS OF THE CONTERMINOUS U.S. "UPDATE INFORMATION"

(Draft 2/10/94)

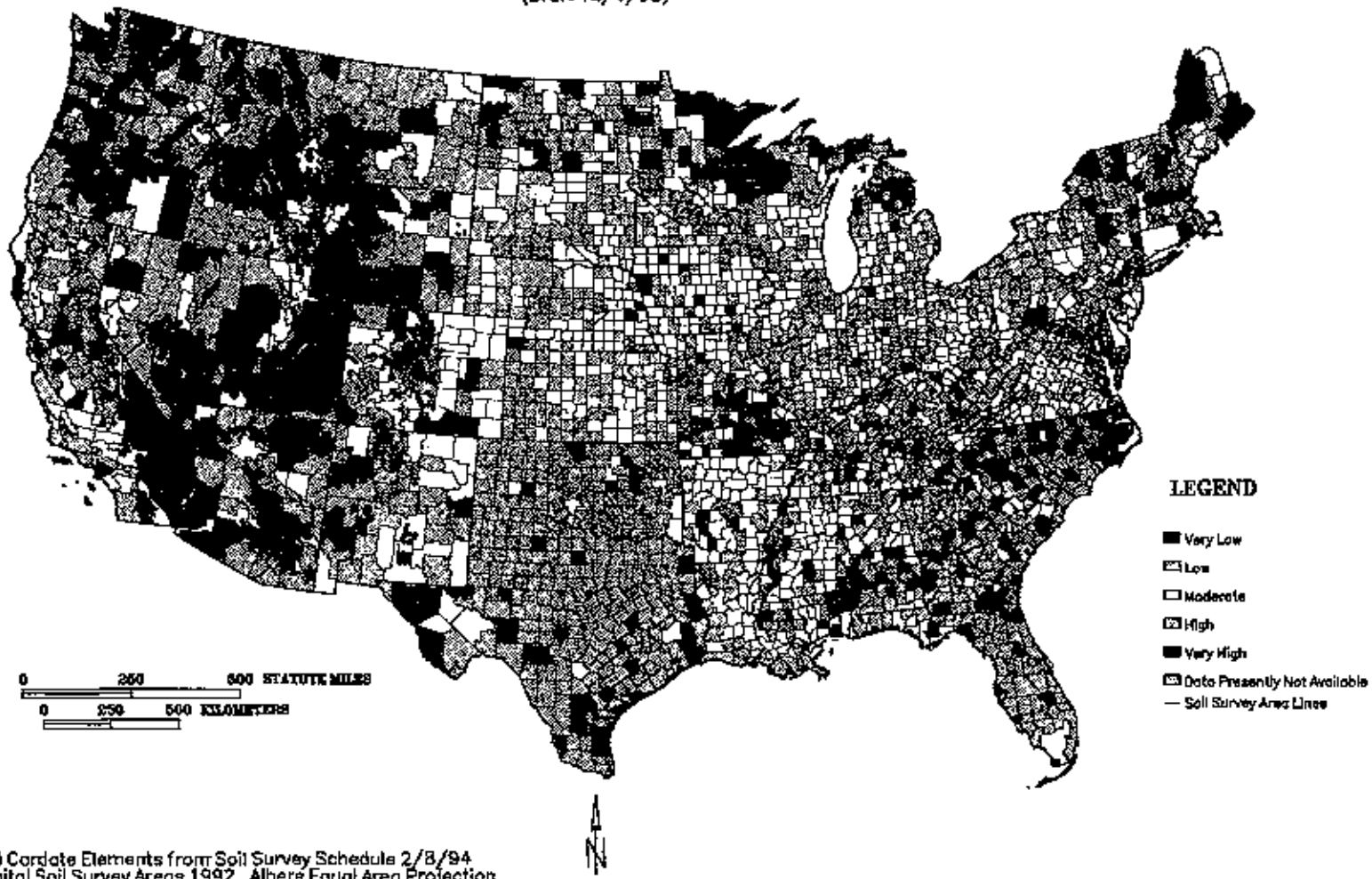


SOURCE: Status and Cordate Elements from Soil Survey Schedule 2/8/94
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln,NE February 1994

USDA SOIL CONSERVATION SERVICE

"STATE OF THE SOIL SURVEY" RESOURCE NEEDS FOR A DIGITAL PRODUCT IN THE CONTERMINOUS U.S.

(Draft 12/1/93)



SOURCE: Status and Cordate Elements from Soil Survey Schedule 2/8/94
Illustrated Using Digital Soil Survey Areas 1992. Albers Equal Area Projection
Map Prepared Using Mapgen 4.0 NSSC–GIS, Lincoln,NE February 1994

USDA SOIL CONSERVATION SERVICE

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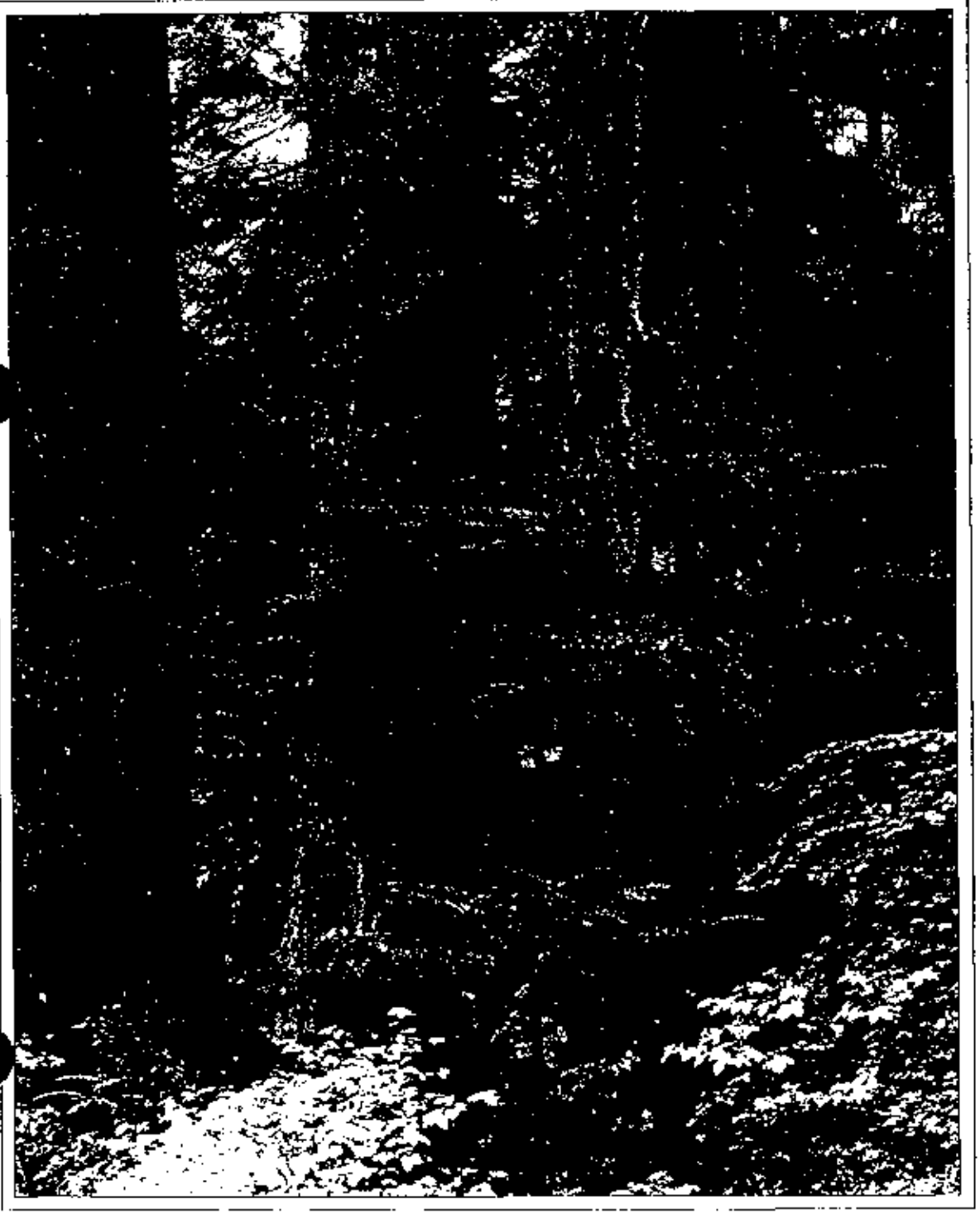
ITEM 31

LTER

NATIONAL RESEARCH SITES WITH A COMMON COMMITMENT



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With an initial set of six sites selected in 1980, the National Science Foundation established the Long-Term Ecological Research (LTER) Program to conduct research on long-term ecological phenomena in the United States. The present total of 18 sites represents a broad array of ecosystems and research emphases. The LTER Network is a collaborative effort among over 600 LTER scientists and students which extends the opportunities and capabilities of the individual sites to promote synthesis and comparative research across sites and across ecosystems.

U.S. Long-Term Ecological Research Network

Cover, temperate coniferous forest, Jerry F. Franklin

Above, eastern deciduous forest, Wayne T. Swank

Top right, ladybird beetle (*Coccinella sp.*) on horseweed (*Conyza canadensis*), row-crop agriculture, Stuart Gage

Center right, ground beetles (*Harpalus caolus*, *Pterostichus lama*), temperate coniferous forest, Andrew R. Moldenke

Bottom right, Adélie penguins (*Pygoscelis adeliae*), polar marine, National Science Foundation

A Common Commitment.

The mission of the LTER Network is to conduct and facilitate ecological research by

- Understanding general ecological phenomena which occur over long temporal and broad spatial scales
- Creating a legacy of well-designed and documented long-term experiments and observations for use by future generations
- Conducting major synthesis and theoretical efforts
- Providing information for the identification and solution of societal problems

Intersite Research & Synthesis

In the commonalities of its sites, the LTER Network creates greater scientific, social and administrative opportunities to take a broader view than most other ecological research programs. Current synthesis efforts include work in process studies, climate forcing, analyses of temporal and spatial data, and scaling up to continental and global scales.

LTER scientists

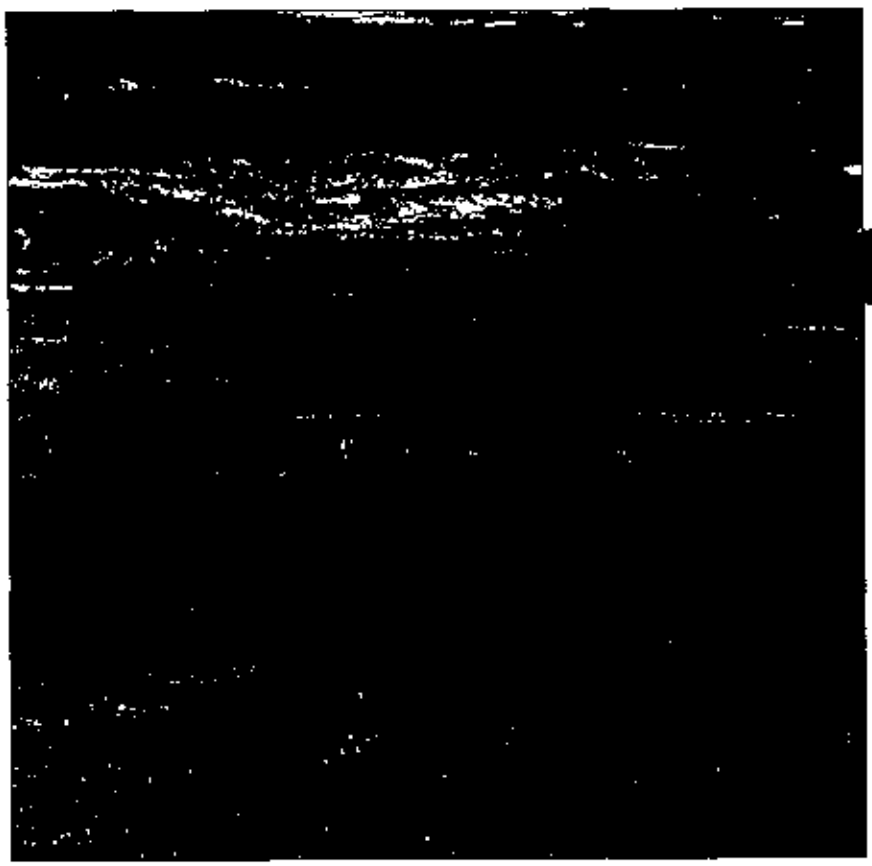
- Ask similar scientific questions in a wide variety of landscapes
- Have similar sets of measurements in core research areas, and accessible data which can be shared
- Have access to and support for incorporating new technologies
- Have mechanisms for communication, planning, and data sharing
- Regularly associate with other ecologists, broadening their exposure to different research approaches and ideas

Research Opportunities at LTER Sites

The LTER Network offers the broader environmental biology research community, including students and foreign scientists, the opportunity to use the sites for both long- and short-term projects appropriate to individual sites, a group of sites, or the Network as a whole. Initial arrangements for collaborations should be made with personnel at the site(s) under consideration, and proposals to the National Science Foundation for such collaborative work should be submitted to the relevant disciplinary program. Program directors may also be contacted for information about short-term funding opportunities.

LTER sites share a common commitment to long-term research on the following core research topics:

- *Pattern and control of primary production*
- *Spatial and temporal distribution of populations selected to represent trophic structure*
- *Pattern and control of organic matter accumulation in surface layers and sediments*
- *Patterns of inorganic inputs and movements of nutrients through soils, groundwater and surface waters*
- *Patterns and frequency of site disturbances*



Above, coastal barrier islands, John M. Hall
Right, cordgrass (*Spartina alterniflora*), John M. Hall

NATIONAL & INTERNATIONAL ACTIVITIES

As a global leader in long-term research and monitoring activities, the U.S. LTER Network has established ages with existing and developing domestic long-term ecological research programs, as well as similar programs around the world. These relationships range from exchanges at the individual scientist and site research program Levels to participation in international meetings to global-scale research planning and collaboration. In the next decade, the L TER Network plans to undertake a major expansion of its national and international activities.

National

- Developing strong multidisciplinary science and public education programs
- Developing a multi-agency effort to add sites for wider representation of key biomes and portions of major gradients
- Creating synthesis centers at selected LTER sites
- Facilitating the advancement of current ecological science and innovative research technologies

International

- Assisting in the establishment of networks for long-term ecological research in other countries
- Creating programs between U.S. and foreign LTER sites and networks
- Developing and operating a communication and data sharing system among an international network of sites
- Facilitating the establishment of a global system of environmental research sites

ve, taiga, Jerry F. Franklin

Top right, limnocorrals in Toolik lake, Alaska, arctic tundra, lakes, and streams, Jerry F. Franklin

Center right, northern temperate lakes, John J. Magnuson

Bottom right, recently burned upland spruce, taiga, LA. Viereck

1 H. J. Andrews Experimental Forest, Oregon.
Temperate coniferous forest.

Research topics: Successional changes in ecosystems; forest-stream interactions: population dynamics of forest stands; patterns and rates of decomposition; disturbance regimes in forest landscapes

2 Arctic Tundra, Alaska.
Arctic tundra, lakes, streams.

Research topics: Movement of nutrients from land to stream to lake; changes due to anthropogenic influences; controls of ecological processes by nutrients and by predation

3 Bonanza Creek Experimental Forest, Alaska.
Taiga.

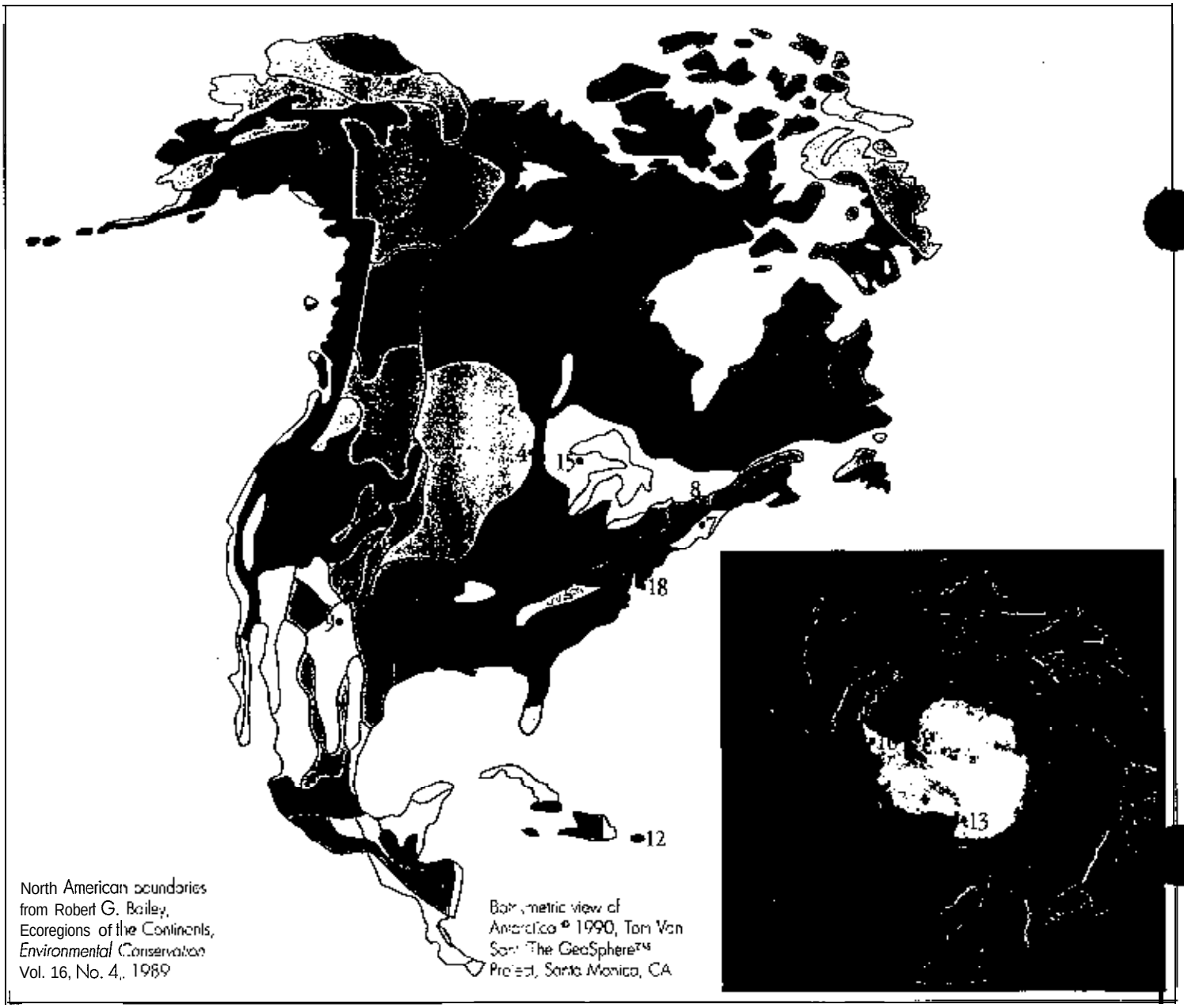
Research topics: Successional processes associated with wildfire and floodplains; facilitative and competitive interactions among plant species throughout succession; plant-mediated changes in resource and energy availability for decomposers; herbivorous control of plant species composition

4 Cedar Creek Natural History Area, Minnesota.
Eastern deciduous forest and tallgrass prairie.

Research topics: Successional dynamics; primary productivity and disturbance patterns; nutrient budgets and cycles; climatic variation and the wetland/upland boundary; plant-herbivore dynamics

5 Central Plains Experimental Rang Colorado.
Shortgrass steppe.

Research topics: Soil water; above- and belowground net primary production; plant population and community dynamics; effects of livestock grazing; soil organic matter accumulation and losses, soil nutrient dynamics; and ecosystem recovery from cultivation



North American boundaries from Robert G. Bailey, Ecoregions of the Continents, *Environmental Conservation* Vol. 16, No. 4, 1989

Bar metric view of America © 1990, Tom Van Sant The GeoSphere™ Project, Santa Monica, CA

Coweeta Hydrologic Laboratory, North Carolina.
Eastern deciduous forest.

Research topics: Long-term dynamics of forest ecosystems including forest disturbance and stress along an environmental gradient; stream ecosystems along an environmental gradient; and the riparian zone as a regulator of terrestrial-aquatic linkages

7 Harvard Forest, Massachusetts.
Eastern deciduous forest.

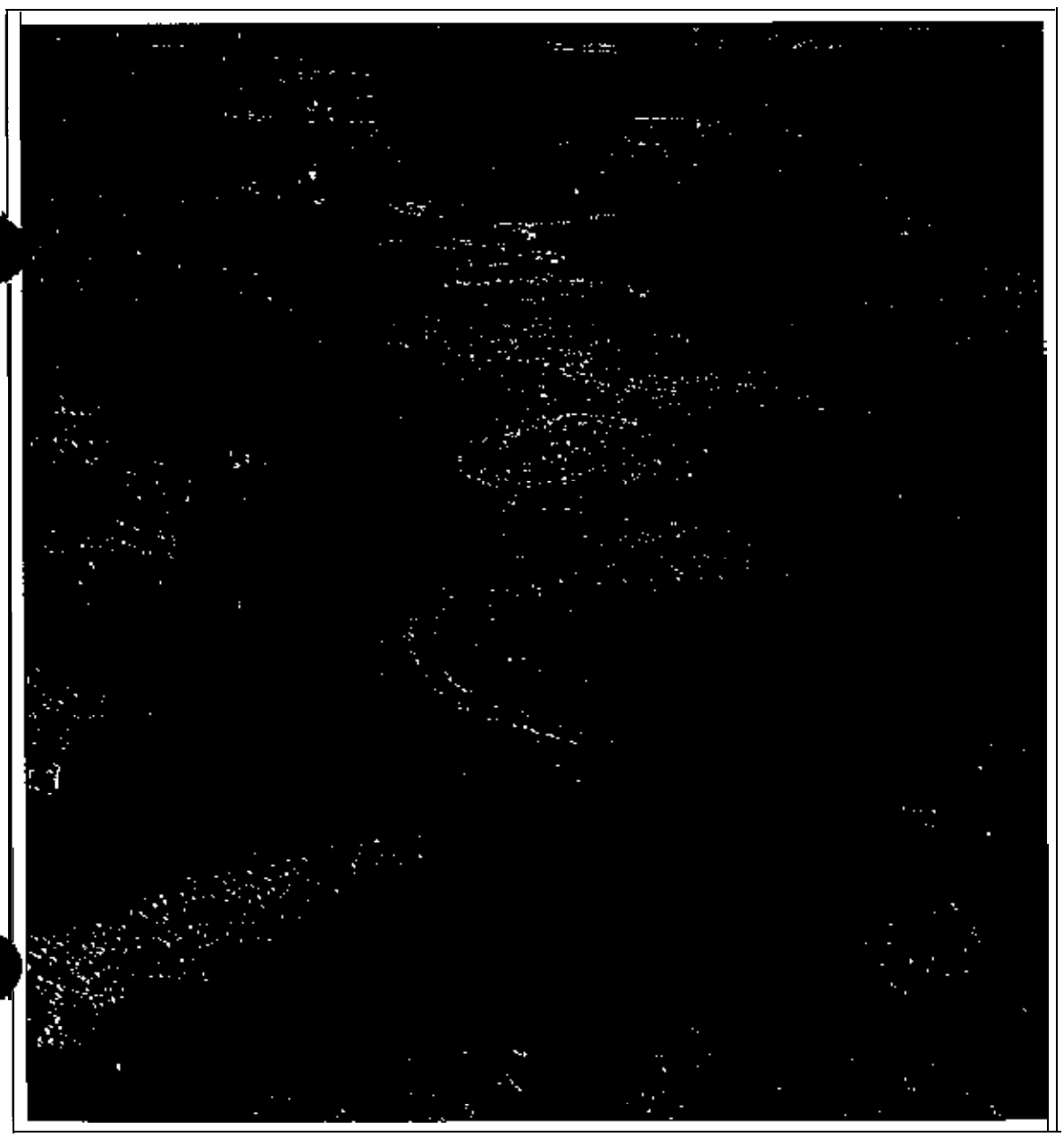
Research topics: Long-term climate change, disturbance history and vegetation dynamics; comparison of community, population, and plant architectural responses to human and natural disturbance; forest-atmosphere trace gas fluxes; organic matter accumulation, decomposition and mineralization; element cycling, fine root dynamics and forest microbiology

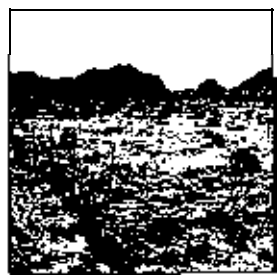
8 Hubbard Brook Experimental Forest, New Hampshire.
Eastern deciduous forest.

Research topics: Vegetation structure and production; dynamics of detritus in terrestrial and aquatic ecosystems; atmosphere-terrestrial-aquatic ecosystem linkages; heterotroph population dynamics; effects of human activities on ecosystems

9 Jornada Experimental Range, New **Mexico.**
Hot desert.

Research topics: Desertification; factors affecting primary production; nitrogen cycling; animal-induced soil disturbances; direct and indirect consumer effects; organic matter transport and processing; vertebrate and invertebrate population dynamics





Top, carbon 14 experiment, shortgrass steppe, Daniel G. Milchunas

Center, prescribed spring fire, tallgrass prairie, Donald Kaufman

Above, nitrogen-treoted site, hot desert, Walter G. Whitford

Left, eastern deciduous forest and tallgrass prairie, David Tilmon

10 Kellogg Biological Station, Michigan.
Row-crop agriculture.

Research topics: Ecological interactions underlying the productivity and environmental impact of production-level cropping systems; patterns, causes, and consequences of microbial, plant, and insect diversity in agricultural landscapes; gene transfer, community dynamics, biogeochemical fluxes

11 Konza Prairie Research Natural Area, Kansas.
Tallgrass prairie.

Research topics: Effects of fire, grazing and climatic variability on ecological patterns and processes in tallgrass prairie ecosystems; use of remotely sensed data and geographic information systems to evaluate grassland structure and dynamics

12 Luquillo Experimental Forest, Puerto Rico.
Tropical rainforest.

Research topics: Patterns of and ecosystem response to different patterns of disturbance; land-stream interaction; management effects on ecosystem properties; integration of ecosystem models and geographical information systems.

13 McMurdo Dry Valleys, Antarctica.
Polar desert oases.

Research topics: Microbial ecosystem dynamics in arid soils, ephemeral streams, and closed basin lakes; resource and environmental controls on terrestrial, stream and lake ecosystems; material transport between aquatic and terretrial ecosystems; ecosystem response to greater hydrologic flux driven by warming climate

14 Niwot Ridge-Green Lakes Valley, Colorado.
Alpine tundra.

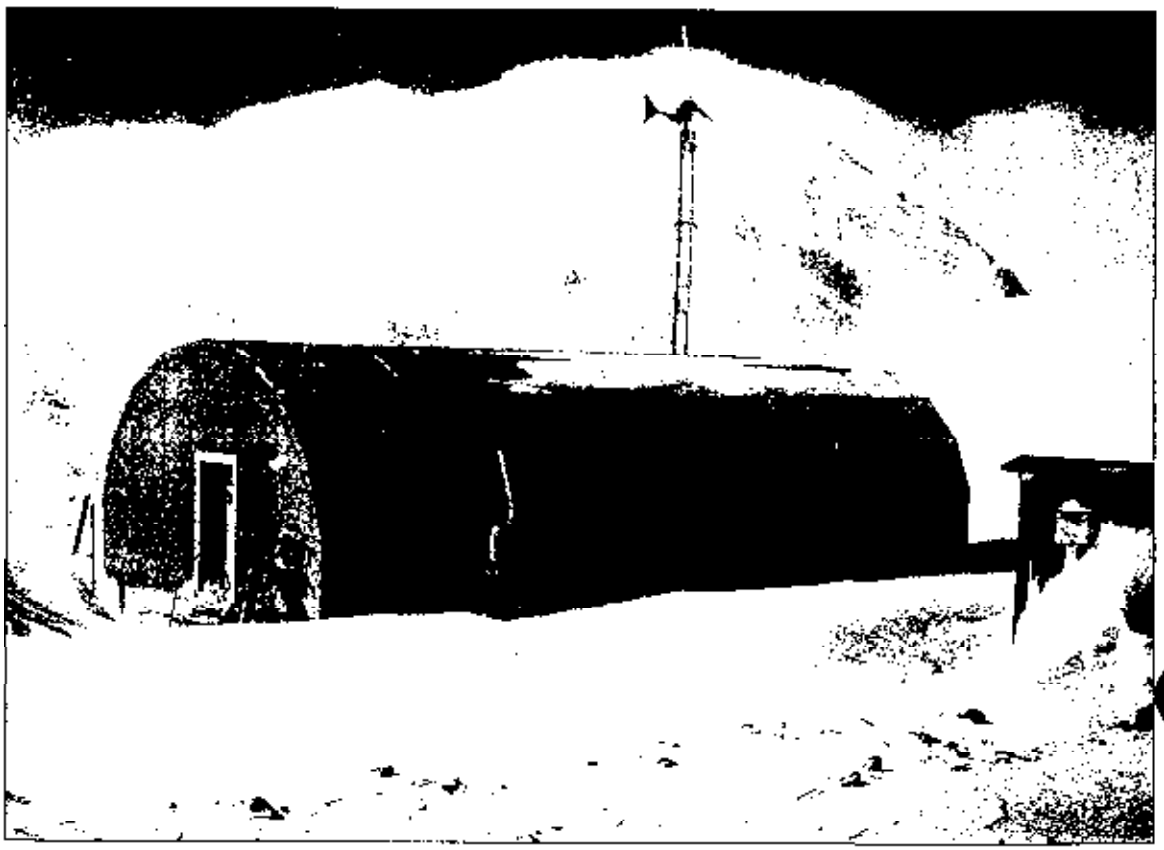
Research topics: Patterns and controls of nutrient cycling; trace gas dynamics, plant primary productivity and species composition; geomorphology, and paleoecology

Right, row-crop agriculture, Kurt Stepnitz

Far right, melting on ice hole, polar desert oases, Russ Kinne/NSF

Above, alpine tundra, Jerry F. Franklin

Right, Niwot Ridge Tundra Laboratory, Skip Walker



15 North Temperate Lakes, Wisconsin.

Northern temperate lakes; eastern deciduous forests.

Research topics: Physical, chemical and biological limnology; hydrology and geochemistry; climate forcing; producer and consumer ecology; ecology of invasions, ecosystem variability, lakescape and landscape ecology

16 Palmer Station, Antarctica.

Polar marine.

Research topics: Oceanic-ice circulation and model; sea-ice dynamics; biological/physical interactions; effect of sea ice on primary production, consumer populations and apex predators; bio-optical models of primary production, spatial distribution and recruitment in consumer populations; seabird population dynamics and reproductive ecology

17 Sevilleta National Wildlife Refuge, New Mexico.

Intersection of subalpine mixed-conifer forest/meadow, riparian forest, dry mountainland, grassland, cold desert, hot desert.

Research topics: Landscape/organism population dynamics; watershed ecology; climate change; biospherid atmospheric interactions; paleobotany/archaeology; microbial role in gas flux; landscape heterogeneity; spatial/temporal variability

18 Virginia Coast Reserve, Virginia.

Coastal barrier islands.

Research topics: Holocene barrier island geology; salt marsh ecology, geology, and hydrology; ecology/evolution of insular vertebrates; primary/secondary succession; life-form modeling of succession

left, polar marine, National Science Foundation

Below left, intersection of several ecosystems (see Sevilleta above), Jerry F. Franklin

Below, tropical rainforest, Robert B. Waide

Top, eastern deciduous forest, Jerry F. Franklin

Center, kongarco rot (*Dipodomys deserti*), Jerry F. Franklin

Above, Puerto Rican Parrot, (*Amazona vittata*), Ariel E. Iugo

THE LTER NETWORK OFFICE

The LTER Network Office, located at the University of Washington in Seattle, is supported by the National Science Foundation (NSF) to facilitate the achievement of overall Network objectives and initiatives identified by NSF and executive and coordinating committees representing the LTER sites. In addition to coordinating regular meetings of site representatives, the Network Office organizes and facilitates workshops, national and international meetings, and All Scientists meetings.

Satellite composite view of Earth © 1990, Tom Van Sant/ The GeoSphere™ Project, Santa Monica, CA

Leadership & Coordination

The Network Office

- Facilitates communication and data sharing among the LTER sites, and between the LTER Program and other scientific communities
- Supports the planning and conduct of collaborative research efforts, including provision of some technical support services
- Leads some intersite scientific activities
- Provides a focal point and collective representation of the LTER Network in its external relationships
- Catalyzes long-term planning, including goal definition for the Network
- Develops linkages with other relevant long-term research programs, site networks, and science and technology centers

Communications

- *Electronic Networking & Data Management. The* LTER Network Support System, developed and maintained at the LTER Nenvork Office, provides direct Network access to on-line databases, information bulletin boards, and the national Internet. As collaboration with other individual researchers and research groups continues to grow, the LTERnet system will be expanded to include additional users and capabilities.
- *Publications.* The Network Office publishes an annual personnel directory, a site directory, and an internationally distributed biannual newsletter, the *LTER Network News, as well* as periodic research reports and workshop and conference proceedings. Recent LTER publications include a catalog of stream research at LTER sites, a report on technology development in the LTER Network, guidelines for sampling forest gaps, and a survey of climate variability and ecosystem response across the LTER sites.

Remote Sensing & GIS Laboratory

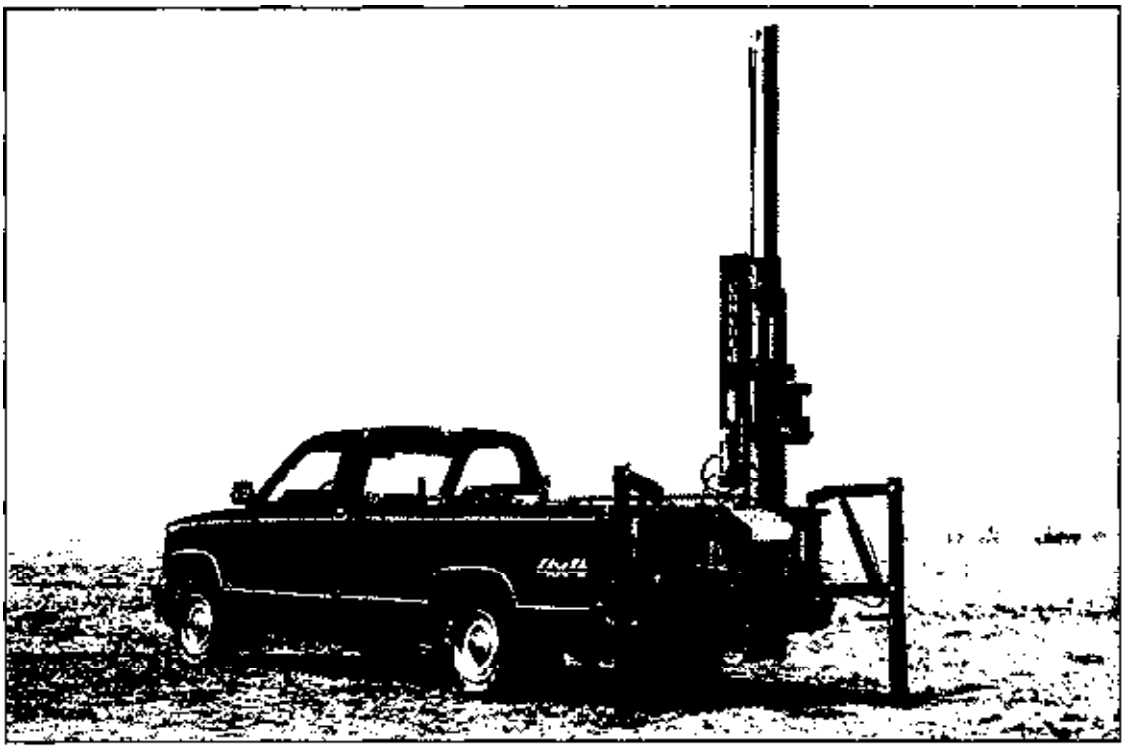
The LTER Remote Sensing and GIS Laboratory, established by the LTER Network Office in cooperation with other research programs at the University of Washington, provides the LTER Network with the capability to initiate synthesis activities involving large-scale spatial analysis, using satellite data and geographic information systems (GIS). Acquisition, archiving, and analysis of satellite and GIS data for the LTER sires is a major activity of the LTER Network Office that will develop further as new partnerships with NSF synthesis centers and federal agencies such as the National Aeronautics and Space Administration evolve.

Credits:
Stephanie Martin, writing/ editing/coordination
Robyn Ricks, design

concord®

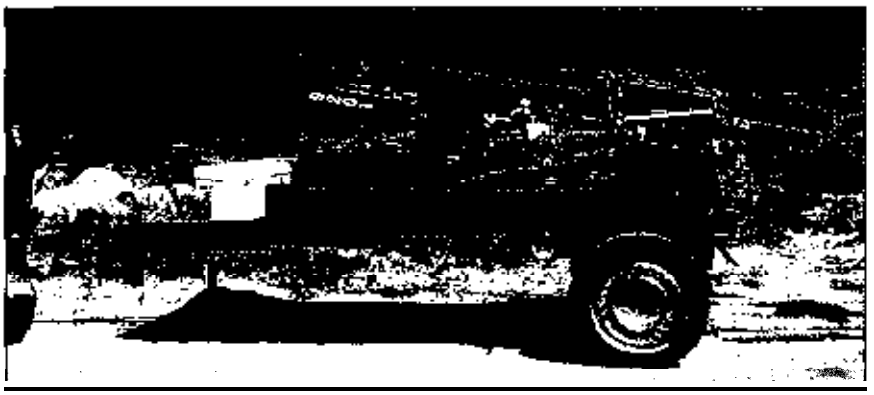
SPECIALTY DIVISION

SOIL SAMPLER
9200 & 9201

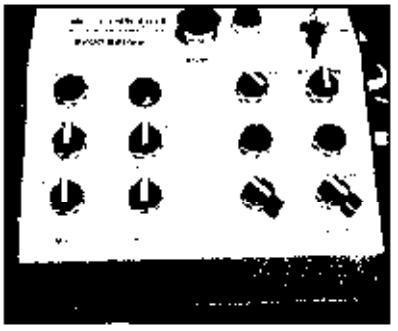


No longer do you need to dedicate a vehicle to your heavy-duty soil sampler. Concord's new series, the Model 9200 and 9201 Soil Sampler, has the capability of either pickup or trailer mounting with the convenience of being able to roll the self-contained model in and out of any standard pickup box in just minutes.

The 9200 Series is capable of sampling or augering down to 75' or deeper in some conditions, and can be used on your projects such as uncontaminated soil sampling, hazardous waste coring, installation of shallow water well monitoring sites and rock investigations. It is the ultimate in versatility.

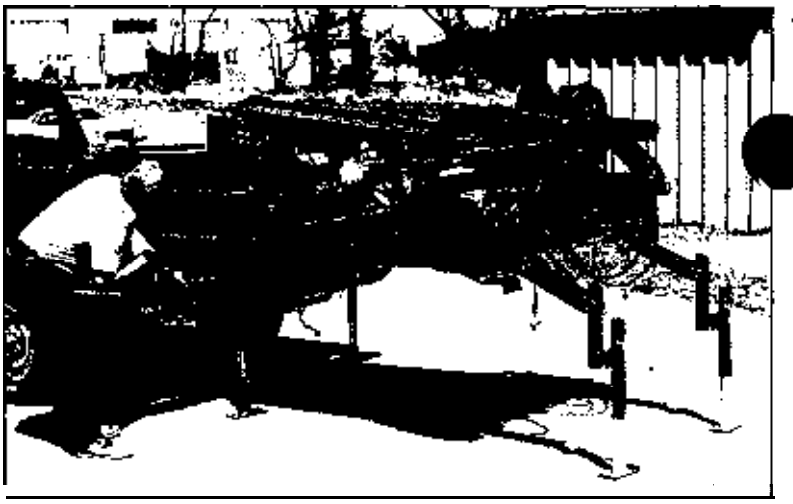


MASTER CONTROLLER:



The electric over hydraulic master controller enables the operator to have precise fingertip control over all operational functions.

THE CONCORD SOIL SAMPLER 9200 SERIES

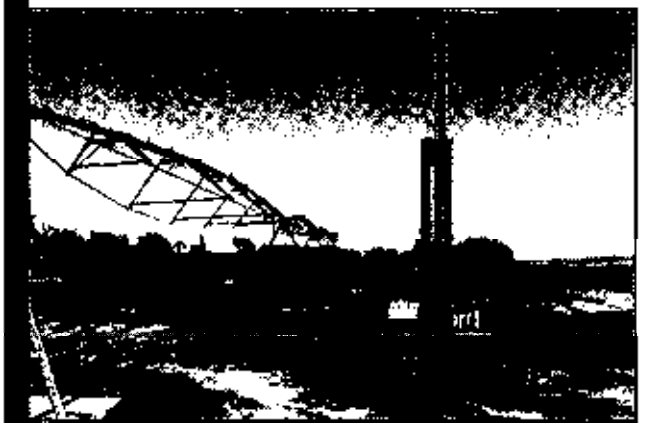


**Built-in parking stands*

Features:	Capabilities:
The Exclusive Concord Chuck	It's versatility will adapt to square, octagon, round and/or hectagon shapes. It can even accept a continuous probe 2" in diameter and up to **30'** long.
Outriggers	Standard Equipment. Electronically controlled hydraulic outriggers allow for greater stability and infinite leveling adjustments.
Strong Down Force	Adjustable from 700 to 14,000 lbs. 14 second down and 11 second up cycle time on 60" cylinder.
Fast Drill Head Speed	Adjustable from 0 to 75 RPMs at 6,050 inch/lb.
Power Unit	Standard Equipment. Electric start Vanguard 16-hp. Briggs and Stratton engine operated from the master controller allowing the engine RPM to vary electronically and change upon demand.
Tools	It may be equipped with a variety of tools including Concord, Inc.'s, probes, augers or any tools you may presently own.

Contacts:

General Manager:
Virg Mahlum
Sales Representative:
Curt Elke
Engineering:
Mike Smette
Parts:
Gary Zeeb
Receptionist:
Kathy Lindgren
Shipping:
Pat Oksendahl
Marketing:
Sue Pinkney



Manufactured by:

concord.

2800 7th Avenue North
Fargo, North Dakota 58102
(701) 280-1260

26.8

ITEM 33

For more information Call or Write:

Manufactured by:

concord®

2800 7th Ave. N.
Fargo, ND 58102
Tel: 701-280-1260
FAX: 701-280-0706

Who to Contact at Concord, Inc.

General Manager
of Special Products . . . . . Virg Mahlum
Reception. . . . . Kathy Lindgren
Sales Coordinator . . . . . Pat Oksendahl
Parts . . . . . Gary Zeeb
Service . . . . . Jack Oberlander
Engineering . . . . . Mike Smette
Shipping . . . . . Pat Oksendahl

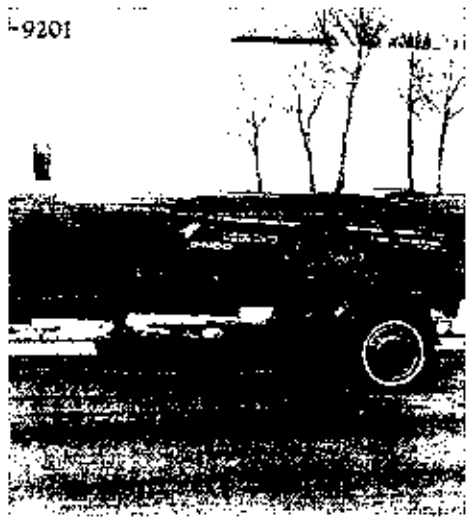
Zero Contamination Unit

A zero contamination unit is also available. Monitoring soil for possible contamination of precious groundwater supplies is an increasingly important task. Zero contamination refers to the [redacted] no mixing of soil occurs from one depth to another. A sample retrieved from four feet will be unaffected by the contents of the soil at the two-foot depth. Without zero contamination samples, accuracy in predicting residual and leaching effects is seriously hampered.

To accomplish this the Zero Contamination Unit cuts a center core from the retrieved sample. This guarantees an uncontaminated sample.

Model No.	Models	Depth: 12 inch (30.5 cm)	24 inch (61 cm)	36 inch (91 cm)	48 inch (122 cm)	72 inch (183 cm)	50' (15 m)	Speedy	Researcher's [redacted]
1200	ATV	✓						✓	
2400	Pickup		✓					✓	
2401	Pickup		✓						✓
3600	Pickup			✓				✓	
4800	Pickup				✓			✓	
4801	Pickup				✓				
4802	Pickup				✓				✓
2403	3-Point Hitch		✓					✓	
3603	3-Point Hitch			✓				✓	
4803	3-Point Hitch				✓			✓	
4804	3-Point Hitch				✓				✓
5000	Zero Contamination Unit				✓				✓
7203	3-Point Hitch					✓			✓
9200	Pickup						✓	✓	✓
9201	Trailer Type						✓	✓	✓
600	Hand	✓							

Contact Concord, Inc. for all your soil sampling needs.
✓ Hydraulic Power Samplers ✓ Hand-Held Samplers
✓ Power Hand-Held Samplers ✓ Acetate Sleeves

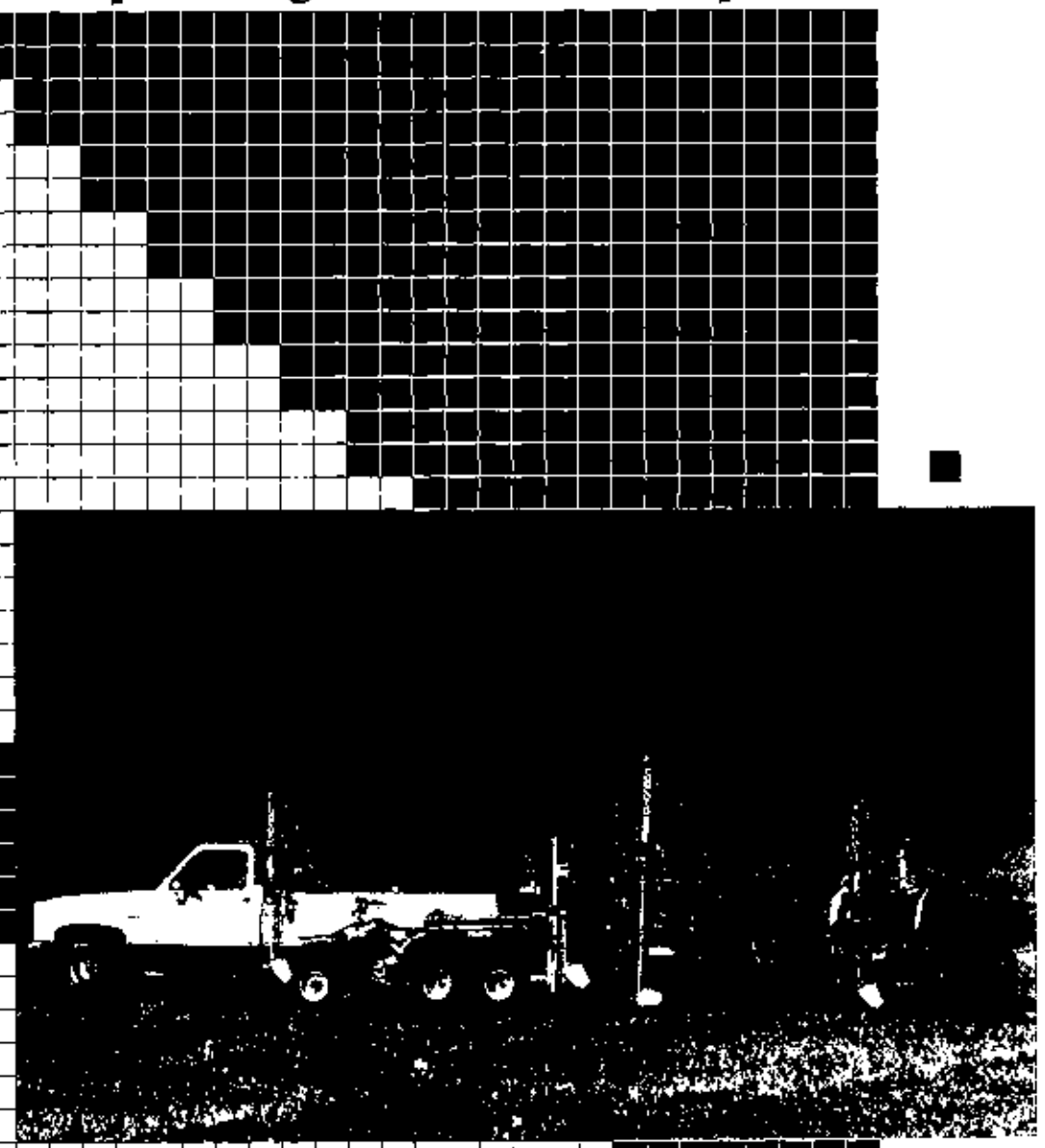


PRODUCT ANNOUNCEMENT
Announcing model 9200 (pickup) and 9201 (trailer), totally self-contained heavy-duty soil samplers.

Printed in U.S.A.

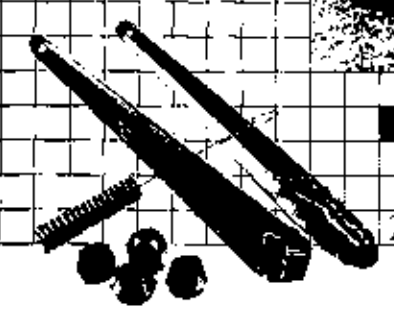
concord®

Speedy Soil Sampler



"The World's Most Affordable Soil Sampler"

1



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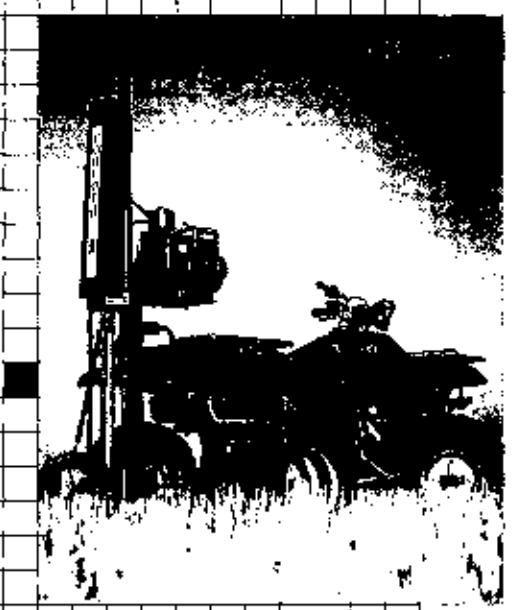


5

Researcher's Special with Swing-Away Probe.

1. *The Concord Researcher's Special model features a Swing-Away Probe that accommodates an acetate sleeve to reduce carryover contaminants between samples.*
2. *Fifteen different probes with replaceable tips are available to ensure you'll have the right probe to match your soil condition.*
3. *The Concord Speedy Soil Sampler three-point hitch model easily mounts to your tractor.*
4. *The pickup-mounted version of the Concord Speedy Soil Sampler is available in models that sample up to 24 in. (60 cm) depths and 48 in. (120 cm) depths.*
5. *Concord's All Terrain Vehicle (ATV) allows you to take samples in hard to reach areas or in areas too soft to support a larger vehicle.*
6. *Expandable rubber stake hole mounts make mounting quick and easy without damage to the pickup box.*

The Speedy Soil Sampler takes soil samples quickly, economically, and precisely. It is the most automated soil sampler on the market today and takes only 12 seconds to retrieve a 24-in. (60 cm) soil sample. Fertilizer dealers, ag/soil consultants, farmers, soil testing laboratories, researchers, foresters, environmental government agencies, waste and waste water treatment plants, and chemical companies have all found the Speedy an efficient way to retrieve samples.

On pickup units, a 12-volt electric motor powers a hydraulic power pack which supplies the working force to the probe tip. Models can be mounted to pickups, all terrain vehicles (ATV's), and three-point hitches on tractors. The ATV model samples to a depth of 12 in. (30 cm). The pickup-mounted and three-point hitch versions are available in models that sample up to 24-in. (60 cm) depths and 48-in. (120 cm) depths. Models can be ordered with or without the Speedy items and probes. There are 15 probe types available. For example, the model 2400 commonly used by the fertilizer industry, comes standard with two probes. A square-tipped probe is designed for use in wet, sticky clay. The other probe features five replaceable round tips for use in varying soil conditions.

How the sampler works

1. The operator drives to the sampling site and stops.
2. A hand-held control switch in the cab is activated until the probe reaches the desired depth.
3. The switch is then reversed to pull the probe and the sample out of the ground.
4. While the probe is moving up, a spring-loaded, curved finger automatically retrieves the soil core from the open side of the probe.
5. The curved, spring-loaded finger scrapes the core out and deposits it into a stainless steel collection container. Up to thirty 24-in. (60 cm) samples can be collected this way without leaving the pickup or tractor cab.
6. The container is picked up by the leading edge of the probe and lifted into its transport position.
7. When the collection bucket is full, the operator removes it by pulling the mounting pin, then empties the bucket into a container to take to the lab.

Features

To ensure the Speedy will last for years, stainless steel components are used and the probe tips, which take the abuse, are replaceable. Stainless steel also aids in the elimination of contamination. An optional self-lubricating system automatically applies a lubricant to the probe after each sample.

Pickup Model

The pickup model features a reliable three-point mounting system that mounts onto the pickup in minutes. Expanding rubber stake hole mounts eliminate the need to drill holes in the pickup box. Once mounted, the Speedy can be removed or remounted in just five minutes.

A hand-held remote control allows you to retrieve up to thirty 24-in. (60 cm) samples without leaving the cab of your tractor or pickup. Because it is so convenient to use, you're more apt to take the time you need to get a more representative number of samples.

Three-Point Hitch Model

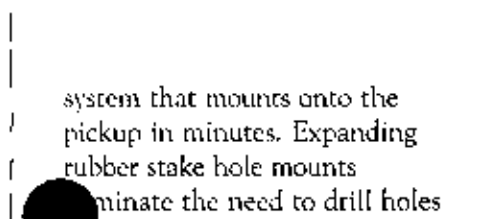
The three-point hitch model can be mounted to the three-point hitch of any size tractor allowing access into areas where a pickup truck may not be able to go. It is also ideal for use by researchers working in field plots.

All Terrain Vehicle Model (ATV)

An ATV model is available and can take samples up to 12-in. (30 cm) deep. This model is designed for taking samples where only a lightweight vehicle can go.

Researcher's Special

The researcher's special offers the same quickness, precision, and efficiency found in the other models, yet it is priced substantially below competitive units from other companies. It features probes that accommodate acetate sleeves which preserve the sample and reduce carryover contaminants between samples. The **Swing-Away Probe** allows you to remove the acetate sleeve without having to remove the probe (see photo #1). Probes and the acetate cores that fit the probe are available in widths of 1 in. (2.54 cm), 1¼ in (3.17 cm), 1½ in. (3.81 cm) or 2 in. (5.08 cm) and lengths up to 48 in. (120 cm), but any length can be custom designed.



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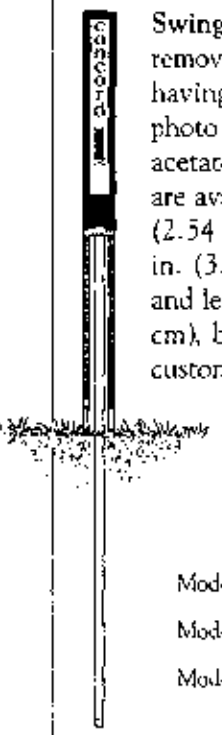

The Concord Speedy Soil Sampler is available in 16 different models, one sure to fit your sampling needs.

Model 600	0-6 in. (0-15 cm)
Model RT 1200	0-12 in. (0-30 cm)
Model RT 2400 RT 2401 RT 2403	0-24 in. (0-60 cm)
Model RT 3600 RT 3603	0-36 in. (0-91 cm)
Model RT 4800 RT 4801 RT 4802 RT 4803 RT 4804	0-48 in. (0-120 cm)
Model RT 5000	0-48 in. (0-120 cm)
Model RT 7203	0-72 in. (0-183 cm)
Model RT 9200 RT 9201	0-50 ft. (0-15 m) 0-50 ft. (0-15 m)

SPEEDY SOIL SAMPLING MACHINES

Model	Mount	Sample to	Description	Price
600	Hand-Held	0-6"	12-Volt Power	$ 425.00
1200	ATV	0-12"	Speedy Items & Probes	1895.00
2400	Pickup	0-24"	Speedy Items & Probes	1995.00
2400LD	Pickup Laydown	0-24"	Speedy Items & Probes	2195.00
2403	3-Point Hitch	0-24'	Speedy Items & Probes	950.00
3600	Pickup	0-36"	Speedy Items & Probes	2450.00
3603	3-Point Hitch	0-36"	Speedy Items & Probes	1300.00
4800	Pickup	0-48"	Speedy Items & Probes	2995.00
4803	3-Point Hitch	0-48'	Speedy Items & Probes	1425.00

Note: All of the above units include Concord's auto collection system and are shipped complete with two probes and five cutting tips. (600=1 Auger)

Optional Equipment

Description		Price
1" x 24" x 6"	Dual Probe	$325.00
1" x 48" x 6"	Dual Probe	375.00
1" x 24"	Self-Lube Probe	215.00
1" x 48"	Self-Lube Probe	265.00
1"	Brush	3.00
13/16"	Auger Bit	34.00

RESEARCH SOIL SAMPLERS AND AUGERING MACHINES

Model	Mount	Sample to	Description	Price
2401	Pickup	0-24"	Researcher's Special	$ 1700.00
2401LD	Pickup Laydown	0-48'	Researcher's Special	1800.00
4801	Pickup	0-48"	Researcher's Special	2700.00
4802	Pickup Laydown	0-48'	Researcher's Special	2775.00
4804	3-Point Hitch	0-48'	Researcher's Special	1700.00
7203	3-Point Hitch	0-72'	Researcher's Special	1950.00
9200	Pickup	75 feet*	Soil Sampling & Augering Machine	20,000.00
9201	Trailer	75 feet*	Soil Sampling & Augering Machine	21,000.00

*Will vary with soil conditions

Note: Must order probes, augers, tips, and other tools in sizes as desired for your job. Concord will cut probes to any length needed.

Researcher's Optional Equipment

Description	Price
3-Stage Probe for casing the hole 2.25" I.D.	$250.00
3-Stage Probe for casing the hole 4.50" I.D.	365.00
18" Side Swing attachment for 4804	200.00
30" Side Swing attachment for 4804	275.00
Parking Stand for 4803, 4804, and 7203	235.00

Stainless Steel Brushes for Researcher's Probes

Probe Size	Price
1.00"	$10.00
1.25"	12.00
1.50"	15.00
2.00"	17.00
2.25"	19.00
45.00" Handle for above	10.00

9200/9201 SOIL SAMPLING AND AUGERING MACHINE OPTIONAL EQUIPMENT

Description	Price
Kelly Bars — 10'	$95.00
Kelly Bars — 4'	60.00
Hyd. Earth Anchors	345.00
Cathead Assembly	812.00
Hammer Assembly — 140 lbs.	615.00

Augers, Continuous

Description		Price
2.5" x 3'	13/16 Hex	$135.00
2.5" x 5'	13/16 Hex	138.00
3.0" x 3'	13/16 Hex	137.00
3.0" x 5'	13/16 Hex	146.00
3.5" x 3'	1-1/8 Hex	136.00
3.5" x 5'	1-1/8 Hex	140.00
5.0" x 3'	1-1/8 Hex	151.00
4.5" x 5'	1-1/8 Hex	156.00
U Pin	13/16	4.00
U Pin	1-1/8	4.25
2.5" Mining Bit	13/16	40.00
3.0" Mining Bit	13/16	47.00
3.5" Mining Bit	1-1/8	105.00
2.5" Fishtail Bit	13/16	43.00
3.0" Fishtail Bit	13/16	49.00
3.5" Fishtail Bit	1-1/8	68.00
Auger Retriever		115.00
Auger Guide		56.00
Auger Ext. Bar		63.00
Auger Holder		45.00

Split Spoon Sampler

Description	Price
2.0" x 24"	$176.00
2.0" Tips Wet or Dry	27.00
Retainer Basket	1.20

Hollow Stem Auger

Description	Price
2.25" I.D. x 4-3/8" O.D. x 5.0' lead sec.	$750.00
2-1/4" x 5' Auger Section	262.00
5.0' Drill Rod	100.00
Cutter Head	195.00
Pilot Bit	30.00

Note: In all categories, there are may other sizes available upon request.

Stainless Steel Probe

Description	Price
1.50" x 48" Probe	$230.00
1.50" Wet & Dry Tip	40.00
2.0" x 48" Probe	250.00
2.0" Wet & Dry Tip	50.00

Note: See Research Optional Equipment for more probes, tips and sleeves.

CONCORD PROBES AND TIPS

1"	Speedy price	Research S.A.W. price	9200/9201 price
1" x 12" Probe		$110.00	
1" x 18" Probe		145.00	
1" x 24" Probe		165.00	$165.00
1" x 24" Round Tip Probe	$91.00		
1" x 24" Square Tip Probe	95.00		
1" x 36" Probe		175.00	
1" x 36" Round Tip Probe		105.00	
1" x 36" Square Tip Probe		100.00	
1" x 1' Meter Probe		165.00	
1" x 48" Probe		185.00	
1" x 48" Round Tip Probe	135.00		
1" x 48" Square Tip Probe	125.00		

*1" Tips for above

Description	Price
#1 - #2 - #3 - #4 - #5 (#1 = wet, #5 = dry)	$13.00

1.25"	Speedy price	Research S.A.W. price	9200/9201 price
1.25" x 18" Probe		$140.00	
1.25" x 24" Probe		160.00	
1.25" x 36" Probe		180.00	
1.25" x 1' Meter Probe		285.00	$185.00
1.25" x 48" Probe		200.00	200.00

*1.25" Tips for above

Description	Price
#1 - #2 - #3 - #4 - #5	$35.00
#1 - #5 Heavy Duty	40.00

1.50"	Speedy price	Research S.A.W. price	9200/9201 price
1.50" x 12" Probe		$200.00	
1.50" x 24" Probe		205.00	
1.50" x 36" Probe		210.00	$210.00
1.50" x 1" Meter Probe		220.00	220.00
1.50" x 48" Probe		235.00	235.00
1.50" x 48" Heavy Duty Probe		245.00	245.00
1.50" x 72" Probe		265.00	265.00

*1.50" Tips for above

Description	Price
#1 - #2 - #3 - #4 - #5	$40.00
#1 - #5 Heavy Duty	50.00

2.00"	Speedy price	Research S.A.W. price	9200/9201 price
2.00" x 12" Probe		$200.00	
2.00" x 24" Probe		210.00	
2.00" x 36" Probe		220.00	$220.00
2.00" x 1" Meter		240.00	240.00
2.00" x 48" Probe		250.00	250.00
2.00" x 48" Heavy Duty Probe		265.00	265.00
2.00" x 48" G & C		250.00	250.00
2.00" x 48" B		250.00	250.00
2.00" x 72" Probe		285.00	285.00

*2.00" Tips for above

Description	Price
#1 - #2 - #3 - #4 - #5	$50.00
#1 - #5 Heavy Duty	60.00

CONCORD HAND PROBES

Model	Description	Probe or auger length	Price
C A	3' Auger and Probe Kit	12" 12'	$201.00
C B	3' Probe Kit	12"	77.00
C C	3' Auger Kit	12"	167.00
C G	1' Probe Kit	12"	43.00
C H	1-1/2' Probe Kit	18"	47.00
C J	2' Probe Kit	12"	58.00
EXTENSION RODS AND TIPS			
C OA-12	Extension Rod	24"	18.00
C S-1	Dry Tip		4.71
C S-2	Regular Tip		4.71
C S-3	Wet Tip		4.71
C S-4	Heavy Duty Tip		4.71
C #10	Tip Wrench		1.63
AUGERS			
C #6	1-1/4" Dia. Auger w/threaded end		124.00
C #6F	1-1/4" Carbide Tipped Auger w/threaded end		208.00
C #5	1" Diameter Auger		124.00
C #5F	1" Diameter Carbide Tipped Auger		208.00

HAND PROBES

Description	Price
Handle	$75.00
Hammer (sliding)	50.00
1.0"	
1" x 4' Hand Probe	70.00
1" x 6' Hand Probe	100.00
1" x 12" Hand Probe	110.00
1" x 18" Hand Probe	145.00
1.25"	
1.25" x 12" Hand Probe	130.00
1.25" x 18" Hand Probe	140.00
1.50"	
1.50" x 12" Hand Probe	220.00
1.50" x 18" Hand Probe	230.00
2.0"	
2.0" x 12" Hand Probe	240.00
2.0" x 18' Hand Probe	255.00

TIPS

Description		Price
1"	#1 - #2 - #3 - #4 - #5	$13.00
1.25"	#1 - #5	35.00
1.50"	#1 - #5	40.00
2.0"	#1 - #5	50.00

*Note: At least one tip per unit is needed. All of the above Hand Probes are compatible with acetate sleeves.

ACETATE LINERS AND CAPS

Probe	Nominal Size	Concord Part No.	48" Liner Price	Cap Part No.	Cap Price Each
Concord 1"	3/4"	1024144	$ .55	1026212 red 1024163 black	$.06 .06
Concord 1-1/4"	7/8"	1024145	.60	1026213 red 1024164 black	.08 .08
Geo 1.131" x 24"		1027728	.66	1026214 red 1024165 black	.10 .10
Concord 1-1/2"	1-3/8"	1024147	1.05	1024168 red 1024167 black	.15 .15
Concord 2"	1.810"	1024152	1.60	1021970 red 1021969 black	.20 .20
Concord 3 – Stage probe	2-1/4" x 48"	1024153	2.15	1026218 red 1024172 black	.25 .25
Concord 3 - Stage probe	2-1/4" x 8"	1026229	.50	1026215 red 1024172 black	.60 .60
Giddings	7/8"	1024145	.60	1026213 red 1024164 black	.08 .08
Giddings & Geo	1.750"	1024151	1.55	1026216 red 1024169 black	.20 .20
Giddings	2-3/8"	1024153	2.15	1026218 red 1024172 black	.25 .25

*For prices on other size liners for other probes, contact Concord or Concord dealer.

AQUA PROBES

Description	Price
Handle	$75.00
Hammer (sliding)	50.00
35" Extension Pipe (order as needed)	10.00
1.0"	
1" x 4" Aqua Probe	70.00
1" x 6" Aqua Probe	100.00
1" x 12" Aqua Probe	110.00
1" x 18" Aqua Probe	145.00
1.25"	
1.25" x 12" Aqua Probe	130.00
1.25" x 18" Aqua Probe	140.00
1.50"	
1.50" x 12" Aqua Probe	220.00
1.50" x 18" Aqua Probe	230.00
2.0"	
2.0" x 12" Aqua Probe	240.00
2.0" x 18" Aqua Probe	255.00

TIPS

Description		Price
1"	#1 - #2 - #3 - #4 - #5	$13.00
1.25"	#1 - #5	35.00
1.50"	#1 - #5	40.00
2.0"	#1 - #5	50.00

Note: At least one tip per unit is needed.

For more information call or write:

concord

2800 7th Ave. N.
Fargo, ND 58102
701-280-1260 Fax 701-280-0706

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Specialty Products
Virg Mahlum

Sales Representative
Curt Elke

Reception
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Gary Zeeb

Service
Jack Oberlander

Engineering
Mike Smette

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concord®

"WE'RE HERE TO SERVE"

Accessories and Tools

PRICE LIST

SOIL SAMPLING MACHINES
AUGERING MACHINES

Prices effective January 1, 1994

Who to contact at Concord for your Soil Sampling needs:

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Gary Zeeb - Parts
Jack Oberlander - Service
Pat Oksendahl - Traffic Coordinator
Kathy Lindgren - Receptionist

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Keystone Heights, FL 32656
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Hanhnbach Germany
49-9664 1400
49 9664 590 (fax)

Rancan
FERTILIZER SYSTEMS INC

June 16, 1992

Mr. Virgil Mahlum
Concord Inc.
2800 Seventh Ave. North
Fargo, ND 58102

Dear Virg,

on behalf of myself and all of the staff here at Rancan Fertilizer. I would vary much like to take this opportunity to thank you and all of your staff at Concord for the successful business relationship that we have all shared together. I have certainly enjoyed working closely with you over the last 4 years that we have been importing and distributing your soil samplers across Canada.

I am also especially grateful for your personal efforts that clearly have helped us greatly expand our customer base in the soil sampling market. To date we have sold in excess of 35 units to a wide range of independent and major brand fertilizer dealers. All indications point to significant expansion in the number of units sold and tha range of dealers.

On this latter point, I would like to thank you for the opportunity that your efforts have afforded us to become actively involved in meeting the soil sampling requirements of Canadian researchers and chemical companies. As we begin our second year as a distributor to these groups, we anticipate a greater number of orders from this particular market, an increase that can be directly attributable to your efforts.

Once again, thank you all very much. We look forward to a continuing successful business relationship with you and Concord well into the future.

Sincerely,

GARY TYHY
President

TSM
TSM SERVICES Inc.
1045 Commerce
P.O. Box 888
Cass R. 81657
TEL (217) 627-2944
FAX (217) 627-2944

November 21, 1990

CONCORD, Inc
2800 7th Ave North
Fargo, ND 58102

Attn: Virgil Mahlum

I just wanted to drop you a line to say that I am completely satisfied with the CONCORD Soil Samplers.

As you know, we work in 8 states with our soil fertility program and have promoted your samplers over this area. Many new dealers will or&r one or two soil samplers at the same time they sign our contract. An example of this is Krob & Co.

I have also taken on the sales method of "complete satisfaction or they don't have to buy. I will give a sampler to any of our dealers on the idea that they try it for 30 days. If they are n satisfied. I will pick it up. I have not been asked to pick up any sampler that has been on this 30 day trial.

Just keep up the good work and especially keep up the quick service you have given on *getting these units out.*

Thanks again,

Sincerely,

Kent E. Durbin, Pres.

S & G SOIL SERVICES

Tythe Farm
School Lane
COLMWORTH
Bedfordshire
MK44 2JZ
Tel: 0234 376375
Fax 0234 376599

Concord Inc
2800 7th Aven North
Fargo. ND 58102
USA

Dear Virgil

We hare now been dealing with CONCORD since 1989. Having very different soil conditions to the U.S.A. this initially required some Research and Development. With the backup of CONCORD staff we have successful17 developed probes suitable for European use.

At all times we have found the service at Concord especially prompt and friendly and have in fact found it just as easy to deal with Fargo as say London. distance has been no abject.

We wish CONCORD continued success and keep up the exceptionally good work.

Yours sincerely

I G Seabrook

DU PONT

E. I. DU PONT DE NEMOURS & COMPANY

WILMINGTON, DELAWARE

June 14, 1988

Mr. Virgil Mahlum
CONCORD, Inc.
2800 Seventh Ave. North
Fargo, ND 58102

Dear Mr. Mahlum,

I wish to express to you, your office staff and shop staff, DuPont's thanks for working with us in solving our problems in soil sampling. Everyone that I interacted with at Concord was very cooperative and responsive to our needs. You were able to respond on short notice and fabricate specialized equipment that worked!

As you know, we had several soil studies that were very important to our business that had to be done. We experienced difficulty getting adequate samples under some soil conditions. After consulting with you and your Engineer we were able to come up with a workable solution. This meant that the Concord staff had to operate in the mode of "drop what you are doing and get to work on this" to make the new equipment. Concord took the approach that DuPont's problem was their problem and we worked together to solve it. I realize that this took extra effort on the part of several people to get this done.

It is a pleasure to do business with a company that is customer-oriented. Please express our appreciation to the whole staff at Concord, Inc. and we look forward to doing business with Concord, Inc. in the future.

Sincerely and with thanks,

Dr. Walter H. Elker, Jr.
Residue Programs Manager

cc: John Fennell

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American Agriculture Services Inc.

December 18, 1990

To Whom It May Concern:

American Ag Services has enjoyed the opportunity to work with Concord, Inc. for the past three years. We conduct as well as manage extensive pesticide soil dissipation studies requiring soil sampling up to a depth of four feet.

Based on our needs ranging from small hand samplers to three-point-hitch mounted hydraulics, we surveyed available equipment and selected Concord for exclusive use on our research station. We are obviously very pleased with the quality and functionality of the equipment, including samplers as well as tubes and caps. As the industry gains experience with this type of sampling, we and other users run into special needs. Concord has always been creative and very responsive to these needs. We have been very pleased with the level of service for both equipment and supplies.

American Ag has previously recommended Concord and its equipment to users and to those who we felt would be (and now are) good distributors. From our experience, we remain confident in the above endorsement.

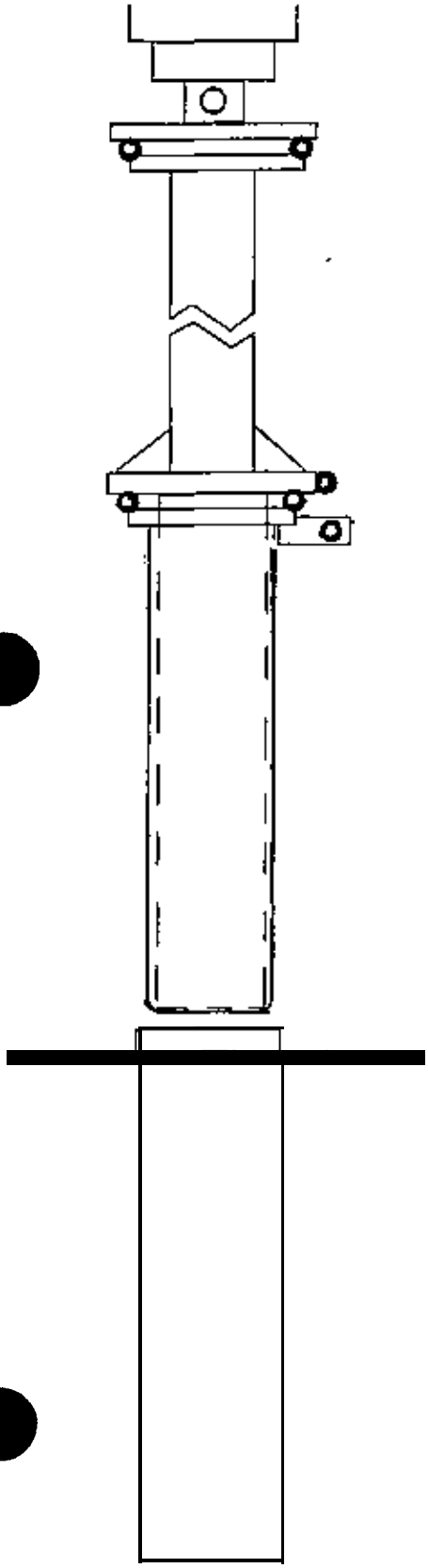
Ronald P. Thompson, Ph.D.
Vice President

concord™

SOIL SAMPLERS

THREE STAGE PROBES, HAND PROBES & LYSIMETER EQUIPMENT

When research projects demand unique equipment, Concord delivers . . . with a variety of specialized tools for standing wafer sampling, zero contamination soil sampling and hand probing. All Concord equipment has been developed and improved with input from researchers around the world, resulting in tools that perform specialized tasks under the toughest, most diverse soil and field conditions. For unique requirements, Concord engineers have proven their ability to work with research engineers and scientists in developing custom equipment that meets specific objectives.



THREE STAGE PROBE (left) When sampling protocols require a 0-6 inch sample, then 6-48 inch cores, simply attach this probe unit to your Concord power sampler and case the hole while retrieving a 6 sample, at the same time removing the Potential for contamination from surrounding soils.

THREE STAGE PROBE **COMPONENTS**

Outside tube	2.75" x 6
Inside tube OD	2.50" x 7
Inside tube ID	2.40"
Sleeve	2.36

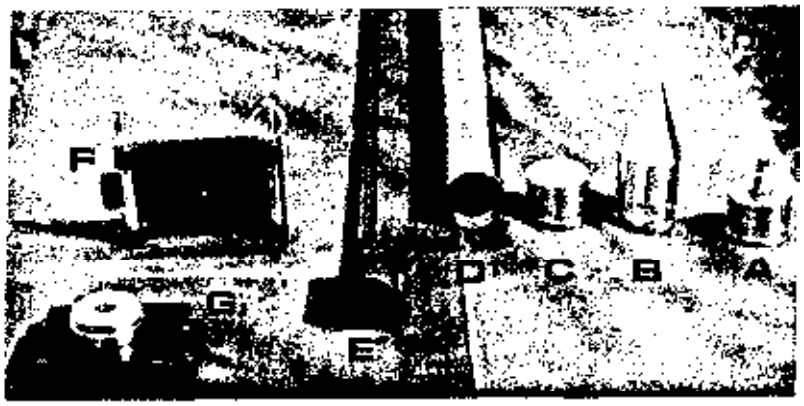
ACETATE SLEEVES

Probe Size	Nominal Size
Concord 1"	314
Concord I-114	7/8
Concord 1-1/2	1-3/8
Concord 2	1.810
Concord 3 Stage Probe	2-1/4" x 8
Giddings	1.750"

For prices on these and 17 other liners for other probes, contact Concord or your Concord dealer.

HAND PROBES (above) - Manufactured in standard lengths of 12"; diameters of 1.25",1.5" or 2". Can be ordered in any length.

LYSIMETER EQUIPMENT (below) - For sampling ground water solution at predetermined depths from 2 to 6 feet. The system works well when combined with standard soil dissipation trials and can help determine the movement of pesticides and other agricultural products.



LYSIMETER COMPONENTS (above) - A. Pressurization & vacuum cap, B. Ground water infiltration tip, C. Ventilation cap, D. Lysimeter tube, E. Infiltration restrictor, F. Concord top plate for swing-away probe, G. Lysimeter tube adapter plate. (Infiltration tip hold 75 millimeters of soil solution; 2" tubes come in 1',2',4' or custom lengths.)

concord™

SOIL SAMPLERS

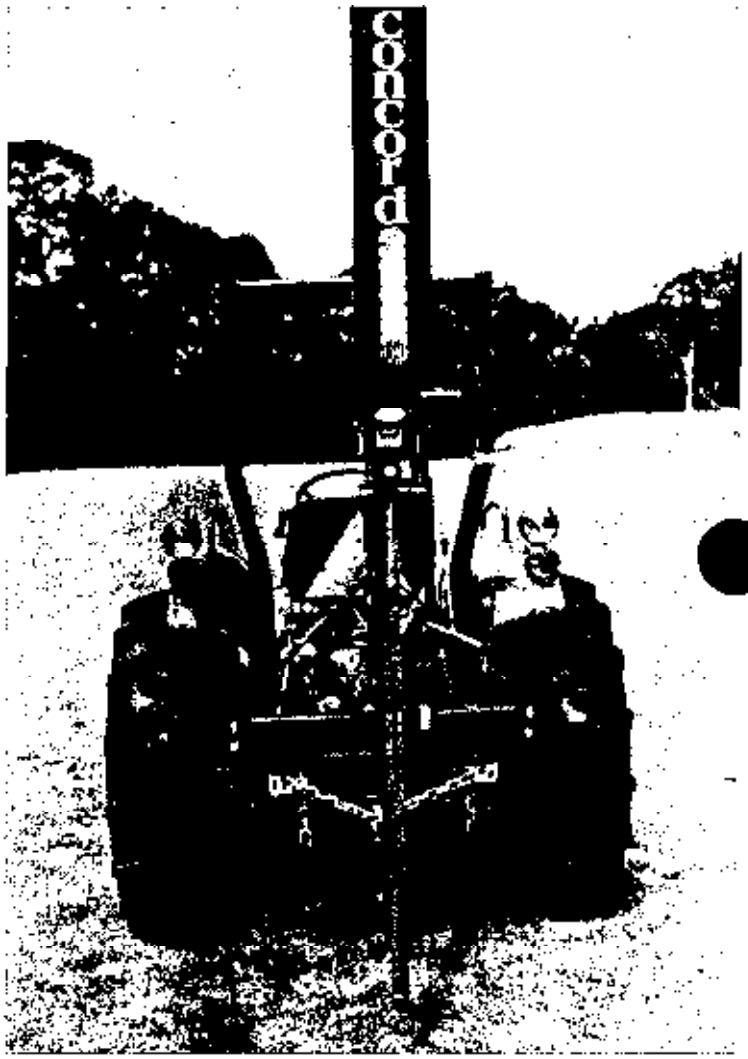
GENERAL INFORMATION

With years of experience, Concord, Inc. of Fargo, ND has developed and modified soil samplers that have earned a reputation of delivering the maxim benefits to research organizations for the most affordable price. Concord's Speedy Soil Samplers are available in a variety of configurations for mount on full-sized tractors, utility tractors, A TVs, pickup trucks and other vehicles. Speedy Samplers are capable of retrieving a 24-inch sample in on/y 12 seconds. They are constructed of heavy duty components with many critical parts manufactured from stainless steel for long life and durability under extreme conditions while he/ping prevent contamination. Depending on the model, Concord soil samplers can probe as deep as 72", using a variety of tip sizes. Many research customers use fhe "Research Special" with Concord's exclusive swing-away probe and acetate sleeves for zero contamination sampling. All Concord soil samplers are fully warranted and fhe company prides itself on fast response time to special requests. Concord service has earned the loyalty of research firms a// over North America and Concord has become the largest distributor of acetate sleeves in fhe world.

OPTIONAL EQUIPMENT

Description:
1" x 24" Probe, Round-Tip
1" x 24" Probe, Square-Tip
1" x 24" x 6" Dual Probe
1" x 48" Square-Tip
1" x 48" Round-Tip
1" x 48" x 12" Dual Probe
2" x 48" Square Probe
1" x 24" Self-Lube Probe
1" x 48" Self-Lube Probe
1" x 48" Round, Swing-A-Way Probe
1.25" x 48" Round, Swing-A-Way Probe
1.5" x 48" Round, Swing-A-Way Probe (sand. or std.)
2" x 48" Round, Swing-A-Way Probe (sand. or std.)
1" Tips #1,#2, #3, #4, #5
1.25" Tips #1,#3, #5
1.5" Tips #1 , #5, #7 (sand. or std.)
2" Tips #1,#5, #7 (sand. or std.)
Hand-Held Swing-A-Way Probe
1" x 18" Light Duty
1.25", 1.50", 2" (12" or 18" length) Heavy Duty
3-Stage Probe for casing the hole, 2.25 or 4.5" I.D.
Side Swing Attachment for 4804
18" (standard) or 36" (optional)
Parking Stand for 4804

Note: Probe prices do not include tips.

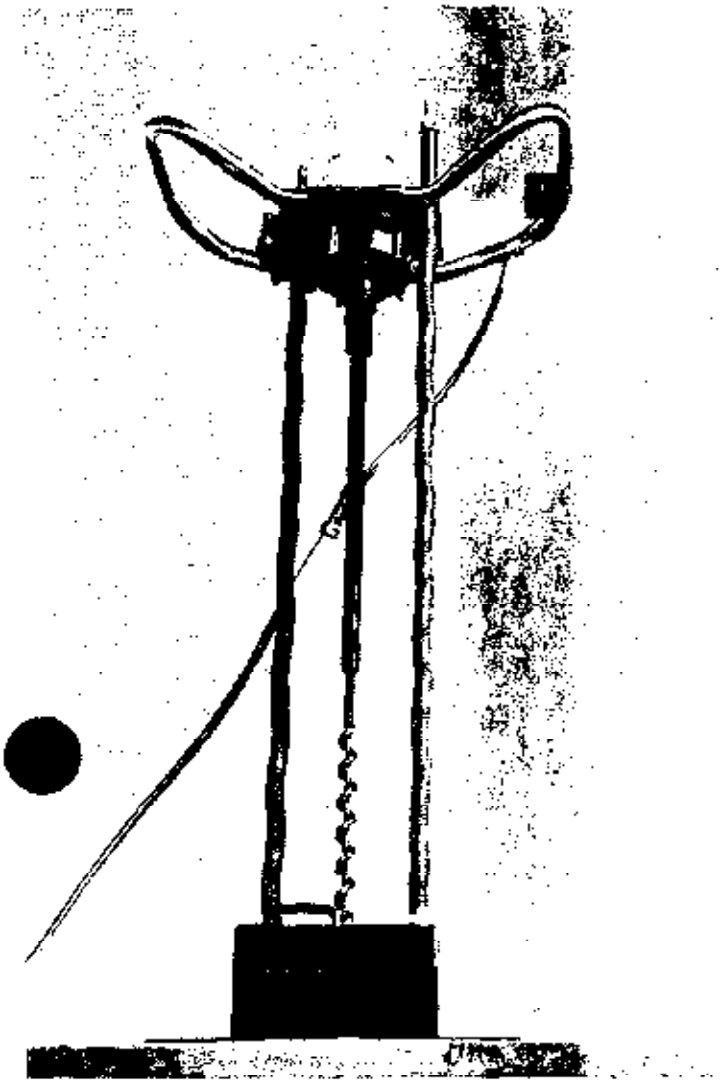


MODEL 4804

The Model *4804 Research* Special is a tractor-mounted soil sampler that uses the tractor's Me-point hitch for fast, powerful and accurate probes down to 48" (120 cm.). Constructed of the same high-quality materials as Concords other soil samplers, the 4300 Series accepts the full range of 15 different probes offered by the company with a variety of probe tips to accommodate any soil condition. Other equipment designed and priced for researchers includes the pickup-mounted 4302 and 2401 soil samplers as well as the Model 5000 Zero Contamination Unit. The exclusive swing-awa probe permits the operator to change sleeves in just seconds without removing the probe from the hydraulic ram. Using the tractors hydraulics to power the ram, the Research Special can be mounted on any Category 1, 2 or 3 three-point hitch tractor. When equipped with a side swing attachment, the unit allows an operator to retrieve several cores without moving the tractor forward.

CONCORD MODEL 600

12 VOLT HAND HELD POWER SOIL SAMPLER

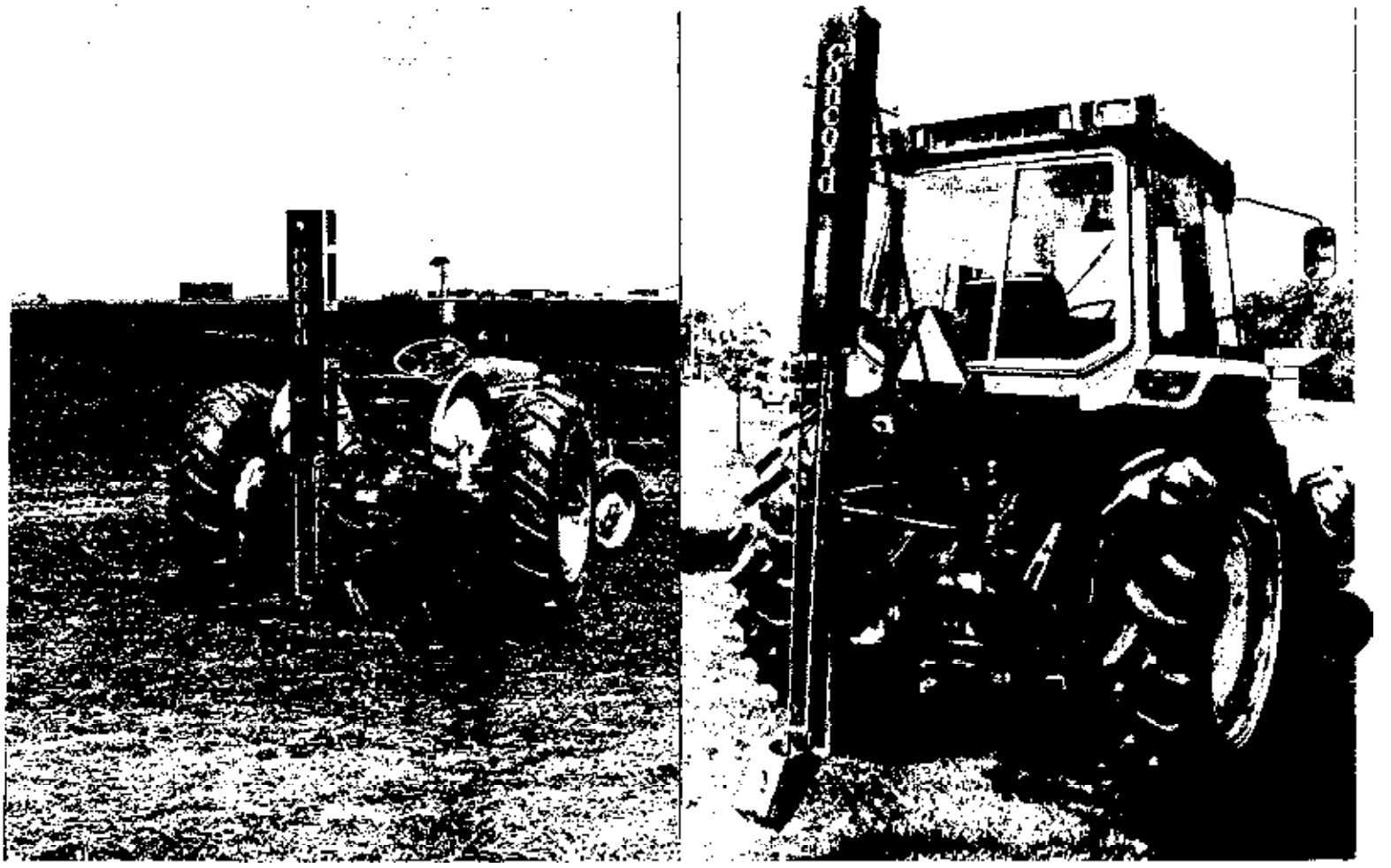


MODEL 600

* Light weight, only 30 pounds
* Sample in frozen ground down to 12 inches
* Sample anywhere, oniy 12 volt power required
* Spring loaded for fast return
* Stainless steel components to eliminate the worry of sample contamination
* Low cost,

concord

SPEEDY SOIL SAMPLERS



Low Cost — Fast — Accurate

Model 2403 0-24" Model 4803 0-48"

Multiple Samples for Composite Sampling or Single Samples for profile analysis

Universal 3 point mount for CAT. I or II

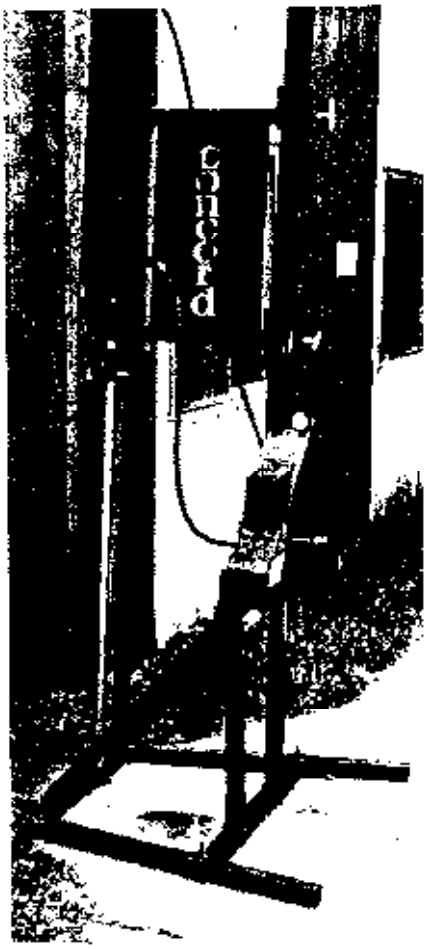
- YOU can now choose from 11 models priced from **$950.00**
- Call us for all your soil sampling needs. Hand Probes, Power Samplers, Swing-Away Probes, Acetate Sleeves, Caps, Aqua Probes

280

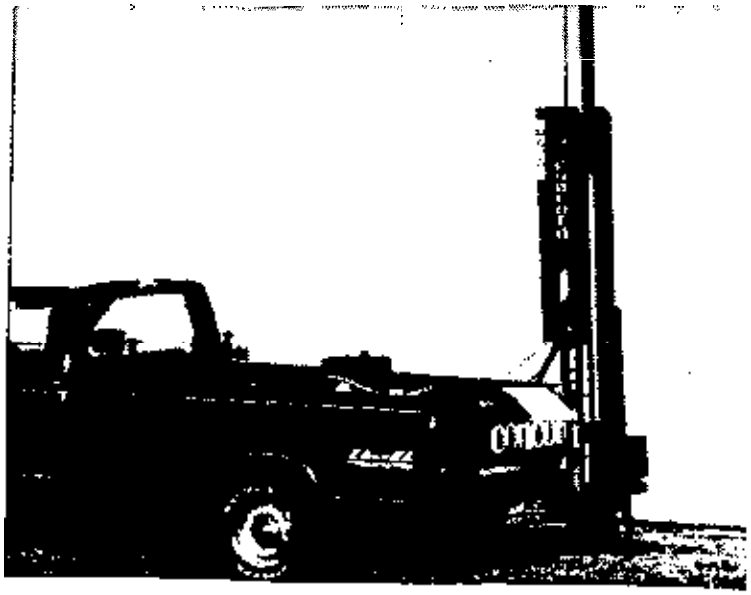
PRODUCT ANNOUNCEMENT

Concord announces several new items for 2993.

A 3 stage probe for casing the hole, 4-1/2" ID.



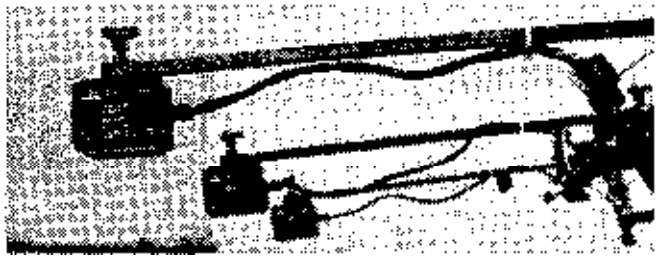
4803 and 4804 Parking Stand. It is now very simple to store your soil sampler when it is not being used. Simply back up to the Concord Parking Stand, lower the 3-point hitch, pull the pins and drive away.

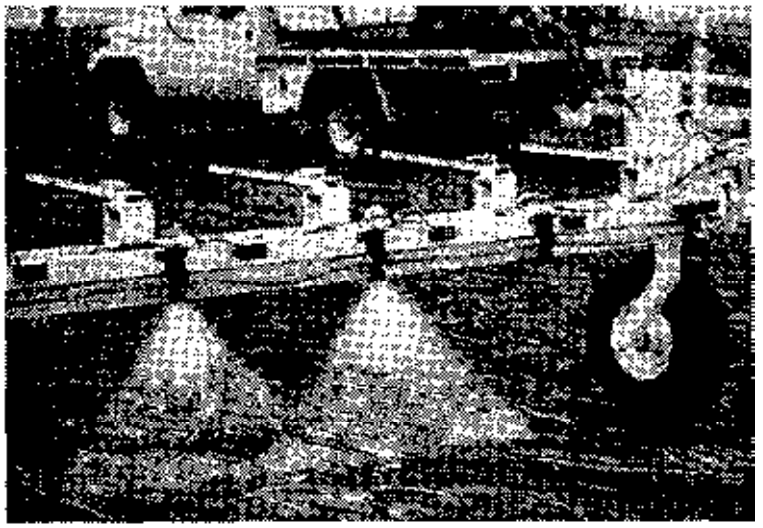


Model 9200 Series offers the latest design in heavy duty sampling. The 9200 is a pickup model and its partner, the 9201 is a self-contained trailer model. Both units are capable of auguring, probing or handling a continuous probe.

36-inch side swing attachment for those protocols requiring that you sample on both sides of the row. This attachment allows you to swing the soil sampler from side-to-side and sample on both sides of a 36-inch row.

concord™ detectspray™ — zoning in on SELECTIVE PLANT CONTROL





The detectspray™ system** mounts on any **boom-**type spray rig up to **120' wide.** It **selectively** applies chemical only where plants exist in the **field. **detectspray ™ actually SEES green.**

Plant Sensors (TOP) Triggers spray nozzle when "seeing" green.
***Master Controller** (ABOVE)Communicates operating mode and sensitivity level to plant sensors.*
***Spray Nozzle Assembly (RIGHT)** Delivers precise quantity of spray on command.*

- Reduced volume of spray lowers your herbicide costs.
- Fewer stops to refill; spray at speeds up to 15 mph.
- Perfect for conservation tillage and zero till agriculture,
- Better control of tolerant weeds with "spot" spraying.
- Less non-target spraying reduces environmental risks.

detectspray™... sensing the future

concord, Inc. • 2800 7th Ave. N.
Fargo, ND 58102 • 701-280-1260

concord™

NATIONAL COOPERATIVE SOIL SURVEY

State Soil Scientists National Workshop

Kansas City, Missouri
March 12-16,1990

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Proceedings
State Soil Scientist
National Workshop

Kansas City, Missouri
March 12-16, 1990

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KANSAS CITY, MO
MARCH 12-16, 1990

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SCS TECHNOLOGY: COUNTDOWN TO THE 21st CENTURY

The technological frontier for the 1990s is enormous and exciting:

Computer technology is having a tremendous impact on personal and professional lives.

. Faster computers and higher-resolution graphics offer a quantum leap in field office automation.

. Optical disk storage offers tremendous opportunities.

. Field office technical guide will likely evolve into "expert system," a working archive of our institutional memory. This will be very important as fewer and fewer new employees come from agricultural background.

Biotechnology...is a change in vision itself

. A whole new realm that lets us manipulate interaction of soil, water, plants, and people.

. Also a thicket of ethical questions...not to mention public safety.

. A two-edged sword that offers great possibilities for resource conservation.

I admire people who like new frontiers...and take initiative. I understand their impatience and willingness to take risks to do their job better...and to have fun at doing it.

As we count down to the 21st Century, we want to continue building an organization that quickly sorts out the best ideas...that uses timely, flexible planning to ensure a quality product and technical integrity.

The worse thing we can do is adopt the philosophy "If it ain't broke, don't fix it."

Willingness to change has to be the philosophy of this agency...top to bottom...if we expect to survive.

The CEO of General Dynamics refers to Foster's "S" Curve to explain why foresight and willingness to change are critical to managing innovation.

Basically, the "S" Curve theory shows the relationship between the effort to improve a product and the performance resulting from that effort:

Remarks by Robert R. Shaw, Deputy Chief for Technology, to the National Workshop for State Soil Scientists, Kansas City, Missouri, March 12, 1990.

First, there's the product-development stage, when there's not much to show for the effort.

Then, there's a stretch of time where this "state-of-the-art" technology we developed is in full use and performance and value accelerate. Here we see the most return on our investment in time and money.

Finally, the return begins to drop off. During this phase, we should be into product improvement and development...the first phase of the next "S" Curve.

The "S" Curve applies to government as well as to the private sector...government agencies like us, whose "profits" from innovation and management take the form of more and better public service...and who have to survive in the competitive world of federal appropriations.

We must stay on cutting edge to ensure customer satisfaction and to keep us an enticing workplace to attract the best and brightest in the workforce.

We continually must have the motivation to develop new technology...and discard the old.

Managing for change requires the cooperation of managers from top to bottom to --

. Encourage innovation...be flexible and open to new ideas.

. Involve staff and other partners in decisionmaking.

. Keep staff well informed...and feeling a part of the agency's mission and priority efforts.

TECHNOLOGY'S PRIORITIES FOR FY 1990:

. Conservation effects for decisionmaking

. Cultural resources

. Engineering directives system

. Erosion and sedimentation prediction technology

. Field office engineering software (FOES)

. Field office technical guide upgrade

. GIS data layer standards

. GRASS GIS development and implementation

- Ground water and surface water quality
- Low-input sustainable agriculture
- Marketing strategies
- NRI data collection technology
- NRI streamlining
- Remote sensing training and development
- SNOTEL implementation
- Soils data base
- Soils digitizing
- Soils mapping
- Soil survey report publication
- Soils updating
- Technical materials
- Wetlands initiatives, inventory technology

QUALITY MANAGEMENT is a key reason why we set priorities. Quality is job #1 at SCS.

Quality and efficiency require upfront planning and investment of time and money...and some frustration...before we and our customers reap the benefits.

Good planning and followup will make sure that we do the job right the first time...and, in the long run, keep the job as painless as possible.

Our goal in automation, for example, is to have everything integrated so that any piece of information we need is put in the system only once...and to make sure that changes are instantaneous so that everyone is working with the same data.

That means we have to design the vehicle from the tire tread to the antenna top. We didn't have the knowledge or take the time to do those things at the beginning. That's why we now have a strategic plan, ISP, etc. for common user interface, data administration, operating systems. We've been educated as to the need for standards.

We've learned the hard way that it's too easy to make a mistake. We've learned to ask ourselves, "If we don't have

the time to do it right the first time, how are we going to have time to do it over?

National development of software requires initiative and new ideas, but it also requires cooperation. Of course, the enduser has the responsibility for picking the tools that he or she uses. If national software doesn't fit, don't use it. But if it does fit, don't spend time inventing programs.

Let's remember the important reasons why we go through this process of national software development:

. All software has to relate to each other.

. Models have to work with databases.

. We should be looking to use a system common agency-wide, so that our employees get the same training and are working with a familiar system when they arrive at a new field assignment.

I'd like to highlight two technological priorities that will make a tremendous impact on SCS if we're sincere about quality through teamwork at all levels of the agency: Geographic information Systems (GIS), and the field office technical guide.

First, let's talk about GRASS/GIS:

Down the road, GIS's will become a major component of computer systems integration in SCS.

GRASS was selected as our nationally supported GIS software and it meets most SCS needs. No GIS software meets all your needs.

There are other important reasons why GRASS was chosen after extensive pilot testing:

. It runs on our AT&T computers under UNIX.

. It's relatively easy to learn and use, compared to other GISs.

It's very fast at the kinds of things we do: Supporting township, county, and regional resource analysis and making soil interpretation maps; supporting hydrologic unit planning.

GRASS meets our soil map digitizing specifications.

. It's compatible with other GIS software such as ARC/INFO.

. It's SCS software so there is no purchase cost.

. And technical assistance and training are provided by SCS at the National Cartographic Center.

Under development:

We are working on--

. A GRASS-CAMPS interface that will support some of your conservation planning needs.

. An interface to the soils databases through Prelude and Informix.

. Enhancements to the vector plotting package.

. And we have just started with interfaces to an SQL DBMS and such SCS models as WEPP and AgNPS.

Now I know that many of you have an incentive to pick up ARC/INFO because your state agency has it. Let me share with you just a few comparisons between SCS-GRASS and PC ARC/INFO:

. GRASS runs on the 382 and 6386 under UNIX. PC ARC/INFO does not, it's DOS.

. GRASS is compatible to ARC/INFO and other GISs.

. GRASS handles both vector and raster data. ARC/INFO only supports vector data. Translated, that means GRASS supports both point, line and area map data as well as digital imagery.

. GRASS performs analysis relatively fast. ARC/INFO does not. For example, a 7.5-minute quad's worth of soils data takes GRASS about 5-10 seconds to compute and display an interpretation. It takes PC ARC/INFO about 5-10 minutes.

We have gone to a lot of expense and effort at the national level to determine what will serve most needs. We have gone through all the steps of national software development. I fully support the use of GRASS and the move to the UNIX 6386 computing environment...and I expect you to help your staff understand the importance of this careful upfront investment in planning.

Keys to success of GRASS:

Four things will make GRASS GIS a success in this agency:

. Excellent user support.

. Continued software development and well designed interfaces with other important SCS software.

. Continued development of digital spatial databases.

. Your commitment to preparing a GIS plan and hiring state office GIS expertise.

Database development....

Databases are the key to the future in SCS. That's why SCS is developing a strategic plan...an interdisciplinary plan to decide how we're going to use data before we build more databases. That's also why the soils data bases deserve your full attention as they will provide the foundation for most field planning decisions.

Think back to the "S" Curve:

. It's that early, developmental stage we're in now for a lot of our software, and folks can't see all that's happening...all the progress being made behind the scenes. We can't afford to get impatient with the process, however.

. Nor can we afford to become complacent after the product is up and running and making everybody happy.

. We need to be on that "cutting edge" as leaders in technology development. We cannot wait until something s broken and then try to fix it...if we expect to maintain the confidence of our field staff and our clients.

MANAGING FOR SUCCESS is the way we're going to achive the finest possible service at the field office level.

Managing for success:

Quality through teamwork:

. Interdisciplinary teamwork

. (Compliment NHQ, and NTC and states leadership for accomplishments)

. Interagency teamwork...and teamwork with the private sector

. It will require stronger partnerships with NACD, districts, state agencies, professional societies, etc. and

. A continuing effort to reach consensus on technical standards, to build bridges of communication with our peers in and out of government.

We manage for success with upfront planning and design.

Proactive and creative recruiting efforts are essential to attract new talented employees to SCS.

We must make SCS a model workplace: fair play, exciting opportunity, and quality customer service.

Shared excitement. The excitement that goes with working with new and innovative technology. The excitement of working beside others that share our vision and dedication to be world class. To be the best in soil and water conservation.

SOIL SURVEY PRIORITIES: FOCAS ON THE 90'S

OPENING REMARKS
STATE SOIL SCIENTISTS NATIONAL WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12, 1990

We know that the soil survey is a collection of professionals - professional soil scientists who identify, classify, map and interpret soils as segments of landscapes. Soil survey is also a collection of professional supporting staff who also help to make our products become reality. (soil mapper)

Our most famous product has been the published soil survey report - and most of our activities have been designed and carried out to provide more of these products at less cost. (published reports)

More recently we have recognized that our numerous data bases require a lot of attention. It is now believed that our information handling and flow will be major products and services of the soil survey. (computer cartoon)

We do all of this because of our attitudes and belief in a conversation and natural resource ethic. We want to help - we want to contribute - we believe in what we do. (hand holding little plant)

And burned deep into our minds is the image of a harmonious, beautiful, sustainable world in which "humanized" landscapes are vital, dynamic components of the whole earth system. (contour strips in PA)

Just who do you think our customers are? You grew up on a farm or in a small rural community -- right? So farmers and ranchers are the preferred audience - the recipients of a conservation management plan based on the available soil resources. Good, Good. (farmer)

This lady is digging sweet potatoes in China. Is she a user of our soil information - or of our kind of special skills? Should she be a recipient? (lady digging)

Here's a group of soil scientists at an international workshop. Aren't they also our customers and consumers? (people at soil stop)

Culturally isolated and technologically deficient - are these hill tribe women in the Golden Triangle of Thailand to be shunned? Are poppy fields and heroin part of your dream

for the future? Barbed wire is a barrier to communication and understanding. We cannot afford these kinds of barbed wire. (women beside wire fence)

This couple could live in anyone of our states couldn't they? Typical, representative - good solid stock. However, these people live in the Soviet Union. Who are our users? (a couple)

Look into the 90's. It's not all that clear, but some peaks stand out - some priorities capture our attention. Map the remaining cropland to our high standards for detailed surveys. Map efficiently and effectively the remaining privately owned lands. Provide more technical services to more clients. These are important priorities today and they will remain so. (karst peaks in fog)

As you peer closer into the unknown you see many more concerns. A lot more than you really want to handle - but there they are. Data base development , data collection, information management systems, digitized soil maps and data sets, updates of maps, of map units, of out-of-date interpretations and somewhere in the haze are concerns, interests, desires, and demands of governments, of agencies, of special interest groups, of individuals, and of yourself. It will be a decade of uncertainty - of unstated risks - of unforseen events. (more karst peaks in fog)

We all know that the mission of the soil survey is to assist people in the wise use of soil resources so that a quality of life is possible far into the future -- even unto the ends of the earth. There are four things we do to help us achieve our mission. First is to maintain our scientific integrity and professionalism. Second is to train soil scientists to do the right things, the right way and at the right time. (title with tow items)

In addition we must bring together our expertise and make it available in forms, ways, and packages that are desired and acceptable to users. This will drive our program more and more. But, the real thrust must be our dedication to users. Who are your users? Who do you respont to? Why do you respond? Is it the right thing - the right time - the right way? Customer satisfaction -- it sounds so simple. (Title with 2 more items)

Technology in SCS, and technology in the world is all about change. How well we deliver technology that makes a difference is part of our everyday existence. Striving to be a little bit better, having a nicer product, providing a better quality service. (red and green leaves)

Flexibility - a key to success. Remember - there are many ways to get a job done. There is no such thing as the ONLY way: the rule book says so; the boss doesn't like it; it can't be done. Who are your customers? Do they control you? They should! (terraces in Philippines)

The globe is also changing. Whether the climate is warming or not - there is a fantastic opportunity to put your work ethic on the line, everyday. Don't just reach out and touch "America - reach out to your fellow man." (earth from space)

Changes, improvements, efficiencies, results - they most often come a little bit at a time - better and better, more and more, today and tomorrow, for me and for you, for you and for her, for her and for them. Constant, yet variable improvement of quality products and services. Achieving excellence is what we're all about. (multicolored leaves)

Who makes soil survey quality? All of us do - but mainly it's in your hands. Please manage it carefully - manage it honestly - with fund integrity and accountability. And always let people be the best they can be - at all levels. Help them! (cupped hands holding soil)

The reward is satisfaction - personal as well as corporate. Satisfaction. A beautiful life, a beautiful process, trust and care. That's our soil survey in the 1990's. (pink protea plant)

Thank you.

Richard W. Arnold, Director, Soil Survey Division, SCS, Washington, D.C.

TEAMWORK FOR NATIONAL COOPERATIVE SOIL SURVEY
by
C. BUDD FOUNTAIN

I appreciate the opportunity to be here today. My interest in the National Cooperative Soil Survey is strong for a couple of reasons. I mapped soils as a range conservationist early in my career. Many of you might feel that the low intensity mapping I did was more like "Windshield Surveys" than soil mapping, but doing some low intensity surveys gave me a strong appreciation for Soil Scientists and the National Cooperative Soil Survey.

Before anyone gets the idea that I did my low intensity surveys by strictly mapping vegetation, let me assure you I used my sharpshooter regularly. I got my hands stained; I used an acid bottle, and I used a color chart. All this really says is - I have an appreciation for what Soil Scientists do and the importance of their work to the success of SCS.

Another experience I had that renewed my interest in Soil Survey was serving on the Soils Productivity Improvement Task Force.

In this effort we looked at soil surveys from about every direction you can imagine and maybe some ways you still can't imagine. This was a good experience for me, and I hope our efforts have some impacts that will assure that a strong National Cooperative Soil Survey effort continues for a long time.

I would like to make a few comments about the PIP study, discuss a few things I see for Soil Survey after once over, and I will try to address my assigned topic of "Teamwork."

The Productivity Improvement Study for the NCSS had two major objectives - (1) To determine how effectively we were managing the program and, (2) To determine which activities were inherently governmental and which activities could be contracted out. As all of you know our study found the NCSS was well managed and effective. Our task force did make some recommendations we felt would help SCS to maintain that effectiveness in our current setting.

Our final conclusions indicated that Policy Development, NCSS Procedure Development, Quality Assurance, Quality Control and Project and NCSS management were the activities that are inherently governmental. All other aspects of Soil Survey could be done by someone else if necessary. That doesn't mean we advocate contracting out any or all of the not inherently governmental items.

Our major finding for productivity was the overlap of responsibilities. For example, correlation was being done by states and NTCs. Our conclusion was this should be done by states with adequate policy guidance from NHQ and quality assurance reviews by NTCs. The PIP study report recommended a change in organizational structures, which has been implemented.

Why did I want to talk to you about the PIP Study? I believe this study documents the outstanding job all of you have been doing for a long time. Your next speaker, Jim Talbot, was on our study team also. I'm sure Jim would agree we took an in-depth look and found only minor areas to address.

What do we do after the once-over soil survey is completed? While I was in South Dakota, I continually had Soil Scientists wanting to convert to Soil Conservationists. They were requesting this because the last project surveys were started and they felt they would have to relocate to some other state to keep their Soil Scientist job. There was so much concern for this that we were experiencing some difficulty in getting the last surveys completed. The fact is - that when we complete once-over surveys it should free up some time to do some things all of us would like to have been doing but didn't have time.

What are some of the things we need to concentrate on after once over mapping is completed?

1. Develop needs and priorities for updating older surveys: These updates can vary from complete remapping, classification and updated interpretations to just updating interpretation tables and table narratives. Any remapping plans should consider orthophotography - from which digitizing can be done.

2. This is an appropriate time for developing updated General Soil Map publications, as well as state MLRA Map updates and publications. The current STATSGO map work is an ideal vehicle to use to develop these updated publications. A well planned State General Soil Map publication can have a useful life of 30 or 40 years if it is done at this time.

3. Development of a digital GIS database of the soil survey is a must. Electronic manipulation of soil, land cover, or land use and other data is proving to be a real time saver with jobs such as Watershed Feasibility Studies, Water Quality Risk Assessments and many areas of Interpretations and Inventories.

4. Gather soil behavior information to fill data gaps and provide information where data is nonexistent.

   Examples:

   Soil temperature studies in addition to those needed for taxonomy. In some areas soils are being used as an energy source for heating and cooling in earth coil systems. In other areas, the soil is being used as a heat dissipator.

   Gather additional representative samples and data to fill gaps for UNIFIED and AASHTO engineering classification.

   Background nutrient levels are needed where soils are used for heavy applications of animal and poultry waste. Nutrient profiles

are needed from soils with a long-term history of animal waste application to determine future risks to water quality in the area.

The Range Study Team developing data for use of the Water Erosion Prediction Process (WEPP) find that we need more testing of the soil within the top one-inch.

5. Continue emphasis on the development of special "Soil Potential" interpretations that are needed in the state, such as potential for commercial vegetable production, etc.

6. Continue supplemental mapping where extensive ground disturbance has occurred, such as strip mining and landfills. These areas needed considerable study to properly classify soils and accurately interpret them for future projected uses.

This list could go on and on, but I think I have illustrated my point. There is plenty for Soil Scientists to do when once-over mapping is complete. My concern in this area is maintaining funding to do these things, and that leads me into my next point on "Teamwork."

Funding for various needs always comes more easily if everyone knows what is needed and why it is needed. This is not different for soil survey. Teamwork can involve more people in soil surveys and educate them to soil survey needs.

We need soil survey teamwork within SCS and outside. My background caused me to be interested enough as a Range Conservationist, District Conservationist and Area Conservationist to participate in progress field reviews and to occasionally accompany the Soil Scientists as they mapped specific sites. Many of our employees don't take the time to do this and never get quite as well informed on soils as they should. It is not your job to make every SCSer become involved in soil survey activities, but you should be assuring that the opportunity is there. Management should encourage all employees to be knowledgeable of soil in their work territory. If all of us work together, we can improve our ability as an agency to communicate soil information and better identify soils data needs.

How do we involve people outside SCS in soil survey activities? I have attended excellent soil survey work planning conferences in at least four states. These conferences are attended by University soils people, state agency personnel and other federal agencies.

I believe we have an opportunity to bring a wider variety of people to these work planning conferences. This could be an excellent educational opportunity. We can invite soil survey users to be on our programs to explain how they use the information and let us know any additional data needs. Many of these people use NCSS data daily but know very little about how it was put together. As they become more knowledgeable about soil survey procedures, they will have a deeper appreciation for NCSS. With deeper appreciation comes stronger support.

As we tackle jobs such as getting all soil surveys digitized, we will need considerable help. The more people we have acquainted with our needs and dependent on our NCSS products, the easier it will be to get the help we need.

Most of all - "Teamwork" will assure that we produce the best Soil Survey information possible.

SOILS DATA FOR ENGINEERING
NATIONAL WORKSHOP FOR STATE SOIL SCIENTISTS
KANSAS CITY, MISSOURI - MARCH 12, 1990
James R. Talbot
National Soil Engineer

General

I am very happy to be invited to meet with the State Soil Scientists of SCS and with those individuals of the National Soil Survey Center in Lincoln, Nebraska and of the Soils Division in Washington, with whom I often have the opportunity to meet and work.

I have had a long career of working with soil scientists in SCS and have enjoyed these opportunities and the working relationship that has developed. Perhaps there are some here who attended the course that Lou Langan and I took to many of the Western States about 15 to 20 years ago. We reviewed the information to be entered on the Form SCS SOILS 5 and how the interpretations were made, and the various classification systems. We discussed behavioral characteristics from an engineering standpoint to help in properly making and reviewing the engineering interpretations. I helped to put together the narrative used for the engineering sections of soil survey manuscripts, and helped to prepare the procedures for making soil potential ratings. I also served on the team for studying the Productivity Improvement Program (PIP) of soil survey that was completed about 3 years ago. Out of this study, the National Soil Survey Center was established.

I am thankful for these and other opportunities I have had to work with soil scientists in SCS. I have a great appreciation for your work and for the contribution you make to the great work of our agency. Surely, the most valuable resources to the agriculture community and to all those who eat and drink, is soil and water. Your assignment to inventory, map, and determine the data needed to protect and use these resources is of great importance.

Background

Early working relationships between SCS soil scientists and engineers evolved from the production of soil surveys and the publishing of soil survey manuscripts. The users of soil survey needed interpretations related to engineering uses of soils and the engineering section of the manuscripts was developed to fill this need. Over the years, the engineering section has evolved to what it is today. Engineering involvement started with reviews of interpretations, engineering properties tables and the narrative in the engineering section of soil survey manuscripts. At first some engineers had problems with the broad interpretations because they had been trained to think of site specific data and of making interpretations that provided soil property values as exact numbers to be used in a math model or analysis. Consequently, the

assistance to soil scientists from engineers has not always been as it should have been.

Hopefully, we have overcome the early barriers of engineering assistance to soil surveys. SCS Engineering policy now requires that engineers at the area and project offices be involved as needed to assist in making engineering interpretations and estimates of engineering properties for soil surveys. Engineers are to be trained to understand the broad mapping concepts used by soil scientists in the soil survey and the purpose of the interpretations made for soil surveys. Engineers at the State Office level are to help with the quality control work, reviewing and checking as needed and cooperating to make the soil survey the best product possible. If this is not happening, we in the Engineering Division would like to know about it.

In the past, the main use in SCS of the soil data and the various maps and interpretations of soil survey was in the conservation planning area. Outside organizations and individuals such as land use planners, developers and builders used soil surveys extensively, (perhaps even more than within our own organization). SCS engineers used soils data from surveys only for preliminary feasibility studies of structural or other engineering measures and to plan more intensive, site specific investigations.

In the last three or four years, there has been a rapid change to a new and more intensive need and use of soil survey data in SCS. This change has come about with the tremendous use of the computer to automate both the planning and application aspects of conservation work. Currently under development in this agency are many electronic processes, models or analysis programs that require soil data as a major input. With the advent of geographic information systems and ways to display and simultaneously consider geologic, geographic, topographic, climatic, and soil data along with land use needs, databases containing these items are necessary. If we consider the large volume of soil survey manuscripts and reports that have been published and those yet to be published, it certainly represents a tremendous amount of data. This is particularly true if we consider the volume of data represented by each map or areal photo in these reports to be in digital form along with the individual bits of information on the soils and its possible uses.

Soils Database Uses In Engineering Related Efforts

Many recent software development projects in SCS are centered around a very comprehensive soils database. SCS Soils Division Personnel have been progressive in establishing databases for soils data. The early establishment of soils databases and computer generated interpretations many years ago has put you ahead of the game or at least in an excellent position to now provide much of the information needed for this revolution of data needs.

You are all aware, I am sure, of the Computer Aided Management Planning System (CAMPS) which incorporates a very comprehensive soils database in it. As a part of this system there will be many additional software packages for conservation application work. Engineering is involved in several software model development projects including CREAMS and GLEAMS which deal with runoff, erosion and sediment yield for small plots or areas with particular attention to ground water and nutrient and pesticide transport. Additional models requiring soils databases are EGEM, HUSLE, RUSLE, and WEPP dealing with soil erosion prediction and the effects of various conservation practices to prevent erosion.

A very large software development effort presently underway in Engineering is FOES (Field Office Engineering Software). This includes a series of software packages that will also be tied into CAMPS and will serve to make detailed designs of engineering practices commonly designed at the field office for conservation application measures. These software packages will utilize the soils database incorporated into CAMPS. Dave Anderson and others are working with the various FOES teams on the soils data needed and on designing the interface with the soils databases. In some cases the soils database information will be supplemented with site specific information, but in all cases, the software is intended to use some information from the soils database.

Engineering personnel are heavily involved in the development of the Water Erosion Prediction Project (WEPP). I have had the opportunity to work on the team that is developing the operational computer program to interface between CAMPS and the research model. WEPP is requiring some very special soils data which is not normally in the soils database in a form that can be used by the research model. Ray Sinclair is working with the team especially to make sure the proper data is available or can be developed in the proper format to be usable in the complicated computer model.

Presently, soils staff people are working with the Environmental Engineers and Ground Water Geologists and others on water quality issues and the development of practices or procedures dealing with water quality protection. We need to continue working together and to address issues that deal with the interaction of the soil and pesticides or fertilizers. Other areas to be addressed include the leaching or the relationship of water movement and the rate at which chemicals move through the soil. Interpretative maps are needed to identify the vulnerability for ground water contamination. We also need to assess the effects of conservation practices on contaminant movement, or to find other soil related issues that deal with water quality.

Future Needs

In the past, I have heard comments about a lesser need for soil scientists "when the mapping all gets done". There will always be a need for soil scientists as a part of the conservation team in SCS. Besides the need for up dates and refinements, the greatest

need will be in the area of what I call "basic soil services". When I worked on the Soils PIP study team, we used that term. I am not sure that I have heard it much otherwise, but I will explain it as I understood it through our work on the PIP study.

Staff work for soil scientists will always be needed in our state and area offices and in many field offices. This work deals with providing the specialized input into the work of the agency at any time. It may involve making a more intensive survey on a particular farm or ranch where some specialized work is going on. It may also mean providing some special soils data for a geographic information system study of a given area. It also means being a member of the team that provides specialized counsel in determining the solution to some complex conservation problem or providing interpretation of some soils data or estimated soil properties.

Engineers need soil scientists to help in the design of on-farm systems to improve soil and water conservation. An example might be to provide more precise estimates of infiltration rate for the soils on a given farm than those shown in the soil survey report. The irrigation engineer may be designing an irrigation system for the farm and needs some fairly precise infiltration values. With some more intensive mapping work on the given farm, the range of values given for infiltration in the entire mapping unit may be improved upon to a point that the system can be designed without further expensive on-site testing. Soils consultation is needed in most engineering design situations such as drainage, irrigation, water quality practices, and others. In my opinion, most area offices need at least one soil scientist to do basic soil services work.

The future issues are going to be even more toward the protection of the environment and our soil and water resources. We must know all the aspects of how contaminants or chemicals move through the soil and the effects they have on the use of the soil. Surface water and ground water quality concerns must be addressed. The factors involved in soil erosion must be studied and data collected to help in predicting erosion and finding ways to prevent it.

Summary

The most beneficial thing I have learned in my experience with SCS is that it takes a team of specialists working together, all contributing their expertise, to identify and solve the soil and water conservation issues that we face. I am proud to have been a part of the team and to have had the opportunity to work with all the professionals we have in the SCS. We have a challenging road ahead in protecting the natural resources and the environment. We need to determine the factors that are involved in soil erosion. Soil scientists will always be involved in the critical work that evolves around these issues.

WORLD SOIL RESOURCES (WSR)

SOIL SURVEY DIVISION

SOIL CONSERVATION SERVICE, USDA

Goal:

The goal of WSR is to assist in providing soil resource information, and utilization of the information for sustainable agriculture, conservation of the resource base, and for other uses of soils.

Mission:

The mission of WSR is to collaborate with all agencies, both national and international, to:

1. develop and maintain a repository of world soils and soil survey information,

2. develop linkages with national and international institutions to enable the transfer of experience and information between US and foreign countries and vice versa,

3. assist less developed countries (LDCs) in the application of SCS standards and quality control methods in national soil survey programs,

4. provide the leadership in the multipurpose utilization of soil survey information.

Functions:

1. Act as the link between the SCS National Soil Survey Center and national and international soil survey organizations world wide.

2. Develop and maintain a data base on world soils and related information on sustainable agriculture.

3. Assist LDCs in developing soil survey programs and/or components of such programs including the utilization of soil survey information.

4. Develop training programs in LDCs to meet their needs in the areas of soil survey, soil classification and soil management.

5. Provide mechanisms for exchange of information through technical workshops, soil correlation meetings

and participation in technical meetings organized by other organizations.

6. Maintain relationships with foreign donor agencies and the International Agricultural Research Centers and collaborate in mutually beneficial activities.

7. Provide support services to the Agency for International Development (AID) and USAID country Missions in the areas of problem identification, technical assistance in soil surveys and soil classification, training in these areas, and technology transfer.

8. Provide information on soils to Federal and International agencies, institutions and US Universities.

9. Assist in the development and distribution of technical monographs, newsletters and other documents including computer softwares to LDC institutions and scientists.

10. Coordinate WSR activities with activities of the National Soil Survey Center, Federal agencies, and International agencies and institutions to ensure that information is integrated and shared.

11. Provide information on soils of foreign countries to U.S business, technical agencies, universities, publishers and where possible, arrange contacts in foreign countries to foster relationships.

An important component of WSR is the Soil Management Support Services (SMSS) project, funded by the Agency for Interntaional Development.The world soils data base is being developed partly through this project. The project also provides the mechanism for developing and maintaining linkages with LDC national institutions and scientists.

TECHNICAL SERVICES OF WSR

1. Provides support services, on request, to USAID Missions and LDC institutions, in areas of soil survey, classification and management of soils.

2. Collects, collates and maintains a data base on world soils and soils information in collaboration with national and international organizations.

3. Initiates and organizes international training, workshops and symposia in collaboration with other donors and/or institutions.

4. Maintains working relationships with US agencies, SCS staff and international organizations in subject area.

5. Assembles and disseminates technical information through newsletters or special publications to international cooperators about soil surveys, recent technology and aspects of application of soil survey information for land use.

6. Collaborates with Soil Taxonomy staff to provide the international inputs to improve Soil Taxonomy.

7. Initiates joint collaborative activities with other sections in the NSSC.

8. Provides (or indicates where available), users with maps, text, and data for foreign countries and assists in the interpretation of data of other countries.

"Soil Survey 2000: Expanding Our Horizons" or "Perspectives on Soil Survey Program Management"*

Good morning. I'm happy to be at this meeting of State Soil Scientists to present my Pearlie's ideas on "Guidelines for Program Managers" with some editorializing by me. Pearlie gave me license to do this so I could personalize the talk a little more.

Over the next half hour I'm going to touch on four subjects that I firmly believe in. First, is the need for you to emphasize and clearly focus on your roles as program managers. Second, is the need for soil scientists to become more involved in management and decision-making processes in SCS. Third is the need to broaden the use of soil survey information. Fourth is the need to identify and meet future challenges in soil survey.

1. Focus on role as program managers.

Our work in the Soil Conservation Service today is not "business as usual". The conservation provisions of the Food Security Act of 1985, new water quality initiatives, the growing number of state programs that count on our technical assistance, and net decreases in the real purchasing power of our budget have induced significant recent changes in our agency. We are undergoing many adjustments in response to new initiatives and shifting priorities. We are exploring different ways to conduct business in the face of diminishing resources, new technology such as digitizing, GIS, STATSGO, CAMPS etc.

We must, however, be prepared for challenges that lay ahead, if we don't want to perish. The 1990 Farm Bill is on the way. Technology, particularly in the area of computers, is rapidly advancing. Environmental awareness and conservation ethic are on the rise in our society. These are things that will continue to influence change and complexity in our programs and place high demands for our technical expertise as we move through the 1990's and into the 21st century. And we need to be prepared to compete for a bigger share of a diminishing federal budget. We must package and sell our wares to where the potential users want it more than other items in the budget (i.e., defense). Our natural resources and our ability to feed ourselves is part of our natural defense.

* Presentation by Wildon J. Fontenot for Pearlie S. Reed at the State Soil Scientist Meeting, Kansas City, Missouri, March 13, 1990.

It is therefore critically important that state program managers in SCS, including State Soil Scientist's, be acutely aware of the scope of their responsibilities. That they be very good at job of program management so that they can efficiently and effectively meet the program needs and expectations of our clients in an increasingly complex working environment.

Most of us in SCS are well educated in our technical discipline. More and more of our employees have M.S. degrees. You were all brought up in the agency as soil scientists and are very skilled in aspects of soil science and soil survey. That is essential, since you are the technical leaders for the National Cooperative Soil Survey (NCSS) in your respective states. However, as program managers you should be doing very little of the actual work in delivering program benefits. Your main job is really one of organizing the work to be done and then coordinating the efforts of those that will actually be doing the work.

You are the state soil survey program managers, and I submit that the effective demonstration of management skills is the most important part of your job now. The technical skills are secondary.

Few of us receive a strong educational background in management skills. Yet, invariably we end up having to develop these skills.

Let's briefly review some management concepts.

Responsibility

The Budget and State Matrix:

As State Soil Scientists, you oversee the 02 budget. You help pull together the 02 portion of the State's Management Matrix. You also monitor progress on the matrix, to see that the Soils program is accomplishing what we said it would. You also write program management statements that give the rationale for fund integrity.

It would seem that the Soils program is your program and you can do as you please with it. But, there is a little bit of a paradox here!! It's not *your* program. Remember, we are a line and staff organization.

Line and Staff Organization:

The State Conservationist is the only allowance holder in the State. Do not get too possessive of the 02 funds. The State Conservationist also sets the direction of the program. He or she uses input from all the other line officers (DC's, AC's, Technical Services Staff, etc.). This is where you can have a lot of impact.

State Soil Scientists are staff to line to help the job get done. You do what line does not have time to do, or does not have the technical expertise to do. Because we do not always keep this in mind, confusion can develop. For example, at California's Technical Specialists meeting last October, I was asked the question, "Are Soil Survey Party Leaders line or staff?" They attend the AC's first line supervisors meeting, don't they? But, and we need to remember this, they attend as staff supervisors, not line officers.

Sometimes staff forgets their role and begins to act as line. This is not a good situation. When this happens, we lose the balance of a well integrated program. Conversely, when line starts making technical decisions contradicting the counsel of technical specialists, we're headed for trouble and out of balance there too.

We have to remember that we have one basic program -- Conservation Operations, through which we deliver our services. All other programs -- soils, RC&D, Plant Materials, Water Resources, including EWP, Snow Survey, Great Plains, Rural Abandoned Mine Program -- are all enhancements to CO-01 working through Districts. They don't usurp or replace, only enhance CO-01.

SO, THE JOB OF PROGRAM MANAGERS IS TO COORDINATE!!

Coordination:

In coordinating your technical work, find out what high priority resource problems or opportunities are. Where are soils data needs most critical now and in the future. We have limited resources, so as managers, we have to put those resources to the highest use possible.

Be a good staff person. Develop criteria, gather data, analyze this data, and follow an open process in setting priorities.

In your coordination activities, scope the job! Ask yourself the se questions "How will the survey be done?" How intense will be the level of study? What about interpretation and likely uses? Consider other discipline impacts -- where and who will provide assistance?

Coordinate the assistance needed in scoping the job. Complete a workload analysis (WLA) before developing any MOU's. Define what will be needed from others and when.Who is most likely to make best use of information? Who is ready, willing, and able to show commitment by furnishing money to supplement SCS inputs. When we are prioritizing our work, look at these factors.

So, you, as the State Soil Scientist, coordinates all of this. You are not supposed to do the work, but see that the work gets done. You facilitate decision making by doing completed staff work. You analyze situations, develop alternatives, evaluate pros and cons, and make recommendations. You also help build consensus with and among the

State Conservationist, AC's and DC's, other Technical Specialists, Districts, and other cooperating agencies. And, once you come to a decision, you deliver. You facilitate getting the survey done, and establish above all **CREDIBILITY** while delivering.

I bet that if you were to ask the people you serve (who are they? -- AC's, DC's -- remember you are their staff because they don't have the time or expertise) what the single most important thing you can do to build a good program -- be a good program manager -- is to deliver what you said you were going to deliver, when you said you were going to deliver it.

A good word of advice on this last state is: DO NOT CHANGE HORSES IN THE MIDDLE OF THE STREAM!! Plan for this, and give advanced notice, or lead time for people to adjust. This is why doing that MOU planning is so important. The MOU must be well planned out, but it also must be monitored well to make sure that things happen as planned.

However, do things always happen as planned? Studies show that only 5% of plans materialize and are implemented as originally planned. So, does not all that time on the MOU seem useless?

NO!!

Plans let you know where you are going and when deviaiton begins. You have to have an agreement that everyone wants to work and are willing to help at the right time. It is very important that everyone involved buy into the process.

Program managers then monitor. At first sign of any miscues, the program manager is dong completed staff work, finding ways to fix the problem. One way to not have to fix is to stay ahead of the game. Be early, get commitments at MOU development and continually confirm several months ahead, and reaffirm again and again as time draws nearer to project completion.

Key: the minute you find out that things are going bad, notify all concerned. Explain the reasonsand give alternatives on how to make up lost time. Get everyone to buy-in on this. Notify everyone that will be impacted; people can handle delays, if they know ahead of time and buy-in. Remember -- no surprises!!

No one wants to look bad. That's what we do when we don't deliver to our line officers on schedule. They have to deliver bad news to Districts, sponsors and other agencies after the fact. In effect, a breach of trust then takes place. If these folks know what's going on, they can help get things back on track.

Let everyone know what the priorities are. Do everything in your power to keep the #1 project on tract. Get it out of the way so that you can deliver that #2 priority. If you have to delay #3 and #4 , they won't mind waiting, because they know that when their turncome around, you will do everything in your power to deliver.

Don't take on more than you can handle. This why WLA is so critical. If you do take on too much, you won't be able to deliver. You'll fall behind, and then end up spending time juggling balls rather than bringing surveys to completion. Quality will be inferior.

The job of the program manager is to not let this happen. Keep balance in your staffing at all levels. If any delays or problems come up, develop a way to let folks know and facilitate their building consensus on the change.

Let me conclude this part of the presentation with this summary:

1. You are a staff person that:
   a. helps set the direction of the program to complement CO-01;
   b. helps set goals and monitor and evaluate to see that they are being realized;
   c. Staff out the allocation of resources to accomplish these goals;
   d. check for accountability. the SSS should come in at the first sign of a problem;
   e. be an advocate for the program -- sell it;
   f. coordinate -- most critical part of job.
   g. need to be a strong communicator and good at human relations;
   h. keep people informed.

2. Soil scientists need to become more involved in management and decision-making processes in SCS.

Soil survey information is used in virtually everything we do in SCS. In fact, soil survey has been at the foundation of SCS since the beginning when it was specified as a major program activity in the Soil Conservation and Domestic Allotment Act of 1935 -- the legislation that established SCS. It seems that soil scientists have been necessarily very busy making soil surveys ever since; necessarily talking to each other to refine the art and science of soil genesis, classification, and mapping among yourselves; working to provide the "once-over" so that soil survey information is available for all to use. You have been so busy with this, in fact, that we don't find soil scientists well integrated within other SCS programs nor upper level management positions outside soil survey.
Question: How many people attained the status of Soil Survey Party

Leader (GS-11) and later became an AC, STC, Deputy Chief, or Assistant Chief, or Chief? Has there been anyone other then Hugh Hammond Bennett?

There is a need for getting soil scientists into top management positions where you can provide more clout for the soils program. The soils program is an integral part of SCS and needs proper support. Soil scientists need to integrate into more positions where they can make an impact.

State Soil Scientists and their staffs should begin working more closely with STC's and principal staff, and with other state programs, in order to become more involved in decision-making, in order to become better established as an integral part of state management team.

Soil scientists should also work more with AC's and DC's to educate Conservation Districts. Get political by identifying problems, creating a need, and selling the product. Use the soil survey as a lever. Find ways to work more in association with Districts, and to garner more political support from Conservation Districts for the soil survey program and for expanding use of soil science expertise!

3. Broaden the use of soil survey information.

The making of soil surveys is an extremely important function. But, soil scientists have even more expertise to contribute in SCS. It is time for an evolution in SCS! Soil scientists are needed not only to map soils, but to be more involved in all SCS programs in applying expertise for using and interpreting soils information. You need to show people what many of you already know -- that when there is a local technical expert to help with interpretations, users benefit to the fullest from soil surveys.

Work in the area of "Technical Soil Services" is expanding and needs to continue to expand in SCS. Area Soil Scientists and similar positions have important roles to play in all SCS programs.

FSA has been providing impetus for pushing this evolution along. We've been highly dependent on soil scientists to provide HEL, hydric soil, and wetlands determinations. A great deal of Area Soil Scientist time has been recently devoted to this. CAMPS has emphasized the need for up-to-date and consistent data bases.

More soil scientist expertise is needed in implementing water quality programs. After all, the pathways whereby pollutants move to waterways are mainly through the soil or across the surface of the soil. We need to apply your understanding of soil chemistry and soil physics, and we need to properly use and interpret soil survey information in the implementation of our water quality programs. Soil scientists have the needed expertise in these areas. In California, soil scientists are

becoming intimately involved, through their work on the state water quality committee, in developing and delivering training and direction and in assisting Water Resources Planning staff and others in assessing specific water quality problems.

Let me relay one other example from California of "Technical Soil Services" assistance. As you know, we recently had a severe earthquake in the San Francisco Bay area. Since SCS has, over the years, designed and built many small earthen dams in counties affected by the quake, a team was dispatched to assess damage that might have been sustained to these dams. A soil scientist accompanied engineers and geologists on the initial field assessment and observed that soils occurring as dam foundation were usually different than under the dam abutments.

Coarse textured alluvial soils were common under the base of dams, but older, more developed soils were usually under the abutments on valley-side hillslopes. This was not readily apparent to all, but obvious to the trained eye of the soil scientist. It was significant because the areas with the "sandy" foundation soils is where the earthen dams were found to be most prone to have cracks. Liquefaction appeared to have occurred in the sandy foundation soils -- soils that have "SM" Unified Soil Classification". The subsequent settling apparently induced the cracks in dams near the quake epicenter, particularly where soils of different composition under the abutments did not settle. The State Soil Survey Database was then queried to pull Unified Soil Classifications and other pertinent soil survey data for the assessment teams to use during the rest of their field evaluations.

A greater recognition by SCS program managers is needed so that higher priority is placed on expanding the use of soil survey information through the expanded use of soil scientist expertise in all SCS programs. Use your management skills to sell the expertise you have to offer. Many times, people don't ask for input from soil scientists because they don't know what to ask for or aren't sure what they need. Show them. "Shake the nut tree"!

4. Future needs from soil survey.

Technology is rapidly advancing. Environmental issues are becoming more important in the public eye. Databases (CAMPS, SSSD), GIS, Computer Modeling, Water quality, and many environmental issues that are broader than our past experiences are knocking at the doors. As the use of soil survey information correspondingly expands, new and different kinds of soil survey information will be needed. You need to provide the kind of leadership to the state soil survey programs so that they rise to meet the future challenges.

Look to the future of soil survey. Make sure that you provide the leadership to meet the challenges that lay ahead!

Conclusion.

1. Management skills are the most important part of the State Soil Scientist job. Make sure to understand and tend to the scope of your responsibilities!

2. Soil scientists need to make more of an impact in the decision-making process in SCS. Soil scientists better integrated into top management positions in SCS will provide more clout for the soil survey program.

Along with those first two points, I ask, are field soil scientists developing the required management skills to move into the State Soil Scientist positions of the future, and into other top management positions in SCS?

3. The mission of soil survey is to assist mankind in understanding soils and wisely using soil resources. Broadening the use of soil survey information through providing soil scientist expertise in all SCS programs is needed to fully realize this mission. Your selling skills will be required to insure that happens.

4. The needs from soil survey are rapidly expanding. Many challenges lay ahead. You need to focus on the needs of the future, identify them, and find ways to provide them.

NATIONAL WORKSHOP FOR STATE SOIL SCIENTIST
Kansas City, Missouri
March 12-16, 1990

W. RICHARD FOLSCHE

ORGANIZATIONAL CHART - Attached

GIS

A. Courses

1. Fundamentals of GIS

2. SCS-GRASS

3. GIS for Managers (future)

4. Advanced GIS for GIS coordinators (future)

a. Making maps with GRASS (future)

b. GRASS-SSURGO interface (future)

c. GRASS-STATSGO interface (future)

5. GRASS - CAMPS (future)

6. LT-Plus Digitizing Package (future)

B. Technical assistance is given onsite upon request. These assistance trips vary widely in nature -- hardware hookup, software loading, digitizing, GIS analysis, GIS training, etc.

C. NCC is the distribution point for soils digital data. SCS will distribute to the public NATSGO, STATSGO, and SSURGO and associated attribute data. The cost is $400 for the spatial and $100 for the attribute data. Distribution internally in SCS is free.

D. NCC will distribute all TIGER (Census data) to states. If you have a need for it now, please request on an SCS-CGI-19 and give priority.

E. Plotting - NCC is presently using Gerber, Calcomp, and Draftmaster plotters. Our future has an electrostatic plotter in it. We expect you to take full advantage of it and send us your work when you want large format plotting.

DBMS

NCC is managing the databases for STATSGO, NATSGO, and SSURGO, plus the TIGER data. In the future NCC will be working with the PSU data files and the hydrologic unit files.

STATSGO is to be completed by December 1990. NCC plans to meet this target if you will get your data to us in time. Problems with STATSGO have been matching across state boundaries and deciding which interpretations to make. States will have the opportunity to choose from several proposed interpretations. NCC will coordinate more and more through NTC Soils Staff GIS person.

SSURGO database is growing slowly, but steadily. Many of you are involved with other organizations in digitizing your data. You should be careful in your Memoranda of Understanding so that data is not copyrighted. PLEASE NOTE: No copyrighted data will be put into SSURGO database. NCC considers this useless data because the SCS cannot use it.

NCSS

Red Feathers now has a database that he can tell you what flights have been flown over a specific area since 1930. This should be good for project type work as well as telling you what is the latest imagery available for mapping or publication if NAPP is not available.

NCC is receiving maps for publication at the rate of about 120 per year and we are publishing at a rate of about 80 per year. You should be contacted when you send maps to NCC as to whether or not you want interim copies (100).

All map finishing and some map digitizing are being cost-shared on a 50 percent rate. We are amazed that many of you are not using this and do not know of this service. NCC receives $100,000 for cost-shared map finishing and $100,000 for cost-shared digitizing. All digitizing over that must be paid 100 percent by the State or with the money you raise from other sources.

If you are contract digitizing yourselves, NCC has found that we can save the government a lot of money if a complete edit is done before the contract is let. Our costs are nearly one-half now as compared with the beginning when contractors were comparing us with everyone else.

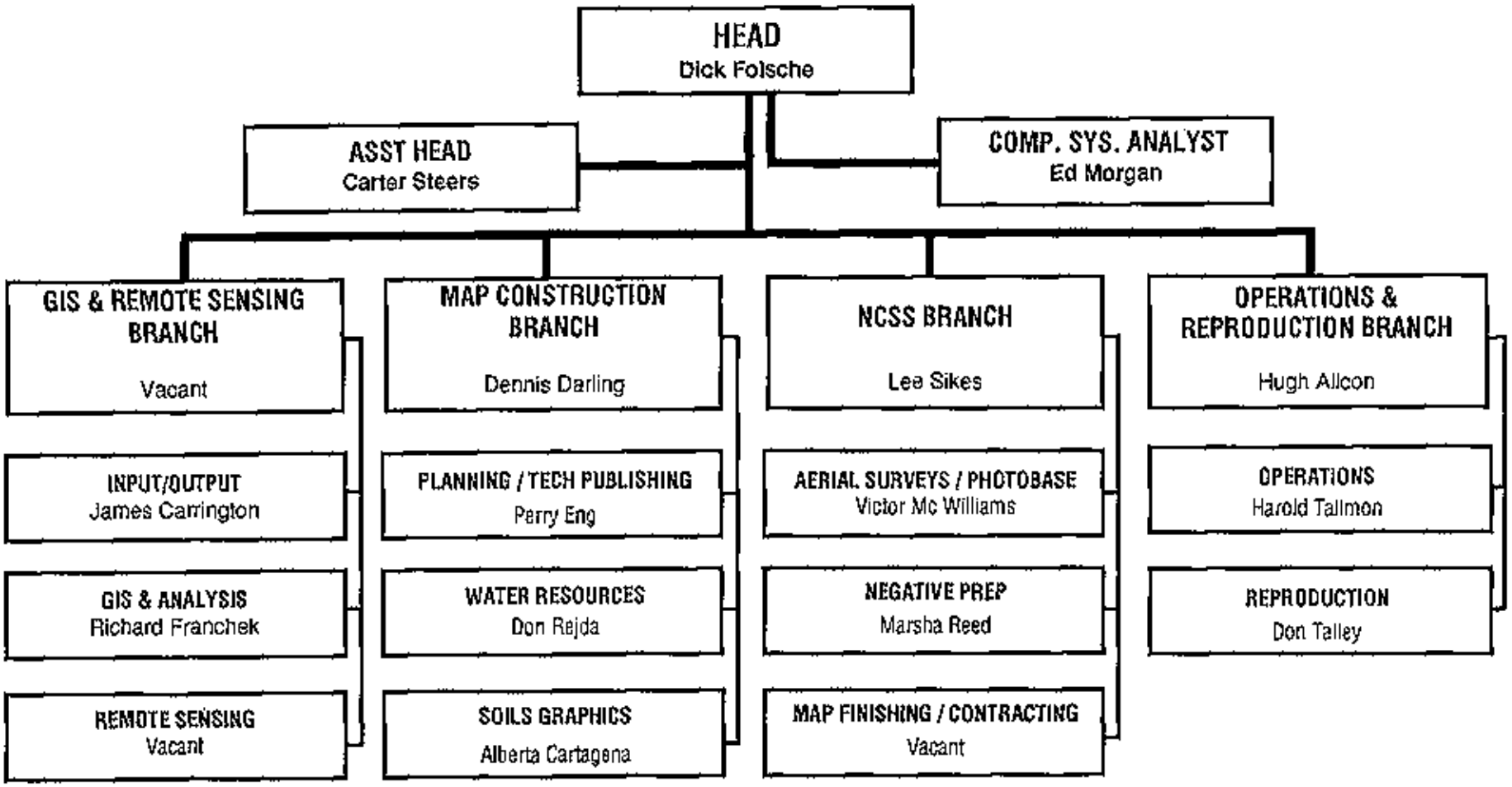
THEMATIC MAPS

NCC continues to make great strides in the automated map department. All soil status maps are now made on automated equipment and soon all general soil maps will be made on automated equipment (see Status of Soil Surveys and CRP Maps). NCC goal is to make all base maps from the Bureau of Census TIGER data and fit the STATSGO data with TIGER data to make the general soils maps that goes into the National Cooperative Soil Survey publication.

TECHNICAL PUBLISHING AND EDITING

NCC does a variety of technical publication and edit functions. Our largest user is NEDS in the development of new training materials. This facility is available to all and if you want to publish or enhance a presentation, Technical Publishing Section can do a good job for you. NCC probably has better capabilities in the graphics side of things than most states have. We also have a scanner, color laser printer, and can go directly to printing from our linographic machine. If you have your work on most popular word processing packages, we can read directly into the machines that these people use.

National Cartographic Center



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March 1990

NATIONAL BUDGET FORMULATION
or
THE INCREDIBLE SHRINKING BUDGET - HOW DO WE LIVE WITH IT?

Introduction. When I tell people that I work in budget formulation, I usually get one of two reactions:

"Oh." - usually delivered in monotone and followed by a long period of silence. OR "My State needs more money. What are 'YOU' going to do about it?" - often delivered in an accusatory tone.

The "Oh's." should be "Oh's!!" because understanding how to personally impact a complex process vital to successfully fund and set program policy is worth knowing. The "YOU's" should be "WE's" because we are all part of the same team. Your expertise, knowledge and vision are the tools we budgeteers need to justify program initiatives and obtain sufficient operating funds. Budgeteers do not have the power or authority to obtain and distribute funds on their own.

Organizationally, the SCS budget is separated into two staffs in the national headquarters. Formulation of the annual budget is handled by the Budget Planning and Analysis Staff - BPAS - under the supervision of the Assistant to the Chief for Strategic Planning and Budget Analysis. The staff works with SCS national program managers and policy officials and with personnel from the Department, Office of Management and Budget, and the Congress to request and justify the annual SCS budget. Once the annual budget is enacted, the Financial Management Division, under the Deputy Chief for Administration, oversees the execution phase of the budget. Larry Scott will tell you how they administer the execution phase after we complete this discussion.

Budget formulation is a blend of cut and dried technical procedures - laws, policy guidance, technical circulars, forms, dates, etc - and personal interaction between individuals who recommend, negotiate and decide policy and funding issues that arise during the annual process. This morning, we will spend a limited amount of time on the technical requirements of budget formulation and more time on the roles each of us play in that process.

What Is a Budget? According to Webster, a budget is systematic plan for meeting expenses for a given time period - a plan for the coordination of resources and expenditures. The Federal Budget encompasses a great deal more:

It is a political decision making document that has increased in importance in proportion to the the dilemma of providing needed domestic services and military strength without bankrupting the Nation. None of us can ignore the political nature of the budget. Decisions made to solve the budget deficit situation have and will continue to impact SCS programs - and our lives - for many years to come. Therefore, we must be equally informed about different political viewpoints and programmatic issues to formulate successful budget strategies.

The Federal budget is more than a plan of work: It is the LAW, and we are required to follow the financial plan detailed in the Bill, the report language and the supporting budget justification material supplied to the Congress. Spending prescribed for each program cannot be exceeded during the year or a fine and/or a jail sentence could result. The funds must be used for the purposes described in the appropriation.

The Federal budget is probably the best description of National goals and priorities that exists. In 1983, the Congress passed an Emergency Jobs Bill in order to get people back to work when unemployment and inflation reached double digit levels. SCS received funds for the Watershed and Flood Prevention and the Resource and Conservation Development programs to provide employment in needy areas and to install cost-shared watershed and RC&D measures. Currently, the President and the Congress are responding to concern about National water quality problems with a Government-wide initiative. SCS received $13 million of new funds in 1990 for water quality and the 1991 budget proposes an additional $16.7 million.

Finally, the Federal budget is an expression of policy in financial terms. Domestic programs have been held level or reduced in favor of military strength for several years in order to maintain a balance of world power. President Bush's first budget showed some change in policy by increasing funds for the environment. The 1991 budget proposals continue that policy shift by increasing funds for SCS and ASCS cost-share programs.

The Federal Dollar - Where It Comes From and Where It Goes. Typically, about 80% of revenues for Federal spending comes from 3 sources: Tax on individual income provides about 38% of annual revenue, Social Security taxes provide about 32%, and borrowing provides about 12%. These percentages have changed significantly from the mid-1960's when taxes from individuals and businesses were about equal and provided the bulk of Federal revenues. About 84 cents of each Federal dollar spent is also accounted for by 3 categories: Entitlement programs, such as food stamps, account for approximately 43 cents of each dollar spent, defense about 27 cents, and interest on Federal debt about 14 cents. In 1988, these three categories plus grants to States and localities accounted for about 95% of Federal spending - leaving only 5% for all other Government programs including SCS programs. There is tremendous competition for these funds.

Borrowing to finance Federal programs has increased nearly 300% in the past decade. Public debt approaches $2.2 trillion. Annual interest payments on the debt has steadily increased during this period, and public debt payments have reduced funding available for other Federal programs. The Gramm-Rudman Balanced Budget Act of 1985 was enacted to reduce the annual budget deficit by approximately $30 billion each year. The Gramm-Rudman Act reduction for one year reduces public debt interest payments enough to operate all SCS programs for 2 to 4 years - depending upon the interest rate paid by the US Treasury.

Federal Budget. The annual budget is carried out in four distinct phases: formulation, presentation, execution, and reporting. You are probably more involved with the budget execution phase, but your participation is vitally important in all phases of the budget. Your estimates of the annual workload and the resources needed to do the job are the basic building blocks for the budget. Justifications for budget requests are built on the information you supply to the national program managers and on progress reporting system data. Accurate estimates of budgetary resources and accomplishments provide the credibility needed to defend our annual budget request. Errors and unexplained workload anomalies undermine our credibility and lead to reduced budgets as we compete for scarce dollars. This data is also used to answer Congressional inquiries about our programs before and after the budget is enacted. Without reliable data, the Soil Survey program could be reduced from the amount requested.

Budget Trends. Since 1979, actual dollars appropriated for SCS programs have declined. The 1991 budget proposes a $727 million program level compared to $794 million appropriated in 1979. Funds for financial assistance have been reduced annually except for 1983 when Congress added $35 million in the Jobs Bill. Funds for technical assistance also steadily declined until enactment of the Food Security Act of 1985. Employment is probably a better indicator than dollars to illustrate the budget trends - SCS staffing decreased by about 10% from 15,421 in 1978 to an estimated 13,821 for 1991. SCS has fared better than some Federal agencies. GSA staffing was reduced nearly 47% from the 1978 level because their basic method of doing business was significantly changed.

The picture for the Soil Survey program is much better. Actual dollars have risen from $49.3 million in 1982 to a proposed $69.8 million for 1991 - an increase of 142%. However, the 1982 appropriation is worth only $66.3 million in 1991 dollars - an increase of only $500 thousand or about 5%. Staffing is estimated to decrease from 1,631 in 1982 to 1,479 in 1992 - a 9% reduction. The funding and staff year reduction would be much greater if we had not received a 1988 increase of $8.9 million - $6 million for FSA work and $2.9 million for increased FERS costs and pay costs. The problem we currently face is keeping the $6 million now that the accelerated soil surveys on FSA impacted lands are complete.

Why Prepare a Budget? The Annual budget is required by law. Article 1, section 9, of the Constitution says that no money shall be withdrawn from the Treasury, but in consequence of appropriation by law. This legal requirement resulted from a disagreement between the framers of the Constitution over which branch of Government - Executive or Legislative - would have the authority to spend funds. Several laws have been enacted in the past 200 years to clarify the issue. In the 1970's, President Nixon tried to enforce his budget policies by impounding and/or deferring funds for Federal programs that the Congress had funded in excess of the amounts he had requested. Congress passed the Budget Control and Impoundment Act of 1974 requiring the president to spend appropriated funds unless the Congress approves any changes. One current budget issue is whether the president has veto power over a single line item in an appropriation or must the entire appropriation be accepted or vetoed. There is speculation in the budget community that President Bush's move to defer spending for weapons systems added to the military budget in 1990 by the Congress is an attempt to set a legal precedent for the line item veto. This authority would significantly change our budget strategies, and could alter SCS program structure. Several past presidential budgets proposed to terminate or significantly reduce funding for all SCS programs, and presumably they would have exercised a line item veto if the authority existed when Congress over-rode their proposals.

The Budget Formulation Process. Budget formulation is divided into four specific phases that occur at approximately the same time each year. The Agency Estimate starts in January and ends in July. The Department Estimate lasts from mid-July through September. The President's request takes from September through December. Congressional action takes from January until the appropriation is passed. The budget then passes into the execution stage. Therefore, SCS is involved with 3 budgets simultaneously - reporting accomplishments for the past year, alloting funds and carrying out programs in the current year, and planning strategies and/or justifying proposals for the

budget year. Today, March 13, 1990, the Budget Planning and Analysis Staff is looking at least two years ahead at the fiscal year 1992 budget. We are examining program and policy issues and estimating program results for 1990 - which becomes the "past year" in the 1992 Budget - in order to ascertain any factors that may influence the 1991 estimated appropriations and the 1992 budget proposal. Questions that were asked at the 1990 and 1991 appropriation's hearings, policy issues raised by the Administration, and Congressional inquiries and the impact of new bills are considered at this time. The House of Representatives just held their hearings on the 1991 budget and, based on their questions, we are estimating final appropriation and report language because they become the basis for justifying the 1992 budget. The objective of the process is to maximize justifiable resources for SCS programs in 1992 and to establish clear policy to implement that budget. Our staff is currently preparing an inventory of potential issues and budget initiatives for 1992 to compare with the proposals that will soon be submitted by the national program managers. Our staff will summarize the proposals for presentation to the SCS Budget Committee.

The Agency Estimate is the only phase of the budget that SCS program and policy officials, including the Chief, have an opportunity to request what they want to include in the budget and to set their priorities for the Agency. The Department's budget office issues annual instructions from the Secretary's Office that frequently places constraints on the SCS request even before it is submitted for consideration. Our Assistant Secretary may also provide policy guidance for the Agency Estimate, and may alter the entire proposal that the SCS Budget Committee has hammered out before it is sent to the Department in July.

The process is repeated during the Department Estimate, but the SCS negotiating position is significantly reduced. Our role is similar to that of a Deputy Chief area during the Agency Estimate phase in SCS. BPAS is the official SCS contact point for the Department's budget office. Technical and policy questions are coordinated by BPAS with SCS program managers or policy officials as needed. The Chief presents the agency estimate proposal to the Deputy Secretary at a special budget hearing. The Deputy Secretary makes his recommendations to the Secretary, and the Secretary decides what will be sent to the Office of Management and Budget - OMB - in September. SCS competes with other USDA programs for funds, and there is limited opportunity to appeal the budget once the Secretary has made his decisions. From that point on, we must defend the Department Estimate as though we had proposed it ourselves.

Between September and December, OMB reviews the budget requests from all Departments, recommends funding levels to the President, and provides USDA with the budget funding and policy decisions for the President's budget. The Department reviews the decisions, and any appeals are usually made to the Director of OMB before SCS sees them. The agency role is similar to that of a program division during the Agency Estimate phase. There is even less opportunity to appeal program decisions and funding levels at this time than in previous stages of the budget. BPAS prepares the technical material for the President's annual budget request, and OMB sends it to Congress by the first or second week of January. The President's budget becomes national policy, and SCS must defend it as though it had been proposed by us even if we do not agree with it.

The Congress usually holds hearings on the SCS budget proposal sometime between February and April. The Chief, Deputy Chiefs and USDA policy officials testify at these hearings. They must support the budget, and cannot supply personal opinions or information about the Agency Estimate and Department unless specifically asked by a Senator or Representative.

Soil Survey Program Budget Representatives. The Soil Survey Program is indeed fortunate to have a strong team of individuals in the national headquarters to represent and justify your program needs. Each person has a specific role to play throughout the budget process, and they all do it well:

Your Deputy Chief, Bob Shaw, and Associate Deputy Chief, Ed Nelson, are strong advocates who come across as shrewd and fair. They aggressively represent you in budget policy matters, yet they are also responsible for balancing your needs with those of the other SCS programs. They fill this role well because they are knowledgeable about all the program issues that are decided by the SCS Budget Committee - of which they are voting members. They also are valuable witnesses when answering questions from Departmental and OMB officials or testifying at Congressional hearings. It is notable that during the past few years of budget constraints which have provided few budget increases for domestic programs they have been able to obtain several program initiatives.

Soil Survey Division personnel also provide many valuable services for you during the budget process: Your Director, Dick Arnold and Assistant Director, Tom Calhoun, are your long range budget planners who represent you in both technical and policy matters. They are often the experts who are called on to explain detailed and complex issues. Their professorial manner or smooth salesmanship - as the situation calls for - serves you well. Bill Roth and Jim Ware are the point men who interact most directly with the Budget Planning and Analysis Staff - BPAS - during budget formulation process. Bill regularly drops in on the BPAS to gather information that will benefit budget planning strategies for the soil survey program. He calls it visiting, but he is picking our brains to make sure that he is not surprised later during the competition for funds. Jim, who is newer at the budget game, approaches everything intently, and is an unimpeachable witness for you. Both of them prepare the technical materials for your budget request and answer budget questions from the Department, OMB and the Congress. Each of these six individuals serve different roles in the budget process that are uniquely enhanced by their professional capabilities and personalities. It is a pleasure to work with them.

The Roller Coaster Chart. One objective of BPAS is to provide an Agency Estimate that is as close to the actual appropriation in order to demonstrate the credibility of the Agency. If the Agency Estimate, President's Budget, and Congressional Action are plotted on a graph for several years, it would show that for each year: The Agency Estimate is the highest point on the graph followed by Congressional Action and the President's Budget in descending order. The gap between the Agency Estimate and Congressional Action has been narrowing. Congressional Action has consistently provided more funds than the President's Budget which has not changed a great deal in the past ten years. SCS's reputation in USDA for providing realistic proposals has improved significantly during this period. Those in USDA who review our budget find it difficult to disregard the proposals and/or recommend changes except for deficit reduction and other policy reasons.

Gramm-Rudman-Hollings Balanced Budget Act of 1985. The Balanced Budget Act of 1985 has had a profound impact on the Federal budget process and how program funding is justified. The Act set maximum annual deficit targets declining to zero for fiscal year 1993. If the deficit target for any year is exceeded by $10 billion, sequesterable programs are reduced by the amount in excess of the target. The targets for 1990 thru 1993 are $100 billion, $64 billion, $28 billion and zero respectively. Both the President's budget and the annual appropriation enacted by the Congress must meet the target or a sequester is triggered. The sequester must be taken from each program that is not specifically exempted on a program by program and state by state basis. The deficit is based on total estimated Federal outlays and revenues. 64 percent of the Federal outlays are exempt because they are entitlement programs, such as Food Stamps, which means that the entire sequester is taken from the remaining 36 percent. All SCS programs are sequesterable. The President has to issue an initial report or sequester order on August 25th. A Final Predidential Report or Sequester Order must be issued on October 16th of each year. There have been two sequesters to date: A 4.3% sequester in FY 1986 that reduced SCS programs by $28.6 million, and a 1.4% sequester in FY 1990 that reduced SCS programs by $6.9 million.

What Does It Mean? Future budgets will continue to be constrained. There will be few if any automatic increases no matter how justifiable or logical the need. The 1989 and 1990 appropriations stated specifically that pay costs would be absorbed within the amounts provided in the Act. There is no indication that the situation will change. In a departure from past budgets, the President's 1991 budget proposes to fund half of an anticipated 3.5% January 1991 pay raise within each agency appropriation. However, the amount requested is probably understated because the budget request is based on a program level that is lower than the amount Congress has traditionally provided for the annual SCS appropriations.

Competition for funds will continue to be intense. Details about the severe damage caused by Hurricane Hugo and the California earthquake were widely publicized, and the legitimate need to provide assistance was acknowledged by the general public and Federal officials. SCS was asked to provide immediate assistance, but all of SCS emergency watershed protection funds were committed before the hurricane and earthquake occurred. Congress responded to National concern by passing an emergency supplemental appropriation to provide disaster relief for the impacted communities. However, the funds for emergency relief went to the Federal Emergency Management Agency - FEMA - and to the White House for further distribution. This shifted the problem of distributing limited emergency funds to provide food and shelter, rebuild the local infrastructures, and repair the damaged watersheds to the Administration. SCS obtained a portion of these supplemental funds from the White House only after the Secretary of Agriculture justified the need to repair the damaged watersheds as an essential part of stabilizing community life disrupted by Hurricane Hugo and the California earthquake

We must defend current funding levels for our programs. Since 1983, the majority of increases for the soil survey program have been for pay costs and inflation. A major exception was the $6 million increase in 1988 to accelerate soil surveys on FSA impacted land. This effort is essentially completed. Congress has not asked us to justify keeping the $6 million -

probably because users of soils information are concerned about restoring traditional levels of service - but we will not know the outcome until the 1991 appropriation is passed. At the 1991 budget hearings before the House of Representatives, SCS was asked when we will complete the "once over".

Congress continues to specify amounts - called "earmarks" - provided in the annual appropriation to fund specific work at specific locations. However, they have stopped adding new funds to pay for these earmarked projects. Report language may also state that these amounts are to be provided in addition to funds normally allocated to that State. The result is that funds must be diverted from other States to comply with the law, and SCS management flexibility is being reduced.

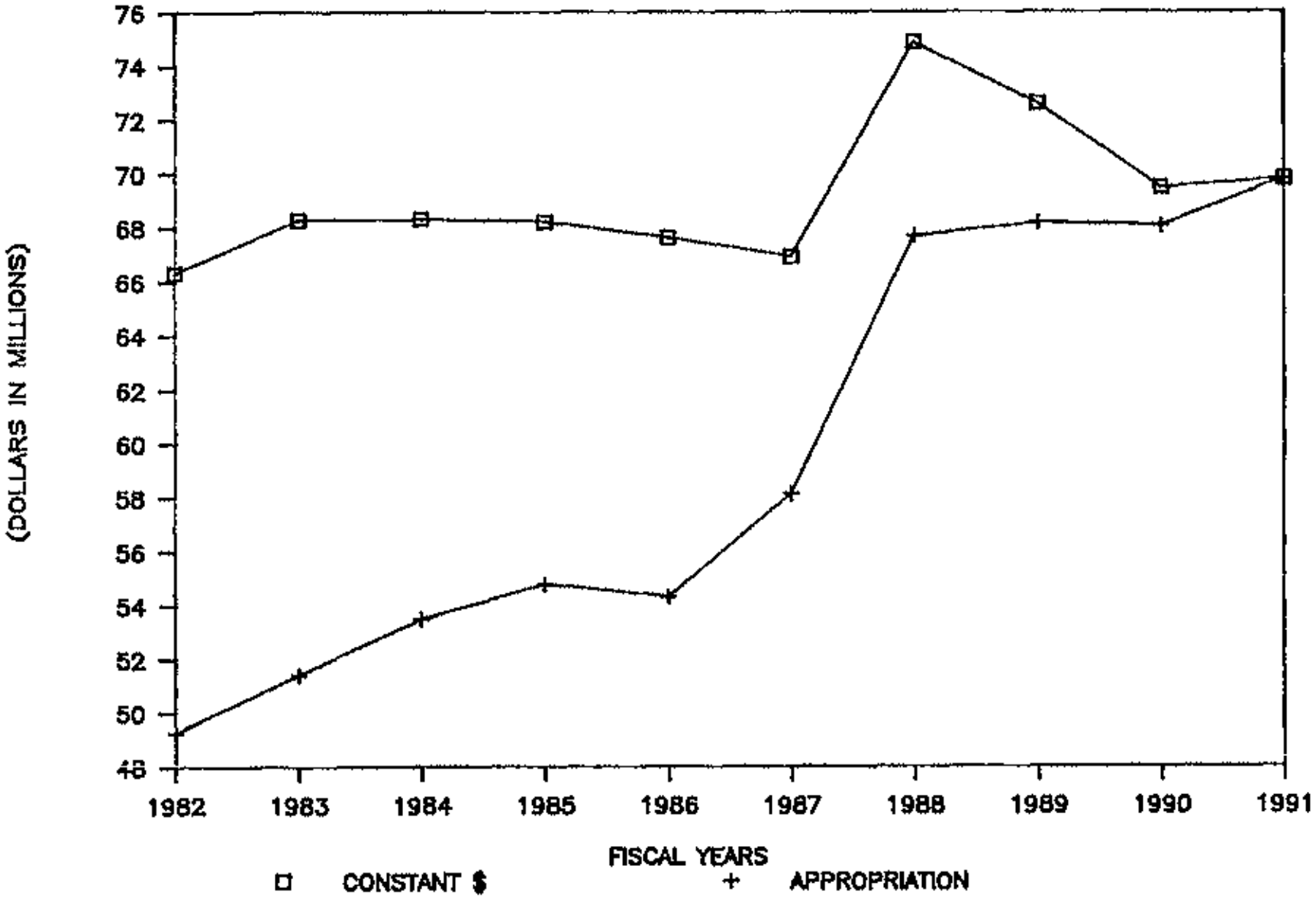
Office of Management and Budget Circular A-11 sets the rules for each year's budget requests. Some of these rules are: to defend policy decisions even when we do not personally agree with them; justify the need to continue the programs; tell why they should be Federally funded; and tell how well we have accomplished our objectives. For increases, we must also explain why: the proposal cannot be accomplished as part of our ongoing work; why we cannot substitute it for other ongoing work; and why we cannot reduce funds for some other program and avoid an increase.

Each year we are directed to increase efficiency and cut out waste. "Waste" is sometimes defined as an entire program or the relevance of federally operating a specific program. Merely citing legal authority for a popular and successful ongoing program that is showing progress in solving a recognized problem is no longer adequate justification. We must provide clear documentable evidence that we are making progress on problems of National importance and concern if we are to continue to be competitive.

There is no easy solution to our budget problems. In today's local newspaper, there is a long article about Dan Rostenkowsky's - Chairman of the House Ways and Means Committee - plan to solve the deficit problem in 5 years. Among other savings, the plan would freeze all program funding for one year. The same paper talks about providing significant aid to Eastern Europe countries, providing relief for low income people, and setting up a new Federal pay scale for high cost areas of the country to attract and keep employees. Should our Nation raise taxes or cut Federal programs? An article in another of today's papers states that the problem of making progress on solving the deficit is that both Democrats and Republicans want to spend. The article goes on to say the difference between the two is that Democrats tax to spend and Republicans borrow to spend, but the real solution is to cut spending. Which programs should be cut? Military? Domestic? SCS? Soil Surveys?

These questions and a many of the decisions made about our annual budget are political ones beyond our control. However, we can influence the process with accurate information about program accomplishments, and by proposing prudent budgets that cannot be discredited because of poor justifications. We must maintain our reputation of doing what we can within current resources, and asking for additional funds only when it is absolutely necessary to accomplish our goals. We budgeteers need your help to properly represent you. You need to diligently continue to improve and revise your goals and performance if the soil survey program is to succeed. Keep up your good work, it is recognized and valued far and wide.

SOIL SURVEYS



Appropriation in (millions):										
Actual.....	$49.3	$51.4	$53.5	$54.8	$54.3	$58.2	$67.7	$68.2	$68.1	$69.8
Constant...	$66.3	$68.3	$68.3	$68.2	$67.6	$66.9	$74.9	$72.6	$69.5	$69.8

National Workshop for State Soil Scientists
Plan of Operations and Offset Budget Execution
Tuesday March 13, 1990, 10:30 a.m.

I. FINANCIAL MANAGEMENT DIVISION, BUDGET BRANCH RESPONSIBILITIES:

A. Issue policy and procedures for SCS budget execution.

B. Provide financial controls to ensure SCS does not exceed appropriation levels approved by Congress - Chief responsible for Anti-Deficiency Act Violation.

C. Issue allowance to each of 57 allowance holders via electronic system.

D. Monitor budget execution throughout year (analyze allowance holder budgets).

E. Report financial results at end-of-year.

II. SOIL SURVEY ALLOWANCES ARE BASED ON:

A. Ongoing surveys and technical services.

B. Special program initiatives such as mapping cropland for FSA.

III. PROGRAM BUDGETING AND ACCOUNTABILITY:

A. Background.

1. October 1, 1986, Soil Conservation Service (SCS changed basis for charging expenses.

2. Integrated the Plan of Operations and new fund charging methods.

3. Objectives were to improve program management and reduce paperwork.

4. We are making a contract with our people, paying for it up front, and then monitoring progress and costs to ensure that we are getting what we paid for.

B. Internal Accounting and Administrative Controls Shall Provide Reasonable Assurances that:

1. obligations and costs are in compliance with applicable law;

2. funds, property and other assets are safeguarded against waste, loss, unauthorized use or misappropriation; and

3. revenues and expenditures applicable to agency operations

are properly recorded and accounted for to permit the preparation of accounts and reliable financial and statistical reports and to maintain accountability over the assets.

C. Policy.

1. Workload described in the Plan of Operations and represented by staff-years will be the basis for the integrity of charges made to program funds.

2. The state is the lowest organizational level in SCS where financial performance will be measured.

3. A states' Plan Of Operations and related documents must be integrated with operating budgets and support the state's program charges at all times.

4. Fund charges for technical assistance may be made using the following methods: direct, modified offset or base offset.

5. Financial assistance charges must be made on a direct basis.

D. Fund Charges.

1. Each type of expense in the budget must be assessed to determine which method (direct, modified offset, base offset) of charging expenses during the year will be used.

2. Using the base offset method (percentage of staff-years in one program to all staff-years in a state), salaries and most technical assistance expenses can be predetermined on a one time basis for charge purposes. The objective is one fund per transaction. Adjustment may be needed for significant expenses applicable to a fund.

3. No further fund charge determination is necessary unless the workload in the Plan of Operations is revised or an obvious error has been made.

4. The staff years used to predetermine expense distribution must always relate to the staff years shown on management matrices.

5. Expense distributions are approximations. Offsetting on a one fund per transaction basis should get close to the target amount in a given fund, but it will rarely be precise.

IV. PLAN OF OPERATIONS

A. Introduction

1. The Plan of Operations is the basic management tool to direct the use of resources to achieve the SCS mission

and objectives.

2. The planning process is critical to all SCS operations. It is setting a course of action to effectively and efficiently use resources.

3. The Plan of Operations is the means of showing what the priorities are and in essence showing "what counts."

4. The Plan of Operations provides the basis for the performance plan.

5. It is strongly recommended that the narrative Plan of Operations be approved by the next level supervisor.

B. Policy

1. All SCS organizational units at all levels will prepare and use a Plan of Operations.

2. The Plan of Operations is to be reviewed quarterly, progress documented and needed changes made.

3. The Plan of Operations is to contain the following:

   a. Narrative Plan of Operations that includes objectives, goals and specific action items.

   b. Schedule of activities.

   c. Summary of applicable goals.

   d. Accountability of all staff time.

   e. Operating budget (state level).

   f. System of scheduling and documenting activity and time.

   g. System of monitoring progress and adjusting the Plan of Operations and fund charges as needed.

   h. Staffing Plan.

   i. Appendices.

4. The Plan of Operations at the field level, area and state office levels will be the basis for the management matrices.

C. Working documents and change.

1. The components of the Plan of Operations are dynamic, working documents. They are the means by which program and fund accountability are maintained.

2. It is essential that changes be communicated to area and

field offices. Adjustments in Plan of Operations activities may be needed to reflect the changes.

3. It is critical that changes in the Plan of Operations be reflected in the management matrices.

V. MANAGEMENT MATRIX

A. Policy

1. Each program is to have a management matrix for use in monitoring and demonstrating program and fund accountability.

2. The management matrix is to contain.

a. Total staff years.

b. Gross salary costs.

c. Total gross budget.

d. Work products, planned accomplishments by quarter.

e. Work products, actual accomplishments by quarter.

3. It is the responsibility of the program managers to maintain the management matrices.

4. Explanations, comments and adjustments are to be made on the management matrix when significant changes have occurred.

B. Working documents and change.

1. The management matrices are dynamic, working documents. They are the means by which program and fund accountability is demonstrated.

2. It is essential that explanations, notations and adjustments be shown on the matrix. This is critical to demonstrate program and fund accountability.

3. Changes on the management matrix must be coordinated with changes in the Plan of Operations.

VI. DETAILED INFORMATION ON THE PLAN OF OPERATIONS AND OFFSET BUDGET EXECUTION PROCESS CAN BE FOUND IN THE FINANCIAL MANAGEMENT MANUAL, SUBCHAPTER D, PART 522, SUBPART D. (THIS WAS HANDED OUT AT THE WORKSHOP) FINANCIAL MANAGERS ALSO HAVE A COPY OF THIS MANUAL. RECOMMEND REVIEWING WITH STATE ADMINISTRATIVE OFFICER AND FINANCIAL MANAGER.

Summary

1. The management matrix concept is a realistic and an excellent means for demonstrating program and fund accountability. A key

part of this is explaining, documenting and making changes as needed. Take the management matrix seriously.

2. Reviews of state operations indicate that overall we have program and fund integrity even if there some isolated problem areas. There is a need for better understanding of the processes and people's roles. Refer to VI for recommendation to review handout with state administrative officer and financial manager.

A STATUS REPORT
ON SCS' GIS AND REMOTE SENSING ACTIVITIES*

by

Gale W. TeSelle

Introduction

Thank you very much for the opportunity to speak to you this morning. It is always a pleasure for me to meet with the State Soil Scientists and the soil science discipline. Over the years we have had a close working relationship with you and with the Soil Survey Program and we remain committed to keep it that way.

My talk will describe some of our recent activities in geographic information systems and remote sensing technologies and announce some software release dates for what we think are significant software packages. And I brought some slides along to help present this information. But before I get to the slides, I want to tell you about recent staffing changes in the Division.

A few months ago, we looked at our Division's organizational chart and decided we needed more focus on the application of the new technologies that we are developing. So, we totally re-wrote the job description of the remote sensing coordinator which was vacant. With Bob Shaw's concurrence and support, we established a National Leader for Geographic Information System (GIS) and Remote Sensing Applications. I am pleased to announce that we have recently filled the position with a person from within my staff; his name is Lane Price. Lane is a person with outstanding abilities, having come from the field with a natural resource background and a talent for understanding geographic information management, computers, and computer programming. You will no doubt be hearing from and talking with Lane in the future.

Our Division's remote sensing coordination function has been moved to George Rohaley, whom most of you already know. George now becomes our overall coordinator for cartography, GIS, and remote sensing. So if you want to know what's going on in our Division, call George.

Unfortunately, however, George has been asked to participate in the agencies' Integrated Systems Planning (ISP) Team, and for three months will be away on this outside assignment. I asked Carter Steers, Assistant Head of the National Cartographic Center (NCC) to come up and work with our staff for a while, and fortunately, he and his boss agreed.

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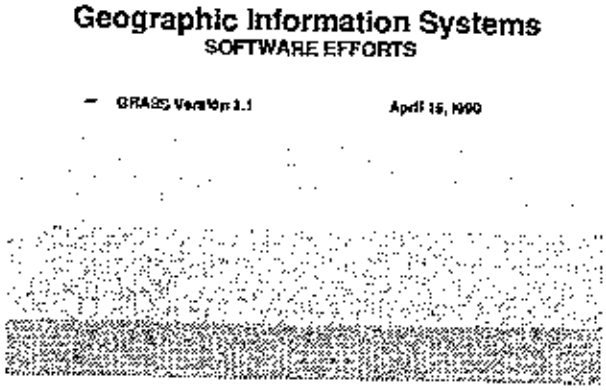
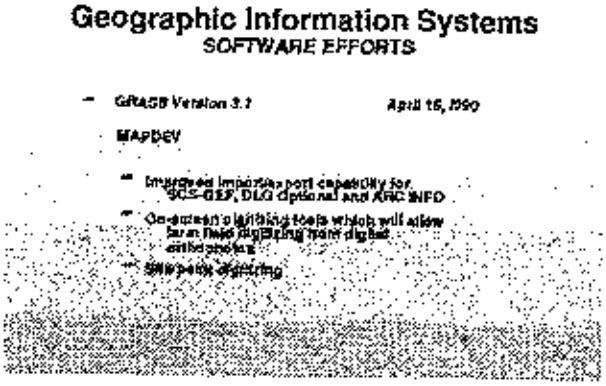
* Presented at the National SCS State Soil Scientist meeting, March 12-16, 1990, at Kansas City, Missouri. Gale TeSelle is the Director of the Cartography and Geographic Information Systems Division, SCS, USDA, Washington, D.C.

Beginning March 26, 1990, Carter will be on a two month detail to our Division and will be filling in for George. So if you call in for George and get Carter you'll know why. We are looking forward to having Carter join us for a couple of months.

I mentioned earlier that we have two new people on the staff. One is Emil Horvath, and I know some of you have already worked with Emil on various state projects. Emil has a PhD degree in soils and comes to us by way of TRW, and prior to that the USGS EROS Data Center. Emil is the manager of the NHQ GIS project which we envision will involve many NHQ Divisions and staffs and will integrate, and make available for use in a GIS environment the largest resource databases in SCS, namely the SOILS 5 and the NRI. Our plan is to have a fully operational NHQ-GIS using GRASS and the INFORMIX DBMS by the end of this fiscal year. We are beginning to produce some products now. Emil brings to our staff an excellent soil scientist perspective and excellent database management skills as well.

Martin Holko is also relatively new to our staff. He comes to us from NASS, the National Agricultural Statistical Service, with an MS degree in statistics and a ton of experience in image processing, the UNIX operating system, computer networking, and graphic computer programming. He serves as a computer scientist, systems integrator and computer programmer on our staff and is already making a tremendous contribution to the GRASS software and the NHQ-GIS project.





GIS SOFTWARE EFFORTS

Now, let me start with the slides.

As you might expect, GIS technology dominates my staff's time and energy. Two years ago when we met in Lincoln, I talked about our fairly recent release of the GRASS GIS software and I said, "we live in exciting times and perhaps revolutionary times and that the soils program is in the middle of that excitement."

Today, I don't see anything to change my attitudes about the excitement and predictions about fast-paced change brought on by new computer technology.

On October 1, 1988, we released GRASS Version 3.0 for the AT&T 3B2 machine. On May 1, 1989, we released Version 3.0 for the 6386 machine. Approximately 70 sites have installed GRASS 3.0, most of which are using the faster 6386 machine. Our Division, in concert with the National Cartographic Center, plans to release Version 3.1 in April 1990. The next few slides highlight a few of the Version 3.1 enhancements in each of the subsystems.

GRASS MAPDEV is the digitizing subsystem and is also used for importing/exporting data files. Enhancements include the capability to import and export the SCS geographic exchange format and the ARC/INFO file format, and additional features and more precision in importing and exporting of USGS's DLG Optional format.

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Version 3.1 April 15, 1990

GRID (Analysis & Display)

- Font specifications for PMAP
- Enhanced 3-D perspective tools for color grids to save set up parameters
- New Graphic make and screen functions
- New vector reclass and display options
- Extended graphics card support for AT&T 750 (EGA) and AT&T 600 (VGA)

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Version 3.1 April 15, 1990

MAPGEN (Vector Plotting)

- GRASS Version 3.1 and AT&T 6386 required
- Vector plotting on large format plotters
- MAPGEN command-level version (USGS)
- SCS MAPGEN interface version (Wier (Hardy))
  - Pilot testing at 6 to 10 sites (5/1/90)
  - Available to allows upon request

Additional digitizing tools include on-screen digitizing, as well as site/point digitizing.

The GRID subsystem, used for analysis and display includes new font specifications for display, enhanced 3-D display, new analytical calculation tools, vector reclass and display options, and extended graphics card support for AT&T's 750 and 600 cards.

A totally new package has been added to GRASS by SCS called MAPGEN. MAPGEN is a vector-plotting package originally developed by the USGS, Geologic Division. We have modified and enhanced the package to satisfy more SCS needs. The package runs only with the 6386 Version of GRASS, supports several large format vector plotters, and supports color area fill (which is a major SCS enhancement to the package written by Marty Holko).

Although we are releasing the package to anyone who has GRASS 3.1 on a 6386 and a vector plotter that is supported by MAPGEN, we are, nonetheless, pilot testing the software as well to get some structured feedback on how to design the next enhancements to the package.

MAPGEN brings a whole new dimension to GRASS. It plots out the traditional vector maps that you have been used to seeing and wanting, and it provides the quality equivalent to any of the leading GIS's and computer mapping packages being used today.

This slide is an example of a MAPGEN plot on the screen. I have the hard copy plot with me if anybody wants to see it. This is from Caldwell Co., N.C., a survey digitized several years ago for North Carolina. It was

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Version 3.1 April 15, 1990
- LTPlus March 15, 1990

Geographic Information Systems
SOFTWARE EFFORTS

- LTPlus March 15, 1990
  - Compatible with GRASS on the AT&T 6386
  - Digitizing features maps using a digitizing tablet
  - Processing digitized and scanned map files in vector or raster format
  - Processing digitized and scanned elevation contours into a DEM
  - Import/export for CalComp, MVSS, DLGS, and other formats

imported into GRASS using the GRASS SCS-GEF import routine, and brought into MAPGEN for map composition. The colors were assigned based on the soil suitability for wildlife habitat. *Some of you are going to be involved in the pilot testing of MAPGEN and we thank you for your support in advance.*

Line Trace Plus, (called simply LTplus) is another major new package ready for release. LTPlus is a state-of-the-art map digitizing package developed cooperatively by the Forest Service and SCS and is scheduled for release March 15, 1990; that is this Thursday. It's been pilot tested and the results show dramatic increases in productivity.

Some of the key features of LTPlus software include its compatibility with GRASS on the 6386 machine (it does not run on the 3B2 machine); its capability to support manual table digitizing as well as scanner digitizing; its ability to digitize contours and convert them to digitial elevation matices (DEM's); and its versatile import/export capabilities. The following slides illustrate some of the characteristics of LTPlus:

This is the main menu of LTPlus.

This shows the line work.

This shows how LTPlus handles and processes data . . . in raster format first.

And then, this is the raster to vector conversion process going on here.

I don't have a slide of the symbols being added, but obviously it has those capabilities as well. It comes with a users manual, and

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Version 3.1 — April 15, 1990
- LTPlus — March 15, 1990
- GRASS Application Interfaces

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Application Interfaces

  GRASS/SSURGO — April 15, 1990 (Pilot release)

  - Generate soil interpretations and attribute maps
  - Targeted users are SO, AO, FO and non-SCS
  - Future enhancements include combining with the STATSGO interface

training will be available from the NCC. We believe this is an outstanding package, and that if you are going to be a serious digitizer of soil maps, you ought to get LTPlus. The NCC has established a new training course for LTPlus and will publish the dates of this course starting next fiscal year.

I'd like to turn now away from the core GIS software, towards application interfaces. A new focus for us recently has been in building application interface software. We think that's were the new action is at, and where it is needed. The first major new interface release is one for the soil survey program and for anyone wanting to make soil map interpretations.

That interface is the GRASS/SSURGO interface. It has been developed by Lane Price cooperatively with Dave Anderson of the National Soil Survey Center. We plan to release it for pilot use in April. It can be used by anyone who has GRASS 3.1 on either the 6386 or the 3B2.

Personally, I think this software needs to be released and announced with a fanfare. It is user friendly, menu-driven software, making the preparation of soil interpretative maps and resulting statistics relatively easy to accomplish. It uses your 3SD soils database in prelude format for the attribute files and then uses GRASS to manipulate the map data. We just completed the prototype version of the software, sent a demonstration disc to Dave Anderson and George Teachman last friday, and I understand its going to be demonstrated on Thursday at this workshop.

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Application Interfaces (Cont'd.)

  GRASS/CAMPS — June 15, 1990 (Pilot release to test sites)

  - Generate maps quickly with no GIS knowledge
  - Test Sites: ID, FL, VA, KA
  - Generates Conservation Plan, SoX (interpretations and land use maps, and others)
  - Future enhancements for IMAGERY and on-screen digitizing

This slide is an example of corn yields using the GRASS sample data set in the system. The software automatically creates a legend based on the interpretation, puts the appropriate units on the legend, and provides you only the interpretative information you want within the geographic window you set.

Our strategy for the release and management of this software is to turn this over to the National Soil Survey Center. I think Dave Anderson is going to be responsible for its maintenance and for providing any future enhancements. We plan for it to be distributed with GRASS 3.1 and future versions of GRASS.

The GRASS/CAMPS interface is another important interface that we have been working on. It is now scheduled for pilot release to four test sites by June 15, 1990. These sites are field offices in Virginia, Florida, Kansas, and Idaho.

The intent of this interface is to make GIS technology virtually transparent to the field office user. It produces conservation plans, soil interpretative maps, etc., and the reports and statistics that go with them.

Future enhancements of the use of GRASS in a field office include the capability to handle digital imagery. GRASS already has the capability to handle imagery and supports on-screen digitizing. Our limitations now are system limitations; primarily we need massive storage devices such as CD-ROM. We have recently found a UNIX device driver for a CD-ROM and intent to hook up a CD-ROM with GRASS and get some experience in managing and manipulating digital imagery in GRASS.

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Application Interfaces (Cont'd.)

GRASS/SQL DBMS	Estimated early FY-91 (INFORMIX Pilot Release)

- Design characteristics
- Interactive query from spatial domain
- Automatic update of certain properties as a result of analysis
- ANSI Structured Query Language pending agency decision
- Current cooperative efforts
  - University of Arkansas, Archeological Dept.
  - Central Washington University, GIS

Geographic Information Systems
SOFTWARE EFFORTS

- GRASS Application Interfaces (Cont'd.)

- GRASS/STATSGO	Planned
- GRASS/Water Quality Models	Planned
- GRASS/Grazing Lands Analysis	Planned
- GRASS/NRI	Planned
- GRASS/Engineering	Planned

GRASS/SQL DBMS is our next major interface effort in which we are working specifically with the INFORMIX DBMS. We established the design characteristics of the interface, which includes interactive query from the spatial domain, automatic updating of database attributes as a result of analysis or updating of a geographic database, and of course; compatibility with ANSIs' structured query language (SQL). The effort is well underway because the University of Arkansas, Archeological Department has been working on a GRASS/INFORMIX interface. We have been coordinating with them and intend to work more closely now through Charles Fultz in Arkansas with a formal cooperative agreement with the University of Arkansas. Pilot test release of software is estimated at early FY 1991.

As I mentioned before, we believe application interfaces are where the action is at, it's where much of our attention will go in the future.

We expect a STATSGO interface to be completed based on the work done by Fred Minzenmeyer. Other future application interfaces include water quality models, grazing lands analysis, the NRI, and various engineering applications.

Ease of use is an important principle that we are using in all these software packages that we are developing. This slide shows how we test the software with a young new computer operator.

Remote Sensing

- TRAINING

Remote Sensing

- TRAINING
  - Introduction to Aerial Photo Interpretation — October 1989
  - GIS and Remote Sensing Training for GIS Specialists and Coordinators — March 1991 (Pilot release)
  - GIS Training for Managers — November 1990 (Pilot release)
  - Remote Sensing Applications for 1992 NRI — January 1991

Remote Sensing

- NAPP (National Aerial Photography Program) — July 1987

REMOTE SENSING ACTIVITIES

Now I would like to talk about remote sensing technology. And let me first look at training initiatives.

Major new efforts have been focused on developing new training courses with the majority of efforts being accomplished by Dick Folsche's staff at the National Cartographic Center.

The aerial photo interpretation course which was completed by NCC and made available October 1989 is one of the best set of training materials I have ever seen assembled for a course of this type. My compliments to the staff at NCC.

I would encourage new soil scientists or soil scientist who would like a refresher in aerial photo interpretation and basic map principles to sign-up for the course. I think it's excellent.

My staff at NHQ, staff at NCC, and some people from the states and NTC's, are now working on a new course geared primarily for the State GIS Specialists and State GIS Coordinators and those wanting advanced GIS and remote sensing training. NCC is also working on a GIS course for managers and they are working on developing a more specific remote sensing course for conducting the 1992 NRI.

The National Aerial Photography Program (NAPP) is another significant, and perhaps most significant remote sensing activity managed by the federal government. The National High Altitude Program (NHAP) was modified and changed to the NAPP program on July 1987.

Remote Sensing

- NAPP (National Aerial Photography Program) July 1987
  - 5 year cycle coverage for conterminous U.S. at 1:40,000 scale
  - Originally all CIR quarterquad photography
  - Now it can be black and white and not quad centered
  - Photo season can be specified

Remote Sensing

- NAPP Contracts Awarded - FY 1990

Leaf Off, Color Infrared	Open Season, Black and White
CT	OK (Scheduled)
MA	Eastern WY
TN (Scheduled)	Western MT
Leaf Off, Black and White	Southern NV
IN	Western WA
IA	Eastern ND
MO	
Central TX	

Remote Sensing

- NAPP Tentatively Planned - FY 1991

ME	Central & Eastern KS
NH	Western ND
MI	Central & Eastern MT
MN	Northern NM
SD	Western TX
VT	Eastern WA

NAPP, as most of you know, is a planned five year cyclic program for acquiring aerial photography coverage of the conterminous U.S. Primarily it's been color infrared photography (CIR) at 1:40,000 scale with quarterquad centered flightlines. Now, with some recent changes in the program, it has become more of a black and white quad-centered program with some CIR photography. Photo seasons, such as leaf-off, can be specified by SCS but they are subject to negotiation by the Steering Committee.

Most of the NAPP 1990 areas have been contracted. Thirteen states are scheduled for flying in 1990 with only two areas not awarded that were scheduled. All states will be for quad centered photography, some are CIR, some black and white, some leaf off, some open season, as you can see by the slide.

Priorities are now being discussed for the FY 1991 areas with a meeting set for March 22, 1990 to discuss and set the SCS priorities.

Remote Sensing

USGS Orthophotoquad Cost-Share Prices

I. 1:12,000 Scale Orthophoto
Quarter-Quads (Made from NAPP)

STANDARD QUARTER-QUAD

- Digital Elevation Model (DEM) Not available $ 850
- Digital Elevation Model (DEM) Available $ 600

Remote Sensing

USGS Orthophotoquad Cost-Share Prices

I. 1:12,000 Scale Orthophoto
Quarter-Quads (Made from NAPP)

DIGITAL QUARTER-QUAD

- Soft Copy (Digital tape only) DEM not available $ 725
- Soft Copy (Digital tape only) DEM Available $ 475
- Hard Copy (Print plot with border info) DEM not available $ 950
- Hard Copy (Print plot with border info) DEM Available $ 700

Remote Sensing

USGS Orthophotoquad Cost-Share Prices

II. 1:24,000 Scale Orthophoto Quads (Made from NAPP)

- Aerial Triangulation (AT) and DEM not available $ 1,300
- AT available and DEM not available $ 1,000
- AT available and DEM available $ 700

Twelve states or portions of states are scheduled to be considered for flying in FY 1991. I expect three or four will not get awarded because of insufficient funds.

This slide shows the whole five year plan for the conterminous U.S. from 1987-1992. In 1992 we will start the next five-year cycle and probably shift a few states and perhaps not fly as many partial states.

Again, as most of you know, orthophotoquads can be made from NAPP at either the 1:12,000 scale or 1:24,000 scale.

Unfortunately USGS really took the wind out of the 1:12,000 scale orthophotoquad sail by adjusting the prices up significantly. Standard 1:12,000 scale quads cost $850 when no DEM exist and $600 when it does. We were paying a flat rate of $300 per quad; so this is more than double the previous cost.

Digital (softcopy) orthophotoquads have now been costed out by USGS and they are $725 and $475 depending on whether the DEM's exist, and $950 and $700 if you want both hardcopy and softcopy.

The cost for 1:24,000 scale orthophotoquads remained the same at $1,300, $1,000, and $700 each depending on whether aerial triangulation or DEM data exists. This cost information was sent out several weeks ago in an SCS national bulletin.

SUMMARY AND CLOSING

In summary, I would reiterate that GIS is a rapidly expanding technology and SCS's use will no doubt expand rapidly throughout the 1990's. The pressures on SCS to provide digital soil map data to GIS users will keep getting greater and greater. Our leadership will be questioned if we don't soon allocate more SCS resources for soil map digitizing.

As for GIS software, we will continue to develop the basic GRASS software and integrate it to the agency's relational DBMS when selected. We will also concentrate on designing, developing and prototyping application interface software built on GRASS and the DBMS. As more software is developed and delivered to users, the NCC role in system training, hotline assistance, technical assistance, and database development will continue to expand.

In FY 1991, we plan to pay more attention to the GRASS imagery subsystem, so expect major new enhancements in the imagery subsystem. Image processing will start coming out of the research and demonstration mode that it's been in for the past 15 years and will move into a cost-effective technology as a result of using integrated GIS databases to assist in the classification process. We think GRASS is in an excellent position to be on the leading edge of this technology. After CAMPS Version 2.0 is released, look for a whole new redesign concept to emerge based on GIS technology and truely integrated geographic queries.

The NAPP program will continue to be a challenge to manage until enough money becomes available in the program to fly where we want, when we want it, and the way we want it. In the next couple of years the program may have to be flown mostly in black and white quarter-quad centered photography due to the lack of dollars. SCS, particularly the Soil Survey Division plays an important role in shaping the priorities and technical aspects of the program.

As far as 1:12,000 orthophotoquads and the potential development of a national orthophotoquad program, please don't give up hope even though the prices have jumped significantly. On May 15, 1990, we have organized a "National Forum on Orthophotography" co-sponsored by SCS, USGS, the National Governors Association, and the National Association of Counties. We hope to find out as much as we can about everybody's potential applications and try to build a coalition to jointly support a national cooperative orthophotoquad program. We will be sending you an agenda to this meeting. I firmly believe this nation needs a national, large scale orthophotoquad base map to support integrated resource management. However, we will need your support in working with state and local governments and the private sector to even have a chance at a national program.

Thank you very much for giving me the opportunity to talk with you about GIS and remote sensing. These two technologies are exciting to talk about and I think they hold the keys to a more complete automation of our resource planning activities. Thanks again.

MONTANA
SOIL SURVEY
OPERATIONS
DATA BASE

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R: BASE System V
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Definition EXPRESS
Application EXPRESS
Forms EXPRESS
Reports EXPRESS
R: BASE
RBEDIT
FileGateway
CodeLock
Return to DOS
```

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STATE SOIL SCIENTIST
WORKSHOP
KANSAS CITY, MO

GORDON L. DECKER

Tables in the Database NT33

Name	Columns	Rows	Name	Columns	Rows
FORMS	2	152	REPORTS	2	2501
CNTY	24	57	ADDRESS	6	19
TRAINING	3	83	SSAREIN	6	68
EMPLARCH	10	182	AWARDS	2	0
EMPLOYEE	23	118	SSAREA	23	67
DATACOL	15	23	CODES	5	297
CNTYSSA	15	131	DETONT	15	10
PROGRESS	7	99			

DEFINATIONS
FOR
COLUMN HEADINGS IN TABLES OR CODES IN TABLE COLUMNS
03/01/90

TABLE NAME
==========

COLUMN HEADING OR CODE NAME

CODE	DEFINATION	PAGE: 1

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

ADDRESS TABLE
==========

HEADING COLUMN DEFINATAIONS

ADDRESS1	ADDRESS - LINE ONE
ADDRESS2	ADDRESS - LINE TWO
CITY	CITY NAME
STATE	STATE FIPS CODE
TELEOFF	OFFICE TELEPHONE NUMBER (NNN-NNN-NNNN)
ZIP	ZIP CODE

AWARDS TABLE
==========

HEADING COLUMN DEFINATAIONS

AWARD	AWARD - ACHIEVEMENT
PERID	PERSONAL ID - FIRST 3 CHAR. OF LAST AND FIRST NAME

CNTY TABLE
==========

HEADING COLUMN DEFINATAIONS

ASCSCROP	ASCS CROPLAND ACRES - 1980
BIACRP	ACRES OF BIA LAND IN CROPLAND FROM NRI
BIATOT	ACRES OF BIA LAND FROM NRI
BLMCRP	ACRES OF BLM LAND IN CROPLAND FROM NRI
BLMTOT	ACRES OF BLM LAND FROM NRI
BORCRP	ACRES OF BOR LAND IN CROPLAND FROM NRI
BORTOT	ACRES OF BUR. OF REC. LAND FROM NRI
CNTYCODE	COUNTY FIPS CODE
CNTYNAME	COUNTY NAME
COECRP	ACRES OF CORP. OF ENG. LAND IN CROPLAND FROM NRI
COETOT	ACRES OF CORP. OF ENG. LAND FROM NRI
DODCRP	ACRES OF DEPT. OF DEF. CROPLAND FROM NRI
DODTOT	ACRES OF DEPT. OF DEF. LAND FROM NRI
FSNET	ACRES OF FOREST SERVICE LAND FROM NRI
FWSCRP	ACRES OF FISH & WILDLIFE LAND IN CROPLAND FROM NRI
FWSTOT	ACRES OF FISH & WILDLIFE LAND FROM NRI
NPSCRP	ACRES OF NPS LAND IN CROPLAND FROM NRI
NPSTOT	ACRES OF NPS LAND FROM NRI

TABLE NAME

COLUMN HEADING OR CODE NAME

CODE	DEFINATION	PAGE: 2
NRICROP	NRI CROPLAND CALCULATED FROM EXPANDED POINTS	
NRIFED	NRI FEDERAL LAND ACRES - CALCULATED FROM FED ACRES	
NRINFED	NRI NONFEDERAL LAND ACRES	
NRITOT	NRI TOTAL ACRES IN COUNTY (SUM OF NFED,FED,HTR)	
NRIHTR	NRI WATER	
OTHTOT	ACRES OF OTHER LAND FROM NRI	

CNTYSSA TABLE

HEADING COLUMN DEFINATAIONS

CNTYCODE	COUNTY FIPS CODE
CSBIATOT	BIA ACRES IN SURVEY AREA/COUNTY PARCEL
CSBLMTOT	BLM ACRES IN SURVEY AREA/COUNTY PARCEL
CSBORTOT	BOR ACRES IN SURVEY AREA/COUNTY PARCEL
CSCALTOT	CALC. FEDERAL ACRES IN SURVEY AREA/COUNTY PARCEL
CSCOETOT	CORP. OF ENG. ACRES IN SURVEY AREA/COUNTY PARCEL
CSFSTOT	FOREST SERVICE ACRES IN SURVEY AREA/COUNTY PARCEL
CSFWSTOT	FISH & WILDLIFE ACRES IN SURVEY AREA/COUNTY PARCEL
CSNPSTOT	NAT'L PARK ACRES IN SURVEY AREA/COUNTY PARCEL
CSNRIFED	FEDERAL LAND ACRES IN SURVEY AREA/COUNTY PARCEL
CSNRINFE	NONFEDERAL LAND ACRES IN SURVEY AREA/COUNTY PARCEL
CSNRITOT	TOTAL ACRES IN SURVEY AREA/COUNTY PARCEL
CSNRIWTR	WATER ACRES IN SURVEY AREA/COUNTY PARCEL
CSOTHTOT	OTHER FEDERAL ACRES IN SURVEY AREA/COUNTY PARCEL
SSACODE	SOIL SURVEY AREA CODE (ID)

CODES TABLE

HEADING COLUMN DEFINATAIONS

CLMNUSED	DEFINES THE COLUMN/HEADING IN THE TABLE WHERE USED
CODE	CODES FOR TABLES, COLUMNS AND DATA
CODEDEF	DEFINATION ON CODED HEADING OR DATA
TABLUSED	DEFINES THE TABLE WHERE THE CODE IS USED
WORKTITL	WORKING TITLE USED IN EMPLOYEE TABLE

DATACOL TABLE

HEADING COLUMN DEFINATAIONS

CROPAC	SOIL SURVEY AREA CROPLAND ACRES
CROPMU	NUMBER OF SOIL SURVEY AREA CROPLAND MAPUNITS
FROPSITE	NUMBER OF CROPLAND DATA COLLECTION SITES NEEDED
FYSTART	FISCAL YEAR TO START DATA COLLECTION
RANGAC	SOIL SURVEY AREA RANGELAND ACRES
RANGMU	NUMBER OF SOIL SURVEY AREA RANGELAND MAPUNITS
RANGSITE	NUMBER OF RANGELAND DATA COLLECTION SITES NEEDED

DETAILED
SOIL SURVEY PROGRESS REPORT
(SORTED BY PROGRESS ITEM THEN SURVEY AREA ID)
02/28/90

PROGRESS ITEM
SOIL SURVEY AREA CODE AND NAME
LAST NAME

DATE	PROGRESS DESCRIPTION	HOURS	ACRES
ACRES MAPPED (184)			
17 CUSTER COUNTY			
Drummond			
10/30/89	SHEET C131		2775
10/30/89	SHEET C110		2700
10/30/89	SHEET C115		1200
10/30/89	PHOTO C104		2440
10/30/89	SHEET C100		320
10/30/89	SHEET C114		920
11/30 89	SHEET C121		5430
EMPLOYER SUBTOTAL		0	15785
Mitchell			
10/19/89	C179	10	709
10 19/89	C179	30	7907
10/31/89	C178		4766
EMPLOYEE SUBTOTAL		40	13382
SOIL SURVEY AREA SUBTOTALS		40	29167
PROGRESS ITEM SUBTOTALS		40	29167
APPEALS - NEL			
17 CUSTER COUNTY			
VanFossen			
10/09/89	NEL APPEAL - CUSTER COUNTY	9	
EMPLOYEE SUBTOTAL		9	0
SOIL SURVEY AREA SUBTOTALS		9	0

SUMMARY
SOIL SURVEY PROGRESS REPORT
(PROGRESS ITEM, SURVEY AREA TOTALS)
02/28/90

PROGRESS ITEM / SOIL SURVEY AREA CODE, NAME AND SUBTOTALS	HOURS	ACRES
ACRES MAPPED (184)		
17 CUSTER COUNTY		
SOIL SURVEY AREA SUBTOTALS	40	29167
PROGRESS ITEM SUBTOTALS	40	29167
APPEALS - NEL		
17 CUSTER COUNTY		
SOIL SURVEY AREA SUBTOTALS	9	0
PROGRESS ITEM SUBTOTALS	9	0
DETERMINATIONS - OTHER ON-SITE		
17 CUSTER COUNTY		
SOIL SURVEY AREA SUBTOTALS	2	0
PROGRESS ITEM SUBTOTALS	2	0
MEETINGS		
17 CUSTER COUNTY		
SOIL SURVEY AREA SUBTOTALS	110	0
PROGRESS ITEM SUBTOTALS	110	0
PROVIDE SOILS INFORMATION		
17 CUSTER COUNTY		
SOIL SURVEY AREA SUBTOTALS	5	0
PROGRESS ITEM SUBTOTALS	5	0
TRAINING - GIVING AND/OR RECIEVING		
17 CUSTER COUNTY		

SUMMARY
SOIL SURVEY (184) PROGRESS REPORT
(SORTED BY SOIL SURVEY AREA ID)
02/28/90

SOIL SURVEY AREA CODE AND NAME

PROGRESS DESCRIPTION	ACRES
11 CARTER COUNTY AREA	
SOIL SURVEY AREA ACRES: 2139283	
SOIL SURVEY AREA FY ACRES MAPPED (184)	56831
SOIL SURVEY AREA ACCUMULATED ACRES MAPPED	1842194
SOIL SURVEY AREA ACRES TO BE MAPPED	297089
PERCENT OF SOIL SURVEY ACRES MAPPED	86.11%
17 CUSTER COUNTY	
SOIL SURVEY AREA ACRES: 2428486	
SOIL SURVEY AREA FY ACRES MAPPED (184)	29167
SOIL SURVEY AREA ACCUMULATED ACRES MAPPED	1649251
SOIL SURVEY AREA ACRES TO BE MAPPED	779235
PERCENT OF SOIL SURVEY ACRES MAPPED	67.91%
622 GALLATIN COUNTY AREA	
SOIL SURVEY AREA ACRES: 878571	
SOIL SURVEY AREA FY ACRES MAPPED (184)	6460
SOIL SURVEY AREA ACCUMULATED ACRES MAPPED	411327
SOIL SURVEY AREA ACRES TO BE MAPPED	467244
PERCENT OF SOIL SURVEY ACRES MAPPED	46.82%
651 SANDERS COUNTY AREA AND PARTS OF FLATHEAD AND LINCOLN COUNTIES	
SOIL SURVEY AREA ACRES: 945545	
SOIL SURVEY AREA FY ACRES MAPPED (184)	25846
SOIL SURVEY AREA ACCUMULATED ACRES MAPPED	518255
SOIL SURVEY AREA ACRES TO BE MAPPED	427290
PERCENT OF SOIL SURVEY ACRES MAPPED	54.81%
STATE FISCAL YEAR TOTAL	118304

SOIL SURVEY STAFFING WORKSHEET
STATE, AREA, OTHER, ETC.

STATE: MONTANA FY - 1990 DATE: 02/28/90

SOIL SURVEY LOCATION, NAME, STATUS

STAFF NAMES OR POSITIONS	WORKING TITLE	FUND SY 02	FUND SY 01	MAPPING SY	NOTES
LOCATION:	BOZEMAN SO				
CODE AND NAME OF SOIL SURVEY AREA:					
OPERATIONAL STATUS :					
Christina Brown	CARTOGRAPHIC AID (TFT)	0.75			
Cameron B. Clark	CARTOGRAPHIC TECHNICIAN (TFT)	1.			
Gordon L. Decker	STATE SOIL SCIENTIST	1.			
Lee Ann Duerner-Mena	SECRETARY	1.			
Kristin E.S. Gerhart	CARTOGRAPHER		1.		
EARNED LAPSE	SOIL SCIENTIST	-2.			
FORCED LAPSE	SOIL SCIENTIST	-1.5			
Robert G., Jr Lund	CARTOGRAPHIC TECHNICIAN	1.			
Dan L. McLean	SOIL SCIENTIST (INTERP)		1.		
ADMINISTRATIVE OVERHEAD	ADMINISTRATIVE OVERHEAD	3.			
Cynthia J. Pfeiffer	CLERK TYPIST				
Robert E. Richardson	SOIL SCIENTIST (CORRELATION)	1.			
Steve E. Speidel	COMPUTER SPEC - SCHED-A - FT	1.			
DATA COLLECTION STAFF	BIOLOGICAL TECHNICIAN (INT)				
LUMP SUM		0.15			
NEW POSISTION VACANCY	SOIL SCIENTIST - DATA SET MGR.	1.			
SOIL SURVEY AREA STAFF YEAR SUBTOTAL		7.41	2.	0.	
LOCATION:	BOZEMAN AO				
CODE AND NAME OF SOIL SURVEY AREA:					
OPERATIONAL STATUS :					
John A. Lindahl	SOIL SPECIALIST (AREA)		1.		
SOIL SURVEY AREA STAFF YEAR SUBTOTAL		0.	1.	0.	

ALPHABETICAL LIST OF MONTANA SOIL SCIENTISTS
AND
SOIL SURVEY SUPPORT PERSONNEL
02/28/90

LAST NAME	FIRST NAME	WORKING TITLE	LOCATION
Bandy	Richard G.	SOIL SPECIALIST	MALTA
Benson	Arnie	SOIL SCIENTIST (TFT)	BIG TIMBER
Berger	Gary F.	PROJECT LEADER	BAKER
Bingham	LaMonte C.	PROJECT LEADER	HELENA
Branch	Jill M.	CARTO TECH - SCHED-A - PT	SHELBY
Brooker	Jay N.	SOIL SCIENTIST	BOZEMAN SS
Brown	Christina	CARTOGRAPHIC AID (TFT)	BOZEMAN SO
Clark	Cameron B.	CARTOGRAPHIC TECHNICIAN (TFT)	BOZEMAN SO
Decker	Gordon L.	STATE SOIL SCIENTIST	BOZEMAN SO
Dougherty	Brian D.	SOIL SPECIALIST	DEER LODGE
Dowell III	G.S. Rusty	SOIL SPECIALIST	CHESTER
Drummond	William J.	SOIL SPECIALIST	MILES CITY
Duerner-Mena	Lee Ann	SECRETARY	BOZEMAN SO
Duncan	Bradley J.	SOIL SCIENTIST	BOZEMAN SS
Engle	Kary J.	BIOLOGICAL AID - SCHED-A - INT	BIG TIMBER
Ericson	Valorie J.	BIOLOGICAL AID (TFT)	DEER LODGE
Evans	Bruce C.	SOIL SCIENTIST	SHELBY
Fehrs	Daniel R.	SOIL SCI. / BOI. TECH. - PT	PLAINS
Feist	Don J.	SOIL CONS/SOIL SCIENTIST	SHELBY
French	Charles C.	SOIL SCIENTIST	FORT BENTON
Galbraith	John M.	PROJECT LEADER	HAVRE
Gerhart	Kristin E.S.	CARTOGRAPHER	BOZEMAN SO
Gordon	Charles N.	SOIL SPECIALIST (AREA)	GREAT FALLS AO
Haines	Hanita E.	CARTOGRAPHIC TECHNICIAN (TFT)	HAVRE
Hamidi	Paul C.	SOIL SCIENTIST (TFT)	DEER LODGE
Hansen	Michael J.	PROJECT LEADER	PLAINS
Herriman	Stephen C.	SOIL SCIENTIST	SHELBY
Hinz	Donna L.	SOIL SPECIALIST	HAVRE
Hoag	James M.	SOIL SCIENTIST	SHELBY
Hockett	Phyllis D.	SOIL SCIENTIST	BIG TIMBER
Irwin	Arnie D.	SOIL SCIENTIST	DEER LODGE
Jackson	Don B.	SOIL SCIENTIST (TPT)	BOZEMAN SS
Johnson	William R.	SOIL SPECIALIST	SHELBY
Karenin	Jane	COOP SOIL SCIENTIST (PPT)	ROUNDUP
Keck	Thomas J.	SOIL SCIENTIST	BOZEMAN SS
Koepke	Byron E.	SOIL SPECIALIST	WHITEHALL
Lincoln	Teresa R.	SOIL SCIENTIST	BIG TIMBER

MONTANA LONG RANGE PLAN
DETAILED WORKLOAD ANALYSIS 'TOTAL' - 184 MAPPING
03/12/89

DETAILED REPORT OF DATA AND STAFF YEARS TO COMLETE THE FIRST SOIL SURVEY INVENTORY IN MONTANA:

RESPONSIBILITY-STATUS / SOIL SURVEY AREA NAME	SURVEY ACRES (A)	ACRES MAPPED (B)	TOTAL REMAINING ACRES (C = A-B)	PROGRESSIVE MAPPING RATE/SY (D)	FIELD SS-BY TOTAL (E)	YEARS TO COMPLETE (F = C/D/E)	FINAL FIELD REVIEW DATE	MAP ACRES COMPILED (G)	MAP ACRES FINISHED (H)	PERCENT OF DATA COLLECTED (I)	WEEKS OF FNL KANJ REVIEW (J=2*(A+3W))	STAFF YEARS TO COMPLETE INITIAL INVENTORY: 184 MAPPING (1SY*C/D)	REVIEW/ ASSIST (.25SY/ 200KAC)	KANJSC REVIEW (.044F+ .02*J)	FO SUPRT (1SY/500K K*(A-G))	MAP FNSH/DTE (.02SY/25 K*(A-H))	COLLECT DATA (1SY/1MA *(1-I))
SCS-MAPPING-COMPLETE																	
CHOTEAU-DUARAD AREA -- PARTS OF TETON AND PONDERA COUNTIES	2015723	2015723	0	50000	1	0.00	06/01/89	2015723	0	0	7.03	0.00	0.00	0.14	0.00	1.61	2.02
LAKE COUNTY AREA	724809	724809	0	50000	1	0.00	05/01/88	724809	0	75	4.47	0.00	0.00	0.09	0.00	0.59	0.18
LEWIS AND CLARK COUNTY AREA	1268258	1268258	0	50000	1	0.00	05/01/89	0	0	75	5.58	0.00	0.00	0.11	0.52	1.03	0.32
MADISON COUNTY AREA	1556880	1556880	0	50000	1	0.00	06/01/81	1556880	1556880	75	5.11	0.00	0.00	0.12	0.00	0.00	0.39
MISSOULA COUNTY AREA	1234660	1234660	0	50000	1	0.00	09/01/83	1234660	1234660	75	5.47	0.00	0.00	0.11	0.00	0.00	0.31
PETROLEUM COUNTY	1071532	1071532	0	50000	1	0.00	02/01/83	1071532	1071532	75	5.14	0.00	0.00	0.10	0.00	0.00	0.27
PRAIRIE COUNTY	1114291	1114291	0	50000	1	0.00	10/01/85	1114291	500000	75	5.23	0.00	0.00	0.10	0.00	0.45	0.28
ROSEBUD COUNTY AREA AND PART OF BIG HORN COUNTY	3182037	3182037	0	50000	1	0.00	04/01/83	3182037	3182037	75	9.36	0.00	0.00	0.19	0.00	0.00	0.80
SUBTOTALS	12198190	12198190	0									0.00	0.00	0.97	0.52	3.68	4.56
SCS-NONPROGRESSIVE																	
BEAVERHEAD COUNTY AREA	2356840	61620	2295220	50000	9	5.10	-0-	61620	0	0	7.71	45.90	1.84	0.36	5.51	1.89	2.36
FLATHEAD COUNTY AREA AND PART OF LINCOLN COUNTY	241600	0	241600	30000	2	4.03	06/01/00	0	0	0	3.49	8.05	0.19	0.23	0.58	0.19	0.24
GARFIELD COUNTY	3102950	622946	2480004	70000	7	5.06	-0-	622946	0	0	9.21	35.43	1.58	0.39	5.95	2.48	3.10
GOLDEN VALLEY COUNTY AREA	752165	189592	562573	50000	5	2.25	-0-	189592	0	0	4.50	11.26	0.45	0.18	1.35	0.60	0.76
MEAGHER COUNTY AREA	1067070	170620	896450	40000	5	4.48	-0-	170620	0	0	5.13	22.41	0.72	0.28	2.15	0.85	1.07
PARK COUNTY AREA AND PART OF GALLATIN COUNTY	780910	278330	502580	40000	4	3.14	-0-	278330	0	0	4.56	12.56	0.40	0.22	1.21	0.62	0.78
PHILLIPS COUNTY AREA	3212172	996520	2215652	75000	8	3.69	12/01/91	996520	0	0	9.42	29.54	1.77	0.34	5.32	2.57	3.21
SILVER BOW COUNTY AREA AND PARTS OF JEFFERSON AND BEAVERHEAD COUNTIES	280640	22314	258326	40000	3	2.15	-0-	0	0	0	3.56	6.46	0.21	0.16	0.63	0.22	0.28
SWEET GRASS COUNTY AREA	774317	294197	480120	40000	3	4.00	09/01/93	294197	0	0	4.55	12.00	0.38	0.25	1.15	0.62	0.77
WHEATLAND COUNTY AREA	845890	246730	599160	50000	5	2.40	-0-	246730	0	0	4.69	11.98	0.48	0.19	1.44	0.68	0.65
SUBTOTALS	13414574	2882869	10531705									195.60	8.43	2.59	25.29	10.73	13.41

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MONTANA LONG RANGE PLAN
DETAILED WORKLOAD ANALYSIS "TOTAL" - ISS MAPPING
03/12/89

DETAILED REPORT OF DATA AND STAFF YEARS TO UPDATE THE PUBLISHED SOIL SURVEY INVENTORIES IN MONTANA

RESPONSIBILITY-STATUS / SOIL SURVEY AREA NAME	SURVEY ACRES (A)	AVERAGE % OF OLD INVENTORY TO REMAP (B)	ACRE WORKLOAD (C = A* B/100)	SOIL REMAP RATE/SY (D)	FIELD SS-SY TOTAL (E)	YEARS TO COMPLETE (F = B/ D/E)	ACRES TO COMPILE (G)	ACRES TO DIGITIZE (H)	WEEKS OF FWL MANU REVIEW (J=2/1MW A+3W(G))	STAFF YEARS TO UPDATE SOIL SURVEY INVENTORY: 10 PCT SPOT CHECK (1SY/500K 4A+.1)	ISS MAPPING (1SY*C/D)	REVISIONS/ ASSIST (.16SY/ 200K*C)	MANUSC REVIEW (.04SY*F+ .02SY*J)	MAP COMPIL (.02SY/ 50K*A-G)	MAP DIGITIZING (.02SY/ 40K*A-H)	50% UPDATE W/O REMAP (.55Y/1M *A*.6)	SSD UPDATE (.065Y/ 1M*A)
SCS-MAPPING-COMPLETE																	
CHOTEAU-CONRAD AREA -- PARTS OF TETON AND PONDERA COUNTIES	2015723	0	0.0	0	1	-0-	0	0	7.03	0.40	-0-	0.00	-0-	0.00	0.00	0.60	0.16
LAKE COUNTY AREA	734809	0	0.0	0	1	-0-	0	734809	4.47	0.15	-0-	0.00	-0-	0.00	0.37	0.22	0.06
LEWIS AND CLARK COUNTY AREA	1298258	0	0.0	0	1	-0-	0	1298258	5.59	0.26	-0-	0.00	-0-	0.00	0.64	0.39	0.10
MADISON COUNTY AREA	1555880	0	0.0	0	1	-0-	0	1555880	6.11	0.31	-0-	0.00	-0-	0.00	0.78	0.47	0.12
MISSOULA COUNTY AREA	1234660	0	0.0	0	1	-0-	0	1234660	5.47	0.25	-0-	0.00	-0-	0.00	0.62	0.37	0.10
PETROLEUM COUNTY	1071532	0	0.0	0	1	-0-	0	1071532	5.14	0.21	-0-	0.00	-0-	0.00	0.54	0.32	0.09
PRAIRIE COUNTY	1114291	0	0.0	0	1	-0-	1114291	1114291	5.23	0.22	-0-	0.00	-0-	0.45	0.56	0.33	0.09
ROSEBUD COUNTY AREA AND PART OF BIG HORN COUNTY	3182037	0	0.0	0	1	-0-	3182037	3182037	9.36	0.64	-0-	0.00	-0-	1.27	1.59	0.95	0.25
SUBTOTALS	12199190		0.0				4296328	10162467		2.44	0.00	0.00	0.00	1.72	5.09	3.66	0.98
SCS-NONPROGRESSIVE																	
BEAVERHEAD COUNTY AREA	2356840	0	0.0	0	9	-0-	0	0	7.71	0.47	-0-	0.00	-0-	0.00	0.00	0.71	0.19
FLATHEAD COUNTY AREA AND PART OF LINCOLN COUNTY	241600	0	0.0	0	2	-0-	241600	241600	3.48	0.05	-0-	0.00	-0-	0.10	0.12	0.07	0.02
GARFIELD COUNTY	3102950	0	0.0	0	7	-0-	0	0	9.21	0.62	-0-	0.00	-0-	0.00	0.00	0.93	0.25
GOLDEN VALLEY COUNTY AREA	752185	0	0.0	0	5	-0-	0	0	4.50	0.15	-0-	0.00	-0-	0.00	0.00	0.23	0.06
MEAGHER COUNTY AREA	1067070	0	0.0	0	5	-0-	0	0	5.13	0.21	-0-	0.00	-0-	0.00	0.00	0.32	0.09
PARK COUNTY AREA AND PART OF GALLATIN COUNTY	790910	0	0.0	0	4	-0-	0	0	4.55	0.16	-0-	0.00	-0-	0.00	0.00	0.23	0.06
PHILLIPS COUNTY AREA	3212172	0	0.0	0	8	-0-	0	0	9.42	0.64	-0-	0.00	-0-	0.00	0.00	0.96	0.26
SILVER BOW COUNTY AREA AND PARTS OF JEFFERSON AND BEAVERHEAD COUNTIES	250640	0	0.0	0	3	-0-	0	0	3.56	0.06	-0-	0.00	-0-	0.00	0.00	0.08	0.02
SWEET GRASS COUNTY AREA	774317	0	0.0	0	3	-0-	0	0	4.55	0.15	-0-	0.00	-0-	0.00	0.00	0.23	0.06
WHEATLAND COUNTY AREA	845990	0	0.0	0	5	-0-	0	0	4.69	0.17	-0-	0.00	-0-	0.00	0.00	0.25	0.07
SUBTOTALS	13414574		0.0				241600	241600		2.68	0.00	0.00	0.00	0.10	0.12	4.02	1.07

MONTANA LONG RANGE PLAN
WORKLOAD ANALYSIS 'TOTAL' - 184 MAPPING SUMMARY
03/12/89

SUMMARY REPORT OF DATA AND STAFF YEARS TO COMPLETE THE FIRST SOIL SURVEY INVENTORY IN MONTANA:

RESPONSIBILITY-STATUS / SOIL SURVEY AREA NAME	SURVEY ACRES (A)	ACRES MAPPED (B)	TOTAL REMAINING ACRES (C = A-B)	PROGRESSIVE MAPPING RATE/SY (D)	FIELD SS-SY TOTAL (E)	YEARS TO COMPLETE (F = C/ D/E)	MAP ACRES COMPILED (G)	MAP ACRES FINISHED (H)	PERCENT OF DATA COLLECTED (I)	WEEKS OF FNL MANU REVIEW (J=2/1M *A+3WK)	184 MAPPING (1SY+C/D)	STAFF YEARS TO COMPLETE INITIAL INVENTORY: REVIEWS/ ASSIST (.1SY/ 200K*C)	MANUSC REVIEW (.04*C+ .02*J)	FO SUPRT (1SY/500K +.02SY/50 K*(A-G))	MAP FNSH/DIG (1SY/25 K*(A-H))	COLLECT DATA (1SY/1M*A *(1-I))
BIA-NONPROGRESSIVE																
SUBTOTALS	161900	0	161900								4.05	0.13	0.15	0.39	0.13	0.15
FS-MAPPING-COMPLETE																
SUBTOTALS	8501178	8501178	0								0.00	0.00	0.12	3.40	6.60	8.50
FS-NONPROGRESSIVE																
SUBTOTALS	8514829	0	8514829								85.15	6.81	1.63	20.44	6.81	8.51
FS-PROGRESSIVE																
SUBTOTALS	907500	0	907500								9.08	0.73	0.46	2.18	0.73	0.91
NPS-NONPROGRESSIVE																
SUBTOTALS	1155648	0	1155648								11.56	0.92	0.30	2.77	0.92	1.16
	*********	********	*********								******	******	******	******	******	******
TASK TOTALS	19241355	8501178	10740177								109.83	8.59	2.65	29.18	15.39	19.24

TOTAL TO COMPLETE THE FIRST SOIL SURVEY INVENTORY IN MONTANA = 184.83 STAFF YEARS
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COLUMN HEADING DEFINATIONS AND ASSUMPTIONS

SURVEY ACRES (A) = TOTAL ACRES IN SOIL SURVEY AREA.
ACRES MAPPED (B) = SOIL SURVEY AREA ACRES REPORTED AS OF 9/30/89.
TOTAL REMAINING ACRES (C=A-B) = SOIL SURVEY AREA ACRES THAT REMAIN TO BE MAPPED.
PROGRESSIVE MAPPING RATE/SY (D) = FIELD SOIL MAPPER ACREAGE RATE PER YEAR BASED ON A 100 DAY MAPPING SEASON.
FIELD SS-SY TOTAL (E) = PROJECTED NUMBER OF FIELD MAPPERS IN THE SURVEY BASED ON A 100 DAY MAPPING SEASON.
YEARS TO COMPLETE (F=C/D/E) = CALCULATED BY REMAINING ACRES DIVIDED BY RATE PER YEAR DIVIDED BY NUMBER OF FIELD SCIENTISTS.
MAP ACRES COMPILED (G) = SOIL SURVEY ACRES WITH MAPS COMPILED ON ORTHO, QUAD CENTERED, HIGH ALTITUTE, OR MOSAIC PHOTOGRAPHY.
MAP ACRES FINISHED (H) = SOIL SURVEY ACRES WITH MAPS FINISHED (SCRIBED).
PERCENT DATA COLLECTED (I) = AMOUNT OF CROP YIELD, RANGE, WOODLAND, ETC. DATA COLLECTED TO MEET SOIL SURVEY REQUIREMENTS. THIS IS OUR CURRENT BEST ESTIMATE AND WILL BE REFINED BY SURVEY AREA AFTER FURTHER ANALYSIS AND SPOT CHECKS.
WEEKS OF FINAL MANUSCRIPT REVIEW (J=2WKS/1M*A+3WKS) = CALCULATED WEEKS OF FINAL MANUSCRIPT REVIEW BASED ON 2 WEEKS PER 1 MILLION ACRES OF SURVEY AFTER FINAL CORRELATION, 2 WEEKS REVIEW AFTER QUALITY ASSURANCE STAFF TECHNICAL REVIEW AND 1 WEEK REVIEW AFTER EDITORS REVIEW.
184 MAPPING (1SY+C/D) = FIELD SOIL SCIENTIST STAFF YEARS NEEDED TO COMPLETE THE FIRST SOIL INVENTORY - INCLUDES MAPPING, SOIL DATA GATHERING, MAP CHECKING, DRAFT MANUSCRIPT DEVELOPMENT, INTERPRETATIONS CHECKING, SOIL INVESTIGATIONS AND ALL FIELD WORK EXCEPT MAP COMPILATION AND FINISHING.
REVIEWS/ASST (.1SY/200K*C) = STATE AND AREA SOIL SCIENTIST STAFF YEARS TO PROVIDE TECHNICAL ASSISTANCE (CORRELATION & INTERPRETATIONS-4 WKS), QUALITY ASSURANCE (PROGRESS REVIEWS AND FOLLOWUP-2WKS); AND DATABASE DEVELOPMENT, CHECKING, AND CAMPS PREPARATION (2WKS) BASED ON 8 WEEKS OF INPUT FOR EACH 200,000 ACRES MAPPED (A 4 PERSON PROJECT SURVEY.
MANUSC REVIEWS (.04SY*C+.02SY*J) = STATE AND AREA SOIL SCIENTIST STAFF YEARS FOR ANNUAL AND FINAL MANUSCRIPT REVIEWS BASED ON 2 WEEKS WORK PER YEAR FOR ANNUAL REVIEWS, 4 WEEKS FOR TECHNICAL REVIEW AFTER FINAL CORRELATION, 2 WEEKS FOR REVIEW OF QUALITY ASSURANCE TECHNICAL COMMENTS AND 2 WEEKS FOR REVIEW OF EDITOR COMMENTS.
FO SUPRT (1SY/500K+.02SY/50K*(A-B)) = FIELD OFFICE SUPPORT (MAP PREP, LAB ANALYSIS, ETC.) BASED ON 1 STAFF YEAR/500000 ACRES PLUS 1 WEEK OF WORK FOR EACH 50,000 ACRES REMAINING TO BE COMPILED.
MAP FINISH (.02SY/25K*(A-H)) = MAP FINISHING STAFF YEARS BASED ON 1 WEEK OF WORK FOR EACH 25,000 ACRES REMAINING TO BE FINISHED AND DIGITIZED.
COLLECT DATA (1SY/1M*A*(1-(I/100)) = FIELD SOIL SCIENTIST (.5) AND OTHER DISCIPLINE (.5) STAFF YEARS TO COLLECT CROP YIELD, RANGE, WOODLAND, ETC. DATA BASED ON ONE STAFF YEAR FOR EACH 1,000,000 ACRES OF AREA WITHOUT DATA. ALSO INCLUDES SOIL PEDON DATA GATHERING AT YIELD SITES.

PROGRAM MANAGEMENT FOR UPDATES Mar. 14 1990

by G. WADE HURT

MY TOPIC IS "PROGRAM MANAGEMENT FOR UPDATES". WHEN I FIRST SAW THE TOPIC I LOOKED AT IT TWICE AND THE SECOND TIME I LOOKED I KNEW WHAT IT MEANT. MANAGING THINGS OR PEOPLE. WAS THAT THE QUESTION? IF SO, THE ANSWER IS SIMPLE. OF COURSE WE DON'T MANAGE THINGS SUCH AS UPDATES WE MANAGE PEOPLE, THE PEOPLE WHO ARE IN CHARGE OF THE UPDATES. THE PEOPLE WHO ARE MAKING THE UPDATES. AND THE WAY WE MANAGE THESE PEOPLE IS TO:

1. GET GOOD PEOPLE
2. DEFINE THE EXPECTED OUTCOME
3. PROPERLY TRAIN THE PEOPLE WE HAVE SELECTED
4. PROPERLY EQUIP THE PEOPLE WE HAVE SELECTED
5. GET THE HELL OUT OF THEIR WAY, BUT HELP

SIMPLE!!

LET'S LOOK AT EACH OF THESE FIVE FACTORS A LITTLE BIT CLOSER.

GET GOOD PEOPLE. WHAT MAKES A GOOD PERSON? HONESTY. COMPETENCE. FORWARD-LOOKING. AND INSPIRED. THESE FOUR CHARACTERISTICS TAKEN ONE AT A TIME, MAY NOT SEEM TO BE DESCRIPTIVE OF AN EXCEPTIONAL EMPLOYEE. BUT TOGETHER, THESE CHARACTERISTICS DESCRIBE "CREDIBILITY'. THAT'S WHAT WE ARE TALKING ABOUT. CREDIBLE PEOPLE.

SO NOW THE EMPLOYEE YOU PUT IN CHARGE OF YOUR SOIL SURVEY UPDATE WILL BE HONEST, COMPETENT, FORWARD-LOOKING, AND

INSPIRED. HE WILL BE CREDIBLE. THE ONLY WAY YOU AS A STATE SOIL SCIENTIST WILL BE ABLE TO DETERMINE IF YOUR EMPLOYEES HAVE THESE CHARACTERISTICS IS TO HAVE THEM YOURSELF. YOU HAVE TO BE ABLE TO LEAD. AND IF YOU ARE NOT HONEST, COMPETENT, VISIONARY, AND ENTHUSIASTICALLY INSPIRED YOU CAN'T LEAD PEOPLE THAT ARE. YOU ALSO HAVE TO BE CREDIBLE.

SINCE BEING IN FLORIDA I HAVE HAD TO CHANGE MY METHODS OF OPERATION SOMEWHAT. BECAUSE I HAVE DECIDED TO MANAGE BY EXPECTING CREDIBILITY; I, THEREFORE HAVE TO BE CREDIBLE.

2. DEFINING THE EXPECTED OUTCOME. SINCE WE ARE TALKING ABOUT UPDATES LET'S CONTINUE TO DO SO, AND IN THAT LIGHT I WILL START WITH MY METHOD OF UPDATING OLDER SOIL SURVEYS. FLORIDA DOES NOT REMAP; FLORIDA UPDATES. THE WORST SOIL SURVEY EXISTING IN FLORIDA IS GREAT. AND THERE ARE TOO MUCH GOOD DATA IN THESE SURVEYS TO BE THROWN AWAY. IN ALL CASES WE ASSUME THE LINEWORK IS CORRECT AND SIMPLY BEGIN THE UPDATE BY TRANSFERRING EXISTING LINEWORK TO THE NEW BASE. THERE ARE TWO REASONS OFTEN GIVEN FOR PERMISSION TO UPDATE THAT WE DO NOT USE;

1. BASE MAPS OUT OF DATE
2. SOIL SURVEY OUT OF PRINT

THE ONLY REASONS WE UPDATE IS TO IMPROVE INTERPRETATIONS AND IMPROVE TECHNOLOGY TRANSFER. AND IF I WERE IN CHARGE OF THIS BOAT THESE WOULD BE THE ONLY REASONS I WOULD FUND AN UPDATE. IF IT AIN'T BROKE DON'T FIX IT. IF YOU CAN'T IMPROVE IT DON'T TOUCH IT.

OK, SO NOW WE TRANSFER THE LINEWORK. WHAT ELSE DO WE DO? AT THE SAME TIME WE DETERMINE, DESCRIBE, AND DOCUMENT WHAT IS BETWEEN THE LINES. WE DETERMINE WHAT IS BETWEEN THE LINES BY MAKING OBSERVATIONS. SINCE OUR USERS IN FLORIDA LIKE DOCUMENTED DATA SO MUCH, WE UTILIZE TRANSECTS MOSTLY. EITHER HAND OR ELECTRONIC (GROUND PENETRATING RADAR) TRANSECTS WORK. DURING THE DETERMINATION PROCESS WE LOOK FOR LANDFORMS NOT PROPERLY IDENTIFIED. THESE WE RESURVEY. THESE ARE THE ONLY AREAS WE RESURVEY.

NOW THAT WE HAVE DETERMINED WHAT IS BETWEEN THE LINES, WE DESCRIBE WHAT IS BETWEEN THE LINES. LISTEN CAREFULLY, WE DESCRIBE WHAT IS BETWEEN THE LINES ELECTRONICALLY, WITH DATA BASES. FEW IF ANY PEOPLE READ MAP UNIT DESCRIPTIONS. THEREFORE INTERPRETATIVE DATA ARE NOT LOST IN A MAP UNIT DESCRIPTION. IT DOES NOT HURT TO WRITE DESCRIPTIONS. BUT DATA IMPORTANT ENOUGH TO INTERPRET MUST BE CAPTURED IN THE DATA BASE. THE LAST OF THE D'S IS DOCUMENT. WE DOCUMENT WHAT WE DID. WHAT WE DO AS SOIL SCIENTIST MUST BE TRACKABLE. IT DOES NO GOOD TO REINVENT THE WHEEL TIME AND AGAIN. OUR PEERS AND THE ONES WHO FOLLOW MUST BE ABLE TO FOLLOW OUR THOUGHT PROCESSES.

SO NOW WE HAVE DESCRIBED THE EXPECTED OUTCOME AND THE SOIL SCIENTIST IN CHARGE OF THE UPDATE KNOWS WHAT IS EXPECTED. SINCE HE HAS CREDIBILITY, HE WILL DETERMINE, DESCRIBE, AND DOCUMENT.

3. TRAINING IS NEXT. THERE ARE TWO REASONS TO TRAIN. ONE IS TO GIVE THE EMPLOYEE SKILLS AND KNOWLEDGE NECESSARY TO DO HIS JOB. THE OTHER, IS RARELY UTILIZED, AND THAT IS TO GIVE THE EMPLOYEE SKILLS AND KNOWLEDGE HE MIGHT NEED AT A LATER DATE. THEREFORE WE ONLY HAVE TO TRAIN THE SOIL SCIENTIST TO DO HIS JOB. IT DOESN'T TAKE MUCH TO TRAIN A PERSON TO DO THE JOB. ESPECIALLY SINCE THAT PERSON IS ALREADY HONEST, COMPETENT, FORDWARD-LOOKING, AND INSPIRED.

4. NEXT IS THE PROPER EQUIPMENT. VEHICLES. AUGERS. QUADRUNNERS. ALL THE NORMAL SOIL SURVEY EQUIPMENT. AND OTHERS, FOR A SOIL SCIENTIST MAPPING ON QUAD SIZED MAPS THE LEAST YOU CAN DO IS PROVIDE HIM A QUAD SIZED LIGHT TABLE. GROUND PENETRATING RADAR IS JUST ANOTHER PIECE OF EQUIPMENT. WE NOW HAVE THREE GPR SETS IN FLORIDA. FOR THE THREE D'S THERE IS NOTHING BETTER.

5. THE NEXT STEP IS TO LET THE SOIL SCIENTIST DO THE JOB. YOU CAN'T. STAY THE HELL OUT OF THE WAY. PROVIDE ASSISTANCE. HELP. DON'T HINDER. MY FAVORITE SAYING IS "CALL ME IF YOU NEED ME, DON'T IF YOU DON'T".

UTILIZING THESE FIVE STEPS, YOU HAVE A SOIL SURVEY UPDATE IN PROGRESS RAN BY A CREDIBLE, PROPERLY TRAINED AND EQUIPPED SOIL SCIENTIST WHO KNOWS WHAT IS EXPECTED. YOU ARE NOT IN HIS WAY, YOU ARE PROVIDING HELP. NOW YOU ARE MANAGING A SOIL SURVEY UPDATE.

NOW FOR A WORD OR TWO ABOUT FLORIDA'S ACCOMPLISHMENTS WITH THIS MANAGEMENT STYLE. SINCE 1984, WE HAVE UPDATED 5 COUNTIES COMPLETE WITH NEW PHOTO BASES AND NEW PUBLICATIONS THESE FIVE COUNTIES ARE : SARASOTA COUNTY, SEMINOLE COUNTY, ORANGE COUNTY, HILLSBOROUGH COUNTY, AND MANATEE COUNTY.

HOW DID WE UPDATE THESE COUNTIES? WE TRANSFERRED THE LINEWORK. WE DETERMINED WHAT WAS BETWEEN THE LINES, REMAPPING WHERE LANDFORMS WERE NOT CONSISTENTLY SEPARATED. WE DESCRIBED WHAT WAS BETWEEN THE LINES.. AND WE DOCUMENTED WHAT WE FOUND.

EACH OF THESE UPDATES COST FLORIDA SCS 2 MAN YEARS ABOUT 50 PERCENT OF WHICH WAS FUNDED BY THE RESPECTIVE COUNTY.

WE ARE NOW IN THE PROCESS OF UPDATING ESCAMBIA COUNTY, 50 PERCENT COST SHARED BY THE COUNTY. AND WE PLAN TO INITIATE ONE ADDITIONAL UPDATE SOON; OKEECHOBEE COUNTY.

CONCURRENTLY, WHILE COMPLETING THE ONCE OVER MAPPING (31 COUNTIES SINCE 1984) AND UPDATING OLDER SURVEYS, WE ARE TRANSFERRING LINEWORK TO TOPO. QUADS. FOR DIGITIZING. WE WILL HAVE DIGITIZED 24 COUNTIES OR ABOUT 35 PERCENT OF THE STATE BY DECEMBER OF THIS YEAR. DURING THE TRANSFER PROCESS WE ARE UTILIZING THE THREE D'S TO INSURE THAT THE DIGITIZING PROCESS IS QUALITY ASSURED.

I AM NOT GOING TO STAND UP HERE AND STATE THAT THE REASONS FOR FLORIDA'S SOIL SURVEY SUCCESSES IS BECAUSE OF ME. WITHOUT THE SUPPORT OF LINE OFFICERS INCLUDING DC'S, AC'S,

AND STC'S WE ALL KNOW ANY PROJECT ACTIVITY IS DOOMED FOR FAILURE. I HAVE HAD TREMENDOUS SUPPORT.

WHAT DOES THIS MEAN? DAMN IT; IT MEANS THAT BY DECEMBER 1993 FLORIDA WILL HAVE AN ELECTRONIC SOIL SURVEY DATA BASE WITH ATTRIBUTE FILES THAT IS UP TO DATE, FOREVER. CHANGES CAN BE MADE DAILY (UTILIZING THE THREE D'S) AND USERS CAN BE GIVEN UPDATED DATA AT THEIR CONVENIENCE.

IN REVIEW.

WE'VE TALKED ABOUT A LOT OF FACTORS. BUT THE MOST IMPORTANT IS TO GET GOOD PEOPLE. THIS IS EASIER THAN IS SEEMS. YOUR PEOPLE ARE GOOD PEOPLE, THEY CAN BE AS GOOD AS YOU DEMAND. MY CHALLENGE TO YOU AS STATE SOIL SCIENTISTS IS TO OUT DO FLORIDA.

STATE SOIL SCIENTIST WORKSHOP
Kansas City, Missouri
March 12-16, 1990

Wednesday, March 14, 1990, 1:30-2:00 p.m.
Saunders/Dundy Counties Update
Norman P. Helzer

Slide 1 --- MAP - STATUS OF RECORRELATION (MLRA)
MLRA 72 and MLRA 106 in PROGRESS - NEBRASKA
MLRA 72 includes - Colorado
- Kansas
- Dundy County, NE update with digitizing/GIS testing (Hoover/Hance)

MLRA 106 includes - Kansas
- (Iowa soils)
- Saunders County, NE update with projects/NSSC staff involvement, Lincoln

Slide 2 --- Saunders County, Nebraska outlines on 1:250,000 General Soil Map showing
- loess drift hills including Sharpsburg soils
- Todd Valley; Platte River Valley and water source for Lincoln/Omaha
- sights for testing techniques and for investigations

Slide 3 --- Soil Survey Primary with Secondaries including:
- Generating Original Data:
  - Investigations
  - Techniques
- Helping to Use Data:
  - Interpretations
  - Operations
  - Resource Areas

These are priority areas to focus on at present and in the near future.

Slide 4 --- Operations (Pie Chart)
- In order to support update techniques and MLRA recorrelation/evaluation activities, 1/3 of working time is dedicated to:
  - progressive soil survey
  - update techniques/investigations
  - MLRA 106 recorrelation/evaluation

This 1/3 partitioning includes goals and funding as well as time.

Slide 5 --- Saunders County flow chart

Attribute data
Interpretations
Spatial data

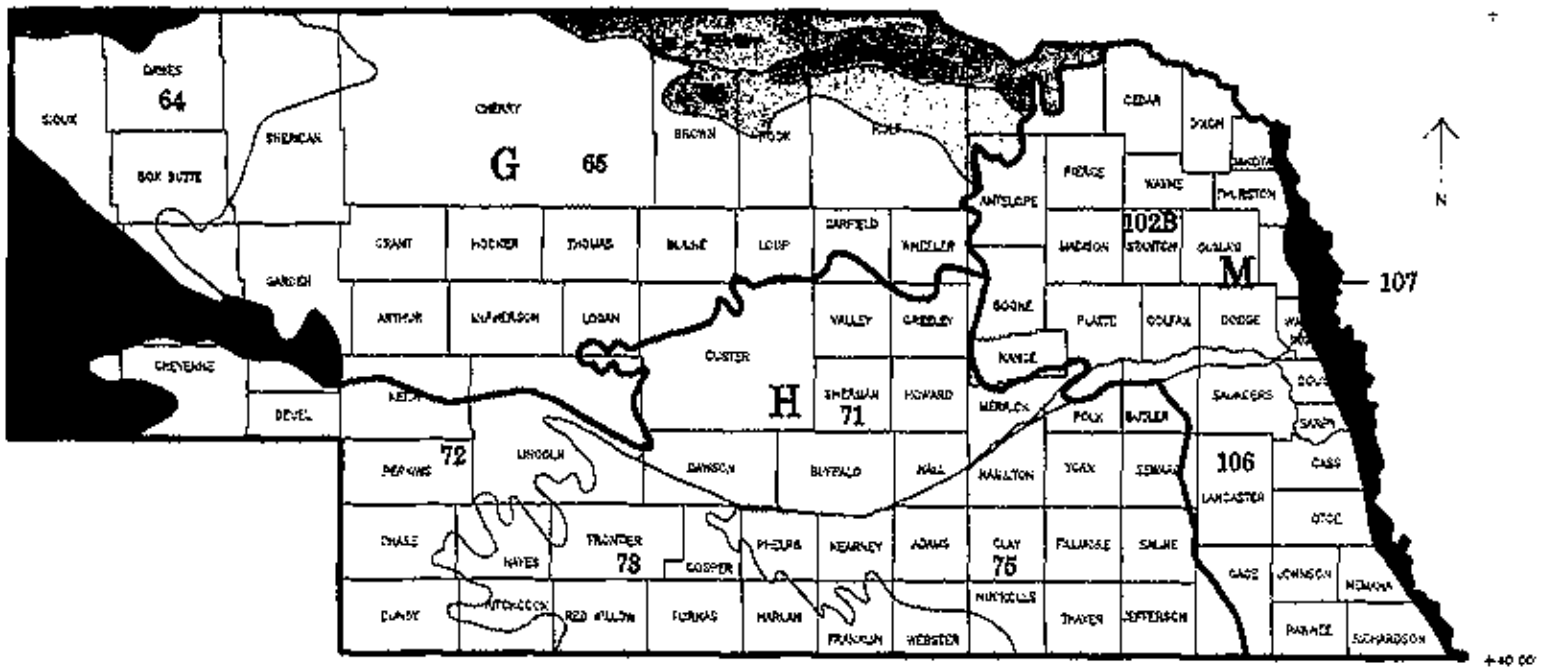
The update includes 20 projects by some 10 sponsors including topics as:

- map unit components
- root measurements/preplant water/bulk density
- FCC
- Data record -- map unit
  -- pedon
- Soil 5's query

Prioritize: Awareness, Objectivity & <u>ANALYSIS</u>

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



LEGEND

G – WESTERN GREAT PLAINS RANGE AND IRRIGATED REGION (MLRA)

- PIERRE SHALE AND BADLANDS
- 33B SOUTHERN ROLLING PIERRE SHALE PLAINS
- 64 MIXED SANDY AND SILTY TABLELAND
- 65 NEBRASKA SANDHILLS
- DAKOTA–NEBRASKA ERODED TABLELAND
- CENTRAL HIGH PLAINS

H – CENTRAL GREAT PLAINS WINTER WHEAT AND RANGE REGION (MLRA)

- 71 CENTRAL NEBRASKA LOESS HILLS
- 72 CENTRAL HIGH TABLELAND
- 73 ROLLING PLAINS AND BREAKS
- 75 CENTRAL LOESS PLAINS

M – CENTRAL FEED GRAINS AND LIVESTOCK REGION (MLRA)

- 102B LOESS UPLANDS AND TILL PLAINS
- 106 NEBRASKA AND KANSAS LOESS DRIFT HILLS
- IOWA AND MISSOURI DEEP LOESS HILLS

STATUS OF RECORRELATION (MLRA)

- AREAS IN PROGRESS

LAND RESOURCE REGIONS (LRR) AND MAJOR LAND RESOURCE AREAS (MLRA) NEBRASKA

SEPTEMBER 1989

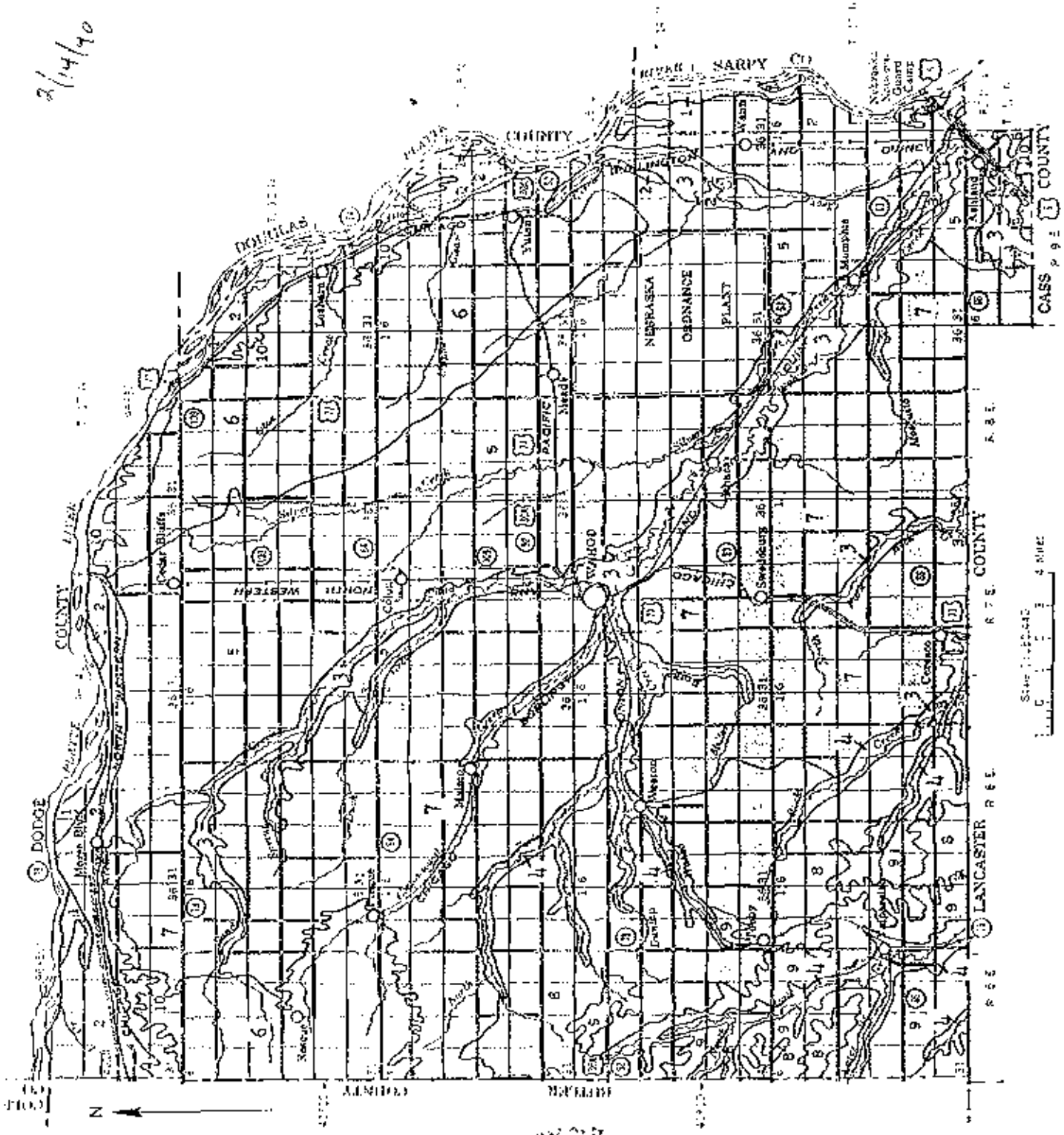
0 25 50 75 100 mi

SOURCE:
DIGITIZED FROM SCS S.N.-37,850 DATED 4-25-89.
MAP COMPILED USING AUTOCARTO MAP CONSTRUCTION WITH THE
PLOTAR EQUIPMENT NATIONAL CARTOGRAPHIC CENTER
FORT WORTH, TEXAS 1989.

Slide 1

Slide 2

2/14/90



SOIL SURVEY

Classification	Techniques
Interpretations	Resource Areas
Investigations	General Soils Maps
Operations	Soil Management
Soil Correlation	Support Services

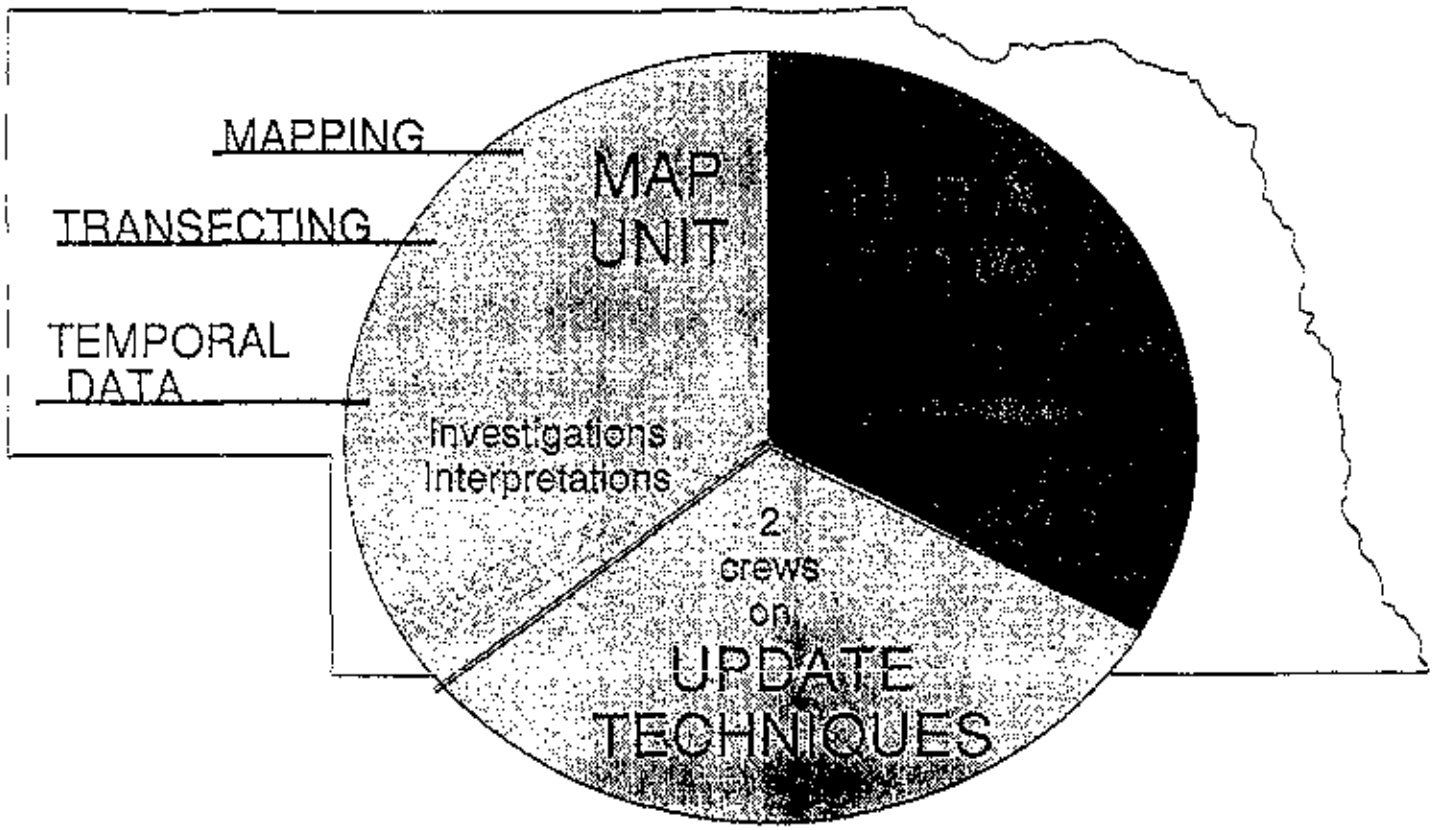
CARTOGRAPHY

Legend: Generating Original Data

OPERATIONS

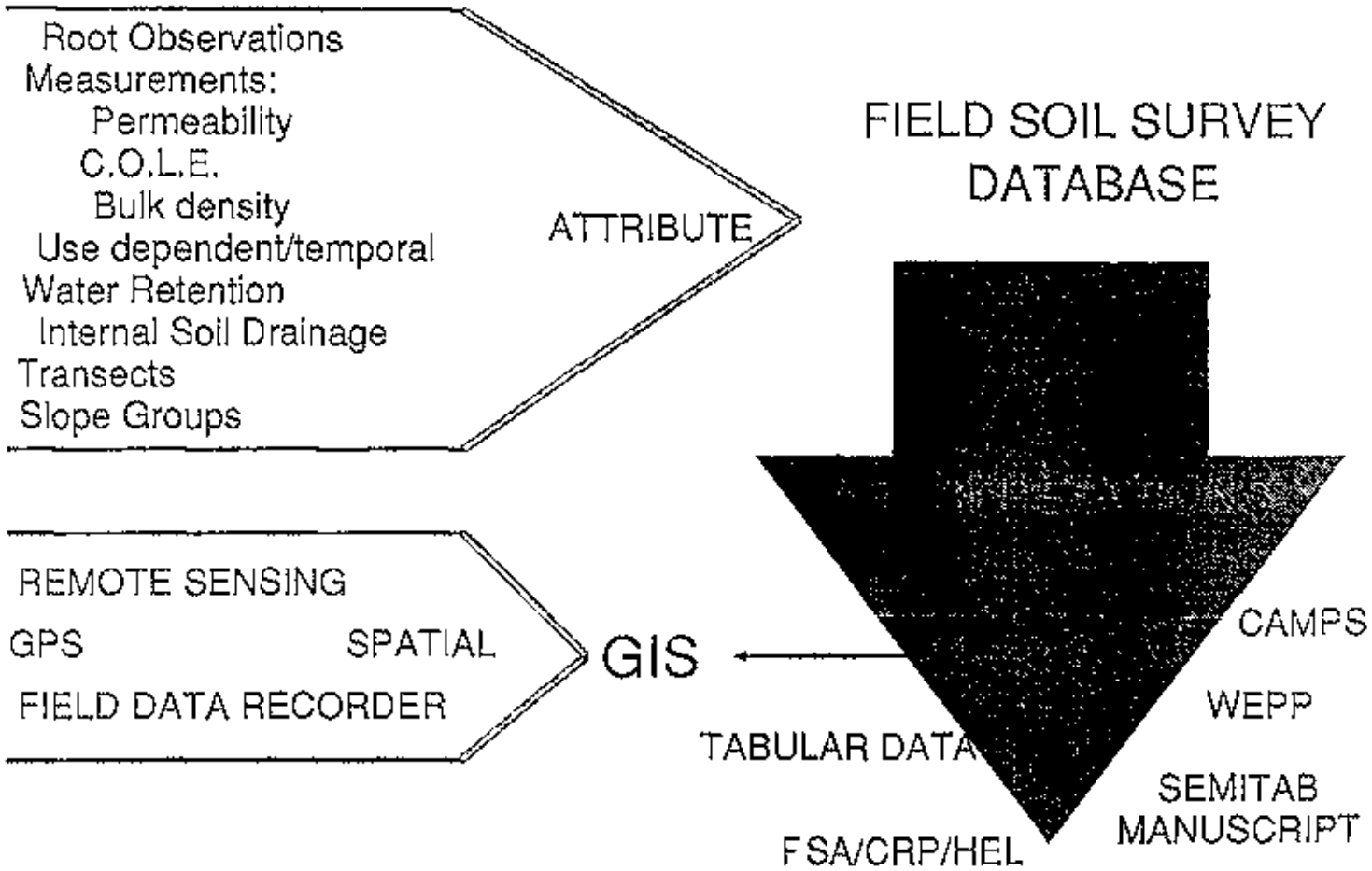
Capabilities - can map 1 million acres/year

12 soil scientists - map .5 million acres/year



Slide 4

SAUNDERS COUNTY



DANE COUNTY PROJECT ACTIVITY

SOIL DIGITIZING AND GIS

INTRODUCTION:
Review with you how through the implementation of several demonstration projects we were abale to develope techniques for and evaluate the accuracy of and expand the use of the soil survy in a GIS setting for solving and meeting local landuse requirements in Wisconsin

STATE and FEDERAL MANDATAES:

PROJECT ACTIVITIES:
Dane County Land Records Project
Intent of the Project:

1. Modernize U.S. Public Land Survey System
2. Improve the spacial accuracy and consistency of local land records.
3. Complete the soil erosion control plan for Dane County, Wisconsin
4. Digitize existing maps relating to land records.
5. Demonstrate cooperation and data sharing amoung cooperating agencies and staff.

I will emphasize those activities relating to the use of the soil survey.

Methods utilized to digitize the soil survey

1. mylars of the soil survey map separates were obtain for digitizing.

2. Software:

the ODYSSEY software package devolped at Harvard University was used; an early attempt to demonstrate the usefulness of vector (polygon) digitizing.

3. Hardware:

a Northern Video Graphic scanner was used to create the computer map file.

the UW systems mini-computer was used to edit the scanned maps

4. grid tics from the USGS 7.5 minute quad sheets were use to provide control points

5. Other activities:

rubbersheeting was used to create the appropriate field sheet join and the individual field sheets were zipped together to create four maps that covered the entire county

quality control was evaluated by comparing the digital field sheets with the mylars and by comparing digital soil survey check plots of a quad sheet with the original quad sheet.

special databases were developed for the map products desired (dthis is one of the reasons we switched the digital information to PC-ARC nearly immediately after digitizing)

PRODUCTS DEVELOPED

many different combinations of layers, including ownership boundaries, landuse and land cover, were utilized to help the local field office

1. identify landowners with HEL fields

2. estitmate HEL workload

3. prepare individual parcel maps by combining the ASCS litho prints and the digitally developed HEL maps.

4. put together sufficient information to develop and document a county wide erosion control strategy

Consoil Project:

The CONSOIL project was undertaken to improve the service delivery for a set of public resource conservation programs. GIS, LIS, and geopositioning technologies, large scale orthophotographs and new institutional arrangements were to be developed to modernize the management of State and Federal soil and water conservation programs. (includes 1985 farmbill components such as CRP, Sodbuster, Swampbuster and conservation compliance)

PRODUCTS PRODUCED:

GIS technology was employed to pinpoint NPS problems and develop a waterfquality management plan for a targetted watershed in the county.

The following slides illustrate some of the products developed during the process.

The availablility of orthophotography at a scale 1:12,000 had the most immediate impact on the soil survey program.

Hydric soil lists were used with the digitized soil survey to guide the wetland mapping team. Overlaying the soil survey, that was digitized at 1:24,000 with the orthophotos at the scale of 1:12,000, was generally successfull. However, the transition is not without incident. Two problems surfaced:

1. Some of the original field sheets which contained a small acreage of land at the edge of the image did not contain a grid tic that was used for control during the original digitizing operation. Needless to say there was sufficient relief to cause some shifting of the soil lines in relation to the landscape shown on the orhtophoto. (this will be corrected by adding additional control- we hope)

2. During the original digitizing and consolidation of field sheets into the four quadrents for the county we overlooked the rubbersheeting and zipping function of this join. Again some minor discrepancies were noted when we tried to apply the digitized soil survey to the orthophotos.

These challenges are presented to illustrate how we can't be careful enough when including control during the digitizing process. The high quality orhtophotos serve as an excellent tool to use when comparing digital maps to the land surface.

Presented at:
SSSNW, 3/12-16/90

SOIL CLASSIFICATION

John E. Witty
National Leader
for Soil Classification

INTRODUCTION

I really appreciate being able to attend these meetings because it is one of the best ways to learn what is going on in the various states concerning soil surveys, especially with regard to new ideas or ways of doing things. In this presentation I am going to give you a brief updatte on soil classification and the Soil Survey Manual, and I want to call your attention to what I might call a problem with keeping our cooperators informed. I will conclude with my evaluation concerning the current status of and the future of Soil Taxonomy.

SOIL CLASSIFICATION STAFF

I am stationed in Washington but will probably move to Lincoln in the spring of 1991. The other soil classification staff members, Richard Fenwick, Robert (Bob) Engel, and Margaret Hitz, are stationed in Lincoln. Richard's main responsibility is to complete the Soil Survey Manual. Bob has been working mainly on amendments and has also been assisting the Quality Assurance Staff by participating in some field reviews. Margaret is our new secretary, but she also provides secretarial help to the field investigations staff.

We have one "active" vacancy. I call it active because it is scheduled to be filled next summer. We have some other vacancies which may never be filled.

KEYS TO SOIL TAXONOMY

The 4th edition of Keys to Soil Taxonomy was scheduled to be published no later than December, 1989, so as to maintain the schedule of updates every other year. I provided the updated version on computer disks to the publishers in June, 1989, but it has not yet been published. This delay is the result of several factors:

1. We changed publishers from Cornell University to Virginia Polytechnic Institute & State University, Blacksburg, VA, and even though a test of software and hardware compatibility was made ahead of time, it turned out that there were some compatibility problems with computers that had to be overcome.

2. Soil Taxonomy was never thoroughly edited by a professional editor. I had planned on getting the Keys properly edited before the 1991 printing, but because of time limitations and because nobody was available to do the editing, I was not planning on having this current version edited. That was before I sent the disks to VPI. The person at VPI who has the responsibility for the Keys is a research editor, and she did not want to print the Keys without some minimum editing. When VPI returned the first page proofs to me, my wife volunteered to do the proofreading and some editing. I reviewed all editorial changes to make sure that no meanings were changed, but it took several months for VPI to get the corrections incorporated because of the software incompatibility.

3. A few other print jobs were put ahead of ours by the higher echelons at the university.

I completed my review of the final page proofs near the end of January and the blue-line page proofs about 2 weeks ago. Printing is now in progress and should be completed by the end of next week (3-23-90). We are now hoping that the new Keys will be ready for distribution no later than the end of March, but it will probably be April before you receive your copies. This new edition of the Keys will carry a 1990 date rather than 1989.

There are two major changes in the Keys this year: 1) a new order, Andisols, is added; and 2) the keys to subgroups have been converted to the same format as the keys to orders, suborders, and great groups. These are the same changes that are reflected in National Soil Taxonomy Handbook Issue #13, of which you have copies. Adding the new order and changing the format of the keys to subgroups will make the new edition approximately one third thicker.

The Keys still require some editing, but the intent should be clearer in many places now than in previous editions.

DISPOSITION OF PROPOSED AMENDMENTS

We have a big problem in coming up with an efficient way to submit proposals and to get them in a review process that results in either acceptance or rejection of the proposal. It seems that our current procedure results in a few proposals being lost or unduly delayed, but with current staffing levels I do not know of a better way.

The following is a summary of the current procedure:

1. The originating State Soil Scientist forwards the proposal to the Chair of his Regional Soil Taxonomy

Committee. The Chairs of these regional committees are the heads of Soils Staffs at the National Technical Centers.

2. The receiving Chair submits the proposal to his committee members for review, with a request that they approve or disapprove the proposal and document their recommendations. Complimentary copies should also be sent to the Chairs of the other Regional Soil Taxonomy committees and to the National Leader for Soil Classification.

3. The Chair summarizes the recommendations from his committee, notifies the originating state concerning the recommendations, and forwards the summary and recommendations to the National Leader for Soil Classification.

4. The National Leader for Soil Classification forwards the proposal to the other Chairs of the Regional Soil Taxonomy Committees and the Chair of the Soil Science Society of America's Soil Taxonomy Committee for their review and recommendations unless the first regional committee had recommended that the proposal should not be accepted and this recommendation is clearly justified.

5. After receiving the recommendations from the Soil Taxonomy Committees, the National Leader for Soil Classification follows up on these recommendations. The originator will be notified if the proposal is not approved. If it is approved, it will be published in the National Soil Taxonomy Handbook.

Most of the questions that I or my staff receive concerning Soil Taxonomy are from the Quality Assurance Staff but the states are welcome to contact me or my staff directly.

SOME CURRENT PROPOSALS UNDER CONSIDERATION

The following are some proposals that we are currently working on:

1. The proposal to recognize a new diagnostic horizon, the glossic horizon. This proposal originated because of problems in applying the definition of tonguing. Tonguing will probably be removed as a diagnostic feature. This also requires modifications in the definitions of the albic horizon and interfingering.

2. Modifying the series control section. A major change being considered is extending the series control section by starting at the surface rather than at 25 cm, and by extending down to a depth of 1.5 m rather

than 1 m if the bottom of any diagnostic horizon is shallower than 1.5 m. Also if a paralithic contact is within 1.5 m from the surface, the series control section would extend 25 cm below the contact or to 1.5 m, whichever is shallower. Other parts of the definition will remain unchanged. If these changes are approved, more emphases will be placed on the plow layer and temporal properties. Also it will allow for correct definition of many of those series that are currently differentiated on the basis of properties below the currently defined series control section.

3. Redefining Ultisols to include frigid or colder soil temperatures. This is a proposal coming from New York.

4. Adding new classes to keep the soils with continuous permafrost separate from those with cyclic permafrost. Soils with cyclic permafrost lose the permafrost in the upper part as a result of fires or clearing, but if these soils are allowed to revert back to their natural vegetation the permafrost returns in a period of 40 or more years. Whether or not the soils with permafrost have continuous permafrost or are subject to cyclic permafrost has considerable impact on their interpretations.

5. We hope to finalize the Vertisol proposal this year. The International Committee on Vertisols has submitted its final recommendations, but we will probably give this proposal limited circulation for final testing before it is finally approved.

6. Other very active international soil classification committees are those on the aquic soil moisture regimes, Aridisols, and Spodosols. We hope we will also be able to wrap up their proposals within the next 1 1/2 to 2 1/2 years.

SOIL SURVEY MANUAL

Richard Fenwick is keeping very busy getting the Soil Survey Manual ready for printing. The current schedule requires the complete, edited manuscript to be in National Headquarters by May 1, 1990, which is about three months sooner than what we were planning on two months ago. The schedule had to be moved up to ensure that the manual will be published using money budgeted for this fiscal year.

Wilda Grant, who works in the Public Information Division, is doing the editing. She used to be an editor on the Soil Survey Staff. I believe the editing is on schedule. Richard is revising the chapters to include the editorial changes as he receives them. He is also completing the appendices and the final selection of photographs.

After the completed manuscript is received at National Headquarters, it will be submitted for departmental approval. After approval it will take approximately 4 months to complete the design work. We expect the printing to be completed before the end of this calender year.

How many of you had started your career before SCS began to revise the Soil Survey Manual in 1970, exactly 20 years ago? It has taken a long time, but it looks like we will finally get the new manual published this year.

KEEPING OUR COOPERATORS INFORMED

The next item I want to mention concerns procedures for making soil survey publications and other information available to our cooperators. I believe it is the responsibility of the State Soil Scientists to keep the cooperators in their state properly informed. For the most part this is being done, and of course it should be a two-way street, but occasionally cooperators will tell me that the "pipeline" is broken; for example, they will tell me that they were not aware that a certain National Soil Taxonomy Handbook issue had been out for many months.

I do not know what kind of address lists you maintain, but I believe it would help the cooperative effort if you identified your cooperators by their interests and, for example, mailed them a copy of National Soil Taxonomy Handbook issues or a complimentary copy of the Keys to Soil Taxonomy if classification is of primary interest to them. Unless an SCS distribution is for internal use only, I am sure there are cooperators who would be interested in receiving a copy.

STATUS OF SOIL TAXONOMY

The last item concerns my evaluation of the status of Soil Taxonomy. Earlier speakers, especially the administrators, have listed several items on different priority lists. Soil Classification has not been included in their lists even though soil classification is a very important component of our soil survey program. Probably during the last 50 to 60 years soil classification has been on priority lists most of the time. It appears that at this point in time soil classification is satisfactory meeting the needs of the soil survey program.

The goal of all managers should be to manage or maintain their program in a fashion to keep it off of priority lists. We should anticipate the needs and be ready to meet those needs.

I expect soil classification will be on priority lists again in the future, especially if staffing does not keep pace with future needs. I am sure that over the next 3 to 5 years we will receive considerable pressure from our users to republishing Soil Taxonomy (AH-436). There will also be a demand to computerize Soil Taxonomy so soils can be classified by computer rather than having to do it manually. That is, either a 232 description or a complete series description with lab data, if available, could be introduced into the computer for automatic classification. This will be a huge job but it is feasible.

Thank you.

OVERVIEW OF THE SOIL SURVEY DATABASE ACTIVITIES
PRESENTATION TO THE STATE SOIL SCIENTISTS MEETING
KANSAS CITY, MISSOURI

David L. Anderson

March 12-16, 1990

Overview

Following are excerpts from a recorded talk given by David Anderson at the State Soil Scientists meeting, Kansas City, Missouri.

This presentation addresses three areas: (1) the growing demand for automated soil databases, (2) the changing role of the soils program in the state office because of automation and (3) some of the features of the new database.

Growing Demand for Automated Soil Databases

We are moving from an era where the primary media for managing our soil information was through written material. We will continue to provide information as text, but today, more and more of our users are requiring information in automated formats. This is fueling a growing importance of and demand for automated soil databases. I will briefly discuss a few examples of how the importance of soil databases is growing.

An Information Strategic Plan (ISP) is currently being put together by the SCS. Tommy Calhoun is the soils representative in the group developing the ISP. This group has completed phase 1 and are now working on phase 2. The ISP identifies the soils database as one of the most important databases used in SCS.

Another major initiative within the SCS is the development of the Field Office Engineering software. This software is going to rely heavily on the automated soils database that resides in CAMPS.

There are several new applications that will soon be coming on line in CAMPS. Many of these need to access the soils database directly.

Another example of increased emphasis on soils data is outlined in a recent report on automated tools used in conservation decision making. A committee is looking at the tools that are either currently available for conservationists to use in the planning process, or are on the drawing boards. The committee has identified over 80 tools. Most of these are models that are either now available or are being developed. Some examples are: WEPP, USLE, RUSLE, GLEAMS, CREAMS, EPIC. . . . Of the tools

identified, I have estimated that about 40 percent require access to a soils database. There are two important recommendations from this group. First, that we provide temporal kinds of information in our databases--surface and near surface conditions, and second that we tailor the CAMPS soils database to represent local soil characteristics.

We are getting an increasing number of requests from people who want to package and sell our information to the public. Recently I met with an individual from Maryland who wants to sell soils information on CD Rom media. He markets a variety of natural resource databases and would like to provide soils information as well. This raises several serious questions. How confident are we about the data in our databases? Can we stop people from selling our information? Do we want to stop them?

Recently, I was contacted by a representative from an Ag chemical company that wants our entire soil database. They would subset the data on field laptop computers and use it to make recommendations for their clients in the field.

There is a renewed interest and increased emphasis on environmental issues. It is exciting to see that environmental issues are now becoming part of the international political agenda. Some of the information on environmental abuse that is now coming out in Eastern Europe and the Soviet Union are helping to emphasize the importance of the environment here at home. We know soils information can play a very key part in natural resource planning. However, to meet this challenge, our databases must be organized so that we can quickly respond to global issues.

Impact of Automation on the State Staff

There are obviously many benefits associated with automating our soils data. Some of the most obvious are increased efficiency, improved data validity, improved performance, and being able to respond to change. Not only are there opportunities, there are costs and constraints involved as well. One of the costs is the commitment to managing an automated information system at the state level. This is something new that we haven't had to do in the past. The ability to manage databases, to be able to use hardware and software effectively, and to provide the required support and training is becoming an important role for soil scientists.

The state office is the focal point for managing our soils information. In the future, we will see more and more processing on our state computer. For example, currently we download the Map Unit Interpretations Records (MUIR) data tables from ISU. We can now create these in SSSD and

download just the Soil Interpretations Records (SIRs) from ISU. We will soon be able to generate manuscript tables out of SSSD as well.

Features of the New Database

I would like to discuss briefly some of the general concepts that are emerging from the analysis of the new soils information delivery system. These concepts are not set in concrete yet, but they are beginning to surface in that general direction.

We begin with the concept of a field database where the observations that the soil scientist collects would be stored. Observations are characteristics that are recorded by the field soil scientists such as pedon descriptions, transects, and field notes. As discussed previously, we are looking at technology that will allow us to do this effectively. The pedon program is an important tool for collecting and organizing this field data. It is currently being rewritten to improve it's capability and efficiency.

We are looking at the soils data collection process. Data collection includes those processes where field soil survey data are collected, validated, and added to the database in an organized and efficient manner. The goal is to provide the field soil scientist the technology to effectively collect, record, manipulate basic field observations, as observed, with minimal constraints due to classification schemes or limitations imposed by the software. One obvious advantage of doing this is the data are entered once, at the point of collection, and used repeatedly throughout the system. This will allow more exact data to be collected and analyzed. It will allow data to be summarized and statistics to be generated resulting in improved data reliability statements. It will allow mechanisms for updating soil surveys and to provide data for models as well as other users. At the present time, we enter information such as official series descriptions and map unit descriptions through a manual process. We then edit these information sets, spending considerable time making sure everything matches. In the future the goal is to enter pedons, transects, and notes in the field and then derive other data sets from these.

We are looking at a variety of technologies that will help us to efficiently collect data in the field. One is the field data recorder which allows information to be entered as hand written text, then converted to machine readable characters. Other technologies being evaluated are the data scanner and global positioning systems.

Once we have these observations stored, the computer can help us aggregate and summarize the data from the individual observations. It will also help establish representative values to be used for interpretations and models.

The map unit component appears to be a key entity in the new databases. The component data record would represent the data for a specific geographic area. For existing surveys, the component records will be populated from the data currently in SSSD. For new survey areas component records default ranges, and representative values would be derived from aggregating the observations within the mapped delineations. Interpretations would be based on the component records for individual map units.

Multiple conditions for data characteristics will be stored. We now have the ability to store only one bulk density or one K factor in the database for a given soil under a specific condition. In the future, we may want to store data for multiple conditions. For example, we may want to store bulk density under a compacted condition, or perhaps compute bulk density.

In the new data structure, data collection methods will also be identified. For a given piece of information the method in which that data were gathered would be recorded.

One of the features currently under design is an automated process that would allow a user to interactively adjust interpretive criteria. This will allow the user to change the criteria and immediately see the impact of that change on the interpretation result. This is a considerable improvement over the way interpretations are managed now. Soils interpretative criteria are imbedded in computer programs and are difficult to change. When changes are made to the criteria, it is difficult to evaluate the impact of that change on interpretations.

Something that I am very excited about is the ability to interface the tabular databases with the geographic databases. Soil information can be separated into two very important kinds of information; attribute data, which are the kind of information in tables, and geographic data which are maps. These two kinds of information are managed entirely different. The attribute data is managed by a Relational Database Management System (RDBMS) and the geographic data is managed in a GIS. Using the RDBMS and GIS, however, requires a high level of skill. Soils and the CGIS Division are in the process of developing interface programs that link these two kinds of systems together and allow easy interactive use. The interface programs allow the user easy, menu driver access to both the map data and tabular data.

In the design of the new database the key word is flexibility. The only thing we know for sure about the future is that change is constant. Our database must respond to change as new requirements become known and as new knowledge is gained. The structure of the database must be such that new reports can be generated easily and new data elements added without a major redesign of the system application programs.

National Workshop for State Soil Scientists
12-16 March 1990
Soil Survey Investigations
Ellis G. Knox

I. National Soil Characterization Data Base (NSCDB)

The NSCDB will be an integrated data base of the soil characterization laboratory data and field pedon descriptions from the National Soil Survey Laboratory (NSSL) and characterization laboratories of state agricultural experiment stations (AES) and possibly other laboratories. Analytical data and descriptions with software for manipulation of the data will be distributed periodically on CD ROM to make it available to the SCS and other participants in the National Cooperative Soil Survey (NCSS).

The NSCDB Committee has National Soil Survey Center (NSSC) members (Dave Anderson, Data Base, and Benny Brasher and Ellis Knox, Investigations) and AES members selected by the four AES soil survey regional committees (Ed Ciolkosz, Northeast; Wayne Hudnall, South; Tom Fenton, North Central; and Bill Allardice, West). Much of the developmental work is being done by Paul Dyke's group at Temple, TX, through an agreement with Texas A&M University, funded by Soil Survey Data Base software development funds. Ellis Benham, of the Texas A&M group is stationed at the NSSL in Lincoln.

The pedon description program will be that used throughout the SCS soil survey. The system will allow and facilitate the entry of laboratory data and descriptions from hard copy and the conversion of existing electronic data to an exchange file format. The current state of CD ROM technology seems to eliminate or severely reduce the need for access to a central data base by telecommunications. We anticipate that characterization data will be in the State Soil Survey Data Base in most states and downloaded to CAMPS as appropriate.

The NSCDB is intended to support estimation of values of soil properties in soil interpretation records, derivation of default values for missing data or new properties by development and application of predictive relationships among properties, work on project soil surveys and updates, soil classification, development and application of models, documentation of soil characteristics, etc.

II. Classification of Soils in Characterization Data Base

The strict family classification of pedons in the data base is crucial for many applications of the data. This is in addition to the identification of the pedon to a map unit component. We have submitted a line item budget request for contract assistance in the classification task.

III. Map Unit Composition and Map Quality Committee

A Center committee has begun work on development of a manual for field use on methods for determination of map unit composition and for evaluation of map quality. This complements the effort of work group 4 of this Workshop. Quality Assurance and Investigations have the lead with the strong support of other staffs. The chairman is Ron Paetzold of the Investigations Staff. Other members are Craig Ditzler, Berman Hudson, Tom Reinsch, Ron Bauer, Otto Baumer, Rick Bigler, and Ellis Knox.

Guidelines and standards currently in use will be an important source of information. Ron has compiled an extensive list of publications. Suggestions and contributions are welcome.

IV. Training

You effective and efficient managers may wonder why the Investigations Staff is involved with nine courses for soil scientists this year, plus the Soils Institute in Gainesville. We wonder, also. Two of the courses were Laboratory Data Procedures, taught in January and February. Two course are Laboratory Data Use, in April. Data Use also was taught in Boise in January and will be in Raleigh in May and in Bismark in July and August. The new course intended to replace both Basic Soil Survey and Laboratory Data Procedures will be taught twice by the Center Staff in May and June. Quality Assurance and Investigations share in the leadership for this new course. In addition to these courses, Otto Baumer helps with the salinity course sponsored by the irrigation engineers and Carolyn Olson and others help Quality Assurance with the correlation course.

Warren Lynn takes a great deal of the burden for our courses and deserves s great deal of the credit. He seems most alive when working with your soil scientists. I hope that they seem more alive and enthusiastic and informed when they get back to you.

V. Characterization Analyses

Most of the analytical work of the NSSL is in response to requests from states, commonly made after consultation with the liaison for the state. Larry Brown and his staff of soil scientists and technicians has kept up with requests for both reference and characterization analyses. In a number of states, the AES has made a major contribution to the NCSS by taking on much or all of the laboratory characterization responsibility. This service is ending in at least one state, so that we can anticipate some increase in requests for soil analyses.

We have characterized soils from other countries, mostly as part of Soil Management Support Service (SMSS) projects. As Hari Eswaran said earlier this week, there is now a substantial international soil characterization data base.

The primary criterion for accepting other reimbursible analytical work, foreign or domestic, is that it be related to good field studies and field descriptions so that the results contribute to the overall characterization of soils or to other goals of the soil survey or the agency.

I think that it is fair to say that the characterization effort primarily has been directed toward soil classificatin, correlation, and mapping. Now that interpretations are becoming important, we may need to consider alternatives to the common practice of complete characterization of complete pedons. It could be argued that we should analyze primarily for those properties on the soil interpretation record for only the major horizons and for only the most extensive soils.

VI. Soil Property Values for Models and Other Interpretations

Application of Existing Characterization Data--Having laboratory data is not the same as using it to make good decisions about the values entered in soil interpretation records. We need to work with Interpretations and Data Base Staffs make it easier to know what is available and to select and display appropriate data in a convenient way for deriving the best estimated values. This is a major part of the motivation for work on the NSCDB and for much of the effort of the data base analysis group. Some state offices have requested and received tapes of the NSSL data. We will continue to work with states, the NTCs, and the rest of the NSSC to make characterization data useful for estimation of soil properties.

Predictive Relationships--Models call for some properties for which not many data are available. Otto Baumer developed algorithms and expert systems to derive default values needed for DRAINMOD. He and others on the Interpretations, Data Base, and Investigations Staffs are working to supply values for missing data needed for WEPP and other models

New Measurements--We cannot depend on predictive relationships to provide all of the values needed for models and other interpretations. We are adapting, developing, and testing new methods that will need review and evaluation by other staffs. For example, water-dispersible clay was measured at WEPP investigations sites and may well become a standard determination. Further, index values for bulk density of plow layers, using standard reconstituted

conditions, may correct the problem of having a single value on the soil interpretation record when we know that there are large variations determined by management practices and weather.

VII. Soil climate

Many measurements of soil moisture and soil temperature have been made since the moisture and temperature regimes were first defined. Ron Paetzold has been working with Joe Nichols and others to formulate suggestions for revision of these regimes and to improve the determination of the regime. Recently, he was named chairman of the new International Committee on Soil Moisture and Temperature Regimes (ICOMMOTR). He will present current ideas to 1990 regional conference committees and in Soil Climate Occasional Notes.

VIII. National Science Teachers Association

The SCS Public Information Division has had exhibits at annual meetings of this group each spring. This provides access to vast numbers of elementary and secondary students through their science teachers. Dewayne Mays in 1988 and Fred Kaisaki in 1989 made excellent presentations about science in soil survey. This year, Rebecca Burt and Fred Kaisaki will represent us all at the meeting in Atlanta.

IX. Investigations (NSSL) Staff

Our staff has its share of senior members so we are pleased to have recruited some excellent newer and younger soil scientists within recent years. Chris Smith came and left in favor of Hawaii, but we have managed to keep Tom Reinsch who came several years ago from Oklahoma, Rebecca Burt who came about a year ago from Kentucky (both Tom and Rebecca are in the Physical Analysis section), Terry Sobecki, also from Kentucky and in the Chemical Analysis section, and Carolyn Olson, recruited from the Geological Survey as head of the Field Investigations Staff. Currently there is a vacancy announcement for a GS-11/12 research soil scientist to be part of our Field Investigations Staff.

Additions by transfer at the start of the NSSC were: Erling Gamble from the Midwest and Jim Doolittle from the Northeast and Ron Paetzold, Milt Meyer, and Ellis Knox from NHQ.

We are pleased that Richard Pullman was able to help with field mapping in MO in 1989 and in ND in 1990.

NATIONAL SOIL SURVEY INTERPRETATIONS AND GEOGRAPHY STAFF
SPEECH PREPARED FOR STATE SOIL SCIENTISTS MEETING
MARCH 12-16, 1990
KANSAS CITY, MISSOURI

INTRODUCTION

At our last meeting, our staff was just getting organized. I talked to you about our plans and planned projects. We now have our staff in place and are busy with those projects. We are blessed with perhaps the largest staff ever in soil interpretations at the national level and couple our staff with the soil interpretations staffs at the NTCs and it becomes clear that we have shifted to the business of serving the user of soil survey information. We can now accomplish things that have been on the back burner for a number of years. I will discuss some of our projects and future plans.

We recently have added a soil scientist for water quality interpretations and also have been given responsibility for part of the Soil Geography duties. Dennis Lytle is our new National Coordinator for Soil Geography. He will be working with national policy, guidelines, and procedures with respect to Soil Geography. Bob Nielsen is our soil scientist for water quality. He will be working on improving upon our interim soil-pesticide ratings and will help me with hydric soil activities.

I mentioned the emphasis with working with users. Showing people how to use soil survey is very gratifying in that we see persons interested in the fruits of our labor and have the opportunity to help them understand and use the data. However, we also are working with a very sophisticated set of users who recognize the quality of our product but who are asking questions about the data that are sometimes difficult to reconcile and who are using our products and information for things that often times surpass the original purpose of the survey. This is where are challenge lies and I want to discuss issues such as kinds of information (estimated properties) that are needed and the quality control/assurance procedures that we have in place for what some call the maintenance phase of a soil survey.

Our goal is to have a fully automated soil information system that supports generating soil interpretations using the most precise information available. As we presently do business, that is the attribute data in the State Soil Survey Database. We can be very proud of this data but we will continually need to update and supplement the data to improve our product.

SOIL GEOGRAPHY

We have made good progress in the development of our first draft of STATSGO and are aware of the glitches that remain. You will have to help us resolve those glitches, especially those that involve Forest Service. But we are well on our way to having the first nationally consistent state general soil map. We will continue to revise and update STATSGO as an integral part of the soil survey process. We

appreciate your efforts and those of the NTCs and NCC. I believe it is an effort we can all be proud of. STATSGO will be heavily relied upon to provide soil input into state and national issues. Just recently the research arm of congress was presented a STATSGO thematic map for soil-pesticide interpretations. This map, in color, will eventually end up in the hands of every member of congress. We can stand publicity like that!

In many ways STATSGO has plowed the ground and set the stage for the STATE-NTC-NCC-NSSC partnership in soil interpretations and geography. Many of the issues we have solved and relationships we have developed with STATSGO will carry over to SSURGO and soil survey interpretations. We look forward to continuing that relationship.

We are working on:

- User manuals for NATSGO, STATSGO, and SSURGO
- Products you can use to demonstrate STATSGO and SSURGO
- STATSGO and SSURGO interfaces that Dave Anderson has mentioned.
- Procedures for quality assurance for STATSGO and SSURGO
- Procedures for aggregating SSURGO data to STATSGO and STATSGO data to NATSGO
- A soil survey digitizing manual with NCC
- Establishing a user support system with NTCs and NCC.

SSURGO and the potential that it holds for SCS is just now starting to be realized. With SSURGO we will have the ability to unlock that vast storehouse of information we have in soil survey. We will have a tool to repackage the soil survey and tailor our reports to meet the exact needs of the user. Soil surveys will be used as never before which will put a great deal of strain on our attribute data. We MUST continue to stress the science in our product and assure that the data in the SIR is the best representation of the soils in the survey area. Our data, whether it is section II of the FOTG or the official copy of the soil survey, will be our only defense in a court of law. We know you are doing the job as well as time allows. However, we must help you by developing national policy and procedures for quality assurance/control of the maintenance phase of the soil survey. Some items of concern that we will be working with you on are the review processes for updating map unit names of older surveys, for updated SIRs, and for data in the State Soil Survey Database.

ESTIMATED (BASIC) SOIL PROPERTIES

At our last meeting, I talked to you about the data requirements of the WEPP and WEPS models. We plan to have a "Set of Basic Soil Properties" which mostly include those properties that we can estimate or collect in the field. From this basic set of data we can use existing models or relationships to predict or estimate those soil attributes that are difficult to measure in the field such as permeability, bulk density, available water capacity, CEC, and etc. The system will allow the estimates to be fine tuned according to available analytical data.

We now know that we must have the particle size separates as part of the basic set of soil properties to be able to run any of the models. As soon as possible we will add silt, and the sand fractions to the set of estimated properties. Otto Baumer has developed algorithms to estimate these properties (best guess them) from the sieve data now on the SIR. We know there will need to be a concerted effort to check and fine tune these numbers.

We plan to add the site properties to the SIR that were agreed to at the 1983 National Work planning conference. This includes a separate entry for ponding. Other site properties include better information on water tables. Ideally the users would like water table information monthly. Perhaps we can ease into this and develop it by quarters.

We have developed a set of updated soil interpretation criteria tables. They were mailed out March 3 for your comment. We will need new data elements to be able to eliminate the footnotes to the tables and be able to computer generate all interpretations hopefully without overrides. This means we may need to add columns to identify soil properties or conditions identified by the footnotes to the criteria tables such as soils that are prone to slippage. Speaking about interpretation overrides, we recently printout all of the overrides by state. We have over 9000 pages of overrides! I'm sure that they are not all due to footnotes in the criteria tables, so we will be looking for patterns where the criteria can be corrected. We need your help in identifying cases where you consistently need to override an interpretation. The large number of overrides may also tell us that we need to regionalize the criteria. In an effort to add more flexibility to our criteria tables and to the expression of soil interpretations, we are looking to incorporating fuzzy set theory into the process. It would allow for indexing of criteria, ranking or prioritizing them, and allow us to represent the result as a sliding scale from slight to severe.

RUSLE will be adopted by SCS sometime in 1991. It provides for using the C factor to account for rock fragments on the soil surface. When this is done the 'k' factor must be for the fine earth portion of the soil. Thus we will be adding an extra 'k' value column for the k_f or fine earth 'k'. We will assume the present 'k' values are for the whole soil (been corrected for rock fragments). In addition we have developed a standardized and computerized method for assigning 't' values. Your NTCs will be sending you output for review soon. Our plan is to invoke the new 't' standards when RUSLE is adopted. This will not affect your HEL lists.

HYDRIC SOIL WETLAND ISSUES

The criteria remain an issue. We are trying to remove the drainage classes from criterion 2 and replace them with taxonomy classes and permeability. I know that this was tried once before but we are receiving more support this time. Some of you have questioned why we use hydrology in defining hydric soils and have asked the NTCHS to consider removing it. We have one the most extensive databases on hydrologic properties in the upper 2 meters of the earth's surface.

Thus the soil survey information becomes the source data to make wetland hydrology calls. You may want to revise the watertable and flooding properties to ensure that they correctly represent the hydrologic regime of the soil. One of comments from a user of the soil database is, why is it that the SIR shows obligate plants in the vegetation section for a soil and the soil is not hydric? We need to look at all data elements on the SIR for internal consistency.

We have routinely been updating the hydric soil list each year in October. However, we haven't published these updates in the Federal Register since 1987. According to our FSA rules and regulations we must publish a notice in the Federal Register each time we change the national list of hydric soils. I will be doing that soon for the changes up to now and will let you know of the changes via National Bulletin.

The Federal Manual for Identifying and Delineating Jurisdictional Wetlands will have a large affect on us from outside users of our soil information. Unfortunately, we at the national level have not done a very good job of letting you know the impact of the manual for SCS and particularly for Soil Survey. In the Manual, we stressed that the local list of hydric soil map units is the PREFERRED list for persons making wetland interpretations specifically those making 404 determinations.

Most of you have done an excellent job preparing your local lists, but we must be sure to follow our own policy in the FSA manual for developing the lists such as including all the soils on the national list on these local lists. An amendment to our FSA Manual, due out soon, specifies that states will have these lists available at the state office and will provide them to persons requesting them for use in wetland determinations. The new release of SSSD will help facilitate the computerization of these lists. We presently have JCL at ISU to assist in developing the local lists and SSSD will capitalize on this program. The new amendment also includes instructions for providing information on map units that have updated names and allows for the use of cultural legends to identify possible areas of hydric soils.

AGRONOMIC ACTIVITIES

In addition to 'k' and 't' activities, Bill has been working with our Agronomists on training modules. His first 'From the Surface Down' is being published in a special information brochure. Other activities include: resiliency rating criteria for use in making interpretations for sustainable agriculture and productivity indices based on soil properties. These indices will be eventually used to develop a soil quality index to replace 't' value when the WEPP technology is adopted.

We are evaluating the Fertility Capability Classification system for use as a fertility interpretation. We believe it may have value as a lay (nontechnical) description of potential fertility considerations for our soil conservationists. We are also looking at computerizing

and thus standardizing Land Capability Class and subclass. I know this is a sensitive issue to many of you and you will have ample time to respond to proposals.

The revision to 450-GM part 401 dealing with the technical guide will impact soils as much as it is impacting the other disciplines. I encourage all of you whose regional sessions on the FOTG have yet to be held to attend the meetings. This revision enforces some of the principles put forth in the 1987 revision. The soil resource is evaluated related to the concerns of erosion, condition, and deposition. To evaluate soil condition we will need to develop soil quality criteria tied to the sustainability of the soil resource. We then can relate this quality criteria to conservation effects being developed in section V of the technical guide. This is no small task and will we all need to work together with our resource conservationists in developing this quality criteria.

WOODLAND ACTIVITIES

Ron has been working with the National Forester in developing the CAMPS modules WINDSPEC AND INFORM databases for forestry. We recently had a get to know one another session with FS regional soil scientists and BLM soil scientists on the kinds of forestry/woodland interpretations they need. We had an excellent session and will expand and have another session in November 1990 to outline a set of interpretations for forestry. This time we will have a working session with SCS foresters and soil scientists as well as representatives from our NCSS cooperators.

WILDLIFE INTERPRETATIONS

The National Soil Range Team is working on updating our Wildlife interpretations on the SIR. George Staidl has the lead and is working with Dave Chalk, biologist at the WNTC. They will begin with the CA proposal of a few years back.

SUMMARY

To summarize, I have discussed some of our projects and concerns in soil interpretations and geography. We appreciate all the cooperation and assistance that we have received from you. I'm especially appreciative of all the help we receive from the NTC soil interpretation staffs.

In the next few months we will be concentrating on the criteria tables in the NSH. These are your criteria and we need you review comments to make them work for you. We look forward to working with you in updating policy, and procedures for quality assurance of the soil interpretations record. We plan on introducing this at our National Workshop for Interpretations and Databases in July. Thank you for your attention.

State Soil Scientists Workshop
Kansas City, Missouri
March 12-16, 1990

Quality Assurance[1/]

Welcome. I appreciate the opportunity to share with you some of the current activities within the National Soil Survey Quality Assurance Staff (NSSQA). This morning I have divided our discussion into several broad areas. Major discussion topics will include current activities related to OSED, field reviews, technical review of manuscripts, soil survey publication, Soil Survey Interpretation Records, Plan of Operations, MLRA update, training, and request for assistance. I appreciate the excellent cooperative assistance of Larry Ratliff and Berman Hudson, supervisory soil scientist in providing the basic data included in these comments.

Series Descriptions

Processing soil series into OSED continues to be a activity in National Soil Survey Quality Assurance Staff. A total of 2241 soil series were processed into OSED in 1989. To date, there are approximately 18,000 soil series in the OSED. The minimum number soil series processed by month ranged from 53 in July to a maximum of 429 in December. This past January, we processed 313 soil series into OSED. A high percent of the soil series being processed into OSED were from the western part of the United States.

Field Reviews

One of the major activities in NSSQA in terms of time and travel is assistance provided on various kinds of field reviews. This includes (1) initial (2) progress, and (3) final field reviews. Our staff has participated in or is scheduled to participate in (1) 21 initial field reviews, (2) 31 progress field review, and (3) 96 final field reviews in FY 1990.

As many of you are aware, there has been a gradual reduction of soil scientists on our staff through retirement and resignments during the past two or so years. Examples include Dick Johnson, Jerry Post, Marvin Dixon, Lou Buller, and Bob Turner. Last year, there was some shifting of assignments from the western and eastern part of the United States to assist with the workload demand in the central part of the United States.

Presently, they are 5 initial field reviews, 9 progress field reviews, and 8 final field reviews not assigned to soil scientists. This is primarily due to presently limited available staff to provide assistance to staff. We will need to take another look at these scheduled reviews in the near future to evaluate our available staff and commitment to participate in these scheduled reviews. We will certainly appreciate your assistance in notifying our office of any projected changes in review dates for the remainder of FY 90.

1/ Jim Culver
National Leader,
National Soil Survey Quality
Assurance Staff

Technical Review of Soil Survey Manuscripts
Activity related to technical review of soil survey manuscripts in FY 89 included (1) 50 manuscripts reviewed, (2) conducting 3 soil survey manuscript workshops, and (3) providing assistance to 17 states in development of manuscript format.

Projected state schedules indicate a large volume of soil survey manuscripts will be submitted to NSSQA for technical review in FY 90. As of January 31, 1990, technical review of 21 manuscripts have been completed.
Ninety seven manuscripts on the National schedule are designated to be received for technical review. Seventy three of these soil survey areas have a firm final field review date.

Soil Survey Manuscripts workshops have been conducted in Colorado, Oregon, Missouri, and Texas during the current fiscal year. Assistance was also provided to three states on development of manuscript format.

Our technical review of soil survey manuscripts is limited to only a portion of the soil series in the soil survey area. The following guidelines are used in making these technical reviews. Where the number soil mapping units is less than 50, a 20 percent review of all series is made; where there are 50 to 100 map units, the percent of series reviewed is 15 percent; and a 10 percent review of series is made in survey areas with more than 100 map units. For each series reviewed, all map units, general soil map descriptions, and tables associated with the selected series are given technical review.

Soil Survey Publication
A summary of the National schedule of soil surveys by state and survey area shows 236 soil survey manuscripts in the system. This includes some stage of review, edit, and publication. Soil maps for 181 of the 236 soil surveys have been submitted to the National Cartographic Center.

Current projections are to edit about 60-65 soil survey manuscripts in FY 90. We are presently using resources in contracting for proof reading and contract editing. We anticipate this use of contractors will increase our ability to edit about an additional 10 soil survey manuscripts during the fiscal year.

We currently have 45 soil survey manuscripts on the shelf ready for editing. Soil maps for 20 of these soil survey areas have been submitted to the National Cartographic Center.

Current projection suggest there is potential for about 100 soil surveys to be published this year. This is contingent in part on three contract of about 17 soil surveys in each that GPO has with private industry for publication.

One item we need your assistance on is having the Soils-7 "Collating Order" completed when the manuscript is ready to sent to GPO for publishing. Phil Chavez, National Coordinator for soil survey publication would appreciate receiving the completed Soils-7 about 6 months prior to the survey being sent to GPO for printing. We would suggest when the state send in the manuscript to NSSQA for edit, a collating order be prepared and transmitted concurrently. We also need your awareness and assistance in advising us of

any changes in shipping addresses as given on the completed Soils-7 form. This will eliminate the possibility of published soil survey reports being delivered to locations no longer occupied by SCS or other designated employees.

Quality Assurance - Soil Survey Interpretations Records
A January 1990 summary shows on a national basis we are using over 30,000 Soils 5 in our cooperative soil survey program. A summary on the number of Soil 5 being used in each NTC area is as follows.

NTC	Number of Soils 5
NENTC	1,845
SNTC	3,705
MWNTC	5,090
WNTC	20,797

The Soils 5 as presently used are an integrate part of data gathering and delivery system. The information on the Soils 5 is being used by a wide variety of customers.

There is a continued need at all levels, i.e., Field, Area, State, NTC, and NSSC, to be cognizant of the values on each Soils 5. Recent personal experience with changes on the Soils 5 related to Hydric soil criteria, soil drainage classes, and coordination with the soil series description clearly demonstrates a continued effort by each of us is needed to maintain quality Soils 5 data.

One proposal discussed between our office, NTC, and some states is coordination and quality review of Soils 5 by Major Land Resource Areas (MLRA). This would allow us to review all of the Soils 5 in a geographic area at one point in time. We feel this approach offers an excellent opportunity to utilize our data bases in making search on inconsistencies and etc. in our data sets.

Plan of Operations - NSSQA
There are a number of items in the Plan of Operations for the staff in the NSSC where NSSQA staff have a leadership or assistance role. The following is a listing of activities in the Plan of Operations where NSSQA staff are scheduled to participate. Some of the activities the NSSQA staff will provide is a lead role, while in other activities, our role will be one of assistance. This is a random listing with no order of significance.

National Soil Survey Handbook (NSH). Revised NSH needs to be made available for our use in conducting the National Cooperative Soil Survey Program.

Map scale, MLRA, GIS.

Map unit characterization and documentation.

Technical review and coordination of Soils 5 by MRRA.

Soil Moisture Regime Map - western United States.

Alternative formats and procedures for publishing soil surveys.

Minimum standards for quality control of soil surveys.

Pilot course: Soil Survey - Laboratory Data.

Pedon Description Program.

State Soil Survey Database (3SD).

Soil survey updating procedure development.

Soil survey digitizing.

Major Land Resource Area (MLRA)
This past week a meeting was held at Stillwater, Oklahoma, to review past activity and develop plans to update MRLR 77. This area about the size of the state of New York includes parts of Texas, Oklahoma, Kansas, New Mexico, and Colorado; and three NTC areas (SNTC, MNTC, and WNTC.) Larry Ratliff, supervisory soil scientist, NSSQA staff provided excellent coordination on a very productive session. In attendance at the session were NSSC staff; MNTC, SNTC, WNTC, NHQ, Oklahoma, Kansas, Texas, and New Mexico. Some significant items were:

1. Update for entire MLRA.

2. A digitized soil map will be one product.

3. One legend for entire MLRA.

4. Soil survey parties with detail to assist - overtime.

5. Recommend party leaders work in an atmosphere of MLRA rather than the state and county boundaries.

6. Scale of 1:24,000.

7. One report for entire MLRA.

8. Subsets of data by county.

9. Involvement of multiple disciplines.

10. A multiple layer project with specific completion data for various phases.

Training
Training is one of the major activities in the NSSQA Staff each year. In addition to training provided on soil survey manuscripts, workshops, state meetings, and etc., several formal courses are conducted. These formal courses are:

1. Basic Soil Survey

2. Soil Correlation

3. Soil Laboratory Data Procedure

4. Soil Laboratory Data Use

5. Soil Survey and Laboratory Data Procedure

There presently is interest in developing courses in (1) Advance Soil Correlation and (2) Party Leader Management.

Request for Assistance
There are a few activities where the NTC or states have a major responsibility role that we would appreciate your consideration. These include:

1. Regional Soil Taxonomy Committee.--I would encourage where appropriate NSSQA staff be involved in working with states in preparing proposals for Soil Taxonomy. Bob Ahrens, soil scientist, NSSQA staff, has provided excellent input and coordination between the State, NSSQA's, and the Midwest Regional Soil Taxonomy on some issues in North Dakota. I am sure this cooperative atmosphere exists in the other parts of the country and certainly support this level of involvement.

2. Regional Work Planning Conferences.--I have strong positive feelings toward the National Cooperative Soil Survey Program. I would encourage you to consider inviting appropriate NSSQA staff to be members of the working committees within your respective regional conferences.

3. As we began to develop our request for assistance this next year, we would be most responsive to any multiple state field studies or field studies involving several soil survey areas within one state. Well organized field studies directed toward a specific objective provide a good vehicle to study soils and resolve issues.

4. The interest to modernize or update soil surveys continues. Our staff will be receptive to providing assistance to a selected limited number of states to assist in the evaluation process for update. Our highest priority will be those areas where the updates will be by MLRA.

Closing Comments
When looking at the names of the various staffs in the National Soil Survey Center, the kinds of work and responsibility most staffs is evident by their name, i.e., National Soil Interpretations Staff, National Soil Data Base Staff, etc.

However, the kinds of activities and responsibilities for the National Soil Survey Quality Assurance Staff is not readily identified in the name alone. A brief look in Webster provides some clarification on use of the terms "quality" and "assurance."

Quality is defined as (1) excellence of character, (2) distinctive character, (3) distinctive trait, (4) accomplishment.

Assurance is defined as (1) state of being certain or sure, (2) full confidence or trust, (3) freedom from doubt, (4) firmness of mind.

Thus, the term "quality assurance" implies one is in full confidence or free from doubt that an excellent, distinctive product, or soil survey is made. This tends to imply that a level of quality assurance is involved in all phases of activity related to soil survey. Traditionally, some of the

activities of the NSSQA staff are similar to those of NTC soil correlation staffs prior to the National Soil Survey Center. As we collectively begin to modernize our soil surveys with an increased demand for various kinds of soil survey information, I can see the old saying "If its not broke, don't fix it" will soon put us in an outdated mode. I am confident as we look ahead and create or take advantage of opportunities in the future, our staffing needs and assignments will need to be flexible.

I personally feel we collectively have an excellent staff in NSSQA. As most of you know, we have two soil scientists, Earl Lockridge and Craig Ditzler, who are actively involved in a PhD program at the University of Nebraska.

I am looking forward to working with the NSSQA staff. We will certainly be responsive to request from you and your staffs. No doubt as time goes on, various kinds of issues will surface. Hopefully we can collectively keep a good line of communication open in mutually maintaining a high quality soil survey product. A comment made by one of the speakers during a recent Regional FSA workshop in Des Moines, Iowa, I thought was quite appropriate. "The road to success is always under construction."

EEO OVERVIEW
BY
M. DENISE DOETZER

I'd like to share some insights into the purpose of EEO, give you an overview of the EEO Branch and staff responsibilities, update you on the Toward's Workforce 2000 implementation strategy, and share some EEO questions/situations with you.

The purpose of the Federal EEO program is really three fold:

(1) to provide equal employment opportunity for all persons and,

(2) to prohibit discrimination in employment because of race, color, religion, sex, national origin, age or handicap, and

(3) to promote the full realization of EEO through a continuing affirmative action program

EEO laws and regulations are based on these concepts:

- prohibition against discrimination
- affirmative action

Equal Employment Opportunity is the right of all persons to apply for and be evaluated for job opportunities without regard to such non-merit factors as race, or sex.

The Soil Conservation Service, as a federal agency, is bound by Title 7 of the Civil Rights Act of 1964 to protect the rights of employees and applicants - and to make a special effort to employ and advance women and minorities in order to overcome the effects of past and present discrimination.

Presented at the SCS State Soil Scientist National Workshop, March 12-16, 1990 at Kansas City, Missouri. Denise Doetzer is the National Affirmative Employment Program Manager, SCS, USDA, Washington, D.C.

It has been said that "We are shaped and fashioned by what we love and by those who loved us." Well, let's take a quick overview of a few laws that have affected women and shaped our lives:

1864 - First statuatory recognition of federal employment for women, and it established a maximum salary of $600 for women and $1800 per annum for men.

1870 - Sex Preference Law - This law gave Federal agencies the option to request men or women only to fill positions. Based on this law, agencies tended to appoint men only to higher level jobs and women to lower level jobs.

1965 - The sex preference law was repealed - 95 years later.

1930 - Economy Act

- Men were given preference as heads of households
- Husbands could receive their wives paycheck without her consent
- Wives of federal employees could not be hired by any Federal agency

Our EEO branch at National Headquarters is staffed by 7 individuals. I'd like to tell you a little about our staff and their responsibilities because:

(1) several people are new to the branch and,

(2) there is increased emphasis on branch responsibilities.

Our branch chief is (Martha Marbury, Martha gets paid for the big headaches), and the secretary is Denise King. The EEO counselor is Pierpont Mobley. Pierpont heads up the EEO program of counseling, mediation, and complaint procedure. This is a process where an employee (or applicant) alleging charges of discrimination can have the facts reviewed. The EEO counselor is an individual who gathers the information and tries to mediate a resolution between the complainant and the responding official. Counselors are not investigators who represent management or the employee. The counselor is a neutral party who gathers the facts and tries to bring the parties together in an effort to resolve the situation. (pg. 26 in handout - complaint). Transparency

We have 3 special emphasis program managers. Tom Baughman is our Hispanic Employment Program (HEP) Manager and also the Selective Placement Program Manager. The Hispanic Employment Program was established initially by a presidential directive in 1970 for spanish-speaking Americans. The SCS HEP manager, serves as an advisor to management on Hispanic issues and policies, carries outreach recruiting efforts into the community and provides assistance and training to the state HEP managers. The Selective Placement Program for the Handicapped has an action plan which promotes the hiring, placement and advancement of handicapped individuals and the retention of employees who become disable for the positions they hold but who may qualify for other positions. The Selective Placement Manager is concerned primarily with an individuals' placement, and the management climate in which the handicapped employee works. I would like to emphasize that this program stresses ABILITY and we, as managers need to examine barriers in the workplace that artificially limit the handicapped person's opportunity in the workplace.

Linda Younger is our Black Employment Program Manager and also our Native American Program Manager. These programs were not a result of a particular law or executive order, but SCS identified a need for special emphasis or employment concerns for these groups. In this position, Linda serves as an advisor to management and provides guidance and training to the state managers.

Sandra Burgess is our Federal Women's Program Manager (FWPM). The FWPM is responsible for employment and advancement of women. It is a unique management program where primary legal responsibility rests with top management. This program was established to implement a recommendation made by the President's Committee on the Status of Women. Our FWP managers assist women as they advance thru the agency by identifying barriers to career development, devising solutions, and drafting plans for implementation by management.

And, I am the National Affirmative Employment Program (AEP) Manager. The AEP is the plan of goals and action items used to track, and report affirmative action in hiring, promotions, and training. Development of this plan was mandated by the Equal Employment Opportunity Commission (EEOC) as a measure of agencies' accountability and compliance with the law.

The EEOC reviewed the Federal Workforce from 1982-1986 and found that minorities and women were under-represented in professional, administrative and skilled craft positions and in higher grades. So they instructed agencies to perform a comprehensive analysis of the representation of gender specific - racial/ethic groups by comparing the agencies'

workforce with the civilian labor force (CLF). This analysis was made and our national multi-year (5-year) (1988-1992) AEP was developed. Every year we are required to review this document and monitor progress. An update and an accomplishment report are required annually.

The AEP document is fairly easy to comprehend. But there is one term I'd like to explain - the under-representation index (U.I.)

Under-representation is a situation in which women or members of a minority group constitute a smaller percentage in employment category than the groups percentages in the applicable Civilian Labor Force. The CLF are those who are working or who are actively seeking employment.

The under-representative index is based on a formula which compares the agencies' workforce with the Civilian Labor Force. An index of 99 or less indicates under-representation.

This year I have incorporated the action items from the Workforce 2000 Conference into the National AEP accomplishment and update reports. These items have also been identified in the appropriate definition and branch APO's. Most of the states have also identified action items into their state AEP's. The implementation strategy was developed by the Workforce 2000 committee and revised by the Chief's top staff and policy referral committee. Many issues were identified and recommendations made in the implementation strategy. Management decided to focus on the 4 top priority issues for FY 1989-1990; which are:

1. Communication
2. Career Counseling
3. Mobility
4. Family care

Draft policy statements have been prepared on networking, career couseling, mobility and family care issues. They are awaiting approval from the Chief's Policy Review Committee and the final products are due out by the end of this fiscal year.

Now I'd like to switch gears, and handout an EEO quiz.

In conclusion I'd like to mention that our branch is updating the EEO section of the General Manual and it will be out by September, 1990. Please take the time to read and understand it. Become familiar with it, so you know what your rights and responsibilities are. So many of the complaints that come in our office are based on non-selection for a position. When the counselor reviews the cases, most of them are based on the fact that the employee did not understand the merit promotion system as well as the EEO complaint processing system.

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12-16, 1990

Work Group 1: Proposal for States Soil Survey Allocation Formula

Chair: Richard D. Babcock, State Soil Scientist, Temple, Texas
FTS: 736-1261 Commercial: (817) 774-1261

BACKGROUND: States soil survey programs cover a wide array of activities and needs: some state programs are relatively small, others are large and complex; some states receive local funding to help support the soil survey program, other states must rely solely on SCS allocations; most states are still heavily involved in completing the initial soil survey inventory, several states have completed the initial inventory and are viewing updates as a priority, many states see the need for updates in some survey areas as a priority over completing the initial inventory; all states have an obligation to ensure that soil survey information is properly utilized and maintained to meet the needs of ever-expanding SCS programs as well as the many other multi-user needs.

Congressional appropriations for the soil survey program are a major line item in the SCS budget each year. Allocation of funds for states soil survey programs is a yearly function of the Soil Survey Division in NHQ. The Soil Survey Division recommends state funding levels to the Chief for final review and approval. States allocations have centered around a "base" state funding level. The development of this "base" primarily considers staffing in the State Office, Project Soil Surveys, and Resource/Area Soil Scientists. Recently, some states allocations have also included special appropriations for FSA mapping and cost-share monies for digitizing.

CHARGE: Staffing for project soil surveys (initial/updates), state staff, resource specialists, cartographic and GIS, and databases; also, program size, program diversity and complexity, states population density, conservation program needs, equipment and overhead, etc.---these are some of the ingredients for consideration in developing states soil survey allocations. What are the priority factors that should affect distribution of appropriated soil survey funds to meet states staffing and program needs? The Work Group is asked to recommend the ingredients and proportions (formula), for NHQ consideration, for developing states allocations of appropriated soil survey funds.

Committee Members

F. Dale Childs
Gordon L. Decker
James H. Ware
Steve Holzhey
Karl Langlois
Dean D. Rector
Paul Pilny
Glenn E. Kelley
Laurence A. Tornes
Dennis J. Iytle
David L. Jones
Robin J. Wisner
Edward H. Sautter
Timothy Craul
Gerald J. Latshaw
Davie L. Richmond
Norman R. Kalloch
Charles L. Fultz

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12-16, 1990

Work Group 2: Procedure and Documentation Requirements for Requesting Soil Survey Updates

Chair: G. Wade Hurt, State Soil Scientist, Florida
Commercial (904) 377-1092

BACKGROUND: Many states are completing or have completed the initial soil survey inventory and now want to update the database to provided current interpretations and information. Updating the soil survey database may vary from providing new interpretation tables to updating most of the soils maps. Criteria are needed to determine if a soil survey needs to be updated and to what extent. If an update is needed, a system to prioritize update requests needs to be developed because our current level of funding is not adequate to complete the initial inventory of private land and fund all the update requests.

CHARGE: The work group should provide guidelines to the Director Soil Survey Division on:

1. The documentation that should be required to accompany the request to update a soil survey. Also, suggest a procedure to obtain documentation.

2. A procedure is also needed to prioritize update requests to ensure that the limited available funds are used to update the most outdated and deficient surveys.

Committee Members

Arville B. Touchet
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Hari Eswaran
Joe D. Nichols
Garland H. Lipscomb
Benjamin N. Stuckey
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Alan Price
Steven J. Hundley

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
March 12-16, 1990

Work Group 2: Procedure and Documentation Requirements for Requesting Soil Survey Updates

Chair: G. Wade Hurt, State Soil Scientist, Florida

Charges: Provide guidelines to the Director Soil Survey Division on:

1. The documentation that should be required to accompany the request to update a soil survey and a procedure to obtain the documentation.

2. A procedure to prioritize update request from states.

Conclusions of the committee are as follows:

1. Existing methods contained in the National Soils Handbook provide an excellent starting point of providing documentation for update needs. Updates should not be considered for approval without this documentation.

2. Prioritizing should involve all players (NHQ, NSSQA, TSC's, and states). States should, as a part of their normal management procedures, prioritize their update needs.

3. NSSQA should review states requests and prioritize by MLRA.

4. NHQ should fund as funds are available by MLRA.

5. Updates are not a type of remapping. Updating a soil survey should require less than 2.0 man-years. Updates with an anticipated work load requirement of more than 2.0 man-years should be reevaluated with the help of NSSQA.

6. NHQ should base funding decisions on a point system based on data received from states. The point system should include the following considerations:

a. Land use changes; cropland increases and disturbed land increases.

b. Out of print surveys.

c. Photo base inadequacies.

d. Lack of laboratory data.

e. Number of inactive series.

f. Pre Taxonomy correlation.

Total weight assignable to these 6 factors (a-f) should not exceed 20%.

g. Cost share availability.

Total weight assignable to this one factor (g) should nat exceed 20%.

h. Reliability of the survey.

Total weight assignable to this one factor (h) should be 60% or more.

The only true reason to update a soil survey is to provide users with additional or unavailable or unreliable data. This is sometimes referred to as "data voids". Date voids are created by the lack of date, the lack of precise data, the lack of accurate data. Data voids in a soil survey means the user is unable to obtain desired knowledge and therefore the survey is not reliable. This lack of reliability must be measured prior to authorizing any updates. Due to the cost of updating soil surveys, measuring reliability must take place prior to the start of an update. All map units of a survey area must be evaluated prior to requesting update authorization. If all map units are measured for reliability data voids could be expressed as a percentage of the survey area. Logically NHQ can then prioritize update requests.

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12-16, 1990

Work Group 3: FSA - Management Efficiencies/Lessons Learned

Chair: Robert L. McLeese, State Soil Scientist, Illinois
FTS: 958-5286 Commercial: (217) 398-5286

BACKGROUND: The challenge of meeting soil mapping needs for the 1985 Food Security Act has caused many states and National Headquarters to undertake new initiatives and management techniques over the last several years. Details and temporary assignments from one state to another, within state details, contracting with qualified soil scientists in the private sector, overtime for soil survey party members, hiring additional soil scientists, and other management initiatives have been used.

CHARGE: What have we learned from these various initiatives and methods used to map our nation's cropland? What has been the impact on productivity, cost efficiency, mapping quality, training and technical proficiency of soil scientists, etc.? The Work Group is asked to explore these and other concerns associated with FSA mapping which may be of benefit to future soil survey program management.

Committee Members

Maurice Mausbach
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Bobby J. Ward
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Larry D. Zavesky

STATE SOIL SCIENTIST WORKSHOP
March 12-16, 1990
Work Group 3
FSA-Mgt. Efficiencies/Lessons Learned

SUMMARY

CHARGE Take a look at FSA initiatives/activities/concerns and evaluate them for future soil survey program management.

BACKGROUND In October 1986 we had 94 million acres of cropland in the nation that needed to be mapped for FSA. Each state developed strategies to accomplish their part of the job. Some of the initiatives undertaken:

- .Details instate
  details out-of-state
- .Contract mapping
- .Overtime $
- .Broad land use/soil association mapping
- .Adjusted work schedules
- .Attitude adjustment/team building
- .Include field staff as part of planning process
- .Supplemental photography
- .Use of mgt. skills
- .
- .
- .

QUESTIONNAIRE There were 63 respondents to the questionnaire. Results are attached.

RECOMMENDATIONS

The following recommendations were made during the two working sessions.

1. The philosophy, "Quality was, is, and always should be Job 1," should be used.
2. Utilize the Awards Program
3. Use a "detail program" for career development (consider details other than soil mapping, also.)
4. Utilize contract and overtime mapping
5. Provide clerk/typist support to soil survey offices
6. Pay close attention to soil scientists' training needs
7. Think about and pay attention to soil survey accuracy, precision, integrity, and accountability.

FREE COMMENTS

Think about the following:

1. What do I get paid for?
2. "Spread the word and expose ourselves"
3. 80/20 rule
4. "It's easier to receive forgiveness than permission."
5. Professionalism
6. "If you're not part of the planning process, you'll be a critic."
7. "Skate to where you think the puck will be."

Are you (circle one)
- .field soil scientist
- .state staff
- .NTC
- .NSSC
- .NHQ

Are you from (circle one)
- NENTC area
- MNTC area
- SNTC area
- WNTC area

STATE SOIL SCIENTIST WORKSHOP
March 12-16, 1990
Work Group 3
FSA-Mgt. Efficiencies/Lessons Learned

QUESTIONS	% YES	% NO	% No Answer
1. Overall, FSA was good for soil survey.	95%	5%	-
2. The idea of a "mobile" work force has strong merits for future soil survey work.	57%	41%	2%
3. Out-of-state details proved productive and efficient.	79%	11%	10%
4. The use of contract soil scientists proved productive and efficient.	49%	17%	34%
5. The use of overtime was effective and should be used in the future.	81%	11%	8%
6. We learned we could be more productive and efficient in our approach to mapping.	81%	16%	3%
7. Individual farm mapping is inefficient and demoralizing.	68%	19%	13%
8. Use of a large group of soil scientists in a project like atmosphere is desirable.	68%	27%	5%
9. Final cost/acre for FSA mapping will be higher than the cost for project activities.	51%	38%	11%
10. Soil survey leaders management knowledge and skill was developed during FSA.	97%	3%	-
11. Soil survey leaders and/or field soil scientists were involved in FSA strategy.	79%	14%	7%
12. The stress level experienced by most survey leaders was acceptable.	68%	19%	13
13. Our soil survey staff feels good about their efforts and accomplishments.	99%	8%	3.
14. Soil survey staffs were adequately rewarded for their efforts.	51%	44%	5
15. Soil characterization/investigation activities suffered during FSA.	86%	13%	1
16. FSA took the "science" out of soils.	38%	62%	-
17. The CRP part of FSA will need to be remapped.	30%	57%	13
18. Many SOI-5's were developed during FSA without adequate background data.	37%	48%	5
19. Training of new soil scientists could be likened to "baptism under fire."	71%	22%	7
20. Technical proficiency of soil scientists improved as a result of FSA activities.	71%	29%	-
21. Do you know what the mission of the cooperative soil survey is?	100%	-	-
22. Do you know the objectives/initiatives of the soil survey program in your state.	94%	2%	4
23.			
24.			
25.			

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12-16, 1990

Work Group 4: Soil Survey Quality Control/Documentation Process

Chair: Sylvester C. Ekart, State Soil Scientist, North Dakota
FTS: 783-4435 Commercial: 701 250-4435

BACKGROUND: Quality control is the process of comparing soil survey work to a set of standards to ensure the work is of acceptable quality. It is a state responsibility, since it is at the state level that individuals are most familiar with the soils. The quality control standards in the National Soils Handbook were prepared when soil correlation was an NTC staff responsibility. Although most states are still using these standards for their quality control, an agreement is needed on what the minimum standards for the states should be. These standards need to be placed in the National Soils Handbook.

CHARGE: The Work Group is asked to:

1. Identify those soil survey processes for which minimum standards are needed for quality control.

2. For each process identified, define the minimum standard or documentation needed to ensure quality control.

Committee Members

Larry F. Ratliff
Remiro Molina
Ellis Knox
Gary B. Muckle
Horace Smith
Christopher Smith
Norman P. Helzer
John Meetze
Gilberto R. Acevedo
George E. Teachman
Frederick L. Gilbert
John Witty
Michael J. Domeier
Richard L. Schlepp
Roger Windhorn
Darwin L. Newton
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Ferris P. Allgood
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Carolyn G. Olson

STATE SOIL SCIENTIST WORKSHOP
KANSAS CITY, MISSOURI
MARCH 12-16, 1990

Work Group 4: Soil Survey Quality Control/Documentation Process

Committee Members: Larry F. Ratliff, Remiro Molina, Ellis Knox, Gary B. Muckle, Horace Smith, Christopher Smith, Norman P. Helzer, John Meetze, Gilberto R. Acevedo, Berman D. Hudson, George E. Teachman, Frederick L. Gilbert, John Witty, Michael J. Domeier, Richard L. Schlepp, Roger Windhorn, Darwin L. Newton, David G. VanHouten, Ferris P. Allgood, Lytond Morris, Carolyn G. Olson, and Sylvester C. Ekart, Chairperson.

Charge 1: Identify those soil survey processes for which minimum standards are needed for quality control.

The following were identified:

1. Map unit boundary placement and procedures to check boundary placement.
2. Standards for developing MOUs with cooperator participation.
   a. for new surveys.
   b. for update surveys.
3. Standards for map unit composition.
4. Standards for classification and correlation.
   a. new series.
   b. lab data.
   c. pedon descriptions, 232s.
   d. taxonomic descriptions.
   e. map unit descriptions.
   f. joining of all surveys, area to area, state to state, etc.
   g. landscape classification.
5. Standards for documentation of soil behavior.
6. Standards for naming map units.
   a. statistical statements.
   b. confidence level statements.
7. Standards for soil survey data bases.
   a. digitizing.
   b. water quality parameters.
8. Standards for data collection, when the survey is completed and additional data is needed or desired.
9. Standards for development of data bases for "estimated properties" collection.
10. Standards for map intensity.
    a. orders of mapping.
    b. map scale.
11. Standards for map compilation and map finishing.
12. Standards for site description.
    a. point data location.

b. landscape.

13. Standards for map model development.

14. Standards for measuring soil degradation.

15. Standards for block diagrams, photographs to include:
    a. quality.
    b. number.

16. Standards for soil survey area handbooks.
    a. format.
    b. contents.

17. Standards for adding and identifying new data elements.

18. Standards for related areas in specific survey areas.
    a. climate.
    b. geology.
    c. yields, crops.
    d. range.
    e. forestry.

19. Standards for manuscript development.
    a. format.
    b. consistency.

20. Standards for the uniform definition and application of terminology to describe soils.
    a. drainage.
    b. consistency.
    c. depth.
    d. s, t, and i values.
    e. erosion.

21. Standards for the development of general soil maps.
    a. legend.
    b. scale.

22. Standards for the minimum qualifications for soil scientists.
    a. field level.
    b. state level.
    c. national level.

23. Standards for the quality of photo base.
    a. for mapping.
    b. for publication.
    c. for photo interpretation.

24. Standards for updating and maintenance of soil surveys.

25. Standards for tracking spot and special symbols.

26. Standards and procedures for conducting field reviews.

27. Standards for collating and ordering published surveys, based on population.

28. Standards for contract mapping.

29. Standards for correlations prepared by cooperating agencies.

30. Standards for special mapping such as FSA.

31. Standards for soil interpretation.

a. SIRs.
b. nonstandard kinds.

32. Standards for the mapping of disturbed lands.
    a. urban land.
    b. reclaimed prime farmland.
    c. land leveled for a specific use.
    d. eroded landscape segments.
33. Standards and procedures for Quality Assurance as it relates to Quality Control.
34. Standards for data base development.
    a. data configuration.
    b. hardware.
    c. software.
35. Standards for the development or describing the soil/geology interface, vadose zone.
36. Standards for benchmark soils.
    a. identification.
    b. data collection.
37. Standards for soil moisture and temperature regimes.
38. Standards for documentation and recorrelation of published soils surveys.

Charge 2. For each process identified, define the minimum standard of documentation needed to ensure quality control.

The discussion was limited to the following:

1. Minimum standards for a new soil series.
    a. Number of pedon descriptions, 23Cs.
        1. partial descriptions.
            a. <200 acres, 2.
            b. >200 acres, 5.
        2. complete descriptions.
            a. <200 acres, 2.
            b. 200 to 1000 acres, 5.
            c. >1000 acres, 10.
    b. Characterization data.
        1. partial analysis if extent is <2000 acres.
        2. complete analysis if extent is >2000 acres.
    c. Listing of differentiating criteria within the control section.
    d. 1 time, 1 place recording of soil temperature and soil moisture by month.

2. Minimum standards for adding a map unit to the identification legend.
    a. 2 transects or 2 traverses recording data at 10 points on each.
    b. 1 complete field description, 23C, for each taxonomic component of the unit.

c. 1 tray (correlation) sample for each taxonomic component of the unit.
d. map unit description.
e. summary of interpretations, analysis of morphology, and justification based on how the proposed unit differs from those unit already in the legend.

CONCLUSIONS: First Day Discussions. Survey processes can be identified and minimum standards can be developed. Second Day Discussions. (1) Survey processes can be identified for which minimum standards should be developed. (2) Local minimum standards might best be developed on a MLRA, MLRU, or other soil physical region.

CLOSING REMARKS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

MARCH 16, 1990

It has been a fun-packed week. Each day brought us fresh viewpoints and opportunities to learn from each other. Let me "re-cap" some of the events.

Welcoming us from Missouri was Russ Mills. We are in the land of Guy Smith and his landmark studies of claypan Planosols. Today they are Typic Argialbolls. (profile of Argiabolls)

Bob Shaw shared his visions of moving toward and into the 21st century. A strong supporter of NCSS. (Bob Shaw with some staff)

We dream up and develop technologies. The proof is in successful transfer. It comes when the recipients have institutional incentives to take the technology within their culture and then to put it in practice. Often this is a hard lesson to learn. (a title slide about transfer)

Bud Fountain encouraged all of us to be team players - to increase our effectiveness and our enjoyment of getting the job done. (Kimble with 2 slides)

Our national soil mechanics engineer, Jim Talbot, stressed the need for and appreciation of relevant soil engineering data and interpretations. We should build for the future as others before have done. (terraces in Philippines)

Hari Eswaran gave us a number of insights about international soil conditions. This map shows major soil stress regions of the world. A large area is where moisture is the major stress. (map of stress areas)

Hari also pointed out uncertainties associated with the concepts of "sustainable" agriculture. There is a lot to be done to clear up the confusion. (fog in front of peaks)

Our Deputy State Conservationist from CA, Will Fontenot, mentioned the importance of paying attention and being alert to opportunities if we want to be good managers. (statue of Chinese figure)

Dick Folsche of the National Cartographic Center said we could work things out. Somehow we'd get the job done - but it won't always be a bed of roses. (closeup of spines)

And Gale TeSelle told us all about the GRASS and interfaces and how they softly cradle the user from the harsh realities of hardware and of software databases. (fawn in deep grass)

Thanks to Bob Reaves and Larry Scott of the National Financial Management Division we now have a better understanding of how budget formulation and allowance execution process operate together. (twin rubber trees)

Deneise Doetzer guided us skillfully along the pathway of EEO and Affirmative Action. We do remember, don't we? True or False? (four scientists on a hill top)

Steve Holzhey reported on the early growth stages of your National Soil Survey Center and where it seems to be heading. (growing head of a plant)

Several different yet important viewpoints on soil survey updating were provided by Wade Hurt and Steve Payne. (closeup of crab)

Gordon Decker told us about computer assisted management programs - and it seemed that it can only help us go farther and higher. (looking up side of bldg.)

And what about the great interchanges at the working group meetings. Allocations by formula - there may be differences in the process and results before stabilization occurs. (graphs)

Soil survey updates. Criteria. Weighting. A lot of good ideas but less agreement on assigning points. Check back again next year. (peaks in the fog)

FSA efficiencies and recommendations for ongoing activities. It gave most of us some "warm fuzzies" as we worked together and supported the bigger picture of soil survey and our role in FSA. (close-up of rice blossom)

Soil Survey Quality Control. Standards as references. Minimum standards to guide us. Even an outdoor privy may need specifications and standards. (privy hole in Indonesia)

Accuracy and precision. Useful concepts - especially as they relate to our products and services. On the left are two examples of poor accuracy - the upper one also has poor precision whereas the lower one is precise, but not accurate. On the right is accuracy - not very precise above the below it is precisely accurate. This also is a way at looking at doing the right things correctly. (four targets)

We can be flexible and we can experiment. But somewhere there has be an official copy of the soil survey on file. (published reports)

And we also had good demonstrations of what lies ahead in using and managing our soils information. Wow! (interp map)

Helping us from on high was the gentle Position Classifier, Cheryl Brock. It's obvious that we can benefit from such help. (bug looking down)

Now you know what TQM (total quality management) is all about. Leading your flock of sheep beside the still waters. Thanks, Ken Cookson. (sheep in mountain scene)

Throughout the coffee breaks and especially at hospitality time, I kept hearing reassurances about what makes our soil survey. We hold certain beliefs or perceptions that guide our activities. Geographic distribution and interactions of soil forming factors; soil-landscape relationships can be inferred from spatial patterns; and relationships are good enough to map. (title slide with these items)

What are the consequences of those perceptions? Soils are segments of landscapes, the segments are map units, internal composition is mainly a function of scale at which we map and components are recognized by representative pedons. Nothing new. Simple, but extremely powerful set of consequences. (title slide with these).

With the feel of soil in your hand and backed with knowledge of soil-landscape models, we recognize and can map soil landscape patterns. (taking soil from auger)

Our consistent and systematic use of standards permit us to correlate information from place to place and from time to time. No big deal-you've been doing this most of your career. (working with color book)

People tell use again and again that we don't blow our own horn often enough nor well enough. Are we losing users and customers, because we aren't active enough? (Swiss horn blower)

Change...beautiful constant change. The future will become today just as today will become yesterday. (multicolored leaves)

We are on a TQM journey. All of us in Technology thank all of you who made our FSA experiences so successful. Thanks to the visiting soil scientists. (Bob Shaw and his directors)

We must do our very best to assist in making our struggling world a sustainable earth system. You have demonstrated your willingness every day. (PA farm)

Thank you.

Richard W. Arnold, Director, Soil Survey Division, SCS, Washington, D.C.

PARTICIPANTS
SOIL SCIENTIST WORKSHOP
KANSAS CITY, MO
MARCH 12-16, 1990

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James R. Culver	National Leader, SSQA	Lincoln, Nebraska
Ellis G. Knox	National Leader, Inves.	Lincoln, Nebraska
Larry F. Patliff	Sup'vy Soil Scientist	Lincoln, Nebraska
Dennis J. Lytle	Nat Coord Soil Geo	Lincoln, Nebraska
George E. Teachman	Soil Scientist	Lincoln, Nebraska
Carolyn G. Olson	Soil Scientist	Lincoln, Nebraska

NHQ

Robert R. Shaw	Deputy Chief, Tech	Washington, DC
Richard W. Arnold	Director, Soil Survey	Washington, DC
Cale W. TeSelle	Director, C&GIS	Washington, DC
Robert K. Reaves	Budget Analyst, BPA	Washington, DC
James R. Talbot	National Soil Engineer	Washington, DC
Cheryl A. Brock	Position Class. Spec.	Washington, DC
John E. Witty	National Leader, Class.	Washington, DC
Hari Eswaran	National Leader, WSR	Washington, DC
William E. Roth	Soil Scientist	Washington, DC
James H. Ware	Soil Scientist	Washington, DC
Larry K. Scott	Budget Analyst	Washington, DC
M. Deneise Doetzer	Equal Emp. Manager	Washington, DC
Kenneth M. Cookson	Director, Opn Mgt Div	Washington, DC

STATE SOIL SCIENTIST
NATIONAL WORKSHOP
HILTON PLAZA INN, KANSAS CITY, MISSOURI
MARCH 12-16, 1990

MONDAY	MARCH 12, 1990	Chair, Bruce Thompson
10:00 - 1:10	Registration	
1:10 - 1:30	Welcome & Comments	Russell C. Mills
1:30 - 2:00	Technology: Countdown to the 21st Century	Robert R. Shaw
2:00 - 2:30	Soil Survey Priorities/ Focus for the 90's	Richard W. Arnold
2:30 - 3:00	B R E A K	
3:00 - 3:30	State Teamwork Approach	Budd C. Fountain
3:30 - 4:00	Soils Data for Engineering	James R. Talbot
4:00 - 4:30	International Activities/ SMSS	Hari Eswaran

TUESDAY	MARCH 13, 1990	Chair, Bill Roth
8:00 - 8:30	Guidelines for Program Managers	Wildon J. Fontenot
8:30 - 9:00	Cartographic Update	W. Richard Folsche
9:00 - 10:00	National Budget Formulation	Robert K. Reaves
10:00 - 10:30	B R E A K	
10:30 - 11:30	National Allowance and Execution Process	Larry K. Scott
11:30 - 12:00	GIS Activities/Aerial Photography Program	Gale W. TeSelle
12:00 - 1:00	L U N C H	
1:00 - 2:30	WG-1 State Allocations WG-2 Soil Survey Updates	Richard D. Babcock G. Wade Hurt
2:30 - 3:00	B R E A K	
3:00 - 4:30	WG-3 FSA Efficiencies WG-4 Survey Quality Control	Robert L. McLeese Sylvester C. Ekart

WEDNESDAY	MARCH 14, 1990	Chair, Jim Ware
8:00 - 8:30	Computer Assisted Program Management	Gordon Decker
8:30 - 10:00	WG-1 State Allocations WG-2 Soil Survey Updates	Richard D. Babcock G. Wade Hurt
10:00 - 10:30	B R E A K	
10:30 - 12:00	WG-3 FSA Efficiencies WG-4 Survey Quality Control	Robert L. McLeese Sylvester C. Ekart
12:00 - 1:00	L U N C H	

NATIONAL COOPERATIVE SOIL SURVEY

Proceedings - State Soil Scientists
National Workshop

Lincoln, Nebraska
October 17-21, 1988

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Wirthy

United States
Department of
Agriculture

Soil
Conservation
Service

PROCEEDINGS STATE SOIL SCIENTISTS NATIONAL WORKSHOP

Lincoln, Nebraska

October 17-21, 1988

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NATIONAL WORKSHOP

FOR

STATE SOIL SCIENTISTS

LINCOLN HILTON, LINCOLN, NEBRASKA

MONDAY, OCTOBER 17, 1988 - Steve Holzhey, Chairman

10:00 - 1:00	Registration	
1:00 - 1:15	We 1 come	August J. Dornbusch, Jr. Director, MNTC
1:15 - 1:45	National Perspective on Soil Survey	Manly S. Wilder Associate Chief
1:45 - 2:15	Practicing Insightful Thinking	Chat-l es R. Adams State Conservationist Arizona
2:15 - 2:45	Rationale for National Soil Survey Center	Richard W. Arnold D i rector, Sol 1 Survey Division
2:45 - 3:15	BREAK	
3:15 - 3:35	Soil Information Used in WEPP, USLE, etc.	Melvin S. Argabright Head, Ecological Sciences Section and Agronomist, MNTC
3:35 - 3:55	Sol 1 Geography	William U.Reybold Nat lonal Leader, Sol 1 Geography
3:55 - 4 15	Soil Classification	John Witty, National Leader, Soil Classification Specialist
4:15 - 4:35	Soil Investigation	Ellis G. Knox, National Leader, Soil Investigat lons
4:35 - 5:00	Discussion	

Tuesday, October 18, 1988 -

Morning Session - Gerald J. Post, Chairman

8:00 - 8:30	Role of Soil Survey in Technical Advances in SCS	Robert R. Shaw, Deputy Chief for Technology
8:30 - 8 50	So i 1 Databases	David L. Anderson National Leader, Sol 1 Databases

8:50 - 9:10	Soil Survey Operations	Thomas E. Calhoun Assistant Director Soil Survey Division
9:10 - 9:30	Quality Assurance	Rodney F. Harner National Leader Quality Assurance
9:30 - 9:45	Discussion	
9:45 - 10:15	BREAK	
10:15 - 10:45	Soil Interpretation	Maurice J. Mausbach National Leader, Soil Interpretations
10:45 - 11:15	GIS in Action	Ed Crane Project Director Base Mapping Program Wyandotte County, KS
11:15 - 11:45	GIS	Gale TeSelle, Director, Cartography and Geographic Information Service
11:45 - 12:45	LUNCH	

Afternoon Session - William Roth, Chairman

12:45 - 12:50	Work Group Assignments *See Last Page	William Roth Soil Scientist
12:50 - 2:30	1st Work Group Session	
2:30 - 3:00	BREAK	
3:00 - 4:30	2nd Work Group Session	

Wednesday, October 19, 1988 -

Morning Session - Ron Yeck, Chairman

8:00 - 8:30	Cartographic Report	Richard Folsche, Head National Cartographic Center
8:30 - 9:00	Desktop Publishing	Stan Anderson Supervisory Editor
9:00 - 9:30	Quality Assurance Procedures	Rodney F. Harner National Leader Quality Assurance
9:30 - 9:45	Discussion	

9:45 - 10:15	BREAK	
10:15 - 10:45	Engrg & Soil Survey	Don Basinget-, Director Engineering Division
10:45 - 11:15	Landscape Model	Gary Wells Landscape Architect
11:15 - 11:45	Updating Nebraska Soil Survey	Ron E. Hendricks State Conservationist, Nebraska
11:45 - 12:45	LUNCH	

Afternoon Session - Berman Hudson, Chairman

12:45 - 1:15	Budgets	Larry Mills Financial Manager
1:15 - 1:45	Water Quality	Thomas A. Dumper Environmental Specialist
1:45 - 2:15	Soil Properties for Water Quality	Don Goss Soil Scientist
2:15 - 2:45	Discussion	
2:45 - 3:15	BREAK	
3:15 - 5:00	Tour of National Soil Survey Center	

Thursday, October 20, 1988 - Joe Nichols, Chairman

8:00 - 8:30	Resource Conservation and Soil Survey	Karl Reinhart Conservation Planning & Application Leader
8:30 - 9:00	Cartographic Support for Soil Survey	Richard Folsche, Head National Cartographic Center
9:00 - 9:30	SMSS	Richard W. Arnold Director, Soil Survey Division
9:30 - 10:00	BREAK	
10:00 - 10:30	Role of NTC Soils Staff	Gary Muckel, Head Soil Interpretations Staff, West NTC
10:30 - 11:00	Rhode Island Soil Survey	Robert J. Klumpe State Conservationist Rhode Island

11:00 - 11:15	FSA Mapping Status	William Roth Soil Scientist
11:15 - 11:45	Discussion	
11:45 - 12:45	L U N C H	
12:45 - 2:30	3rd Work Group Session	
2:30 - 3:00	B R E A K	
3:00 - 4:30	4th Work Group Session	

Friday, October 21, 1988 - William Roth, Chairman

8:00 - 10:00	Work Group Reports	
10:00 - 10:30	B R E A K	
10:30 - 11:00	Wrap Up	Richard W. Arnold Director, Soil Survey Division

*The State Soil Scientists, Heads of NTC Soil Staffs, National Leaders, and designated staff, will be assigned to 4 work groups. The following 4 topics will be discussed by each group.

1. GIS - where we are; where do we want to go; how do we get there?
Chairman - Richard Folsche; Recorders - Chris Smith, Les Brockmann

2. Progress reporting items for basic soil services and other management items.
Chairman - Horace Smith; Recorders - Henry Mount, Robert Engel

3. Manuscript content; printed or electronic format; documentation of map units; additional interpretations, etc.
Chairman - Larry Brown; Recorders - Tom Reinsch, Richard Mayhugh

4. Next generation of soil surveys updating; future data needs; new uses; how we interface with users, present and new
Chairman - Larry Ratliff; Recorders - Loyal Quandt, Terry Sobecki

Chairman and recorders will stay in assigned rooms while the work groups rotate.

PRACTICING INSIGHTFUL THINKING

TO MY CO-WORKERS AND FELLOW COMPETITORS WHO NARROWED THEIR COMPETITION BY EXPELLING MB FROM THE SOILS PROGRAM IN OCTOBER 3, 1973, I BRING GREETINGS FROM ALL OF THE SCS EMPLOYEES IN ARIZONA. I FEEL HONORED HAVING RECEIVED AN INVITATION TO SPEAK BEFORE YOU. YOU REPRESENT THE BEST THAT WE HAVE TO OFFER IN THE SOILS PROGRAM--THE CREAM OF THE CROP, SO TO SPEAK.

I HAVE AN INNATE FONDNESS FOR THE SOILS PROGRAM, AFTER HAVING FORMAL TRAINING IN SOIL SCIENCE AND HAVING BEEN A SOIL SCIENTIST. I HAVE CHOSEN THE SUBJECT "PRACTICING INSIGHTFUL THINKING", NOT BECAUSE THERE IS AN ABUNDANCE OF PRACTITIONERS AMONG THE RANKS OF SOIL SCIENTISTS, RATHER A PITIFUL HANDFUL. I HOPE THAT BY THE TIME I COMPLETE MY PRESENTATION THIS AFTERNOON, YOU WILL HAVE GONE THROUGH SEVERAL MENTAL CHANGES. FIRST, YOU WILL HAVE A DEEP-SEEDED REGRET THAT I WAS INVITED. SECONDLY, YOU WILL QUESTION YOURSELF AND REPEAT IN HONEST AS THE DISCIPLES ASKED OF THEMSELVES WHEN CHRIST DECLARED THAT ONE OF THEM WOULD BETRAY HIM, "LORD, IS IT I?" THEN, THIRDLY, YOU WILL COMMIT WITHIN YOUR HEART AND TO YOUR EMPLOYEES THAT YOU WILL MAKE AN IMPACT ON THE "INSIGHTFUL THINKING" OF SOIL SCIENTISTS WITHIN THE SOIL CONSERVATION SERVICE. OKAY-LET'S TURN UP THE THERMOSTAT.

HOW MANY OF YOU RECOGNIZE THIS FORM? FOR THOSE OF YOU IN THE BACK OF THE ROOM, IT IS AN SF-52. IF I WERE A RELATIVELY NEW EMPLOYEE IN SCS AND A SOIL SCIENTIST, I WOULD SIGN THIS FORM TODAY UNDER PART IV-EMPLOYEE RESIGNATION.

Remarks by Charles R. Adams, State Conservationist, Arizona, at the National Workshop for State Soil Scientists. October 17, 1988, Lincoln, Nebraska.

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National Perspective on Soil Survey
Manly S. Wilder, Associate Chief, SCS

The Soil Conservation Service has always had challenges and priorities. Today we face some of the biggest challenges that we've faced in a long, long time. This past year has certainly been one of change. Right now we're literally up to our ears in the FSA and you all are in the throes of it too. We need to remember that we have a farm bill. But we also have to recognize the nonfarmer, the city, and rural people we work with, environmental groups, lobbyists, the conservation districts, and all the interested groups that it takes to come together to form the soil conservation coalition. My past experiences make me have a deep appreciation for the soil, which is, after all, the first name of our organization and is the basis for everything that we do. I'm very pleased with some of the things I see happening in soils and the National Soil Survey Laboratory. The National Soils Lab is a real plus for the SCS. The SCS ought to have world leadership in soils. Make sure we do all we should to attain that leadership.

During the past few months, I have had the opportunity to travel to Thailand and Israel to look at some of their work. When you do that, it makes you appreciate the soil conservation work that we have here and tend to take for granted. You come back home to the United States and realize that conservation in this country excels anywhere else in the world. It makes me realize how strong conservation education is in educating our people, and how strong our conservation technology and our delivery systems are. Our delivery system is probably unsurpassed in the world and is the envy of many. It's also the envy of many other governmental organizations right here in the United States. We do have a commitment in this nation to soil conservation tbat we can be proud of. The politics of conservation are often as important as the technical aspects.

There are four or five issues facing us in the next few years. The first is FSA implementation. I think we'll get the conservation planning done by 1990. It all has to be implemented by 1995. The latest progress report shows that we have made 84 percent of HEL determinations, 54 percent of the planning is done, and about 15 percent of the planning is applied, which does put us on target. Our goal is to have about 98 to 100 percent of HEL determinations and 65 percent of the planning done by the end of 1989. It's going to take a lot of cooperation between us, state agencies, other federal agencies, and conservation districts. By strengthening our cooperative relationships, we can go a long way to help get this job done. State *soil* scientists need to develop a very effective working relationship with their state conservationist. Be sure that you tell him what he needs to hear from the standpoint of managing the soil survey program. In other words, just do complete staff work and manage the soil survey program in cooperation with other agencies.

Let me say a word or two about water quality. Already at the Washington level, we're seeing a lot of activity in terms of interagency decisions and working groups, tasks forces, and in terms of the USDA budget. There is a lot of interest in both the technical arena and the political arena. We have liaisons in most all EPA regional offices. Water quality is going to impact us in terms of training, in terms of technology, in terms of

technical assistance. The technology impact is immediate. Just take the issues of pesticides and low input agriculture. You all will pay a role as soil scientists. We have a lot to learn about the transport of agriculture chemicals and their effect on groundwater.

Let me say a few words about a couple of other issues. One is in regard to training. None of us on the national training committee are completely satisfied with where our training has gone. We all feel there is a need for better long-term strategy in the SCS for where we ought to be going. Today's training emphasis varies a lot from state to state. Many of the young people that we are bringing into our organization today come from backgrounds that ware not agricultural, were not farm related, or farm oriented. They may be more environmentally oriented. I think that for some of our young people to hit the ground running and get into a journeyman level job, we have to do a better job of training than what we've been doing. And certainly we need to devote time for training in soils.

Let me also say a few words about equal employment and civil rights. The SCS has a good record because we work hard at it. We are going to continue to. It's important that we deliver our services to the minority landowners. The USDA is establishing liaisons with the 1890 universities. This is a first for the USDA and we will be very actively involved as an agency. The Workforce 2000 conference in Arizona is an effort to move forward in a way to strengthen women in our workforce. You can see from the Workforce 2000 material that by the turn of the century, we're going to have an entirely different face to our workforce. The number of women will be greatly increased.

Technology is changing rapidly and we've got to change with it or we've got to adapt to it. We have to look forward to such things as GIS, automation, computers, and CAMPS. They each strengthen our technology.

A few words about local leadership. The Soil Conservation Service is led by local leadership. That's a fact of life. It's been difficult for the SCS as an agency to adjust to that. But as an agency, the SC5 perhaps needs to do an even better job of understanding and adapting to a political leader. It makes good communication essential for not only our day-to-day operations but also trying to understand where our priorities are and in looking ahead. Political chiefs set priorities which may differ from the past. They expect a very high degree of responsiveness. We are coming up to the national election, so we are going to have a political transition. Political transition is a part of the democratic process. So as career employees we need to respond in a very objective and professional manner, because whoever is elected will no doubt bring a mandate for change.

I'11 close out my remarks by saying that I think the future of our organization is good. The FSA is giving us an opportunity we haven't had in almost 50 years. We have more challenges and more opportunities than we know what to do with. I'm very proud of our agency. Working together, there is very little we can't accomplish.

PRACTICING INSIGHTFUL WINKING

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Remarks by Charles R. Adams, State Conservationist, Arizona, at the National Workshop for State Soil Scientists. October 17, 1988, Lincoln, Nebraska.

UNDER PART A WHICH ASKS FOR "REASON FOR RESIGNATION--AVOID GENERALIZED REASONS", I WOULD GET BUSY INDICTING MY SUPERVISOR WHO NO DOUBT WOULD BE A SOIL SURVEY PARTY LEADER. THEN I WOULD TAKE MY CASE TO THE MSPB. I WOULD ACCUSE HIM OR HER OF NOT PRACTICING INSIGHTFUL THINKING. YOU SEE, AFTER A FEW MONTHS ON THE JOB THE AVERAGE EMPLOYEE STARTS TO TAKE NOTE OF THE ENVIRONMENT AROUND THEM. THEY NOTICE THAT EVERY DISCIPLINE UNDER THE SUN IS AFFORDED TRAINING OPPORTUNITIES; OTHERS RECEIVE THE LION'S SHARE OF INCENTIVE AWARDS; OTHERS ARE COUNSELED ON HOW TO DRESS FOR SUCCESS AND OFTEN GARNISH KEY POSITIONS ON STANDING COMMITTEES. OTHERS ARE ASKED EARLY ON IN THEIR CAREERS WHAT THEIR GOALS ARE AND DEFINITIVE TRAINING PLANS ARE DEVELOPED AND MONITORED TO ASSURE THEM OF SUCCESS. OTHERS ARE PRIVY TO STAFF CONFERENCES AND ALL OF THE OTHER NICE FUNCTIONS THAT KEEPS ONE ABREAST OF WHAT IS AVAILABLE IN THE ORGANIZATIONS. NOW, THE SOIL SCIENTIST, HAVING OBVIOUSLY BEEN BORN UNDER A BAD SIGN, IS RELEGATED TO A LESSER ROLE FROM DAY ONE. NO ONE TALKS DRESS CODE. AFTER A FIRST DAY IN THE FIELD DIGGING PITS, THROUGH LOGICAL DEDUCTION, THE POOR SOUL FIGURES IT OUT; THAT THEY NEED TO HEAR WORK CLOTHES BEFITTING THE ASSIGNMENT. THE SOIL SCIENTISTS ARE NEVER TOLD THAT THEY SHOULD DRESS FOR THE OCCASION--THAT THOSE DENIM BLUE JEANS ARE INAPPROPRIATE FOR AN SWCS MEETING. THE YOUNG PERSON STARTING TO WORK, BEING OBSERVANT, PROBABLY NOTED ON THE FIRST TRIP TO THE OFFICE THAT ONE VEHICLE IN THE PARKING LOT WAS OF WORLD WAR II VINTAGE. WITH FADED PAINT AND OTHER DILAPIDATED CONDITIONS, IT NEVER DAWNS ON THE NEW RECRUIT THAT "THIS IS YOUR VEHICLE".

YOU WILL TRAVEL ISOLATED BACK ROADS WITH INFREQUENT SIGHTINGS OF HUMAN AND ANIMAL LIFE, BUT YOU WILL HAVE TO DEPEND ON THIS PIECE OF JUNK TO GET YOU BACK TO THE DINNER TABLE WITH YOUR WIFE AND ATTENTION STARVED CHILD THIS EVENING. THERE IS WORST TO COME. THE NEW EMPLOYEE WALKS THROUGH THE OFFICE

WHERE THE SOIL CONSERVATIONIST AND RANGE CONSERVATIONIST ARE SEATED AT THEIR DESK WITH BOOKS AND PAPERS NEATLY STACKED. IN A CORNER OF THE ROOM THAT DOES NOT APPEAR TO HAVE BEEN ORGANIZED SINCE THE OFFICE OPENED FOR BUSINESS, SETS A CHAIR WITH SPRINGS PROTRUDING OUT AND A DESK WITH SEVERAL COATS OF DIFFERENT COLORED PAINT. (ALL HAND BRUSHED). NOW THE ONLY POSITIVE THING ABOUT THIS "ALL TOO TRUE" AND "ALL TOO FREQUENTLY" OCCURRING SITUATION IS THE FACT THAT WE HIRE SOIL SCIENTISTS FROM MANY OF THE BETTER SCHOOLS SUCH AS CORNELL UNIVERSITY, SOUTHERN UNIVERSITY AND PURDUE UNIVERSITY, ETC. IT DOESN'T TAKE TOO LONG FOR THESE BRIGHT UPSTARTS TO REALIZE THAT ALTHOUGH FROM THE SAME SCHOOL, THE SOIL CONSERVATIONIST, RANGE CONSERVATIONIST, AGRONOMIST, ETC., ARE ON A DIFFERENT TRACK. THIS RINGS HOME CLEARLY WHEN THE YOUNG SOIL SCIENTIST IS USHERED TO THE FIELD AT THE SAME HOUR THAT A FIELD OFFICE STAFF CONFERENCE STARTS. THE SOIL SCIENTIST IS TOLD THAT THEY ARE DIFFERENT; THEREFORE THEY BEGIN TO BELIEVE THAT THE TREATMENT THEY RECEIVE IS JUSTIFIABLE. "I AM DIFFERENT, THEREFORE I SHOULD EXPECT TO BE TREATED DIFFERENTLY. IT IS OKAY TO DISCRIMINATE AGAINST ME EECAUSE I HAVE BEEN PROGRAMMED FOR SUCH." OTHER RECRUITS ARE SOON CHANNELED TOWARD A TRAINING MODEL THAT WILL ALLOW THEM TO BECOME DISTRICT CONSERVATIONISTS, AND SO ON. ISN'T IT OUR RESPONSIBILITY TO LET NEW SOIL SCIENTISTS KNOW THAT WITH THE PROPER TRAINING AND EXPOSURE, ANY EMPLOYEE CAN ASCEND THROUGH THE RANKS TO KEY LINK POSITIONS? I RECENTLY READ AN ARTICLE THAT STATED THAT THE DODO BIRD DIDN'T HAVE A PLAN. HE STAYED ON THE ENDANGERED LIST TOO LONG AND SOON BECAME EXTINCT.

MY MESSAGE TO YOU IS THAT IF THE SOIL SCIENTIST STAYS ON THE ENDANGERED LIST MUCH LONGER, THEY TOO WILL BECOME EXTINCT. UNLESS YOU START TO PRACTICE INSIGHTFUL THINKING AND DROP THE ANALOGY THAT THE VIRTUES OF THE PROFESSION WILL BE PAST AND GONE WHEN WE FINISH THE ONCE OVER SURVEY, WE ARE GOING TO BE LIKE THE DODO BIRD. LET'S BE POSITIVE, FOLKS.

IF THE CONSERVATION PROVISIONS OF THE FOOD SECURITY ACT OF 1985 DID NOTHING ELSE, IT SHOULD HAVE REINFORCED OUR FAITH IN THE SOIL SCIENCE DISCIPLINE. I AM REMINDED OF THE PITCHER WHO THREW A BALL TO THE BATTER. THE UMPIRE HESITATED TO MAKE A CALL. THE CATCHER TURNED AND ASKED HIM, "IS IT A BALL OR A STRIKE"? THE UMPIRE CLEARED HIS THROAT, OBVIOUSLY OFFENDED THAT THE CATCHER HAD VENTURED INTO UNSOLICITED TERRITORY AND REPLIED, "IT AIN'T NOTHNG UNTIL I CALL IT." THE FSA AND IT'S CONSERVATION PROVISIONS WOULD NEVER HAVE GOTTEN OFF THE GROUND HAD IT NOT BEEN FOR THE SOIL SCIENTIST. SO YOU SEE, EACH EMPLOYEE THAT OCCUPIES THE 470 SERIES SHOULD RESPOND WHEN TOLD THAT THEY ARE DIFFERENT,"YES, I AM DIFFERENT--I AM IMPORTANT AND SOME DAY I MAY BE YOUR DISTRICT CONSERVATIONIST, AREA CONSERVATIONIST, STATE SOIL SCIENTIST OR STATE CONSERVATIONIST.

FOR SOME OF YOU WHO HAVE BEEN AROUND THIS ORGANIZATION FOR 20 OR MORE YEARS, YOU MAY ALREADY RAVE NOTED A NEED FOR CHANGE IN THE SOILS PROGRAM. THE ESTABLISHMENT *OF* THE NATIONAL SOILS SURVEY CENTER WAS A SHOCKING CHANGE FOR MANY OF YOU. SOME OF YOU WERE NOT READY FOR IT BECAUSE YOU WERE NOT IN THE HABIT OF PRACTICING INSIGHTFUL THINKING AND SOMEONE ELSE HAD THE NERVE TO MOVE OUT WITH A NEW THOUGHT.

LADIES AND GENTLEMEN, WE HAVE A GROUP OF NEW ACHIEVERS AT OUR DISPOSAL-READY TO BE RECRUITED AND TRAINED. WE MUST NO LONGER LEAVE RECRUITMENT OF SOIL SCIENTISTS UP TO THE PERSONNELIST. HOW MANY OF YOU WHO ARE STATE SOIL SCIENTISTS CAN ADEQUATELY AND ACCURATELY GO OUT AND RECRUIT A COLLEGE GRADUATE? HOW MANY OF YOU DID SOME RECRUITING IN FY 1988? IF YOU DIDN'T--YOU SHOULD HAVE. IT'S YOUR PROGRAM. YOU WOULDN'T SEND ME OUT 'TO RECRUIT A WIFE FOR YOU-WOULD YOU? IT'S NOT A WHOLE LOT OF DIFFERENCE WITR YOUR EMPLOYEES.

AFTER ALL, YOU ARE MAKING A 30-YEAR COMMITMENT EACH TIME YOU BRING ON A NEW EMPLOYEE. BE INSIGHTFUL. ENVISION WHAT THIS NEW RECRUIT WILL OFFER THE DISCIPLINE OVER A 30-YEAR CAREER, THEN SET OUT TO HAVE SOME LASTING, POSITIVE IMPACT ON THAT CAREER. LET YOUR EMPLOYEES KNOW WHAT IT TAKES TO BE PROMOTABLE.

IN UNCHARTERED TERRITORIES AND LITTLE TRODDEN PATHWAYS SUCH AS OUR WATER QUALITY INITIATIVE, IT WILL TAKE STRONG AND DETERMINED MEN AND WOMEN TO CLEAR THE PATHS FOR OTHERS. YOU ARE THOSE DETERMINED MEN AND WOMEN. NEW RECRUITS WILL ENTER OUR WORKFORCE WITH NEW TECHNOLOGICAL IDEAS, NO MATTER WHAT THEIR FIELD OF STUDY IS, RAVING BEEN LED TO BELIEVE THAT THE WORLD AWAITS THEIR EXPERTISE. THEY WILL BE RUDELY AWAKENED TO THE REALITY THAT THIS AGENCY TENDS TO RESIST CHANGE AND HOLDS ON TO EXISTING WAYS OF DOING THINGS. IT WILL BE IMPERATIVE THAT YOU PRACTICE INSIGHTFUL THINKING. HELP THEM TO UNDERSTAND THE GOALS AND MISSION OF OUR AGENCY AND TO BECOME PRODUCTIVE AND LOYAL MEMBERS OF A GREAT TEAM.

THANK YOU.

"Pay attention to the young, and make them just as good as possible."

—Socrates

A Rationale for the National

Soil Survey Center

"Useless Unless Used"

Richard W. Arnold 1/

1. What do you feel deep down inside? Beautiful, far away, restful clear smooth water, untarnished wilderness. A dream environment, a place of peace and quiet, a blessed retreat. But unobtainable because as always I'm far too busy with my work. Such a place is always there someplace in our mind isn't it?

2. More and more we sense the frustration of being in a world so complicated and so complex without adequate instructions or preparations that we want to reach in with our teeth because we don't have enough hands to quickly and easily solve the Cats Cradle riddle? Each of us from time to time reverts back to the solutions that we perhaps tried, or at least wanted to try, when we were younger.

3. All of our lives have dealt with the constant ebb and flow of transformations. We love it, we hate it, we are afraid of it, we are excited by it. Our lives cannot exist without change - thus it is mostly a matter of coping with

1/ Slide presentation at State Soil Scientists Workshop in Lincoln, Nebraska - 17 October 1988

cycles of change and the randomness of events that constitute the blend and the mix of our world. Beautiful, sad, common, quick, constant, irreversible. The transfer of technology is but a part of a larger scheme of things. Aren't we fortunate?

4. Somedays I get up in the morning and know, yes absolutely know, that we're on a one way track. That the thermodynamic laws of the universe are fixed, immutable and that I'm simply a bit of flotsam being wafted through life according to predestined forces. And when I feel this way I want to run, to rebel, to find another way. Oh how I want to have just a little bit of choice in my destiny. I really do want to matter. Have you ever felt this way, yourself? Of course you have - if not, you may not quite be taking an active role in the wonderful transformations all around us.

5. You can take the simplest of hand made bricks and do all sorts of innovative things. Creativity is the thinking, the conjuring up of new ideas, of new ways. The world is full of creative individuals such as yourselves. You have no shortage of ideas. When we brainstorm together we can fill pages and pages with good ideas - some of which might even work. But it is the innovators - those people who implement new ideas; those people who have the know how, the energy, and the doing and staying power to implement ideas - who are

scarce. It is this innovation of creativity that the National Soil Survey Center is all about - and yet, believe it or not, that is exactly what the National Cooperative Soil Survey of the United States is all about. Innovation of Creativity. World class leaders of Pedology.

6. It all starts rather simply. The seeing and feeling of small samples of Mother Earth. That simple, pure, direct communication with soil. That particular contact draws on the accumulated knowledge and experience of "hardball science" that carefully permits integration of precision landscape modeling, application of standards of description and terminology, the sensitivity of selective sampling and relevant location, and finally the cascade of physics, chemistry, geology, climatology, agronomy - and perhaps even some metaphysics - that flow through the finger tips as the interaction of man and nature takes place.

7. The training, the skill, the art, and the science blend into one as the pedologist transforms his perceptions of reality into the abstractions of the soil map. The culmination of years occurs in the subtle adeptness, of the pencil line as it encompasses and captures thousands of ideas into one delineation. The power, the finality of a decision whose total foundation lies in the computer rapid analysis of multiple joint probabilities and the selection

of those whose chances of success are the most satisfactory for the objectives and demands of the day.

8. The common place stereotype of a modern soil survey. A plain, simple, organized, presence whose unobtrusiveness belies the fantastic combinations of knowledge that bring to life the "soil map units" in an array of concepts unmatched in the geographic world of natural resources. It 's One hell of a legacy, my friends!

9. It all fits together and the heart beats a little faster when you see what man can really do in the worlds' environments. I think I like "humanized landscapes" like this one so much, because I sense with pride the potential that exists to help people understand and wisely use the available soil resources in their quest to maintain and improve their quality of life. There is not a day when you cannot observe a renewed spark of hope that the mission of soil survey is relevant, is meaningful, and is obtainable.

10. But man does not live by agriculture alone. Economic development and cultural growth rise above the foundation of agriculture reaching toward the goals of mankind itself. Using resources wisely means different things to different users. In this we can rejoice!

11. The speed and skill and success of development relies a great deal on transferring technological information to appropriate places at the right time and to the right people. Soil survey information is useful in locating the right kinds of places so that the power of simularities may be tapped to gain efficiency and effectiveness. Challenges? Of course! And rewards? Most certainly!

12. You are the best when you have the sure strength of up-to-date current scientific knowledge girding up your day to day operations. You are the best when an understanding and partnership exists with the users of soils information. You are the best when you know the reliability of your statements and the interpretations you offer to the users. You. You. You. But being the best carries a commitment to continuing the search, the desire, the creativeness, the innovations ; yes continuing those actions that let us be who we are, the champions, the best pedologists the world has ever known.

13. We can be at the edge - capturing the highlights - providing the critical components in just the right way so that the transformations are for the better. When you develop and test and implement innovative transfers of relevant information - the whole team looks good and has the appearance of integrated, competent interactions. Listen to the story of the leaves and they will reveal the dynamic

orientation of the tree. Listen to the soil scientists and learn the orientation of the soil survey.

14. Our world of Pedology is built on the shoulders of other scientists. Men and women who had visions far beyond their spheres of influence. They had a collective wisdom and a dream for a better world in which Pedology was global and omnipotent. Dr. Fridland, an outstanding Soviet soil classifier, has passed on. Professor Tavernier of Ghent has retired and has loosened the reins; Klaus Flach retired several weeks ago from Soil Conservation Service. Professor Schlicting of Germany passed away this past summer, and Jamagne of France is deeply involved in national affairs. Just as there is now a new group of players, the saga, the transformations, the transfer of technology will go on and on and on.

15. Soil is too valuable to treat it like dirt. A healthy respect for the history of man as recorded in soil is justified. Our science is rich and wonderful and worthy of the praise it is accorded. High quality soil descriptions done to the highest standards is a tribute to the contribution that they make to knowledge and understanding and improved use of the worlds' soil resources.

16. A soil profile is like a signature on the Magna Carta of human relations. The testament that man can and must

yet learned. There are questions, there are doubts, there are principles yet to be discovered. The search for truth - for knowledge - for understanding - it is a part of man and it will continue to motivate us even when the possibility of immediate technology is remote. We crave to know.

29. But new technologies/let us see our pieces of the world in new fascinating ways. GIS carries us along new pathways and into hidden crevices of understanding. Patterns - relationships - causes - effects - the human mind scans the scene rapidly - cataloging and classifying data.

30. Combinations - new answers to yet unasked questions. The thrill of color fades into the gray tones of other relationships. Is there a connectivity? Are they parts of the same but only viewed differently? On one fine day in October this was the pattern observed on an Eucalyptus tree. We look for commonality - for explanation - in almost everything.

31. A soil pit and a little isolated pedon sitting in the water - a pedestal for a passing bird. Creativity conjures up the concept of measurement - the laser beam, the radio waves, the metor burst of "Snotel", ground penetrating radar, a yardstick of reference. Innovation puts new ideas into practice - remember - an idea is U3- useless unless used. The little pedestal is the visual measure of where

the land surface was previously and the volume of soil removed can easily be calculated. It permits the payment of honest wages for honest work. Simple, creative, innovative. There is much that can be done, isn't there?

32. Soil surveys and their interpretations have always been highly visual. Information to assist users is commonly provided in colored map form. Similarities, differences, locations, and patterns are woven into a tapestry of nature. And we are a part of this.

33. When your stand with you feet spread and tilt back your head, and look up - it seems to go on almost forever. If you put things off - if you procrastinate - it is usually because the completed project might not be acceptable. This sense of possible failure leading to procrastination can now be thrown away. Look again - You won't get the whole job done - you can only begin - you can only be a partner in the team effort. If we fail, we will fail together - but in the meantime let's get started.

34. Reflections are a way of feedback. They measure the progress of a morning shave or the placement of lipstick. Nature looking at nature is almost always a pleasure to behold.

35. A painting is the reflection of man looking at nature. It varies with the artist and his perceptions of reality. You are an artist - You are perceptive - you reflect your perceptions in many ways.

36. Direct contact - visual stimulus -order -symmetry - color - Nature and Man - a confrontation. Perceptions and actions. Stimuli and reactions. People and their environment - goals - time frames - hunger - posterity - abuse - use - Yes, a confrontation. A lesson of values.

37. The people of the soil survey - whether in the field, at an area or state office, at a Technical Service Center, at the National Soil Survey Center, or at the National Headquarters - have a mission. That mission is to provide the best information possible to help people understand soils and to use them/wisely in their pursuit of a quality life. We are all proud to be a part of the team.

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16. A soil profile is like a signature on the Magna Carta of human relations. The testament that man can and must

make to the environment. A system of soil classification is a powerful tool of communication. Soil Taxonomy is the best known language of Pedology. But languages must be used, and thought, and learned, and improved if they are to make a continuing difference.

17. There are few places that man has not been on this earth. He invariably seems to want to change it from one state to another. From wilderness to domestic, from marsh to cropland, from desert to oasis. In many places the transformation indicates that man can live in harmony with the environment. The matching of resources can be a wonderful thing to behold.

18. Innovation is the implementation, the doing, the completion of the ideas of creative minds. The concept of a monument to the Love of a man for his beautiful wife transformed into one of the wonders of the world - the Taj Mahal. Excellence at its very best. Achievable. Remember, an idea may be a 3 U- "useless unless used", "Useless unless used".

19. The Soil Survey is a major staff in Technology. Ed Nelson, Associate Deputy Chief for Technology (on the left), and Bob Shaw, the Deputy Chief for Technology very skillfully guide the seven divisions within Technology. Bob is a man of vision and deals in holistic terms about

where to go. He has an uncanny sense of timing that permits each of the staffs to cooperate in ways not previously possible.

20. A common complaint about many organizations is that they have become more complex than is necessary. Good companies and institutions are not transfixed with organization charts, or job descriptions, or that authority exactly matches responsibility. Excellent companies believe that if you've got a major problem, bring the right people together and expect them to solve it.

Ready, Aim, Fire, Learn from your tries. That's enough for the top performers, the winners. Technology is learning to behave in this way. Ready, aim, fire, and learn from your tries. Ready, aim, fire .....

21. This map illustrates the marginal lands far agriculture throughout the world. Mountains, different degrees of dryness, cold temperatures - and their combinations. These constraints limit the availability of suitable soil resources. The white area5 have serious physical and chemical limitations for agricultural production. It is estimated that only 3% of the world's soil resources are what we consider as prime farmland. I believe the challenges and opportunities for soil scientists to help are so great that it is irresponsible to talk about what we will do after the "once over". It should be evident.

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22. Aluminum toxicity is severe limitation to root growth. It can be corrected with lime but in many parts of the world where the problem soils/ exist there are no sources of lime and almost no resources to purchase lime even if you can get it there. Are there alternatives? What does soil science say?

23. Many of the workers at the Red Soil Research Institute in south central China are women. The old grandmother is absolutely delighted with her one granddaughter. Population control reduces the number of people but creates new and different social and cultural stresses. Her daughter on the left has her quota of children. Are we prepared to cope with these user clients? Or with those who work with similar users?

24. Over 80% of the limited resource farmers in the United States are black females. They raise children, they create a home environment, they manage and work the land. Does your fancy computer provide the right information at the right time in the right format? Transformations usually start slowly - but eventually all the parts of a system are modified. There is a role for soil scientists. There are many unfulfilled potential users.

25. Illiterate, hard working, barely healthy, chewers of betel nut, smokers of opium. Farmers behind barbed wire -

the prisons of the mind are frightening to behold. Surely such barriers are as difficult to change as the real restraint of wire. Cultural stigma and tradition in agriculture in developing countries (and in parts of the U.S.) are keeping us from producing and providing the best products and services that we strive to achieve. Well, so what? The so what is our personal response to moral issues.

26. The crowning beauty of the protea plant takes many shapes and colors and forms. It is unfettered - it is free to sway in the breeze -it soaks up the soothing sun's rays. Freedom, dignity, grace, self esteem, worth and true value. Surely it is part of our mission to transform ideas into innovations ; to help reduce the abuse and the hurt.

27. It does take place, and will take place, through people. Trained and skilled soil scientist who are far beyond technicians - the workers, the rote laborers. Men and women whose abilities to produce quality products and services are "tunedin" and turned on" to the society in which they live. They are winners - they are professionals. They are the life blood that surges throughout the soil survey. They are an important reason for our National Soil Survey Center to exist.

28. There are phantoms lurking in this shrouded karst topography. There are mysterious and myths and lessons not

yet learned. There are questions, there are doubts, there are principles yet to be discovered. The search for truth - for knowledge - for understanding - it is a part of man and it will continue to motivate us even when the possibility of immediate technology is remote. We crave to know.

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because the completed project might not be acceptable. This sense of possible failure leading to procrastination can now be thrown away. Look again - You won't get the whole job done - you can only begin - you can only be a partner in the team effort. If we fail, we will fail together - but in the meantime let's get started.

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Thank you.

SOILS INFORMATION USED FOR EROSION PREDICTION

Melvin S. Argabright, Head, Ecological, Sciences Section and Agronomist, MNTC

I will assume the privilege of changing the topic slightly to "Soils Information Used for Erosion Prediction". I hope to discuss soils information from the perspective of field application of soils and erosion prediction technology.

-- can the principles be understood by a technician or new soil conservationist and applied with a minimum time requirement and with information and observations available at the site?

My remarks will apply to a family of erosion prediction models including USLE, WEQ, WEPP, WERM, and EGEM. Similar technology is involved in components of EPIC, CREAMS, and others. My specific comments will be in the context of the technology I am most familiar with -- IJSLE and WEQ.

Some have asked why we continue to work with new adaptations of USLE and WEQ when new improved models are already being developed? Put another way, why not put all our available resources into perfecting WEPP and WERM, instead of diverting effort to improving obsolete technology? The *answer* is that we need to do the erosion prediction job today, and we need to use the best tools we are able to come up with today.

WEQ I:

We have experienced the most difficulty with applying this equation to the variety of field conditions across the country. Some of the key problems are soil-related.

A. Understanding and appreciating the definition of "I", and how this affects use of I in the equation.

1. Controversy over what "I" is, and how to measure it.

a. "I" is expressed as expected average annual erosion by wind under a given set of conditions. Seiving to determine "I" must account for the effect of these conditions.

b. The conditions of "I" include:

(1) no influence of erosion from offsite (isolation),

(2) no topographic effects (level),

(3) no influence of surface ridges oriented crosswind (smooth),

(4) no protection by shelter-belts or other wind barriers (unsheltered),

(5) no protection by living or dead vegetative cover (bare),

(6) on a field large enough to permit an avalanching effect to occur (wide),

(7) clods and crusts broken down by the abrading impact of eroding soil particles (loose and noncrusted), and

(6) a dry windy climate similar to western Kansas (C = 100).

2. Relationship of soil textural class to I --- a poor correlation.

a. Resistance to abrasion -- "I" expresses the percent of non-erodible fraction remaining after abrasion has occurred.

b. Response to surface moisture, and geographic variability in available moisture, including irrigation.

- This is presently expressed in the climatic factor "C", which captures moisture availability as rainfall, but poorly expresses soil drying rates, and does not account for moisture in the form of snowfall and/or irrigation.

3. Two national references for interpretation of "I" (NAM and NSH) are not in complete agreement --- this needs to be resolved.

a. NSH provides basis for interpretation by soil scientists of Wind Erodibility Groups, which becomes Part of the Soils 5 data, and Section II of FOTG.

b. NAM is the usual source of WEQ guidance and procedures developed by agronomists in Sec. I-C of FOTG.

c. There is not a great difference, except NSH Puts non-arable land in WEG 8, whereas NAM interpretations apply to all land uses, and WEG 8 includes soils that are non-erodible.

B. Adjustments of the "I" value:

1. Currently used adjustments:

a. Knoll erodibility

b. Clod-forming tillage (limited use).

c. Crusts (not generally used, but available in NAM. The effect is temporal, hence can only be used when erosion is estimated by cropstages or management periods -- a relatively new adaptation). Important properties are:

(1) Strength

(2) Resistance to abrasion

2. Proposed or needed adjustments:

a. Coarse fragments

b. Temporal changes in response to various influences -- a time-variant "I"?

C. Standard rotary seiving as a basis for "I"

1. Comparison to use of flat seives in the field -- can "I" be accurately determined on site?

2. Seiving at Big Spring indicates a wide range of temporal change in response to tillage, moisture, crops, etc. These measurements are not the "I" of WEQ, but are indicators of erodibility of the surface under present management and at the time of measurement, whether or not in an actively eroding state. Again, "I" seems to express a condition where soil conditions tending to dampen the erosion process are absent.

3. How to handle rock fragments, which tend to act as abraders in the seive, but remain in place and provide protective cover (armor) in the -field.

D. Knowledge gaps

1. Behavior and fragility of organic soils

USLE K" and WEPP:

A. Surface rock fragments -- treat as a soil property or management effect ("C" or "K" of USLE)? There are expressions of both. A soil mapped as a stony phase will have the same "K" as the non-stony phase, but "C" will be adjusted.

B. Recently or continuously tilled surfaces, versus untilled or not recently tilled surfaces -- a function of soil bulk density, accounted for in the C factor of USLE.

C. The process model being developed (WEPP) needs to simulate soil detachment, transport, and deposition by raindrop impact, overland surface flow, and channel flow (rill and interrill erosion). Important properties are:

1. soil texture
2. organic matter
3. aggregate size and stability
4. soil structure
5. bulk density
6. soil surface shear strength
7. crust thickness and resistance to penetration
8. water retention
9. clay mineralogy

-- and others

D. Water erodibility concepts being developed include:

1. Two erodibility parameters for two erosion processes.
2. Time varient erodibility (proposed for current USLE).

WERM:

Returning to wind erosion prediction and looking to the future (WERM).

A. Increasing concern about wind erosion in states east of the Great Plains has resulted in some SCS/ARS cooperative erosion studies in areas outside the region where the original WEQW was based.

1. Being planned: a cooperative study on the sandy soils of northwest Indiana.

2. Already in operation: a similar study in southeast Missouri.

3. There are other similar studies around the country. Proposed studies by the Universities of Wisconsin and Michigan are examples. In addition to providing validation for the new wind erosion model, we also hope to gain information useful for the present WEQ.

B. In some of these areas, there is serious erosional history where the climatic index of WEQ indicates little problem with wind erosion, due to high annual precipitation.

1. The problem is apparently related to the behavior of droughty soils, such that the assumptions built into the WEQ climatic index about surface soil moisture don't hold true.

2. As a result, we have experienced some problems with determination of eligibility for CRP, identification of highly erodible lands, etc.

C. Important to WERM are the effects of management and climate on intrinsic soil properties, resulting in temporal changes in characteristics of the soil surface.

1. Management actions include the residue management, tillage, and cropping history.

2. Climatic influences include windspeed, precipitation, freezing and thawing, evaporation, etc.

3. Intrinsic soil properties include texture, organic matter, calcium carbonate equivalent, pH, CEC, etc.

4. Temporal changes in soil surface properties, resulting from these influences, include:

a. Microrelief (whereas WEQ accounts only for ridge roughness, this research will account for both random and oriented roughness).

b. Bulk density

c. Aggregate size distribution

d. Dry aggregate stability

e. Stability of ridges, clods, and crusts

f. Soil moisture

5. Note: these are all temporal properties. Data bases will be needed that enable models to simulate changes in these parameters over time.

GENERAL CONCERNS:

A. Handling variability

1. Spatial variability -- with soils this means handling variability in soil erodibility properties along the direction of erosion.

2. Temporal variability -- problem: dealing with temporal changes in soil properties which influence erosion.

3. "K" of USLE and "I" of WEQ are treated as constants (average values).

4. This issue is more manageable (but requires more data) with process models which may work on short time steps such as daily, hourly, etc.

a. Challenge to modelers and data gatherers -- need to model the real world where variability over both space and time is the normal condition.

b. Models that can handle variability.

c. Data to support these models -- something more than average values.

B. Integration -- handling the interaction of all erosion processes occurring on the same site.

C. Consistency in soil manuscripts.

1. "Crops & Pasture" consistent with map units.

D. Involvement of agronomists in soil interpretations

E. Future role of soil scientists in soil interpretations and planning.

1. Shift from mapping soils to developing interpretations and data bases on soil properties.

SOIL GEOGRAPHY

SOIL SURVEY DIVISION

MISSION

-- FUNCTIONS

-- STAFF

-- PLANS FY89

USDA, SOIL CONSERVATION SERVICE

SOIL GEOGRAPHY
MISSION, FUNCTION, STAFF

MISSION

To formulate and recommend policy; develop plans, standards and procedures; and provide national leadership for a program of soil geography to serve national and international interests.

FUNCTIONS

1. Coordinate the development of new and improved methods of soil mapping.

2. Develop, improve and coordinate the maintenance and use of soil geographic databases.

3. Collect and maintain international soil maps and related data.

4. Maintain and improve procedures for making small-scale soil maps of the U.S. and other countries.

5. Enter into cooperative arrangements with State, Federal and international agencies to prepare small-scale maps, develop attribute databases, integrate with other data and train personnel in their preparation and use.

6. Determine new methods and techniques for analyzing and presenting soil geographic data alone or in combination with other spatial data.

7. Identify land related issue of importance to the U.S. or to other countries, determine soil attributes having a direct relationship to the issues and propose data sets and formats that will provide the appropriate soil-geographic information.

8. Generate thematic small-scale soil maps.

9. Provide basic soil services to Federal and international agencies and others.

10. Coordinate soil-geography activities with geographic information activities of other SCS disciplines and of State, Federal and international agencies to ensure information can be integrated and shared.

STAFF

Title	Grade	Name	Phone FTS
National Leader, Soil Geography	GM-15	Bill Reybold	382-1825
Secretary	GS-6	Lorraine Jamison	382-1819
Tech. Assistant Specialist, Soil Management Support Services	GM-14	Terry Cook	475-5332
World Soil Data Specialist	GM-13	Dave Yost	447-6370
Soil/GIS Development Specialist	GM-13	Fred Minzenmayer	594-6035
Soil/GIS Application Specialist	GM-13	Lawson Spivey	447-6371
Small-scale Soil Map Specialist	GM-13	Ben Smallwood	382-1813
Data Processing Clerk	GS-4	Vacant	

SOIL GEOGRAPHY
PLAN OF OPERATIONS FY-89

What	Who	When
Complete evaluation of digitizing hardware/software as part of soil survey process and issue guidelines to state offices	Chimmery, Reybold	Apr 1989
Issue DEM Handbook to all soil scientist	Reybold	Dec 1983
Prepare and distribute technical note describing Montana's mapping base technique	Reybold, Stelling	Apr 1989
Develop methodology for use of remotely sensed/soil data for resource management	Minzenmayer	Oct 1988
Prepare and distribute NATSGO thematic map examples to state office staffs	Spivey	Jan 1989
Install NATSGO in NHQ ARC/INFO and develop procedures for generating thematic maps	Minzenmayer, Bliss, Spivey, Schafer	May 1989
Develop GIS procedures to assist soil survey quality assurance staff	Spivey , Harner	Sep 1989
Write and distribute STATSGO user guide for mini ARC/INFO	Bliss, Minzenmayer, Reybold	Jun 1989
Write and distribute STATSGO user guide for GRASS	Minzenmayer	Jun 1989
Initiate procedure to provide STATSGO attribute data in Prelude DBMS in 3SD	Terpstra, Anderson, Reybold	Mar 1989
Coordinate international Correlation Workshop - cold Aridisols	Cook, Kimble Witty, Eswaran	Aug 1989
Coordinate international correla- tion Workshop - Wetland	Cook, Kimble Witty, Eswaran	Oct 1990
Prepare soil degradation map of U.S. (GLASOD) at 1:7.5M for UNEP	Smallwood	Jan 1989
Prepare pilot SOTER map of	Yost	Dec 1989

northcentral North America at 1:1M in cooperation with Canadians		
Prepare small scale soil map of the Sahille using AVHRR and other recent data sources	Smallwood, Yost	May 1989
Prepare 1:1M MLRA map of Uganda, complete soil survey reports for Uganda experiment stations	Yost	Oct 1988
Develop MLRA mapping guide for international use	Cook, Reybold Yost	

Scientific Papers

-Soil Geographic Databases-Journal of S&WC	Rebyold, TeSelle	Oct 1988
-Using Small-scale Digital Soil Maps for Interpreting Resources Journal of S&WC	Bliss, Reybold	Dec 1988
-Soil Geographic Databases-LIS/ GIS Conference, San Antonio	Reybold	Nov 1988
-Use of Geographic DBS in Less Developed Countries -Nairobi, Kenya	Reybold	Mar 1989
-Use of Color Triangle for Map of Three Classes on Maps with Multi-component units-American Cartographer	Bliss, Minzenmayer	Jan 1989
-Small scale National Maps for Illustrating Spatial Distribution of Soil Characteristics - ASA Annual Meeting and Journal of S&WC	Spivey	Oct 1989
-State Soil Geographic Maps and Their Interpretation - ASA Annual Meeting	Minzenmayer	Oct 1989
-Soil Degradation Map of U.S. as Part of Global Initiative - ASA Annual Meeting	Smallwood, Reybold	Oct 1989
-A Global Soil/Terrain Databases	Yost, Reybold	Oct 1989

STATE SOIL SCIENTISTS' MEETING
October 17-21, 1988
Lincoln, Nebraska

Soil Classification

Most soil classification activities will not change due to the establishment and staffing of the National Soil Survey Center. However, due to the centralization of staff, we plan to have increased activity with more interaction with the states.

We will work with the NTC's and the state offices to improve Soil Taxonomy through the preparation of proposals to amend Soil Taxonomy and work to keep taxonomy in an up-to-date usable form. We will provide the necessary training to carry out these objectives.

As outlined in the PIP report, the soils staff develops and recommends policy; develops plans, standards, and procedures; and provides staff leadership for a national program of soil classification in support of a field soil survey program. Specific functions are to:

1. Maintain and improve the national system of soil classification (Soil Taxonomy) and cooperate with international efforts.

2. Coordinate efforts to expand the United States system of soil classification (Soil Taxonomy) to accommodate the soils of areas outside the United States; and to assist in developing and evaluating proposals to modify the classification system as needed.

3. Maintain the Soil Survey Manual and National Soils Handbook information relating to soil classification and its application.

4. Promote or initiate continuing studies where necessary for the classification, definition, description, and nomenclature of soils.

5. Review the National Cooperative Soil Survey program to ensure proper use and application of Soil Taxonomy.

6. Assist in developing and maintaining an international soil classification reference system.

7. Provide current soil classification information for the soil classification file.

8. Advise and assist field staffs in soil classification activities and in training and development programs.

9. Maintain working relations with other United States agencies, other SC8 staffs, and international organizations in connection with soil survey and soil classification activities.

10. Assist in evaluating NC88 and international soil survey programs as requested.

Some major jobs to be accomplished this year are:

1. Finish the Soil Survey Manual so that it can go to the printers in 1990.

2. Update and oversee the printing of keys to Soil Taxonomy.

3. Prepare the Andisol amendment to issue as part of the National Soil Taxonomy Handbook.

4. Change the format of subgroups in the Keys to Soil Taxonomy.

5. Work on the ICOMS to have three studies and field trips.

   a. Spodosols--1988

   b. Cold aridisolc--1989

   c. Wet soils--1990

6. Revise and update Soil Taxonomy--starting with the diagnostic horizons.

7. Attend field reviews.--We will need the state soil scientists input as to where there are taxonomy problems. However, we do not want to focus only on problems, but also include opportunities for the continued improvement of Soil Taxonomy.

8. Assemble and disseminate pertinent information including technical publications.

9. Advise and assist field staffs and in training and development programs.

Some continuing jobs that are to be accomplished in the future are:

1. Make photo collection of soils by subgroup, diagnostic horizons, etc.

2. Systematically revise definitions of diagnostic horizons.

3. Actively work with states to propose changes in Soil Taxonomy.

   a. Make study trips as needed to study in field and to gather additional documentation as needed.

   b. Review SSSA Journal papers that contain recommended changes for Soil Taxonomy. Test proposals and follow-up on basis of test results.

   c. Route proposals through Regional Soil Taxonomy Committees, SSSA Soil Taxonomy Committee, and others as appropriate.

   d. Work closely with correlation staff to test proposals and identify problems.

   e. Provide training to states, correlation staff, and others concerning Soil Taxonomy.

4. Maintain computerized copy of Soil Taxonomy.

5. Oversee updating and printing of Keys to Soil Taxonomy every two years.

6. Provide necessary guidance to International Soil Classification Committees to ensure that assigned mandates are completed.

7. Systematically improve Soil Taxonomy so it can readily put in final form for republishing in about 1995.

8. Follow through to publication of the Soil Survey Manual.

9. Revise appropriate sections in National Soils Handbook.

Soil Conservation Service
National Workshop for State Soil Scientists
17-21 October 1988

Soil Survey Investigations

Welcome to the National Soil Survey Center. Because Soil Survey Investigations incorporates and somewhat expands upon the National Soil Survey Laboratory (which has been here for many years), I think that we can claim to be the original and, I hope, essential core of the Center. Of course that may also mean that we are the ones to blame for your airline schedule problems. Now that you have managed to get here, I hope that you will enjoy your time in Lincoln.

You have received a brief statement of our functions. A more detailed statement is as follows:

> The Soil Survey Investigations staff is responsible for providing reliable, new information and understanding about soils, soil relationships, and soil survey methods. More specifically, its functions are:
>
> 1. To supplement the basic information of the soil survey (soil and map unit descriptions and soil maps) with data on the properties and behavior of identified kinds of soils: to develop and test new soil characterization methods; and to store characterization data and make it readily available.
>
> 2. To provide new concepts, methods, understanding, predictions, and information in support of soil survey interpretations, modelling, and other SCS activities.
>
> 3. To provide information and develop theories and understanding about processes of soil formation, formation of specific kinds of soil, relationships of soils to genetic factors, and landscape relationships in support of soil mapping, soil classification, and soil correlation.

Soil Survey Investigations:
--provides assistance in response to requests from SCS state offices, other SCS National Soil Survey Center staffs, and other branches of the SCS.
--initiates investigations, basic research, and other activities in anticipation of need for information to advance the National Cooperative Soil Survey program.
--cooperates with state agricultural experiment stations, other participants in the National Cooperative Soil Survey, and other organizations to carry out joint investigations, to coordinate and support research, and to exchange research facilities and personnel.

Many NSSL activities will continue as before. These include (1) laboratory characterization of soils (help with site selection and sampling, laboratory analyses, interpretation of results), (2) other technical assistance to the states, (3) support of interpretations work of the NTCs, (4) training, and (5) support of modelling work.

We will return to assigning liaisons by NTC areas. Each area will have one or two liaisons with one person responsible for working with the NTC staff and with regional committees and conferences.

We have filled the new soils-geomorphology position. Dr. Carolyn Olson will report in early December. We will continue and perhaps expand geomorphic and GPR consultation and assistance. We hope to work with and support ongoing projects in your states and to initiate some new landscape studies. The Palouse, the Delmarva Peninsula, and the Southern High Plains have been nominated so far as study areas.

We will work with Jim Culver of the MNTC, the Nebraska state office, and other staffs of the NSSC on special studies in Saunders County, NE, during the update of the soil survey. We hope to develop, test, and demonstrate new procedures for such things as making and recording observations and measurements of soil characteristics in the field, determining the composition and variability of map units, relating laboratory data to land areas rather than a single pedon, using geomorphic and stratigraphic information in mapping, and recording the criteria and models used in mapping.

A National Soil Characterization Data Base Committee started work in July on development of an integrated NCSS laboratory data base. The group includes four regional agricultural experiment station representatives (namely Bill Allardice, Tom Fenton, Wayne Hudnall, and Ed Ciolkosz), the NSSC Data Bases staff, consultants, as well as the NSSL.

Water Quality Action Plan and other water quality activities can be expected to continue and increase.

ARS, Texas A&M, and other disciplines in SCS want help at Temple, TX, with EPIC and other models. If funds permit, we probably will fill that position again.

We recognize the need for more emphasis on work in support of interpretations and look forward to greater efforts in this area and to close cooperation with the NSSC and the NTC soil interpretations staffs.

Cur staff organization is shown on the attached sheet. We are all here in Lincoln except for Jim Doolittle in Chester, Reese Berdanier in Fort Worth, and Milt Meyer in Washington. John Kimble's duties are primarily in support of the international Soil Management Support Services project.

Supervisory Soil Scientist	Supervisory Soil Scientist
Brown	Vacant
Kaisaki	Baumer
Klameth	Brasher
(Maw)	Goss
Pullman	Grossman
Reinsch	(Holmgren)
Smith	Lynn
Sobecki	Nettleton
Vacant	Yeck

TRAINING

- Cultural Resources
- Dam Safety
- Hydrology
- Remote Sensing
- Geographic Information Systems
- Social Science
- Soil Mechanics
- Soil Properties and Interpretation
- Water Quality
- NRI User Access
- Plant Materials

TECHNOLOGY DEVELOPMENT

- Improve Performance
  - Coordinated Plan
  - NHQ GIS
  - Integrated Staff Assignments
  - Budget for Software and Database Development

- Expedite Water Quality Tools
  - WQAP Follow-up
  - Update Technical Guide'
  - Develop Comprehensive Evaluation System
  - Nutrient and Pesticide Management
  - Training

TECHNOLOGY MISSION

- The Office of the Deputy Chief for Technology supports the SCS mission by leading the development and application of science and technology..

- Activities include developing policy and procedures, assuring quality of technical work, identifying research needs, training of technical personnel, and leading overall technology developmerit and transfer for SCS.

TECHNOLOGY **PRIORITIES**

- Technology Leadership
- Technology Development
- Technology Transfer
- Management and Organizational Effectiveness
- Affirmative Employment

MANAGEMENT AND ORGANIZATIONAL EFFECTIVENESS

- Improve Performance of Programs/Activities
  - Productivity Improvement
    - Cartography
    - Engineering
    - Resource Inventory
    - Snow Surveys
    - Soils
- Assess Quality of Technology Development and Transfer
  - Technology Reviews
  - Management Control Systems

TECHNOLOGY

SCS

TECHNOLOGY LEADERSHIP

- Improved Communications
- Networking
- Improved Relations
- Publish Professional/Technical Papers
- Team Building
- Coordinated Plans of Operations
- World Class Leadership

AFFIRMATIVE EMPLOYMENT

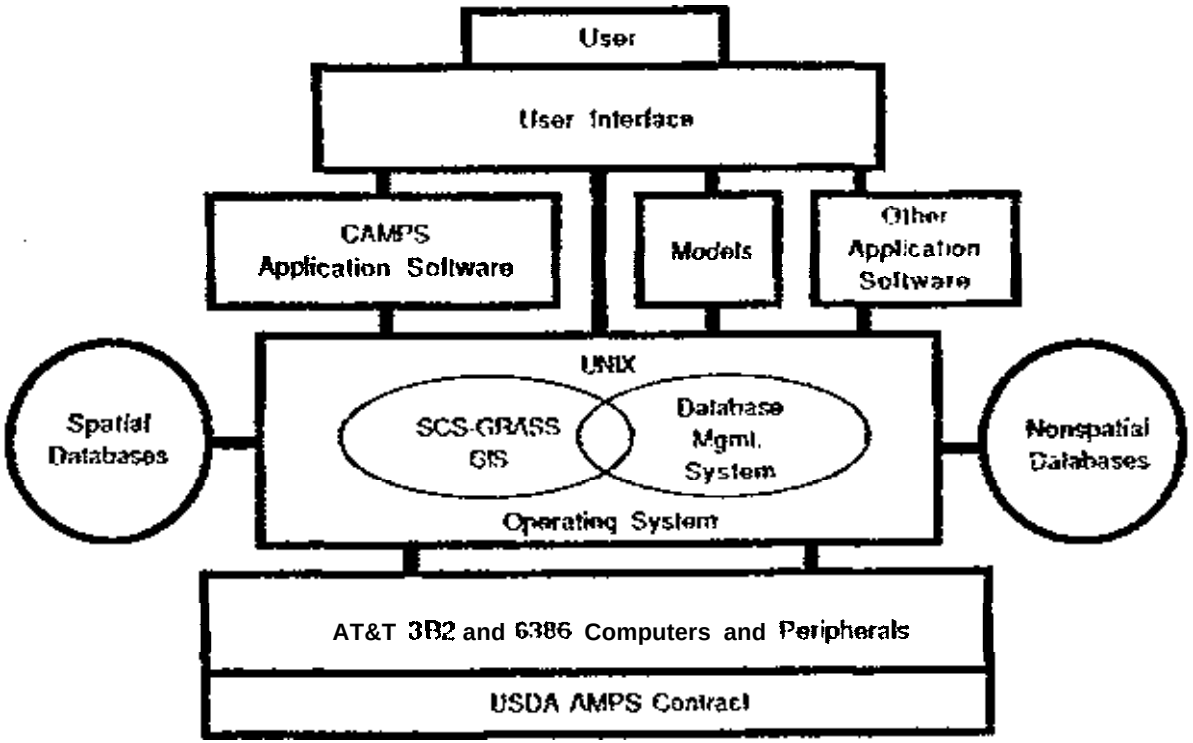
- Bridge Positions
- Wider Advertising
- Upward Mobility
- Executive Development Training
- Mentors
- Committee Assignments
- Special Studies
- Limited Resource Farming
- Exposure
- Opportunity to Perform
- 1890 Activities

TECHNOLOGY MINDSET

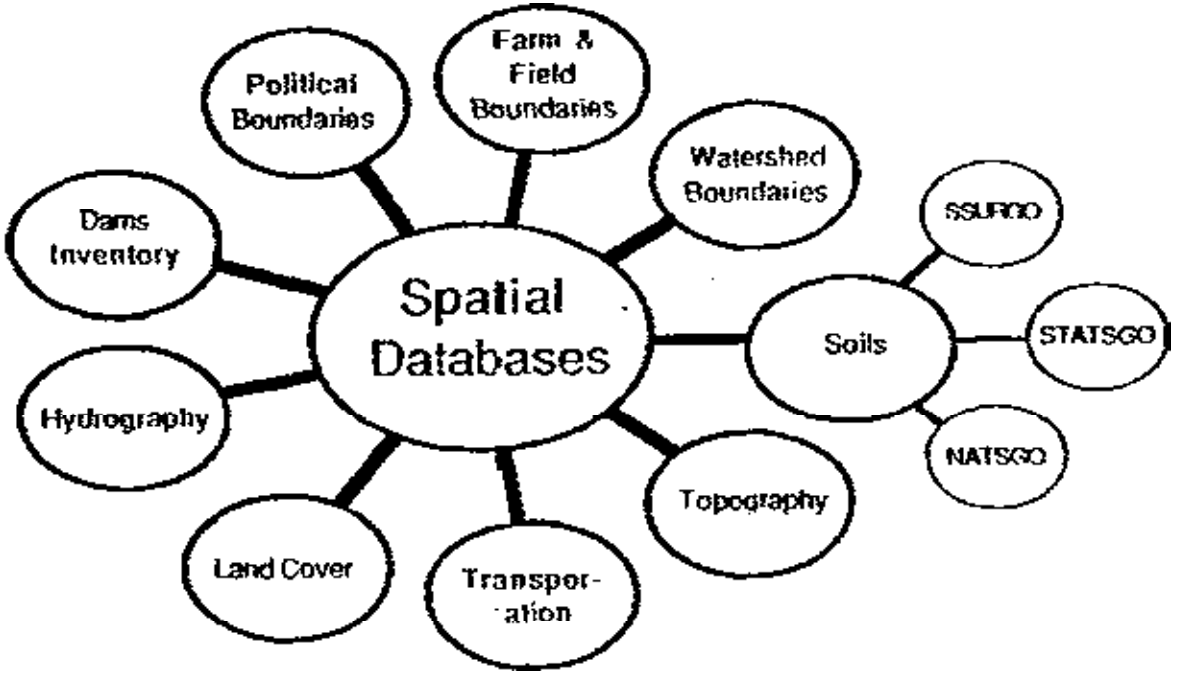
- Think Spatially
- Think Integration/Connectivity
- Think Systems
- Think UNIX
- Think of Better Ways
- Think Professionally
- Think Together - Network
- Think Globally

- Be a World Class Leader

SCS AUTOMATION MODEL



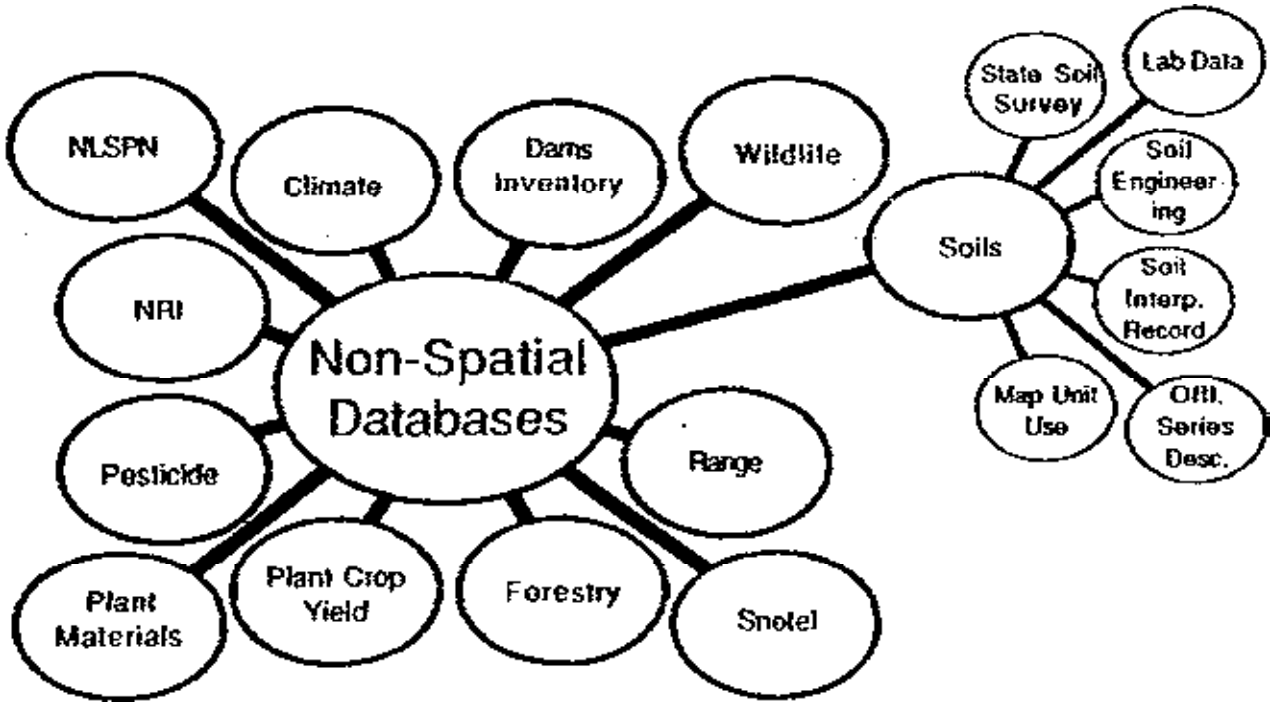
SPATIAL DATABASES



TECHNOLOGY

SCS

TECHNOLOGY
NON-SPATIAL DATABASES



TECHNOLOGY PRODUCTS/SERVICES IN FY-1989

- Computer Software
- Policy, Procedures, and Standards
- Training

COMPUTER SOFTWARE

- CAMPS
  - Conservation Effects Display
  - Grassed Waterway Design
  - INFORM Forestry Module
  - WINDSPEC Windbreak Specification Writer
  - **VEGSPEC** Vegetative Plantings Specification Guide
  - AGROSPEC Agronomic Practice Specification Writer
  - Range Modules (4) Alpha Test
    - Range Inventory
    - Range Site Database
    - Livestock/Forage Balance
    - Annual Grazing Plan

COMPUTER SOFTWARE

(Continued)

- Practice Application Programs
  - Reinforced Concrete Channel Design
  - S.A.F. Stilling Basin Structural Design
  - GAMES
  - Ephemeral Gully Erosion Model
  - WSP2 for Microcomputers
  - DAMS2 for Microcomputers
  - EFM Peak Discharge Program

COMPUTER SOFTWARE

(CAMPS Continued)

- Wind Erosion Equation

- GRASS
  - 3B2 Version
  - 6386 Version
  - GRASS/CAMPS Interface
  - Imagery Subsystem

POLICY, PROCEDURES, AND STANDARDS

- ASTM Standards (12)

- Engineering Field Manual (4 new or revised chapters)
  - Hydrology
  - Soil Mechanics
  - Drainage
  - Bio-engineering

- NRI Data Users Guide

- Practice Standards
  - Nutrient Management
  - Pesticide Management

POLICY, PROCEDURES, AND STANDARDS

(Continued)

- Geographic Information Systems Handbook
- Remote Sensing Handbook
- Water Quality Indicators Guide
- Soil Survey Manual
- Revised USLE

NATIONAL SOIL SURVEY DATABASE STAFF
SOIL INFORMATION SYSTEMS
The Role For The Future
10/88

This year the Soil Conservation Service, and the Soils Division have taken a bold step to implement the recommendations of the PIP study. This study called for the establishment of the National Soil Survey Center as a center of excellence for soil science. Also as a part of the PIP recommendations., was the establishment of the Soil Survey Database staff.

Service and to our nation. This commitment recognizes the fact that these databases must be cared for, and managed as an integrated resource, not as individual files on widely dispersed systems.

ROLE OF THE NATIONAL SOIL SURVEY DATABASE STAFF:

The National Soil Survey Database staff is committed to the design, development, maintenance and support of automated applications and databases. Specifically, to provide:

- system analysis, design & implementation (life cycle management)
- national database standards
- training
- user support
- documentation
- management & maintenance

MAJOR ANALYSIS & DESIGN EFFORTS:

An intensive effort will be made during FYS9 to restructures some of our main soil survey databases and streamline our information processing systems. The resulting design will integrate databases, data collection and validation processes at the field, state, and national levels. This design will take advantage of the new hardware and software in the field and state offices. It will utilize current data management technology to improve our ability to manage and provide soil information in an efficient and effective manner.

There are three major analysis and design efforts that will be undertaken this year.

I. NATIONAL SOIL SERIES STANDARD DATABASE.

The National Soil Series Standard Database (NSSSDB) will be created by integrating the Official Soil Series, the Soil Interpretations Record (SOI-5), and the Soil Classification File into a single coordinated system. By integrating these files the estimated properties on the SOI-5 record will become an integral part of the series, and in concept an extension of the ranges in characteristics. This integrated file will define the allowable ranges for the soil series.

Development of the National Soil Series Standard will allow us to use the computer for many of the correlation checks that are currently done manually. In the future we will be able to run a validation program against the field soil survey database to verify that the data is within the allowable ranges for the series. It will also be possible to have the computer compare a pedon description with all series of the family and tell us which series the pedon fits. It will also tell us which properties are outside the range for the series.

NSSSDB will be managed using current database management technology. Using this technology will eliminate many of the restrictions that we now have with the SDI-5. For example, we will be able to store any number of layers, crops, plant communities, and class determining phases. This should eliminate the need for multiple SOI-5s we are now creating solely because of space limitations on the current record. The information on the Official Series Description will be stored as single data values, as opposed to the current narrative format. The narrative will be generated from the tabular record set. Storing the information as discrete values will allow us to use this record to verify data in field databases.

Following are some of the important aspects of the Soil Series Standard that are currently being discussed:

subsurface characteristic data would be stored as major soil horizons instead of layers as it is currently on the SOI-5

The restrictions on the number of surface or subsurface horizons would be removed.

Each surface texture would be stored as a separate row. We would not combine surface textures into layers as is done now,

Other series criteria (IE., color) would be added to the data record in the same format as the SOI-5.

The comments that follow are somewhat speculative. Future analysis may change these considerably.

> We must evaluate how we manage the performance information and site data currently on the back of the SOI-5. This information (IE., crop, range, woodland) may not be a part of the NSSSDB but may exist in the State Soil Survey Database (SSSD). A national database could be created by uploading the data from state systems to a national file. This idea has some advantages. First, the performance data is the most volatile data on the SOI-5. About BO percent of the changes to the SOI-5 record are a result of changes to this information. Secondly, The yield data on the SOI-5 is usually not specific enough for local needs. This information is often changed only on manuscript tables. Under the current situation when a new soil survey area uses and edits a existing SOI-5 the changes that are made often conflict with information for the older areas. This results in the current SOI-5 representing the latest survey area, and in some instances no longer represents the series as a whole. The design of the new system MUST correct this problem.
>
> We will look at the possibility of linking the soils record with a range database that is collected and managed by the range scientists. This might allow us the opportunity to change the concept of the plant information that we now store to reflect the current vegetation and let the range people deal with climax vegetation. After all, the current vegetation is what we use to map and characterize the map unit anyway.

The concept of the SOI-5 is now about 13 years old. It has served us very well. It was originally designed to generate manuscript tables, however, we have been able to use this important database far beyond its original intent and purpose. It is time now to rethink the purpose and function of this critical data set, and to integrate it with other databases, both our own, and those of other divisions.

II. FIELD SOIL SURVEY DATABASE:

The second area of emphasis for analysis is the design of the Field Soil Survey Database. The term "Field Soil Survey Database" is an interim term. I am sure we will find a better name for it as design gets under way. The intent is to develop a database, operational at the field level, that will meet future client needs. The needs of our clients (and we do have clients) are changing rapidly. The automation of the SCS field and state offices, and the increasing use of models to simulate processes are combining

to create demands for our data that were not imagined a few years ago. Models such are Gleams, WERM and the new WEPP model, and the intdnse effort being made by our Agency in the water quality area, are creating intense demands on our data, and our current delivery systems. WE MUST TAKE THE TIME TO MENTALLY PROJECT OURSELVES INTO THE FUTURE TO DETERMINE WHAT THESE NEW DEMAND WILL BE, AND PROVIDE THE TOOLS, TECHNIQUES AND DELIVERY SYSTEMS TO MEET THESE NEEDS. (When I speak of delivery systems, I include the people as a part of the system. More on this later.)

We must look at new methods for delivering the data and integrating our databases with expert systems. We must investigate methods *for* providing what Bob Grossman calls "temporal data," that data which is use dependant, or changes with the seasons. This database must *have* multiple Assess paths and Allow the user to specify which path is more appropriate, If we Are going to have the database that will meet the needs of the future, we must start to develop them now!

In the most simple terms, the goal of the field soil survey database is to provide the most specific, valid and reliable database possible to the SCS field office. The dataranges that are currently on the SOI-5 Are too broad for some of the detailed interpretations needed At the farm level, *and* the range of values do not lend them selves to use in models. Modelers usually need A single number. If we don't give them one, they simply compute one, usually by calculating A Average of the range given on the SDI-5. When this process is Applied to a survey Area data set it may askew the data in An unintended direction.

One possible solution to this problem is the creation *of a new* data element called A Representative Value (RV). The concept of the RV is a single value developed statically from pedon descriptions, transects or notes. Soil scientists could edit the RV if needed to provide intuitive information not verified by field data. Each date element that we currently store AS A range will have An RV as well. The RVs would be stored in the CAMPS soils databases AS the value used to drive models, and to make interpretations.

Quality assurance of the RV values could be a simple task of running A program that compares the RV in the field database to the ranges in the NSSSDB. This would verify that the R V is within the allowable range for the series. The RV concept will Allow us to be more exact in specifying data. It Will allow us to interpret A soil with RV's near the limits of the series without having to deal with overlapping ranges.

III. NATIONAL SOIL CHARACTERIZATION DATABASE:

The third area of emphasis is the design of a National Soil Characterization Databases. There is a recognized need within the National Cooperative Soil Survey (NCSS) to develop a database as a common storehouse for soil characterization data. This database will provide a standardized format, structure and environment for soil pedon descriptions and accompanying soil characterization data. The common format will create a medium for exchanging information among members of the NCSS and other users and collectors of soil characterization information

A committee (NSCDB Committee) has been established to oversee the development and implementation of the NSCDB, and to provide continuing management authority. The committee is composed of a representative from each region of the Agricultural Experiment Stations and Soil Conservation Service.

ANALYSIS METHODS:

To carry out the task of designing these systems, a "think tank" (consisting of "insightful" thinkers1 will be established to serve as user analysts. This group will develop the conceptual design for the new system and describe in detail the functions and requirements. We will use established structured analysis techniques to document data flows, processes and data stores. The STRADIS system life cycle development methodology will be used to assure that detailed analysis and design steps are followed.

For efficiency the analyst team must be as small as possible, but broad enough in geographic representation, experience and philosophies to adequately represent the user community. Two levels of group involvement have been identified for conducting analysis and design, a steering body group and application analyst teams.

The National Leaders will make up the steering body. The role of the steering body is to define organizational objectives, provide project direction, develop and implement policy, and provide resources for the project.

The application analysts are persons who have a deep knowledge of how soils information is collected, processed, managed and used at all levels. Their main function is to specify and document system requirements.

For efficiency, and to accommodate travel and time constraints, the #application analyst will be divided into two groups; a core team, who will develop much of the detail, and an advisory group to provide depth of experience.

A training session for all members of the above teams will be held the week of Dec. 12-16 at Lincoln, Nebraska. This session will be conducted by a consultant from McDonnald Douglas Corporation who has had extensive experience with the SCS. The subject area will be structured systems analysis techniques and data modeling. Examples and content of this session will be tailored specifically to our needs.

Starting in January, there will be periodic team meetings to document the system. Most of these sessions will be informal where parts of the design are detailed by individuals or small groups. When the group has interim products developed,, these will be reviewed by the advisors and the steering committee.

TIMING:

liming for the design and implementation of our new soils information system is critical. The Computer Assisted Management and Planning System (CAMPS) development effort has many modules either being developed or planned. Many of these modules use information from the soil database. The Engineers are heavily involved in the dndlysie and design of Field Office Engineering Software (FOES). The total FOES effort is expected to cost about 52 million dollars, CAMPS modules another 10 million next year. You can see that our agency is serious about automation. Many of the design modules in FOES will use soils information. These, and many other software development efforts are going on now. We simply Can not wait two or three years to design d new soils information system, By then all this development work will be Well underway. Once this happens,any major changes to our field databases will have a major impact on the other applications that use them.

CRITICAL SUCCESS FACTORS:

One of the most critical factors to the successful implementation of our automated systems is the state soils' data set manager,. Where this position has been adequately staffed dnd supported the implementation of SSSD has been a success. This is a new role for soil scientists. And it is a real opportunity. The need for those individuals that can use computer tools to solve real problems can only escalate.

CLOSING THOUGHT:

I like the term "insightful thinkers." In the future we soil scientists must be insightful thinkers. we must see our product, not solely as the published survey report, but as a dynamic, living body of people and information, a database that lives on after the survey party is gone. That changes as needs change or as our understanding increases. A database that can be related to other databases to address complex issues that natural resource planners must deal with in the future. And we must grow the skilled people to make it work!

This is exciteful, and I am glad to be a part of it.

David L. Anderson
National Leader, Soil Survey Databases

SOIL SURVEY OPERATIONS
THOMAS E. CALHOUN, ASSISTANT DIRECTOR
SOIL SURVEY DIVISION

I. Functions - Plan5

a. NHQ Soil Survey Program Management (See Handout)
b. Staff

1. Assistant Director
   a. Internal Operations
   b. Coordinates Soil Survey Program
   C. Provides leadership and direction
   d. Formulates policy, guidelines, and standard5
   e. Assists and acts for director
   f. Has responsibility for allowance5

2. Program Development Specialist
   a. Formulates budget elements (proposals)
   b. Prepares proposals for development and implementation of policy, procedures, standards, and guidelines concerning Soil Survey Operations, and evaluates the program effectiveness
   C. Determines needs and priorities for appraisals and reviews
   d. Responds to inquiries on Soil Survey Operations
   e. Assists in developing, delivering, and evaluating training, and career development opportunities

3. Program Implementation Specialist
   a. Develop5 allowances
   b. Provides information on status and progress of soi1 survey projects
   C. Provides appropriate state and national status report5 (funding, stâffing, progress)
   d. Makes operations and functional reviews to assess program effectiveness
   e. Formulates standards, policies, and procedures concerning participation of cooperator5
   f. Assists in training and career development opportunities

4. Liaison and Coordination Specialist
   a. Represents Soil Survey Division on special assignments and on committees
   b. Serves as representative in formulation of interagency agreements on soil survey and soil resource information applications
   c. Serves as liaison with National Staffs of other agencies in NCSS
   d. Provides information on capabilities of Soils Staff to respond to special initiatives

II. Leadership and Direction - Grace Commission, S.S. Prog.Eval., PIP

A. Number 1 priority Fi'-89 - Mapping Cropland
   1. Provided 6 million dollars for that purpose
   2. Had 61,097,235 to do
   3. Projected 88 figures shown 22.5 million remaining
   4. FY-88 accomplish = 20 million
   5. 82 detaileea for this winter
   6. 107 requested for this past summer
   7. 100-125 needed next summer
   8. Expect FSA funds to be removed FY-90

B. Number 2 priority FY-89 - Project Soil Surveys
   1. Still need to map previously unmapped acres
   2. Need to improve efficiency (See handout)

C. Maintenance of Soil Surveys
   1. Update --
      a. Transect data
      b. MLRA or natural landscape basis
      c. Prepare for digitizing budget initiative for FY-90

   2. Technical Soil Services

III. Allowances FY-90

a. Cropland Mapping Complete - Shift Priorities
   1. Analyze
      a. Project mapping needs
         1. staff
         2. equipment
         3. imagery
            map finishing
      b. &date - needs (same as above)
      c. Technical Soil Service needs
      d. State office needs
      e. Be reasonable and realistic

IV. Career Development

a. NHQ staff - needs
   1. Liaison
   2. Program implementation

b. State Soil Scientists
   1. Encourage people to apply for jobs
   2. Take advantage of opportunity when it comes

APPENDIX G

MANAGEMENT INITIATIVES

The following list provides opportunities to increase efficiency and improve effectiveness of the soil survey program. (Implementation of all of these items in every state would increase the mapping output by an estimated 5 percent to 10 percent. State allowances should not be increased significantly until these initiatives have all been implemented:.

1. Adjust the number of on-going surveys in the states to a number that can be completed in a 3- to 5-year period with the available staff. Many of the soil surveys are understaffed.

2. Increase the use of less intensive soil surveys for areas of less intensive land use. Design map units so that the amount of detail mapped will be adequate to meet the needs of the users, but not more detail than they need. Soil surveys should be adequate for making the intended land use and management decisions, no more, no less.

3. Get mapping rates in line with the detail mapped. Higher mapping rates should be expected on lower intensity surveys.

4. Adjust state staff numbers to be able to handle the workload in a timely manner. States with more than 12 to 15 surveys consistently in progress need at least four state staff members.

5. Do not start soil surveys until cartographic materials are available to send to the field. Transferring mapping from one set of maps to another is inefficient. Mapping should be done on-the photos it is to be published on.

6. Do progressive correlation as soil survey progresses, Complete each area of the survey as you go, so you don't have to go back to that area later. This saves a great deal of time if the project leader happens to get transferred before the survey is completed.

7. Keep map compilation current with progressive correlation. Eliminates delay at end.

a. Do all map compilation with field soil scientists. One of our biggest problems in map finishing has been because of poor compilation. This causes delays and frustrations. A good map compilation job eliminates most of the map finishing problems.

9. Complete the first draft of the manuscript by the time of the comprehensive review. If the manuscript is not complete by the time the mapping is completed it cannot be published timely.

10. Use word processing equipment for processing the manuscript. We cannot afford the time or expense of keying manuscripts more than once. Word processing also will help the project leader use existing information and reduce the need to redo material that has already been done,

11. Hake certain any needed laboratory data is obtained well ahead of final correlation. If it is determined at the time of final correlation that laboratory data is needed, unnecessary delays will occur.

12. Make full use of mapping aids such as, color infra-red (IX), all terrain vehicles, power probes, backhoes, and other needed equipment. All field soil scientists should have access to color IR If it has been flown. This is a very cost effective tool.

13. Make sure vehicle fleet is adequate. -It should be in good condition and appropriate for mapping conditions.

14. Increase use of flexible work schedules and overtime. Overtime has been demonstrated to be very cost effective.

15. Increase use of orthophotography for mapping and publishing wherever it is available. Use of orthophotography provides many more options for electronic processing of data including digitizing maps instead of doing map finishing. We need to get away from a 1:15,840 scale for ortho. We cannot produce satisfactory quality of orthophotos at that scale using the NHAP negatives. Other negatives are not available at this time.

16. Make certain that project leaders are adequately trained to do their jobs. The job of the project leader is the most critical in the whole soil survey process. This is where correlation begins, interpretation begins, and the soil survey report begins. The project leaders either sees or fails to see how to properly design map units to fit the landscapes and

provide information that will answer users questions. If the project leader does a poor job, no amount of fixing by people in the state, NTC, or NHQ offices can turn it into a good publishable soil survey.

MISSION OF SOIL SURVEY PROGRAM

To assist mankind in understanding and wisely using soil resources to achieve and sustain a desirable quality of life by--

' maintaining a strong scientific basis for defining and describing soil relationships important to decisions about the use and management of soils.

° providing scientific expertise to identify, classify, map, and interpret soils.

° making field and laboratory information and its interpretation readily available through texts, maps, and other forms of data bases and assisting people .se the information.

FUNCTIONS

I. Develop policy and provide national leadership for a comprehensive soil survey program; provide assistance and training to state, national technical center, and field office staffs in soil survey activities and collaborate with other 'staffs.

II. Develop, test, and improve soil survey information; evaluate soils and predict their response to management: make soil survey information available and train others in its use.

III. Develop and use methods and procedures in the National Cooperative Soil Survey that ensure effective and efficient preparation and delivery of high quality products and services.

IV. Provide management initiatives and resources to maintain an effective national program of soil survey activities consistent with approved plans and available resources in concert with State Agricultural Experiment Stations and other Federal and state agencies of the National Cooperative Soil Survey.

V. Maintain and improve a comprehensive system of soil classification as basis for transferring soil technology worldwide; provide technical assistance and training in its application.

FUNCTIONS

National Headquarters

The Soils staff in the National Headquarters (NHQ) is organized to provide leadership and standards for technical direction of principal functions as follows:

(a) Soil survey program management. The Soils staff develops and recommends policy; develops plans, standards, and procedures; and provides staff leadership for a national program of soil survey operations in support of a field soil survey program. The functions of the Soils staff in support of NCSS are to--

(1) Plan, organize, and coordinate NCSS work throughout the United States in cooperation with state agricultural experiment stations and other cooperating agencies; provide leadership for national soil survey conferences;

(2) Prepare policy statements and issue papers relating to the NCSS;

(3) Schedule NCSS activities and coordinate priorities to ensure that the goals of the program are achieved;

(4) Record, analyze, and summarize soil survey accomplishments;

(5) Develop programs and formulate budgets

(6) Give guidance to the soil survey program and recommend allowances;

(7) Supervise and participate in program evaluation of NCSS operations;

(8) Develop standards and procedures for the NSH, the Computer Aided Scheduling of Published Soil Surveys (CASPUSS) and Soil Operations Data (SOD) files; and

(9) Maintain working relations with other SCS staffs and with other agencies, groups, and organizations in connection with these activities.

National Soil Survey Quality Assurance (NSSQA)
Rodney F. Harner, National Leader

Responsibilities

Technical quality assurance is the function of working with the state conservationists to assure that the state conservationists and their staffs have the knowledge, technology, information, standards, procedures, and processes necessary to perform technical functions and technical quality control, which are the responsibilities of each state conservationist. (General Manual 404.95 Functions)

The NSSQA staff has the following responsibilities.

- Provides technical leadership and has responsibility for maintaining uniformity nationwide in soil classification, soil mapping, map unit interpretations, soil correlation, and application of Soil Taxonomy.

- Provides technical leadership for assuring that adequate quality control is being carried out by the states for soil mapping, soil classification, soil interpretations, soil survey manuscripts, and soil correlations.

- Provides guidance in scheduling soil surveys, developing memorandum of understanding for soil survey areas, preparing soil handbooks, conducting field reviews, and soil correlation.

- Provides guidance in the preparation of soil survey manuscripts and the technical review procedures for manuscripts.

- Edits, keys and proofreads soil survey manuscripts and prepares camera ready copy of text and tables.

- Provides training in soil classification, soil correlation, soil interpretation, and preparation of soil survey manuscripts.

Organization and Staffing

Soil scientists have been assigned responsibility by Major Land Resource Areas (MLRA's). Within their assigned area the soil scientists will have responsibility for all quality assurance and technical assistance. They are to become the "experts" in their assigned area. Three supervisory soil scientists on the staff have responsibility divided by Land Resource Regions. It is the responsibility of the supervisory soil scientists to maintain uniformity and consistence within their assigned area and with the other supervisory soil scientists. The supervisory soil scientists have full responsibility for workload analysis, staff assignments, scheduling, and quality assurance.

The staffing plan specifies that each supervisor have a staff of six soil scientists; five soil classification and mapping specialists and one manuscript review specialist. Two soil classification and mapping positions and one manuscript review position are vacant. In the immediate future, Robert Turner and Robert Engel from the Soil Classification staff are

going to give part time assistance to the NSSQA staff. Although each soil scientist has major responsibility by MLRA there will be some assignments in other MLRA's in order to balance the workload. Assignments will be changed periodically in order to broaden the experience of individuals.

All of the soil scientists are located in Lincoln except for Richard Mayhugh, headquartered in the South NTC and Loyal Quandt, headquartered in the Northeast NTC.

The national soil survey editorial staff is under the supervision of Stan Anderson. Stan manages and directs the editing, keying, proofreading and preparation of camera ready text and tables for manuscripts from throughout the U.S. In addition to Stan the staffing plan includes 13 editors, four editorial assistants, one of which is an upward mobility position, and one clerk-typist. Two of the editor positions are vacant. Two editors are headquartered in the West NTC with Ken Thomas in charge; two editors are headquartered in the Northeast NTC with Jim Giuliano in charge; and four editors and two editorial assistants are headquartered in the South NTC with Marjorie Christie in charge. In addition, four stay-in-school employees assist with proof-reading and keying of manuscripts.

Accomplishments

Fiscal year 1988 has been a formative year for the National Soil Survey Quality Assurance staff. Operational procedures and assignments have shifted throughout the year as the transition was made to a national staff. During fiscal year 1988 the staff accomplished the following:

- Prepared correlations for 20 soil survey areas.
- Made quality assurance reviews of 35 correlations prepared by the states.
- Made technical review of 79 soil survey manuscripts.
- Gave training in manuscript preparation to seven states.
- Edited 60 soil survey manuscripts.
- Reviewed GPO page proofs of 80 manuscripts.
- Provided technical assistance and quality assurance by participation in about 25 initial and progress field reviews and about 60 comprehensive and final field reviews.
- Reviewed 2036 soil series and entered them into the official series description (OSED) file.
- Participated in two soil correlation training courses and two basic soil survey courses attended by approximately 120 soil scientists from 28 states.
- Provided assistance to states by participation in about a dozen NTC or state soil survey workshops.
- Made ground penetrating radar studies in 16 states.

- Provided soil-geomorphology assistance in eight states, including a seven county area in southwest Kansas.

- Provided quality assurance review of memoranda of understanding and progress reviews submitted by states.

- Maintained the soil classification file.

Priorities

Major priorities of the NSSQA staff for fiscal year 1989:

- Assist states with initiating and perfecting progressive soil correlation.

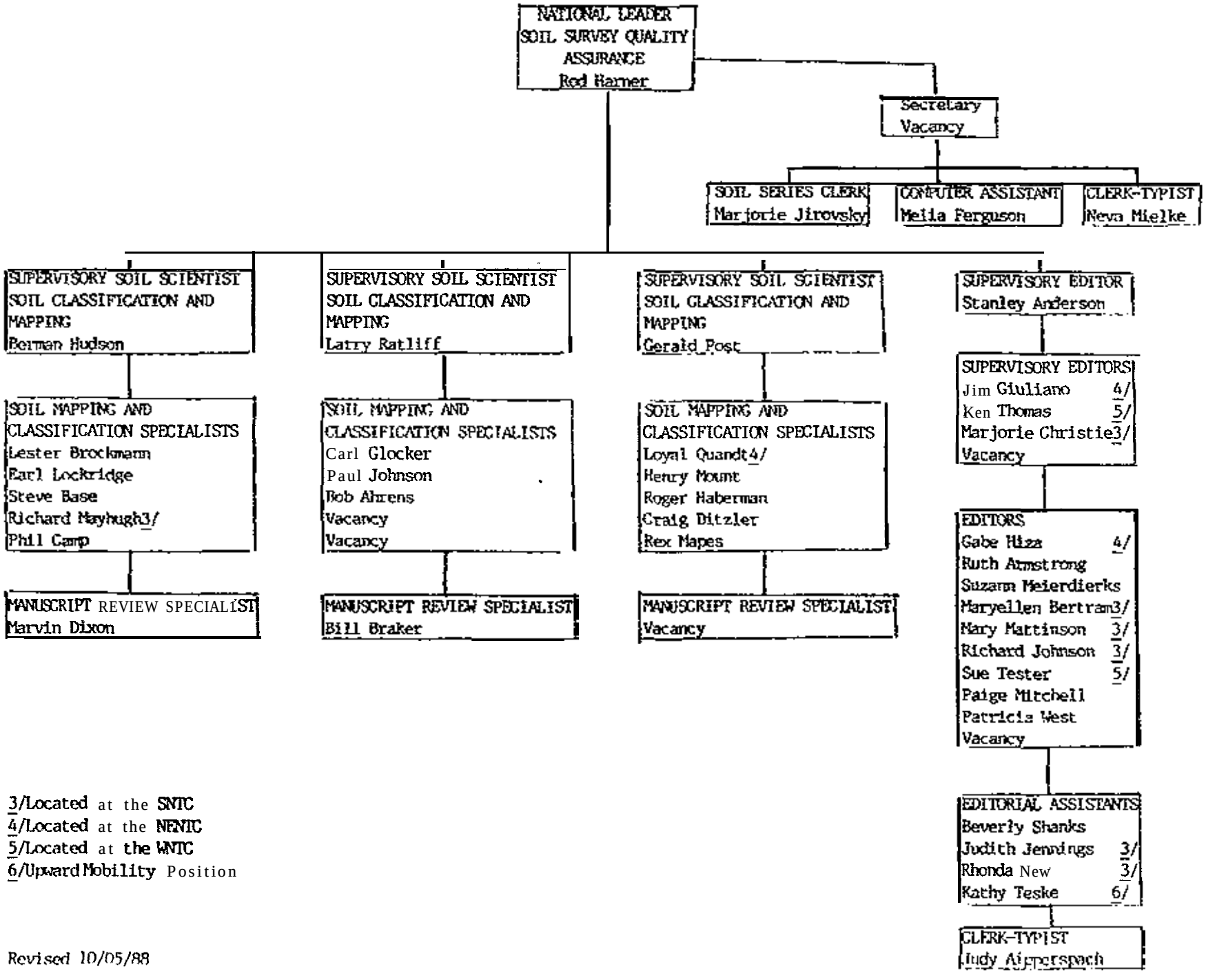
- Provide training in soil survey concepts and procedures.

- Assist states with entering series into the OSED file.

- Provide training in preparation of and attaining consistency in soil survey manuscripts.

- Update National Soil Handbook Part 602, Soil Classification.

- Coordinate update of soil surveys on a multicounty or regional basis, such as an MLRA.



3/Located at the SNTC
4/Located at the NENTC
5/Located at the WNTC
6/Upward Mobility Position

Revised 10/05/88

Soil Interpretations
Prepared for National Workshop for State Soil Scientists
October 17-21, 1988
by
Maurice J. Mausbach

This has been a year of change for the Soil Survey Division and especially for the soil interpretations staff. We have organized and staffed the National Soil Survey Center (NSSC) according to guidelines and recommendations of the Productivity Improvement Study of the Soil Survey Program. Soil Technology has again become Soil Interpretations and the whole staff of one at National Headquarters was realigned to the NSSC. We have just added the following staff to our section: H. Raymond Sinclair, Jr., as Supervisory Soil Scientist, my assistant; William Broderson as soil scientist for agronomic interpretations, Ron Bauer as soil scientist for woodland interpretations (Ron comes to us from the Forest Service in Denver, Colorado.), and M. DeWayne Mays as soil scientist for engineering and urban interpretations. George Staidl is also a member of our staff as part of the soil-range team in Reno, Nevada. This is more staff than we have had in many years in soil interpretations and we are looking forward to working with you on the present and next generation of soil interpretations. Today, I will briefly describe our staff functions and plans.

STAFF FUNCTIONS

The Mission of the Soil Survey Program is --

> 10 assist mankind in understanding and wisely using soil resources in achieving a sustainable and desirable quality of life by:
> - Maintaining a strong scientific basis for defining and describing soil relationships important to decisions about the formation, use, and management of soils.
> - Providing scientific expertise to identify, classify, map, and interpret soils.
> - Making field and laboratory information readily available through text, maps, and other forms of databases, and helping people use the information.

Our part of the overall mission is to maintain the scientific basis for soil interpretations and to interface with users to provide up-to-date, user-friendly soil information. Our functions are:

> - Develop concepts, criteria, and methods for interpreting and using soil survey information. This includes interpretations for limitations/suitability of soil for land uses and classifications of soil such as prime farmland, hydric soil, and fragile land.
>
> - Provide leadership for the use of soil survey information in making wise land use decisions. This includes working with SCS disciplines in resource planning activities and with interagency groups in development of interpretative models.

- Provide training and guidance on developing soil interpretations and procedures for collection of needed attribute data for interpretative models.

- Establish guidelines and procedures for technology transfer. This includes the presentation and dissemination of information via technical publications, electronic information systems, and technical guides.

PLANNED ACTIVITIES

This is an exciting time for all of us in SCS. With the formation of the NSSC, the soil interpretations, soil database, and soil classification staffs have the opportunity to coordinate activities and to work more closely with and to obtain the expertise of scientists in the quality assurance and soil investigation staffs. Organizational charts are like Soil Taxonomy in that our staffs are broken into discrete boxes. However, as with soils, I look at our NSSC staffs and their functions as a continuum and look forward to the synergistic relationships of the staffs. We also lnok forward to a close working relationship with the interpretations staffs at the National Technical Centers. We look to them as extensions of our staff and will seek, among other things, their assistance in the review and development of soil interpretations.

One of our most important tasks is to maintain an open line of communication5 among all of us. In addition to planned workshops, we plan to have monthly teleconferences between the center interpretations staff and the NTC interpretations staffs. The NTC interpretations staffs will also be looking to extend the communications to you the users of soil information. If you have concerns, suggestions, or proposals for additional interpretations, please contact your respective NTC soil interpretations staffs.

The FY89 priorities in SCS/Soil Survey include Food Security Act (FSA), Water Erosion Prediction Project (WEPP), Water Quality and Quantity, completion of the Soil Interpretation Training Modules, Geographic Information Systems, Wind Erosion Research Model (WERM), and the next generation (electronic) soil survey databases. These activities will involve all of our staffs, especially at the state and field off ices.

WEPP, WERM, GIS, Water Quality all are based on an electronic soil database. We have the opportunity and challenge to provide sound user-friendly information to these activities. This means a more active program for data collection and verification and a general restructuring of our databases to the field office CAMPS system. The restructured databases must also support and automate our soil survey operations including the quality control/quality assurance functions. The data collection activities include new data elements necessary to drive the models, map unit description/characterization to support application of models and interpretations, and the necessary delivery systems for the data.

Databases/data elements

Under the direction of the National Soil Survey Database staff, the restructuring of our databases will be a joint effort among staffs at the NSSC, NTCs and states. A top priority for our staff is the development of the National Soil Series Standard (merging of the estimated properties of the Soil Interpretations Record with the Official Soil Series data) and identification of data elements needed to drive the new models, those needed to serve soils scientist in basic soi 1 services, and those needed in the proposed field level interpretative database. Included in this effort is the development of a process/procedure to gather and store the temporal data that are important in the wind and water erosion models. In addition George Staidl (National Soil Range Team) will continue on the expansion of the site description database to include riparian areas.

Map Unit Description/Characterization

As we continue to develop models and our GIS capabilities, the demand for more quantitative data on the composition and character of the map unit (polygon) will increase. Fortunately or unfortunately, GISs demand quantitative data to function most efficiently. The soil geography staff is looking at ways to best display attribute data within the GIS environment. One issue is how to display limitations for a land use such as Septic Tank Filter Fields for a map unit (polygon) that has more than one soil component. Do we pick the major component, do we average, or do we develop a procedure to display information based, on probabilities or possibilities, ie display all areas in green that have a 70 percent likelihood of a slight limitation, etc? Others have suggested a striped pattern for such cases with the width of stripes indicating relative composition of the map unit with respect to the degree of limitation.

If we accept a likelihood or probability approach, then the statistical representation of map unit composition has increased importance. This composition must include composition of landforms as well as soils. Our staff will be working on a method to standardize landform descriptions in a hierarchial scheme. This scheme will provide a format for consistency in describing landforms within a physiographic region. By adding landform composition to a map unit, we have the opportunity to tie the soil components of the map unit to landform position and quantitatively describe the relationship (sociology) of component soils in a map unit.

Again this may mean additional data collection for some survey areas. We have the challenge to develop a statistically valid procedures to characterize map unit composition (variability). These procedures must be within our means to collect the data but also must provide the necessary probability statistics whether the use be predictive models or map unit interpretations.

Data delivery systems

Implicit in the restructuring and design of our databases is the development of a delivery system of the data to the field office or user. The delivery system will involve both resource soil scientists and computer technology. The data will need scrutiny and review by soil ecientiats. Our field staff will also need to collect additional support data needed to drive new interpretations and models. Because of this expanding need for additional data for map units and map unit components, we no longer will be able to relax once a survey is published. In fact in many cases our work has only begun. Some of us call this the maintenance function of a soil survey. We are striving to facilitate these functions through the use of computers and soil information systems.

We anticipate phasing in new data elements for WEPP over the'next 2-3 years. These new data elements will be introduced at the field office level within the present structure of the CAMPS software.

Continuing functions

We will continue to support and update the present database at Ames while working on the National Soil Series Standard. In the past year we have consolidated and integrated the Official Series Description, Soil Classification, and Soil Interpretation Record at Ames. This year processes will be added to provide an electronic review process for SOI-5 updates, to input/edit SOI-5 data on the FOCAS computers, and to accommodate the new data elements proposed at the Ft. Collins Work Planning Conference. We also plan to further expand the access to the SOI-5 data by placing it into the ORACLE relational database on the ISU computer. The MUUF database is already in ORACLE.

Our staff will begin to review section 603 of the National Soils Handbook with the goals of developing computer models or checks for the estimated properties section of the SOI-5, of evaluating the interpretative guides, and of developing algorithms to generate the interpretations using 3sd or field office systems. We will also continue to work with Don Goss on water quality interpretations. George Staid1 will continue his work with site descriptions concentrating on eoil and vegetation use interpretations and expanding the site description to include riparian areas.

We continue to have hydric soils/wetland activities. The National Committee for Hydric Soils will meet this winter to consider proposals on fine tuning the hydric soil criteria.

We have many opportunities and challenges in soil interpretations and look forward to working with you in developing soil interpretation systems that work for all us. Again we can only accomplish the goals through cooperation and communication. If you have concerns or suggestions please contact either my staff or the NTC soil interpretations staff.

WORKING TOGETHER IN THE AGE OF GIS
A COUNTY PERSPECTIVE

Presented
by

Edward Crane

Mapping Project Director
Wyandotte County, Kansas

USDA Soil Conservation Service
Lincoln, Nebraska
September 1988

Local governments are realizing more every day that the land records and maps they must maintain are quite valuable to many different people. Especially as counties, cities and utilities move to automate records and maps, local officials must begin to realize also that there is only one geography, one set of streets, one set of property addresses, etc. It no longer makes a lot of sense for each agency, or unit of government having a separate set of maps, using different scales, different symbology, and with these maps often being poorly maintained.

With county officials in many areas of the country at least examining the need to modernize, it is likely that SCS representatives will more and more be required to work with local governments using automated maps and land records or at least in the process of conversion to these systems. Indeed, the soil scientist may often be asked for advice in the process.

The education and experience the professional soil scientist brings to the table is very important to local officials. Even more important is the perspective that the soil scientist will have about the appropriate use of data and models using soils information. Using the new technologies indeed produces beautiful, effective displays; however, inaccurate data and poor models may appear to be just as appealing as accurate, sensible models. It's going to be easier to make mistakes.

That's why cooperative agreements with counties automating the soil surveys is so critically important. Establishing good communication with local soil scientists at the outset will help alleviate the tendency to "shoot from the hip" when officials are asked to use soils survey data, or produce analytical mapping of soils related phenomena.

Wyandotte County, Kansas, is one county that has taken advantage of the cooperative agreement program to automate its soils survey. Most of the presentation and overheads included serve to illustrate what counties with modern, land records systems are going to be doing in the future. Although the specific details may be different between counties, the common themes will be consistent. Technology will continue to change rapidly, and institutions will continue to resist adopting a more comprehensive approach.

Progress is being made and as is illustrated by Milwaukee's study of existing multiple uses of maps, a coordinated approach between departments and agencies appears desirable. Furthermore by these groups working together, the future for the use of soils surveys and other natural resource data should see ever wider and more effective application in solving some of our more pressing environmental problems.

11/01/88

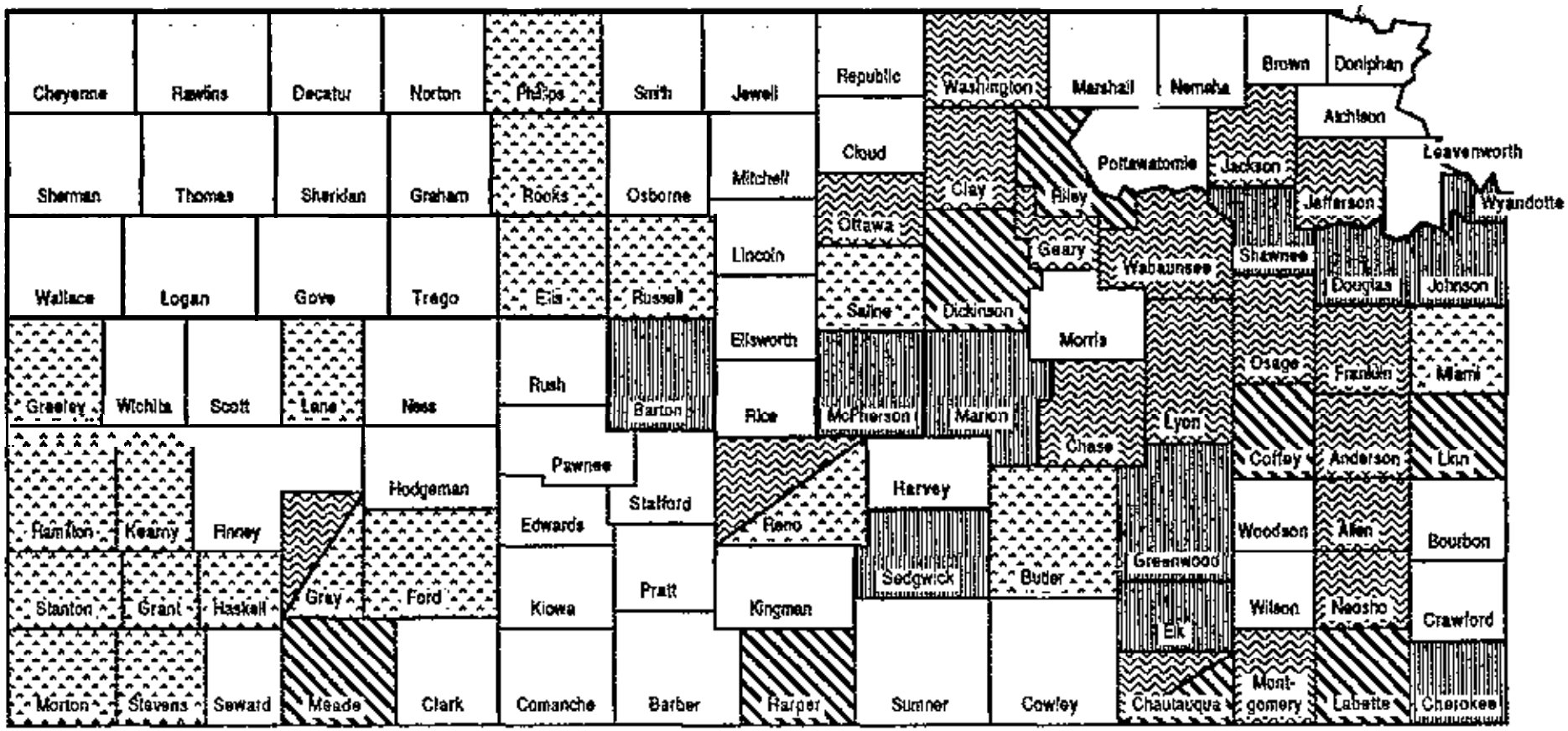
DIGITAL MAPPING ACTIVITY IN KANSAS

DIGITAL DATA IN USE NOW

DIGITAL DATA AVAILABLE, BUT NO MEANS FOR IMMEDIATE ACCESS

PROSPECTIVE SYSTEMS

"GRAPHIC PLANIMETER SYSTEMS



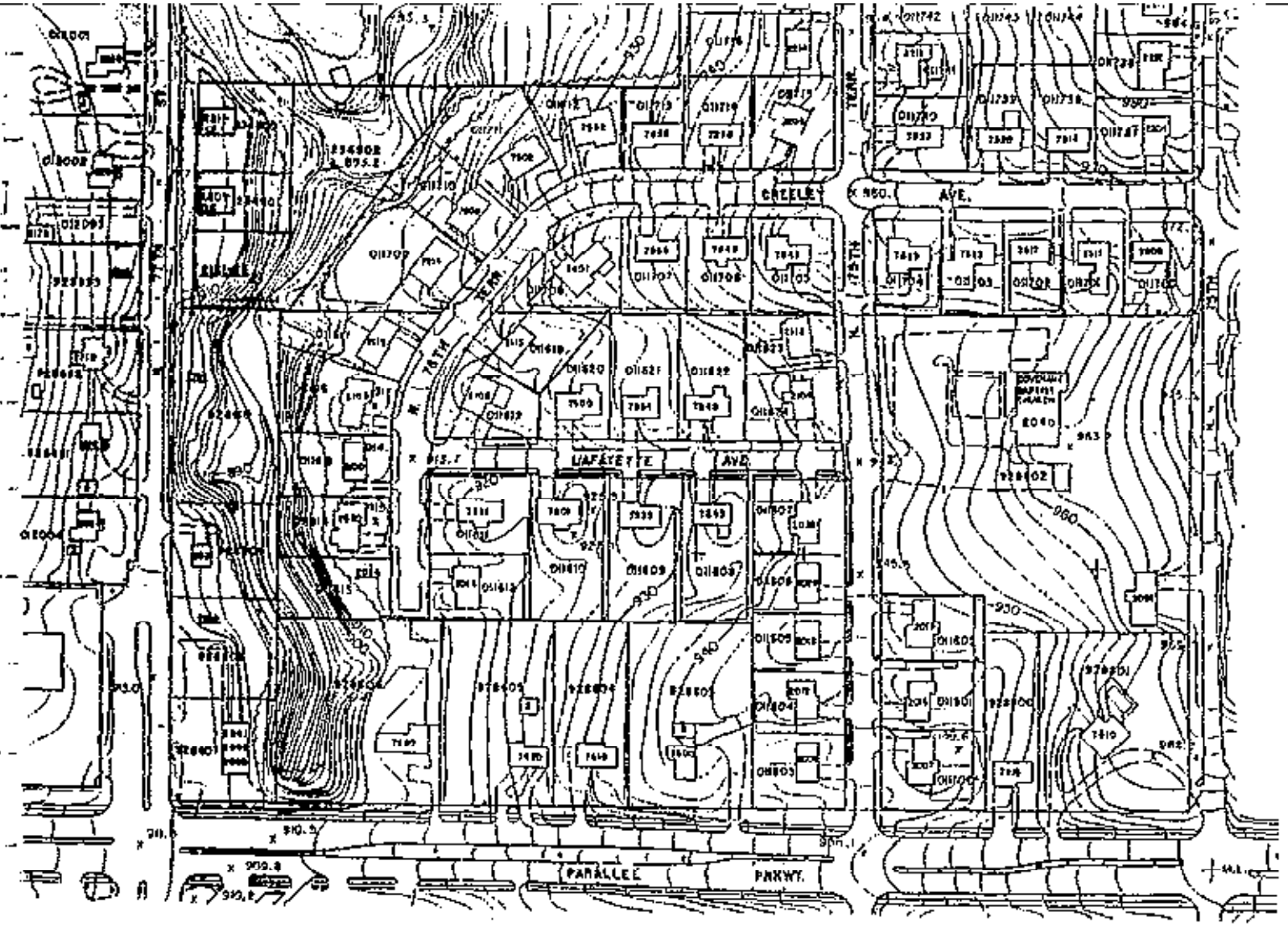
LANDS

A Multi-Purpose Land Records System

- *Base Maps*
  - Scale 1:1200
  - 2' Contours
  - Unique 6-digit Parcel Number
  - Property Address(s)

- *Rata Base*
  - Parcel Number and Address from Maps
  - Alternate Keys
    - Owner Name
    - Property Address
    - Property Description
  - Comprehensive Property Characteristics

- *Automated Mapping and Graphics*
  - Parcel Boundaries
  - DIME street file
  - Voter Precincts
  - Tax Districts
  - Sewer Network (x,y,z)
  - Census Tracts/Blocks (1970,1980)
  - Service Districts
  - Soils (recompiled to 1:6000)
  - Agricultural Use Boundaries



SAMPLE
ASSESSMENT PARCEL SECTION MAP
1" = 200'

This ASSESSMENT PARCEL SECTION MAP is a composite of Wyandotte County Base Mapping's 1/4 Section Maps. Parcels are intended to show as accurately as possible the relationship of neighboring ownership parcels but are not intended to be construed as survey accurate in any manner. The topographic and planimetric features are for reference only with respect to parcel boundaries.

REVISIONS

Information Lists regarding REVISIONS of this map series are maintained by the Base Mapping Program of the Wyandotte County Surveyor's Office.

COPY DATE

90

Assessment Parcel
Section Map

B32

AUTOMATED MAPPING

General Functions/Operations

- Map Construction
  -poin t/line/area digitizing
  -parametric *data* en *try*
  -conversion/rectification of existing maps

- Map Maintenance
  -interactive digitizing from updated source
  -feature rectification to improved source data

- Map inquiry
  -queries about features; name,ID,size,e tc
  -access to data bases about features
  -mixed graphical & data base queries

- Map Analysis
  -overlay map features and summarize results
  -relate features to each other
  -relate disparate data thru geographic linkage

- Map Production
  -consis tent cartographic quality
  -flexible con tent/feature selection
  -plot preview/in terac five plot editing

WYANDOTTE COUNTY, KANSAS

Conversion to ARC/INFO

- *Existing Digitized Data Converted to Arc\Info*
  - Parcel Boundaries
  - DIME street file
  - Voter Precincts
  - Tax Levy Districts
  - **Census Tracts/Blocks** (1970,1980)
  - **Prototype** Map (Plan,Relief,Utilities)

- *New Digitizing Completed 1988*
  - Soils (Cooperative Project with USDA SCS)
  - Agricultural Use Parcels (reappraisal)
  - Auto-Assignment of Kansas Parcel IDs
  - 1989 Precinct Boundaries (Reapportionment)
  - Reappraisal Neighborhoods

- *Planned Projects 1989*
  - Utility Service Districts
  - 1990 Census Boundaries
  - Sub-Parcel Zoning Boundaries
  - Dimensioned Maps (Auto Annotation)
  - Convert Districts to Cadastral Features
  - Sewer Network--Conversion (x,y,z)
  - NAD27 to NAD83 Coordinate Adjustment
  - Remonumentation Adjustments from GPS Proj
  - Audit Administrative District Assignments

Wyandotte County, Kansas

MAJOR MAPPING PROJECTS 1988

- REAPPRAISAL SUPPORT
  (Appraisal Date 1/1/89)
- VOTER PRECINCT REVISION/REAPPORTIONMENT
  (Effective Date 1/1/89)
- UPDATE VIDEO PICTURE INVENTORY OF PARCELS
  (Completion date 1/1/89)
- REMONUMENTATION/CONTROL PROJECT - GPS
  (Cooperative Agreement with NGS 11/88)
- INTEGRATED TERRAIN UNIT MAPPING
  (9 *square mile pilot project)*
- SOILS SURVEY RECOMPILATION AND AUTOMATION
  (1:20000 to 1:6000 Completed Q/88)

City of Milwaukee's Policy Development Information System **(PDIS)**

Milwaukee is similar to most American cities in that it is faced with a major issue: how to allocate limited resources to meet **growing** or changing city needs. To help resolve complex policy issues as well as manage day-to-day functions, the city has developed and implemented a multipurpose automated land records system, the Policy Development Information System (PDIS). The boundaries of over 160,000 individual ownership parcels were digitized and assigned a parcel identifier, so that data from many types of records can be readily displayed for any one parcel. The diagram below illustrates which user organizations might contribute to PDIS, and potential applications available to each.

An analytical application of PDIS is illustrated on the opposite side of this insert, which shows the distribution of property tax delinquencies by aldermanic district as of March 1986. These delinquencies represent about 6.8 percent of the total real estate tax base. or about 1.8 million in delinquent taxes. Graphic portrayal of the delinquencies allows an alderman to see their distribution, and analysis indicates that three districts contain the majority of delinquencies. Closer examination of those three districts using overlays of other maps allows the alderman to view individual parcels, to investigate various factors that might account for the delinquencies, such as owner occupancy vs. absentee ownership. vacant vs. built-up land. and identical ownership of a group of parcels.

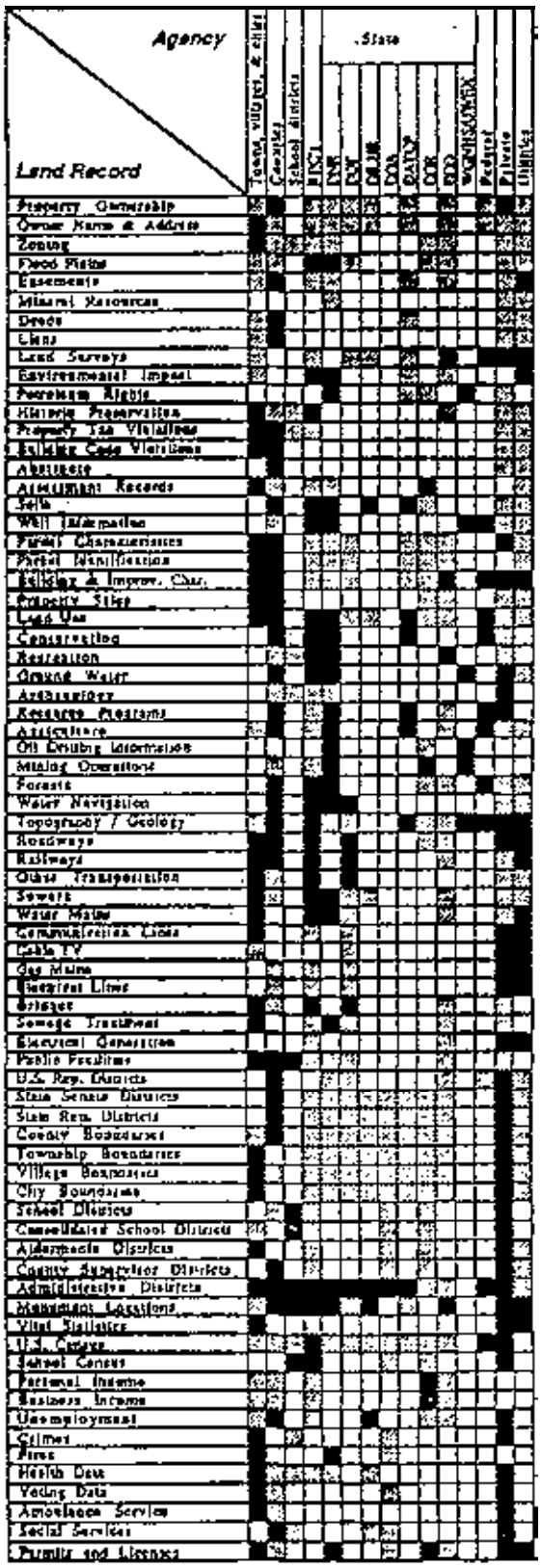
The ability to access, integrate and analyze existing records-to transform data into information with the assistance of modern information concepts and technology-has been essential to PDIS's success in helping to resolve a wide variety of city management and policy problems.

For more information about PDIS, contact Mr. William Huxhold, Project Director, Policy Development Information System, City of Milwaukee. 741 N. Milwaukee St., Suite 202, Milwaukee. Wisconsin 53202; (414) 278-3877.

Cross Reference of Existing Organizational Use of Maps and Potential Use of a Multipurpose Land Records Information System

MAP SOURCE ►	1				2				3					4			5						6		7			8			9		10		11		12			13				14		
USER ORGANIZATION / APPLICATION DESCRIPTION	QUARTER SECTION MAPS	CONSTRUCTION/PAVING	CURB LINES	HOUSE NUMBER ATLAS	LAND USE MAPS	CHOROPLETH MAPS	THEMATIC MAPPING	ZONING	PLAN EXAMINATION	INSPECTION WORKLOAD MANAGEMENT	VIOLATION MAPPING	REDISTRICTING	THEMATIC MAPPING	TAX FLAT MAPPING	CHOROPLETH MAPS	THEMATIC MAPS	STREET LIGHT SYSTEM	UNDERGROUND CONDUIT	TRAFFIC SIGNAL RECORDS	TRAFFIC CONTROL MAPS	ACCIDENT DATA	THEMATIC MAPS	ELECTION DISTRICT MAPS	REAPPORTIONMENT	CABLE TV MONITORING	VIOLATION INSPECTION	THEMATIC MAPS	INSPECTION MANAGEMENT	VIOLATION MAPPING	THEMATIC MAPS	CHOROPLETH MAPS	BUSINESS GRAPHICS	CHOROPLETH MAPS	BUSINESS GRAPHICS	CHOROPLETH MAPS	BUSINESS GRAPHICS	ARSON INVESTIGATION	THEMATIC MAPS	RESOURCE ALLOCATION	CRIME STATISTICAL MAPPING	THEMATIC MAPS	RESOURCE ALLOCATION	AUTOMATED DISPATCH	GARBAGE COLLECTION SYSTEM	SNOW REMOVAL MANAGEMENT	TRAFFIC TICKET PAYMENTS
City Engineer	■	■	■	■	•	•								■									◆	◆																						
Planning Department	■		■	■	■	■	■	■			•		•	■	■	■					•	•	•	•	•	•	•		■	■	•	•	•	•	•	•		•			•					•
Building Inspector	■	■	•	■	■	•	■	■	■	■	■	■	■	■	•	•	•	•	•	•			•	•	•	■	•		■	■			•	•	•	•										
Tax Assessor	■		•	■	■	•	•	■	•				•	■	■	■							•																							
Traffic Engineering	■	■	■	■	•	•								■			■	■	■	■	■	■	•		•																					
Election Commission						•																	■	■																						
Cable TV Administration	■		■	■	◆	•	•				•	•	•	■			•	•	•	•			•		■	■	■																			
Health	•			■	•	•	■				•	•	•	•									◆					■	■	■														•		
Fiscal Liaison						•	•							•	•	•							•								■	■	•	•	•	•										
Mayor's Office	•				•	•	•	•			•		•	•	•	•					•		■	■	•	•	•		•	•	■	■	■	■	◆	•	•	•	•	•	•			•		
Community Development						◆																	•								•	•	•	•	■	■										
Fire	•			■	◆	•								•									•														■	■	■	•	•				•	
Police	•		•	■	•	•								•					•	•	•		•						•								■	■	■	■	■	■	■		•	
Sanitation	•			■	•	•								•									•						•	•														■	■	■
Water Works	■	■	■	■	•	•								■			•	•	•	•			•		•																						
Forestry	◆		•	■	•	•								■									•																								
Common Council	•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	■	■	■	■	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Street and Sewer Maintenance	■	■	■	■	•	•								■			•	•	•	•			•		•																						
Policy Development Info. System Group	•			•	◆	◆	◆	◆			•		•	■	◆	◆						•	•																		•						
Comptroller						•	•								•								•								■	■	•	•	•	•										
Municipal Equipment Management																							◆																					■	■	■
Outside Agencies	■		■	■	■	•	•	•						■	•	•	•	•	•	•	•	•	•		■		■	•	•	•	•	•	•	•	•	•									•	•	•
Public Information	◆		•	•	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				•	•			•	•	•

■ Used continually • Used frequently • Used



Key

Collect and use data

Use data collected by others,

DNR	Dept. of Natural Resources
DOT	Dept. of Transportation
DILHR	Dept. of Industry, Labor, and Human Relations
W A	Dept. of Administration
DATCP	Dept. of Agriculture, Trade, and Consumer Protection
DOR	Dept. of Revenue
DOD	Dept. of Development
RPC's	Regional Planning Commissions
GNHS/ UWEX	Geological & Natural History Survey (within University of Wisconsin-Extension)

Examples of Land Information Collection and Use in Wisconsin

SELECTING A SYSTEM

INAPPROPRIATE METHODS

- THE FIRST ONE YOU SEE
- BELIEVING ONE SALESMAN OVER ANOTHER
  Attractive Salesperson Syndrome
- THE ONE THAT THE 'PILOT PROJECT' WAS DONE: ON
- BASED ON WHAT THEY CLAIM WILL BE THERE AT SOME FUTURE DATE
  'Oh sure' Syndrome
- VENDOR LOYALTY
  Computers as Religion
- THE HARDWARE THAT IT RUNS ON
  You *won't have to buy another computer*
  (The Eleventh Great Lie)
- OBSERVATIONS AT AD HOC, UNPLANNED MAP REGURGITATION DEMONSTRATIONS
  Vendor-Sponsored Seminars
- STANDARDRFP PROCEDURES
  Low Bids
  Based on Specifications Provided by a Vendor
- BENCHMARKS USING THEIR DATA

Source: D. Friedley

Horwood's Short Laws

of Data Processing and Information Systems

1. Good data is the data you already have.

2. Bad data drives out good.

3. The data you have for the present crisis was collected to relate to the previous one.

4. The respectability of existing data grows with elapsed time and distance from the data source to the investigator.

5. Data can be moved from one office to another but it cannot be created or destroyed.

6. If you have the right data you have the wrong problem; and vice versa.

7. The important thing is not what you do but how you measure it.

8. In complex systems there is no relationship between information gathered and the decision made.

9. Acquisition of knowledge from experience is an exception

10. Knowledge grows at half the rate at which academic courses proliferate

All I Ever Really Needed to Know I Learned in Kindergarten

By Robert Fulghum

Most of what I really need to know about how to live, and what to do, and how to be, I learned In kindergarten. Wisdom was not at the top of the graduate school mountain, but there In the sandbox at nursery school.

These are the things I learned: Share everything. Play fair. Don't hit people. Put things back where you found them. Clean up your own mess. Don't take things that aren't yours. Say you're sorry when you hurt somebody. Wash your hands before you eat. flush. Warm cockles and cold milk are good for you. Live a balanced life. Learn some and think some and draw and paint and sing and dance and play and work every day soine.

Take a nap every afternoon. When you go out Into the world, watch for traffic, hold hands and stick together. Be aware of wonder. Remember the little seed In the plastic cup. The roots go down and the plant goes up and nobody really knows how or why, but we are all like that.

Goldfish and hamsters and, white mice and even the little seed In the plastic cup-they all die. So do we.

And then remember the book about Dick and Jane and the first word you learned, the biggest word of all: LOOK. Everything you need to know Is In there somewhere. The Golden Rule and love and basic sanitation. Ecology and politics and sane living.

Think of what a better world It would be If we ail-the whole world-had cookies and milk about 3 o'clock every afternoon and then. lay down with our blankets for a nap. Or If we had a basic policy In our nation and other nations to always put things back where we found them and cleaned Up our own messes. And It Is still true. no matter how old you are, when you go out Into the world, It Is best to hold hands and stick together.

IMPLEMENTING A GEOGRAPHIC INFORMATION SYSTEM (GIS) IN SCS

by

Gale TeSelle

Introduction

I am very pleased to be here. I enjoy interacting with soil scientists perhaps more than any other SCS technical discipline. I'm happy you asked me to be part of this program.

Times have been and continue to be exciting for the Cartography ii GIS Division. The times are also revolutionary, in the fields of cartography, remote sensing, and wherever there is analysis of spatial data; and GIS is causing this revolution. The acronym GIS is becoming so common that you almost don't have to say what it is. This technology is starting to have a" effect in SCS, in project planning, conservation planning, resource inventory, engineering, ecological sciences, and perhaps most in Soil Survey. Soil survey is in the thick of the GIS revolution.

I want to spend most of my time talking about GIS. But before I get too heavy into the GIS aspects, let me talk about recent issuances of SCS policy and some of our plans for National Handbooks. Also I want to talk a little about the National Aerial Photography Program (NAPP) and its related large scale orthophoto quarterquads products.

Policy

Recently the chief signed a new National policy on cartography, remote sensing, & GIS as a general manual edition. It was a major update and rewrite of the National Carto Manual. I brought a few copies along for your review at the workshop and have placed them on the exhibit table. You should be receiving them very soon in the mail. Please take the time to read it as the whole document is only 15 pages. 1'11 ask you to take a look particularly at the GIS section which is a totally new policy.

Prepared and presented by Gale W. TeSelle at the National State Soil Scientist Workshop at Lincoln, Nebraska, October 1988. Mr. TeSelle is the Director of the Cartography and GIS Division, SCS, Washington, D.C.

The general manual policy has very few technical details and is intended for all offices. We plan to develop and issue national technical policy and guidance in National Handbooks. Those of interest to you folks in soils are the Soil Map Digitizing Handbook, GIS Handbook, Remote Sensing Handbook, and the National Cartographic Center Operations Handbook. You should also all be aware of a policy that we issued back in June 1988 that pertained to soil map digitizing which described and set the SCS specifications for soil map digitizing. If you are not familiar with this please talk to me at the break.

NAPP and Orthophotoquads

The NAPP program is now in its second full year and it is an excellent multi-agency program. Unfortunately it is still underfunded for flying the country in 5 years, so its more like a 5 year/10 year program. It isn't a perfect program for SCS because compromises have to be made in the multi-agency environment. But if we went off on our own, it would cost a lot more. We still need you working to get state cost share dollars. State cost share money guarantees your state will get flown the year it is scheduled. If no state dollars are available, make sure you talk to the NHQ Soil Survey Division about your needs for imagery so it can be properly prioritized from a soil survey perspective.

One of the great products you can make from NAPP is large scale 1:12,000 scale orthophotoquads. These are outstanding looking orthos formatted as a quarter of a 7 1/2 quad. USGS is quite willing to produce these for us as part of the SCS-USGS 50/50 cost share program. We recently reached an agreement with USGS on the cost of orthophotoquads from NAPP which is $300 per 1:12,000 quarterquad, $1200 for 1:24,000 full quad. This includes preparation and application of a collar plate and image overedge. You may order the 1:12,000 scale quarterquads from NCC just as you have ordered the 1:24,000 scale in the past.

As a pilot project, we have a cooperative project with USGS to produce 140 orthophotoquads at the 1:12,000 scale with 36 of these quads being produced digitally. It's an exciting project in which NAPP is computer scanned, digitally rectified, and output on a high resolution film recorder. It provides excellent quality imagery. This digital orthophoto process is currently more expensive than the conventional method but USGS is going to purchase an operational system which should reduce the cost of production. The primary big benefit of this digital orthophoto quad imagery is that it can be used as a data layer in the GRASS GIS. Imagery can be displayed on the

graphics monitor for orientation just like conventional aerial photos have been used and then digitized soil boundaries and farm field boundaries superimposed. Hard copy output would result in a conservation plan map or soil interpretation map with an imagery background.

Geographic

No", let me talk specifically about GIS. GIS is in its infancy. It's only been around seriously for about 10 years. We in SCS just took a critical step forward. We selected one GIS software package to support, and to develop nationally on the AT&T UNIX based equipment. That software package is called GRASS. GRASS stands for Geographic Resources Analysis Support System and it was developed by the U.S. Army Construction Engineering Research Laboratory at Champaign, Illinois.

We recently issued a National bulletin announcing this decision, National bulletin 170-8-6 dated Sept. 28, 1988. The bulletin describes the results of the pilot testing of GRASS, and for all of you who have helped in pilot testing GRASS, I thank you. The test team recommended that GRASS be released in SCS as soon as possible and we have now made it available as of Oct. 24, 1988. We view this as a major accomplishment and step forward for the agency.

GRASS is UNIX based. It supports the 5 basic functions of a GIS which are; input, manage, manipulate, analyze, and display geographic data. It's public domain software, we have the source code. We can tailor and help develop it the way we want.

To help announce and publicize this decision about GRASS, we developed the GRASS folder being handed out at this time. We also demonstrated GRASS at the National State Conservationist Meeting in Myrtle Beach, S.C. two weeks ago. We want to get the word out on GRASS and to a degree, promote GRASS. But, we don't want anybody to have GRASS unless they really want it and are ready for the commitment that it takes to implement GIS technology. Our intent is to make the GRASS digitizing software efficient enough so that digitizing can be a" integral part of the soil mapping and pulication process.

Let's take the remaining time going through the GRASS folder. The folder itself describes many aspects of GRASS and the potential SCS objectives supported by GRASS. The contents of the folder include: GRASS Questions and Answers, GIS Fact Sheet, Pilot Test Overview, SCS-GRASS Development Plans, Implementation Guidelines, Staff

Responsibilities and User Support Roles, Duties and Responsibilities of a State GIS Specialist, State GIS Plan Outline, Developing Spatial Databases, and the AT&T 3B2, 6386, and 6386 Hardware Configurations.

Please take the time to read these inserts in the GRASS folder and pay close attention particularly to the Implementation Guidelines paper. It spells out a 5 step process for implementing GRASS, which is 1) acquire a GIS specialist, 2) develop a state GIS plan 3) access your data requirements and availability of existing databases, 4) acquire the necessary hardware, and 5) get the GRASS training and the GRASS software.

Thank you very much for letting me share this information with you. I'm looking forward to joining you in the GIS break-out discussion sessions. I invite you all to come to our GIS/Carto/R/S Workshop in Ft. Worth, TX on March 6, 1989.

CARTOGRAPHIC REPORT
W. R. FOLSCHE
NATIONAL CARTOGRAPHIC CENTER
October 19, 1988

The National Cartographic Center (attached organization chart) is moving into some exciting new technology nitches which will better display your work and products.

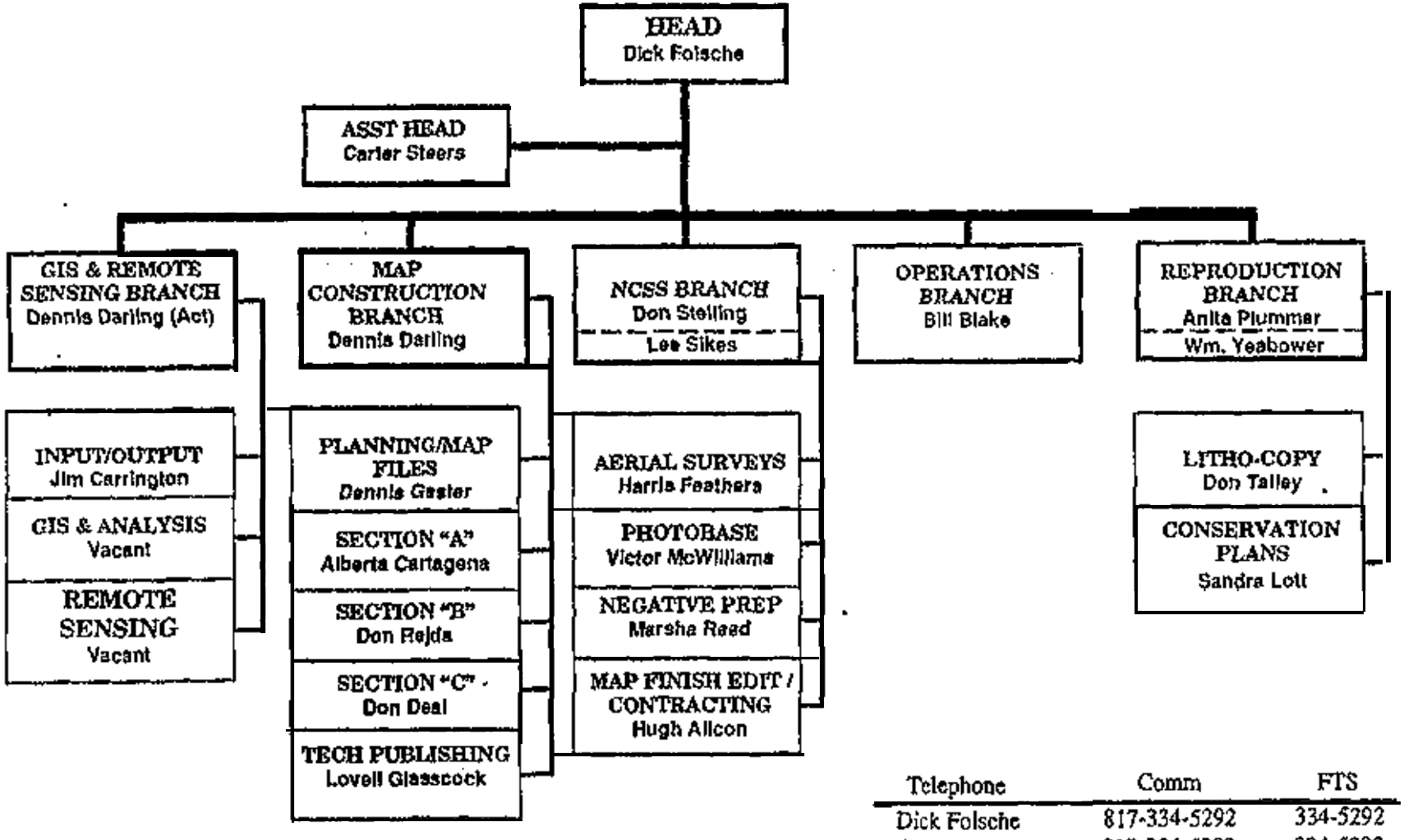
A. Color Copier - NCC has a color copier which can take up to 11X17 color maps, pictures, prints, and reproduce output sizes of 11X17 and 8-1/2X11. The size can be increased up to 400 percent (remembering the 11X17 maps) or reduced 50 percent. Prints can be made from slides and color vugraphs (example shown) can be made of slides, pictures, or maps.

B. Atlas Graphics - NCC has been using Atlas Graphics (a pc mapping pckage) to complete certain map requests. The new 6386 chip technology is now in use (three examples are attached). The examples are all in black and white but color can also be used. Any county data can be used to color a county by using the FIPS codes and the LOTUS l-2-3 spreadsheet. This software runs in the DOS environment and on FOCAS equipment. Output has been on a Houston pen plotter and on an "E" size Calcomp pen plotter. What this means to you, the user, is that all your maps made this way can be made in a shorter time period.

C. Technical Publishing - NCC moved back into the technical publishing business last spring. The MacIntosh environment is in use and turns out some extremely nice products. You may have seen a number of information sheets on remote sensing and the Water Quality Workshop handbook (all done in the Technical Publishing Section). In addition, graphics can be done (examples from Arkansas) or, if you want, a complete brochure layout. You still have to get the clearances required in NHQ.

D. GIS - NCC is offering courses in GIS and GRASS (a GIS software package). This year GIS is offered the weeks of October 24-28, 1988; December 5-9, 1988; February 13-17, 1989; March 20-24, 1988; April 24-28, 1989; May 22-26, 1989; June 26-30,1989; July 24-28, 1989; August 28-September 1, 1989; and September 25-29, 1989. The GIS course is a prerequisite for the GRASS course. GRASS training is to be given October 31-November 4, 1988; January 9-13. 1989; February 6-10, 1989; March 6-10, 1989; April 10-14, 1989; May 15-19, 1989: June 12-16, 1989; July 10-14, 1989; August U-18, 1989; and September 11-15, 1989. GRASS is the GIS for field offices and the software package for digitizing called Map Dev is what is recommended for field digitizing. The NCC provides direct assistance and hotline assistance for GRASS systems after the user has taken GRASS training. We would prefer that all users take the GRASS training before we give either type assistance. At present, we have a staff of four people to provide this assistance.

National Cartographic Center



Mailing Address:
National Cartographic Center
Fort Worth Federal Center
501 Felix St., P.O. Box 6567
Fort Worth, TX 76115

Telephone	Comm	FTS
Dick Folsche	817-334-5292	334-5292
Carter Steers	817-334-5292	334-5292
Dennis Darling	817-344-5212	334-5212
Don Stelling	817-334-5292	334-5292
Bill Blake	817-334-5292	334-5292
Anita Plummer	817-334-5292	334-5292

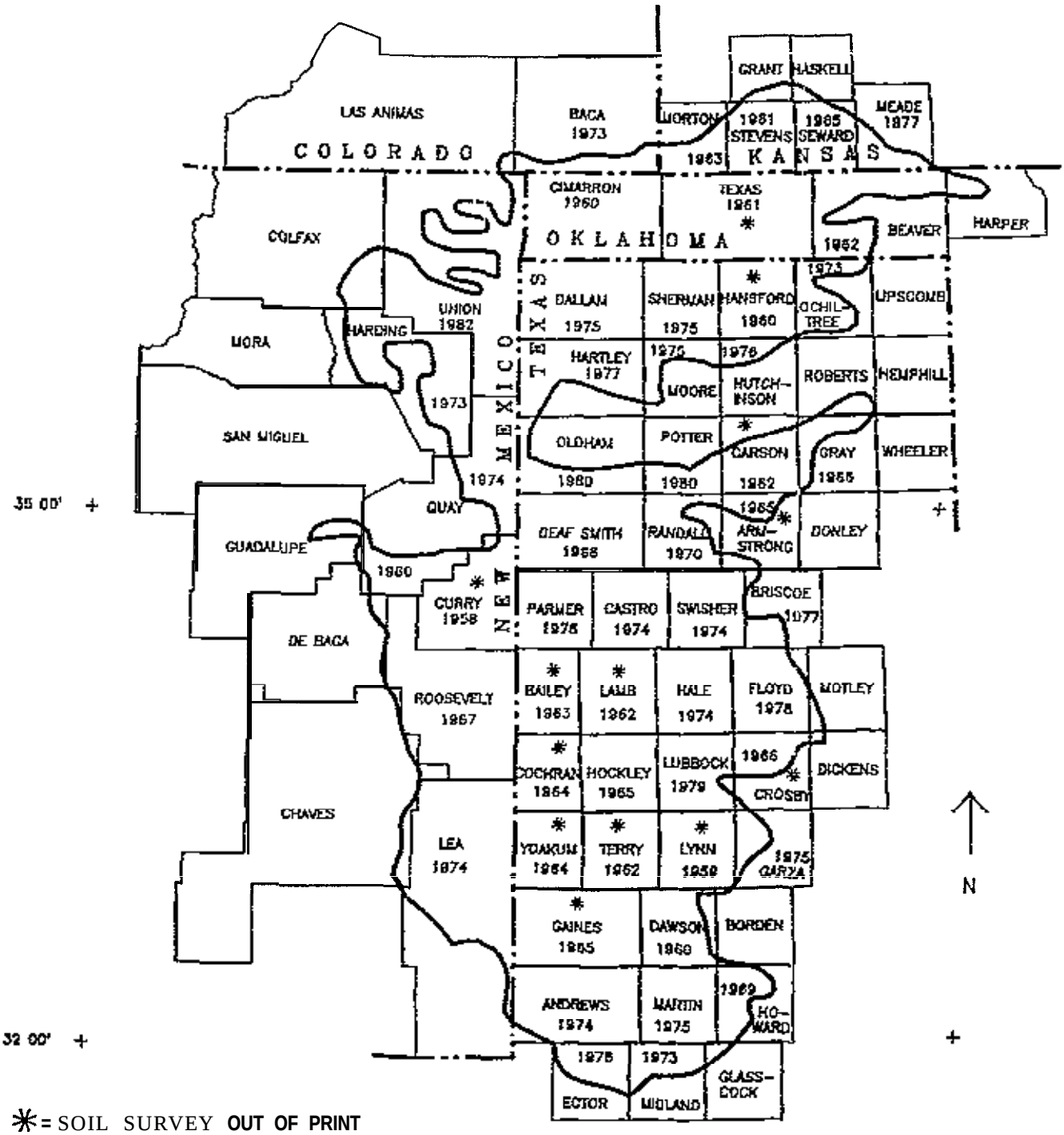
May 1988

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SOIL SURVEY PUBLICATION DATES

SOUTHERN HIGH PLAINS



* = SOIL SURVEY OUT OF PRINT

0 25 50 75 100 MI

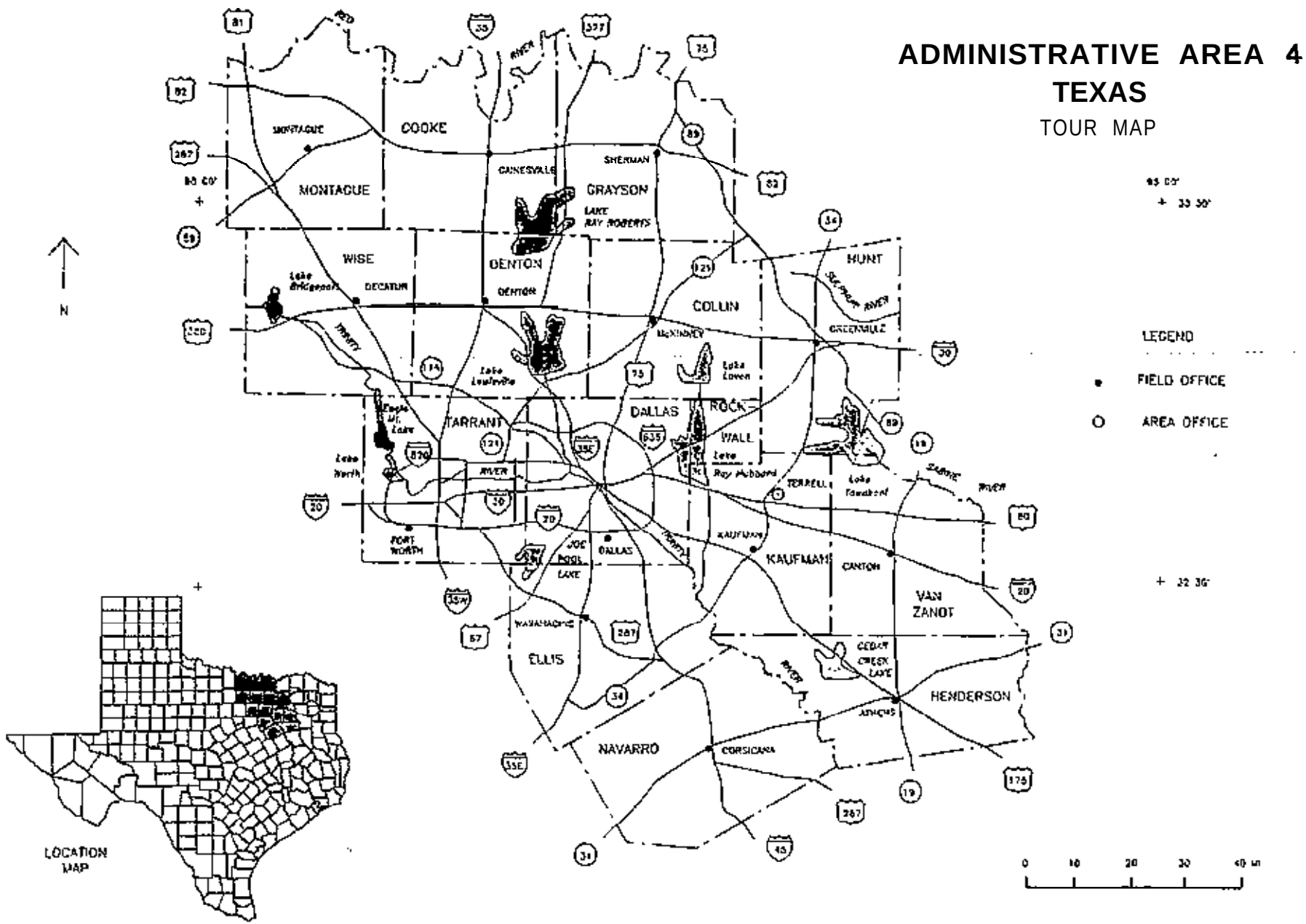
MAP PREPARED USING AUTOMATED MAP CONSTRUCTION WITH THE FOCAS EQUIPMENT. NATIONAL CARTOGRAPHIC CENTER FORT WORTH, TEXAS 1988

FEBRUARY 1988 1003268

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

ADMINISTRATIVE AREA 4
TEXAS
TOUR MAP



MAP PREPARED USING AUTOMATED CONSTRUCTION WITH THE FOCUS COMPONENT. NATIONAL CARTOGRAPHIC CENTER FORT WORTH, TEXAS 1983

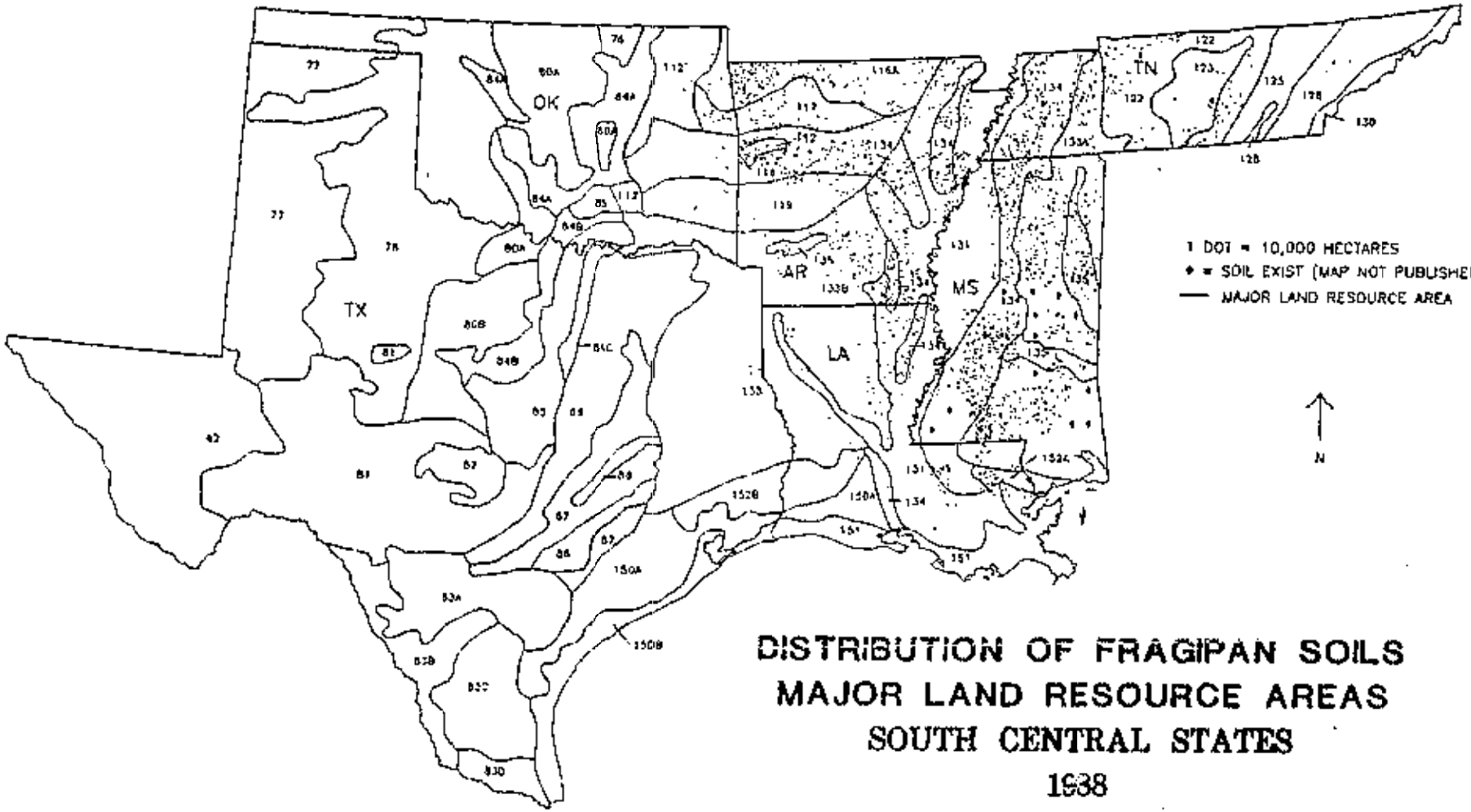
MARCH 1986 1003558

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

LEGEND

42 SOUTHERN DESERTIC BASINS, PLAINS AND MOUNTAINS
78 BLUESTEM HILLS
77 SOUTHERN HIGH PLAINS
78 CENTRAL ROLLING RED PLAINS
80A CENTRAL ROLLING RED PRAIRIES
80B TEXAS NORTH CENTRAL PRAIRIES
81 EDWARDS PLATEAU
82 TEXAS CENTRAL BASIN
83A NORTHERN RIO GRANDE PLAIN
83B WESTERN RIO GRANDE PLAIN
83C CENTRAL RIO GRANDE PLAIN
83D LOWER RIO GRANDE VALLEY
84A CROSS TIMBERS
84B WEST CROSS TIMBERS
84C EAST CROSS TIMBERS
85 GRAND PRAIRIE
86 TEXAS BLACKLAND PRAIRIE
87 TEXAS CLAYPAN AREA
112 CHEROKEE PRAIRIES
116A OZARK HIGHLAND
117 BOSTON MOUNTAINS
118 ARKANSAS VALLEY AND RIDGES
119 OUACHITA MOUNTAINS
122 HIGHLAND RIM AND PENNYROYAL
123 NASHVILLE BASIN
125 CUMBERLAND PLATEAU AND MOUNTAINS
128 SOUTHERN APPALACHIAN RIDGES AND VALLEYS
130 BLUE RIDGE
131 SOUTHERN MISSISSIPPI VALLEY ALLUVIUM
133A SOUTHERN COASTAL PLAIN
133B WESTERN COASTAL PLAIN
134 SOUTHERN MISSISSIPPI VALLEY SILTY UPLANDS
135 ALABAMA, MISSISSIPPI, AND ARKANSAS BLACKLAND PRAIRIES
150A GULF COAST PRAIRIES
150B GULF COAST BARNE PRAIRIES
151 GULF COAST MARSH
152A EASTERN GULF COAST FLATWOODS
152B WESTERN GULF COAST FLATWOODS



DISTRIBUTION OF FRAGIPAN SOILS
MAJOR LAND RESOURCE AREAS
SOUTH CENTRAL STATES
1938

0 100 200 300 MI

MAP PREPARED USING AUTOMATED MAP CONSTRUCTION WITH THE FOGIS EQUIPMENT, NATIONAL CARTOGRAPHIC CENTER FORT WORTH, TEXAS 1985

MARCH 1988 1003820

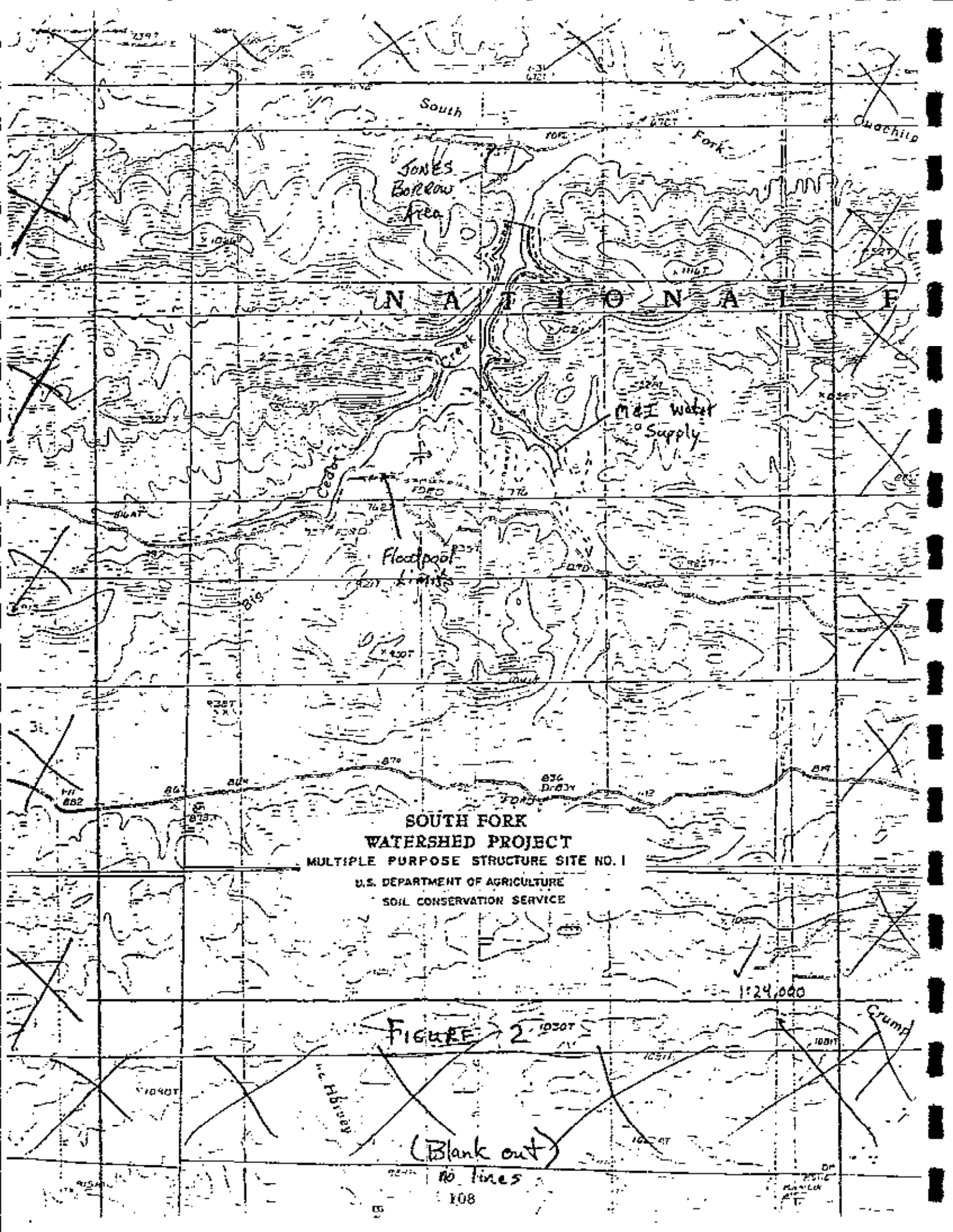
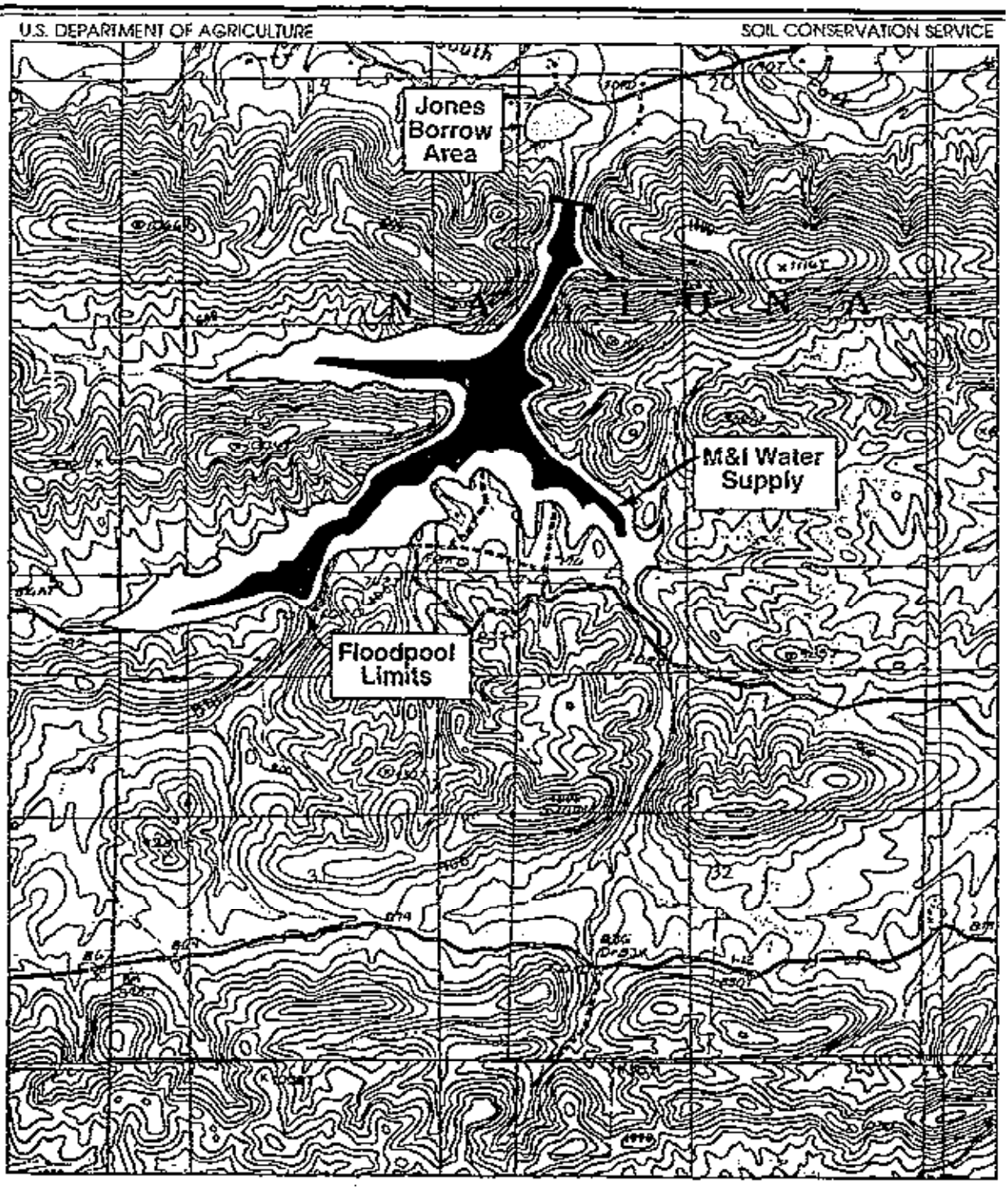

South
Fork
Jones
Borrow
Area
N A T I O N A L F
Creek
M&I Water
Supply
Cedar
Floodpool
Limits
SOUTH FORK
WATERSHED PROJECT
MULTIPLE PURPOSE STRUCTURE SITE NO. 1
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
1:24,000
Crump
(Blank out)
no lines

FIGURE 2



N

SCALE: 1:24,000

Figure 2

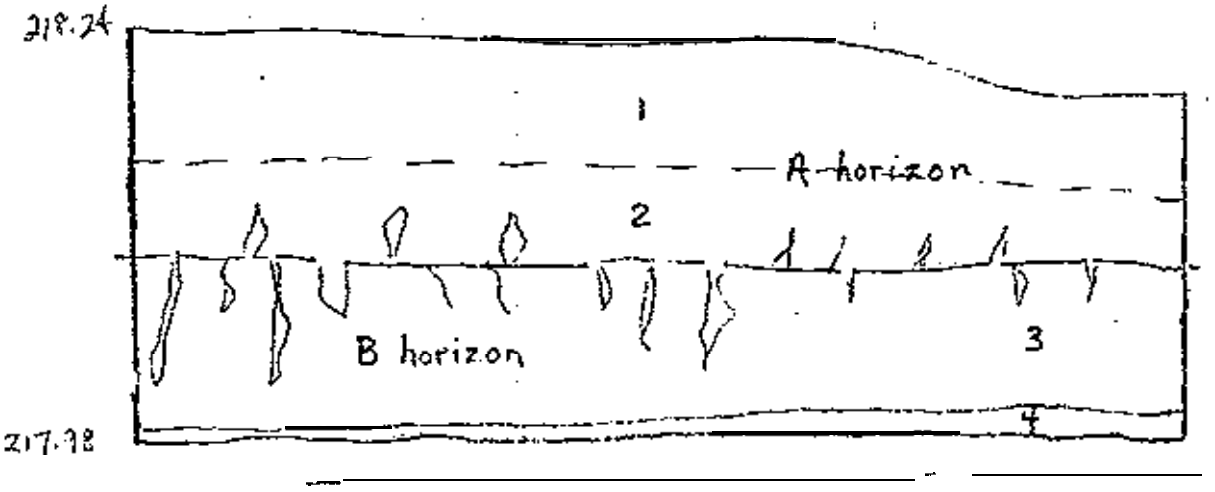
Project Map

SOUTH FORK WATERSHED PROJECT

Multiple Purpose Structure Site No. 1

3MN369

TEST UNIT A - NORTH WALL



Zone 1

0-8cm 5YR3/3; Pebbly silt loam; very bioturbated with few fine $f_A f_A$ mottles of AS & B horizon soils. Sod layer.

Zone 2

8-12cm 5YR4/4-3/4 pebbly silt loam with chunks of few fine $f_A f_A$ SABK in a bioturlated matrix.

Zone 3

12-25cm 2.5YR3/6 SiCL w/upper 8cm very mottled w/zone 2 inclusions. Fine/SABK w/common disruptions from bioturbation and small rootlets.

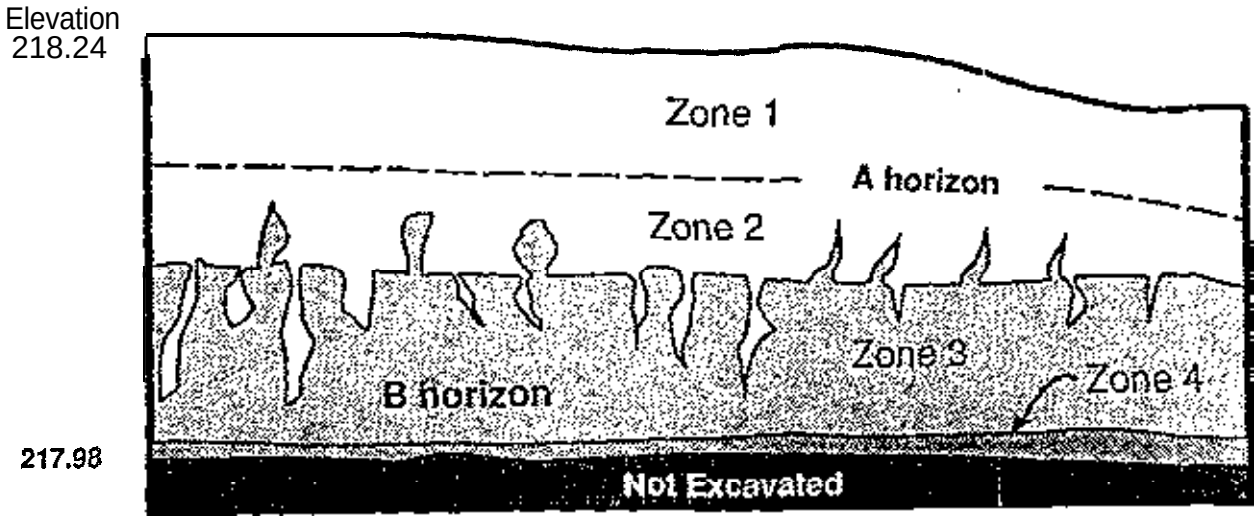
Zone 4

25-44cm 2.5YR4/8, massive w/pockets of fine F.SABK SiC few fine w/F.F. rootlets and slickensides.

SiC - Silty Clay
SiCL - Silty Clay Loam
SABK - Subangular Blocky Structure

Figure 5. Profile of test unit A at archeological site 3MN369 in South Fork Watershed, Structure 1.

3MN369
Test Unit A - North Wall



Zone 1
O-8 cm — 5YR3/3; pebbly silt loam; very bioturbated with few fine mottles of AB & B horizon soils. Sod layer.

Zone 2
a-1 2 cm — 5YR4/4-3/4 pebbly silt loam with chunks of few fine SABK in a bioturbated matrix.

Zone 3
12-25 cm — 2.5 YR3/6 SiCL with upper 8cm very mottled with zone 2 inclusions. Fine SABK with common disruptions from bioturbation and small rootlets.

Zone 4
25-44 cm — 2.5YR4/8, massive SiC with pockets of fine SABK with few fine rootlets and slickensides.

SiC — Silty clay
SiCL — Silty clay loam
ABK — Subangular blocky structure

Figure 5. Profile of test unit A
archeological site **3MN369**
SOUTH FORK
WATERSHED PROJECT
Multiple Purpose Structure Site No. 1

Desktop Typesetting of Soil Survey Texts

by Stan Anderson, Supervisory Editor

As of the beginning of the current fiscal year, all soil survey manuscripts will be typeset on a desktop publication system operated by the Soil Survey Quality Assurance Staff In Lincoln, Nebraska. This system will make camera-ready copies of the texts, which will be sent to GPO for printing and binding, along with the tables and the maps. The new system will be able to handle all of the texts that will be ready for typesetting during the current fiscal year. The number of such texts Is likely to be between 60 and 70.

The desktop system, which consists of Magna typesettlng software and a Printware laser printer, sets prlnt nearly as hlgh in quality as that set by the photocompositlon process at GPO. For each survey, It saves about $1,900 in GPO costs. It also saves about 3 months in the amount of time needed to prepare a page proof for publicatlon. The system allows for greater flexibility in maklng changes in page proofs. Al so, It gives SCS editors greater control over the process of making and proofreading the page proofs. If SCS runs out of publication money during this fiscal year, for example, the editors will be able to continue maklng and proofreading page proofs, thus eliminating the buildup of a large backlog of unread proofs.

The new system will not change the procedures currently used when soil survey manuscripts are revlewed and edited, unless

the state plans to use a semitabular format for the detailed soil map units, series, or both. The text will continue to be coded with dollar sign codes. The editors on the National Soil Survey Quality Assurance Staff have written search and replace routines that will change these codes to typesetting commands in the Magna system. The conversion program Is called Blueberry. The conversion routines In the Blueberry software are called "total .swp" (total swap), which makes changes throughout the entlre text; "front.swp" (f ront swap), which makes changes In the front matter; and "back.swp" (back swap), which makes changes In the part of the text after the front matter.

The National Soil Survey Quality Assurance Staff, with the help of the manuscript reviewer on the Minnesota State Soils Staff, has developed a semitabular format for both series and detailed soil map unit descriptions. New dollar sign codes were required for this format. 'The Blueberry routine that converts these codes to Magna typesetting commands is called "semi .swp"(semiswap). States wishing to use this format will be required to enter the appropriate dollar sign codes throughout the soil descriptions. Also, their manuscript revlewers must get together with editors on the National Soil Survey Quality Assurance Staff for the purpose of hammering out a format that meets their needs. At least one example of each different kind of format should be typeset and assigned dollar sign codes for use by both soil scientists and editors. The format for a complex is likely to differ somewhat from the format for a "consiclation."

Quality Assurance Procedures

Rodney F. Harner, National Leader, NSSQA

Progressive soil correlation is one of the keys to publishing soil surveys in a reasonable time after completion of mapping. Progressive correlation means that during each field review the taxonomic units and map units recognized since the last review are reviewed and approved. Soil survey interpretations are developed and updated, soil investigations are completed, and the soil survey manuscript is developed concurrently with mapping. A preliminary correlation memorandum is prepared by the state at the final field review, which is held about one year before the completion of mapping. The preliminary correlation is circulated for review by cooperators and the NSSQA staff after the final field review. Upon completion of mapping the correlation is finalized and approved by the state soil scientist. The first draft of the manuscript is available for the final field review. After the correlation is finalized the manuscript is updated and submitted for editing.

Quality *assurance* for progressive correlation will be provided by assigning a soil scientist to a survey at its initiation. This soil scientist will carry out quality assurance through the following functions:

- Review memorandum of understanding
- Participate in initial or early progress field review
- Review field review reports
- Review new and revised series descriptions
- Participate in final field review
- Review draft of final correlation
- Review draft of soil survey manuscript

The memorandum of understanding will be given a complete review because of its importance in establishing the groundwork for the survey. Emphasis items will be purpose of the survey, cooperating agencies and their responsibility, guidance on soil survey procedures, average size of management unit, maximum size of contrasting inclusions, publication plans, and completion schedule.

The assigned soil scientist will participate in the initial field review or early progress review to become familiar with the soil survey area and provide assistance and coordination in the early stages. The NSSQA staff needs input from the state soil scientists as to when staff input would be most effective. At least 30 days prior to the review the assigned soil scientist needs to have a descriptive legend that describes all of the approved taxonomic units and map units. If the descriptive legend is not received by this time the state soil scientist will be contacted to consider delaying the review until the descriptive legend is available.

The assigned soil scientist will review and comment on field review reports as they are submitted by the state. Emphasis will be on quality control procedures, staffing and management, legend control, classification of the soils, and naming of map units. New and revised series descriptions will be reviewed and transmitted into the OSED file as they are submitted.

A draft of the soil survey manuscript including tables, must be received by the NSSQA staff at least 30 days prior to the final field review. At this time the assigned soil scientist will review at least a minimum number of series and map unit descriptions based on the following:

Number of series/mar. units	Review
Less than 50	20 percent
50-100	15 percent
More than 100	10 percent

In any case, all of the map units will be reviewed that contain the names of the reviewed series. The series and map units will also be checked throughout the tables and other manuscript sections in order to ensure consistency. I want to emphasize that it is essential to have a draft of the manuscript at least 30 days prior to the review for the NSSQA staff to make a meaningful input. If the manuscript is not available it is obvious that the state staff also has not had an opportunity to make a review. If the manuscript is not received the state soil scientist will be contacted about rescheduling the review. Also, it would be very helpful if we received a list of the problems to be addressed during the review.

After the final field review the state will prepare a draft of the final correlation and circulate it for review to cooperators and the NSSQA staff. The soil scientist assigned to the survey area will make this review. After completion of mapping the state finalizes and distributes the correlation. When the final correlation is received the NSSQA staff will check only the changes and additions made since the final field review.

The soil survey scheduling module specifies that the manuscript will be submitted to the NSSQA staff for technical review within 15 months after the final field review. Again, this check will be on a sample basis to ensure consistency and accuracy.

Figure 1 shows the percent of NSSQA soil scientist time by major activities according to the workload analysis for fiscal year 1989. The analysis shows almost 20 percent of the staffs input prior to the final field review. Thirty-two percent is input at the final field review and beyond. I feel that this is still too much input near the end of the survey and not enough early. More emphasis will be put on review of MOU's, input into initial and progress reviews, and review of field review reports. If we do a good job of quality assurance in the early stages the time spent on final field reviews and review of final correlations will come down. About 7.6 percent of staff time is on formal training and workshops. Increased emphasis on training will decrease the amount of time required for technical review of manuscripts.

Accurate, complete scheduling is essential for the states to keep soil surveys on schedule and for the NSSQA staff and other National Soil Survey Center (NSSC) staffs to function. The national soil survey schedule which is a part of 3SD, will provide a management tool for scheduling key dates and tracking the progress of soil surveys. The NSSQA staff will be able to anticipate workloads from the schedule; however, specific dates for activities will have to be confirmed with the states. About May 15 of each year the states are asked for the input needed from the NSSC for the

following fiscal year. It is very important to do a thorough job of scheduling at this time. The state's requests for assistance are a major part of our workload analysis and budget development for the coming year. We adjust schedules as needed throughout the year but after the initial schedule is made it becomes increasingly difficult to accommodate the states requests. Also, there is a chance of running short of travel funds if we are under scheduled at the beginning of the year.

Summary

A soil scientist from the NSSQA staff will be assigned to a survey at its beginning.

The emphasis on quality assurance will be on the early part cf the survey.

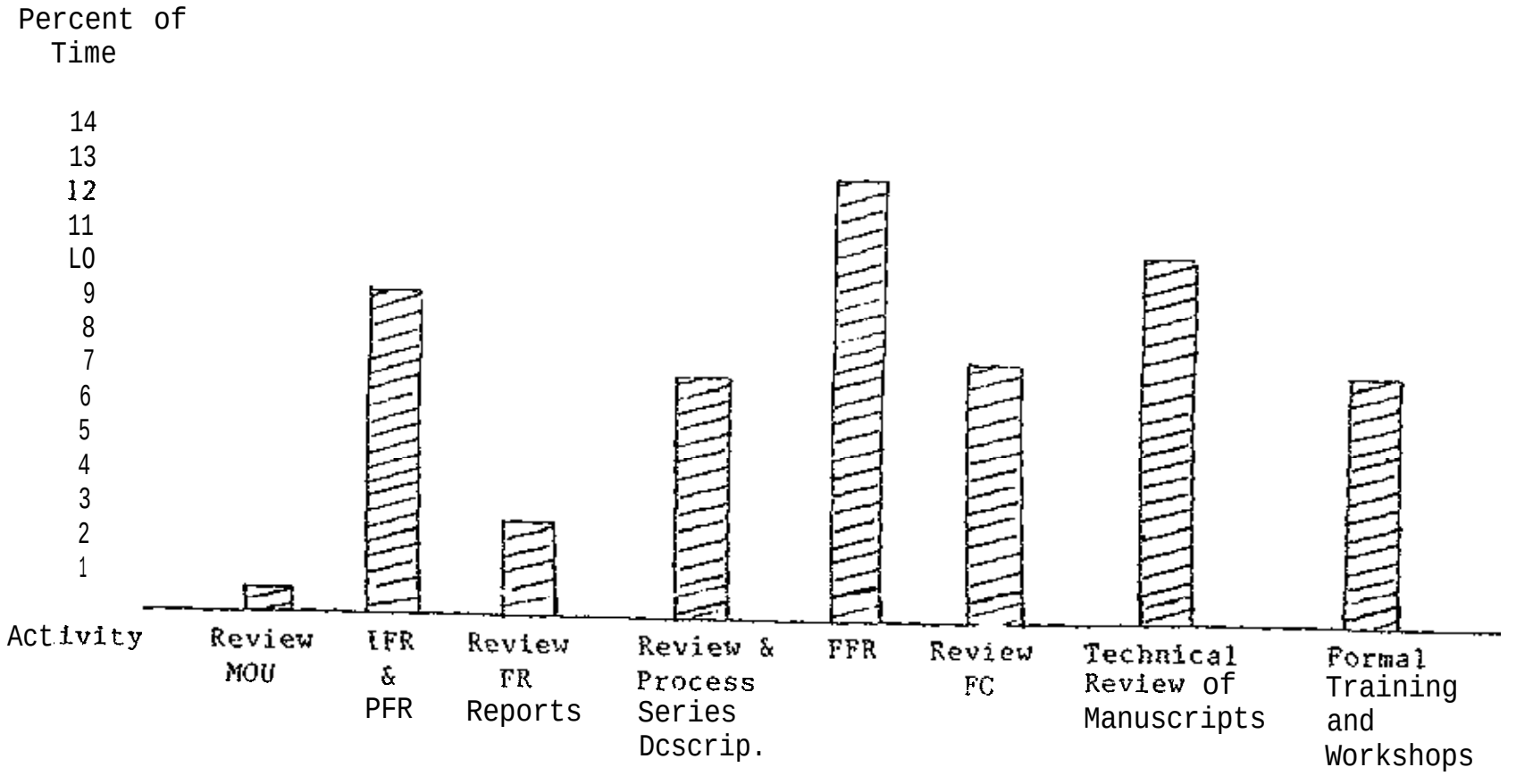
Progressive soil correlation will be emphasized.

Development of the soil survey manuscript must be concurrent with mapping.

Accurate, complete scheduling is essential to the operation of the soil survey.

FIGURE 1

Percent of NSSQA Soil Scientist Time by Major Activities
(Fiscal Year 1989 Workload Analysis)



ENGINEERING AND SOIL SURVEY
PRESENTATION TO THE NATIONAL WORKSHOP FOR STATE SOIL SCIENTISTS
Lincoln NB, October 19, 1988
James R. Talbot
National Soil Engineer

History of Engineering Involvement with Soil Survey

Early involvement of SCS engineers in the soil survey process was not always as it should be. There has been policy for engineers involvement in soil survey for many years. This policy was revised and strengthened in 1980, giving more specific direction. A copy of the 1980 policy was distributed at the meeting.

We consider it very important to have engineering input into the soil survey process. We are not only users of the soil survey manuscript, but we can also encourage its use by others including developers, planners and engineering groups.

Prior to about 15 years ago, a large portion of the engineering input was at the NTC level. Engineers made reviews of the engineering sections checking estimated soil properties tables, classifications, ratings, and test data against the series descriptions. We also checked the narrative written for the engineering section and other appropriate information in the manuscripts. Other work has included helping with a "canned" narrative to be used as a guide for engineering sections, rating guide criteria for Section 603 of the National Soils Handbook and soil potential ratings procedures.

Interdisciplinary input at the State, Area and Field Levels

I had the privilege of serving on the PIP study task force that reviewed Soil Surveys. An innovative concept that came out of the PIP study is that of keeping the responsibility for quality control at the lowest level possible. In the past, reviews were to have been made in the State office, the NTC office and finally in NHQ. I believe that it is the soil survey project leader or party leader that knows the most about the soils that his or her team has mapped. If the coordination is done with other disciplines at the area and state level, the inconsistencies found can best be corrected at that level, rather than at the NTC or NHQ levels where the least is known about the specific soils in question.

The concept now is that quality control and interdisciplinary input will be accomplished at the state office level and below. The area engineer is to work with the project or party leader to assist and review as the mapping is done, the estimated properties tables are formulated and the ratings are made. As soil surveys are reviewed in the state office, the State Conservation Engineer (SCE) or some of his staff should be involved in this process. Generally, as we have conducted engineering appraisals, we have found that the SCE has been fairly well involved. However, in many areas, there was a lack of involvement at the Area Engineer level. When the engineers are involved, they understand better what information the soil survey provides and are better able to use it themselves and promote its use by others.

National Soils Handbook review

Over the years, I have worked with the NHQ Soils Staff in review of National Soils Handbook proposals, particularly those dealing with engineering interpretations or other items in the engineering sections. I still want this involvement. With the main staff of Soil Survey now located in Lincoln, it may not be as convenient to drop by my office and discuss some item or to leave something for me to review. I hope the extra effort to send items through the mail and to have me work with your liaison in NHQ will be made so that I can still have my input. I am also available to discuss items by phone. I am particularly interested in any proposed changes to the rating tables and to soil potential rating procedures or other items I have worked on in the past.

Cooperative efforts for input into research and modeling

Cur engineering laboratories are presently cooperating along with the National Soil Survey Laboratory on testing for and counseling with the ARS on the Water Erosion Prediction Project, (WEPP). Together with soil scientists, we are counseling with the WEPP core team at their meetings and with the ARS scientists on the use of test data and on determining the near surface shear strength of the soil and its correlation with erosion.

We are aggressively pursuing the engineering aspects of soil erosion. We have found a new test that determines the boundary shear produced by flowing water where erosion starts. We have modified our pinhole test used to identify dispersive clay soils to measure this critical boundary shear of flowing water where erosion starts. These tests are being used in connection with the WEPP project.

We have become involved with the Israelies on a study of the effects of soil and water chemistry on erosion and chemical treatments that can reduce erosion. This information is also helping us in the WEPP effort. Since the field rainfall simulation tests are made using water other than rain water, we need to determine the effects of electrolytes in the water on particle detachment and on retarding crust formation which effects infiltration, runoff and erosion. We have also been working with the WEPP core team in this effort. To do this, we must know the concentrations of soluble compounds in the water and in the soil, the NSSL is providing this information and the engineering soil mechanics laboratory is providing additional evidence of the effects of water chemistry with the pinhole test modified to determine critical boundary shear,

Summary

The Engineering Division is vitally interested in Soil Surveys and particularly in having adequate engineering interpretations. We want to cooperate in the effort to provide a usable product for the public and to also be able to use the information ourselves. We want to cooperate with you in any way we can to accomplish this. We want our state and field engineers involved in the process in a helpful manner.

IMAGE PROCESSING

by

G. W. Wells,
MNTC Landscape Architect

The ability to communicate is essential to be effective. Whether you are trying to communicate conservation alternatives or explaining soil limitations, it is important to be able to express your ideas. Now with the help of a micro-computer visual images can be used to assist in this communication effort. Image processing software quickly edits still video pictures creating realistic graphic images.

Image processing is widely used in todays media, from 'Star Wars' to the daily weather forecast. The public has come to expect flashy graphics. With the use of image processing the Soil Conservation *Service* (SCS) can *now* produce sophisticated graphics.

Systems vary widely in ease of operation, quality of output and cost. Prices range from $1,500 to $50,000. SCS is using the Truevision Image Processing Software. The Midwest National Technical Center (MNTC) has invested $4,000 in upgrading an AT&T 6300 into an image processing station.

The MNTC originally acquired the technology to assist in the visualization of engineering activities. It soon became apparent that this technology had a tremendous potential throughout SCS. Although its full potential is not yet known it seems to only be limited by your imagination. The MNTC has used it to:

- assess visual impacts
- visualize planning/design alternatives
- produce graphics for workshops/briefing
- assist in training
- transfer technology
- produce public meeting videos
- produce public information products

The Midwest National Technical Center (MNTC) has been using the Truevision Image Processing Software since January 1987. The software was originally distributed by AT&T, but early this year it was sold to employees of the Truevision branch. It is now sold under the name of Truevision and is based in Indianapolis, Indiana.

The software allows you to edit a still video image. A special graphics board enables the computer to read a video image by grabbing a frame from a, video camera, VCR, video scanner or video slide input device. Once the image is grabbed by the computer it displays the image on an analog monitor. A mouse or stylus is then used to edit the image either freehand or by overlaying images from other files.

There are several choices when designing an image processing station. The software can be loaded on any IBM compatible PC with at least 512KB RAM. The image storage requirements range from 102KB for ICB images to 409X for TARGA 16 images. With this kind of storage requirements it is highly recommended that the computer have a large hard disk. The MNTC has a 20MB hard disk and a Bernoulli Box with a removable 20MB disk. The advantage of the removable hard disk system is that it allows for quick access to an infinite library. An alternative to this system would be to use a tape backup to download the hard disk when it is full. With this system the largest hard disk would be recommended.

The next decision is what graphic board to tuy. There are several truevision boards available. For SCS type work there are two basic choices, the Image Capture Board (ICB) or the Truevision Advanced Raster Graphics Adapter (TARGA). There are 5 TARGA boards available, but the TARGA-16 is recommended for landscape simulation work.

The basic difference between the ICB and TARGA-16 is in the resolution. The ICB displays 256 pixels by 200 lines while the TARGA-16 displays 512 pixels by 400 lines. The price difference is $1295 for the ICB and $1995 for the TARGA-16 (prices as of 6/14/88).

Once the graphic board is selected then software can then be purchased. The basic software is called Truevision Image Processing Software (TIPS). This software allows you to store, retrieve, manipulate, transmit and present still video images. The ICB version is $695 and the TARGA-16 version is $750. If the TARGA-16 board is going to be used I would recommend your computer have at least 1MB of RAM. This extra RAM allows for an option called undo that is not available without the extra RAM.

Another software package called PC Carousel Presentation Software, allows for your images to be arranged and played back as a slide show. This software is $150.

To use any TRUEVISION board an analog monitor is required. An analog monitor is similar to a television. The software is loaded using a digital monitor and then a menu is shown on the analog monitor. A Microsoft (or compatible) Mouse or Summagraphics 961 or 1201 series graphics tablet is used to access the menu.
To load a picture it must be in a video signal. There are several methods that can be used. A VCR or video camera can be connected to the computer. The live images are previewed on the analog monitor and then grabbed at 1/60th of a second. Slides can be loaded either by projecting them and then taking a video picture or by use a special slide input device. These devices connect directly to the computer and allow for color and contrast adjustments. There are also hard copy scanners available.

There are several output devices that can be used by the software. A VCR can be connected to the computer to video tape a

presentation. A film printer can also be used to make photographs and slides. The software will also drive a few color printers.

IMAGE PROCESSING WORK STATION

COMPUTER	EXAMPLE /	COST*
IBM compatible PC	ATT 6300	
Hard Disk (20MB min. the bigger the better)	IBM AT,XT	
512 K RAM min.(2MB recommended for TARGA-16)		
DOS 2.0 or later		
Monochrome monitor		
or (desirable for TARGA-16)		
386-16Mhz Computer, 5.25" 1.2MB Floppy,	ATT 6386	
40+MB Hard Disk, 3.0MB RAM	NEC Powermate	$3850
Monochrome monitor		
ANALOG MONITOR		
(you need one of the following)		
Analog RGB Monitor	Sony CPD-1302	$650
Long-Persistence RGB Monitor		$925
Composite Video Color Monitor		
Color Television w/RF modulator		
VCR connected to standard Television		
POINTING DEVICE		
(you need one of the following)		
Mouse-serial port	Microsoft mouse	$110
	Graphics tablet	
	Summagraphics 961	
	Bit Pad One	
IMAGE PROCESSING GRAPHICS BOARD		
(you need one of the following)		
Truevision Image Capture Board (ICB)		$1150
(256x200 lines of resolution)		
Truevision Advanced Raster Graphics Adaptor		$1695
w/overscan (TARGA-16)		
(512x400 lines of resolution)		

SOFTWARE
(basictart-up software)

Truevision Image Processing Software (TIPS)		both for $595
Truevision Slide Presentation Software		
(for improved title slides option)		
Resolution Independent Object Software (RIO)		$1150

INPUT DEVICES
(need at least one of the following)

Video Camera (NTSC OR RGE)		
(S-VHS needs encoder)		
VCR		
Slide Input Device	Howtek Photomaster	$2250
Color Scanner	Howtek Scanmaster	$7900

OUTPUT DEVICE
(need at least one of the following)

VCR		
Film Recorder	Montage FRI	$4900
Color Printer		

MASS STORAGE DEVICE
(external storage recommended)

Removeable Disk Drive	Bernoulli Box20/20	$1950
	20MB cartridges are	$65
	PLUS 40MB	$1300
	cartridges are	$700
Back-up Tape System equal to hard disk		
Large Hard Disk	320MB Disk	$3400

* Costs from national distributor as of 10/1/88

I appreciate the opportunity to be with you today.

There are some of you that had a very valuable part in some very early training in my career. One of those individuals present today was Bruce McCullough.

There are a number of others who have put forth a more recent effort, such as Joe Nichols, Garland Lipscomb, Dick Babcock, Jim Culver, Bill Hatfield, Fred Gilbert, and most recently Norm Helzer. I thank you and don't give up trying.

I feel very humble coming before this group as I 'look around this room at the experience and talent present.

Think about it, there is nowhere in the world the talent and capability in this room could be duplicated today.

I feel humble and I also feel a concern. A concern for a need or a need to be met.

Dick Arnold showed us a picture of the world soil limitations on Monday. Then I think of the future demands for food and fiber production.

- I also look at what is happening to our soil resource in much of the third world countries and ask myself if we are duplicating the demise of the Roman and similar empires only on a global basis.

I feel we have gone beyond that point in this nation, but only to the point of sustaining the resource base.

I have concern for the potential to meet today's and tomorrow's needs of this nation and its landusers.

I believe our capacity and potential is much greater than we can envision today.

And I believe you (this group) holds many of the keys to realizing that potential capacity.

With those thoughts in mind, I become very optimistic because I believe with the talent this agency has, we will continue to lead world technology.

- But, just as importantly we must demonstrate it on the landscape and on the dinner tables of this nation.

Let me shift gears on *you* for a moment and talk about change.

- Change is continual
- Change is inevitable
- Change does not have to be bad
- Our challenge is how to deal with it is a positive manner

Ron E. Hendricks, State Conservationist, SCS, Lincoln, Nebraska

I'd like to provide you with some food far thought.

- FORMULA FOR SUCCESS -

InMnC3IU = SUCCESS

INNOVATION MOTIVATION, CREATIVITY, COMMUNICATION,
COORDINATION, INVOLVEMENT, UNDERSTANDING

Please keep in mind I'm not coming to you with the answer, but only a consideration. Only you can find the answer within yourself.

You heard a number of speakers talk about innovation and motivation.

I could not agree more.

However, I would go a step further and suggest that we need to continually work toward creating and maintaining an environment for innovation and motivation.

- Do we need to publish manuscripts?
- Are there other ways in todays automated society?
- What information are we able to display?
- How about giving some consideration to what-if's
    * What if energy costs doubled?
    * What if we had a national drought?
    * What if we wanted to or certain types of commodities?
    * How do we update surveys?
    * What tools do we use?
    * How do we display it?
    * Who else needs to have an input outside SCS?

The third area deals with creativity.

- We need to continually challenge ourselves to reevaluate why and how we do things.

- Are there other ways?
- What would be our gain or loss?

The next three areas are communication, coordination, and involvement.

- What are we doing?
- Why are we doing it?
- How are we doing it?
- Who are we doing it for?
- Is there another way?

I would like to touch on these from the management aspect,

Take time to sit down with your STC and talk through your program.

- Where are we at?
- Where are we going?
- How are we going to get there?

Once that is done, it also needs to be done with other organizational disciplines including those you are dependent upon including B&F, Personnel, and Administration.

This needs to be done annually or more often in some cases as the need dictates.

Finally, - Understanding.

- Is is easily understood by the user?
- Does It meet the external needs?
- Does it meet the internal needs?

One of the toughest jobs we have it to step back and objectively take a look at ourselves,

We have heard many times, 'the old adage, "If it ain't broke don't fix it."

However, I would challenge you that if we are to:

- Meet our agency responsibilities
- Maintain technical leadership

We need to reevaluate o&effectiveness every time we meet the challenge of change.

Get others involved when evaluating or reevaluating.

You have an opportunity for a tremendous resource input.

In addition, you have a real opportunity for assistance in telling the story or carry the word.

Another way to put it 'is commitment.

Are we committed as an organization and are supporters and users committed that this is the right way and the right product.

As I have indicated, you hold a lot of the keys, but to make the program more effective you need to work with management and to a better job of "selling your product."

In summary:

Create an environment for creativity and innovation - use it.

Communication and coordination - internally and externally.

Involvement - use it.

Now, let me take a few minutes to talk about the soil survey program in Nebraska. I will attempt to just overview our program more from a direction standpoint. After I leave, Norm Helzer can straighten it out and get it back on track for you.

There are two broad areas we are addressing:

Updating - first generation (cropland completed)

Interpretation

Take updating first:

1. Why are we updating?

   This question needs to be addressed very intensely. If we adequately address this question, it will give us a better insight into priorities as well as interpretations.

2. How do we determine the need and degree of updating?

   Does the whole survey area need to be remapped, or does it just need to be recorrelated?

(Saunders-Dundy)

Tillage zone characteristics:

- Aggregate Stability
- Bulk Density
- Crust Resistance
- Compaction Zone5
- Chemical, Physical, and Biological

Studies through UN-L:

- Soil Map Statistical Data
- Remote Sensing
- Crop Yields

Next is interpretations:

1. What needs to be displayed?
2. Why does it need to be displayed?
3. How can it be displayed?

In this age of technology, the flexibility or ability to manipulate data is unlimited if we can:

- Get the data in that we need
- And in a format that can be manipulated

In summary:

The potential use of our soils data is only limited by quality, innovation, and flexibility.

National Workshop for State Soil Scientist6
Plan of Operations and Offset Budget Execution
Wednesday, October 19, 1988, 1:15 p.m.

I. Program Budgeting and Accountability

A. Background

1. October 1, 1966 Soil Conservation Service (SCS) changed basis for charging expenses.

2. Integrated the Plan of Operations and new fund charging methods.

3. Objectives are to improve program management and reduce paperwork.

4. We are making a contract with our people, paying for it up front, and then monitoring progress and cost to ensure that we are getting what we paid for.

B. Internal Accounting and Administrative Controls shall provide reasonable assurance that:

1. obligations and costs are in compliance with applicable law;

2. funds, property, and other assets are safeguarded against waste. lass. unauthorized use. or misappropriation; and

3. revenues and expenditures applicable to agency operations are properly recorded and accounted for to permit the preparation of accounts and reliable financial and statistical reports and to maintain accountability over the assets.

C. Policy

1. Workload described in the Plan of Operations and represented by staff-years will be the basis for the integrity of charges made to program funds.

2. The state is the lowest organizational level in SCS where financial performance will be measured.

3. A state's Plan of Operations and related documents must be integrated with operating budgets and support the state's program charges at all times.

4. Fund charges for technical assistance may be made using the following methods: direct, modified offset or base offset.

5. Financial assistance charges must be made on a direct basis.

D. Fund Charges.

1. Each type of expense in the budget must be assessed to determine which method (direct, base offset, modified offset) of charging expenses during the year will be used.

2. Using the base offset method (percentage of staff-years in one program to all staff-years in a state), salaries and most technical assistance expenses can be predetermined on a one time basis for charge purposes. The objective is one fund per transaction.

3. No further fund charge determinations are necessary unless the workload in the Plan of Operations is revised or an obvious error has been made.

4. The staff years used to predetermine expense distribution must always relate to the staff years shown on management matrices.

5. Expense distributions are approximations. Offsetting on a one fund per transaction basis should get close to the target amount in a given fund. but it will rarely be precise.

II. Plan of Operations

A. Introduction

1. The Plan of Operations is the basic management tool to direct the use of resources to achieve the SCS mission and objectives.

2. The planning process is criticalto all SCS operations. It is setting a course of action to effectively and efficiently use resources.

3. The Plan of Operations is the means of showing what the priorities are and in essence showing "what counts."

4. The Plan of Operations provides the basis for the performance plan.

5. It is strongly recommended the narrative Plan of Operations be approved by the next level supervisor.

B. Policy

1. All SCS organizational units at all levels will prepare and use a Plan of operations.

2. The Plan of Operations is to be reviewed quarterly, progress documented and needed changes made.

3. The Plan of Operations is to contain the following:

   a. Narrative Plan of Operations that includes objectives, goals and specific action items.

   b. Schedule of activities.

   c. Summary of applicable goals.

   d. Accountability of all staff time.

   e. Operating budget (state level).

   f. System of scheduling and documenting activity and time.

   g. System of monitoring progress and adjusting the Plan of Operations and fund charges as needed.

   h. Staffing plan.

   i. Appendices.

4. The Plan of Operations at the field, area and state office levels will be the basis for the management matrix.

C. Working documents and change.

1. The components of the Plan of Operations are dynamic, working documents. They are the means by which program and fund accountability are maintained.

2. It is essential that changes be communicated to area and field offices. Adjustments in Plan of Operations activities may be needed to reflect the changes.

3. It is critical that changes in the Plan of Operations be reflected in the management matrices.

III. Management Matrix

A. Policy

1. Each program is to have a management matrix for use in monitoring and demonstrating program and fund accountability.

2. The management matrix is to contain.

   a. Total staff years.

   b. Gross salary costs

   c. Total gross budget.

   d. Work products, planned accomplishments by quarter.

   e. Work products, actual accomplishments by quarter.

3. It is the responsibility of the program managers to maintain the management matrices.

4. Explanations, comments and adjustments are to be made on the management matrix when significant changes have occurred. This is an essential part of the management matrix.

B. Working documents and change.

1. The management matrices are dynamic, working documents. They are the means by which program and fund accountability is demonstrated.

2. It is essential that explanations, notations and adjustments be shown on the matrix. This is critical to demonstrating program and fund accountability.

3. Changes on the management matrix must be coordinated with changes in the Plan of Operations.

Summary

1. The planning process is improving. Priorities are clearly identified and communicated.

2. The narrative Plans of Operations have significantly improved. There is much evidence that communications and coordination in the development of the narrative Plan of Operations at the state level has improved.

3. The flrst year of the management matrix concept (FY 1987) brought mixed reviews. The management matrices for FY 1988 are much improved in showing work products, staff years and budget information.

4. The management matrix concept is a realistic and an excellent means for demonstrating program and fund accountability. A key part of this is explaining, documenting and making changes as needed.

5. Reviews of state operations indicate that overall we have program and fund integrity even if there are some isolated problem areas. There is a need for a better understanding of the processes and people's roles. The remainder of today's session is designed to provide that understanding.

Water Quality Probleme of the United Staten and the SCS Soil Scientist

Prepared by

Thomas A. Dumper
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Water quality problems are in the news; newspapers, trade journals and the scout manual. Information dealing with water quality is found everywhere from local well drillers advertisements to state water quality management plans to federal law. We know that there is a problem but its perception, described in the news, seems either locally overwhelming or nationally abstract. The citizen asks: Where a id why is water quality a problem? How bad is it? The SCS soil scientist find8 themselves in a new role; improving, maintaining and protecting water quality.

Alarming articles in the popular, urban press call attention to an agriculture role in water pollution but the production of food and fiber is a necessity and cannot be the only source. Agriculture is certainly ready to admit its share of the problem and to work on a solution but it is not the only villain. How much of the problem belongs to agriculture?

BASIC CONCEPTS FOR UNDERSTANDING WATER QUALITY PROBLEMS

Two concepts must be applied to understand water quality problems. These concepts are:

1. There is only water resource problem8 and not ground water problem8 and surface water problems.

2. Water quality problem8 exist where water uses, designated by state law, are impaired.

These concepts form the bases to define water quality problems.

All atmospheric water stems from precipitation (ignoring juvenile water from vulcanism) and where it goes when it strikes the earth, determine8 whether it become8 ground or surface water. Water that does not go into the soil to be used by plants, is either evaporated or runs off to become surface flow. This water movement may be considered a waste from an agricultural production standpoint. Soil water, that may be used by plants, is a driver of agricultural production. Soil water that percolates paot the root zone may recharge ground water. If the water movement picks up polluting substances and transports them in runoff or recharge, that become8 a potential source of a water quality problem.

The second concept to define water quality problem8 is based on the classification of our rivers and streams by state law and standards that are designated by their potential use. Typical designated uses are agriculture, industry, drinking water, recreation and fish and wildlife. These designated uses reflect the water's natural and potential quality in light of the economic uses of the area. Substance8 from any source may enter streams and impair their quality until the water can no longer support the designated uses. Satisfactory water quality is based upon its ability to support the designated use. Quality is determined upon the basis of the physical and chemical constituents of the water as well as the biological communities that it supports. Aquifer uses are also being designated by states by use and ground water quality laws ore increasing.

Substances that enter and impair the use of water cause water quality problems. These substances may come from point discharges such as from the end of a pipe that carries waste to a stream. Substances may also come from nonpoint sources that are diffuse and

vary in discharge over time and space. These substances are produced by human activity such as land use and management. Activities that can become nonpoint sources that cause water quality problems include agriculture, construction, hydrologic modification, leaching from landfills, urban living and mining. It is estimated that 66 percent of the nonsupported water uses in our rivers and streams are caused by nonpoint sources, 27 percent from point sources and 8 percent either from natural or unknown sources (USEPA, 1987).

LOCATION OF WATER RESOURCE PROBLEMS IN THE UNITED STATES

Nonpoint sources of water quality pollution occur in every state in the nation and 47 states reported agriculture as the largest category (USEPA, 1987). Runoff from urban areas is the next argest source and it is reported by about 36 states. This is followed by construction and mining activities with about 20 states reporting each category.

Nonpoint sources provided 76 percent of water use impairment of lakes and 45 percent of estuaries of the nation. Municipal and industrial point sources were reported to a lesser degree (USEPA, 1987). Relative contributions by source vary with the type of land use and terrain. For example, nonpoint sources were estimated to be the cause of 97 percent of the impaired water uses in Iowa while Alaska estimated that 85 percent of the impaired uses caused by industry,

Water use impairments are extensive but moat water body uses are not impaired. Nationally, about three-fourths of the designated uses of our rivers, streams, lakes and estuaries are supported (USEPA, 1987 and ASIWPCA, 1986). It is anticipated that only about 7 percent of these water bodies have unsupported uses; the balance are partially supported.

States reporting impaired water uses (ASIWPCA, 1986 and USDA, 1987) indicate that agriculture is a large source activity with 34 percent of the states reporting severe pollution, 43 percent reporting moderately severe pollution and 17 percent reporting minor pollution. Other significant sources of NPS pollution problems, reported by states, are urban activities with 23 percent severe, 43 percent moderately severe and 26 percent minor. Land-based water disposal is reported to cause 32 percent severe pollution, 21 percent moderately severe and 28 percent minor. Agriculture is a significant source of NPS pollution on a national basis; but not the only significant source.

Nonpoint source parameters, most widely reported by the states as impairing surface waters are turbidity, nutrients, bacteria, toxics and concentrations of dissolved oxygen or BOD (USEPA, 1987). All of these parameters may be caused by an agricultural source. They are the parameters that describe the principal agricultural polluting substances of sediment, animal waste, salinity, nutrients and pesticides (Soil Conservation Service, 19831.

The effects of pollutants on river and stream fishery concern moat Americans. Surface water quality problems that adversely affect fisheries were reported for 56 percent of all our nation's streams and 66 percent of perennial streams (Judy, et. al, 1984 and USDA? 1987). Nonpoint sources of pollution were estimated to degrade 38.4 percent of perennial streams and 49.6 percent of all streams. Agricultural nonpoint sources were estimated to adversely affect 29.5 percent of perennial streams and 37.6 percent of all streams. However, for comparison purposes, natural sources were estimated to affect 22.2 percent of perennial streams and 22.5 percent of all streams (Judy, et. al, 1984 and USDA, 1987). Incustriall point sources were estimated to affect 4.6 percent of perennial streams and 6.9 percent of all streams.

Turbidity, frequently resulting from sediment, was estimated to be the principal fishery pollutant and affected 42 percent of perennial streams; 34 percent of all streams

(Judy, et al., 1984 and USDA, 1987). Many of the substances that adversely affect stream fishery have an agricultural source and cropland contributes 42 percent of the sediment, 93 percent of the pesticides, and 31 percent of the phosphorous and 42 percent of the BOD concentrations (Gianessi, et al, 1986 and ASIWPCA, 1984). For contraat, on a national basis, point sources are estimate to contribute 16 percent of total phosphorus and 10 percent of the BOD.

Areas of the United States that potentially contribute the greatest amount of agricultural NPS substances that may pollute surface water quality were appraised by the US Department of Agriculture (USDA, 1987). Generally, in agreement with other reporting sources, the distribution of agricultural NPS pollution sources were found to be wide spread nationally. However, there is a high potential for degraded water quality where cropland agriculture is dominant such as in the Cornbelt, humid regions that have extensive runoff, concentrations of livestock and poultry, and where pesticides and nutrients are frequently used. Salinity problems were found where natural salts from geologic sources were readily available and irrigation is commonly practiced.

Although the water pollution potential may be widespread nationally or regionally, the local incidence is quite variable. Local combinations of land use, management, soil characteristics and geologic materials cluster pollution problems in some watersheds while other drainages in the same geographic area may be relatively free. Clusters within watersheds result from the combination of market driven land use and management activities intersecting with soil, water and geologic resources.

Ground water impairment has a somewhat different signature although there is a strong relationship to land use, management and natural resources. It is necessary to have an aquifer to have a ground water problem and they do not occur everywhere. Although common nationally, large volume aquifers are usually found most in areas underlain by unconsolidated geologic materials; especially glacial deposits. Aquifers with lower ground water yields are more common.

Demand for drinking water from ground water sources is population dependent. Areas where ground water supplies a high percentage of the drinking water are frequently located where populations and precipitation are low (USEPA, 1987). Costs for ground water development are frequently less than for surface water and wells are typically used in rural settings. Ground water also serves many large urban centers. Ground water is the principal supply for 50 million people; 31 million with publicly operated wells and 19 million from private wells (Lee and Nielsen, 1987). Rural populations served by ground water total 43 million people but only about 6.3 million of these people actually live on farms (Hostetler, 1988). Consequently, concerns for ground water quality are universally shared.

Ground water contamination, reported by states, generally is generally found where an aquifer is vulnerable to surface contamination. These areas appear to cluster as a function of the economic activity and geologic setting. Sources of ground water contamination, most commonly reported by states (USEPA, 1987), are septic tanks and underground storage tanks in urban areas and were 89 and 83 percent respectively. Agricultural activities were reported by about 79 percent of the states as being a source of ground water contamination. Concentration of agriculturally related ground water problems is noted in the Corn Belt, Great Plains, Lake States and portions of the Northeast and Southwest where agricultural activities are common (Lee and Nielsen, 1988). Other pollution sources are surface impoundments, road salting and mining. Ground water contamination may potentially occur to half of the counties in the conterminous United States.

FACTORS AFFECTING SURFACE OR GROUND WATER QUALITY

The location of surface and ground water quality problems is related to the interaction of human activity and natural resources. The first requirement is to have a significant water body or aquifer. This water resource must then be characterized by some component of the water budget that would affect its management such as direct precipitation, ground water recharge or surface water runoff. Precipitation, except when in short supply or in cases of local atmospheric deposition, may generally not be an agricultural concern. Connection with human activity creates the pollution concern because people use the land, people use the water and people want to use more water for economic purposes. The type and intensity of land use becomes a dominant pollution factor because the waste products produced by the human activity becomes the water degrading substance. If human produced substances do not enter the water resource in excess qualities, there is no water quality problem.

The human factor also determines the impaired water quality. Water quality is defined on the basis of human use through legal statute; usually state standard and law. The water quality for the designated use is a sensory perception of the user.

The opportunity to manage water use to maintain its quality is the remedial human factor. Although, different patterns of land use and management may potentially produce a certain type of waste substance whether agricultural, industrial or municipal in source, no individual activity is universally bad. Water and waste management is the determiner of the relative quality. Production agriculture, for example, may be the dominant economic activity in the Cornbelt. Depending on the management of the land and water resources by the land user, it may be carried out without pollution of the water resource. The opportunity to carry out such a nonpolluting enterprise is a function of the individual production unit and its ability to manage compatably their soils, geologic materials and water resources. The widespread national problem of surface and ground water quality thus relates back to the individual manager.

CONSERVATION PLANNING FOR WATER QUALITY AND THE SOIL SCIENTIST

Water resource planning in the SCS, whether project related or by individual conservation plans, considers these general steps.

1. Water resource problem is defined.

2. Inventory and analysis of human and natural resources is made.

3. Alternative ways to solve the resource problem are made and evaluated.

4. A choice is made of the best alternative for the client baaed upon their social and economic resources.

The SCS employee must have the best tools available to define and interpret the client's resources to evaluate these resources. The soil scientist, along with the geologist, hydrologist, engineer, plant scientist and other technical specialists all have important roles. A review of some of these contributions to conservation planning for water quality concerns, now and in the future, will show the importance of the soil scientist role.

The definition of a resource problem on an agricultural enterprise may use all of the SCS soil identification and interpretation tools. However, what we must also now consider is how the agricultural activity interfaces with components of the water budget. This analysis of the water budget may be the new hydrologic basis for conservation planning. Geologic and hydrologic components of the farm or ranch must be known. Familiarization of the planner with the soil water parameters are an important part of this activity. The

definition of the water resources for planning must be made as a function of the time distribution of water budget components. This is especially important in determining their ground and surface water pollution hazard.

A new tool, developed to evaluate the ground water quality hazard, is a model called SEEPPAGE which uses several soil parameters. Data bases, must be constructed to help our field planners to use this model as part of their normal field office routine.

New soil chemical related parametera and interpretation have been developed that will aid the SCS planner respond to problems related to pesticides and nutrients. These include the potential for leaching and runoff as well as the relation of the water budget components to agricultural management and the use of conservation practices.

Water management, in addition to the normal concerns for irrigation and drainage, must be employed in most future conservation plans. Soil scientist are already making their contribution to analyses of drainage and irrigation. They must now develop the soil water data bases to support these other conservation activities.

Nutrient and pesticide management are important new activities that will soon become widely used SCS conservation practices. Soil water parameters to aid in the application of these practices will be required. Nutrient management will need realistic estimates of crop or forage yields, by mapping unit, to allow for adequate chemical management. The development of the models and data bases which will support these activities will require the help of the soil scientist.

Including surface and ground water quantity and quality as part of the conservation planning requires interdisciplinary inputs to the planning process. This inclusion is not only the result of a federal law, NEPA, which actually demands such interdisciplinary interaction but also the realization of the local environment through the total year. The soil scientist is a critical part of the team that will improve the definition and use of these concepts in SCS planning. In that way me may have a quality effort for the new SCS challenge for the 90's.

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IMPLEMENTING WATER QUALITY

Don Goss

Background

The top priority resource goals defined in the U.S. Department of Agriculture National Program for Soil and Water Conservation from 1988 through 1997 are:

(1) "Reduce the damage caused by excessive soil erosion on crop, pasture, range, forest, and other rural lands."

(2) "Protect the quality of ground and surface water against harmful contamination by non-point sources."

The authority for the water quality effort includes:

(1) The Water Quality Act of 1987, which includes non-point source of pollution,

(2) USDA policy, which states that "non-point sources can be a significant pollution problem, and agriculture is a major source in some locations."

(3) SCS water quality policy, which states that "the Soil Conservation Service will integrate water quality concepts, consideration and management techniques into appropriate programs."

(4) SCS policy for technical guides, which states that "the guides will provide information for interdisciplinary planning for the conservation of soil, water, and related resources!'

The SCS assembled a group of soil scientist, geologist, economist, environmentalist, and engineers in early 1988. This team was assigned the responsibility of developing the Water Quality Action Plan. The team completed this assignment between February and September, 1988. Three Water Quality Workshops were held during October and November, 1988. Participants in these workshops were SCS, EPA, SES, TVA and Geological Survey. A few states had personnel from the state organization responsible for water quality.

Water Quality Action Plan

Several products and techniques were developed by the Water Quality Action Plan. The plan was designed to provide:

(1) General Resource References
- (a) USDA and SCS water quality policies
- (b) Water Resource Data and INformation
- (c) The effects of land use and management on water resources
- (d) Conservation Practices and Effects on Water Resources
- (e) Pesticide Data Base

(2) Soil and Site Information
- (a) Soil pesticide interaction ratings
- (b) Soil ratings for phosphorus (not completed)

(c) Rating for nitrate and soluble nutrients (LI)

(3) Resource Management Systems

(a) Planning in response to water quality concerns

(b) Basic Concepts and Processes

(c) Water resource consideration and criteria for resource management systems.

(d) Guide to selecting conservation practices

(e) Revising RMS's to incorporate water resource concerns.

(4) Practices, Standards and Specifications.

(a) Water resources supplements to national practice standards.

(b) Planning and Design considerations for developing state standards and specifications.

(c) Nutrient and pesticide management practice standards

(5) Economic tools to facilitate the plarming process and evaluate conservation options.

Soil and Site Information

Most of the products developed in this section will be applicable to the FOTG directly with little modification.

The Pesticide Data Base was provided to the Water Quality Workshop participants. Included in the Pesticide Data Base are ratings for each pesticide relative to run-off or leaching potential. These values were developed at the NSSL. A separate section in this publication, "Pesticide-Soil Interaction, Potentials For Loss" outlines the development of these values.

The Soil rating potentials for pesticide loss by runoff or leaching are available from interpretations of the SOIL5 data set at Ames, Iowa. Dr. Arnold included instructions for obtaming these ratings in National Bulletin Number 430-9-3, November 14, 1988. Also included in this bulletin was "Pesticide-Soil Interaction, Potentials For Loss." The soil ratings can be obtained for the state or for a survey area.

The soil scientist should review the potential pesticide loss ratings carefully. The scientist in the field obviously has considerably more knowledge about a particular soil series or mapping unit than the author of this technique or the computer at Ames. The ratings should be reviewed, if apparently inaccurate adjustments should be made according to flags adjacent to the rating. The flags are:

* Slopes > 15 percent
# Organic soils and soils with organic surface layers
& Water table above 6 feet.

Another factor that may cause inaccurate ratings is the hydrologic group. Occasionally the soil series has been assigned a hydrologic group that may adequately express run-off potentials, but do not reflect infiltration as it relates to leachmg. This has most frequently occurred for hydrologic group B soils. The most frequent miss-classification is placing a hydrologic C soil in hydrologic group B.

Figure (1) is an example Pesticide Work Sheet for evaluating pesticide use in a specific environment. The parameters needed are Soil Mapping Unit, Crop, Management, Target Pest, and the Recommended Pesticide. The recommended pesticide is obtained from the Extension Service or a pesticide bulletin provided by the Extension Service. The pesticide loss potential from surface or leaching is obtained for a pesticide from the data base provided in the Water Quality Workshop Manual. The soil loss potential from surface or

leaching is obtained from the soils tables obtained from Ames and adjusted, as needed, by a soil scientist. The soil and pesticide rating are combined in a matrix to obtain the overall pesticide loss potential. Figure (2) is a matrix for potential leaching loss and Figure (3) is a matrix for potential surface loss.

The pesticide data base distributed at the work shops includes three parameters that were used in estimating the potential pesticide loss. These parameters are solubility in water, half life in soil and soil sorption mdex (KOC). Several pesticides have estimated or guessed values for these parameters. The estimated values are flagged with an 'E'. The guessed values are flagged with a 'G'. These flags should also be attached to the leaching and runoff potentials. When obtaining a pesticide loss potential also observe the solubility, half life, and KOC values. If these parameters are flagged, also flag the surface loss or leaching potential.

The example Pesticide Work Sheet (Fig. 1) is a real example from MN. The last example, Barnes 4% and Corn, provides some interesting comparisons. Examine the overall surface loss potential. Three pesticides have a 1 rating (the most likely to be in runoff) one has a 2 rating (intermediate) and one has a 3 rating (the least likely). If surface waters are a potential contamination hazard the pesticide with a three rating would be an environmental "best" choice. Note that this pesticide (Carbofuran) has a 1 rating for overall leaching potential. The "best" choice pesticide for low surface loss is not the "best" choice for leaching loss. One of the pesticides (Chlorpyrifos) that has a 1 overall surface loss potential has a 3 overall leaching potential. One of the pesticides (Tebufos or Chlorpyrifos) with a 3 rating would be the "best" environmental choice if a ground water resource could be contaminated by leaching,

Soil Rating for Phosphorus

Soil ratings for phosphorus were not developed in time for inclusion in this set of recomended additions to the FOTG. Scientist at the NSSL are currently developing techniques for estimating the phosphorus loading capacity of soils.

Phosphorus is commonly associated with sediment. Conservation practices that reduce runoff also reduce phosphorus loss. Some soils that are sandy and low in iron or carbonates may leach phosphors. Areas where animal waste are applied are suspect for phosphorus loss.

Soil Rating for Nitrate and Soluble Nutrients.

A set of Leaching Index (LI) values and map for your state is available from the state office. The LI state map for a mountain state should be used with caution. The high precipitation variation over short distances in the mountain states were not handled well by the computer. In most mountain states the use of the station data and interpolating those values to the desired location will produce more accurate LI estimates.

The LI values were estimated from a method developed by J.R. Williams and D.E. Kissel. Their article, "Water Percolation: An Indicator of N Leaching Potential" can be found in the soon to be published ***Managing Nitrogen For Groundwater Quality and Farm Profitability,*** edited by R.F. Follet.

Figure 1

PESTICIDE WORK SHEET sheet 1 of 1 Owner G. W. Measuring Water Resource Concern (Surface) (Sub-surface)

SOIL	CROP	MANAGEMENT	TARGET PEST	RECOMMENDED PESTICIDE	LOSS POTENTIAL					
					PESTI-CIDE		SOIL		OVER ALL	
					SUR	LEA	SUR	LEA	SUR	LEA
Barnes 4%	Corn	Sprinkler Irrigation, Continuous Corn, Clean cultivation,, Herbicide - Preplant Incorporated	Green and Yellow and Foxtail, Lambsquarters Pigweed	atrazine	M	L	I	I	2	1
				cyanazine	M	M	I	I	2	2
				EPTC	M	M	I	I	2	2
				metolachlor	M	M	I	I	2	2
Salida 5%	Alfalfa	Second Year Stand, Sprinkler Irrigation,	Foxtail	pronamide	L	S	N	H	2	2
				sethoxydim	S	S	N	H	3	2
Barnes 4%	Corn	Continuous Corn, Sprinkler Irrigation, Clean Cultivation	Corn Rootwrom	Tebufos	M	S	I	I	2	3
				Fonofos	L	M	I	I	1	2
				Chlorpyrifos	L	S	I	I	1	3
				Carbofuran	S	L	I	I	3	1
				Phorate	L	M	I	I	1	2

SUR = SURFACE
LEA = LEACHING

PESTICIDE:
L = LARGE
M = MEDIUM
s = SMALL
T = TOTAL USE

SOIL:
H = HIGH
I = INTERMEDIATE
N = NOMINAL

OVERALL:
1 = HIGH
2 = GRAY
3 = LOW

'Figure 2. Potential pesticide loss to leaching matri:

Soil Leaching Potential	Pesticide Leaching Potential			
	LARGE	MEDIUM	SMALL	T· CAL USE
HIGH	Potential 1	Potential 1	Potential 2	Po· ential 3
INTERMEDIATE	Potential 1	Potential 2	Potential.3	Po' ential 3
NOMINAL	Potential 2	Potential 3	Potential 3	Po ential 3

Figure 3. Potential pesticide loss to surface runoff matrix

Soil Surface loss Potential	Pesticide Surface loss Potential		
	LARGE	MEDIUM	SMALL
HIGH	Potential 1	Potential 1	Potential 2
INTERMEDIATE	Potential 1	Potential 2	Potential 3
NOMINAL	Potential 2	Potential 3	Potential 3

PESTICIDE - SOIL INTERACTION

Potentials For Loss

Don Goss

INTRODUCTION

This document describes a method used to evaluate the relative potential loss of pesticides from soils. Evaluation results are expressed as a relative potential for a specific pesticide to be lost when used on a soil series. The GLEAMS(1) model was used to estimate pesticide losses form a large combination of hypothetical pesticides and soils. The estimated pesticide losses were ranked according to the amount of pesticide lost. Algorithms using soil properties were developed to categorize soil series for leaching and surface water loss potential. Also, algorithms using pesticide properties were developed to categorize pesticides for leaching and surface water loss potential. The soil and pesticide categories are combined in a matrix to give a pesticide loss to surface water potential and a pesticide loss to leaching potential.

(1) GLEAMS: Ground Water Loading Effects of Agricultural Management Systems by R. A. Leonard, W. G. Knisel, D. A. Still. Transactions of the ASAE Vol 30 No 5, pp1403-1418, 1987.

BOUNDARIES OF CONSIDERATION

A pesticide loss is assumed to have occurred if the pesticide is leached below the root zone, or leaves the field boundary in solution or adsorbed on sediment suspended in runoff waters. Thus, the boundaries are the bottom of the root zone and the edge of the field.

FACTORS AFFECTING RISK POTENTIAL

The potential of losing pesticides from a field by surface water runoff or leaching below the root zone is a combined function of pesticide, soil, and climate factors. The pesticide loss assessments listed in this section have been developed by using a combination of soil and pesticide properties. The climatic factor has not been varied. The meteorological components used in the rating process are for evaluating potentials independent of climate and are not intended to represent any climatic zone. The primary goal was to determine the capacity of a soil to retain a pesticide at the point of application, regardless of management or climatic inputs,

FACTORS NOT INCLUDED IN PESTICIDE LOSS POTENTIAL

Climate was not a variable in the pesticide loss potential determination. Storm size and frequency immediately after pesticide application will impact the amount of pesticide lost to surface runoff. This loss occurs as pesticide in solution and adsorbed on the sediment suspended in runoff waters. Another climate related impact occurs when pesticides that have a high leaching potential are applied on soils with high infiltration rates. The pesticide will infiltrate below the root zone when a large or extended precipitation event occurs immediately after application. Therefore, the fact that a pesticide has been applied produces a potential for pesticide loss. This potential for loss occurs regardless of management practices that utilize pesticides.

Actual climatic data was not used in the GLEAMS model because of the several hundred potential climates that would require evaluation. Over 24,000 iterations of, the GLEAMS model was required to test the hypothetical soils and pesticides without varying the climate. The meteorological data used in the model to estimate pesticide losses was artificially generated to represent the most likely situations for pesticide loss mentioned above.

An indirect climatic influence not considered in this assessment is soil temperature and moisture during the period the pesticide resides in the soil. The persistence or half-life of a pesticide in a soil is partially dependent on soil moisture and temperature. The degradation of the pesticide is favored by warm and moist climates. The difference in half-life rates of the pesticide due to soil moisture and temperature has not been considered. The half-life for a given pesticide was assumed constant, regardless of climate or geographic location.

The type of crop was not considered, ard the method of pesticide application was not considered. 'The soil was assumed fallow and the application was to the soil surface. To consider each crop and method of application available for a pesticide is beyond the scope of this guide.

Some soil parameters that are thought to influence pesticide half-life rates or solubility have not been considered. These factors include soil pH, Aluminum content, elements toxic to microbes, and total soil surface area.

FACTORS CONSIDERED IN PESTICIDE LOSS POTENTIAL.

Soils have been categorized according to the relative potential for pesticide loss from the surface (soil surface loss potential), or the relative potential for pesticide loss to leaching (soil leaching potential). The pesticides have been categorized according to the same potentials (pesticide surface loss potential or pesticide leaching potential).

Break points for each category were based on the percent of pesticide applied lost to surface runoff or leaching. Multiple simulations of the GLEAMS model were used to estimate pesticide leaching below the root zone, and pesticide losses in runoff. The categories for soil potentials are:

High
Intermediate
Nominal

The categories for pesticide potentials are:

Large
Medium
Small
Total Use

The pesticide was applied to the surface of a fallow soil sixteen, eight, four, and two days before, and on the day of the first major precipitation event. A 3.5 mch precipitation event was generated every second day for five events, and then a 1.0 inch event every other day for at least four times the half-life of the pesticide. The field was ten acres, square m shape, with a four percent slope. The rooting depth was set at 36 inches.

The pesticide variables tested were:

(1) half-life,
(2) solubility, and
(3) organic matter partitioning coefficient (KOc).

The soil variables tested were:

(1) surface horizon thickness,
(2) organic matter content of the surface horizon,
(3) surface texture,
(4) subsurface texture, and
(5) hydrologic soil group.

The estimated properties that vary with above inputs are:

(1) Effective saturated conductivity from texture and hydrologic group using Table A-6, pg. A-8. 1/ (Fallow)
(2) Bulk density from texture by NSSL method. The NSSL method utilizes the Pedon Data Base for predicting the most probable bulk density from texture.
(3) SCS curve number from Hydrologic soil group using Table A-4, page A-5. 1/ (Fallow, straight row)
(4) Porosity from [1 - (bulk density)/2.65)]*100.
(5) Field capacity from texture using Table A-3, pg. A-4. 1/
(6) Wilting point from texture using Table A-3, pg. A-4.1/
(7) Soil evaporation parameter using Table A-3, pg. A-4. 1/
(8) Percent sand, silt, and clay from texture using Table B-4, pg. B-3. 1/

(1/) CREAMS A Field Scale Model for Chemicals, Runoff, and Erosion from Agricultural Management Systems. Conservation Research Report Number 26. USDA, Science and Education Admmistration. (which also applies to GLEAMS)

The climatic constraints used for this method of ranking are somewhat rigid considering the wide variety of climates where pesticides are used. The precipitation inputs into the model are highly improbable in most climates. An additional constraint is methods of pesticide application relative to true application methods of the pesticide. However, these ranking of soils and pesticides are relative with no absolute definition. The categories reflect a potential of how a soil and pesticide will interact. Pesticide losses from this model reflect only the relative ability of the soil to retain the pesticide at the point of application. The interplay of climate determines whether the leaching or surface loss potentials are reached in a given area.

DEVELOPMENT OF THE ALGORITHMS

Soil and pesticide categories were developed by using the results of multiple simulations using GLEAMS. An algorithm was developed to rank soils and pesticides for losses due to infiltration and for losses due to surface runoff. These algorithms were developed by ranking GLEAMS estimated pesticide losses for leaching or runoff into three groups. The pesticide loss would occur if a large precipitation event occurs immediately after application. The largest loss group has the potential for unacceptable losses regardless of management. The lowest loss group has little potential for loss regardless of management. The intermediate loss group has the potential for unacceptable losses, but may be reduced to acceptable losses by management. Selection of soil and pesticide properties for the

algorithms was based on Factorial Analysis or Stepwise Regression. Both methods selected the properties that most influenced pesticide loss.

Leaching Algorithms

The soils algorithm for ranking soils for potential loss to leaching are:

SOIL LEACHING POTENTIAL ALGORITHM

High:

If hydrologic group = A
and Organic Matter times horizon #1 depth < = 30 or
If hydrologic group = B
and Organic Matter times horizon #1 depth < = 5

Nominal:

If hydrologic group = A and
Organic Matter times horizon #1 depth > = 65 or
If hydrologic group = B and
Organic Matter times horizon #1 depth > = 45 or
If hydrologic group = C or
If hydrologic group = D.

Intermediate:

Everything else

The method of D.I. Gustafson (unpublished) was adopted and modified to rank pesticides (Groundwater Ubiquity Score: A Simple Method of Assessing Pesticide Leachability). There are certain classes of pesticides that will probably never be leached. These pesticides will have a small leaching potential regardless of the soil type they are applied. This group of pesticides was ranked Total Use. The pesticide algonthm for ranking pesticides for potential loss to leaching are:

PESTICIDE LEACHING POTENTIAL ALGORITHM

Large:
If log(half-life)*(4 - log(KOc)) > = 2.8

Small:
If log(half-life)*(4 - log(KOc)) < = 1.8

Total Use:
If (solubility < 1 or KOc > = 10000) and
half life < 10.

Medium:
Everything else

The loss of pesticides in surface runoff occurs in two phases, in the soluble and adsorbed phase. The current algorithm considers both phases combined. However, there is an advantage in separating these phases. This advantage is evident in considering management alternatives. Practices to manage water, the soluble phase, could be different than practices to manage sediment, the adsorbed phase. The algorithms for surface losses are not as definite as the algorithms for leaching. The number of factors corollary to surface losses are much greater than those to leaching losses. The algorithm for ranking soils for potential loss to runoff are:

SOIL SURFACE LOSS POTENTIAL ALGORITHM

High:
If $\log((\text{soil k factor})*(\text{hydrologic group})^{5.7}) >= 2.8$

Nominal:
If $\log((\text{soil k factor})*(\text{hydrologic group})^{5.7}) <= 1.0$

Intermediate:
Everything else

The algorithm for ranking pesticides for potential loss to runoff are:

PESTICIDE SURFACE LOSS POTENTIAL ALGORITHM

Large:
If $\log(\text{half-life})*(1.23 - \log(KOc)) <= -2.4$

Small:
If $\log(\text{half-life})*(1.23 - \log(KOc)) >= -0.4$

Medium:
Everything else

RESULTS OF CLASSIFICATION

The maximum, minimum, and mean value with standard deviation from the Matrix for Leaching Potential are presented in Figure 1. The values are relative, the larger the value the greater the expected loss. The qualitative risk potentials listed in Figure 3 reflect this relative loss. The mean is greater than 1000 for the Potential 1 Category, and less than 100 for Potential 3 category. Mean values between 100 and 1000 fall in the Potential 2 Category.

The maximum, minimum, and mean value with the standard deviation from the Matrix for Surface Loss Potential are presented in Figure 2. The values are again relative. The qualitative risk potentials listed in Figure 4 reflect this relative loss. The mean is greater than an 1500 for the Potential 1 Category, and less than 500 for the Potential 3 category.

Mean values between 500 and 1500 fall in the Potential 2 Category. Slightly higher values were used for surface loss since the potential for mixing and dilution is greater than in losses below the root zone.

DEFINITION OF LOSS POTENTIAL

The potential pesticide loss is relative, and explains no more than a relative probability of pesticide loss. A Potential 1 Category has a higher probability of contaminating the respective water source than the risk value of Potentia 2, and Potential 2 has a higher probability than Potential 3. The Potential 1 category estimates the probability for contamination to occur to be very high. The Potential 3 category estimates the probability for contamination to be very low. The Potential 2 category is in a fuzzy zone, the probability of contamination is uncertain and additional on site investigations should be made. Possibly the GLEAMS model should be run using the real pesticide-soil-crop-climate combinations to develop better estimates of the pesticide loss potentials.

Text of remarks by Karl H. Reinhardt at tire National meeting of State Soil Scientists, Lincoln, Nebraska, October 20, 1988.

Resource conservation, and specifically resource conservation planning, in SCS is now primarily aimed at implementing the Food Security Act of 1985 (FSA). Soils information is as critical in FSA as it is in all other aspects of SCS work. We have made extensive use of soils information in implementing FSA. Soils information is used to make lists of highly erodible map units from which highly erodible field determinations are made. The process of identifying and listing highly erodible map units, non-highly erodible map units, and potentially highly erodible map units has worked well. SCS has completed 84% of the highly erodible land (HEL) determinations as of September 30, 1988, and we have had only 10 appeals of HEL determinations that have been made to the Chief of SCS. In each of these appeals the Chief has been able to concur in the decision of the State Conservationist.

Soils information has also been used to develop hydcic soils lists that ace used as a basis for making wetland determinations. Many states are beginning wetland inventories to permit consistent wetland determinations. Be sure that the hydric soil lists are consistent with Section 512.12(d) of the National Food Security Act Manual, Second Edition, so that they can be an accurate basis for wetland inventories. Ail highly erodible map unit lists and hydric soil lists should now be in place in every field office in the U.S.

After the lists are developed, it is important that they be monitored and changes made where and when needed. Changes should be made when a technical reason determines that a change is necessary, such as a new soil survey, a change in classification of a map unit, or 2 change in quantification of soil characteristics. We shouid then use the new information for all future determinations, but not go back and change determinations that are based on the previous information, if the prior determination is correctly made. If the person requests a new determination based on the new information, we should proceed to do this, but at a lower priority than a person who has not had a prior determination. We need to consider the consequences of all changes before making them.

Even though the FSA work is first priority in SCS, we need to keep our competence in other areas, such as work with units of government and in broader resource planning. Soil scientists have a unique opportunity to be working on some of these activities.

The policy established in 1987 for Section 111 of the Field Office Technical Guide (FOTG) now uses six resource concerns as the basis for conservation planning and for resource management systems. These six resource concerns are erosion control, water quality, water management, resource management, of fsite effects, and agricultural chemicals and animal waste. Each of these resource concerns is to be treated to an acceptable level in order that a Resource Management System (RMS) is established. Erosion control is the only resource concern that has had a specific level of treatment established. There are many interrelationships in these resource concerns that are dependent on soils and their characteristics, especially with regard to water quality.

Section III of the FOTG is to be set up using guide sheets for soil map units or groups of soil map units. Each guide sheet is to provide a basis for the conservationist to present and discuss conservation alternatives with the farmer or rancher. The development of groups of soil map units for this purpose needs to be done carefully in the light of thr six resource concerns listed above, so that the soil groupings developed will truly be able to be treated and managed in a similar manner for all of the six resource concerns that are involved and meet the criteria for each. IL nay be that meeting the requirements of all six resource concerns will make groupings of soils impossible, and require the use of single soil guide sheets. The soils data base in CAMPS can be used to search for all soils that have specified characteristics, and this method can be used to develop groups of soils for the current need. DeWayne Williams and Jim Culver are working on this and it will be discussed further at the Midwest NTC workshop that is to be held in Lincoln the week of November 28, 1988. Be sure that the right people are involved in the process of making these soil groupings.

The Land Evaluation portion of the LESA effort should now be completed for all counties. The policy for this is in the Land Use section of the General Manual, dated June, 1984.

We are planning an update of the National Conservation Planning Manual. A committee chaired by Bob Eddleman will meet next week to begin to scope the extent of the update and the changes that will need to be made. The committee consists of NTC, State, Area, and Field Office soil and resource conservationists. After the initial decisions are made as to what is to be done and how we plan to proceed with the NCPM update, we will involve all SCS disciplines in the process. We will be working with Horace Smith in this activity.

Weare continuing to develop and implement CAMPS. CAMPS requires a field office level soils database to operate. The development of the field office soils database is a tusk that should be very nearly done for each field office in every state.

Soil scientists need to continue to bc a part of thr resource planning team.

Be sure that new employees are aware that there are other aspects of SCS work beyond FSA.

Wang Doc. 0023r, 10/21/88 kr

NATIONAL WORKSHOP FOR STATE SOIL SCIENTISTS
LINCOLN, NEBRASKA
OCTOBER 17-21, 1988

W. R. FOLSCHE
NATIONAL CARTOGRAPHIC CENTER

I. NCC ACTIVITIES FOR FY-88

A. Imagery Acquisition
1. Field Mapping Imagery
   a. Number of orders issued 66
   b. Funds encumbered $173,000
   c. Number of orders received 93
2. Publication Imagery
   a. Number of orders issued 90
   b. Funds encumbered $577,000
   c. Orthophotos ordered 1,222
   d. Orthophotos received 1,153
3. Total imagery acquisition $750,000

II. STATUS OF MAP FINISHING

A. Soil surveys sent to printer (includes one reprint) . . 65
B. Completed by Negative Prep Section 66
C. Soil surveys with map negatives on hand waiting for text before NCC sends to printer 58
D. Soil surveys for which map finishing is complete but negative prep is not complete. (Text is not ready) . . 135
E. Total soil surveys with map negatives at NCC 193

III. INTERIM MATERIAL FROM SOIL SURVEY MAP SHEETS ON HAND

A. States were notified in June 1988 they could submit requests for interim soil survey map sheets.
B. Total requests for material received 85
C. Orders in work or complete 75
D. Orders to be placed in work 10

Cartographic encouraged states to submit requests so soil survey map sheets could be placed in hands of field people for FSA and other purposes.

IV. PHOTOBASE PREPARATION

A. Field mapping annotation completed 15
B. Photobase preparation completed 103
C. Total map sheets prepared 6,196
D. Major concerns in NCC
   1. Changes in soil survey boundaries.
   2. Requests for newer imagery than previously requested.
   3. Changing scale of publication.
   4. Changing publication format.

V. MAP FINISHING CONTRACTING

A. Number of soil survey areas; compilation reviewed . . . 34
B. Number of soil survey areas contracted 34
C. Total funds encumbered $196,448
D. Final edit and acceptance of map finishing (survey areas) 15
E. Soil survey areas completed by states and sent to NCC and reviewed by ten percent edit 33

VI. STATUS OF FUNDING FOR MAP FINISHING AND DIGITIZING

A. NCC recently canvassed states
1. Number of survey areas identified for map finishing 50
2. Estimated cost of FY-89 map finishing $400,000
3. Number of survey areas identified for digitizing. 26
4. Estimated cost of FY-89 digitizing $735,000
5. State will need to fund both map finishing and map digitizing in FY-89. (Bulletin may be issued soon.)
6. States need to make estimates and advise NCC again what they plan to fund and date material will be sent to NCC. NCC should receive in the first three quarters to be awarded in FY-89.

VII. NATIONAL AERIAL PHOTOGRAPHY PROGRAM (NAPP)

A. U.S. Status map shows FY-87 and FY-88 contracts.
B. NCC can provide reproductions from microfiche upon request.
C. Examples of NAPP reproductions.
1. CIR
2. Black and white
D. Orthophotography for publication from NAPP
1. 1:12,000
2. 1:24,000
3. States should send cartographic requisitions to NCC a minimum of 24 months prior to date photobase material is needed in the state.
4. NCC is funded for $500,000 in FY-89 for imagery acquisition.
5. Age of orthophotography at NCC is a growing concern to many states.
6. Clarification needed on how old imagery can be before we decide to reorder more current imagery.

VIII. STATSGO

A. Number of states received.
1. Digitizing completed 7
2. Contracted 4
3. At NCC 5

IX. CONSIDERATIONS WHEN DIGITIZING IN STATES

A. Determine whether the digitized data will be used for publication or only for digital data base. The end products will determine the way data layers are structured.

B. Culture and Hydrography
   1. Culture, hydrography and type are contracted by NCC at state expense for FY-89.

C. Use SCS specifications for digitizing.
   1. All digitizing performed by SCS should conform to SCS guidelines and specifications.
   2. Refer to National Instruction No. 170-303 (June 2, 1988).

D. Conversion of digital data
   1. In many cases, conversion of digital data to DLG or SCS Standard Exchange Format can be time consuming if original work is not planned or documented properly.
   2. The NCC can be more effective if you ask for guidance BEFORE you start digitizing.

E. Map compilation edit
   1. Thoroughly edit the compilation manuscript (photobase sheets) BEFORE you start digitizing.
   2. Reconcile conflicts in source material BEFORE you start digitizing.
      a. Limits of soil surveys on field sheets may conflict with administrative boundaries on quad maps.
      b. Alignment of drainage on field sheets may not agree with quad maps or publication imagery.
      c. Carefully match all map sheets.

F. Preliminary review
   1. Digitize two adjoining map sheets and send to NCC for review.
   2. This will help avoid large amounts of data input being rejected.
   3. Send data tapes for two map sheets so NCC can test plot.

G. Check plots
   1. Check proof plots should be plotted, edited and corrected BEFORE sending to NCC for review.
   2. Film plot overlays should not be ordered to use for edit purposes.

H. Final check plots
   1. Send a complete set of paper proof plots to NCC along with all source material for final review.
   2. NCC *will* return check plots to states for correction or correct at the NCC.

I. Culture, hydrography and soils symbols and other type.
   1. Provide NCC contract money for the culture, hydrography, soil symbols and other type after the soils data layer is completely edited.

The Soil Management Support Services

Richard W. Arnold 1/

1. The United States Agency for International Development works with developing countries to improve their management of national resources so that agricultural development and economic development can proceed in an orderly way. Most of the developing countries occur in the intertropical zone where in addition to political and social difficulties there are also serious soil and water constraints as shown here.

2. Adequate and appropriate agricultural development is the same everywhere. It requires the matching and integration of resources. Soil - water - crops - people - economics - policies.

3. If the match is poor and resources are pushed way beyond their capabilities and suitabilities the results can be disastrous. Sometimes it appears to be irreparable at least within the current economic framework.

4. The small holders the limited resource farmers - the landless laborers - are hard to help directly so much of USAID's efforts are related to policies, infrastructures, and upgrading or building institutions who then may be better able to effect postive changes.

1/ Slide presentation at State Soil Scientists Workshop in Lincoln, Nebraska October 1988

5. Farming systems, multiple cropping , and introduction of new or improved crops are some of the challenges of matching resources. USAID Mission personnel request assistance, they want help, they want to make a difference. And the transfer of technology is vital to their efforts.

6. USAID saw a unique opportunity to strengthen their agriculture work if technology transfer were more effective and efficient. They believed/that soils information had a great potential to improve the flow and sharing of relevant information. They knew that experimentation is slow and expensive and Soil Taxonomy might be of assistance.

7. Look what they've done to my song, Ma - look what they've done to my song. A lot of the world has access to Soil Taxonomy - and it has all been because USAID wanted to improve the weakness as/that existed for soils of the intertropics.

8. Recognition of 'the role of soil and of soil scientist was an important step. but it didn't assure any success in being able to help AID. SMSS was created in late 1979 to offer technical assistance, advice, and counsel to AID Missions and to improve Taxonomy for soils in the tropics.

9. A major effort was the series of soil classification workshops that brought together specialists from around the world. Soils were sampled a year in advance, analyzed by the National Soil Survey Lab, and a 2 week workshop held. The purpose was to let the International Committees examine soils and propose modifications for testing. Fred Beinroth of the University of Puerto Rico helped arrange for the 2 workshops prior to the formation of SMSS.

10. These were followed by soil classification workshops/ in Chile, Ecuador, Philippines, Brazil, and Japan.

11. From the work of ICOMLAC came the kandic horizon - a fine textured subsurface horizon dominated by low activity clays. New Great Groups - Kardi and Kandhapli - were established in Ultisols and Alfisols. This is a kandiustult in Thailand. As the result of ICOMOX, the Oxisol order was completely revised and in addition a new format was established for keying out subgroups.

12. The Vertisols are still being debated. Their special physical properties of shrink-swell and lack of morphological features associated with wetness make them difficult to classify.

13. When Guy Smith retired he spent the next few years studying how to provide an appropriate status to Andepts. Under the able leadership of Mike Leamy of New Zealand the world now has a vastly improved database on Andisols.

14. Yesterday a final proposal was hammered out by John Witty, John Kimble, Terry Cook and Ben Clayden (New Zealand) and we can soon expect the final draft of the new order Andisols. Every field trip whether a classification workshop or a soil correlation conference like the one in the Northwest - has added new members to the Andisols.

15. Scientists from many countries rub shoulders, share ideas and help develop criteria for testing modifications of Soil Taxonomy. We would not be this far without the support and encouragement of USAID through the SMSS program.

16. But Soil Taxonomy is not the only activity nor is it the major one these days. Training forums that discuss cropping practices and farming systems are receiving more attention.

17. Helping do site characterization and mapping of experiment stations is another way we can assist developing countries. Here is Arville Touchet in Burundi.

18. Field morphology and physical - chemistry are examined and related to the attributes that determine land evaluation. Soil diagnostic features are explained to agronomists, soil and plant scientists, and even administrators. A world soil data base is also being accumulated that will permit broader testing of crop models as well. as evaluating taxonomic changes.

19. There are many technologies that are not appropriate for the socio - economic and cultural conditions in some countries. But as we work together we learn more about the needs of some user clients and which principles may be transferable. This man is very rich because he has draft power - a great advance over human power.

20. Another committee has been examining the moisture regimes. They have suggested 3 sub-classes for each regime. Another committee is examining the many problems of the Aqic regime and a soil correlelation conference will be held in the South in 1990.

21. The FAO/UNESCO Soil legend of Africa was translated to Soil Taxonomy and here interpretations of soil constraints are presented.

22. Many soils with a kandic horizon and even some Oxisols, Andisols and Spodosols have large amounts of exchangeable

aluminum that inhibit root growth. Liming experiments and cropping systems are now being designed and evaluated to reduce the impacts.

23. Gelatinous, amorphous, short - range order imogolite - a weathering component in Andisols and some Spodosols. Much information has been gained because of the initiatives in soil classification.

24. Training materials to illustrate concepts and models have been prepared by and for SMSS. Slide sets, videos, and films/of Soil Taxonomy, naming soil map units, and audisols *have* been produced. Land evaluation, soil keys, more slide sets and lecture notes are also being compiled to share with others.

25. The teaching of map unit concepts and the field art of mapping are skills that the U-S, abounds in and slowly we are making in roads with some foreign soil surveys such as that of Indonesia.

26. We map soil landscapes and interpret them based on our understanding of soil variability. The concepts and principles of soil stratigraphy, geographic distribution and reliability of soil map units is important everywhere in the world.

27. Our skills and experiences with detailed soil maps is of interest and value to many developing countries as they struggle to reach a balance among the resources available to them.

28. The properties of soils themselves, the interpretation of their influence on soil behavior, and the supporting databases provide a framework of understanding that has global implications.

29. Teaching others the beauty and simplicity of the nomenclature of Soil Taxonomy has a reward of its own as eyes brighten and heads nod with the grasp of far reaching consequences of the applications of a quality soil survey.

30. There isn't a lot of highly productive land in the world. The Udolls and Udalfs of the Corn Belt serve as references of comparison and benchmarks of potential. High input technologically advanced commercial agriculture has a special role in the global economy.

31. The limited resource farmers whose loyalties are always divided between family and farm will be important components in the world's solutions to hunger, poverty, and population.

32. SMSS has just been granted a 10 month extension while a new project will be developed/and proposed AID. A

redirected thrust will emphasize the same kinds of things we are dealing with in the National Cooperative Soil Survey.

33. I hope, and we expect, to continue the array of publications that has afforded SMSS a very favorable status with most USAID officials. We are making a difference and many of you in this room have been involved in one or more of the projects and assignments that have been made available through SMSS.

34. Let me summarize the philosophy behind SMSS. Mankind needs food and fiber to survive and grow and develop civilizations. Our history is full of the ways and beliefs of the influences of sun and rain, darkness and light, and mother earth. Some myths still abound - maybe even most of what we believe as enlightened understanding here in 1988.

35. Short - circuiting expensive long term research is an admirable objective. Soil Survey in its many aspects and ramifications is an important part of the process.

36. We can predict where to go and what we might expect of the physical environment of soils and their landscapes.

37. What we don't do is the following. (pause) We have to work with and through others to bring about institutions

that are relevant and provide meaningful experiences of successful transfer.

38. Soil maps, soil classification, soil databases - none of them can socialize and implement ideas. Only people can. Therefore the future must be in closer association with those who can make a change.

39. When it all does get together, there are wonderful changes that occur. Patterns of effective land use that are sustainable - for resource use and for man's productive enterprises. But it requires contact attention.

40. Truly Nature shows us the implementation, the innovation of a mysterious creativity. The power of transformations - the tantalizing, trickery of technological transformations is a challenge - and SMSS is also involved.

THE ROLE OF THE NTC SOIL INTERPRETATION STAFFS

During this last year many technical functions of the soils program were consolidated from the NTCs and NHQ to Lincoln, Nebraska. Correlation and manuscript editing were moved from the NTCs to Lincoln. Soil classification, investigations, and technology were moved from headquarters to Lincoln. * The NTC soils staffs have changed their rule with thi5 consolidation of functions. I would like to explain this new role fur the NTCs.

The SCS soils productivity improvement plan or PIP study recommended the consolidation of these soils functions and a. change of author-ity level on the product ion part of soil surveys. The plan did not outline a role for NTC soil staffs. The PIP study was only concerned with the production part of soil survey.

Last October it was decided to keep a soil interpretation staff at each NTC. The purpose of which was to provide a network of assistance to the states parallel to that provided by other disciplines at the NTCs.

Some NTC soil staff members previously handling correlations became part of the soil interpretation staffs. Others joined the Lincoln staff. Some vacancies have been filled.

Staff makeups at the NTCs vary. The West NTC has four soil scientist, one GIS specialist and one secretary position. The South NTC has three soil scientist, one computer assistant, and one secretary position. The Northeast NTC: has three soil scientist, one GIS specialist, one computer assistant, and one secretary position. The Midwest NTC has two soil scientist positions assigned to the Ecological Sciences and Planning staff. The other soil interpretation staff heads report to the NTC Director.

NTC soil interpretation staffs have now been in existence one year. This year has been a year in which staffs have been assigned and roles explored. Of course the rule of the National Soil Survey Center has also been in a process of clarification. That process can not be separated from the NTC role determination. Realize that the staff heads and staff within the Soil interpretations and Data base staffs wet-e just recently assigned. Now, it would appear, that some of these folks have plans to utilize the talents of the NTC staffs!

The NTC soils staff heads met in September with the heads of the various soils staffs at the National Soil Survey Center at Lincoln to discuss the many activities and the individual

role of the various groups. There are several areas where we will work together.

'The role of the NTC: soil staffs is one of fluctuation and always will be, by the nature of the regional concept and by way of the function to assist the states. The intent is that the NTC be a responsive unit in addition to other more stable functions. By responsive I mean a unit that not only responds to changes from the states but is responsive to needs of the region and initiates change. In private industry the adage is that if you react to change you are too late. As needs differ between the regions the role of the NTCs in each region vary in role somewhat.

In preparing this presentation I took the activity statements of the different NTC: soil staffs, the plans for FY89, the outline prepared to organize these unit5 and anything else I could find. Then I watered all these down with my bias and opinions. I want you to realize that a. firm overall plan has not been laid out for the NTC soil staffs. Each staff has been trying to evaluate the needs and respond to those needs. Consequently each NTC has taken a slightly different direction. Notable however is the siroilarity of the needs.

In clarifying the role of the NTC soils staff it should first be said "WE ARE NOT THE PRODUCTION PART OF PUBLISHING SOIL SURVEYS." NTC: soil scientists will not be involved in direct activities related to mapping, correlation, manuscript preparation or publication. -- Although,-- like non soil disciplines we still have a strong interest in the published soil survey because it i5 the input to the soils data base and a significant part of the technical guide, the main routes with which we provide interpretative information.

We have been freed of correlation duties to concentrate on the use and improvement of soil survey information.

In explaining the role of the NTCs let me talk about the overall purpose of soil survey and ask you to think about how your state operations may fit into the additional aspects required to provide soils information to users within SCS and within the public.

THE MISSION OF THE SOIL SURVEY HAS NOT BEEN TO PUBLISH SOIL SURVEYS BUT TO PUT SOIL INFORMATION TO USE FOR THE BETTERMENT OF MANKIND.

That's a rather broad statement but probably describes our 3oal.

A SOIL SURVEY ON THE SHELF SERVES NO ONE.

SLIDES

TO EMPHASIZE THE AFTER PUBLICATION ASPECTS OF SOILS WORK, ALLOW ME TO PRESENT THE FOLLOWING SLIDES;

SOIL IS A VALUABLE RESOURCE
I KNOW WE SHARE THIS FEELING! AND I WANT US TO SHARE THE FEELING'S ON PUTTING A SOIL SURVEY TO USE.

TO ILLUSTRATE MY FEELINGS LET ME COMPARE A SOIL SURVEY

TO THE PRODUCTION OF AN AGRICULTURAL PRODUCT

A SOIL SURVEY BEGINS WITH PREMAPPING. A STEREO V lEW COMBI NED WITH VARI OUS RESOURCE DATA AND TOPO. MAPS PROVIDE THE SOIL SCNT. WITH THE PRELIMINARY MAF

A CROP MAY BEGIN WITH THE FIRST CULTIVATION

AS A SOIL SURVEY PROCEEDS THROUGH TRANSECTS

TRAVERSES

DESCRIPTIONS

INVESTIGATIONS

OBSERVATIONS

SLOPE DETERMINATIONS

AND PROGRESS REVIEWS! ! ! !

A CROP PROCEEDS THROUGH PLANTING, FERTILIZATION

CULTIVATION

IRRIGATION

HARVESTING

THE SOIL SURVEY PRODUCES SOIL MAPS

AS PART OF THE SOILS HANDBOOK

THE AGRICULTURAL OPERATIONS PRODUCE A RAW PRODUCT AS WELL. BOTH THE SOIL HANDBOOK

AND KAW AG PRODUCT AKE USEABLE FOR THE FRESH MARKET BUT THEY ARE NOT READY FOR THE FINAL MARKET.

THE SOILS HANDBOOK PROCEEDS WITH TECHNICAL REVIEW AND EDITING,

COMPILATION,

DIGITIZING,

AND MAP PRINTING.

THE HARVESTED CROP PROCEEDS DOWN THE ROAD

FOR PROCESSING AND PACKAGING.

THE PRODUCT OF THE SOIL SURVEY PROCESSING IS A PUBLISHED SOIL SURVEY.

THE PRODUCT OF THE FOOD PROCESSING IS A PRODUCT SIMILAR, IN THAT IT IS READY FUR PUBLIC CONSUMPTION.

FROM HEKE THE FOOD INDUSTRY DEVIATES AND DOES NOT LEAVE THEIR PRODUCT ON THE SHELF.

THEY ADVERTISE

AND PROMOTE THEIK PRODUCT.

THEY WORK WITH USER SPECIALISTS IN DEVELOPING AND DISTRIBUTING HOW TO MANUALS LIKE COOK BOOKS,

TO TELL YOU HOW TO-- FRY IT'?

IN A VAKIETY OF WAYS?

OR MICROWAVE IT, TO USE AN EXAMPLE OF ADAPTING TO CHANGES IN HOME TECHNOLOGY.

THEY WORK ON PRODUCT AND PACKAGING IMPROVEMENT TO PROVIDE THE USEK WITH EASY ACCESS.

-EXPANSION INTO NEW MARKETS AND USEK GROUPS IS A CONSTANT EFFORT.

BECAUSE THROUGH EXPANDED USE:

COMES THE MOTIVE AND THE HEAL PRODUCT FOR PRIVATE INDUSTRY " $$$$$$$ " .

THROUGH EXPANDED USE OF THE SOIL SURVEY,
THE MOTIVES OF THE SOIL CONSERVATION
SERVICE IS REALIZED

IT IS FOR THESE CONSERVATION MOTIVES THAT
THE APPLICATION, IMPROVEMENT AND EXPANSION
OF SOIL INFORMATION BECAME THE FOCUS OF
THE 'SOIL INTERPRETATION STAFF.

IT IS THE GOAL OF THE NTC SOIL STAFFS TO
ASSIST YOU IN TAKING

THE SOIL SURVEYS OFF THE SHELF AND MAKING
THEM MORE ACCESSIBLE AND ADJUSTABLE

THROUGH EXPANDED USE OF THE DATA BASE.

COMPUTERS HAVE GIVEN US WAYS TO LOOK AT

AND RETRIEVE PILES OF DATA PRODUCED BY THE
SOIL SURVEY.

SOILS INFORMATION WILL BE IMPROVED BY
GATHERING AND RECORDING ADDITIONAL DATA.

BY TAKING A BROADER PERSPECTIVE WE CAN
HOPE TO IMPROVE CONSISTENCY.

PERHAPS NEW TOOLS SUCH AS
REMOTE SENSING WILL HELP.

IMPROVEMENT WILL ALSO COME THROUGH THE
GATHERING AND DISCUSSION OF SOIL.
SCIENTISTS AT REGIONAL, NATIONAL AND
INTEHNATIONAL WORKSHOPS. *

BY WORKING TOGETHER WE CAN IMPROVE OUR
CLASSIFICATION AND INTERPRETATION
STANDAHDS.

A FUNCTION OF THE NTC SOIL STAFFS WILL BE
TO WORK CLOSER WITH OTHER DISCIPLINES TO
FULLY INTEGRATE SOILS INTO THOSE AREAS.

RANGE LAND IN THE U S OR --

IN DRIER PARTS OF THE WORLD

CAN BENEFIT FROM UNDERSTANDING THE
SOIL RESOURCE.

RECREATIONAL ACTIVITIES THAT AFFECT OUR
FAMILIES

OR OURSELVES CAN BENEFIT,

WILDLIFE --

FROM OUR WETLANDS NEED HABITAT
IDENTIFICATION AND PROTECTION.

OUR CROPLAND- -

NEED5 PROTECTION.

FOREST LAND--

MAY BE MORE FRAGILE THAN WE THINK.

WATER QUANTITY --

AND WATER QUALITY--

MAY BENEFIT FROM A CLOSE CONSIDERATION OF
THE SOIL RESOURCE.

WE HAVE COME A LONG WAYS OR SO IT SEEMS
SOME DAYS.

BUT WE HAVE ONLY BEGUN A LONG JOURNEY ONCE
THE SOIL SURVEY IS COMPLETE.

THE ROAD WILL HAVE A FEW HUMPS, DUT AS WE
APPROACH ANY RESOURCE CONCERN

LETS REMEMBER TO "CONSIDER THE SOIL FIRST"

Now that we've had an introduction to the activities and role of soil survey let's summarize the specific role of the NTCs as they are shaping up to be.

The Food Security Act put more in service emphasis on the soil survey than any legislation before it. It fixed the soil survey into use by the SCS. It also provided a major test of its strengths. It has 5hown the importance of adequately address ing the purposes of a soil survey and pointed out where we need some improvements. It has also stressed the need to coordinate between disc i plines. We will be working thru multidiscipline groups on many of the following roles. I don't believe any group or discipline can be effective when operating in a vacuum. This discipline coordination effort is an emphasis item for the NTC soil staffs. This is the first role. Throughth i6 role the effective use of soil survey can be expanded within our agency. By coordinating closely we can be responsive to soil needs from other disciplines and ensure that soils information is used properly. We must also help these other disc ip l ines get up to speed in inputting and maintaining

their own data sets. 'COORDINATION WITH OTHER DISCIPLINES AND USERS IS THE FIRST ROLE.

Of course with increased use comes the responsibility to maintain the information and be sure it is technically accurate. The national resource inventory irreversibly chan3ed the soils form 5 and 6 information to a data base. No longer can form 5 and 6 information only be for the printing of tables for soil publications. Although this tabular data base came to us through the back door, the geographic data base will need your planning and efforts to build. So far- two of the NTCs have GIS specialists to provide assistance and all NTCs will be providing data base management assistance. Maintaining and increasing out-consistency will have. greater importance as we fully utilize our state data bases. The second role is NTC technical assistance and quali 'c-y assurance. Trainin3 throu3h workshops and onsite is part of both assistance and quality assurance. State data sets are the foundation of the Field Office Technical Guides through CAMPS. These now legislative established documents deserve our closest attention. The latest most technically accurate information needs to be in them. The information must also be consistent with national guides. The soils data sets must fill these needs. NTC: soil staffs will be part of the quality assurance review teams for the Food Security Act. The Field Office Technical Guide will most likely be part of these reviews. TECHNICAL ASSISTANCE AND QUALITY ASSURANCE IS THE SECOND ROLE.

New techniques fur interpretation of soils information are needed. A staff with close contact with the states will be more responsive to state and regional needs fur soil interpretation. Assistance on woodland soil potentials and computer adoption to soil potentials in the Northeast is an example. Establishment of a demonstration soil survey for soil techniques in the Midwest is another. Our current interpretations need a close review. The soils farm 5 is near exhau5tion. Interpretations are needed on a mat-e specific basis from more specific soil properties. We must learn to interpret soil responses at specific times of the year. We must recognize that soil properties change during the year and incorporate the changes into the way we interpret soil response to use. A third role of the NTCs is technology development. Regional soil interpretation committees made up of cooperators will play a new role. This role will be much like the soil taxonomy committees. New proposed interpretations will be reviewed and tested. The NTCs will continue to coordinate the regional work planning conferences and their committees. Of coarse we Will continue to play a part in review and formulation of national technical standards within the NSH in close coordination with the Center staff. TECHNOLOGY DEVELOPMENT IS A THIRD ROLE OF THE NTCS.

Strong publlic support continue5 for the soil survey. I'm sure that i$ a reflection of the strung publ ic emphas i s you all project. But I also believe it is because wein the service have been able to provide people with basic and technical information. AS technology changes we need to keep in step or better yet a step ahead, Technology transfer is a fourth key role of the NTC. The transfer of new soils techniques and information i s needed for SCS soils staffs, but better technology transfer i s needed to our clientele as we ll. The Field Office Technical Guide has been the mai 7 information del iverymechan ism of soi l survey information within SCS. Are the most current surveys used or are old interim surveys stil l being used? Have 'more Specific surveys' at a smaller scale been completed? Are these surveys approved for use and documented to the level we require of the published reports? How da we maintain survey and soil information to our users?
I believe THE BEST OPPORTUNITY TO GET SOILS INFORMATION OUT TO THE USERS MAY BE THROUGH THE FOTG, RIGHT NOW through CAMPS and the soil data set. Soil interpretations currently are l imited to soi l map unit components. We do not interpret soils by map unit and certainly not by soil series as some of our users be l ieve. We have l imited ourse lves to map un i t components and left our user:; to interpret the maps by themse lves. Interpretat ions for map units and by artificially bounded areas such as field boundaries are being requested. With these new requests, no longer can single map units stand alone. The relationship of map unit components to each other and to adjoining map units are needed. Computer model s with three dimensional landscape component!; as part of a GIS may be tools far these complex interpretations. Technology transfer to me means proper application of soi IS information. We must tran5fer other technologies into our mission and transfer our technology into other circle5. TECHNOLOGY TRANSFER IS THE FOURTH ROLE OF THE NTC: SOIL STAFFS.

In describing this last role I don't have to tell you as soil scientists that the exc i t ing time of so i l Survey is when the main emphasis on mapping is past. That time is here far many states. We are at least to the paint that w E can start putting the soi l Surveys together to have them work together at the same time. Pr i a r to the cr e a t i o n o f a data base this wasn't as feasible. I believe the NTC: can help in this aspect. Correlation has taken on a new meaning. Maybe the l ong i ntended meaning. Surveys can no longer act alone as individuals. The NTC sail staffs will work with the qual ity assurance staff to coordinate soi l interpretations in conjunction with correlations. Technical coordination is the fifth role of the NTC:. STATSGO has helped in this process of true correl at ion. The use of soi l 5s that do not match the series name points nut the need fur additional correlation. Soil moisture/temperature maps can

he lp attain total correlati on needed to transfer interpretative information. The South NTC is already working on cl imate models to improve interpretation consistency. The mat-e we dig into range sites and other soil assignments and jump into technical guides the move we will note the need for better technical coordination. Viewing one survey at a time will not bring us together. Coordination and correlation by MLRAs may do it if these are well defined. TECHNICAL COORDINATION IS THE FIFTH AND FINAL ROLE OF THE NTCS.

It is within the above direction I see the NTC soil staffs moving. But to truly t-rave soil survey remain active and viable these roles are needed at each operational level. They are especially important in the state.

In conclusion, the mission of the soil survey is to put the informat i on to work. Making the soup and putting it in the can is only part of the job. The fo I I ow-up work i nvolves identifying our clientele and potential clientele and exp an d i n g the mar k e t. Provide product quality assurance and make sure it's what the user wants. Improve the product within the can through technology development. Sell and distribute the product; make the product mare assessable for the users. The final step is to make sure production and distribution work together in producing the same product. All of these are roles in which the NTC and you play a part.

Thank you for the strong support you have shown for these new roles of the NTC. I look forward to our continued team effort.

Presented to the State Soil Scientist meeting Oct. 17, 1988 by Gary B. Muckel, Head of WNTC: Soil Interpretation Staff.

STATE SOIL SCIENTISTS CONFERENCE

LINCOLN, NEBRASKA

OCTOBER 17-21, 1988

"FOCUS ON THE FUTURE"

ROBERT J. KLUMPE
STATE CONSERVATIONIST
RHODE ISLAND

My comments to this group of technical SCS people will not be "technical" It will be practical and directed to the future. It will focus on the "User" of the Soil Survey, not the maker of the survey.

I challenge each of you scientists to break out of the traditional line of thinking, that is, the intricacies of mapping, classifying, compiling, and recording soil survey information, and begin thinking about how this invaluable data fits into the overall SCS program delivery system in your state. Escape from that "tunnel" vision that soil survey stands out here alone somewhere, a separate entity to be nurtured. massaged, and most of all, guarded from those would-be intruders who just never will understand "our" discipline.

We desperately need to get this most important data set into the hands of the user. I recently spoke to a Rhode Island legislator who successfully managed a far reaching land use bill through last year's legislature. The bill calls for every town in Rhode Island to have a comprehensive land use plan completed and ready for operation by July 1990. He said, Bob, the most important data we need to get to the town planners is soils information. Moat planning decisions are rooted in the soils data...its the common denominator. This is not a revelation to you people...you have been telling us that for years.

We cannot focus on the future without concentrating on the "User" of the Soil Survey. I urge every State Conservationist to convene a Soil Survey 'Users" Conference as soon as possible. The conference needs to be structured to feature the User. It should be a "listening" exercise for SCS managers and soils staffs. We need to invite representatives from every conceivable user group out there and prompt them to tell us what they need and want from the Soil Survey. I mean listen, not just hear words. Don't scoff at what you may hear. These folks will not talk "technical". They will talk practical and what they need in everyday situations. They are not interested in pedons, and podsols, and porosity. They more-than-likely want to know what relative degree of success or failure can be expected from a

certain soil under certain situations. How reliable is this soil for this purpose or that purpose!

This leads me to my basic pitch today. That is User Applications of soils information and what is being bantered about as "confidence levels" of soils.

I see this concept as User directed and the next plateau in the evolution of the Soil Survey. I heartily invite your best effort and energy into this practical and exciting arena. One'that can attract attention to our agency concurrently with meeting the demands of the user.

Confidence levels, or as Dick Arnold recently called it, "Soil Reliability", can be put into jargon and terms that "Users" can apply every day to on-site situations. Consider developing a Soil Survey User's Manual in your state that features this description of Confidence Levels for every soil mapping unit.

We live in an age of numbers and statistics. The general public relates to them and makes choices based on numbers and percentages. I can tell you as a person with a weak stomach, I pay attention to the Weather Forcasts in Rhode Island, particularly the wind velocities, when I'm thinking about a ferry ride out to Block Island, 15 miles offshore. The fish are always hungry and I don't care to feed them. The point is, if the forcast indicates a 70% chance of winds exceeding 10 to 15 MPH, I may make a different choice that day.

We are talking about the interpretive uses of soils here. Heretofore, our best shot has been giving out soils interpretation information centered in limitations or more recently, "soil potential". This soil has slight, moderate, or severe limitation for "X" use. Folks, this approach doesn't measure up anymore. Likewise, users struggle with the term "potential" because it is to ambiguous, leaving little to grab onto when seeking a feeling of confidence in making a decision.

I like the concept of confidence levels or soil reliability because it can be described or published in numerical format...percentages of success or failure that can be expected from "X" soil for "X" use. I know it is not an easy matter to transform current information into such a format but I submit the result can come closer to expectations from a soil survey by the User in the 1990's and beyond. It is not a safe place to be either. There is risk associated with assigning numbers and percentages or degree with soil interpretive uses but we have great minds sitting in this audience who collectively can reduce the degree of risk to an acceptable level.

I recently heard Bob Shaw, our Deputy Chief for Technology, say to a gathering of people discussing the future of the soil survey, "You need to look for clues out there", as to future program direction. Well the clues... the subtle signals are

there if we watch closely. In my state the soil survey is published and is a hot item. This is a clue to me as a manager that people are vitally interested in this information, particularly when I see who is coming into our offices and asking for it. Land Use legislation placing deadlines on towns that is heavily dependant on soils data tells me we better organize and come up with a game plan to meet the demand. We are doing just that and a lot of it relates to our Rhode Island GIS system and the soils data base that is critical to that. 'But that is another subject but one that totally intrigues me.

I challenged all of you earlier to take off the wraps of secrecy about soil surveys and get the information integrated into the mainstream of management thinking in your state. Relate the information to issues of state and local concern. Determine how soil information effects every component of those priority issues.

In Rhode Island I have real life issues that are directly impacted by soils. How does the Scituate Reservoir, which delivers drinking water to about 60% of the state's population, get the protection from pollution it must have? The soils in the contributing watershed are of critical importance.

Then too, much of the remainder of the state depends on high yielding groundwater aquifers for drinking water. A major concern is protecting those aquifers, and what do you know...soils lay over the top of those precious aquifers!!

You have all heard of the Chesapeake Bay program. Of equal importance to Rhode Islander's is Narragansett Bay. The single biggest water resource we have that impacts the economic and social fabric of the state like no other resource. We have been successful in gaining a commitment from the state to include a non-point source pollution control element in the state water quality implementation plan. They see the linkage between water quality in the Bay and how the soils and lands in the Bay's watershed are being abused.

These are but a few examples in Rhode Island of how soils information is being integrated into issues of statewide importance. We have been successful in elevating the importance of soils to the point where soils are considered an indispensable ingredient to major environmental resource decisions in the state. We are proud of that!

My comments have been necessarily long on subject and not nearly as long on detail because I am not a soil scientist and the work of detail must rest with the pro's in the field and that is you.

Remember the soil survey is one program, among a few, that SCS has ownership to. People are getting to know that and understandably come to us for all the reasons alluded to in my

comments. This brings attention to our agency and that's a bonus.

In closing, let me say there is life in the soil survey after the "last acre" ceremony. However, it will take a new line of thinking...much more contemporary than traditional, if the expectations of the present, and future, soil survey user is to be realized. The ball is in our court, let us not dribble it around so long that the clock runs out and an opportunity is lost. Take a shot at the basket... in this case the User of the Soil survey1 Thanks for the opportunity to spread my wings a bit today. I hope I have given you some food thought.

-END-

FSA MAPPING STATUS

WILLIAM ROTH

Nearly every state exceeded their mapping goal for FY-88.

The chart on the back shows the acres remaining and the number of winter and summer details needed to complete the mapping of all the cropland by September 30, 1989.

We will need the cooperation of all states, especially those 'who have completed their cropland mapping, if we are going to have enough soil scientists available for detail in the summer of 1989.

FSA MAPPING

	CROPLAND ACRES REMAINING	DETAILS REQUESTED W	DETAILS REQUESTED S		CROPLAND ACRES REMAINS	DETAILS REQUESTED W	DETAILS REQUESTED S
AL	232,000			NV	55,000		
AZ	3,000						
CA	820,000	5					
CO	50,000			NY	297,000		
				NC	519,000		
				ND	4,258,000		104
FL	105,000	30		OH	635,000		
GA	175,000			OK	332,000	4	
				OR	236,000		
ID	1,000,000		6				
IL	2,700,000		22				
IA	88,000			SC	40,000		
				SD	850,000		
KY	717,000	2		TN	200,000		
L4	591,000	8		TX	215,000	6	
ME	11,000			UT	290,000		1
				VT	8,000		
MI	357,000			VA	460,000	15	
MN	2,335,000		24	WA	455,000		4
MS	75,000						
Ml	1,400,000		8	WI	444,000		5
MT	2,368,000		26	WY	183,000	-	-
					20,993,000	70	199

STATES COMPLETED: AK, CT, DE, HI, IN, KS, MD, NH, NJ, NM, PA, PR, RI, Wv

Summary GIS, Work Group 1
Soil Scientist Workshop
October 1988

Chairman: W. R. Folsche

States are at various stages in GIS activities. Some stated that they are highly involved and some stated they had just begun. Major concerns surfaced are:

1. Need for a state plan and define goals
2. Funding sources and the use of different SCS funds
3. Staff needs - state level
4. Leadership - SCS at state level
5. costs
6. Priorities - timing
7. Methods of input - digitizing - scanning
8. Training need6
9. Coordination with other agencies
10. Support - NCC
11. Map finishing - direct from digitizing
12. Software options - GRASS-others
13. Proper base - Ortho photo - 7 1/2 min. quad.
14. Quality control - SCS must control
15. Databases from others - quality considerations - documents
16. Data security - house different places, State, NCC, EROS
17. Joining GIS and attribute data

State plan.--Most important - required by policy - can answer most questions - need to address major concern issues - NHQ has provided an outline - plans should be updated yearly - multiyear plan each year.

Funding.--Through normal SCS funding process - develop plan - show use in 06, 09, 11, 12, 01, etc. Through cooperation with other agencies and private companies--power company's.

Staff needs.--Technical person from resource group be in charge. Size of staff depends on state involvement with GIS and the use of other agencies. May use students or other WAE type people for digitizing.

Leadership - SCS at state level.--Policy recommends deputy or assistant state conservationist be coordinator - SCS should take the leadership in developing the soils digital database.

Costs.--Plan should spell out costs - equipment from NHQ worksheets - people, grade, and speciality.

Priorities - Timing.--Must be addressed in plan - do you put efforts into new surveys or old surveys - old surveys were the most important because that's why they were first!

Methods of input - digitizing - scanning.--SCS must control digitizing - SCS @ survey level, SCS @ state office, SCS @ NCC contracting, SCS @ state office contracting, SCS providing quality control to others (public agencies and pvt. companies. Scanning - scanning is not here yet to be most effective - must be on separates.

Training needs.--Training courses are being provided at NCC - GIS course once a month and GRASS course once a month - UNIX is required for GRASS course.

Coordination with other agencies.--Must cooperate with other agencies because of cost of databases. Interact with coordinating group with state,- take lead on soil databases.

support. --NCC supports GRASS - training (above), hot line and direct assistance (onsite) - contact NCC before starting jobs! NTC's will support GIS.

Map finishing.--Can be accomplished by digitizing - should be digitized in Gerber format or DLG optional - contact NCC if different from Gerber.

Software options.--GRASS is the official SCS GIS for FOCAS equipment - other software packages must be approved by NHQ. Can go from Arc Info files to GRASS.

Proper base - Orthophoto - 7 1/2 min. quad.--Are proper bases - all others should be adjusted to the 7 1/2 min. quad. Don't order orthophoto's too far ahead. Quad and quarter quad. will be the scales of the future for GIS.

Quality control.--SCS must control quality - cooperative agreements - pass state laws - whatever it takes!

Databases from others.--Must consider quality - document source base, scale, quality, etc. Good sources - other federal agencies especially USGS Water Resource Groups.

Security.--House databases in different places - State, NCC, EROS - only one place can change data 'that is at the state level.

Joint GIS and attribute data.--CAMPS - GRASS interface - interps are mainly tabular - technical people get the most out of interacting with a GIS (includes special and attribute date)

GROUP 2-PROGRESS REPORTING ITEMS FOR TECHNICAL SOIL SERVICES AND OTHER MANAGEMENT ITEMS

Chairman: Horace Smith

Recorders: Henry Mount, Rex Mapes, and Robert Engel

Discussion Items: (1) Progress reporting items for technical soil services, (2) plan of operations, (3) long range plans, (4) area and field office appraisals, (5) image of soil scientists as managers, and (6) other management concerns.

1. Progress Reporting Items for Technical Soil Services

(a) Are progress reporting items needed?
(b) If needed, what activities should be reportable?

During the past few years it has been a national trend to get away from detailed reporting. Only a few states have developed progress codes for reporting technical soil services. It was the consensus of the group that national progress codes for technical soil services should not be developed unless mandated by Congress. It was agreed that when performing technical soil services, the soil scientist is a member of the field office technical support staff like the area engineer, agronomist, range conservationist, and other specialists. The soil scientist should not be singled out with a formal reporting system, but rather should use the same reporting system used by the other specialists on the team.

There are several ways in which states can assure accountability and track progress relating to technical soil services. These include, but are not limited to the following:

"Trip reports;

"Monthly narratives;

'Plan of operations;

'Management matrix;

'Individual state reporting codes; and

"Code 190 from the national system.

2. Plan of Operation.

(a) Is there a need for an APO for Soil Survey separate from the statewide APO?

(b) When should the APO planning process start?

(c) What should be included in the Soil Survey APO?

The State APO contains a summary of major activities for all program5 administered by the Soil Conservation Service. Soil survey activities included in the State APO are usually brief and not very comprehensive.

Soil Survey is the only program administered by the Soil Conservation Service that is a part of the National Cooperative Soil Survey (NCSS). A separate APO for Soil Survey is needed so special items which may be of interest to NCSS Cooperators can be included. Also, a separate APO for Soil Survey will allow for a comprehensive accounting of all activities of the Soil Survey Program.

Several items were discussed as possibilities for inclusion in the Soil Survey APO. These include, but are not limited to the following:

- Schedules for field reviews, field correlations, and investigations;
- Schedules for workshops, meetings, and conferences;
- Schedule for technical soil services activities;
- Plans for soil scientists activities in support of the Food Security Act;
- Management matrix;
- Schedule of manuscripts to be reviewed;
- Schedule for map compilation and map finishing;
- Schedule of soil surveys to be started, completed, and published;
- Soil survey *activities* relating to IRM;
- GIS activities;
- List of SCS and NCSS soil scientists and personnel involved in the program;
- List of soil survey parties;
- Federal, state, and local funds that make up soil survey budget;
- Soil survey status map;
- Priority listing of areas needing mapping;
- Agenda for Soil Survey Conference;
- Minutes of Soil Survey Conference;
- List of participants at the Soil Survey Conference.

Planning soil survey activities for the fiscal year is an ongoing process that never really starts or stops. As soon as the Plan of Operations is completed for one fiscal year the process starts all over again for the next year.

3. Long Range Plans.

States need to have a good idea of the type of Soil Survey Program that will be in the state 5, 10, or 15 years down the road,. The group felt that one way to get a handle on this is to have a good Long Range or Multi-Year Plan. The Long Range Plan is also needed by National Headquarters for use in developing funding and staffing strategies. After 1990, as FSA funding for soil surveys ends, the group felt the Long Range Plan will become a vital management tool. in helping NHQ determine funding allocations for states. Items discussed for possible inclusion in the Long Range Plan were:

°Staffing;

'Plans for recorrelating old survey areas by MLRA or Physiographic Provinces;

"Budgets;

'Plans for digitizing soil survey areas;

'Plans for GIS activities;

"Soil Survey databases; and

'Other appropriate items.

4. Area and Field Office Appraisals.

The group agreed that state soil scientists should participate in area program appraisals. All state soil scientists indicated that they are currently serving as members of state office area appraisal teams and area soil scientists (or equivalents) are serving on field office appraisal teams. The state or area soil scientist, while serving on the appraisal team, is looking at the total SCS program with special emphasis on the Technical Guide and how the Soil Survey Program interacts with other programs.

5. Image of Soil Scientists as Managers.

A very spirited discussion developed within the group concerning the image of soil scientists as managers. The discussion was actually a follow up to remarks made on the first day of the workshop by keynote speaker, Charles Admas. Most in the group felt that soil scientists have been frozen out of top management (deputy state conservationist and above) within SCS. It was pointed out that only one soil scientist is in the Senior Executive Service (SES) and none are deputy or state conservationists, or NTC directors. This is in contrast to the numerous SES and state conservationists positions held by engineers.

The group felt that the negative stereotype image that soil scientists have within SCS is a factor in keeping them out of top management positions. It appears that soil scientists have never really assimilated into SCS since the old Bureau of Plant Industry was

merged with SCS around 1953. Many in the group felt that soil scientists are their own worst enemies. They tend to shy away from management and tend to be more comfortable in the technical arena. The soil scientists who are proven strong managers, with a genuine interest in top level management, tend not to apply for these positions for fear of rejection.

The group felt that soil scientists should be able to move into top level management positions without having to switch over to soil conservationist positions early in their careers. Engineers and other specialists have been allowed to do this all along. The group listed several avenues in which soil scientists can take to improve their images and hopefully enhance their chances for top level management positions. Some of these are:

- Convene a task force of soil scientists to meet with the Chief and his top staff to discuss the lack of management opportunities for soil scientists;
- Soil scientists need to be visible in all programs;
- Need special management courses for GS-11 soil scientists;
- Need a training module for area soil scientists;
- Young soil scientists need to be counseled early on about career opportunities; and
- Soil scientists need to start applying for positions in management.

6. Other Management Concerns.

The group felt that the state soil scientist should be involved with the area conservationist in the preparation of performance elements for supervisory soil scientists at the field and area levels. The state soil scientist should also concur in the performance ratings of supervisory soil scientists.

#3 Manuscript Content and Publication

Chairman: Brown Recorders: Reinsch, Mayhugh

Ranking of discussion topics (Tue pm):
General Format
Printed or electric format
Documentation
Interpretation Tables
Diagrams
Base Maps
Manuscript tracking
Publishing responsibility

Ranking of best manuscript ideas (Thur pm):
Choice of manuscript formats
Addition interpretations such as pesticides
More photographs including color photos
More information on map unit composition
No interpretations in published report. Tables available electronically.
More correlation of interpretation between areas.
Block diagram.
Statistical information on map unit composition.
Manuscripts published within the state.
Soil potential ratings for manuscripts.
More lab data with faster delivery service.
Leave everything as is.
Publish information on temporal properties.

Ranking of worst manuscript ideas (Thur pm):
Manuscripts published within the state.
Leave everything as is.
No interpretations in published report. Tables available electronically.
Block diagram.
Soil potential ratings for manuscripts.
More information on map unit composition
Choice of manuscript formats
Addition interpretations such as pesticides
Statistical information on map unit composition.
Publish information on temporal properties.
More photographs including color photos
More correlation of interpretation between areas.
More lab data with faster delivery service.

General Formats

--Increase flexibility, give states more options.

--Which states have the best formats? What are the different formats being used?

Survey of Formats:

Conventional (full narrative)	23
Semi-tabular	23
Tabular	0

--Value of rigidity - users can find information because of consistency of format.

--Rigidity goes beyond standards and specifications.

--Only four tables are required other tables are included to meet user's needs.

--Allow surveys to present map units in different formats to try to meet objectives of survey.

--We should do our very best to orovide the basic data to the public. The public can rewrite the data for specific uses.

--We should address the needs of the end users.

--County steering committee is used to determine content of the soil survey. Each county soil survey then contains the interpretations suited to the needs of the public.

--Semitabular fonnat works well (Faulk commission report). The interpretive tables seem to change through the life of the soil survey. Perhaps interpretations should be electronic where they can be edited.

--Additional interpretations after publication of the soil survey suggests interpretations could be published separately. They could then be updated more easily.

--We are required by law to publish interpretations.

--Field office technical guide is becoming the standard for many programs. The interpretations in the technical guide has to be current.

--SCS is our principle client. Soil survey has to support technical guide. Published interpretations are dated but documentation of derivation of interpretation is lacking.

--MOU contains lists of interpretation tables to include in each published soil survey.

--CAMPS is designed to provide interpretations.

--Money saved by deleting interpretation tables could pay for CAMPS database manager.

--However, our clientele still expect interpretative tables.

--We should publish a monogram explaining the use of CAMPS as the electronic technical guides.

--Storage of interpretative data could exceed hardware storage capacity.

--Publish soil maps on paper and changing data in an electronic format.

--How can we protect or maintain the excellent quality mapping done in the past and still update the interpretative and descriptive part of soil surveys that have outlived the expected life span.

--Interpretive single phase supplements are very useful to extend the life of the soil survey by including potentials and new interpretations.

--Most of the soil scientists prefer the semi-tabular format and pictures of the soil profiles. (Each state could write a document of the principal state soils including photographs, block diagrams, and other illustrations.)

--In Florida, the users prefer the interim reports which include maps, interpretations, legend, and a brief soil description.

--CAMPS will provide for diverse public use. Law requires documentation of map units which is an essential part of the soil survey.

--How much should be published? Should the survey be printed, electronic, or both?

--Publish hard data. Model the interpretations, store all descriptions and transect data for future manipulation.

--Weed to coordinate interpretations between states.

--Yield data - Illinois and Indiana land grant colleges control crop yields. Should SCS have another set? Capability units are different in adjacent states.

--We could develop a family of publications

--MOU should determine format. We should publish in formats acceptable to other agencies. We need several model formats. **Develop blank, formated table for additional information to include in surveys.**

--General format should not have all data in one publication. Should have at least 2. Prepared loose-leaf maps, 2 or more publications.

--Limited numbers (250 copies) of full data reports for libraries and universities. Remainder published in separate document.

--Plea for flexible format. Discussed maverick tables in P.S. surveys.

--Do we need 100 percent flexibility?

-- Put the whole survey on elec ronic media.

--Insure that all information is available to the public

--Include rating guides used to develop interpretation tables.

--Place all the soil survey data into a relational database

Documentation of the Soil Survey

--Should the transect data and other field notes be included? Some think the data should be included, others would omit the data.

--Prior to transecting, MOU should state the purpose of gathering transect data and whether it will be used for interpretive or taxonomic purposes.

--Standard methods for collecting transect data need to be used.

--Time budgets should be considered before committing to statisically oriented transecting.

--We are publishing the data of transect statistics in tabular form to include in updates.

--We are doing a good job, why include statistics?

--Order 3 soil delineation transect data helps describe the map unit composition.

--Published transect data verifies the quality of work we are doing.

--We should fully document the soil in the field in order to meet future interpretative demands.

--Transect data and pedon data should be entered in electronic form.

--Map unit descriptions and landscape documentation should be included. Figures and diagrams are extremely useful.

-1s STATSCO format a trend that will be used in the future?

--Use of photos in published soil survey increase publication costs. Trend is toward computer graphics. 10-15 photos add 5 percent to printing cost, but is less than 1 percent of the total cost.

--Conflict between maverick tables and too many interpretation tables. Should we publish support data?

--Additional information available if user wants it (statistical data).

--Way of providing reliable of data.

--Way of manipulate data, depends on interpreter.

--Maybe we don't want to publish data, but do need to save in some other way, e.g. calcareous surface.

--Some states microfilm field notes, others enter all field notes into electronic media.

--Are we documenting map units or delineations? Will statistics hold for all delineations? What are the inclusions? Are they similar or disimilar?

--Need to know how to use statistical interpretations. All right for correlation, but not for interpretation,.

--Chances to find an area that would be suitable for septic tank in an area. Can we provide this information?

--Use of statistic in published soil surveys must be accurate (population vs. individuals in the population).

--Why not show raw transect data?

--Table will be used to show this data.

--Must work with cooperators if some data is to be left out.

--Should this be decided and recorded in M.O.U. before survey starts?

Desktop Publishing

--Who should publish the soil survey? Should the state be given responsibility to publish the soil survey?

--Law: All federal printing must be done by GPO between GPO contracts with local printers.

--We should go through GPO but use local printers.

--How many interim reports can we generate from the desktop publishing?

--Can Conservation Districts publish to supplement soil survey publication?

--Consider the diversity of users.

--Scribing should be eliminated in favor of digitizing all soil surveys.

--I would favor using the "new" desktop publishing technology, setting up manuscripts following SCS standards, and printing some advanced copies (if needed) before GPO printing is completed.

Work Group Session No. 4 Summary
National Workshop for State Soil Scientists
Lincoln, Nebraska
October 17-21, 1988

Topic:
Next generation of soil surveys; update; new uses; data needs; user; interface.

Chairperson: Larry F. Ratliff
Recorders: Loyal A. Quandt and Terry Sobecki

The four work sessions evolved to a general discussion of why an update is needed, special planning and management considerations, rather general data needs and a vision of the next generation of soil surveys.

The main reasons for updating were to bring outdated soil surveys up to current NCSS standards and to better meet user needs. This included providing soil descriptions adequate for classification, improve outdated or inaccurate interpretations and to provide more accurate maps on a quality photo base at a scale meeting user needs.

The consensus of the groups was that updating required as much planning as new surveys. There should be a thorough evaluation of the existing survey. Existing guidelines were deemed adequate for the evaluation process. The update should result in a marked improvement with the point being that the older survey should not be casually discounted. Flexibility is the key. Remap, recorrelate or republish only what is needed. Skillfully bring people together to determine user needs. Be user oriented, generate financial support, and take advantage of new technology. Most participants favored maintaining county geographic boundaries for publication but felt that updates should be done by major land resource area (MLRA) for consistency in naming map units, data gathering, and interpretation. The main obstacle to this concept was in handling surveys with several MLRA's, one or more of which might not be updated concurrently. It was suggested that any one MLRA within a county or group of counties could be updated and documented with the publication being delayed until all MLRA's within a particular county had been updated.

It was generally agreed that the update process is a refinement of existing data in conjunction with the gathering of new data to fill gaps and meet user needs. An inventory of all existing data must be made and their integration as data layers considered. The input of other disciplines and agencies should be solicited. Many participants felt there was a need to better address agricultural concerns in the update. Specific areas identified were waste management, herbicides, insecticides, tillage, and soil properties related to water quality. The need for uniform landscape description terminology, surficial geology information, digital terrain data, and model specific data bases were mentioned.

All groups agreed that it will be impossible to anticipate and provide interpretations for all user needs. The major effort should be on identifying, measuring, and describing soil properties and landscapes, including spatial and temporal variability, by map unit in such detail that users can make interpretations as needed. The “benchmark soil” program

should be revived and maintained to provide physical and chemical data on extensive kinds of soils.

The vision of the next generation of soil surveys is an electronic relational data base with the capacity to generate user specific reports.

WORK GROUP SESSION NO. 4
STATE SOIL SCIENTIST NATIONAL WORKSHOP
Lincoln, Nebraska
October 17-21, 1988

Next generation of soil surveys updating; future data needs; new uses; how we interface with users, present, and new.

Chairperson: Larry F. Ratliff

Recorders: Loyal A. Quandt and Terry Sobacki

The update of soil surveys is a continuing process to improve and expand the technical knowledge in these surveys to need the quality standards for National Cooperative Soil Surveys.

REASONS FOR UPDATING

IMPROVE CLASSIFICATION
Many of the older soil surveys are pre-taxonomy and the pedon descriptions are inadequate to determine the correct classification of soils.

IMPROVE INTERPRETATIONS
Most of the soil interpretations are outdated or inaccurate. There is also a need for new information for the many technical advances in agriculture and urban users of soil surveys. There have been changes in land use which also requires additional soil interpretations.

INADEQUATE MAPS
The detailed soil maps in the older soil surveys are outdated and in some cases inaccurate. The photo base is often of poor quality and not to the scale of standards of the Geographic Information Systems and other Electronic Data Base Systems requested by users for soil interpretations.

USERS NEEDS
Ths increasing demand from users of soils information has made it necessary to update the older surveys to meet the needs for additional soil interpretations.

STANDARDS OF NATIONAL COOPERATIVE SOIL SURVEYS
Many of the older soil surveys do not meet the present standards of the National Cooperative Soil Survey Program. The Food Security Act and Water Quality initiatives have placed new emphasis for more specific soil information and related resource data.

PLANNING CONSIDERATIONS

THOROUGH EVALUATION OF WISTING SOIL SURVEYS

1. Major land use changes
2. Soil erosion and other soil problems in survey area
3. Users needs information
4. Cooperators for soil survey
5. Adequacy of existing soil survey - maps, laboratory data
6. Taxonomic unit and map unit descriptions
7. Soil Interpretations
8. Specific items to meet the needs for technical advances

UPDATE MUST BE AN IMPROVEMENT

To justify the expenditures for the update, there must be an improvement over the existing mapping.

SKILLFULLY BRING PEOPLE TOGETHER TO DETERMINE USER NEEDS

The people responsible for updating the soil survey should bring together the persons who can best determine the future needs for soil information in the selected areas.

FLEXIBILITY

1. Remap only where needed
2. Reclassify, recorrelate and revised interpretations as needed
3. Storage of date in electronic data base systems
4. Be oriented to users needs

SCOPE OF UPDATE

1. County of multi-county area with common legend
2. Major Land Resource Area(s) - problems when several in a county
3. State or multi-state
4. Other select areas

FINANCIAL SUPPORT

The intensity scale for updating the soil survey should be based on the users needs and the financial support by local, state, federal, or other agencies towards the survey.

QUALITY CONTROL AND ASSURANCE

The quality control and assurance for the update of the soil survey should continue to be a function of Soil Conservation Service.

MANAGEMENT OF UPDATE

COMPREHENSIVE PLANNING

A Memorandum of Understanding should be prepared for the update to ensure that a high quality soil survey be made for the lowest possible cost. The information for the update should also be included in the State Annual Plan of Operations.

EXISTING RESOURCE DATA

Existing resource data should be reviewed and incorporated in the update. Specific elements mentioned were:

1. Soil laboratory data
2. Field notes and transact data
3. Geology and terrain data, to include field work if necessary

INTEGRATION OF OTHER DATA SOURCES

The soils data should be only a part of the data base system.

MULTI-DISCIPLINE

The update of the soil surveys should be a cooperative effort of all agencies and disciplines involved in natural resource management and development.

PROVIDE FOR QUALITY CONTROL AND ASSURANCE

The quality control and assurance for the update should be a coordinated effort of the survey party, state office, and National Soil Survey Center Staffs. The revisions and changes should be documented to ensure statistical reliability, continuity, and consistency.

PERSONNEL

Training on the techniques and procedures for updating soil surveys should be provided to those involved in the update of soil surveys.

DATA NEEDS

REFINE EXISTING DATA
The existing data should be reviewed very thoroughly and revisions made where needed to meet the standards of the National Cooperative Soil Survey. The degree of update will vary based on age of the survey, quality of existing survey, and users needs for updated survey.

FILL GAPS OF EXISTING DATA
The users need for the updated survey may require collecting additional laboratory data, transact data, special soil investigations and studies to improve the quality of the survey. Suggest use of "benchmark soil" concept.

VARIABILITY DETERMINATIONS
The spatial and temporal properties of soils should be determined in the survey area and be made a part of the data base system.

RECOGNIZE AGRICULTURAL CONCERNS
The persons involved in the update should recognize the soil properties relating to tillage operations, applications of herbicides, pesticides, and waste materials to the Land and their affects on Water Quality.

MODELS
The collection of soil resource data used in prediction models should be a integral part of the update process.

UNIFORMITY IN LANDSCAPE TERMINOLOGY
There is a strong need to be more consistent in the use of landscape terminology by soil scientists involved in updating soil surveys with that of other disciplines in the natural resource field.

SURFICIAL GEOLOGY AND GEOMORPHOLOGY
The surficial geology maps and information from geomorphic studies should be a part of the resource data for the update of the survey.

SPECIFIC DATA SOURCES
The persons involved in the update of the survey should constantly be alert to additional resource data which becomes available and make this data a part of the electronic data base system.

INSIGHTFUL BUT REALISTIC

It is impossible to anticipate all the users needs and the data to effectively update a soil survey area. We should concentrate on identifying, measuring, and describing soil properties, including the variability of soils on the landscape for the map unit. Additional information can be stored in the data base system as it becomes available.

There is a concern that we place additional emphasis on maintaining and reviving the benchmark soil program as part of the update for the soil surveys.

Our vision for updating soil surveys is to establish a electronic relational data base system which has the capacity to generate user specific reports.

NATIONAL COOPERATIVE SOIL SURVEY

1984 State Soil Scientists Workshop
Washington, DC

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Jim Culver: Here is that Wash-D.C. Conference

Here PYC

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 8/28/84

TO

TERRY COOK

~~State Soil Scientist, SCS~~

- [ ] ACTION
- [ ] NOTE AND RETURN
- [ ] APPROVAL
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REMARKS Enclosed is a copy of the proceedings of the National State Soil Scientists' Meeting and a list of participants.

FROM

Kenneth C. Hinkley,

Assistant Director, SS Division

GPO 1982 -385-526 FORM AD-514 (8-64)

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State Soil Scientists Meeting

Purpose and Objectives

Some of you are meeting each other for the first 'time--others have crossed paths more than once. Let's introduce ourselves:--who are you, what is your position and where are you located.

By the end of the week introductions will no longer be needed--and we hope that maybe it won't be so long before our next gathering.

Purposes of this meeting include

- To get acquainted with each other--because we make up an important network of people. The National Cooperative Soil Survey depends on us, the Soil Conservation Service relies on us, and we need to be aware of state and regional differences as well as similarities.

- To provide an awareness of what is happening in the soil survey--what drives us, how do we respond to initiatives, what strategies are being envisioned? This is not a one way exercise--we need desperately to listen to each other--to share ideas and to work together.

- To create an atmosphere in which each of you has an opportunity to contribute, to say your piece, but most important, a chance to help each other and assist in planning for our future. You are the leaders; you make things happen; and you need to be sensitive to what others are saying.

Some objectives we hope to accomplish this week:

- Review of plans of the soil survey to give us a broader perspective of the program.

- Guidance on directions, activities, and opportunities that will help all of us in the years ahead.

- Concerns and suggestions about technical aspects that need attention. What needs to be done, how might we address the issues, how better can we pool and share our knowledge.

- Ways and means to maintain our professionalism, to strengthen our scientists, to improve our career opportunities, to maintain our leadership, our ability to serve, and our espirit-de-corps.

We can meet these objectives and purposes only if we gather here in openness, with frankness, with desire and hope, and with a vision that motivates us to be the very best we can possibly be. This is your meeting--we are here to serve you--to hear you--and to build a strong positive future together.

Goals and Objectives of the NCSS

Dick Arnold, February 27, 1984

When soil surveys were first authorized in 1896, it was to inventory and characterize soils in important crop areas. The intent was to obtain information that would permit relationships between crop behavior and soil properties to be examined and lead to sharing of knowledge. This is what we now call "argotechnology transfer."

When soil surveys started in SCS they were to assist in planning and implementing conservation plans on individual farms and ranches.
Soil surveys by the Bureau were for larger survey areas – usually counties. When combined in 1951 the soil survey was already beginning to provide both activities--individual farm maps and progressive soil surveys.

Today we look at how much of the whole United States is mapped and published, how well we service the needs for soils information, and strive for ways to improve the working of the National Cooperative Soil Survey.

Some goals of NCSS can be stated as follows:

- To provide high quality soils information through mapping, description, analysis, and publications.

- To assist people in using the information in ways that support wise resource decisions--there, are many pathways and opportunities.

- To ensure that fundamental or basic information is observed, recorded, packaged, interpreted, and made readily available. Without the skills and knowledge of soil landscapes, how they form, how they occur, how properties are related to different behavior and so forth--there will not be a strong basis for scientific soils work in the future. It is a major responsibility that we have.

- To maintain and improve the operational aspects of a soil survey program. Management of resources is, and always will be, of vital importance. Training people to handle their own designated responsibilities is essential. This includes not only the technical aspects of soil survey and soil science in general but also the management of funds, of people, of a program, and of all the interrelated aspects.

- To remain flexible and adaptive to new advances of technology and the innovative and creative ideas of individuals, of groups, of agencies, and of our society. We have always responded to change--and there are more changes daily than we imagined. Personnel ceilings, budget reductions, improved standards, changing priorities, new hardware and software, and requests for more qualitative as well as quantitative information are just examples of what we respond to.

- To fulfill, to the best of our abilities, the leadership in international soil survey concepts, design, implementation of programs,

training in the application of Soil Taxonomy, soil interpretations, and promoting expertise in soil surveys throughout the world.

I hope you'll take a few moments in your discussion groups to comment on, or reflect about what you consider to be the goals and objectives of the NCSS. I have avoided specifics about completing the so-called once-over or the numerous activities of basic soil services because those will be major items of discuss-ion by your groups on Tuesday afternoon and Wednesday morning.

To help you recall the goals I've mentioned and start your own discussions, consider:

QA - IO - FL

They stand for:

Quality
Assistance
Investigations
Operations
Flexibility
Leadership

comments Presented at

State Soil Scientists' Meeting

February 1984 by

Kenneth C. Hinkley

Assistant Director, Soil Survey Division

New Initiatives and Directions

1. Emphasis will be placed on obtaining a better balance of the soil survey program (see attached sheet).

2. States will be asked and trained to accept more responsibilities.

3. We will be looking to the NTC soil staffs to spend more time providing guidance and assistance and less time on doing activities that can and should be done by the states.

4. There has been a change of correlation responsibilities. The responsibility for soil correlations now rest with the NTC soil staffs.

5. We will be changing the editing responsibilities to the NTCs during FY 84.

6. There will be a deemphasis on rules and regulations and an emphasis on standards with guidelines for meeting them.

7. More emphasis needs to be put on developing and producing interpretative data. In addition to helping people use soil surveys we must constantly ask and seek answers to the question of how they can be made more useful. This is a tremendous challenge facing us today because there is so much demand for soil information, so many users and so few soil scientists. We must meet this challenge.

8. The soil survey program will assist the targeting efforts of the soil conservation service. There will be redirections of funds and personnel to meet this objective.

9. We will be looking at multi-year planning and budgeting for each state.

10. We be looking at ways to improve our track record on map compilation and map finishing. Several recommendations will be presented to the Chief's staff for alternative ways of solving the problems of getting map finishing and map compilation done.

11. We will be developing a critical path management system for managing project soil surveys. This new system will take the place of CASPUSS.

12. There is a growing and unmet need for updating older soil surveys so that they provide adequate information to meet users needs.

Staffing

We will be looking at staffing needs to provide Basic Soil Services and maintain project napping activities. Difficult decisions will need to be

made on staffing priorities. The present trend is a declining number of people with a level or slightly increasing number of dollars.

Basic Soil Services provides the opportunity for a new role for soil scientists. In addition to traditional soil scientist activities, this new role needs to emphasize the ability to provide training, promote soil surveys, and be a communicator. Some of the requirements of a Basic Soil Services position will be communications, teamwork, self-development, and development of others.

There is a need to some way indicate the importance of Basic Soil Services rather than to talk about the time it rewires.

Training and career development will be important in effectively carrying out the increasing responsibilities of soil scientists. State soil scientists need to be sure that soil scientists in their states are receiving adequate training and career development.

State Soil Scientists and Managers

With reduced staffing and funds efficiency needs to be emphasized. We need to get better balanced more efficient programs in the states.

We have a reputation for doing things right, doing a good job judged by quality and quantity. We also need to be concerned about doing the right things, getting the right things done, efficiency judged by effectiveness. Don't be occupied with efforts rather than results. We need to emphasize

results. To do this we need to identify and put priority on work activities that must be completed to achieve progress.

The most detailed precise soil map has limited usefulness if you don't need a detailed precise soil map. Watch for efficient failures. No matter how efficiently we did a job, if it wasn't needed we had a failure on our part.

Let's take a look at what we are doing. Get rid of yesterday's activities that cease to promise results. Be careful of yesterday's successes. They will probably linger beyond their usefulness. Be careful of activities that should do well but for some reason don't. These to be tend to become investments in ego. To be effective, we need to review all activities and all tasks and ask is this still worth doing. Decide what you can quit doing. Don't start a new activity without getting rid of an old one.

Make a plan for getting the right things done. If pressures make the decisions, the important things may not get done. If we try to do a little bit of everything, its easier to make everyone happy. The problem is not much gets done.

Let's focus on opportunities rather problems. We need to develop standards and principles to handle problems so they don't take so much of our time.

We have been doing a good job, but we can be better.

A Balanced Soils Program

Although we are many years short of completing the soil survey once-over, we have reached the point where equal consideration must be given to other parts of the soils program and we must seek a proper emphasis among the program components if we are to maintain a viable well balanced program. The emphasis to cost share with local and state government and other federal agencies primarily for the purpose of conducting soil mapping has caused a significant shift of attention away from the need and effort to carry out a complete soil survey program. While this may have been expedient and desirable during the past decade, it is now beginning to cause significant inefficiencies and impacts upon carrying out a balance program. We need to establish and maintain a balanced soils program within the states and with the nation.

Areas needing increased emphasis in order to achieve a proper balance include:

1. There is an unmet and increasing need for soil science expertise to help people use existing soil maps and associated descriptive and interpretive data as a'basis for their decisions concerning the use and management of soils.

2. Updating older published soil surveys to better meet the current needs of users has been neglected.

3. There is a need to develop soil interpretations and to carry out kinds of activities to improve the quality of soil interpretations.

4. Many of the soil survey parties are understaffed, causing inefficient time spans for completion. There is optimum time frame for completing a soil survey. Many are not adequately staffed at this time.

5. Cartographic needs are not being met. The number of survey areas being mapped exceeds the capabilities of NCC to provide needed materials on a timely basis. This results in delays, poor quality unrectified photos for mapping, necessity to transfer lines and frequently the need for ratioed transparencies. It is estimated that these problems reduce the soil scientists efficiencies by 15 to 20 percent.

6. Training needs particularly for users of soils information are not being met.

Regardless of the funding level requested or received, a well balanced program should be designed for the use of those funds. Attention needs to be given to reducing the number of project soil surveys nationwide, increasing the available soil science expertise to provide needed user assistance, updating older inadequate published soil surveys, increasing training efforts and developing soil interpretations to better address critical soil resource problems.

TUESDAY MORNING DISCUSSION GROUP 1
Horace Smith - Leader
Billy Wagner - Rapporteur

GOAL OF THE SOIL SURVEY: The goals of each state vary because the status of the soil survey is so different from state-to-state. Some states have a lot of mapping remaining to be done, but also have some old soil surveys that may need to be updated before the state is completed once-over. That is, our priorities for once-over may not be the same priority as that of the local people in a highly urbanizing area with an old soil survey. Also, funding often sets priorities for a state.

UPDATING OLDER SOIL SURVEYS: Some soil surveys completed before Taxonomy may have soils well delineated but need investigation, better description, recorrelation, and modern interpretations prepared. The new evaluation sheets are proving to be very helpful in evaluating older soil surveys. Some soil surveys can be updated by transferring the survey to new photography and preparing modern interpretations. Soil surveys made during the 1940's and 1950's have to be looked at closely, especially in regard to map unit design. Land use at that time ma,y have been very different from present land use, and today's land use requires different kinds of soil investigations. It was suggested, where two or three nearby soil surveys need updating and they occur in the same MLRA, we need to look at designing a legend for the broad area, rather than doing a lot of repetition description in each county. Dne typical pedon could be sufficient for the entire area.

QUALITY CONTROL - BALANCED PROGRAM: A question from one of the state conservationists, "What does the National Office Staff see as the real priority or goal for the NCSS?" We need a balance between basic soil services and state mapping completion. Priority number 1 is to provide soil surveys on private cropland. In some areas we may need to talk less about the "completion of the soil survey." Because of changing land uses and intensified land use, we will need to be making soil surveys for a long time. We also need to cut down on the number of soil surveys in order to complete the surveys in a timely manner.

Question: This one probably needs to be given some thought and then guidance provided. "Where does the Soil Survey Division think we should be ten years from now?"

BASIC SOIL SERVICES: It was suggested that the area soil scientist or area soil specialist should have party leader experience. There is some concern among field soil scientists about whether the area soil scientist position will be a "dead end" position. Because of the great variation of responsibilities of the area soil scientist, this position should be filled with a highly qualified, highly motivated individual who works well with people and is good at training others in the uses of soil surveys.

PUBLISHED SOIL SURVEYS: Policy is still to order a 25 to 30 year supply of soil surveys.

Computerized soils information is being looked at in several states. Digitizing soil data is so costly that most states are moving slowly in this area.

There continue to be concerns about the length of time between the completion of soil mapping and when the survey is published. We need to put a high priority on setting and meeting publication schedules. The new emphasis in this area should get soil surveys from field correlation to publication in 18 months. The Critical Path Management System will be a good management tool in meeting schedules. All soil surveys should be completed in three to five years. With proper staffing five years should be the maximum time required to complete a survey.

The Grace Report indicated that our published soil surveys are over-edited. We can permit a few errors in the text and still have a good survey. More editing and a better job will have to be done at the state level and the field party level. We must have progressive correlation as the soil survey is being progressed.

There is concern among some states about loss of quality map finishing staff. Others are concerned about the proposed shift to contracting out all map finishing work.

DISCUSSION GROUP 2
Tuesday 2-28-84: 9 - 12 a.m.

SOIL SURVEY MAP COMPILATION AND MAP FINISHING

Soil survey map compilation will be done by the soil survey party on matte half-tone positives under the supervision of the soil survey party leader. Some surveys are using the matte half-tone positives as the field sheet thus eliminating the need for soil map compilation.

Soil Survey map finishing has alternative ways of being done:

1. Contracting to an outside jobber.
2. Setting up a map finishing group that would do work for more than one state.
3. A combination of 1 and 2.
4. The state does all its own map finishing. A number of states finish enough soil surveys to maintain a full time staff to do their map finishing. These staffs are funded by nonfederal funds.
5. Use digitizing.

The group agreed all five alternatives are acceptable methods of doing map finishing. The state should be allowed to select the procedure that best fits its mode of operation.

LAND EVALUATION AND SITE ASSESSMENT

The land evaluation and site assessment (LESA) uses soils data in its development. The table indicating prima farmland by soil map unit can be generated using the Soil Interpretation Records. There seems to be concern because the generated data needs additional work before it can be used. This is probably correct since the Records are not for a specific soil survey but are usually for more than one soil survey. The work to bring the table into agreement with a specific soil survey takes an insignificant amount of time in some states. In other states it would take less time to develop the same information without using the computer program to develop the table indicating prime farmland by soil survey map unit. Also, the table for the soils portion of LESA is a working document and will probably be modified by the land evaluation committee to meet the local situation. Recommendations are:

1. Review the Soil Interpretation Record and correct any errors.
2. The states need to decide the method by which the soils data is developed for the land evaluation committee.

SOIL INVESTIGATIONS

Soils data are not available for older soil surveys being furnished basic soil services. This information is needed so accurate soils information can be given to land use decision makers. Soil scientists assigned to basic soil services will need to spend part of their time collecting soils data to build these data bases.

Numerous soil studies are done or in progress. The data and kinds of studies usually are not known by other scientists. A procedure is needed to keep interested persons knowledgeable of research in progress and data available from studies, research, etc. Additional data collected in the field on soil morphological properties will help decision makers in their deliberations. An example is the correlation of mottling and depth to seasonal soil water table.

A large volume of soils data is generated annually but is not readily available. A system needs to be made operative to store and retrieve the soils data at all levels both in the public and private sectors.

Information on the Index to Soil Laboratory Data (Form SCS-SOILS-S) and Engineering Test Data for Soil Samples from One Pedon (SCS-SOILS-IO) can be part of the system outlined in the three preceding paragraphs. More attention is needed in making the information on forms SCS-SOILS-8 and 10 available to users of soil surveys.

The soils data seem to differ between soil laboratories. The question raised was - What, if anything, needs to be done to standardize the methods, procedures, techniques, etc.?

Models using soils need the best soils data to assure credibility of the conclusion(s) reached. This goal can be achieved if soil scientists are involved during the modeling procedure.

FUNDING

An inventory of soil resources on lands that are not privately owned is needed. Some of these lands are under the supervision of members of the National Cooperative Soil Survey (NCSS). An arrangement between some level within (SCS) and the member of NCSS needs to be developed so these lands can be soil surveyed. Soil Conservation Service

QUALITY CONTROL OF SOIL SURVEY

Quality control of soil surveys is a constant concern. It takes the cooperation of everyone in the NCSS. Joining soil maps and coordinating interpretative materials between soil surveys promotes a high quality soil survey and the best soil survey for our users. Close working relationships with members of the NCSS promote high quality soil surveys. If there is a quality control problem in soil survey, let us solve each problem as it arises. Quality control of soil survey needs to be at the lowest level within the NCSS. Guidelines need to be explicit and show who is responsible for different phases of the soil survey.

Design of soil map units is important in making a soil survey meet the needs of its users. Many Major Land Resource Areas (MLRA) are 80 percent or more soil surveyed. The design of soil map units within these MLRA was determined by the users a number of years ago. What should be our approach to the redesign of these units? Those MLRA mostly soil mapped should finish with the design being used at the present time. For soil surveys being updated in MLRA that are nearly or completely soil surveyed, a meeting is needed with the users to determine the design of the soil map units that they will need in planning and making land use decisions.

BASIC SOIL SERVICES

Basic soil services will help people use soil maps and their descriptive and interpretative data as a basis for decisions concerning use and management of soils. SCS is one of the largest users of soils data. Thus, an inventory needs to be made to determine the training needs of SCS personnel. After the inventory, the training should be tailor-made to the needs of the person or field office receiving the training.

OPERATIONS

Soil surveys need to be considered in any decisions concerning use and management of soils. The state conservationist looks to the state soil scientist to advocate the use of soil surveys.

MEMBERS OF DESCUSSION GROUP 2
Tuesday 2-28-84: 9 - 12 a.m.

Joe Nichols-Leader
Ray Sinclair-Rapporteur

Ed Spencer
Jerry Post
Harry Sato
Earl Voss
Jack Rogers
John Ferwerda
Sylvester Ekart
Wendell Kirkham
Darrel Grice
John Brubacher
Bill Shelton
Tom Holder
Allan Hidlebaugh
J. Clatie Powell
Rollin Swank

Report of Discussion Group No. 3
State Soil Scientists Meeting
February 27-March 2, 1984
Washington, D.C.
Group Leader: Rod Harner, Head, Soils, MTSC
Reporter: Tom Priest, State Soil Scientist, Colorado

The following statements, observations, comments, or questions were noted for each of the general heading subjects listed.

1. *Quality of Surveys:*

What is being done about quality control, at the national, state, and field office levels?

a. *Verification of quality should be by use of, and based upon a statistical analysis and evaluation.*

Mississippi and Alabama have had experience on this. The State Soil Scientists may be contacted for detailed information. Also Carter Stears.

Many members of the group indicated they would appreciate receiving more detailed information on random sampling and transects. Data should include numbers needed, how to carry out the sampling and transects, and how to document findings.

b. It was *generally agreed* that *verification takes time, and lots of it. Also that it is needed and well worth the time.*

c. *Milt Meyers mentioned a positive verification of soil surveys during the coarse of the Cd-Pb study.*

d. *Lab data on soil samples which have ken accurately selected to represent the mapped soils is a very important aid* in verifying *the quality of surveys.*

e. Parameters checked on *transects usually relate to soil* series *identification or verification. Perhaps other sets of perameters should be noted for characteristics relating to specific interpretations. Transects in some areas will* be *used to* evaluate and *update completed or older surveys. In other areas they are used to assist in quality control or verification of surveys in progress.*

f. *Alternative methods of quality control and/or verification of soil surveys should be available for individual cases rather than restrictive sets of specifications or directions.*

2. Assistance:

Provide information and help people use soils information in the decision process. Ways to get information out: publications, geographic information system (GIS), digitizing, computerized data bases.

a. Should all digitizing, GIS's, etc., be at a scale of 1:24,000? Whenever possible, a scale of 1:24,000 should be used!

b. SCS is presently investigating and attempting to evaluate and determine favorable methods to cover the majority of cases: GIS's, digitizing, data bases and data base management systems (DBMS).

c. A transition period will be needed as SCS moves from the present publication procedures to computerized data storage and delivery systems.

d. Other questions or items needing additional consideration: What kinds and amounts of staffing are needed, now and in the future? What should SCS do, and what should be left to consultants? What training and information should be provided to consultants? Will professional soil scientist associations be one avenue to dissimentate information? Should criteria for interpretations be included in publications? If so, should interpretive tables be printed?

3. Availability of Basic Information:

a. With decreases in staff, more emphasis will be needed on making soils information available.

b. Laboratory and Engineering test data are generally not included in publications. Should they be included?

c. Soil investigations needs to be encouraged, especially by ARS and Universities.

4. Operations:

a. CASPUSS - Critical Path; Are both needed?

b. What are the deficiencies of CASPUSS? Has it developed to a record of changes or delays in schedules paralleling a reduced program? Should CASPUSS be updated annually, semi-annually, or near the beginning of the fiscal year along with annual planning?

c. What is the role and effect of state conservationist, personnel, budget?

d. Relations with other agencies has seen continued improvement in recent years. National Memoranda of Understanding with other agencies at the national level (BLM, FS) and those agencies commitments to make, complete and use soil surveys has helped greatly.

e. National and state SCS offices should continue cooperative efforts with other agencies (as Forest Service, BLM, Bureau of Reclamation, BIA, Department of Defense, National Park Service).

5. Creative Ideas and Flexibility of Operations:

This must be developed and persued, in spite of, or because of restrictions (as in budget or personnel ceilings).

Most of the discussion of this group centered on "Contract Map Finishing":

a. A state representative is needed, whether on SCS or Department of Natural Resources or comparable staff.

b. Of 14 in the groups, 2 were in favor of contracting.

c. Both good and bad experiences have occurred with contracting.

d. Contracting requires good map preparation and compilation, contracting agreements, specifications, and procedures.

e. It is possible that CART0 could handle all contracts with less personnel time than if each state did their own contracting.

f. Digitizing or contracting by a single Unit for several states is a viable alternative.

g. Present delays in map finishing is due to many factors, including availability of suitable photographic materials, shortage of personnel, other priorities, and difficulties with contractors.

6. Leadership in International Field:

The priority may be more political than technical in nature.

Details of soil scientists benefit both the individual and the Serivce.

7. Additional Items Discussed:

Consideration also needs to be given to changes in leadership and program direction from emphasis on soil mapping to providing basic soil services.

Other unanswered questions included: What should be the national role (Soil Survey Division) in developing guidelines for training for basic soil. services, and how to handle and what are the career alternatives as soil scientists a&the program moves from making soil surveys to providing basic soil services.

What is a "Balanced Program"? An outline for and a summary of a balanced program can be obtained by a completed critical path development, from determination of the needs for a survey through completion and providing basic soil services, developed for each survey area and compiled for the state.

The SCS should continue to investigate, develop and impliment new technology in digitizing, geographic information display systems, data bases, and data base management systems.

SUMMARY
OF
GROUP 4 DISCUSSION/RECOMMENDATIONS

Tuesday, February 28, 1954

Group Leader: Dick Kover
Rapporteur : Keith Huffman

Seven topics were discussed. The topics, highlights of background discussion, and recommendations are as follows:

Topic I - Goals and Objectives

Highlights - Field soil scientists are concerned for their future and the future of the soil survey program.

- There is a general feeling among administrators (STC's) that when an area has a modern soil survey for every countv in an area or state, one soil scientist can handle all the needs for 20 or more counties.

Recommendations - NH@ and NTC's provide guidance to states during the transition from once over mapping to the basic soil services workload; training, assistance to programs, working with user groups, and modernization programs.

Topic II - Soil Map Compilation and Soil Mao Finishing

Highlights - Our grouo had success with in-house soil map finishing, some states were contracting successively (NC), some states had failure with contracting, and some states were unable to keep up the workload on their own.

Recommendations - NHQ should select a national approach to permit states options of selecting the best approach to their situation, i.e. -

a. do in-house
b. use multi-state map finishing shops
c. use contracting

- States with successful soil mao finishing programs (OH) could be contacted to see if they would be able to help other states.

Topic III - Text Editing

Highlights - Discussed use of word processors, computers, and compatibility of different systems.

- Nevada has experience in using computers for soil surveys.

- There are portable, handheld computers costing 51,000 to 53,000 that are being used/tested for use in the field that can be electronically used to transfer data into PC's once back in the office.

Recommendations - When purchasing word processing equipment, plan to purchase asynchronous and bi-sequence communications package which will enable equipment to be compatible with Harris as well as PC's.

Topic: IV - Correlation Quality Control

Highlights - Need to encode the SS-6 form after the initial field review to begin the MUUF file for that county.

Participation of NTC personnel during the field work.

Hecommendations - Require computer storage of SS-6 forms after each field review and a computer printout of correlation materials before holding the correlation conference.

Place responsibility in the state to summarize correlation documentation used in final correlations. Use this management technique to reduce NTC work and speed up the correlation process.

NTC's should regularly (every 2-3 years) hold training for state correlators.

Topic V - Investigations

Highlights - Encourage a coordinated and successful data base program which will enable states to encode and recall data for characterization, engineering test, and mineralogy data. This is particularly important across state and regional lines.

One state (LA) uses soil fertility profile data program for up to 6 feet of soil. This fertility profile data is used in construction and engineering design.

Topic V - Investigations (cont'd.)

Recommendations - Encourage NSSL to accelerate the work to make JCL for soil characterization data available to all states.

- State and national laboratories are to work together in developing compatible data base programs.

Topic VI - National Coordination/Direction

Nighlights - There is a lack of coordination and direction to NTC's and states for use of manuals, handbooks, and policy. Specifically, National Forestry Manual.

Recommendations - NHQ to provide leadership and program direction to NTC's and states on the coordinated implementation of manuals, handbooks, and technical standards.

Topic VII - Budgeting

Highlights - State soil scientists should be involved in use of 02 funds in their states.

NTC director and head, soils staff should also he more involved in 02 budgeting for their states.

Recommendations - Head, soils staff, state soil scientist, and state conservationist should meet on a regular basis to discuss annual and long range planning of the soil survey program.

- Assistant chiefs should be supportive of the need for NTC participation with state soil scientists and state conservationists.

NATIONAL STATE SOIL SCIENTIST MEETING

DISCUSSION GROUP 5 (2/28/84)

Objective: For the discussion group to express themselves about the direction of the soil survey. CHANGES - OBJECTIVES - DIRECTION

The budget formulation process in individual states is becoming better with much more State Soil Scientist involvement than in past years.

The completion of parts of survey areas by non-SCS soil scientists and dollars, has made a large contribution toward mapping completion, yet it has created some problems. Many areas of the county now have survey areas with parts not completed and with insufficient staffs to finish the jobs.

Giving emphasis to paying people, as a first priority in budget formulation, causes a state to fall behind in monitoring and updating equipment.

The accountability of Soil Scientist's time and output from basic soil service activities needs to be a subject that gets attention. Before we have the activities categorized, people need to keep a good record (i.e., daily diaries).

There is a continuing need to have the soil scientist write and publish what he is doing. Soil Survey Horizons is a good media for this kind of communication. Special work being done under basic soil services are best reported with a clear, concise narrative (Bill Reybold urged us to promote new subscriptions).

The writing of an article that is technical in nature should be a part a soil scientist's training plan.

The question of NCSS organization was discussed. The need for work done by a group serving many states was considered. The better way to do the map compilation and finishing job was discussed as an example of multi-state cooperation.

There is a need to have a person assigned to targeted areas not regarding state lines, so as to promote consistent soil survey interpretations and to minimize political competition between states. Some assistance would be useful in setting up inter-state details in order to assist states that have budget shortages, to use this opportunity to get relief from that situation.

Group 5 was made up of the following people:

Steve Holzhey - Leader
Fred Gilbert - Rapporteur

Horace Smith
Shelby Brownfield
Tom Calhoun
Talbert Gerald
Dave Yost
Charles Thompson
Ed Naphan
Jim Carley
Charles Fultz
Ben Smallwood
Phillip Chavez
Bill Reybold
Dick Arnold
George Anderson

DISCUSSION GROUP I

Steve Holzhey - Leader
Doug Pease - Rapporteur

Tom Priest
Sid Pilgrim
Arville Touchet
Gerald Latshaw
Ferris Allgood
Ken Hinkley
John Brubacher
J. Clatie Powell
Gilberto Acevedo Ramos
Bill Koos
Bill Hatfield
Philip Chavez
Dick Gilbert
Bobby Birdwell
Eugene Andreuccetti

BASIC SOIL SERVICES

The handout provided by Ken Hinkley was revised to incorporate ideas by the group (Attachment 1).

Three items have been helpful in making the shift to basic soil services. They are an area staffing plan, a state staffing plan, and the briefing papers presented at the state conservationists conference.

Soil scientist, or the implication, needs to be a part of the job title. Some suggestions were:

1. Area soil scientist
2. Soil specialist
3. Soil services specialist
4. Soil scientist specialist

The group recommended that the job requirements provide for sufficient flexibility or latitude to meet the needs of of the area. As an example -- In New England SCS soil scientists doing basic soil services would not do more intensive soil surveys within published areas because it would be competing within the local soil consultants It is desirable that the person have party leader experience to be competitive for other career opportunities. They should have the ability to communicate and meet the public. It is important that persons selected to serve in basic soil services positions be kept current on the soil survey program so they be competitive for advancement within the soil scientist discipline. The individuals need to be able to pursue the career ladder they choose. Suggestions were to:

1. Keep them on the maling list for all material sent to soil scientists.

2. Include them in all soil scientist workshops.

3. Provide training to maintain or improve their technical skills.

4. Provide training in communication and instruction skills.

5. Provide training in Information Resources Management.

6. Keep area, state, and NTC offices aware that these individuals are a part of the soil survey program.

Currently states represented in the discussion group have been involved in basic soil services in these areas.

1. Update and maintain technical guides.

2. Train SCS personnel -- soil scientists and other disciplines.

3. Feed expert soils information to the district conservationist.

4. Collect and disseminate soils data within targeted areas.

5. Work with party leaders, serve as an extension of the state office staff.

6. Provide soil information for NRI.

7. Prepare and revise Forms SCS-SOI-5 and soil series descriptions.

8. Make on-site investigations for various uses.

PROJECT SOIL MAPPING

The group briefly reviewed the paper on project soil mapping presented by Rod Harner. The factors that prevent soil surveys for qualifying for project management are:

--Base imagery used for field work is also used for publication. Timely delivery of quality imagery continues to be the biggest problem.

--Funding and staffing (FTE) makes it difficult to complete soil surveys in 6 years or less.

--Coordination of other mapping agencies or constant flow of reimbursable funds makes it difficult to staff a survey party with enough members to complete the survey within the designated time.

Attachment 1

Rev. March 1984

BASIC SOIL SERVICES

The purpose of Basic Soil Services is to help people use existing soil maps and associated descriptive and interpretive data as a basis for their decisions concerning the use and management of soils. The intent is to strengthen this activity in SCS and make it an important component of the National Cooperative Soil Survey program. Following is a list of tasks included in Basic Soil Services:

Training - There is a need to provide training on all aspects of soil survey with emphasis on interpretative uses and how to make effective uses of data during the planning process.

- Train SCS peopleon a one-to-one basis and through formal presentations.

- Train non-SCS people, including district people, to use soil survey data or to improve their skills in use of soil information.

- Provide training to other federal and state agencies.

- Instruct soil mapping courses at university level.

- Provide soil training to students of various school ages, school teachers, public library staff.

- Assist in conducting workshops on minimum tillage, range, windbreaks, nonfarm uses.

- Provide International assistance in selected areas.

Maintain Technical Guides - Section II and other sections of the technical guide related to interdiscipline use of basic soil survey data need to be maintained at a high quality level. This includes items, such as capability grouping, hydrologic groups, range sites, pasture groups, windbreak groups, woodland suitability, T&K values, conservation tillage systems, soil productivity and erosion, economical evaluations.

- Technical guides need to reflect changes in technology, in land treatment and suitability of soils for specific uses.

- Participate in area technical guide committee, plant materials committee.

- Maintain current Forms SCS-SOI-5 for all field locations.

- Prepare and update soil interpretations for selected uses by MLRA's.

- Review use of soils information used in Great Plains, LTA and watershed contracts.

- Assist in use and evaluation of soils information in resource planning for cropland and rangeland.

- Assist in providing soils assistance on new programs, such as CRES.

Soil Interpretations - There is a need to develop soil interpretations and to carry out kinds of activities to improve the quality of soil interpretations. This involves working closely with other disciplines and other agencies.

- Develop soil potentials.

- Collect crop yield data, i.e., eroded vs. noneroded soils.

- Collect range site yield data.

- Collect soil-woodland site index data.

- Windbreak and pasture evaluation.

- Studies on water table, i.e., piezometers, and field observations to measure fluctuating levels of seasonal high water table throughout the year.

- Prepare soil monoliths.

- Prepare soil interpretative thematic maps using family of maps concept.

- Water quality studies, i.e., soil properties as it pertains to nitrate movement.

- Guides on interpreting the interraction of soil properties, such as organic matter content, texture and acidity as related to rate of herbicide application.

- Prepare or update Forms SCS-SOI-5.

- Site selection and soil evaluation on unique uses.

- Prepare special interpretative maps, i.e., depth to water table.

- LESA - units of government.

Updating Soil Surveys

- Provide supplemental data for published soil surveys where it is not necessary to prepare a memorandum of understanding.

- Evaluate the need for updating soil interpretations, correlation, and soil mapping.

Assistance

- Provide assistance in targeted areas. Assist with irrigation evaluation, i.e., evaluation of results, length of run, intake rate. Work closely with irrigation specialists and distict conservationists on interdisciplinary evaluation and interpretation of data.

- Provide soil interpretative data, evaluation and technical guide planning and application of conservation measures with priority given to targeted critical erosion areas.

- Evaluation of sites for ponds, terraces, sewage lagoons, tile drainage, etc.

- Provide on-site assistance on suitability for various uses, irrigation, septic tank absorption fields, landfills, homesites, etc.

- Prepare more detailed soil maps for more intensive uses, i.e., irrigation, research studies, urban uses.

- Assist in soil related land use regulations.

- Assist in conservation field days, career days.

- Assist land judging contests.

- Soil-Geology field studies related to watershed and RCD projects.

- Use of soils data in setting priorities for other USDA, state or local cost-sharing programs.

- Provide soils information requested by FmHA, USGS, state agencies, etc.

- Review of proposed projects in evaluating the impact of prime farmland.

- Explain use of soil survey to local units of government, County Board of Equalization Appraisers, etc.

- Work with county assessors and commissioners on use of soils in land equalization process.

- Review and prepare soils data for watershed plans, RCD measures, Special State Studies.

- Assist agencies, such as Extension Service, in presenting soils information at formal and informal training sessions.

- Provide soils training at tech schools.

- Assist in conducting area program appraisal of field office operations.

- Assist with special studies related to preparing resource data, i.e., wetland studies.

Special Studies

- Special reports

- Natural Resources Inventories

- Erosion Productivity Impact Calculator (EPIC)

- Wind Erosion - I Values

- Soil moisture and temperature

- ADP

- Water Erosion - K values, Tons soil loss

- Research needs

Soil Investigations

- Collection of soil samples for soil characterization studies, engineering test data and soil fertility.

- Make interpretative analysis of soils data and develop techniques to make this data more useable.

- Special studies to evaluate the composition and reliability of selected soil map units.

- Make or assist with soil percolation and infiltration studies.

REPORT OF TUESDAY PM DISCUSSION - GROUP 3

Dick Kover - Group Leader

Bill Roth - Rapporteur

Basic Soil Services and Project Soil Mapping were the topics discussed.

The group discussed the many aspects of Basic Soil Services and exchanged ideas from the states represented. Providing soil training to SCS personnel was the first priority for most states. Where the soil surveys are completed, we must now help SCS and others to use the soil information we have recorded. We feel soil *scientists* should remain a part of the title of the person providing Basic Soil Services. Titles suggested were Area Soil Scientist, Soil Specialist, or Soil Resource Specialist. The NTC's should provide technology transfer between states in Basic Soil Services. They should also make plans to provide direct assistance in Basic Soil Services in the near future.

How we report and evaluate the items soil scientists provide with Basic Soil Services ware identified as two problems. We offer the following recommendations:

1. Not have a reporting system, but have the soil scientist act as a support to other programs. This would be similar to the system used by other specialists.

2. If a reporting system is needed, the National Headquarters would appoint a task force to prepare a broad national list of possible reportable items, but each state would have the option to use what they need.

Four states have mostly project soil surveys. The group identified three major factors that prevent soil surveys from qualifying for protect management.

1. Staffing. Three states have limited funds that prevent adequate staffing to meet the six year time frame. Local or state cost share agreements prevent management's ability to reduce the number of active surveys. It was felt that when substantial local or state funds are committed to a survey, we are obligated to start a soil survey in that county.

2. Base maps or material needed for map finishing not available when needed. Two major reasons were cited. NHAP not available and local and state cost share funds require survey be started before material is available.

3. Unable to meet six year time frame. The two factors discussed above keep most surveys from meeting this requirement.

Recommendation

We strongly support digitizing, but recommend we redirect those funds to cartographic to accelerate the availability of base maps and map finishing material.

State Soil Scientists Workshop

Group No. 4 Discussion Report

February 28-29, 1984

Group Leader- Joe Nichols
Rapporteur- Glenn Kelley

Project Soil Surveys

Advantages or good points

1. Most agree with the conceptual approach of the project soil survey.
2. Gives more control of soil survey operation.
3. More energy devoted to soil survey operation with an upfront connnittment.
4. Generally works better than non-project surveys.
5. Is easier to justify and fill positons.
6. Is easier to get specialized and needed equipment.

Disadvantages or bad points

1. Problem with getting imagery on time.
2. Problem with providing party leader with sufficient lead time to prepare for initial field review.
3. A four-year time span for surveys puts considerable pressure on the party leader to complete all phases from initial through final field review in this period of time.

   Some states are scheduling the comprehensive review two years before the end of the survey to provide more time to finish up loose ends. Another state is scheduling a description review during the winter prior to the comprehensive field review. Soil Mapping details are also used to help speed up project surveys.

4. Separate office space is good but may cause a problem in working closely with the conservation district particularly in training new soil scientists and soil conservationists.

5. The question was raised--Does one item missing from the requirements for a project survey such as "imagery not available" take the survey out of a project status?

Other 'Discussion Concerning Project Soil Surveys

1. One state has quit using the terms "Soils Handbook" and "Descriptive Legend" and refers to these terms as "Text Manuscript." The committee recommends that the National Soils Handbook be revised accordingly.

2. Party leaders should be encouraged to order interpretation tables for their surveys frequently if not annually on project surveys. Arrangements are being made to obtain final tables from the Harris Terminal and transmit a tape of these tables directly to the NTC. Pat Looper will discuss later in the program.

3. A problem was expressed with the time delay in getting new Soils Form 5's into storage due to delays at NTC and at Ames. NTC and Washington offices should check on this problem.

4. Can we reduce some of the quality control on Soils Form 5's now being done at NTC?

Manuscripts

1. It was pointed out that dates on project surveys are not necessarily met, if in fact the work, such as a manuscript, is submitted incomplete or inaccurate.

2. It is important to start a manuscript with keyed and edited descriptions.

3. One state reported that it is submitting manuscripts between the comprehensive and final field reviews.

4. Although streamlining mapping unit descriptions is important, we also need to get important and needed information into the mapping units.

5. The concept of splitting the manuscript into technical and non-technical reports was discussed. The primary disadvantage was the cost in preparing two reports, however, the ease and cost of 'updating and reprinting the survey later may offset the cost of printing these sections separately.

6. We are trying to satisfy two types of users--(l) those limited to information on a single tract of land and need soils information tailored for this tract and (2) those needing a library file for consultation.

7. Some surveys are becoming voluminous due to either a large land area or to the scale and size of photographs and are very expensive to hand out to users interested in a small area.

Word Processors and Personal Computers

We need to train our people on using new equipment and working with computer programmers to develop the potential of this equipment.

Certification for Quality Control

1. The NTC will be signing off with a minimum of review on selected correlations.

2. The pros and cons of certification statements were discussed. Some states may option to use certification statements more frequently for joins, manuscript quality and so forth by the party leader up through the state soil scientist.

3. A concern was expressed that we may be putting too much pressure on

party leaders and could affect the quality of work.

Basic Soil Services

1. Most items on Ken Hinkley's list of basic services are 01 activities that are not getting done without soil scientists. Activity code 30 now allows us to do these activities under 02.

2. An additional item to add to the list of basic soil services is to serve as a liason with universities, research stations, ARS, and so forth. We need to develop expertise such that interpretations can be developed in chemicals for no-till farming, municipal sludge applications, toxic waste disposal, etc.

3. Need to include a section in the state and soils annual plan of operations devoted to basic soil services.

Updating Surveys

1. Many surveys are adequate as far as line work, but need recorrelation. We need to put our most skilled and capable soil scientists on surveys that need to be updated. Quality control should also be carefully maintained from the state office level.

2. The pros and cons of standardized slope breaks were discussed. It was pointed out that it is difficult to establish slope groups that fit both the users needs and also fits the appropriate landscape breaks.

SUMMARY OF GROUP DISCUSSION ON
BASIC SOIL SERVICES AND PROJECT SOIL MAPPING

GROUP #5

Group Leader: Oliver Rice Rapporteur: Ronald Hoppes

Two issues were discussed by this group - Basic Soil Services and Project Soil Surveys.

Basic Soil Services

While most administrators feel basic soil services are needed, a few State Soil Scientists noted that some have the opinion that once soils information is published in a soil survey report, soil scientists are no longer needed. Use of soil scientists to provide basic soil services has proved to be successful in many states to both SCS personnel in their planning efforts as well as to others outside the SCS.

The National Office has provided direction to states in the use of soil scientists to perform basic soil services. State Soil Scientists should also play an active role in each state in the promotion of basic soil services. Information programs should be initiated to make the public more aware of soils information. As pointed out by Ken Hinkley, from the National Office, "that once we wet the whistle of the DC and others in the use of soils information, that only then will they see the need for additional assistance from soil scientists." Only then will the administrative staff.see the need for soil scientists in roles other than soil mapping. It would also be helpful if the State Soil Scientists would provide a list to Area Conservationists of the types of basic soil services that could be performed to make the resource planning process more efficient and technically sound. Examnles of job descriptions for basic soil science positions should also be developed jointly between the Area Conservationist and the State Soil Scientist.

Reporting accomplishments should be handled in much the same way as range conservationists, engineers, and agronomists. Sufficient documentation for reporting activities can be handled through APO's and the Personnel Aopraisal Worksheets.

When selecting Soil Scientists for basic soil services positions, the selecting officer should consider a soil scientist with the following types of qualities.

1) The person should be a good salesperson with the ability to work with others, both within SCS and with planners or other groups.

2) The person should have a wide range of experience in the uses of soils and how various soil characteristics affect each use.

3) The person should be both innovative and creative.

4) The person should have the ability to work with data base systems and computers to assure that the Service has qualified soil scientists to meet the demands required for basic soil services. Training courses should be established to fill these needs. Courses should be made available in such fields as salesmanship, resource planning and development and various technical fields, such as in waste disposal, soil engineering and slope stability. To meet these training needs, the educational branch should work with both the soils and planning sections from each of the NTC's to formulate the necessary courses. Some of these courses may better be handled through universities or private enterprises. Soil scientists interested in filling basic soil services positions can also prep themselves by attending various professional society meetings, such as the Soil Conservation Society of America, American Society of Agronomy and Soil Science Society along with professional societies with sanitarians, city planners, etc. Two books recommended as being helpful in salesmanship are "The Magic of Thinking Big" and "How to Win Friends and Influence People."

Other questions or concerns related to basic soil services include:

1. How far can we go into basic soil services before we infringe on private consultants work? Most felt that there is more work to be done than all of us can accomplish and at least for the foreseable future this will not be a problem. One of the main functions of an SCS soil scientist performing basic soil services should be to assist the private consultants in making better use of soil survey reports. With our declining resources, we need to take advantage of outside resources to get the job done.

2. Many State Soil Scientists emphasized the need for additional soils information in River Basin and Watershed studies. Soil scientists working with basic soil services could provide good input into these reports. Since the River Basin and Watershed staffs normally include economists, the use of soil potential ratings would possibly be useful in their studies.

3. Soil data bases are being developed in many states as part of geographical information systems. There is urgent need for guidance from the National Office to assist states in maintaining information in a form that is usable throughout the country by many agencies. There is also need to coordinate the application of the data. A system analyist is needed to assist in designing a GIS but technical staff should be included in the development staqes to assure that information placed in data bases can be retrieved appropriately.

Project Soil Surveys

The question was raised as to how many project soil surveys each State Soil Scientist has in his state. No one in the group indicated that all their surveys fully met the requirements for project soil surveys; however, each were attempting to meet them.

All felt that they were meeting the five basic requirements shown on the attached sheet for project soil mapping. The additional requirements, however were not being met in several cases.

The major reasons for not meeting the additional requirements are shown below. They are in order of importance to preventing soil surveys from qualifying for project soil surveys.

1. Staffing With a current trend in declining funding and current restrictions in FTE, it is difficult to maintain sufficient staff on soil survey parties to complete surveys within a six year time frame.

2. Changing Priorities - National and state priorities other than soil mapping such as NRI, Heavy Metal Study, County Resource Inventories made within states, general soil maps and other activities require time by soil scientists. These activities are often not programed into staffing plans and result in extended dates for completion of soil surveys.

3. Political Pressures - Political pressures often dictate opening new surveys without having sufficient personnel to staff a survey party to complete in a six year period.

4. Photography - Securing base photography at the proper time is a problem for a few states but normally does not hold up the progress of a survey for extended periods. Some concern was made, however, that if map finishing activities are contracted or centralized that this could slow up the progress of the survey. This is based on past experiences with both contracting and centralizing of work.

Conclusion - All states are striving to use project mapping, however, with present staffing problems and other problems as related above, it may be impossible to have all soil surveys under project management.

ATTACHMENT

State Soil Scientists Workshop

February 2?-March 2, 1984

PROJECT SOIL MAPPING

In order for'a soil survey to meet the standards for project management it must meet the requirements for a progressive soil survey. These requirements are:

(1) An approved current memorandum of understanding (work plan) for the soil survey area exists;

(2) A party leader has been assigned to the area;

(3) A soil handbook for the survey area with a current descriptive legend has been approved by the state soil scientist,

(4) Mapping is underway and is being completed in contiguous blocks, or mapping has been completed and the survey is in the publication process; or

(5) A date for completion has been established and there is a plan for publication. All progressive soil surveys are to be made using project management or converted to project management as soon as possible. Project soil surveys are those progressive soil surveys using project management where--

In addition the survey must meet the following requirements:

(1) All field work, including the final manuscript draft, for the survey will be completed in 6 years or less from the date of the initial field review;

(2) The survey party consists of enough members to complete the survey within the designated time, or future staffing is planned to accomplish completion within the designated time;

(3) Base imagery used for field work Is also to be used for publication;

(4) Field correlation is made on each progress review, and progress on all survey activities is concurrent; and

(5) A current draft of the soil survey manuscript is available at the comprehensive field review.

SOIL INTERPRETATIONS COMMITTEE
State Soil Scientists Meeting
March 1, 1984

Chairman - Tom Calhoun
Rapporteur - Don McCormack

Attending - Gilberto Acevedo Ramos, Dick Babcock, Don Bailey, Tom Calhoun
Jim Carley, Jack Chugg, Charles Fisher, Louis Fletcher
Charles Fultz, Talbot Gerald, Dick Googins, Dick Hall
Rod Harney, George Hartman, Ron Hoppes, Wendell Kirkham
Gil Landtiser, Gerry Latshaw, Garland Lipscomb, Don McCormack
LeForrest Miller, Doug Pease, Sid Pilgrim, Clatie Powell
Harry Sato, Bill Shelton, Miles Smalley, David van Houten
Billy Wagner, Keith Young

The chairman mentioned three possible areas for consideration:

(1) Present interpretations,

(2) New interpretations that may be needed to assist users in the future,

(3) New methods of presenting interpretations.

Discussion was mainly on present interpretations.

1. Wildlife interpretations.

In some Western States the ratings of habitats are being dropped in favor of rating only habitat elements.

Ratings of additional habitat elements are needed.

This system is being used on a trial basis in California and other States.

Oregon staff thinks the present wildlife table does not meet current needs. They plan to omit the table and put wildlife interpretations in narrative form in the description of the General Soil Map Units.

Several people expressed a preference for interpreting wildlife for general soil map units only.

Important wildlife data cannot be obtained from SOI-5's.

Strategy has not been established for coordination of interpretations for habitat elements.

It was proposed that the approach being used for wildlife interpretations in the West be tried elsewhere.

The Western approach is outlined in the new Biology Handbook.

2. Soil-Crop Yield Data Base.

Data is to be keyed through the Harris terminal.

The manual for handling the data is being developed by the IRM staff at Fort Worth and will be sent out soon.

Virginia Experiment Station farms will submit data.

In Georgia the Agricultural Experiment Station and ARS will obtain data.

In Maine and New York, ASCS is assisting in obtaining data for their yield program. All party leaders in Maine were asked to do 5 plots and Dick Babcock says it should be an ongoing activity for all survey parties.

Several good proposals for revision of the form have been received. Revisions will be made after another year of testing.

3. Land Capability Classification.

Northeast is testing a criteria table and use of the computer to test the capability classification. The program is available through the Washington Computer Center.

Work is needed in all parts of the country on criteria for capability classification.

States in the West have criteria tables on a State basis.

Use of the "c" subclass was discussed. Several disagree with limiting the use of c subclass to soils which would be class I if irrigated.

4. T Factor.

The concensus was that there should not be a different T value for different land uses. A proposal has been made to have a 2 ton maximum limit for rangeland. The group felt that it would not be appropriate to have a 2 ton limit when a soil is used for rangeland and a limit of 3 tons or more when the same soil is used for cropland.

Concern was expressed that the range of 1 to 5 in T value is not wide enough.

Off-site damages are no longer considered a part of T. The receiving waters or area could determine the level of erosion that might be permitted on a watershed by watershed basis.

The problem of T values of more than 10 tons was discussed. There was some feeling that maximum T could be more than 5 tons.

The PSU data on K and T is inconsistent. There is a need for better coordination. The group concensus was to instruct the computer to use K and T from SOI-5's.

The question of how to show the T value of en eroded phase was raised. Instructions are given in item 17, page 603-199 of NSH.

5. Forestry interpretations.

Michigan is doing some new work with understory habitat schemes from the standpoint that they are indicators of production. Washington State is collecting data on understory. Oklahoma sees a need for better understory classification for range management.

Several pointed out that woodland sections are widely used by foresters.

Big timber companies use order 2 and 3 surveys - mostly 1:24000, scale with a minimum delineation of 10 acres.

6. Soil Range Team (SCS-BLM Coordination)

Working to achieve a correlation of plant community and soils.

Testing USLE on rangeland.

Working on present potential productivity of plant communities.

7, Urban Interpretations.

There is disagreement between States on drainage classes. One State has dropped drainage classes from interpretive rating guides. Strong sentiment was expressed for keeping drainage classes in all soil descriptions.

Slope criteria - dwellings. In the West most choice sites are on slopes but many people did not think that this is a problem.

It was emphasized that a rating of severe does not mean the soil cannot be used. The intent is to warn the users that there are soil properties or site features that are unfavorable or difficult to overcome.

There was discussion as to whether the lower slope limit should be greater than 15 percent for a severe rating. Oregon prefers to keep 15 percent. Several others agreed.

An improved definition of soil limitation is being completed. This will be put in the prewritten material.

8. Engineering Test Data.

Arizona has no agreement with the Highway Department Soils Laboratory. They had some questions as to whether the engineering laboratory was supplying valuable data. In response, there were positive statements from many State staffs about the value of the data they were receiving.

The concensus of the group was that developing new and improved interpretations will be an important part of basic soil services. It was concluded that we need to talk more with people who use the land to learn what they know about soils.

There was not much discussion on new methods for presenting soil interpretations but the general concensus was that now is the time that we should give more thought to developing new methods.

March 13, 1984

National State Soil Scientist Workshop
Washington, CC
March 1, 1984

neport of Committee on Publication Format
Charles M. Thompson, Chairman
Patricia Looper, Rapporteur

The Committee displayed a lively interest in the subject of Publication Format, discussing a wide variety of topics, and agreeing on a series of recommendations.

The main thrust of the discussion was on utilizing new, automated technology to provide soils information and interpretations to users. Other main topics were identifying user needs more precisely and reducing growing publication costs.

Coneensus was reached in five major areas of concern, as follows:

1. PRESENT FORMAT. The present format is acceptable to fulfill the intended purpose, with few exceptions. The group agreed that the present format is a vast improvement over that of older soil surveys. Also, flexibility is adequate under present policies for tailoring the survey to meet differing user needs.

A comprehensive list of 50 comments and suggestions from users both within and outside the, NCSS, compiled by Chairman Charlie Thompson, was discussed (see attachment 1). NHQ policy on many of these suggestions was clarified by referring 'to a memo prepared by Clatie Powell in April 1982 (see attachment 2). Ey and large, the group agreed that:

- Tables are preferable grouped at the back of the text, which is iess expensive than placing them in the text.

- The format presently contains sufficient information about climate, transportation, water resources, etc.

- A Z-volume format would initially be more costly, but would save money in the long run since interpretations could he updated without republishing the entire survey. Because of the added initial. cost, and attendent difficulties, however, Ken Pinkley asked that the NHQ be queried for permission before deciding on this option.

- On the proposal to combine map units and series descriptions, the group preferred to follow our current format.

- 'The use of the full quad format for maps has some advantages, sinde maps can be pulied out and used in the field. Tnis format is, however, more expensive.

- We felt that furnishing single phase interpretation sheets or Soils-5 forms to users is not as useful as furnishing tables. Single phase interpretations for map units are useful in providing information to d .c.'s, however. It was pointed out that State Offices can order individual interpretation sheets on Soils-F! forms.

- The use of color on the cover is presently against USDA policy.

- A preference for alphabetic symbols on the soil legend was expressed. Some states use hoth alphabetic and numeric legends concurrently, publishing both in the same survey.

- The use of tabular and semi-tabular map units is a current option. It was recommended that the NHQ and NTCs furnish further information and samples of these to State Offices.

2. TECHNOLOGY TRANSFER. The rapid advent of computer technology in preparing soil surveys makes it important that we improve our communications between State Offices, NTCs, and the NHQ. By sharing information on new methodology, we can both take advantage of new technology and achieve the benefits of standarization.

The committee recommended that information on the Computer Assisted Writing (CAW) system, now used extensively in the WNTC, be provided to State Offices interested in using it.

It was also recommended that the NTCs and NHQ improve methods for information transfer to State Offices.

3. USER PACKAGES. Although most counties have been furnishing information selectively to users for years the committee agreed that computerization offers new opportunities to service local users, particularly as field offices acquire persona! computers.

Much of the information in the publication is obsolete the day it is published, it was agreed, particularly soil interpretations. The published report, therefore, should be considered only as the "anchor" for updated supplemental information. A primary purpose

of the publication is to lead, users into the field office. Caution was advised, however, on giving differing interpretations to different users, since some standardization is necessary for needs such as tax assessment, for example.

Ideally, local SCS staffs should be able to access computerized data for users--a text-map-table package for example, designed to meet selective needs. State-wide soils data bases, such as those being developed in Colorado and in Indiana, will eventually he available to provide State-specific information. At present? updated interpretations car be ordered from the Ames Statistical Laboratory in a matter of days. Maps digitized to show specific interpretations are not widely available yet, but printed maps can be furnished to users until further digitization is accomplished.

Maps are not suitable for microfishe storage, according to Dennis Darling, National Cartographic Unit, but photostat copies can be made if only 1 or 2 are needed. Fred Gilbert, N.Y., mentioned that he had used the Touchet Corporation in East Syracuse to microfishe soil surveys that were in short supply, at reasonable cost.

4. COST REDUCTION. Ken Hinkley, Assistant Director, Soil Survey, stressed the need to reduce publication costs. noting tne pressing need to explore alternatives that will allow'us to reduce costs and still meet user needs.

The new ceiling on the number of publications ordered was acceptable to most committee members. Rising storage costs are a factor in large orders.

Large, multi-County surveys with full-auad maps are particular-l y expensive to print, largely because of the high cost of the jackets. A cost comparison of full-auad versus third-auad map printing is being completed by the NHQ.

Although a proposal for selling published soil surveys has been studied 2nd rejected by tne NHQ, the Committee commented on the apparent willingness of many users to pay for the publication and recommended tnat this proposal ne investigated furtner.

5. IMPLEMENTATION OF TECHNOLOGY AND COST REDUCTION. Gene Andreuccetti, STC, California, proposed tnat the anticipated cost savings from printing fewer publications be applied toward the cost of furnishing personal computers to field office personnel. He proposed that State Conservationists and legislators be appraised of new means of distributing information as tney become available. Since the publication is legislatea, we would need the cooperation of Congressmen to reduce their orders. He

proposed that our goal should he to work toward automated techniques for user packapes, to publish once-over information mainly for libraries, etc., and to provide maps to users from a digitized base.

The group aqreed that it was only a matter of time.

Summary of Comments on
Publication Format

Prepared for Discussion
National State Soil Scientists Workshop
Washington, D.C.
March 1, 1984

1. Omit the detailed descriptions given under the General Soil Map Units. This is often just a repeat of what is said under the Detailed Soil Map Units.

2. Place tables immediately after their discussion in the text rather than at the end of the manuscript.

3. It would help the user if the section with mapping unit descriptions and the section with series descriptions were combined so that all the information (except tables) for a mapping unit would be in the same location. An explanation in the introduction cad differentiate between a mapping unit and the series typifying pedon description.

4. USE THE TAXONOMIC NAME!! When the series name is used add the taxonomic classification in parenthesis (at least to the subgroup level) as is common with other taxonomies. What is the purpose of the SCS developing the Taxonomy and us teaching it if YOU won't use it? On pages 56-57 of the Nacogdoches County Survey there is a discussion of the Classification System but there is no further mention until the table on page 146. Also, the series is of little importance outside of Agriculture. The important soil behavior and land use interpretation information. is contained in the pedon description and at the family and higher levels. We are trying to get people to use and interpret the taxonomic terminology but received little help from the SCS itself. I suspect that the non-soil scientist employees of the SCS are unfamilar with the system and unable Co use it.

5. Most criticisms I have heard have been directed toward photograph quality, failure to ink cultural features (mainly roads and streams), the use of numeric symbols for mapping units, and the use of "broadly defined" map units.

Based on this experience I would be reluctant to recommend mass changes in the format. However, I personally prefer the old method of having the detailed series description and range of characteristics immediately preceding the mapping unit descriptions that are named in terms of the series. In addition, I feel that available characterization and engineering test data should be referenced after the range of characteristics paragraph. This could be done as follows: Tables 19 and 20 show the selected physical, chemical and engineering properties of a pedon representative of this soil series.

6. I think it would be appropriate for the committe to address the recent trend to publish the soil maps in the quad sheet format. It is my opinion that failure to bind both the narrative and maps portion under a common cover will not be well received by the user.

7. Do not throw away the present model.

   a. Work within the framework of the present model and make the additions and deletions necessary to meet the needs of the users in the survey area.

   b. Before accepting a completely new model (or format) require something similar to an environmental impact statement detailing the affect on overall operations from the field level to the national office to printing *and binding.*

c. Test some innovative type changes in the format, such as moving the general soil map from the back of the publication to follow the text of the general soil map section.

d. If radical changes are made in the format then phase them in gradually, rather than requiring immediate change.

8. Some sections are not given the attention that would allow the user to gain sufficient information. i.e. climate, transportation and water resources. Other sections overlap or contain the same information. i.e. general soil map units, detailed soil map units, soil series, and to a certain extent, use and management of the soils. Also, the format varies from state to state.

9. The surface geology and landform section and the formation of the soils could be placed before the discussion of the soils and their mapping units.

10. It would be nice to have the tables follow the discussion rather than have them all in one location. Some of the tables seem to be either out-of-date or are not consistent with the present knowledge of the soils. i.e. potential sand limitations of the soils, recreational development, construction materials, and engineering properties and classification.

11. The terms that are used to define the soil properties are ambigious. i.e. what does slight, moderate and severe or poor, fair and good mean?

12. There are not enough explanations as to how the survey can and should be used. We should tell the user that the survey is order, 1, 2, or 3 etc. and explain what this means. There should be a statement as to the accuracy of the survey and where and who the user should contact to obtain additional information.

13. We should do a better job of relating to the user what we mean when we use symbols and letters. i.e. we place a soil in hydrological group A, B, C, and D and we tell the user to see the description of the map unit for the composition and behavior characteristics. However, in the map unit there is abosolutely nothing said about A, B, C, or D, not even anything that mentions hydrological group. This is only one example. There are many others in the report.

14. We give the report to a potential user and say "Here, this will solve all your soil problem." Actually, we have just started his problems because we do an extremely poor job in helping him use the survey. Part of this is a format problem and the rest is the lack of information on its use. A potential user will not visit his district conservationist 5 to 10 times to find out how to use the survey, expecially when some conservationists do not know what the terms mean either.

15. There is much repetition in some parts of the report. i.e. General Soil Map Units vs. detailed Soil Map Units vs. Soil Series and their morphology. Although it would require considerable work initially to revise these sections, I believe they could be combined (totally or in part) and meet the needs of the different target groups - perhaps even better than the present format.

16. Grouping the tables together has some advantages. I believe the disadvantages outweigh the advantages. i.e. difficult to locate, segregated from applicable written material, less likely to be studied by readers.

17. Many of the 'General Nature of the Parish' subsections should either be deleted or expanded to adequately treat the subject. This is especially true of the 'climate' section. Typical subsections now range from about 60 to 400 words. Very little definitive information about either climate, agriculture, transportation, or history, for example, can be transmitted in such brief statements.

18. In many reports there is a discussion of the individual soil map units x and Y as well as a discussion of an X-Y complex. The X-Y complex discussion essentially repeats information given in the individual X and Y map unit discussions. In the X-Y complex discussion, why not reference the other material and give more detailed information about those things that differ because of the complex occurrence? i.e. Drainage, fertility, irrigation, tillage, etc.

19. We have added a section 'Soil Fertility Levels' which includes a discussion and data showing profile fertility level of a representative pedon of each soil mapped in the parish. Response from users has been very positive. Likewise, we've revised the Geology section to 'Landforms and Surface Geology' and write the section based on field studies and oriented toward soil-geomorphology-parent material relationships. We have also revised both subsections of "Formation of the Soils' and oriented them to actual factors and processes influencing soils in the survey area. These revisions too have been well received by users.

20. I think we need to take a close look at the information that goes into some of our tables such as 'Yields Per Acre of Crops and Pasture', 'Engineering Index Properties' and 'Physical and Chemical Properties of Soils.' These are important tables and large amounts of supporting data are required if they are to have maximum value.

21. For a long time we have talked about making more generalized, non-agricultural interpretations in areas used mainly for rangeland, woodland or cropland, especially where map units are largely associations or other broadly defined units. I feel like we need flexibility to do this in some areas. Presently, I'm not sure how much support this would have.

22. Something that does bother me, concerns the way we package Soil Surveys with folded full-quad maps. What we do to save a few dollars is a disgrace to SCS and certainly does damage to our creditability. We have fought this battle before and lost. I suspect the western states would give support for a change if given the chance.

23. I think we will see the general soil map moved to the front of the text where -it should be.

24. If we could get some colored photographs accepted at least for the cover -- this would be a great improvement. We have fought this battle -- and lost.

25. I'd like to see more characterization data to document the properties of at least the more extensive soils.

26. The accuracy of soil survey mapping units should be expressed in probabilities. The user too often, regardless of disclaimers, assumes that mapping units are "pure" or at least nearly so.

27. The increased use of soil potentials would enhance most soil surveys.

28. The woodlands section is too brief, especially in counties where forestry is the dominate land use. The survey report needs more interpretations if foresters are to use the survey.

Specific interpretations suggested are:

a. Better productivity ratings.

b. Limitations of site for commercial forestry, such as steep slopes, rugged topography, high sodium, shallow soils, etc.

C. Recommended type of site preparation (herbicides, chopping, shearing, bedding, etc.).

d. Type and amount of fertilizer most likely to give economic returns.

e. Hazard ratings for insects and pathogens (diseases) that are site related such as southern pine beetle, annosus root rot, littleleaf.

29. My first Idea on publication format is to have a way of up-dating sections of the reports as changing needs dictate.

For example, many survey areas are correlated without much laboratory analysis. Later, when data is available, some soil series names need changing. I would like to be able to do this. As yields and management change, these sections need to be updated too.

30. An ever present problem with soil survey publications is that we try to make it cover all things for all potential users. Consequently, it often falls short in accomplishing that goal, desirable though it may be.

I admit that I am not computer literate, but a detailed soil survey data base and detailed sections in a computer memory could be used to generate specific reports for specific desires. In addition, special manipulations of the field sheets could also be tailored to specific wants.

31. I believe that my main overall concern has been that in trying to serve such a wide variety of user groups with their increasingly specialized requirements and demand for soil data, we may not be serving any one user as well as we could. If we combine this problem (if it is one) with our continuing and grossly unsatisfied need to educate users on what the survey is and how it can be used I think we have the basis for a radical change in format.

Rather than try to satisfy everyone in the report should we first produce a readily understandable detailed soil. resource inventory without interpretation? This would allow us to retain, document and communicate some of the soils knowledge that leaves the county in the heads of the survey party. This would permit a rigorous assessment of soil conditions, properties, landscape distribution, spatial variability, etc. etc.

To serve individual user needs with a more in-depth treatment we then could prepare supplements dealing only with particular groups of interpretations. A much more thorough, tailored evaluation is accomplished. Furthermore this could be designed so as to provide examples and illustrative information to teach the use and application of soil. survey data for the particular use. These user focused supplements could be localized to adapt to local needs. Such an approach could be much more "user friendly" and would have the potential for more of a self-teaching concept of soil survey data.

32. Certainly the future of many of our scientists as consultants rather than map makers is heavily dependent on a demand for soil services. If that demand hasn't been established by the time the mapping is completed then I am concerned whether grass roots support for soil scientists and their services can be generated. zIt is my feeling that development of a strong public demand and support for soil survey information should now be given top priority. Perhaps a change in format that would more strongly satisfy and stimulate users would be a major step in this direction.

33. Need more cultural details on the maps including roads, power lines, gas lines, cemetaries, schools, etc. to aid the user in locating parcels. Several indicated that is a major deficiency.

34. Place the Table of Contents on the first page so the user sees it immediately upon opening the report.

35. More emphasis is needed on soil occurrence on landscape units including percentage occurrence.

36. More information is needed on vegetation occurrence, what are dominant vegetation types and what are minor species, and understory.

37. Need more site specific data for each county.

38. Need more individual input from the survey party on what they saw and observed in the survey area. Many feel the pre-written material detracts from the maximum usefulness that could be made of surveys with more local data base.

39. Some users feel it is a detraction to have the pedon descriptions separated from the detailed map units.

40. Some users feel it is very confusing to have different order surveys on the same map.

41. Need for more detail was expressed in wooded and non-wooded areas.

42. I would like to see the general soil maps overlay an ultra-small scale orthophoto image or even a satellite image, to indicate the types of land use/land cover overlying the particular general soils delineations.

43. To get maximum use of scarce resources in inventory and management of resources, our one driving need is to produce similar format products from diverse federal, state, local and private sources. There is no other way to obtain the data we need to manage resources optimally. The SCS should produce county soil survey data which is additive to data obtained from various other sources.

44. Improve detail of mapping unit descriptions and make this section more visible in the report.

45. Need to include L.S. factors for mapping units.

46. Need to allow more flexibility in manuscript format from one location to another. Example: Need more woodland management detail in forested area.

47. Consider tabular type presentation mapping unit descriptions to allow easy comparison.

48. Allow more detail in the report (or an accessory publication).

49. Describe inclusions in more detail (to maintain creditability).

50. Consider including statical data from transects particularly regarding mapping unit purity (confidence).

51. Get better yield data.

52. Use color photography were possible.

53. Consider hiring an out-side firm to write reports.

54. Strive to shorten the publication process.

55. Consider publishing interpretive information in one publication and maps and technical data in another.

56. Develope better cooperation with Extension in selling "Soil Survey information."

57. Expand discussions of limiting and nonlimiting inclusions.

58. Where possible, describe erosion productivity relationship and variation of soil surface thickness.

Summary of Recent Suggestions Regarding Changes Needed in Content and Format of Published Soil Surveys

The suggestions that we received recently from the private and public sectors regarding the changes needed in content and format of published soil surveys have been grouped according to these seven general kinds:

1. Suggestions that States already have the flexibility to incorporate.

Many of the suggestions ware in this group. No changes in policy or authority are needed. States and NTC's are being notified.

Examples of this kind of suggestion follow:

- Write one or two pages on Soil Taxonomy as it applies to the survey area.

- Include in each series description a paragraph on the associated soils. Not only list the other soils that border or are intermingled with the soils being described but elaborate on the landscape pattern, and the major morphological properties of the associates.

NHQ response: This is permissible and commonly done.

2. Suggestions that already have been implemented or implementation is under way.

Some examples follow:

- Add a column to Tables B and B1 (Yields per acre of crops and pasture) showing the land capability class and subclass.

NHQ response: A draft of a NSH revision providing procedures for showing land capability was sent in January 1982 for review by NTC's, States, and NCSS cooperators (see NRA Bulletin No. 430-2-8).

- Provide better disclaimers where appropriate.

As an example, we are proposing that a statement be added to the headnote for Tables H, L, M, N, and P pointing out that the information in these tables indicates the dominant soil condition but does not eliminate the need for onsite investigation for design purposes.

- Use a better quality paper to provide more durable covers. The present covers won't stand field use.

NHQ response: We recently upgraded our cover stock. The weight of the paper is defined in our current printing contract. We suggest that State

offices and soil scientists purchase protective covers for surveys for field use.

- Make better use of bold letterhead and other methods to emphasize special points.

NHQ response: We have already done this. See Exhibits 1 and 2.

- Show the date of imagery on the index to map sheets.

NHQ response: There are no objections to this suggestion. A note giving the date (year or years) and the source of imagery would appear to be appropriate. We are recommending to Cartographic that this be done nationwide. The note will be located so that it is visible after the index map has been bound in the publication. This information already is on each map sheet but in binding the publication the information is obscured.

3. Suggestions that 'definitely have merit and which the Soils Staff has plans to develop.

some examples follow:

- Give more and better information on how to use the soil maps and text in published soil surveys. This should be in addition to the statements and illustrations on how to reach the maps and use the tables.

NHQ response: We propose to develop a brochure on how to use the published soil survey that could be handed out with copies of the publication. We would want to give examples of some of the uses such as how to make a "flood-prone" map or a prime farmland map for a specific tract of land from the information in the published soil survey.

- Need more information on applying waste water, solid wastes, and sludge on different soils.

NHQ response: We note that the NTC's proposed high priority be given to studying and determining whether helpful data and information can be published. Guidelines for these interpretations will be included in Section 603.03 of the forthcoming update of NSH. We agree to increased emphasis on this point.

- Place the introductory and explanatory material for tables with the tables.

NHQ response: This option is possible if requested. There are two options: tables could be placed in the text, or explanatory material could be placed in the back of the publication with the tables. In either case, additional programing and format revision would be required. This must remain optional because some users commented on how useful it is to have the tables together to facilitate referring to two or more tables at the same time.

-- Tailor the survey to the area and for the purpose it is to be made. All of the available interpretations are not needed in some surveys. For example,

where a survey area contains large blocks of government or corporately owned land, there is a relatively small. number of potential users and an especially good opportunity to tailor the publication to their needs.

- Focus or emphasize the main land issues in the area. The lack of this is one of the greatest deficiencies in pubished soil surveys. The format has become so standard that it is difficult to tell whether the survey is in a highly urbanized area, an important agricultural area, an extensively mined area, or an area of predominantly woodland or range. For example, if the extent of surface mined soils is increasing rapidly, tell the user that many acres shown on the soil map as unmined soils are now mined. Also summarize the total acres mined as of the date of publication. The choice as to which issues need highlighting is strictly local.

4. Suggestions that need to be called to the attention of another discipline.

This has been done. Some examples follow:

- Include bearing capacity in engineering tables.

NHQ response: We discussed this suggestion with James Talbott (National Soil Engineer). Jim pointed out that "bearing capacity," like "shear strength," depends on the weakest layer of the soil (like the weakest link of a chain) and requires a site specific evaluation. For this reason, the accuracy of broad interpretations of the bearing capacity of soils generally is questioned (how determined, what method was used, how accurate, etc.). Results available from standard tests on individual soils under stated moisture conditions may be given in published soil surveys, but the methods used and validity of results must be fully explained.

- Develop a list of prima forestland soils comparable to the prime farmland soils.

NHQ response: We will pass this suggestion on to Bob Hartung (the national forester).

- Make it possible to use color covers on selected soil surveys, especially where the conservation district or others are willing to provide the extra funds.

NHQ response: The question of color covers is being presented to Mr. Myers for consideration. When a decision is made, a bulletin will be issued.

- Give high priority to investigate whether quality of base maps can be improved.

NHQ response: This was a repetitive suggestion. Contrast and resolution can probably be increased over time, but what is already in the pipeline is probably locked in because of the film and flying specifications that have been used in the past. Soils staffs in States will need to work closely with their cartographic liaison and NTC soils staffs if we try to increase contrast and resolution, to be sure that we don't overcorrect and

that contrast and resolution are really the problem. We also suggest that State Conservationists consider providing soil surveyors with reversal type color infrared photographs for field mapping when such source materials are available.

- Place grid ticks showing UTM coordinates on atlas sheets.

NHQ response: We are not in favor of putting UTM coordinates on the atlas sheets. It can be done, but we believe it would add clutter to the borders of the map sheets. The Cartographic Staff does not have the manpower to add this additional set of grid ticks on the map sheets in the preliminary drafting stage. If the State desires that these be shown on the final publication, the Cartographic staff would work with the States in developing proper procedures in portraying this information. We recognize the fact that many of the States served by the South National Technical Center are using UTM coordinates as part of their MIADS encoding process. We, however, recommend that UTM coordinates be added to the soil survey maps after publication for only those surveys encoded using the MIADS procedure.

5. Suggestions that warrant further consideration.

We will use on a trial basis some of the following:

- Study feasibility of publishing the soil survey in two volumes -- one bound (technical material and soil maps) and one unbound as a loose-leaf type (soil interpretations) with both volumes put in a jacket. Update the interpretations periodically.

NHQ response: This proposal warrants further study. While it is not cost effective, the ease of updating interpretations and possibility of printing fewer copies may reduce cost.

- Eliminate from map unit descriptions those conservation practices that tend to apply to most of the map units and develop a table or text to relate the most appropriate practices to given slope and erosion phases.

NHQ response: We need to see samples before making a decision. This format offers the opportunity to emphasize management statements that are unique to a particular map unit and to shorten map unit descriptions by eliminating those statements that apply to nearly all of the soils. On the other hand, it conflicts with the Vaught Committee's recommendation to accommodate the users by giving this information for the map unit in one place.

- Place the general soil map and text together (or place text on the back of map).

NHQ response: The feasibility of this proposal needs further study. Maps are easier to handle in the publication if they are grouped together. If the text is placed on the back of the map, it may be difficult for the reader to refer to both map and text together. Also, if the text is moved to be adjacent to the map in the back, there are formating problems. Either way, coordination with Cartographic would be required to effect the process.

6. suggestions that were not approved or approval was qualified.

Examples follow:

- Design the published soil survey to be more like a technical guide.

NHQ response: There is no intent for the published soil survey to replace or compete with the technical guide. The published soil survey records as a permanent record a map that shows the location of the different kinds of soil in the area and text that describes each and gives some interpretive information on suitabilities and limitations of soils for selected uses. In some cases, corrective measures also are given for overcoming the soil limitation for selected uses. On the other hand, the technical guide contains much more detailed and specific information such as spacings between drains or slope gradients of certain soil structures tied to kinds of soil. The information in the technical guide is much too detailed and voluminous to publish for each survey area. Past experience has shown that it is highly desirable to have an experienced person working with the potential user to help interpret the technical guide information.

- Extend soil descriptions to a greater depth, estimate depth to bedrock where the soil is thicker than 60 inches, and interpret the soil material between the bottom of the solum and bedrock.

NHQ response: The concensus of replies from the NTC's was that this generally is not feasible. We especially do not want to encourage interpreting soil material below a depth of 60 inches for each soil in the tables of engineering interpretations. On the other hand, we see no particular problem in including for map units or taxonomic units the description of a profile of a particular soil described to a depth of more than 60 inches if the party leader is confident about the properties of that part of the profile.

We see merit in recording some of the survey party's observations about the soil material below a depth of 60 inches if the party leader feels that these observations are useful. The underlying material. for some soils is reasonably uniform and the party leader can give some useful information not available elsewhere. These observations may be summarized in the discussion of parent material or in a special section written by a geologist and soil scientist and tied to individual soils. Where appropriate, such a special section should describe bedrock characteristics for map units or groups of map units.

- Include in the published soil survey, as a foldout, an important farmland map at a scale of about 1:100,000.

NHQ response: We agree with the NTC that submitted this suggestion that the disadvantages outweigh the advantages. Prime farmland or other important farmland maps should not be included in published soil surveys as there is a tendency to use this kind of map to the exclusion of the detailed soil map sheets.

- Publish all soil surveys at a scale of 1:24,000.

NHQ response: This should continue to be optional to the States based on their program needs.

- Rate specific soil horizons as substitute material for topsoil for use in areas where there is surface mining of coal and oil shale.

NHQ response: This should not be done in published soil surveys. There is the possibility that we might conflict with existing surface mining laws.

- Give States the option of using SOILS-5's in lieu of the interpretive tables in published soil surveys.

NHQ response: We recognize the SOILS-5's have been helpful in getting advanced soil interpretations in the hands of some users before a survey is published, but we do not want to substitute them in lieu of the interpretive tables in published soil surveys. We generally have followed the Vaught Committee's recommendation that published soil surveys contain technical information presented for both the nontechnical and technical users. The computer-generated tables, from information stored with SOILS-5's, are easier for many nontechnical users and they make it much easier for any user to compare soils for a specific use or soil feature.

- Restore the old guide to map units.

NHQ response: It is not feasible to return to this guide. Most of the requests that we have received for this were for the purpose of having one place in the publication that gives the land capability for each map unit. We agree with Joe Nichols that since land capability is being added to Tables B and B1, it is not necessary to restore the old guide to map units. Mike Stout also pointed out that our format has changed considerably from what was used when we had the guide to map units. The best that we could do now would be to list the map units and the major interpretive groups to which they are assigned. It is not possible to refer to pages where capability units, range sites, or other groups are discussed because management is not given by interpretive groups in the current format.

- Place publication date on cover and on spine.

NHQ response: This procedure was dropped in response to the Vaught Committee's recommendation. The Committee's thinking was to try not to "date" the information in such obvious places because much of the contents of the publication (such as soil descriptions, test data, and some interpretations) do not become outdated for many years.

- Do not publish a survey without some sort of picture or cover graphics.

NHQ response: We make every effort to publish soil surveys with a photograph on the cover, provided the State office submits one that is suitable. On the other hand, if the survey is ready to send for publication, we would not want to delay it just because there is no cover photograph or cover graphic.

-- Wake and publish soil potential studies where applicable.

NHQ response: The concensus of opinion from the NTC's was that these studies are definitely needed, but they should not be included in published

soil surveys. The soil potential ratings developed from these studies, of course, are appropriate and may be included in the published soil survey if desired by the State.

-- Eliminate such standard statements as "runoff is rapid and the hazard of erosion is high" from map unit descriptions, There are other soil qualities just as important so there is no reason to list those two and none of the others.

NHQ response: There is flexibility to cover the soil properties significant to use and management of the soils in the area. Soil qualities other than those giving runoff and erosion hazard may be listed. In many survey areas, however, erosion is a concern even in wooded areas in constructing and maintaining roads, logging trails, etc. Erosion control is a primary responsibility of the SCS and as such should be emphasized.

-- Flag soils that have toxic elements.

NHQ response: Toxic elements should be discussed in map unit descriptions but map units should not be flagged in a legend or list or on the soil map. If for some reason we failed to flag a soil that is toxic and some user was affected by the toxic condition, someone might try to fault SCS.

-- Add terms such as argillic, chroma, euic, hue, and mesic to the glossary.

NHQ response: These terms should not be added to the glossary for two reasons. First, they are used only in the most technical parts of the publication and these parts supposedly will be used only by technical people who will know what the terms mean or where to find a meaning. Secondly, most of these terms would require a lengthy explanation, if added, much longer than the others in the glossary.

-- Address land use and management in more precise and practical terms in published soil survey for areas dominated by public land. For example, include: logging and yarding systems, cutbank stability, sidecast stability, seeding potential for disturbed areas, fertilization responses, effects of burning slash, effects of controlled burns, effects of wild fires, brush control practices, road location and construction practices, reservoir and watering pond location and design, surface runoff disposal on disturbed areas, competition effects of grasses and shrubs, and ORV effects.

NHQ response: It is permissible to discuss the soil related aspects of the preceding items in use and management interpretations of soils in map unit descriptions and management sections. The published soil survey, however, should not cover such items as specification of design for specific engineering structures. Professional help (engineer, district conservationist, technical guide, etc.) generally is advisable for special design information.

7. Suggestions that need continued emphasis at all levels of SCS, dealing with-an effective public information and education program. An effective public information and education program is essential to achieving full use of the soil survey.

NHQ response: The following two suggestions that we received relate to the preceding statement and we consider them of vital importance:

- Develop better training procedure for users. Several replies pointed out that most of the commonly requested information is already in the published soil survey.

- Conduct an effective continuous effort informing the public about benefits of a soil survey. The increasing pressures of population growth will make soil surveys even more needed in the future.

EXHIBIT #1

mottled sandy clay loam. Below that is strongly cemented sandstone.

Permeability is moderate, and available water capacity is very tow, Surface runoff is slow. The surface layer is crusty and become5 hard and massive when the soil is dry. **The hazard** of soil blowing is slight. The hazard of water erosion is severe. The root zone is shallow over sandstone.

included with this soil in mapping are small areas of stony Bonti and Vashli soils. These closely similar soil5 are in area5 of 2 to 15 acres and make up 10 to 30 percent of most areas. A few spots of very stony Shavash soils that are less than 3 acres are also included.

This Shavash soil is used as rangeland and is moderately well suited to this use. The potential plant community is a post oak savannah with an understory of tall and mid masses. The oredominant plants are-

- little biuestem-30 percent
- big bluestem and indiangrass- percent
- sand lovegrass—10 percent
- forbs. such as trailing wildbean, partridge pea, dayflower. dalea, catclaw sensitivebrier, dotted gayfeather. senna, croton, and western ragweed-5 percent
- woody plants, such as post oak-15 percent
- greenbrier, bumelia, pricklyash, blackjack oak, western soapberry, plums, grapes, and sumac-5 percent.

Other important plants are sand dropseed, tall dropseed. purplelop tridens, silver bluestem, and Texas bluegrass.

Big bluestem, indiangrass, sand lovegrass, and palatable forbs are preferred by livestock; therefore, they are grazed out first if grazing is not controlled. They are replaced by silver bluestem. tall dropseed. Texas wintergrass, and woody plants. Continued overgrazing causes a decline of these plants, except for post oak and woody plants which continue to increase along with an invasion of fall witchgrass; hooded windmillgrass; red, tumble, and gummy lovegrasses; fumblegrass; threeawn; mesquite; juniper; and catctaw. The plant community can degenerate to a thick stand of trees and brush.

Potential for wildlife habitat is fair; Dear, turkeys, squirrels, quail, and dove inhabit this area. They feed extensively on acorns and other mast. Other small animal5 and birds feed and raise their young on this site. Birds also nest here. If brush is dense, habitat fcr most wildlife species declines, although deer use the brush for escape and resting cover.

This Shavash soil is poorly suited to use as cropland and pastureland and is poorly suited to urban uses. Shallow soil depth and large stones on the surface are the main limitations. The soil is also poorly suited to most recreation uses.

This soil is in capability subclass VIs and the Loamy Sand range sito.

41—Thurber clay loam, 0 to 1 percent slopes. Th deep, moderately well drained. nearly level soil is on broad upland valleys. Areas are irregular to oval in sha and range from 5 to 150 acres.'

Typically, the surface layer is *brown* **clay** loam about inches thick. From a depth of 6 to 45 inches is clay tha is dark grayish brown in the upper part and tight brownish gray in the lower part. At a depth of 45 to 60 inches is very pale brown clay loam that has many soft masses of calcium carbonate. Reaction is neutral in the upper part of this soil and moderately alkaline in the lower part.

Permeability is very slow, and available water capacit is high. Tilth is poor. The surface layer is very hard and massive when the soil is dry. Runoff is slow. The hazards of water erosioh and soil blowing are slight. Th! soil can he worked easily in a very narrow range of moisture content. The root zone is deep, but root penetration is restricted by the dense, clayey lower layers.

Included with this soil in mapping are small areas of Hassee and Leerav soils. Hassee **soils are as much as** 5 acres and are occasionally ponded. Leeray soils are in positions similar to the Thurber soil but have deep cracks when dry. The included soils are less than 10 acres and together make up about 10 percent of most mapped areas.

This Thurber soil is dominantly used as rangeland and is moderately well suited to this use. The potential plant **community is a** mid and short grass prairie. The predominant plants are-

- sideoats grama—20 percent
- vine-mesquite-20 percent
- Arizona cottontop—10 percent
- forbs, such as sagewort, heath aster, verbena, greenthread, and Maximilian sunflower-5 percent
- **woody** plants. such as lotebush and mesquite-5 percent
- blue grama, silver bluestem, Texas wintergrass, tall dropseed. buffalograss, curlymesquite, and white tridens make up the rest.

Sideoats grama, vine-mesquite, blue grama, Arizona cottontop, and the perennial forbs are preferred by livestock; therefore, they are grazed out first if grazing is not controlled. These plants are replaced by an increase of silver bluestem, buffalograss, Texas wintcrgrass, tall dropseed, and perennial threeawn. Continued overgrazing causes **a decline in most** of these plants and **a** continued increase of lotebush along with an invasion Of mesquite, pricklypear. tasajillo, annual lovegrasses, hairy tridens, and tumble lovegrass.

Potential for wildlife habitat is fair. This area is inhabited by dove, quail, rabbits, and deer. Ample food for birds is produced. Deer use this area for supplemental grazing along major drainageways, where adjacent Protective cover is abundant.

This soil is moderately well suited to use as cropland. Small grain and grain and forage sorghums arc grown.

EXHIBIT #2

›plying capacity is 10 to 22'inches. Effective rooting ›th is limited by a seasonal high water table that is at lepth 01'12 to 36 inches in winter and spring. Runoff is w, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigaled hay and sture and as homesites. A few areas are used for reation and dryland pasture.

Hay and pasture.—This unit is suited to irrigated hay d pasture, It-is limited mainly. by wetness. Crainage is eded for maximum production of crops. Tile drainage n be used to lower the waler table if a suitable outlet available.

n summer, irrigation is also needed for maximum ›duction of most crops. Sprinkler irrigation is the most table method of applying water. Applications of gation water should be adjusted to the available waler ›acity, the water intake rate, and the crop needs to ›id overirrigating and leaching 01 plant nutrients. veling helps to insure the uniform application of water. Successful establishment and proper distribution of ›dlings can be insured by driifing the seed. Using nagement that maintains optimum vigor and quality of age plants is a good practice. Fertilizer is needed to ure optimum growth of grasses and legumes. Grasses ›pond lo nitrogen, and legumes respond to sulfur and ›sphorus.

Proper stocking rates, pasture rotation, and restricted zing during wet periods halp to keep the pasture in ›d condition and to protect the soil from erosion. azing when the soil is wet results in compaction of the face layer, poor tilth, and runoff. Periodic mowing and ›ping promote uniform growth, discourage selective zing, and reduce clumpy growth.

This unit has few limitations for pond reservoir velopment (iig. 3).

Homesites.—If this unit is used for homesite velopment, the main limitations are wetness and derately slow permeability. Because of these itations, septic tank absorption fields can be expected function poorly.

Drainage is needed if roads and building foundations constructed. Wetness can be reduced by installing in tile around footings. Buildings and roads should be signed to offset the limited ability of the soil in this unit support a load.

Recreation.—If this unit is used for recreational velopment, the main limitation is wetness. Providing inage helps to overcome this limitation.

This map unit is in capability subclass IIw, irrigated and nirrigated.

5B—Barron coarse sandy loam, 2 to 7 percent ›pes. This deep, somewhat excessively drained soil is toe slopes and alluvial fans. It formed in colluvium d alluvium derived dominantly from granitic rock. The getation in areas not cultivated is mainly Douglas-fir, nderosa pine, Pacific madrone, California black oak, ›iteleaf manzanita, and grasses. Elevation is 800 to 2.500 feet. The average annual precipitation is about 30 to 40 inches. the average annual air temperature is 52 to 54 degrees F. and the average frost-free period is 140 to 170 days.

Typically. the surface layer is dark grayish brown coarse sandy loam about 9 inches thick. The subsoil is light olive brown coarse sandy loam about 25 inches thick. The substratum to a depth of 60 inches *or mors* is light olive brown coarse sandy loam. It is underlain by bedrock.

Included in this unit are about 10 percent Clawson soils in depressional areas, 5 percent Jerome soils in drainageways, and 5 percent Holland soils. Also included are small areas 01 Siekiyou soils. The percentage 01 included soils varies from one area to another.

Permeability 01 this Barron soil is moderately rapid. Available water capacity is abou: 4 to 7 inches. Water supplying capacity is 10 to 14 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and tha hazard of water erosion is moderate.

This unit is used mainly for irrigated hay and pasture and as homesites. It is also used for recreation, dryland pasture, other adapted cultivated crops, and timber production (fig. 4).

Hay *and pasture.*—This unit is well suited lo irrigated hay and pasture. The main limitations are droughtiness and the hazard of erosion. Crops that are tolerant of drought are best suited because the available moisture is not adequate for good growth of other crops.

In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigalion is the most suitable method of applying water. Use of this method permits the even. controlled application of water. reduces runoff, and minimizes the risk of erosion. Applications of irrigation waler should be adjusted to the available water capacity, the water intake rate, and the crop needs to avoid overirrigating and leaching of plant nutrients.

Seedbed preparation should be on the contour or across the slope where practical. Successful establishment and proper distribution of seedlings can be insured by drilling the seed. Using management that maintains optimum vigor and quality 01 forage plants is a good practice. Fertilizer is needed to insure optimum growth of grasses and legumes. Grasses respond to nitrogen, and legumes respond to sulfur and phosphorus.

Seeding early in fall. stubble-mulch tillage, and construction of terraces. diversions, and grassed waterways help to control erosion. Piping is a concern. however, if the unit is used for the construction of terraces, diversions, embankments, dikes, and levees.

The organic matter content can be maintained by using all crop residue, plowing under cover crops, and using a suitable cropping system. Returning crop residue to the soil or regularly adding other organic matter improves fertility. Crop residue left on or near the surface

Understanding Soil Taxonomy: some comments

Richard W. Arnold

INTRODUCTION

At a meeting of SCS State Soil Scientists in February 1984, we discussed what was happening or not happening with Soil Taxonomy. I expressed a concern that many ideas and suggestions had not received adequate attention because there was a general lack of understanding of the abstract definitions and underlying genetic concepts that guide the development, application, and eventual modification of our soil classification system. After some discussion, I agreed to develop a draft set of definitions for review and comment by members of the National Cooperative Soil Survey. It was thought that a well stated set of definitions would be of benefit to all of us. I have taken the liberty to provide additional comments which may assist you in developing stronger and more consistent definitions. Remember, we aren't building a new system; we are trying to better understand our current one and to better guide our future activities in soil classification.

SOME BACKGROUND

As we observe soils we note that most of the properties we measure are physical ones which have developed over a relatively long pedologic time span. These are patterns of structure, consistence, texture, coarse fragments, color and sometimes specific chemical compounds, like carbonates and salts. These are like historical markers and need to be interpreted as such.

We also observe and record temporal properties that are generally characterized by systematic patterns. Included are moisture contents, temperatures, pH, and compounds related to moisture conditions such as nutrients and organic matter. These are dynamic, changing features that are associated with and respond to current events.

An interesting observation was made recently by Dr. A. Sokolov, an outstanding pedologic philosopher. He pointed out that soil classification might advance more if a double scheme were developed. One scheme would deal with the static-historical-genetic development of soil properties and the other would be concerned with the dynamic-temporal-genetic features responsive to the processes that are active in soils. If both schemes were developed and then merged, the resulting system might be very effective in resolving conflicts in classification and also be useful in identifying components in landscapes.

Soil Taxonomy, like all systems currently in use, combines both schemes with little attempt to explain the differences between historical and dynamic approaches. The <u>orders</u> emphasize historical concepts and associated properties with the exception of the Aridisols which relate more to dynamics. The <u>suborders</u> emphasize the dynamics of current processes, however, some properties selected may be static-historical ones. The <u>great groups</u> emphasize subordinate dynamic conditions, but again some of the properties selected are static-historical ones. The <u>subgroups</u> permit both static and dynamic properties to indicate blending of processes or other conditions that contribute to the homogeneity of a class. The <u>families</u> use both static

(particle size) and dynamic (temperature) soil properties. The series rely more on subdivisions of static-historical properties, such as horizon thickness or type of material, than on the dynamic, changing features.

DEFINITIONS OF CATEGORIES

The hierarchy of Soil Taxonomy requires that appropriately abstract definitions be used for the higher categories. The order is the most abstract and its classes the most inclusive ; the series in the least abstract and its classes the most exclusive. The definitions of the categories guide the selection of soil properties to be used at each categorical level.

Order: Soils whose properties are the result of major processes of soil formation.

Neither the genetic processes nor the soil forming factors are precisely known but the accepted concepts influence the selection of properties. Many of the features are thought to have taken a reasonably long time to develop and are stable in a pedologic sense. Soil properties selected are mainly static-historical ones.

Suborder. Soils whose properties (in addition to those of the order) are major controls, or reflect such controls, on the current set of soil forming processes.

Often the properties selected are dynamic, such as the moisture regimes; others may relate to materials or processes that retard horizon differentiation.

Great Group Soils whose properties (in addition to those of the order and suborder) are subordinate or additional controls, or reflect such controls, on the current set of soil forming processes.

Subgroup. Soils whose properties (in addition to those of the order, suborder and great group) are the result of either (a) a blending or overlapping of sets of processes in space or time that cause one kind of soil to develop from or toward another kind of soil that has been recognized at the great group, suborder or order level, or (b) sets of processes or conditions that have not been recognized as criteria for any taxon at a higher level.

Those properties of blending are intergrade properties, and those not previously recognized in the system are extragrades.

Family. Soils whose additional properties reflect the potential for further change.

Particle size and mineralogy are mainly capacity factors and soil temperature is an intensity factor.

Series. Soils whose properties reflect relatively narrow ranges of factors of soil formation and of processes that transform parent materials into soils.

As can be noted in the above definitions , the properties that have been selected in Soil Taxonomy can be thought of as "marks" or "evidence" that we believe are highly correlated with abstract processes of soil formation, with controls of current processes, with potentials for change, and with limits of variability.

SOME REFLECTIONS

Some people have asked why the phrases "or reflects such controls" is added to a definition. Is it not sufficient to state that the properties "are the result of?"

The dryness of soil with an aridic moisture regime (most of the Aridisols) can be thought of as the result of an absence, or a very low degree of expression, of soil forming processes. It may be a near-zero degree of a process, or it may itself be a dominant process depending on one's viewpoint.

Many properties of Orthids and Argids are not the result of current processes but they do control current alterations that can and do take place. Someday we need to deciee if Aridisol is an appropriate order.

It is not known how or why an umbric epipedon in an Umbrept or the organic carbon in a Humox exert a major control of current process. Instead we think of these properties as reflecting processes that are controlling organic carbon production and destruction in these soils. It appears that we use these properties as surrogates for the controlling features.

At the order level in Soil Taxonomy the sets of soil forming processes have been broadly grouped into 10 classes. The proposed Andisols would represent an 11th class. In very general terms the sets of processes are those that favor:

1. the production and accumulation of organic materials over those of deterioration and destruction (Histosols)

2. the production and illuvial accumulation of Al-humus and associated compounds (Spodosols)

3. the presence of low charge, mainly pH dependent, constituents (Oxisols)

4. a limited capability to form horizons due to significant amount of high shrink-well components (usually smectites)(Vertisols)

5. a very low capability to undergo transformations due to the lack of soil moisture (Aridisols)

6. the presence and/or illuvial accumulation of crystalline clays and a relatively high base reserve in the substratum (Alfisols)

7. the production and maintenance of a base-rich, organic enriched surficial horizon and a high base reserve (Mollisols)

8. the presence and/or illuvial accumulation of crystalline clays and a relatively low base reserve in the substratum (Ultisols)

9. The alteration of parent materials and initiation of horizon differentiation (Inceptisols)

10. The presence of materials that may be altered to form horizons with the advent of more pedologic time (Entisols) and

11. The transformation of parent materials (mainly volcaniclastics) and the presence of extractable Al (Andisols).

In a similar way the properties used at each categorical level can be evaluated for their appropriateness of providing evidence that supports the category definition and for their priority use relative to other properties that also satisfy the definition.

The National Soils Handbook--How to Use It [1/]

Richard W. Arnold, Director, Soil Survey Division

The National Soils Handbook (NSH) is intended to guide various soil activities of the National Cooperative Soil Survey and not only those within the Soil Conservation Service.

Major Soil Conservation Service policy is in the SCS General Manual. There you expect, to find concepts, principles and goals of SCS activities and programs. Although it may not be complete in all sections, the General Manual is our primary source of policy information.

Often SCS policy has been repeated in the NSH, however, it is intended only for ease of reference or perhaps for clarification. The NSH is not the proper place to look for changes of agency policy.

What is policy? In large part, it seems to depend on your vantage point. At the national headquarters (NHQ) level policy is thought of as general guidance about the goals of SCS, general guidelines on kinds of activities, and guidance on how we, as an agency, operate to achieve the mission, role, and goals of the Soil Conservation Service.

However, provided with such policy statements, the divisional staffs quickly translate the policies into rules and regulations. some are designed to ensure adherence to legal rulings for operating our government and complying with their interpretations. Other rules are designed to help us implement regulation or respond to several kinds of ac-. countability.

It has been stated in the Federal Register, and informally by most of us, that NCSS has standards contained in the Soil Survey Manual, Soil Taxonomy, and the National Soils Handbook.

> The Soil Survey Manual provides us with principles, describes concepts, and defines classes that are useful in soil surveys.
>
> The Soil Taxonomy outlines the framework and defines the classes of soil classification that we use to identify and name soils.
>
> The National Soils Handbook contains instructions and suggests procedures that are guidelines. They are not meant to be regulations and rules.

1/ Comments presented at a meeting of SCS State Soil Scientists, March 1, 1984, in Washington, DC.

In regional, state, and field offices, many of the statements in the NSH have been considered to be "policy" and this translates to regulations and into fairly rigid rules that must be followed. This situation is rather sad!

In the National Cooperative Soil Survey we want to obtain and provide soils information that has scientific integrity. We do agree that it is important to use standards for describing and defining soils, their properties, and their nature of occurrence in landscapes.

In all aspects of our scientific endeavors we work with models. Science is not precise; it is characterized by variability. That is how we must accept and deal with soils. We can only hope to develop, describe, and improve information about relationships. All of our interpretations are founded on relationships; some of these correlations are better than others. Thus our work is never done, never finished; it exists only in different stages of improvement.

What then is the National Soils Handbook? It is not regulations, nor is it a collection of rules. It is much more important than these. It is a set of guidelines and suggested procedures that work, that make us effective. They help us improve efficiency and assist in answering to accountability. The NSH guidelines are provided to help you get your job done; to give you the flexibility needed to produce good results; to let others be a part of the whole process.

Please, please, do not try to hide behind the NSH! It is intended for guidance, not for control.

You are managers, you are soil scientists, you are trainers, you are trainees, you are cooperators. Be all of these. Make good use of standards, be wise and prudent in the ways of applying our skills to achieve our objectives and to reach our goals.

Tell us how we may help you more, how to improve the National Soils Handbook as a document that can better guide our actions and decisions in the future.

Closing Remarks at State Soil Scientists' Meeting

Richard W. Arnold, Director, Soil Survey Division

The equation, SS#ss, is to remind us that soil. survey is not a secret society. The openness with which we operate is one of our greatest assests.

A few days ago I mentioned that one of the purposes of our meeting was to let us get together and discuss items of mutual interest and concern. We wanted you to have the opportunity to know each other better, and we wanted to share some of our ideas with you.

The main objective of the meeting was to have a two-way dialogue to provide ideas and guidance on the future direction and activities of the soil survey. Soil survey had a lot of help this week; a deputy chief, several state conservationists, a center director, division directors, and specialists from several staffs. Each one of you made this a better meeting by your presence and participation. Thank you.

I feel good. You have given freely to us; you have not been critical without also offering positive suggestions. I like that, and I think you do too.

We are a better team, a stronger group. We are ready to reach out and touch others because we ourselves are better prepared and more understanding.

Here at NHQ we will assemble and distribute remarks, comments, and reports from this meeting as soon as we can. Please be patient.

As a closing comment let me offer S^S. This is S to the power of s. Please stare into space or close your eyes and we will sense these thoughts together.

SOIL

subsoil

subtraction

sandy

saline

sticky

sustenance

scientific

survey

<u>SOIL SCIENTIST</u>

special

stimulating

sincere

success

service

STATE SOIL SCIENTIST

supportive

sensitive

searching

soaring

satisfaction

solidarity

Soil Survey Staff Salutes State Soil Scientists.

NATIONAL COOPERATIVE SOIL SURVEY

National State Soil Scientists Workshop

Chicago, Illinois
March 6-8, 1978

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STATE SOIL SCIENTIST NATIONAL WORKSHOP

March 6-8, 1978

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AGENDA

State Soil Scientist Workshop
Arlington Park Hilton
Arlington Height, Illinois

March 6-8, 1978

SUNDAY - March 5

5:00 - 7:00 pm	Registration

MONDAY - March 6

7:30 - 8:30 am	Registration
8:00 - 8:15 am	Workshop Introduction
8:15 - 8:45 am	Soil Surveys - SCS (Tentative) Marion E. Strong Director, Midwest Technical Service Center USDA - Soil Conservation Service Lincoln, Nebraska
8:45 - 9:15 am	Workshop Objectives Dr. Klaus W. Flach Assistant Administrator for Soil Survey USDA - Soil Conservation Service Washington, D.C.
9:15 - 9:45 am	Pending
9:45 - 10:05	Break
10:05 - 10:25 am	Report Kermit N. Larson Soil Scientist Watershed & Minerals Area Management USDA - Forest Service Washington, D.C.
10:25 - 10:45 am	Report Ronald Kuhlman Chief, Division of Watershed USDI, Bureau of Land Management Washington, D.C.

10:45 - 12:00 noon	Reports - Summary of State Agency Soil Mapping Programs Land-Grant University Representatives Northeast Southern North Central western
12:oo - 1:30 pm	Lunch
1:30 - 1:55 pm	Budget Process Westal W. Fuchs Assistant Director, Soil Survey Operations Division Soil Conservation Service Washington, D.C.
1:55 - 2:20 pm	CASPUSS Richard A. Dierking Chief, Soil Class. & Mapping Branch Soil Conservation Service Glenn Dale, Maryland
2:20 - 2:45 pm	Multi-year Planning Wayne F. Maresch Director, Management Evaluation Division Soil Conservation Service Washington, D.C.
2:45 - 3:10 pm	Staffing of Soil Scientists Dr. Klaus W. Flach Assistant Administrator for Soil Survey Soil Conservation Service Washington, D.C.
3:10 - 3:35	Break
3:35 - 4:oo pm	Imagery Jerome A. Gockowski Director, Cartographic Division Soil Conservation Service Washington, D.C.
4:00 - 4:25 pm	Future Uses of Soil Survey Information Wilson J. Parker Chief, Resource Planning Branch Soil Conservation Service Washington, D.C.

4:25 - 4:50 pm	Manuscript Editing and Processing Patricia 0. MacPherson Chief, Soil Survey Editorial Staff Soil Conservation Service Glenn Dale, Maryland
4:50 - 5:oo pm'	Safety in Sail Surveys
5:00 - 5:10 pm	Soil Potentials David F. Slusher Assistant Director, Soil Survey Investigations Div. Soil Conservation Service Washington, D.C.
5:10 pm	ARCPACS M. D. Openshaw Director, ASA Madison, Wisconsin
	<u>TUESDAY - March 7</u>
8:00- 12:oo noon	Discussion Sessions Soil Survey Operations - Group No. 1 Field Procedures and Techniques - Group No. 2 Quality of Soil Surveys - Group No. 3
1:00 - 5:oo pm	Discussion Sessions Data and Records to Meet Future Objectives - Group No. 4 Procedures for Map and Text Preparation for Publication - Group No. 5 Planning and Meeting Future NCSS Needs Group No. 6
	<u>WEDNESDAY - March 8</u>
8:00 - 8:30 am	Report - Soil Survey Operations - Group No. 1
8:30 - 9:oo am	Report - Field Procedures & Techniques - Group No. 2
9:00 - 9:30 am	Report - Quality of Soil Surveys - Group No. 3
9:30 - 1o:oo am	Report - Data & Records to Meet Future Objectives - Group No. 4

10:00 - 10:30 am	Break
10:30 - 11:00 am	Report - Procedures for Map and Text Preparation for Publication - Group No. 5
11:00 - 11:30 am	Report - Planning and Meeting Future NCSS Needs - Group No. 6
11:30 - 1:00 pm	Summary
1:00 pm	Adjourn

STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

This is the first national workshop of State soil scientists and I would not have missed it personally had it not been for the 1979 budget hearings. We value the interest in the National Cooperative Soil Survey by the Forest Service, Agricultural Experiment Stations, and Bureau of Land Management, and appreciate their cooperation and participation. We have called this workshop in the face of serious budgetary constraints because we believe that the soil survey of the United States has entered a crucial phase. The two main areas of concern are the extensive new demands for soil surveys and the planning that will be required to complete the remaining 1/3 of the soil survey of the Nation.

The new demands for soil surveys go back to the national concern for the preservation of our natural resources. At the Federal level, SCS needs soil surveys not only for an increased emphasis on conservation planning, but also for implementing the Soil and Water Resources Conservation Act of 1977, certain provisions of the Surface Mining Act, and the Rural Clean Water Act. Our sister agency, the Forest Service, is engaged in the second phase of the Resources Planning Act. The Fish and Wildlife Service is conducting a wetland inventory and the Bureau of Land Management is under obligation to develop environmentally sound management practices for many million8 of acres of public land. At the State and local levels, many agencies have programs Chat supplement the Federal efforts and require soil surveys.

We have completed mapping of roughly 2/3 of the land area of the Nation. Four States, Delaware, Maryland, Rhode Island, and Hawaii, as well as Puerto Rico and the District of Columbia are completed; three States, Connecticut, Pennsylvania, and Oklahoma, are more than 90% completed. In contrast, in some States, less than 30% of the land area has been mapped. As States are completed, we have to shift manpower and money from those States to States with the greatest need. At the same time, we have to retain the technical capabilities for providing soil expertise for SCS and other soil related programs, capability for onsite investigations, and capabilities to update soil surveys as necessary. In allocating manpower and funds, we have Co weigh priorities on a national basis, within our Service and also our principal cooperating agencies, and balance the need far new soil surveys in some parts of the Nation to the need for updating and resurveying in others.

It has long been the goal of the Soil Conservation Service and our cooperators in the National Cooperative Soil Survey to provide a soil survey of the Nation that is complete and current. As we approach completion of mapping we have to define more precisely what we mean by "complete and current survey." Do we mean that we expect to serve our users with a medley of soil surveys of many vintages that cannot be related to one another, or do we mean that we have a nationally correlated soil survey, well documented with computerized interpretations and digitized maps that will enable us to answer any questions concerning the national soil resources rapidly and accurately? The first alternative is obviously not adequate, but we msy have to be satisfied, for the foreseeable future, with a product that falls short of the second alternative. As in any soil survey of a country, we will have to work closely with users inside and outside government to arrive at a product that meets current needs.

In order to perfect soil survey planning, we have to improve our documentation of what has been done and what remains to be done. We have to incorporate in our CASPUSS system the data that will aid in the setting of priorities, for evaluating State by State and survey area by survey area the acreage of private land for which SCS has the primary responsibility and of Federal lands that are primarily the responsibility of other agencies. We also have to be able to project workloads at the State, regional, and national levels. At the same time, we have to pay increased attention to our responsibilities to provide quality control for other agencies within the framework of the National Cooperative Soil Survey.

Administrator's speech presented by Klaus W. Flach, Assistant Administrator for Soil Survey, at the State Soil Scientists Workshop, Chicago, Illinois, March 6-8, 1978

I" order to get the job done, we have to improve productivity while at the same time maintaining and improving quality. 'There are large differences in productivity among survey areas in individual States end among States. We believe that if all soil surveys were managed like the best 25% of our current soil surveys, national production could be increased by 50%. Although soil survey enjoys continuing strong support by the Administration and Congress, it is not likely that funding will increase greatly in the future. Hence, we will have to do with what we have and manage better.

Increased productivity is not achieved by putting pressure on soil scientists to work harder but by helping them to work more efficiently. We have made much progress in the designing of soil surveys for the need of individual areas. Yet, in many parts of the country, we are still mapping excessive detail that will not be useful for planning at the foreseeable intensity of land use. I" many areas, a low intensity of *mapping* will be adequate for the major parts of a survey area if wc maintain the capability for onsite investigations to provide the necessary detailed soils information. But in order to make onsite investigations effectively, we need better documentation of the composition of mapping units.

To increase productivity, we ale" have to provide better training for soil scientists to enable them to work more effectively in all phases of soil surveys. We have to teach how to design soil surveys, how to set up map units that relate to the natural soil landscape, how to develop skills in reading the landscape, and how to use air photo interpretation and modern remote sensing technology to best advantage.

With all the emphasis on productivity we must not forget quality. We hove to be certain that all lines are in the right place and that our documentation of mapping units is accurate. We have to strive continuously to improve our documentation of soil behavior that serves as the basis of soil survey interpretations. More than in the past, We have to work closely with specialists in all disciplines to bring their knowledge to bear on the application of soil survey information. We must also improve our communications with those who will be using soil survey information to insure that we know their needs and make soil surveys to meet these needs.

These are some of the major challenges currently facing the National Cooperative Soil Survey. The task ahead is complex and difficult. New skills may have to be acquired. Effective plans of operations need to be developed and managed efficiently in accordance with national priorities. We will need to improve cooperation with other participants in the soil survey, for our *objective cannot* be achieved without their assistance. Soil survey information is essential for the effective and orderly development and conservation of the Nation's soil, water, and related resources. We must be responsive to this need and be ready and willing to give our best effort.

SOIL SURVEYS: OUR BASIC TOOL

Welcome to the Great Midwest, the Nation's foodbasket! We like to boast about having the highest percentage of our total land in crops, but we admit this may also mean we have a higher erosion rate. It also means we have a greater need for accurate soil surveys to help protect these valuable acres.

Then let me congratulate you. Last year you and your cooperating people turned in the best year yet in acres of soil surveys--57 1/2 million! And your record of completing and publishing the surveys is equally as good--91 last year, only slightly below the all-time record of a year before. You have now mapped 1.4 billion of the country's 2.4 billion acres. You have published 1,100 surveys, about one third of the potential survey areas. If you publish the 128 proposed for fiscal year 1978 you. will top your own record. I hope you do.

Significant as these accomplishments are, however, it may be the supporting facts, the fringe benefits--the "spin-off," if you will-- that may be even more meaningful. Let's take a look at them.

To beginwith, 7 1/2 million of the 57 1/2 million acres mapped were done by non-SCS soil scientists, an increase of 40 percent in the last year. This has some very savory conotations. It means that cooperating agencies are putting more into the soil surveys, and logically expecting to get more out of them. We hear a great deal about public involvement in the conservation program, and involvement in soil surveys justmightbe public involvement at its finest. It is one thing to gather moral or verbal support, but quite another to gain dollar support as soil surveys are doing. The more dollars local governments or other entities put into any venture, the deeper their interest. It isn't unreasonable to expect this deeper interest in soil surveys to spill over into other phases of our work--erosion control, flood prevention, etc. Just a little followup by the rest of us can make it happen where it hasn't already.

How much money do local governments contribute to soil surveys? Let's see where we stand.

(overhead)

First, note that SCS appropriations for soil surveys have nearly doubled in the last 5 years. So have state and local contributions--the money that is channeled through SCS for soil surveys. State and local appropriations include funds used directly by local agencies to make soil surveys themselves.

Remarks by Marion E. Strong, Administrator's Representative and Director, Midwest Technical Service Center, Lincoln, Nebraska, before the meeting of SCS Soil Scientists, March 6, l978, in Chicago, Illinois.

The bottom line is the important item. The total NCSS effort ha's increased nearly 100 percent since 1972.

This is another enviable record, when contrasted to a few short years ago when we were paying most of the bill ourselves. Is the local contribution enough? Is it too much? Or is it about right?

We still have a billion acres left to map. At 60 million acres a year, it will take about 18 years to finish the first round of mapping. Is that soon enough? By 1996, the demands for soil survey information will be overwhelming us, according to some predictions.

Having enough local dollar involvement in soil surveys to get the job done as quickly as we'd like is a good thing to dream about, but it brings with it a residue of responsibility we need to be sure we can handle. We in SCS have the primary responsibility for soil survey work of USDA, and with the responsibility goes such things as quality control, training of non-SCS soil scientists, correlation across boundary lines, writing and editing the manuscripts, and the biggest job of all, interpretations. Dollar contributions from outside SCS cannot be translated directly into acres of final surveys without a corresponding extra cost we bear from our own operating funds. As the amount of outside money goes up, it does not mean SCS amounts can come down by a Corresponding figure.

In fact it means exactly opposite. You in the states need more SCS funds to maintain your oversight. We in the TSC need more SCS dollars to carry out our responsibilities in quality control and correlation. The National Soil Survey Lab needs additional resources to keep the research and investigation apace with field surveys. These things have not been happening. Our CO-02 appropriations have not been keeping up with the needs,

Last year our CO-02 appropriation was, in round figures, about 40 million dollars. We used nearly 47 million in the CO-02 program. Where did the additional funds come from? They came from CO-01, the technical assistance program. Some states went as high as 30 percent over their CO-02 allocations. Such a diversion of funds cannot be defended before the Congress in the face of sharp questions about why SCS technical assistance has been reduced in field offices.

We have two choices: Get a CO-02 appropriations up to the level needed, or reduce the program to the level we can handle with the funds available. This year the administrator has taken the latter step. No more than 2 percent can be transferred from CO-01 to CO-02. If this course is not acceptable to you then you have the opportunity to help your state conservationist build a climate where the soil survey needs are recognized and those needs transmitted through the political process to the people who approve budgets and act on appropriations. That support must come from the local level; from the users Of soil surveys and interpretations. Neither Mel Davis, Bill Johnson, nor Klaus Flach can generate that kind of political support. It does no good for you to ask your state conservationist or for him to ask Mel Davis for more money if it is not in the budget approved by the Department and the OMB, or appropriated by the congress.

I believe there are areas in the National Cooperative Soil Survey in which we can make some improvements NOW. These things will take your support.

It grieves me to see us keyboarding soil survey manuscripts twice. The equipment is available to make it possible to do this job only once. Several midwestern states are already equipped with IBM Mag Card II typewriters which are compatible with the equipment we have in the Records and Communications Center at the MTSC. We can run mag cards through a computer system to convert the material on them to 9 track tapes. I suspect there is a way to go from mag cards to the Linotron which will set the type in the Government Printing Office. I know there are optical scanners that can be used to set type for the printing press. I hope you will explore the equipment question in discussion group #5.

But equipment is not the only answer. Stan Anderson, Editor at the Midwest TSC, tells me that there are so many editorial changes and errors in manuscripts that are received from the states that it is just as efficient to rekeyboard on the Linolex as to try to correct the text. If that is the case, and I have no valid reason to disbelieve it, something else needs to be done. I'm not sure what that something else is, but if we cannot get better quality under our current policies and procedures, let's change the policies and procedures.

Either the standards are too high or unclear to the writers or the writers can't write. I guess from my own background and experience, I would conclude generally people responsible for writing soil survey manuscripts can't write and maybe we shouldn't expect them to. The party leader must be the technical expert in soil mapping and they should be good supervisors and managers of the resources made available to them, so why should we expect them to be writers too. Maybe we ought to try to free the party leaders from the writing responsibilities and turn that over to an individual skilled in putting technical words on paper--a technical writer--and I don't imply the writer should not also be a soil scientist or have such a background.

Again, a challenge to you in your discussion groups this week to solve this very large problem so we don't have to waste so many resources on writing and rewriting, and typing and retyping.

As a beginning point, each state soil scientist and each state conservationist can insist on higher quality from the people assigned to carry out the writing assignment.

But let me get away from my challenges to you and return to one further point on money and people: I hope the day is past when, as the soil survey program phases down in a state and the field mapping is finally complete, those positions occupied by soil scientists are converted to other purposes such as conservation technicians, soil conservationists, or engineers and the ceiling for that state maintained at the same level.

As a soil survey program in a state phases down the soil scientists, the positions under the ceiling, and the soil survey funds (CO-02) will go to another state where soil surveys are not complete. You, as advocates of your program, must support this posture. Too often, in the past, the state conservationist has converted these positions when the program was completed. Sure, he has been willing to give up the soil scientists, but not the positions (ceiling) or the money.

Admitting, however, that the acceleration of soil surveys has brought some strain on the range conservationists, biologists, agronomists, and other scientists who are supporting you in mapping "nit design and interpretation. These people must work shoulder-to-shoulder with you and I hope you can avoid outrunning the hounds in this hunt.

These are some of the exciting challenges that lie ahead of you. The greatest of these maybe in accelerating the uses for soil surveys. I believe we have not reached the peak of achievement in this area.

These challenges begin at home. It is a continuing job to train new employees, specifically new soil conservationists, to understand and use soil surveys as a basis in planning assistance. And there are still a lot of our older employees who could "se additional training. I see this as one of the priority responsibilities of state soil scientists.

You need to keep a close watch on Section II of the technical guides in your state, to make sure they contain up-to-date, useful, and complete information about the soils in that working area. As land use changes and new demands for soil data arise, these guides need to be equal to their assigned task. Likewise, you may need to delete from the guides any information about soils not found in that area, as a step toward making the guides more meaningful and useful.

Even though we in SCS are, by tradition and practice, the primary users of soil surveys, weare finding new uses every day right at home, right in our ranks.

For example, our engineers need more identification of the kinds of soils that are causing clogging in subsurface drains. As the price of land goes up and the cost of drainage continues to rise, our evaluation of the drainability of certain soils needs to be more comprehensive if we keep up with modern technology.

There is still something lost in the translation of soil textures into irrigation intake rates. We in SCS may be able to bridge the gap, but can the reasonably intelligent irrigator do it for himself? There is opportunity here for an extra interpretation.

The field of agricultural waste disposal opens up a whole new set of demands for specific soils information. Strip mine reclamation technology will also lodge more demand. And who knows what interpretations may be needed before the printed survey becomes obsolete: Speculation on that one will boggle the mind.

Perhaps we should stick to the refinements, improvements, and expansion we can control today.

We've come a long way in making published surveys clearer to the reader with the "se of language he can understand. But we still have a long way to go. Descriptive legends still use a lot of SCS jargon and abstract terms. There is a need for more positive statements.

There is room for more useable interpretations of soil data into potential yields of specific crops related to specific management practices. There are those who feel the estimated yield tables for various levels of management may be too general. The problem may be more in the definition of management level than in the yield estimates, but it is something we need to think about. I think you will agree that as farming has become more a science and industry than a vocation, the need for exacting data has accelerated.

The use of soil surveys, as a basis for tax structure, zoning, land appraisal, community development, and the other nonfarm uses has barely scratched the surface of the potential. There is a problem in some areas with misuse and overuse of the data for these purposes, which should make us more cautious with the interpretations, and perhaps make it necessary for us to show what the soil survey will not do as well as what it will do.

Which brings us to a point we need to face up to sooner or later: Soil surveys may soon be as restrictive in nature as they are expansive. When the soil survey is a basis for denying people what they consider their rights, it immediately becomes controversial. We will need to be equipped to handle situations where the "buck stops here" if it involves soil survey data. Your work may have to stand the test not only of problem solving and decision making, but also of litigation.

I challenge you to keep looking positively and judiciously at some of these opportunities for refinement. Seek ways to make the soil survey more meaningful and useful to your fellow workers and to the user public.

When you go looking for challenges, and I hope you will, I think one of the greatest will be in the area of water quality improvement.

To start your thought processes, take a look at an average rain falling on am acre. Five million drops per second strike an acre. Each drop exerts a force of 2 pounds per square inch. At the end of an hour, the land has been subjected to 3 quadrillion, 763 trillion pounds of bombardment. An inch of rain weighs 133 tons on each acre.

What size particles will be dislodged by the force? How far will they move? What percent of them will be suspended in runoff and go into the river system? How much organic matter, plant food, and chemicals will go along? Should these measurements be a part of soil survey interpretations?

To go a step further, will this same inch of rain react the same on a disturbed soil at a construction site as it does on fallowed wheat land?

My only hope is that you are as good at supplying answers as I am at posing questions.

And I'm sure you have questions of your own. One of these may concern the future of the soil survey program in SCS. I don't promise to answer fully, but let's speculate together.

We've already admitted we have at least 18 more years of soil mapping at a rapid pace if we get the job done. Our best plan at this point is to concentrate on that challenge.

But we've also accepted a warning that new interpretations, expanded interpretations, of present surveys is going to be a concurrent demand. We will need to meet that need while we continue with the mapping and publishing phases.

Some time out in the future we 'will have to face the problem of what to do with the old surveys--those made on nonphotographic bases; those done prior to 1960 and in some form other than detailed surveys we are doing today; and the constant need for updating land use changes even on some later surveys.

Technological changes in the future may require more detailed onsite surveys for special uses. How far we will be able to go in meeting that demand depends to a large extent on the time and manpower resources we have available at the time.

I certainly see no prospect of a decrease in soil survey activities in the near future in SCS. I can think of no situation that would warrant any such change.

There has been some speculation about other agencies and organizations getting into soil surveys, perhaps to the extent of employing their own soil scientists. No doubt local governments and other state or federal agencies are going to need intensified interpretation of soil data for their purposes, but whether these people will be classified as professional soil scientists or serve as inspectors, planning specialists, sanitarians, or some other capacity remains to be seen. Many such types are already at work. They have helped to add to our burden of production capacity, and the end is not in sight.

By way of summarizing, let's go back over the points I think I have made:

1. We have a high level of public involvement in soil surveys, but it helps us accelerate production rather than lighten our load of responsibility.

2. We still have a big training job to do; training our own people and those in our cooperating agencies and organizations.

3. There is a continuing job of watchfulness and quality control; quality of uses and interpretations as well as quality production.

4. There is an open field of new uses for soil surveys; new programs involving SCS, new challenges in the contemporary technology of our way of Life. The burden of sound and adequate interpretations for these new uses is ours.

5. Our soil survey program in SCS has, in my opinion, a bright future.

My closing challenge to you is not in the field of classification, mapping, or interpretation, but in the art of selling. There are a lot of potential customers who don't know we do soil surveys or how they can be used. Enlist the aid of others on SCS staffs, especially your public information officer, in contriving ways to "sell" soil surveys to those who need them.

Some time ago, our South Dakota State Office came up with a graphic illustration of a portion of the uses made of soil surveys, and it might be useful to you.

(overhead)

There is room enough for a few more circles, and you're welcome to add your own.

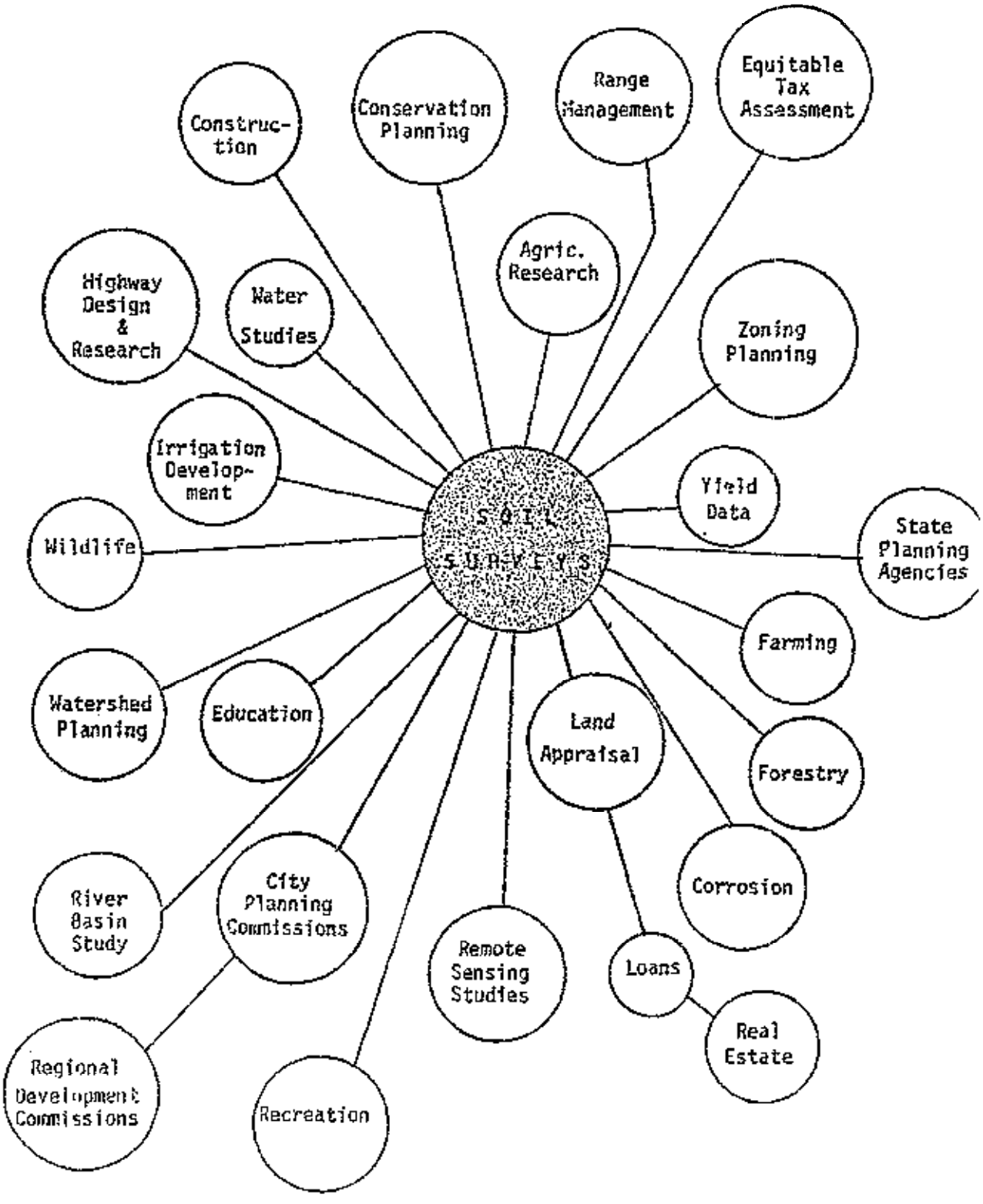
Attachments:
Trends in Soil Survey Funding
Uses Made of Soil Surveys

Trends In Soil Survey Funding - (Thousands)

	Fiscal Years							
	1972	1973	1974	1975	1976	1977	1978	1979
SCS Appropriations	23,300	23,800	24,205	31,100	36,400	40,600	42,400	43,901 (Request)
State & Local Contributions	1,876	2,077	2,500	2,043	2,076	3,047	3,536	
State & Local Appropriations				4,084	4,278	4,820	5,641	
Other Contributions				279	671	2,212	1,527	
Assistance - Services	3,620	3,741	Not Available	5,300	6,940	6,487	8,606	
Total NCSS Effort	28,004	29,618	31,000 (Estimate)	43,606	51,165	57,165	61,710	

Soil Survey
Operations Division
February 2, 1978

USES MADE OF SOIL SURVEYS



NATIONAL STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

FOREST SERVICE ACTIVITIES IN THE NATIONAL COOPERATIVE SOIL SURVEY

by

Kermit N. Larson
U.S. Forest Service
Washington, DC

The Forest Service welcomes the opportunity to participate in this first ever State Soil Scientist National Workshop, and report to you on our soil survey activities.

The Forest Service Soils Program muse be responsive to several agency goals. A primary goal of the Forest Service is to manage the National Forests for multiple purposes at a high level of sustained periodic output of goods and services "without impairment of the productivity of the land." This goal is further amplified in the Forest and Rangeland Renewable Resources Planning Act. This Act directs the Secretary of Agriculture co develop an assessment and long-range program for the Nation's renewable resources that will assure an adequate supply of forest: and range resource while maintaining the integrity and quality of the environment. As part of the assessment, the Secretary is directed to provide, on a continuing basis, a comprehensive and appropriately detailed inventory of all National Forest System lands and renewable resources. This includes an assessment of the present and potential productivity of the land.

Other goals of the Forest Service to which the soils program must respond are:

"Promote and achieve a pattern of natural resource uses that will best meet the needs of people now and in the future."

- Promote high quality multiple use management on National Forests and other ownerships, where applicable.
- Share expertise in specialties where the Forest Service constitutes the prime source of experience and skills; nature, properties and management of forest sails.
- Cooperate with other Federal, regional, State, multicounty and county agencies in resource management, and in planning and economic development programs.

"Protect and improve the quality of air, water, sail, and natural beauty."

- Promote practices to protect and enhance environmental quality in management of all forest ownerships.
- Encourage prevention and abatement of air, water and soil pollution from operations of forestry-related enterprises.

"Develop and make available a firm scientific base for the advancement of forestry."

The Forest Service soil management program is a primary contribution to this data base. It is designed to provide knowledge about the sail resource including an assessment of soil capabilities and suitabilities for use in land and resource planning and decisionmaking, for resource development, and the protection of forest, range and related lands.

While the soil resource inventory is a major part of the soils program, a great deal of effort is expended on non-survey activities. At least 50 percent of our staff capability in the soil area is for land management planning, other support services activities such as on-the-ground advice and counsel regarding timber sales, reforestation projects, range improvement projects, and constructive activities.

A principal goal for soil inventory with the Forest Service for the past 10 years has been to keep pace with soil requirements for resource and land management planning. We have been able to keep pace with this need by primarily conducting order 3 and 4 surveys. Presently, we have completed about 75 percent of the total acreage of National Forest System lands. Most of these surveys are order 3 or 4. Our goal is to complete soil resource inventories suitable for land management planning an all National Forest System lands by 1985. AL the present rate of accomplishment, we should achieve this goal.

The National Cooperative Soil Survey.

Questions have been raised concerning the relationship of the Forest Service soil resource inventories and the Notional Cooperative Soil Survey. During the joint Soil Conservation Service – Forest Service coordination meeting in January 1976, it was mutually agreed to review this relationship. As a result, a joint task force was designated with the charge to review the goals of each agency with respect to the procurement and use of soil information. A document was to be prepared that could be distributed to field offices in order to enhance mutual understanding and cooperation in this area of effort. This document has been completed, and has been approved by the Chief of the Forest Service, and the Administrator for the Soil Conservation Service.

Most of you are familiar with this report, but it basically teafirmed the viability of the Memorandum of Understanding between the Forest Service and Soil Conservation Service regarding soil surveys. It also indicated that recent changes in procedures to accelerate correlation and publication within the framework of the NCSS offers the opportunity to attain a greater degree of overall coordination. Both agencies have taken action regarding the recommendations of this task force. One of the actions the Forest Service has taken in response to Recommendation No. 1, is to develop quality control standards for soil resource inventories. The following standards are now applicable to all soil inventories in the Forest Service.

Soil resource inventories, including In-Service soil resource inventories, will meet as a minimum, the following standards:

1. An approved work plan will be required for each soil resource inventory.

2. A field soil notebook will be assembled and kept current for each soil resource inventory.

3. All soils will be classified according to "Soil Taxonomy," United States Department of Agriculture, December 1975.

4. Intensities (orders) of soil resource inventories will conform to those orders described in "Kinds of Soil Surveys" Committee Report No. 7 of the National Soil Survey Technical Work Planning Conference.

5. A minimum of two field reviews, one of which will be a final review, will be performed for each ongoing soil resource inventory.

6. An In-Service soil resource inventory report will be prepared following the completion of each soil resource inventory.

Soil resource inventories that arc made within the framework of an integrated inventory, such as land systems inventory, ecoclass and other ecosystem inventories, will also conform Lo the above standards.

What's Ahead.

Presently, about 30 percent of the soil inventories in the Forest Service have been accomplished within the NCSS. The percentage has increased considerably in the past 2 years. I believe it will continue to increase in the years ahead.

Recent legislation such as RPA and the National Forest Management Act, require the Forest Service secure detailed soils information on much of our land. This means we will have to convert many of order 3 and 4 surveys to order 2 and 3. This effort will allow us the opportunity to incorporate more of our In-Service Soil inventories into the NCSS.

The objectives of the National Cooperative Soil Survey are consistent with Forest Service objectives regarding soil survey; that is securing reliable and useful soils information for use and management.

NATIONAL STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

A NEW SOIL HORIZON IS FOUND ON PUBLIC LANDS

by

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Concern for soil husbandry within the Bureau of Land Management (BLM) has been growing for the last 10 years. This concern was given a tremendous boost with the passage of the National Environmental Policy Act (NEPA) in 1969, which was a national expression of environmental concern. One of the results of this legislation was the awakening of environmental organizations within the general public. These groups, in turn, became influential in the determination of how NEPA was to be implemented within the Federal establishment. Of particular importance to BLM, was the Natural Resource Defense Council (NRDC). There is little doubt chat NRDC, through its concern for the public lands, has been successful in gaining the recognition of the importance for natural resources by the Judicial and Executive Branches of the Government. It is partly because of their efforts that BLM was required to prepare environmental impact statements (EIS's) on all grazing lands under our administration. The NRDC's continued concern for proper recognition of basic resources, (such as soils) that are addressed in the EIS, has generated support within the Department of the Interior, OMB, and the Congress..

Increase8 in appropriation and major internal shifts of funding and manpower within BLM have resulted. We are now looking at an organization that has a new recognition of the importance of soil resource management, a recognition through commitment.

During the lifetime of BLM, approximately 40 million acres were subjected to soil surveys, between 1946 and 1975, on the 175,000,000 acres of public lands in the contiguous States. This has since increased to 55,000,000 acres, in 1978. Soil scientists have been placed within the Bureau. There were but 5 soil scientists on board in 1970. This was increased to 75 by FY '78. By 1980, we expect to exceed a total of 100 soil scientists on the permanent roll, plus perhaps another 100 on the temporary roll. This, by no means, suggests the creation of a self-sustaining soils capability. We are committed to a very close working relationship with the Soil Conservation Service (SCS). It is through SCS that our technical procedures originate. We recognize SCS as the authority in soil surveys. As such, we have and will continue to have their direct input to attaining soils data on approximately 171 million acres of public lands over the next 10 years.

The BLM's soil needs are now recognized. We have identified data intensities appropriate to our needs. We have the capability to work as a partner in field mapping and interpretations. We have the will to work together.

Table 1 shows the general magnitude of the job ahead and the commitment that we must make over the next several years. This table must be refined for each State as specific geographic areas are identified through the combined efforts of BLM and SCS. There is flexibility in geographic location (that should be explored by the two organizations) that will assist both of us in meeting our own goals. Soil survey areas will be identified to meet the scheduled Environmental Statement from BLM's point of view. On the other hand, SCS is more concerned that survey areas are large enough to allow the survey party to be physically located for 2 or 3 years without a major move. Experience in personnel management suggests more frequent moves created an excessive personnel turnover problem. The SCS has the goal of a nationwide soil survey by 1998. The BLM has a Western States goal of 171 million acres by 1990.

One might ask, how such a tremendous job can be done? Considerable thought has been given to this question. Obviously, it will take the combined efforts of BLM, SCS, contracts with other agencies such as the Forest Service, private contracts, and universities. This, in turn, will create a need for quality control, training, cooperative agreements, multi-agency soil survey parties, and many other coordinated actions. We should start now to look at this effort in the broad perspective that it must receive. We cannot accomplish the job if we look at it Stare-by-State alone. Yet, we must start with a recognition of each State's needs as they hold the key to completion of a program capable of meeting tbe needs of bath BLM and SCS.

For instance, how many soil scientists will be involved? Experience has taught us that a soil survey party leader should be on board far about 2 months evaluating the objectives of soils data users, the interpretation needed, availability of equipment, transportation network, and several other items before actually assuming the reaponeibility of supervising a soil survey party. We have also learned that a well organized party may consist of four soil scientist mappers, with possibly a student trainee in soils. These, in turn, should work very closely with a Range Conservationist, Forester, and Biologist, as needed. Such a team approach can be expected to map at an average rate of 1,500 acres per day on a 150-day field year with the rest of the year devoted to nonfield work. At this T-ate, 900,000 acres per year can be properly surveyed by the 5 soil scientists. With these assumptions, it follows that sail scientists will be needed, as shown in Table 2.

Discussions have been held at the Washington level regarding the possibility of having SCS soil survey party leaders work with BLM soils mappers. As the mappers gain the experience to assume the responsibility of the party leader they should be promoted, and BLM would then assume ehia responsibility. We have also discussed the probability that training would be required to obtain the assurance that there would be 100 soil scientist mappers available far the mapping teams. Recognizing that many of these would be individuals on eleven-and-a-half-month assignments, with the possibility of overtime during the field season, heavy use of helicopters far field transportation, and frequent travel, we see a continuing training need. Therefore, thought should be given to the establishment of training facilities.

Knowing that BLM's commitment to this effort is demonstrated by the commitment of over $6,000,000 per year for the next 10 years. We should initiate a coordinated effort at the national level to address such subjects as position descriptions, the roles of SCS and BLM in training, quality control, correlation, laboratory support, aerial photography and its suitability for field operation, map preparation, publications, field review, and special field investigations, report writing, use of temporary employees, overtime pay, per diem rates, travel and transfer regulations, and other considerations not recognized at this time.

Some additional questions that need answers are:

1. Is it mandatory to obtain 10 pedon descriptiona to identify each soil series? Or is this practical on the public lands? The BLM has been obtaining one to three and SCS has done the rest if it is deemed necessary. Perhaps thie ought to be put in a cooperative agreement on a State-by-State basis. At the same time, we have concern that we do not inadvertently weaken the National Cooperative Soil Survey.

2. How should the soil correlator's role be handled within BLM and SCS?

3. Can the SCS laboratories handle the increased load or whould BLM plan on using State experiment stations and private labs as well as SCS? How long should it take for full analysis to correlate soils, 1 or 2 years? How about grab samples, 4 months? If BLM needs the reports in 6 months, how can the lab time be reduced?

4. Xn-house reports will be needed by BLM within 6 months of the completion of a field survey. Will this report be sufficient to meet the needs of SCS in counties having very few private, if any, Soil and Water Conservation District cooperators? At what stage will the reports become a responsibility of SCS?

5. Since BLM has adopted the SCS Range Site System there will be a major increase for transfer of existing information. Can SCS handle the request for: copies of field sheets, published soil surveys, unpublished manuscripts, preliminary range site correlations where they are not now in final stages, interpretative data, range site descriptions, range information from ADP systems?

These requests will impact both the Soils and Range staffs starting this month.

The primary purpose of this paper is to bring this effort into perspective at a national level. A secondary purpose is to generate sufficient interest in our field offices to initiate a joint planning system SCS and BLM for soils needs at the State level. When the State planning has been completed to meet the schedules already finalized, they must then be summarized into a national program.

Now is the time to complete our mutual planning.

TABLE 1

SOIL SURVEY NEEDS
1,000 acres

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Arizona	1,397	-	-	1,207	-	1,409	-	1,358	1,321	2,559
California	1,804	331	739	336	520	20	55			
Colorado	260	971	1,004	539	350	317				
Idaho	1,628	1,657	2,330	1,843	671	750	693			
Montana	1,431	972	791	50	97	131	131			
Nevada	1,220	3,776	5,096	6,732	6,482	5,617	3,818	2,182		
New Mexico	1,680	855	524	476	215	207	193	67	GO	50
Oregon	1,496	2,927	2,705	4,654	2,174	515	177			
Utah	1,682	2,455	3,046	2,827	2,673	2,015				
Wyoming	-	1,470	2,928	2,874	2,245	3,120	900	322		
Total	12,598	15,414	19,163	21,488	15,427	14,023	5,967	3,929		

TABLE 2

SOIL SURVEY PARTIES

STATES	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Arizona	1	1	1	1	1	1	1	1	1	1
California	1	1	1	1						
Colorado	1	1	1	1						
Idaho	2	2	2	2	1	1				
Montana	1	1	1	1						
Nevada	2	4	6	7	7	7	4	2		
New Mexico	2	1	1		1					
Oregon	2	3	3	5	2	1				
Utah	3	3	3	3	2					
Wyoming	1	2	2	3	3	3	I			
Total	16	19	21	24	17	13	6	3	1	1

REPORT OF ACTIVITIES FROM THE NORTHEAST COOPERATIVE SOIL SURVEY

Richard W. Arnold

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To members and friends of the National Cooperative Soil Survey, I want to report that all is well and active in the Northeast. Instead of outlining what everyone is doing and how many people we have, I would like to highlight some activities that are being done with soil survey information after it has been produced as part of the cooperative soil survey.

1. Using Conservation Needs Inventory Data

One of the uses of CNI data has been to determine the average elevation for each CNI plot. By knowing the soil series that occur in these plots and developing frequency distributions of soil series by elevation, it permits us to spot problems of correlation if we see bi-modal or extremely skewed distributions. This has enabled us to predict where we need to pay a little more attention to some of our series criteria, or their interpretation.

Another use has been to help us estimate temperatures by elevations. For example, the CNI plot data gives us series by elevations and then by calculating a theoretical temperature gradient from north to south and from high elevations to low elevations, we were able to develop a tentative map of the frigid/mesic areas in New York State. Such information is currently in use in the recent Soil Association Bulletin written by Dr. Marlin Cline and Ray Marshall. This activity has prompted us to increase the measurement of soil temperatures in the field. The experiment station provides the thermisters and recorders and the soil survey field parties locate the sites and take the readings.

A spin-off has been that we feel that it may be necessary to describe and propose a number of new series for areas that likely will be frigid whereas in the past we have considered these to be mesic soils.

2. Methods to Preserve Agricultural Land

In New York State we have a law that establishes agricultural districts and commercial farms my ask for special assessment on the land if it will be kept in agricultural production. The agricultural districts have been based on the concept of economic viability of faming that was developed by a land economist looking at land resources. To assist in further evaluation and renewal of agricultural districts we have attempted to provide additional soil data such as estimated rooting depth, available water, lime status, nitrogen, potassium and phosphorus levels, parent materials and drainage for each of the series that occur in many of the agricultural districts. This information is stored in a computer and therefore lets us compare the concept of economic viability and various soil properties. It is believed that in the reviews that will start in 1980 soil surveys my play an important role in helping evaluate the continuation, the expansion, or the decline of various agricultural districts.

3. Soil Indices for Ranking Soils

Because much of the Northeast is primarily dairy rather than cash grain farming it is not readily possible to base a productivity index on corn yields soybean Yields. or some combination of those crops. We have proposed the use of total digestible nutrients for corn silage and hay as used in rotations on a dairy farm. We calculate a TDN per acre per year for each map unit which my be then ranked as a productivity index. At the present time, each of our survey areas is a universe of its own; consequently the indices are developed on a county basis. These indices will be examined as part of farm real property taxes. This will be a new approach for us in New York where our current taxation is based on **market** value of farms.

4. Soil Survey Expansion

Tight budgets and personnel ceilings have affected all of us very greatly. We have followed part of the national program in reducing part of our mapping phase but are trying to increase our backstop capability of the cooperative soil survey. This is being done in two ways: first, we have developed a modest soil characterization lab that currently has low funding but very high enthusiasm. We feel that we can do most of the analyses needed for the operational aspects of soil survey and also combine it with a training program for Soil Conservation Service soil scientists. After thev have been through a laboratory training program and a field sampling program, we assign so many points to each field party or survey area specialist that he may use for whatever analysis he chooses. This means we assign points for each kind of analysis, such as particle size, iron determination and so forth, so that the field man has the option of selecting the analysis he prefers on the soils of his choice, This appears to be working very well. Another move to expend our soil survey **activities has** been to add a new position **that** will be an assistant at the experiment station, hopefully to make us more effective cooperators in the soil survey program.

5. Improved Soil Test Programs

Soil test analysis and data handling have now been computerized. We see it as a tool for getting people re-acquainted with soil surveys and soil names on their farms. within the program we have developed what we call the "guess routine" for areas that do not have detailed maps or have very old soil maps. By indicating the township, physiographic position, something about their concept of texture and stoniness, we feel that we can probably make a judgment of three or four soils that will likely be very close to his conditions. This also permits us to develop an educational program to get away from the guessing routine and to have more active participation of individuals in indicating what soils they actually have on their farms. For example, when the program first started, less than ten **percent of** the returns had soil names on their forms, and within one year there has been an increase to sliqhtly over 50%.

6. Research Fostered by Soil Surveys

I'll point out some areas of research that we have undertaken because of the soil surveys. I am sure you note the same thread of research going on at experiment stations throughout the country because of the need to strengthen, backstop, support and train people for soil survey activities.

a. A model for Stating the Probabilities of Components of Map Units

This type of research is a common practice in some areas of the United States. I refer to transecting and calculating the composition or purity of map units. We have tested a number of soil associations in nine areas of the United States using the detailed soil survey as the ground truth for the soil association map that is produced. We have tested areas in California, Idaho, Arizona, Arkansas, Kansas, Nebraska, West Virginia and Delaware. We evaluated units by using point transects of different intervals, line transects, and pilot areas. For each transect the estimated composition of the area is calculated and the approximate amount of effort and man hours to do the particular work is estimated. Consequently we are able to develop graphs or tables to match the amount of effort with the accuracy that may be expected in those particular physiographic areas. We will be glad to share our results with anyone who is interested or, if you are patient, hopefully they will be published in a year or so.

b. A Scheme for Transecting and Determining Map Unit Composition in the Cooperative Soil Survey in New York State.

We currently are using a cluster sampling analysis that is an equation developed for use with binomial distributions. We believe this will permit us to provide probability statements about the variability of nature, and the probabilities of our interpretations of that variability. For example, many results throughout the United States indicate that taxanomic composition of map unit delineations is not as high as we perhaps would hope. However, when one looks at the interpretations for many uses we find the probability of acceptable performance is up to standards that we believe are very satisfactory for most map uses. A report of this system will be provided for consideration by Committee 3 on Quality Control, by Fred Gilbert. It is contained in the proceedings of our recent New York State meting on map quality.

c. Research on our Lack of Understanding of Soil Maps Themselves

(1) What an exciting challenge: It seems that we currently know more about soils, their classification and how to analyze pedons than we do **about** maps, their patterns and their useful interpretation. We have undertaken research or analysis in this area through a grant from U.S. AID. Earlier this year we had a workshop on soil resource inventories end this report is available to you if you wish for a $1.00 mailing charge. In the report we have developed some methods for soil map classification based on scale changes, minimum size delineations, composition of map units and so forth, and are in the process of trying to prepare a handbook that **will** permit people, primarily in other countries, to evaluate their own soil survey information as to its quality or adequacy for their particular purposes. As we developed the handbook, we also looked at the accuracy of base maps and the implications this has on the accuracy of delineations on field sheets as well as boundary location problems and. classification problems. It turns out to be a fairly complicated

process, however we have broken it down into steps that are somewhat artificial, but permit one to go through the process of evaluation.

(2) In evaluating LANDSAT imagery, we have one project looking at the southwestern part of Puerto Rico, trying to sort out lard use, physiography, soils and geology. An interesting sidelight is that we have found that we cm generate about 15% of corresponding lines by a random process. Consequently, the other 85% is where we had better really be good because anybody likely could generate 15% of our liner;.

(3) Another feature of soil maps is related to the pattern of the same kind of soil delineations. For example, we are looking at the number, size, shape and pattern of delineations of a single map unit as it may affect alternative land use decisions. Although this may sound fairly straightforward, we have had to measure some 1500 delineations and then we found that there is no readily acceptable size or shape classification that adequately handles map unit delineations. We think it is an intriguing problem and that many more of us could give attention to it.

(4) A final point about soil patterns that may be of interest to you is the question of whether the location of map unit delineations of the same kind ever have a distribution pattern that can be generated by some random process. The implication might be that if it were true that there is some degree of randomness in geological patterns that exist on the earth's surface. We have examined a few soil patterns. We take a square grid and superimpose it on a soil survey map, locate the centers of delineations or if it is a large one two centers, and then subdivide these squares and count how many are empty, how many have one point, how many have two and so forth. We have been able to subdivide some maps until we obtain a very close match with a randomly generated distribution. It is the negative binomial distribution. This really scared me at first because I thought it meant that that distribution pattern itself might be able to be generated by some random process. However, a negative binomial distribution is one that characterizes what you would call clusters or contagious patterns similar to the clustering on a cultured plate of bacteria. Taking the same soil pattern but analyzing it with methods used more by plant ecologists whereby distances, angles to neighbors, and the number of neighbors around each point are measured, we have been able to demonstrate that these parameters are not random. It suggests that there is some ordering or some pattern that is not able to be generated directly by a random process. This latter result is more satisfying because it permits us to reaffirm that the simple soil forming factor equation is still one of our most powerful tools.

Gentlemen, I thank you for the opportunity to share with you some of the things that are going on that take soil survey information that extra step both into the academic realm and into the practical applied world. We know that each of the regions are doing similar kinds of work and wanted to reaffirm that it is an important part of our function in the cooperative soil survey. Thank you.

State Soil Scientist National Workshop
Chicago, Illinois
March 6-8, 1978

Summary of State Agency Soil Mapping Program Support in Southern Region*

The following summary is for 12 states in the Southern Region, exclusive of Virginia and Puerto Rico, as of 1 March 1978.

Each state has an experiment station representative for soil survey. This person may devote as little as 1/4 time equivalent (FTE) or up to full time on the work. Most states have other personnel working with him in such work as map compilation, laboratory procedures, and correlation activities. Over 32 FTE's were so reported, in total, for this category.

No state reported actual soil mappers as experiment station employees, but two states (FL, NC) reported state funding for the cost of SCS mappers. Florida reported some $360,000 funded and North Carolina reported funds (amount unspecified) for six SCS mappers on winter assignment.

Six states (KY, LA, NC, OK, SC, TN) reported that other state agencies employ soil mappers. The agencies can be generally described as related to conservation and natural resource type organizations. Forty-seven, plus, FTE's were so reported plus at least one PTE in a supervisory position (KY).

All but one state reported cooperative work with their highway departments in providing laboratory support in processing engineering samples. This estimates to a total of about four FTE's for the reporting states.

In summary, the several Southern Region Agricultural Experiment Stations tend to put more emphasis on providing correlation and laboratory support rather than on actual soil mapping operations. However, a significant numbers of soil mappers are provided by other state agencies in over half of the states. 5tar.e highway department laboratories are active in processing engineering samples provided by the cooperative soil survey. In total, by conservative estimate, over 85 FTE's are provided from non-SCS sources in support of the National Cooperative Soil Survey program In the Southern Region, exclusive of the dollar fundings in Florida and North Carolina. This equates to over seven FTE's average, for each of the-12 reporting states.

H.H. Bailey, University of Kentucky
Representing the Southern Region

* Data verified at 1978 Southern Regional Technical Work-Planning Conference of the National Cooperative Soil Survey, Jekyll Island, Georgia. March 13-17, 1978.

AGRICULTURAL EXPERIMENT STATION INVOLVEMENT IN SOIL SURVEY IN THE WESTERN UNITED STATES

LeRoy A. Daugherty
New Mexico State University

The Western United States has a coordinating committee on soil survey made up of representatives of most of the Agricultural Experiment Stations. The purpose of this committee is to allow representation at both regional and national work planning conferences. The decisions from work conference committees on guidelines for mapping, soil investigations, classification and interpretations have significant impact on the flexibility of the soil survey programs for meeting state and local needs. The primary objectives of the Western Regional Coordinating Committee (WRCC-30) on Soil Survey are three fold: a) provide a mechanism for maintaining the capability of the Experiment Station for direct input into the National Cooperative Soil Survey; 2) allow the university researchers an opportunity to meet jointly with other agencies involved in the National Cooperative Soil Survey for the purpose of assessing the research needs of the survey program and coordinating research activities for meeting those needs; and c) allow for representation of all Agricultural Experiment Stations, through scientists designated by the respective Experiment Stations for fulfilling the commitments and responsibilities of the Experiment Stations to the cooperative survey program, at regional and national soil survey work planning conferences, for the purpose of insuring that the soil survey program is meeting the soil survey needs of each state--primarily as related to the nature of soil mapping, classification and interpretive programs; and to allow for research inputs into decisions made with respect to the above programs.

Most states have interagency committees for the coordination of soil survey. The most active state in this regard is California with as many as four meetings per year. Most of the state Agricultural Experiment Stations have limited involvement in field soil survey activities. The input is predominantly limited to work planning conferences, field reviews, manuscript reviews, and supportive research. Utah is the only state reporting experiment station personnel actively involved in soil mapping (2).

Several states have graduate students involved in soil survey as summer trainees with the Soil Conservation Service,

Many of the western states have completed general state soil maps at a. scale of 1:1,000,000 through interagency cooperation involving the Agricultural Experiment Station and the Soil Conservation Service. Through similar cooperation, several states have county general soil maps at or near scales of 1:250,000.

The western region has a regional research committee (W-125) entitled: "Soil Interpretations and Socio-Economic Criteria for Land-Use Planning." The results of the varying projects aid the soil survey activities in the region. The objectives of the regional project are three fold: a) to determine biophysical and socio-economic factors that influence non-urban land use; b) to organize and deliver existing biophysical and socio-economic land related data needed for land-use policy making and planning; and c) to identify and develop critically needed data and interpretations for land-use policy making and planning; develop and evaluate alternatives to overcome soil limitations affecting land-use and environmental degradation.

Most of the western states provide supportive service to the National Cooperative Soil Survey in terms of soil characterization. This ranges from a few specialized samples to complete characterization of as many as 50 pedons per year.

Montana State University operates an Automated Data Processing System and Data Bank for soil inventories. Several thousand pedon descriptions are processed each year.

SCS - USDA

State Soil Scientist National Workshop

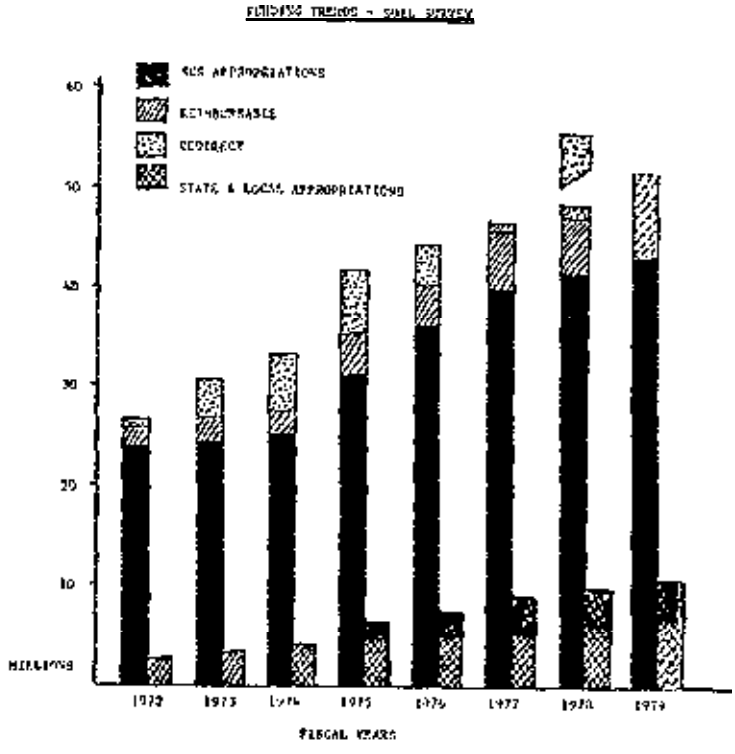
Chicago, Illinois, March 6, 1978

Budget Process By Westal W. Fuchs

Assistant Director, Soil Survey Operations Division

There is more money in the sail survey budget than any *time* in history, yet the budget is of greater concern to most of you here than at any time in the past. My objective is to better acquaint you with the reason for this paradox by discussing some of the budgetary processes, the changing demands and shifting priorities fur the soil survey dollar, and some of the constraints in this phase of our work.

Most of us are much more involved in the budget phase of our work than just a few years ago and do not yet feel comfortable wearing this new hat. We of course must continue to proudly wear our quality control hat every day, and at the same time become proficient enough with the budgeting processes that we can don our new hat with confidence when needed to effectively guide our soil survey program.

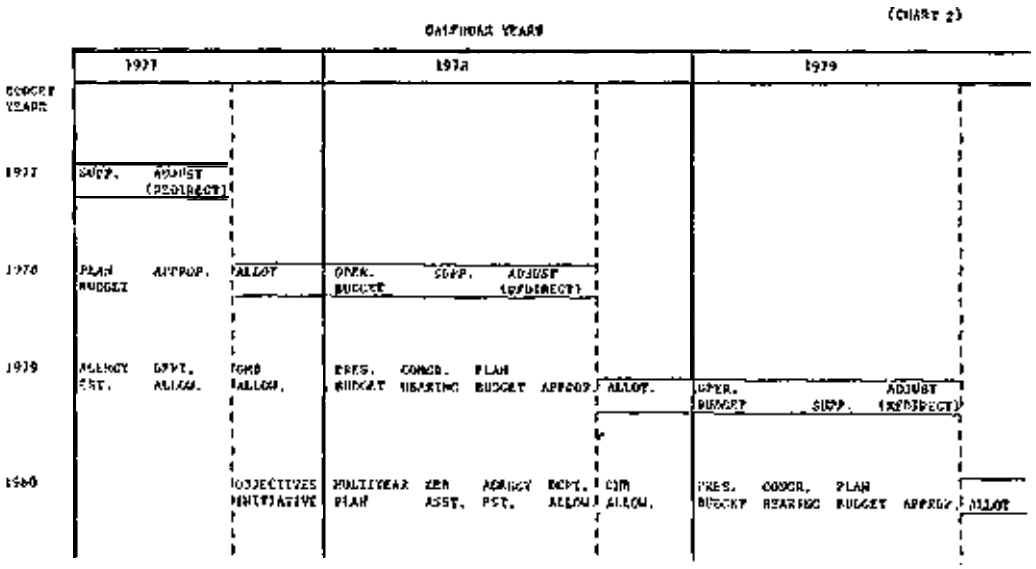


Soil Conservation Service appropriations for *soil surveys* have increased significantly over the last seven years, but not at a uniform rate.

The distinct changes in 1975, 1976, and 1977 were related to congressional support for soil surveys for the Fort Union Coal, strip mine reclamation, prime farmland, and other environmental issues. Public support for soil surveys was also reflected by increasing amounts of State and local appropriations. Contributions and reimbursables earned by SCS has steadily increased, as well as State and county funded personnel working in the National Cooperative Soil Survey. In addition, state conservationists redirected significant amounts of funds from conservation operations.

The number of SCS people in soil survey remained fairly constant because the increasing dollar had a declining value; however, total personnel dropped in conservation operations. The total number of people involved in soil surveys increased because of the growth in numbers of state and local soil scientists. These national trends show that soil survey *in* quite popular and continues to receive strong support. Then why do we feel such a pinch this year?

Let's review the budget process first, then we will look in more detail at the allotment process. The budget far a given fiscal year extends over three years, and three fiscal year budgets are in process at all times.

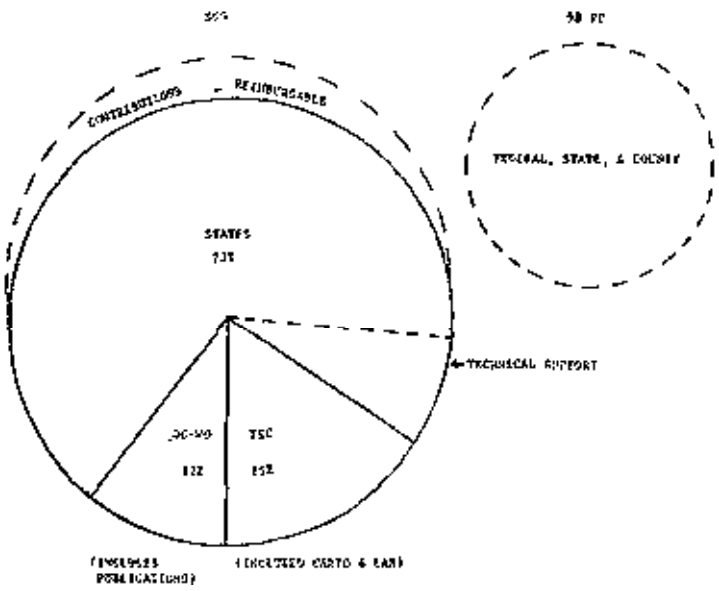


Most of our recent concerns were in the allotment process, which in *most* instances ***did not*** provide as much as we indicated as a need in the planning budget. The appropriations were not sufficient to cover planning budget requests. The amount of appropriations was set in motion nearly two years before. **This** overall budget timetable and schematic has been in effect for several years; however, significant additions have been made within the last year which will involve States throughout the planning process. To supplement Zero Based Budgeting (ZBB), SCS has adopted multiyear planning as the vehicle to provide State level input into the national issues and needs. You will recall from the previous chart where soil survey funding increased significantly when coupled with issues of national concern. These needs are translated into the agency estimates in consultation with, and constraints imposed by the Assistant Secretary of Agriculture. A possible constraint could be no agency increase in funding or personnel, thus increasing one program would have to be at the expense of another.

The agency estimate may be altered by the Department or by the Office of Management and Budget (OMB). While congressional hearings and compromises are proceeding, States prepare their planning budgets for the use of anticipated funds. After appropriations, allotments are made considering the planning budget requests. Supplemental allotments are made when later appropriations cover pay act costs. Redirection from or to conservation operations is used to balance accounts at the end of the year.

The allotment process should provide for an equitable distribution of funds in order to accomplish the maximum toward our national objectives. Existing staffing patterns need to be sufficiently funded to bring about an orderly restructuring. Existing staffing patterns evolved over several years by building upon the soil survey base allotment, which was somewhat related to the base allotment for conservation operations. The base increased each year by applying adjustments such as pay act costs. Approval of requests for additional recurring funds also increased the base. The shifting of workloads and priorities to, from, and between States and other allotees dictates a new approach to the allotment process of sail survey funds.

SURVEY FUNDING



Distribution of sail survey funds between allotees for 1978 fiscal year was very similar to the old procedures. The fallowing were the major considerations:

1. Appropriations were 6 million more than last years base, and 2 million more than total alloted last year.

2. Appropriations were 1 million less than lest years use.

3. Appropriations were 8 million less than the planning budget requests, or about 83% of expressed need.

4. The base allotment for 1977 as well as a calculated base for 1978.

5. The shifting of functions through times between allotees.

   a. Compilation and map finishing.
   b. Correlations and manuscripts.
   c. Imagery and base map acquisition.
   d. Effects of computerization.

6. The present and long-range workload of allotees.

The shifting functions and declining workload had only a limited effect on the 1978 allotments, but will need stronger consideration in future allotments. The increasing workload generated both by reimbursables and 98 financial project will need to be considered in future allotments.

New budget procedures will involve us all much more than in the past, and will change some of the ways we express our needs. We already have many of the tools we need to be effective. Our soil survey plan of operations is a multiyear plan of this soil survey program in a State. CASPUSS is a very effective Cool in budget considerations and will be even better as we sharpen up our scheduling procedures. Funds for operating our soil survey program in the future will be alloted based upon how effectively we convey our needs.

United States Department of Agriculture
Soil Conservation Service

State Soil scientist Workshop
Arlington Heights, Illinois
March G-g, 1978

CASPUSS

By Richard A. Dierking
Soil Survey Classification and Correlation Division
Chief, Soil Classification and Mapping Branch

I. The Computer Aided Scheduling of Published Soil Surveys(CASPUSS) system is designed to compile schedules that aid in the coordination of sail survey activities. The program uses inputs from all levels of soil survey to output activity schedules. It standardizes the administrative data necessary for coordinating a national soil survey program.

The CASPUSS system furnishes data in a number of formats. The various formats are suitable and used for:

1. Scheduling and monitoring completion of important steps in each progressive soil survey.

2. Preparing the soil survey budget.

3. Answering congressional inquiries and those from the general public.

4. Determining long-range workloads and associated manpower and financial needs.

5. Determining those steps in a soil survey that consistently cause bottlenecks.

6. Providing status of work in all soil survey areas.

Instructions for completing the schedules are given in National Soils Handbook, Section 205.4(a).

The CASPUSS system was started around January 1975 and the first input program was run in March 1975. The system has been developing for three years and is still being modified. Approximately 50 different programs have been developed to display different formats of the basic input data. Some of the programs are simple and display chronologically a single function and other programs are more complex, i.e., the operations schedule. Four programs are stored online, and about ten are stored on private disk packs and can be recalled, and about 35 are kept as punch-card decks, which can be inserted into our terminal facilities.

Since the acquisition of EASYTRIEVE (Pansophic Co., Oak Brook, Illinois), it has been easier to develop programs far many of the formats chat are useful for sail survey management. This software package has allowed us to provide special formats. The special formats requested by the TSCs for example, are all different. The NE and M use one each and the S and W each uses four. Only a few States have requested special formats. Refer to attached Distribution List for the kinds of formats.

The ADP costs for CASPUSS are about 17 percent of the total combined computer and terminal costs allotted to us. The Soil Classification and Mapping Branch spends about $2100 of $15,000 allotted for computer time and $1200 of $4800 allotted for the terminal. We do have a limited budget for these kind of activities. We also have limited personnel to reproduce, collate, and distribute printouts of these formats.

II. How can CASPUSS aid in pour State's soil survey management program?

1. CASPUSS provides the status of each soil survey area in your State each 4 months,

   - You can determine if there are holdups in processing maps and text for publication. These can be investigated, through the Head, Soils Staff, to determine cause and possible ways to expedite.

- You can determine more nearly the actual time of publication which should help in planning and scheduling introductory information activities.

2. CASPUSS can be a tool that illustrates the overall State soil survey program to area and district office staffs,

   - By making field staffs aware of the overall effort, and by

   - Showing the importance of scheduling and meeting schedules.

3. CASPUSS can be a tool for your State's long-range soil survey planning.

   - You can identify all major steps in a concise format, and it can

   - Serve as a reminder to prepare work plans and order imagery prior to initial field reviews.

   - The Mississippi ten-year soil survey program plan uses similar kinds of data that is distributed to the public.

4. CASPUSS provides a means to coordinate plans and actions by State, TSC, and Washington offices with their carto, editorial, and operations staffs.

   - It ensures that the same ""me and spelling is used throughout.

   - It ensures that all staffs are aware of scheduling changes at all levels.

   - It ensures that funds are adequately budgeted for printing and binding.

   - It ensures the proper listing of priorities so that text and maps are ready for printing and binding at the same time.

5. CASPUSS printout format is easily changed to show data arranged in various ways to assist in management.

   - The TSCs receive a printout after each update listing critical dates from the operations, manuscript, and cartographic schedules. All pertinent data are on one printout instead of 3 printouts--and therefore is more easily handled and referenced. Perhaps State conservationists and Stare staff could use a similar printout to carry with them.

   - A single-page printout format was developed by Bob Johnson, Florida State Soil Scientist, that leaves blank columns so that they can be filled in for steps pertinent to state operationa. The attached Mississippi example is very similar. (Critical scheduling dates for State's soil survey staffs.)

6. CASPUSS is used by Washington office staff who participate in program inspections, State appraisals, and inspections to help evaluate your soil survey program.

III. Some of the recent changes to the CASPUSS program are:

   - The column "FINAL-MS-REVIEW, HYATT TECH" has bee" replaced with "FINAL-MS-REVIEW, "EDIT IDENT" which will give initials identifying the soil scientist on the soil survey publications staff and the editor responsible for final manuscript review.

Technical Reviewer		Editor	
CP	Clatie Powell	JB	Jim Benson
GE	Guy Earl"	JG	Jim Giuliano
JT	John Trach	JO	John Owen
WS	Bill Shelton	JR	John Ryan
		KT	Ken Thomas

PC Phil Chavez
RF Ruth Foget
SA Stan Anderson
SF Steve Foland
TF Thelma Finlay

- The column "MAP-COMPILATION-AND-FINISHING, PCT PIN" will be dropped.

- Standard intervals have been developed for scheduling purposes between steps on the manuscript schedule. Dates for individual surveys may change because of such things as work priorities of the editorial staff, problems with editorial contracts, and status of maps--changes in dates will show on updated schedules.

IV. Past reviews and evaluations of CASPUSS printouts suggest the following actions:

1. The preparation of the soil survey work plan should be scheduled.

2. The soil survey area number must agree with the number assigned the area in the Time-keeping & Progress Systems Codes.

3. The difference between a progressive survey and a project survey is not clearly understood, thus surveys are not always recorded properly. Definitions are given in Advisory SOILS-12, June 24, 1977.

4. We believe that progressive soil surveys should be scheduled by the State through to "Initial MS Review, State Complete" and column "Mew Base Imagery, Date Ordered" plus column "Map Compilation and Finishing, Due TSC."

5. Initial review dates should reflect those reviews that have followed many of the procedures in the National Soils Handbook.

6. All overdue dates (*) should he rescheduled.

7. The soil survey status map included with APOs should agree with data on the CASPUSS schedules.

This brief discussion completes our review of the CASPUSS system. We have mentioned a little background information, how CASPUSS may aid your State's soil survey management program, and some recent developments and evaluations.

12/30/77

DISTRIBUTION OF ROUTINE CASPUSS SCHEDULES

	SCS Unit	Original Operations	Copy Operations	Original Cartographic	Copy Cartographic	Original Manuscript	Copy Manuscript
Bi-Monthly							
3-Year Publication Schedule--All S.S. Areas--Updated and Distributed Bimonthly	Operations (Fuchs)		1		1		1
	SCAM Branch	x		x			1
	Publications Branch		1		1	x	1
	Editorial Staff		1		1	x	
	E. G. Rickert		1		1		1
	D. A. Darling		1		1		1
	J. A. Gockowski		1		1		1
	TOTAL		6		6		6
Complete alph. printout of all G, J & N surveys	Cartographic Div. (give orig. to Darling & 1 copy to Jung Gatel	x (only) (Cartographic Schedule only)					
Complete alph. printout by TSC for each TSC of all G, J & N surveys for Operations, Manuscript, & Carto schedules	All 4 TSCs	x (make 1 copy of NE for Buchaley and send with buck slip) (make 1 copy of W for PSC)					
Critical Scheduling Dates by State & S.S. Area Names--Alpha.			Copy				
	SCAM Branch	x					
	Operations (Fuchs)		1				
	Publications Branch		1				
	Editorial Staff		1				
	E. G. Rickert		1				
	D. A. Darling		1				
	K. W. Flach		1				
	J. A. Gockowski		1				
	W. E. Jenke		1				
	TOTAL		9				
Critical Scheduling Dates by TSC for each TSC as follows; Originals only sent to TSCs.	NE TSC	Printout of survey areas listed in alphabetical order by state by fiscal year scheduled for publication.					
	South TSC	1. Sequenced by date manuscript is due Hyattsville. 2. Sequenced by date imagery is due state. 3. Sequenced by date map compilation is due TSC. 4. Sequenced by date map negatives are due Hyattsville.					
	Midwest TSC	Printout of survey areas listed in alphabetical order by state by fiscal year scheduled for publication.					
	West TSC 1 copy of all four printouts	1. Sequenced by date final correlation conference is scheduled. 2. Sequenced by date manuscript is due Hyattsville. 3. Sequenced by date new base imagery is accepted by Cartographic. 4. Sequenced by date new base imagery is scheduled to state.					

DISTRIBUTION OF MONTHLY CASPUSS SCHEDULES

	SCS Unit		Original Operations	Copy Operations	Original Cartographic	Copy Cartographic	Original Manuscript	Copy Manuscript
Yearly *All S.S. Areas in Alphabetical Order by State for All of U.S. Distributed-- every four months	To all states	(Schedules)	x	1	x	1	x	1
		(APOs)	(original and one copy to each state)					
	Operations (Fuchs)			1		1		1
	Cartographic Div.		x	1	x	1	x	1
	SCAM Branch	(Schedules)		1		1		1
	Diarking			1		1		1
	TOTALS	(schedules)	2	5	2	5	2	5
		(APOs)	x	1	x	1	x	1
*All S.S. Areas in Alphabetical Order by State for each TSC Distributed--August	All 4 TSC FSC's -- originals only							

*These schedules will not be returned to the SCAM Branch for updating. They are retained by the designated division or FSC for use in their management program.

ROUTINE DISTRIBUTION OF SPECIAL CASFUSS SCHEDULES

Critical Scheduling Dates By:	FREQUENCY	ORIGINAL TO
MS-TO-GPO, MS-TO-HY	After each update	S. S. Editorial
MS-TO-HY, MS-TO-GPO	After each update	S. S. Editorial
MS-TO-GPO, NEGS-DONE	After each update	S. S. Editorial
	After each update	S. S. Editorial
IMAGERY ACCEPTED, MS-LAUE-HY	Annual	S. S. Editorial
UNPUBL-MS-SCHED-HY SEQ. BY MS-TO-HY, MS-TO-GPO	After each update	S. S. Editorial (1 copy to Clatie Powell)
UNPUBL-MS-SCHED-GPO SEQ. BY MS-TO-GPO, MS-TO-HY	After each update	S. S. Editorial
MS-SCHED-(BUT-NOT-SENT)-HY SEQ. BY TSC, MS-TO-HY	After each update	Editorial for Transmittal to TSCs

Printouts for WO staff on inspections:

1 - reduced copy of the 3 schedules for the state being inspected listing all soil survey areas in the state alphabetically - print two, skip two

Limit of 132 characters determines format

(DATES WITH ASTERISK (*) ARE UNMET SCHEDULED DATES)

JOB	STATE FIPS CODE	SOIL SURVEY AREA NAME	WORK PLAN DATE	SURVEY AREA NUM	ORDER	ACRES-IN SURVEY AREA	ACRES MAPPED	PUBLCN SCALE	NEW PRC IT	BASE IMAGERY RI	FLD	PUB	FIELD-REVW-DATES INITL	PROGR	FINL	SOIL MAPPNG COMPLT	FINAL-CORRN CONF DATE	DOC TO HY
CHAR.	5	29	5	3	4	11	11	6	3	3	3		5	5	5	5	5	5
28001	MS	ADAMS COUNTY	X	1	20-F	286,720	286,720	15					X	X	X	X	X	X
28003	MS	ALCORN COUNTY	X	1	20-F	259,200	259,200	20					X	X	X	X	X	X
7293	MS	AMITE COUNTY	4X56	5	20-F	466,560	466,560	20		NI		HA	X	X	X	X	X	5X71
28007	MS	ATTALA COUNTY	8X56	7	23-N	463,360	127,252	20	20	Y	YI	LAN	8X56	6/85	10/86	9/86	10/86	11/86
28009	MS	BENTON COUNTY	4X68	9	20-F	263,680	263,680	20		N	Y	LAN	5X60	X	8X71	3X71	9X72	10X72
28011	MS	BOLIVAR COUNTY	X	11	20-F	586,880	586,880	20					X	X	X	X	X	X
28013	MS	CALHOUN COUNTY	X	13	20-F	378,880	378,880	15					X	X	X	X	X	X
28015	MS	CARROLL COUNTY	1X76	15	23-G	408,320	145,430	20	20	Y	YI	LAN	1X76	11/78	12/82	12/82	1/83	1/83
6850	MS	CHICKASAW COUNTY	5X61	17	20-F	323,840	323,840	20		NI			X	X	X	X	X	X
28019	MS	CHOCTAW COUNTY	4X73	19	23-G	266,880	121,080	20	20	Y	Y	LAN	7X60	7/78	5/81	4/82	6/81	6/81
28021	MS	CLAIBORNE COUNTY	X	21	20-F	311,040	311,040	20					X	X	X	X	X	X
28023	MS	CLARKE COUNTY	X	23	20-F	446,080	446,080	15					X	X	X	X	X	X
7476	MS	CLAY COUNTY	11X72	25	23-F	264,960	264,960	20	20	Y	YI	LAN	9X62	4X73	9X73	3X74	9X73	6X74
28027	MS	COAHOMA COUNTY	X	27	20-F	364,800	364,800	20					X	X	X	X	X	X
28029	MS	COPIAH COUNTY	3X73	29	23-G	499,840	303,715	20	20	Y	YI	LAN	6X60	9/78	11/81	9/81	12/81	12/81
28031	MS	COVINGTON COUNTY	X	31	20-F	266,240	266,240	15					X	X	X	X	X	X
28033	MS	DESOTO COUNTY	X	33	20-F	283,520	283,520	20					X	X	X	X	X	X
28035	MS	FORREST COUNTY	1X71	35	23-G	300,160	300,160	20	20	Y	YI	LAN	8X62	6X74	9X75	8X75	11X75	1X76
28037	MS	FRANKLIN COUNTY	/	37	23-N	363,520	69,670	20		Y	YI	LAN	6X62	/	12/78	11/78	1/88	2/88
28039	MS	GEORGE COUNTY	X	39	20-F	307,840	307,840	20					X	X	X	X	X	X
28041	MS	GREENE COUNTY	/	41	23-N	465,920	197,510	20		Y	YI	LAN	9X60	/	1/87	12/86	2/87	3/87
28043	MS	GRENADA COUNTY	X	43	20-F	277,120	277,120	15					X	X	X	X	X	X
28045	MS	HANCOCK COUNTY	5X59	45	23-G	310,400	265,860	20	20	Y	YI	LAN	5X59	8X77	11/78	10/78	12/78	12/78
7294	MS	HARRISON COUNTY	4X57	47	20-F	374,400	374,400	20		NI		HA	X	X	X	X	X	5X71
28049	MS	HINDS COUNTY	3X73	49	23-G	561,280	561,280	20	20	Y	YI	LAN	9X55	5X75	8X76	7X76	9X76	9X76
28051	MS	HOLMES COUNTY	/	51	23-N	488,960	130,945	20		Y	YI	LAN	10X56	2/78	12/85	11/85	2/86	3/86
28053	MS	HUMPHREYS COUNTY	X	53	20-F	262,400	262,400	20					X	X	X	X	X	X
28055	MS	ISSAQUENA COUNTY	X	55	20-F	265,600	265,600	20					X	X	X	X	X	X
28057	MS	ITAWAMBA COUNTY	12X62	57	23-G	346,240	346,240	20	20	Y	YI	LAN	12X62	4X75	6X75	3X75	11X75	11X75
28059	MS	JACKSON COUNTY	X	59	20-F	476,160	476,160	20					X	X	X	X	X	X
2806	MS	JASPER COUNTY	4X73	61	23-G	437,120	437,120	20	20	Y	YI	LAN	10X57	9X72	2X74	12X73	9X74	7X74
28063	MS	JEFFERSON COUNTY	7X62	63	23-G	332,800	332,800	20	20	Y	YI	LAN	7X62	7X74	2X76	8X75	3X76	6X76
7417	MS	JEFFERSON DAVIS COUNTY	6X60	65	20-F	264,960	264,960	20		N	YI	LAN	X	X	X	X	11X71	4X72
28067	MS	JONES COUNTY	9X59	67	23-G	451,840	57,927	20	20	Y	YI	HAY	10X77	/	1/84	12/83	2/84	3/84

(DATES WITH ASTERISK (*) ARE UNMET SCHEDULED DATES)

SOIL-SURVEY-AREA-IDENT JOB NUMBER	ST	NAME (ABBREV)	(R) (C)	INITIAL-MS-REVIEW STATE COMPL	TSC COMPL	DUE HYATT	HYATT TECH	TSC-EDITING MS ACCPT	EDIT COMPL	STATE REV	MS TO HY	FINAL-MS-REVIEW HYATT EDIT	EDIT IDENT	STATE REV	MS TO GPO	GALLEY-SENT FROM GPO	TO GPO	PAGE-PROOF FROM GPO	TO GPO	PUBLD SURVEY OUT
28001	MS	ADAMS COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X70
28003	MS	ALCORN COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X71
07203	MS	AMITE COUNTY		10X71	X	4X72	X	/	/	/	/	X	/	8X74	12X74	X	X	10X75	1X76	5X76
28007	MS	ATTALA COUNTY	Y	10/86	12/86	1/87	2/87	/	/	/	/	/	/	/	7/87	/	/	/	/	/
28009	MS	BENTON COUNTY	N	X	X	4X73	X	/	/	/	/	X	/	X	10X75	12X75	4X76	5X76	10X76	4X77
28011	MS	BOLIVAR COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X58
28013	MS	CALHOUN COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X65
28015	MS	CARROLL COUNTY	Y	12/82	1/83	2/83	3/83	/	/	/	/	/	/	/	8/83	/	/	/	/	/
06950	MS	CHICKASAW COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	7X74
28019	MS	CHOCTAW COUNTY	Y	5/81	6/81	7/81	8/81	/	/	/	/	/	/	/	1/82	/	/	/	/	/
28021	MS	CLAIBORNE COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X63
28023	MS	CLARKE COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X65
07476	MS	CLAY COUNTY	Y	4X74	X	8X74	X	/	/	/	/	X	/	X	11X75	1X76	3X76	4X76	8X76	12X76
28027	MS	COAHOMA COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X59
28029	MS	COPIAH COUNTY	Y	11/81	12/81	1/82	2/82	/	/	/	/	/	/	/	7/82	/	/	/	/	/
28031	MS	COVINGTON COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X45
28033	MS	DESOTO COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X59
28035	MS	FORREST COUNTY	Y	4X76	10X76	/	/	10X76	1X77	2X77	2X77	/	GE/TF	/	7X77	/	/	10X77	4/79	7/79
28037	MS	FRANKLIN COUNTY	Y	12/87	2/88	3/88	4/88	/	/	/	/	/	/	/	9/88	/	/	/	/	/
28039	MS	GEORGE COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X71
28041	MS	GREENE COUNTY	Y	1/87	3/87	4/87	5/87	/	/	/	/	/	/	/	10/87	/	/	/	/	/
28043	MS	GRENADA COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X67
28045	MS	HANCOCK COUNTY	Y	12/78	1/79	2/79	3/79	/	/	/	/	6/79	/	9/79	10/79	/	/	12/79	2/80	5/80
07294	MS	HARRISON COUNTY		11X71	X	9X72	X	/	/	/	/	X	/	6X73	2X74	X	X	X	X	8X75
28049	MS	HINDS COUNTY	Y	12X76	1X77	1X77	3X77	/	/	/	/	2/78	GE/PC	3/78	4/78	/	/	6/78	9/78	11/78
28051	MS	HOLMES COUNTY	Y	11/85	1/86	2/86	3/86	/	/	/	/	/	/	/	8/85	/	/	/	/	/
28053	MS	HUMPHREYS COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X59
28055	MS	ISSAQUENA COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X61
28057	MS	ITAWAMBA COUNTY	Y	1X76	3X76	4X76	5X76	/	/	/	/	6X77	/	6X77	8X77	/	/	10X77	9/79	12/79
28059	MS	JACKSON COUNTY		X	X	X	X	/	/	/	/	X	/	X	X	X	X	X	X	X66
28061	MS	JASPER COUNTY	Y	8X74	10X74	1X75	7X75	/	/	/	/	5X76	GE/KT	6X76	4X77	6X77	12X77	3/78	2/79	5/79
28063	MS	JEFFERSON COUNTY	Y	10X76	1X77	/	/	1X77	3X77	4X77	4X77	/	GE/JO	/	7X77	/	/	9X77	2/80	5/80
07412	MS	JEFFERSON DAVIS CN	N	1X72	X	3X73	X	/	/	/	/	X	/	6X74	12X74	3X75	5X75	6X75	2X76	6X75

(DATES WITH ASTERISK (*) ARE UNMET SCHEDULED DATES)

SOIL-SURVEY-AREA-IDENT JOB NUMBER	ST	NAME (ABBREV)	NUM MAP SHTS	PUBLCN SCALE	PUR IMG	NEW-RISE-IMAGERY DATE ORDRD	DATE ACCPT	19 RCV	TO-TSC DATE	TO DISTATE	MAP-COMPILATION-AND-FINISHING CONTR	CULTURE STATE	PCT FIN	DUE TSC	MISC-MAPS ASSGN	COMPL	MAP-NEGATIVES DUE HYCAR	DATE COMPL	TO GPO	PRESS APRVL
28001	MS	ADAMS COUNTY		15		X	X	NA	X	X	X	X	100	X	X	X	X	X	X	X
28003	MS	ALCORN COUNTY		20		X	X	NA	X	X	X	X	100	X	X	X	X	X	X	X
07293	MS	AMITE COUNTY	57	20	HA	X	X	NA	X	X	X	X	100	X	X	X	X	12X75	1X76	2X76
28007	MS	ATTALA COUNTY		20	20	HA	/	/	/	/	/	/	0	3/80	/	/	5/80	/	/	/
28009	MS	BENTON COUNTY	36	20		HA	11X74	2X75	NA	3X75	F	7X75	X	X	100	5X76	3X76	3X76	8X76	9X76	10X76	12X76
28011	MS	BOLIVAR COUNTY		20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28013	MS	CALHOUN COUNTY		15			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28015	MS	CARROLL COUNTY	51	20	20	HA	2X76	/		/	/	/	/	/	0	4/83	/	/	6/83	/	/	/
06850	MS	CHICKASAW COUNTY	40	20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28019	MS	CHOCTAW COUNTY		20	20	HA	/	/		/	/	/	/	/	0	1/82	/	/	3/82	/	/	/
28021	MS	CLAIBORNE COUNTY		20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28023	MS	CLARKE COUNTY		15			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
07476	MS	CLAY COUNTY	35	20	20	HA	6X73	9X74	NA	5X75	F	5X75	X	8X75	100	2X76	1X76	1X76	4X76	7X76	8X76	10X76
28027	MS	COAHOMA COUNTY		20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28029	MS	COPIAH COUNTY		20	20	HA	/	/		/	/	/	/	/	0	11/82	/	/	1/83	/	/	/
28031	MS	COVINGTON COUNTY		15			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28033	MS	DESOTO COUNTY		20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28035	MS	FORREST COUNTY	38	20	20	HA	6X76	1X77	YES	2X77	F	11X77	/	/	0	12/78	8X77	12/78	2/79	4/79	4/79	6/79
28037	MS	FRANKLIN COUNTY		20		HA	/	/		/	/	/	/	/	0	10/80	/	/	12/80	/	/	/
28039	MS	GEORGE COUNTY		20			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28041	MS	GREENE COUNTY		20		HA	/	/		/	/	/	/	/	0	6/80	/	/	8/80	/	/	/
28043	MS	GRENADA COUNTY		15			X	X	NA	X	X	X	X	X	100	X	X	X	X	X	X	X
28045	MS	HANCOCK COUNTY	40	20	20	HA	2X77	/		12*77		10/78	/	/	0	6/79	11/78	6/79	8/79	10/79	2/80	4/80
07294	MS	HARRISON COUNTY	50	20		HA	X	X	NA	X		X	X	X	100	X	X	X	X	X	X	X
28049	MS	HINDS COUNTY	71	20	20	HA	6X76	1X77	YES	1X77	F	4X77	/	/	0	1X78	4X77	2/78	4/78	6/78	8/78	10/78
28051	MS	HOLMES COUNTY		20		HA	/	/		/		/	/	/	0	4/81	/	/	6/81	/	/	/
28053	MS	HUMPHREYS COUNTY		20			X	X	NA	X		X	X	X	100	X	X	X	X	X	X	X
28055	MS	ITSAQUENA COUNTY		20			X	X	NA	X		X	X	X	100	X	X	X	X	X	X	X
28057	MS	ITAWAMBA COUNTY	43	20	20	HA	6X76	1X77	YES	2X77	F	7X77	/	/	0	5/79	5X77	5/79	7/79	9/79	9/79	11/79
28059	MS	JACKSON COUNTY		20			X	X	NA	X		X	X	X	100	X	X	X	X	X	X	X
28061	MS	JASPER COUNTY	55	20	20	HA	6X75	6X77	NA	8X77	F	3/78	/	/	0	10/78	8X77	10/78	9X77	5/78	2/79	4/79
28063	MS	JEFFERSON COUNTY	42	20	20	HA	6X76	1X77	YES	2X77	F	12X77	/	/	0	10/79	10*77	10/79	12/79	2/80	2/80	4/80
07417	MS	JEFFERSON DAVIS C	34	20		HA	X	X	NA	X		X	X	X	100	7X75	X	X	10X75	11X75	2X76	3X76

CRITICAL SCHEDULING DATES FOR STATE SOIL SURVEY STAFFS
STATE - MISSISSIPPI

SOIL SURVEY AREA	FIELD-REVW-DATES INITL	PROGR	FINAL	SOIL MAPNG COMPL	FIELD CORRL TO TSC	CORRL DOC TO ST	INITIAL-NS-REVIEW DUE S.O.	STATE COMPL	TSC COMPL	NUM MAP SHTS	MAP-COMPIL-FINISH TO CONTR	CONTR COMPL	DUE TSC	PUBLD SURVEY OUT
ATTALA COUNTY	08X56	06/85	10/86	09/86	10/86	11/86		10/86	12/86				03/98	
CARROLL COUNTY	01X76	11/78	12/82	11/82	01/83	01/83		12/82	01/83	51			04/83	
CHOCTAW COUNTY	07X60	07/78	05/81	04/81	06/81	06/81		05/81	06/81				01/82	
COPIAH COUNTY	06X60	09/78	11/81	09/81	12/81	12/81		11/81	12/81				11/82	
FORREST COUNTY	08X62	06X74	09X75	08X75	11X75	01X76		04X76	08X76	38			12/78	07/79
FRANKLIN COUNTY	05X62		12/78	11/78	01/88	02/88		12/87	02/88				10/90	
GREENE COUNTY	09X60		01/87	12/86	02/87	03/87		01/87	03/87				06/89	
HANCOCK COUNTY	05X59	08X77	11/78	10/78	12/78	12/78		12/78	01/79	40			05/79	05/80
HINDS COUNTY	09X55	05X75	08X76	07X76	09X76	09X76		12X76	01X77	71			01X78	11/78
HOLMES COUNTY	10X56	02/78	12/85	11/85	02/86	03/86		11/85	01/86				04/87	
ITAWAMBA COUNTY	12X62	04X75	06X75	03X75	11X75	11X75		01X76	03X76	43			05/79	12/79
JASPER COUNTY	10X57	09X72	02X74	12X73	09X74	07X74		08X74	10X74	55			10/78	05/79
JEFFERSON COUNTY	07X52	07X74	08X76	08X75	03X76	06X76		10X76	01X77	42			10/79	05/80
JONES COUNTY	10X77		01/84	12/83	02/84	03/84		01/84	03/84	54			01/84	
KEMPER COUNTY	09X58	01/78	01/85	12/84	02/85	03/85		01/65	03/85	58			11/85	
LAFAYETTE COUNTY	01X75	04/79	05/79	04/79	05/79	06/79		05/79	07/79	52			06/79	11/80
LAUDERDALE COUNTY	09X74	11X77	12/79	11/79	02/80	03/80		12/79	02/80	54			10/80	06/81
LAWRENCE COUNTY	05X61	00X01	05X71	02X71	02X72	03X72		00X01	00X01	35			12X76	01/78
LEAKE COUNTY	01X57	03/63	07/64	06/64	08/84	08/84		07/84	09/84				05/85	
LOWNDES COUNTY	05X58	09X75	12X76	11X76	05X77	06X77		09X77	02/78	42			12/79	07/80
MADISON COUNTY	03X59	03/76	11/81	10/81	12/81	12/81		11/81	01/82				11/82	
MARION COUNTY			09/86	08/86	10/86	11/86		09/86	11/86				08/89	
NESHOBA COUNTY	09X57	10X77	02/79	01/79	03/79	03/79		02/79	04/79				04/80	11/80
NOXUBEE COUNTY	07/78	07/81	09/82	08/82	10/82	10/82		09/82	11/82	55			09/83	
PEARL RIVER COUNTY	07X72	04/78	08/81	07/81	09/01	09/81		09/81	11/81				06/82	
PERRY COUNTY	09X60		12/86	11/86	01/87	02/87		12/86	02/87				01/89	
RANKIN COUNTY	06X77	06/78	04/82	03/82	05/82	05/82		06/82	07/82	66			03/82	
SCOTT COUNTY	07X60		09/87	08/87	10/87	11/87		09/87	11/87				05/90	
SIMPSON COUNTY	07X62	01/78	04/85	03/85	06/85	07/85		04/85	06/85				10/86	
SMITH COUNTY	10X55	11/84	01/86	12/85	02/86	03/86		01/86	03/86				04/86	
STONE COUNTY	05X61		11/82	10/82	12/82	01/83		11/82	01/83				03/84	
TISHOMINGO COUNTY	12X56	02/78	08/80	07/80	09/80	09/80		08/80	10/80	36			03/81	
UNION COUNTY	07X62	03X73	02X75	12X74	06X75	08X75		11X75	06X76	32			03/78	09/78
WAYNE COUNTY	12X62		12/85	11/85	01/86	02/86		12/85	02/86				10/87	
WEBSTER COUNTY	06X61	05X73	06X74	04X74	11X74	02X75		03X75	09X75	33			10X77	08/78
WILKINSON COUNTY	04X57	06/78	01/88	12/87	02/88	03/88		01/88	03/88				04/91	
WINSTON COUNTY	08X58		09/87	08/87	10/87	11/87		09/87	11/87				11/89	
YALOBUSHA COUNTY	04X57	00X01	03X75	02X75	06X75	07X75		05X75	10X75	41			05X77	05/78
TOTAL MAP SHEETS IN STATE										998				

38 Records Totaled

Multiyear Planning and the Soil Survey

President Carter issued a memorandum dated January 12, 1977, calling for budget requests to be prepared within the context of a 3 year budget plan. OMB has since issued instructions to implement this multiyear budget planning concept.

AL the 1976 State Conservationists' Meeting, the Administrator asked his policy committee for 1977 to examine the multiyear planning approach. That committee upon completing its work, recommended that a multiyear planning and budgeting concept be adopted and that the necessary procedures be developed. The Administrator appointed on implementation committee that is now preparing those procedures. Hopefully, the results will be of maximum value to the States and to the Washington Office.

Budgets exist for one primary reason. That is to support work plans. Therefore, a sound budget requires a sound plan of work. If you are going to prepare a budget for several years ahead, then you must have a clear idea of the work to be done in those years and the expected results. You must communicate that idea to others involved in the work planning and budgeting process to arrive at a coordinated approach. And you must give those who will do the actual. work an opportunity to make an input to the plan.

In addition, the Soil and Water Resource Conservation Act of 1977 (RCA) presents a situation in which soil survey will provide soils information for multiyear planning of other SCS programs. However, RCA will also require a multiyear plan or strategy for the soil survey program.

Why are we concerned about multiyear planning in soil survey?

a. Must plan carefully if to meet 1998 target.

b. Must assure meeting soil survey needs of other programs as they change over the years.

c. Must be able to meet user demands.

d. Must assure adequate workforce in right locations.

e. Must identify the remaining job to be done, the resources needed, output expected, and provide this information for State, TSC, and national decisionmaking. This means in soil survey we need a plan for more than 3-4 years.

The multiyear plan for soil survey must necessarily cover the period from now until the survey is completed. Some key elements need to be identified:

- A proposed starting date for each survey area and an estimated completion date should be included.

- The staff of soil scientists expected to be available for working in each area should be known.

- The estimated costs of moving people out of and into survey areas as surveys are completed and begun must be identified along with the cost of equipment, office spare, specialist support, etc.

- Other discipline leaders must know what is expected of them and when.

The following work planning steps should help in developing a multiyear plan:

a. Assess and evaluate the situation.

What remains to be done?
What are the priorities?

Talk given by Wayne F. Maresch, Director, Management Evaluation Division, USDA, Soil Conservation Service, at the National State Soil Scientist Meeting, Chic%@, Illinois, March 6-8, 1978.

h. Identify alternative courses of action.

Wow are we now doing the job?
What other ways can it be done?

c. Analyze workload.

What are the jobs to be done?
What resources do we have to carry them out'?
Are they the resources we will nerd 2 or 3 years from now?

d. Develop long-term objectives and plans.

Changes in the mix of resources cannot he made overnight.

e. Break long-term objectives and plans into annual increments.

f. Schedule work.

g. Evaluate progress and adjust as needed. The plan should never be final, it is intended to be a point of departure. Change it to accommodate changes in the situation.

One problem we have encountered is in how we measure success in the soil survey.

What does acres mapped mean to those outside SCS and agencies and universities associated with soil survey?
What if we did not complete the survey?
What if we did not publish it even though the mapping has been done?
What is the tax payer getting for his money?
Does he or she really need surveys of that intensity published in that form?

We need to be able to answer those questions.

Why do we concern ourselves with multiyear planning for the soil survey?

- With our limited resources we must concentrate them on the jobs that will produce results.

- With the emphasis on completing the survey we must avoid encouraging efficient failures. Effectiveness is doing the right thing while efficiency is doing the thing sight. With our limited resources we cannot afford inefficiencies or ineffectiveness.

- We must involve the field.

- We need to forget the past. Our life in SCS is in the future. Our plan must meet tomorrows needs not just reflect yesterdays performance.

These call into question several things:

a. Do we have the right people in the right places?

b. Do they fully understand their joh and its contribution to the total effort?

c. Are they adequately trained?

d. Do they have the equipment, maps, etc., needed?

e. Do they have sufficient management and technical support?

f. Do they have enough time to do the jab?

g. At the current rate of progress, will the survey he completed by 1998?

h. What staff adjustments need to be made as we approach the completion of the survey? What adjustments in other resources?

i. What make up of staff should wc have after the survey is completed?

We have made mistakes in the past, I do not need to reiterate them here. We need to learn from our mistakes and develop plans that will help us avoid making those mistakes as well as to avoid making new ones.

Soil scientists need to be involved in the multiyear plan development for all programs to be aware of the resulting demands on soil survey of those program activities. Other program leaders need to be involved in the soil survey multiyear plan development.. You need to consider the entire soil survey multiyear plan and budget, not just the personnel portion. Soil survey is a team effort.

SCS-USDA

CARTOGRAPHIC DIVISION

PRESENTATION AT STATE SOIL SCIENTIST MEETING

CHICAGO, ILLINOIS

March 6, 1978

IMAGERY FOR NATIONAL COOPERATIVE SOIL SURVEY

By

Jerome A. Cockowski, Director

I would like to share with you our thoughts on the changes relating to photographic base imagery for the National Cooperative Soil Survey.

The Soil Conservation Service used ASCS photographs exclusively from the period 1935 to 1968, Our sister agency was responsible for imagery acquisition for the Department of Agriculture. However, ASCS imagery is flown for the ASCS mission--that is, with vegetative cover--which is contrary to the soil scientist's needs in most instances.

Major changes have evolved in the NCSS imagery program. Since 1968, SCS has been flying for the specific SCS mission of soil surveys in areas of low relief. Cartographic provides photobase sheets for soil mapping. Using this imagery has several advantages: (a) it may be obtained with optimum cover condition, (b) more area is mapped per photobase sheet thus requiring less matching from sheet to sheet, (c) 3 better quality of imagery results from first generation prints, (d) mapping at this publication scale gives the soil scientist better control of density of mapping far publication, and (e) eliminates mosaicking of Low relief areas in cartographic, thus reducing personnel requirements. Since 1'968, we have contracted for high altitude imagery far 818,317 square miles or 1,070 areas at a cost approaching $2-3/4 million.

Another change was the use of orthophotography commencing in 1973 when a cost-share program was developed with USGS. The use of this product precludes mosaicking in areas of excessive relief. It is a planimetrically correct base, that is, every point on the image is in its correct location respective to all other points on that image. Tha primary benefit is that it reduces SCS cartographic personnel requirements for laying mosaics and fits other agencies map bases. Since 1973, we have contracted far 8,563 quads covering 470,965 square miles at a cost of $2,793,500.

Another important change was the new procedure for soil surveys approved in May 1974. This change resulted in the States Funding the entire cost of imagery acquisition. No longer are the States waiting for the NCSS publication program to finance the cost of imagery and then waiting one to two years for imagery before map finishing can commence. This change did more to provide imagery on time for publication than any other single step.

Another change that is vital to keeping the SCS soil survey publication program on schedule is the agreement that SCS entered into on June 4, 1976, with ASCS and PS, Department of Agriculture. This agreement, effective October 1, 1977, centralizes acquisition of all aerial photo material for the Department in ASCS. The benefits should be fourfold, This agreement will result in: (1) one set of standards fur all USDA agencies, (2) larger contracts covering contiguous areas with resultant cost reduction, (3) better contractor performance since sll flying will be for USDA and (4) better coordination of acquisition activities in the Department. The Administrator stated in a letter to TSC Directors in July 1977, that SCS must give this USDA agreement for aerial photo acquisition a fair trial period of about two years before we consider other alternatives.

On October 5, 1977, the Administrator approved decentralization of imagery acquisition from Hyattsville to each TSC Cartographic facility. Your *SC Cartographic Staff is now responsible for the ordering of aerial photography for your State. This should result In better and more direct communication between the State staffs and TSC Cartographic Heads and it should also result in better contractor responsiveness. Purchase orders will be submitted through the TSC to ASCS for aerial photography or to USGS for orthophotography.

SCS has used black and white panchromatic photography for the past 43 years. I am aware that studies are presently underway in three States to compare using color IR imagery with black and white imagery. State staffs are comparing resolution, photointerpretation, and other qualities of both films while mapping. In Houston County, Minnesota, photobase sheets for mapping and publication have been prepared in black and white from the color IR negatives. Color transparencies have been enlarged to the publication scale and are used for photo-interpretation. In Harmon County, Oklahoma, the black and white negatives from color IR are used for photobase preparation and color IR paper prints have been obtained for comparative photointerpretive purposes. ASCS has flown Dallas County, Iowa, with color IR and black and white panchromatic at the same time. Cartographic has already prepared the photobase sheets for conducting this project survey. Iowa staff shall obtain a few color IR positives or prints to be used for photointerpretive purposes to determine whether color IR would add to the rfficicncy of mapping. They shall also use black and white infrared prints for interpretation. These studies are being conducted to determine whether by using a slightly more costly photo-base product, appreciable soil scientist mapping time might be reduced resulting in a total cost reduction in the soil survey program.

LANDSAT imagery has been used for low intensity soil survey activities primarily in foreign countries. It does present good data for State general soil maps; however, because of the resolution we recommend enlargements of the reconstituted images to scales no larger than 1:250,000 or 4 miles to the inch.

In one or two pilot areas, SCS is using classified imagery as a source of data for conducting soil surveys. The primary benefit of using classified imagery is the immediate availability of current imagery over the majority of the country.

Dr. Flach has suggested that, where areas will be published at a scale smaller than 31:680, a line map should be considered. USCS quads with topography could be used as a base with soil linen and symbols over printed in red.

On avenge, you and cartographic are doing well in imagery acquisition for the publication program. However, if you are one of the States where you are waiting for one or two areas, you are not happy. The attached table specifies the summary of imagery acquisition from CASPUSS as of February 12, 1978.

From the table we have a 98% success ratio for imagery acquisition for FY 78 publications; 92% for FY 79; and 80% for FY 80 Far an average of 89.25%. All prior years' survey areas have the imagery 100% flown. This includes imagery for orthophotography and mosaicking also. We realize that orthophotography is giving many of you problems. In our most recent meeting with WCS, Doyle Frederick, Chief, Planning and Program Development, who is directly under the Chief of the Topographic Division, indicated that USGS has taken action to insure that 1,300 additional quads will be delivered to SCS during the period early December 1977 through March 197%. He stated emphatically that after March of 1978 the GS orthophotoquad production program will remain current with SCS requirements. We have finally gotten the attention of the GS and particularly the attention of their Mapping Centers.

Even though we have done a good job in really getting the soil survey and imagery acquisition program together, there is still much room for improvement. Advance planning by the State staffs for aerial photography acquisition is of utmost importance. Many times the State staff indicates a priority need for imagery for the purpose of mapping to avoid transferring data. However, in many instances. the area is already 40-50% mapped before the imagery is ordered and the likelihood of mapping on new imagery is rather remote. We suggest that imagery should bc ordered a minimum of three years prior to your need. This issue was discussed at a recent Technical Services/TSC Directors meeting in Washington. Dr. Flach indicated to Clete Cillman that when Clete was the Indiana State Conservationist, they did advanced planning and had imagery when field mapping commenced. Clete stated that they were in good shape because they ordered imagery, not two, but three years prior to need to make certain that they had a prod&t when they required it.

Letting. the State staffs award their own flying contracts is not the answer. All flying contractors, large or small, are eligible to bid on aerial survey contracts provided they meet USDA requirements for equipment and file a satisfactory financial statement. You all know that a flying contractor, in order to stay in business, must have a full schedule of contract flying. Consequently, even though the weather is clear in your area, he may be flying in another area where the weather is also clear. We believe that the decentralization of flying

contracting to the TSC's will result in better contractor performance and better communication between you and the TSC.

Most important, counsel with your TSC Cartographic Heads regarding imagery acquisition. They are your right-hand and are there to help you.

In conclusion, the SCS soil survey program is in the best shape ever regarding imagery acquisition. This is due to your efforts to order in a timely manner. Per CASPUSS, imagery has been ordered or is available for all areas scheduled for publication through FY 1981. Keep up the good work. I would like to paraphrase Major Bowes and later Ted Mack of the "Original Amateur Hour", "Keep those requests and SCS Cartographic 19's coming in " early in planning your soil survey mapping program.

Attachment

ATTACHMENT

SUMMARY OF IMAGERY ACQUISITION FROM CASPUSS (Z-12-78)

TSC	Imagery Type	FY 78	FY 79	FY 80	FY 81	FY 82	Totals 1/
South	High Altitude	31/31	33/32	40/29			104/92
	Ortho	5/5	4/3	5/4			14/12
	Mosaic		2/2	4/4			6/6
		36/36	39/37	49/37			124/110
West	High Altitude	6/6		1/1			7/7
	Ortho	19/17	14/13	21/13	2/2	3/2	59/47
	Mosaic	2/2	4/4	1/1	1/1		8/8
		27/25	18/17	23/15	3/3	3/2	74/62
East	High Altitude	2/2	12/12	6/6	2/2		22/22
	Ortho	6/6	3/2	3/3			12/11
	Mosaic	10/10	6/3	9/4		1/1	26/18
		18/18	21/17	18113	2/2	1/1	60/51
Midwest	High Altitude	24/24	47/44	48/45	6/5	1/1	126/119
	Ortho	4/4	4/4	6/5			14/13
	Mosaic						
		28/28	51/48	54/50	6/5	1/1	140/132
TOTALS BY FY		109/107	129/119	144/115	11/10	5/4	3981355
	TOTALS BY FY BY IMAGE TYPE						
	High Altitude	63/63	92/88	95/81	8/7	1/1	259/240
	Ortho	34/32	25/22	35/25	2/2	3/2	99/83
	Mosaic	12/12	12/9	14/9	1/1	1/1	40/32
		109/107	129/119	144/115	11/10	5/4	398/355
		(98%)	(92%)	(80%)	(91%)	(80%)	(89%)

1/ 398/355
- Number of survey areas listed on l-5-78 CASPUSS PRINTOCZ
- Number of survey areas with imagery flown

All prior years survey areas imagery 100% flown.

State Soil Scientist Workshop
Chicago, Illinois - March 6-8, 1978
W. J. Parker

Good to be here with you--it isn't often that the planner and soil scientist have an opportunity to sit down together. I especially appreciate your invitation to be with you.

- Purpose of presentation:

  Bring you up-to-date on some current resource planning activities so that you have a better understanding of resource planning as you hold group discussions tomorrow.

- Today I am going to do three things:

  - describe resource planning as that term is used in SCS today.
  - explain several resource planning activities and show how soils data are used.
  - suggest some topics for you to explore in your groups tomorrow.

- In the Objectives Statement for this workshop is this sentence:

  "Soil survey information is now used for a greater variety of purposes than at *any time* in the past."

  Certainly a true statement--a bit later we will inventory these uses. The Objectives Statement goes on to say that it is "the specific purpose of this workshop to review and (evaluate current policies and procedures. ..." Here is where the inventory of uses may help you.

- Let's look at resource planning:

  It is what the words say it is--planning for our resources. Of course in SCS we don't own the natural resources, so we can't really plan for them either.

  What we do is assist the people who do own them (and have decisionmaking responsibility for them).

  And we also assist the people who have legal responsibility for public decisions that affect private decisions.

- Assist these people--what does this mean?

  It means that SCS provides information about the natural resources, provides help to understand the importance of the information.

- So what are some of the activities included in resource planning?

  - One you may be best acquainted with is prime lands.

    - You identifv the land that is defined to be prime.
    - Others use 'this information.
    - 'Some use it in land use planning. If this land is prime, it should be reserved for agricultural purposes. Prime land then becomes an issue involving a variety of interests.
    - For the future, it may be more pertinent to identify prime lands for energy conservation purposes. After all, our best lands would require less energy resource than our other lands.

- Another activity included under resource planning is Coastal Zone Planning.

  - This is a program of NOAA - Oceanic and Atmospheric Administration.
  - It is a grant program to the States on the coasts and Great Lakes.
  - Each State defines "coastal zone" for itself, and then designs a program for managing the natural and economic resources.
  - Soils are an important factor in this zone, which corresponds to an "edge" in an ecological system.
  - Perhaps you know of the red clay study made by SCS for the Minnesota coastal zone planning study.

- Ar activity of considerable dimension--208

  - This is another grant program--from EPA to State or local government for the purpose of designing a program to handle water pollutants.
  - Some pollutants enter our rivers from pipes--these are point sources.
  - But many pollutants enter our rivers from diffused sources--these are nonpoint sources.
  - Soil is one of these pollutants.
  - In planning to handle these pollutants, soil information is essential.
  - It is used by planners by must be understood by elected decisionmakers, who adopt plans, and by citizens who have an interest in them.

  So these are three important resource planning activities.

- Recently a more minor activity--minor in terms of volume of SCS work--not in terms of substance--use of soil survey was described in a publication. This article told of using soil surveys from SCS in historic preservation work.

- All these illustrations show that soil survey data has moved far beyond its use for agricultural decisionmaking. Soil scientists and specialists must be aware that there is a large variety of professionals and nonprofessionals who use soil survey data. Their needs differ. But they depend on you for this particular type of data.

- Based on the resource planning activities described above, I'd like to suggest some items for your discussion tomorrow:

  - When you consider soil survey operations, would you discuss how you would involve resource planners.
  - They are some of the users of your products.
  - Consider how you will involve government officials and citizens and interest groups in planning your surveys.
  - Recall that AOM GEN-17. Re: Public Participation speaks of involving the public in all SCS programs.

- When you discuss presenting soils data, recall the variety of data users. Consider publication formats that are designed for the non-soils technician.

- When you talk about future needs, reflect on the fact that the resource planning programs described here did not exist 10 years ago. We do not know precisely what is ahead. But we know that we have information-handling capabilities that have not been exhausted. Be ready to make use of them. Then when the new need for soils data arises, we may be ready to meet them.

- The future brings the challenge of the unknown.

- We have met these in the past.

- We will be ready to do so in the future to the extent that we ready ourselves now.

Thank you for inviting me to be part of your discussion.

NATIONAL STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

MANUSCRIPT EDITING AND PROCESSING

by

Patricia O. MacPherson
Chief, Soil Survey Editorial Staff
Glenn Dale, Maryland

I'm not going to talk specifically about manuscript editing and processing. What I'm going to do is talk about communications systems- and making better use of the technology we already have.

In the past few years, greater technological changes have occurred in the publication area than any other But we don't need to stop there. Right now, we have the capability of setting up systems that are more flexible, selective, multi-use, and responsive to the user. Let's speculate on bow they might'work.

First, let's consider that every published soil survey and maps is a base document containing as much information as we have at one point in time. We're aware, however, that a soil survey is usually out-of date the day it's published. One of our challenges in the years ahead will be to develop ways of upgrading interpretations and management info- ation, and --most important-- getting it to the user.

To do this efficiently we need word processing capability in every state office. We already have several hundred survey areas stored on 9-track magnetic tape. If these are kept in the state office, they can be accessed to add new interpretations, delete out-of-date material, and selectively print out needed data.

Within a year or so, we should have the technology to automatically enter "old-style" published surveys on tape through an OCR system. Thus, this data could also be updated, added to, manipulated, and selectively retrieved. It's possible that maps could be stored on microfilm--for retrieval on request.

What we would have is a pretty complete data base. It can be updated easily. Suppose teams of soil scientists were assigned to collect data on soil potential, fertilization, or waste disposal interpretations--on a county-by-county basis. This information could be keyed into the data base--in a format suitable for future publication--but which is instantly useful

This information system is also accessible. We already have the capability to set up a key-word system for information retrieval. suppose, for example, a county sanitary commission wanted across-the-board information on locations suitable for sewage lagoons. Using the "search and retrieve" program, every paragraph with the word "sewage lagoon" would be printed out. We can also selectively retrieve appropriate columns in one or more tables.

In this way the user is furnished only the information he needs--quickly, cheaply, and efficiently. Because the tape have been revised to add the most up-to-date data, he is assured of getting the best we got! The sanitary commission, for instance, would be given a copy of the print-out--made for them in seconds--inserted in a binder with maps and instructions for using the material. Perhaps in the future, the information

could be transmitted automatically to the county via a telephoto system.

This information system can also be manipulated. Programs can be developed to compile and print out data on any combination of interpretations. Whatareas of the state, for example, have high potential for recreation development? Let's go a step further and interface this system with AMS or MIAIDS systems for producing interpretive maps.

Last, when the time comes to republish the base document--the soil survey--the tape need only be edited, revised, and submitted to GPO for publication. Thus, we've turned a soil survey into a living, viable record--not a static, out-of-date publication gathering dust on a shelf.

This system--or any other--isn't going to be effected overnight. We do need to plan and coordinate, however, and I guess that's why we're here.

But what is new now? A lot of things, including:

1. Some states and TSCs are experimenting with a system for capturing keystrokes on mag cards and converting them into linolex discs. After editing and revision, the survey is ready for electronic typesetting.

The optimum procedure would be to capture edited keystrokes. Until we can, this procedure isn't going to save us much time. Also, input must be carefully controlled. Of course, the mag cards are useful for series descriptions and perhaps other state office functions.

2. We're hopeful that the program of assigning editors to TSCs has been of help to you. The practice of pre-editing map units early in the writing process seems to really be working out well--from our point of view. Also, in the WTSC, a modular system for map units--called computer-assisted writing (CAW)--seems to hold early promise.

3. In Glenn Dale (Hyattsville), we're doing a few new things.

We're still negotiating for approval to purchase some new software that would make it possible to typeset tables--and which may eventually give us more flexibility in format. We've worked out programs to identify errors in the codes that signal changes in format and type size. We've also worked out a new system for internal scheduling on the linolex, so we can predict publication more accurately.

You're aware that more and more responsibilities are being given to states. Some people have asked about the possibility of assigning more editors to TSCs or even state offices. For a lot of reasons this isn't very practical--but I have a compromise that may help us to be more responsive to state needs. I'd like your reaction.

What I'd like to do is assign you an editor--to use or not to use as you please. Thus, every SSES editor would have responsibility for the soil survey publications of around two states--say Idaho and Iowa. Hopefully, he would develop a commitment to you and your program. He could speed up and monitor publication--according to your priorities. You could communicate directly with him on your editorial or publication

problems (photos, format, status, GPO rules--anything not of a technical nature). Possibly, he could visit the state office to help with training or to be trained. What do you think--the editors are enthusiastic.

One last point I'd like to make--where I think we can be helpful. That's in the area of publicity and information activities for published surveys. We're developing general guidelines for the NSH in this area; we hope to work with TSC information specialists in setting up information kits. These kits will contain sample press releases, radio and TV spots, agendas, even speeches. They should make this important job a lot easier.

Wow, just one very last point. In the past 2 years, I've seen some outstanding soil surveys submitted for publication. I've also seen some very poor ones. I'd like to propose a system for identifying and recognizing those authors and state office people who've done such an outstanding job. Perhaps annual awards could be given by Mr. Davis. I'll leave that up to Klaus.

SOIL POTENTIALS

A review draft of policy and procedures for preparation of soil potential ratings was sent to States and TSC's with Advisory SOILS-13, June 30, 1977. Your comments and suggestions for improvement are sincerely appreciated. They were carefully evaluated and many have been incorporated in the latest draft. We have also included more examples and exhibits to illustrate procedures. The latest draft is being edited and will soon be ready for distribution to the field as Section 404, National Soils Handbook.

The basic policy and procedures remain the same as those in the review draft, State conservationists favored optional inclusion of soil potential ratings in published soil surveys. They expressed concern that the ratings would not be coordinated, but felt the advantages of local ratings outnumbered the disadvantages. Relative cost of corrective measures, soil performance (or yield) and relative cost (or effect) of limitations that continue after feasible corrective measures have been applied was accepted as a suitable basis for preparation of soil potential ratings.

Deficiencies in many of our present soil interpretations have brought about this new approach that we call soil potentials. The following are some of the needs that will be fulfilled:

- identification of corrective measures that are feasible and effective in overcoming or minimizing the effects of soil limitations.
- determination of soil performance (or yield) level after corrective measures have been applied.
- ranking of soils from best to poorest for a given use.
- emphasis on use with proper treatment rather than avoidance of problems.
- rating by one set of terms applicable to all land uses.
- consolidation of information on soil use and treatment from many sources both inside and outside SCS Including sanitarians, engineers, builders, agricultural experts and others.
- preparation to meet local needs.
- strengthened planning and achievement of better land use by identifying suitable soil use and treatment alternatives.

A few of the significant features of the forthcoming policy and procedures for preparation of soil potential ratings are as follows:

- soil potential ratings supplement soil limitation ratings, capability classification, woodland groups, and range site interpretations, but may be used in lieu of them under certain circumstances.
- ratings are prepared for map units, however, map unit ratings may be supplemented by ratings of component soils.
- ratings are prepared locally using locally developed rating criteria and locally feasible and effective corrective measures.
- ratings are prepared with inputs from local experts in the use being rated.
- systematic procedures are followed.
- soil potential ratings are an optional form of soil interpretations, available for use to meet local needs.
- ratings may be included in published soil surveys at the option of the state conservationist.

Presented by David F. Slusher, Assistant Director, Soil Survey Interpretations Division, at the State Soil Scientist's Workshop, Arlington Heights, Illinois. March 6-8, 1978.

Soil potentials provide an opportunity to extend the role of SCS in resource planning. We must go further than just pointing our soils with limitations so people can avoid problems. Soil potentials provide an overall evaluation of soil resources to help people see opportunities. The comparative ratings of soils and identification of corrective measures needed to achieve soil potential are features of this approach that will be extremely valuable to SCS personnel who are on the front line of resource planning.

STATE SOIL SCIENTIST WORKSHOP
Arlington Heights, Illinois
March G-8, 1978

Report of Discussion Group I
Soil survey Operationa

The objective of the workshop adequately defines the charge for Discussion Group I - Soil survey operations. This objective was "Review the job remaining to complete the once-over soil survey of the nation and evaluate key program elements affecting the completion by 1998 or sooner."

The discussion group addressed the following key issues:

1. Objectives of National and State Long Range Work Plans
2. Use of Non-SCS Resources in Soil Surveys
3. Soil survey Work Plans
4. Soil Survey Management
5. Financial Concerns

The contents of this report highlight significant discussion items for each of the above key issues. This is followed by the recommendations of Discussion Group I, Soil Survey Operations, and a listing of participants.

I. Objectives of National and State Long Range Work Plan

1.1 Workload analysis considerations other than mapping and publications - Soil scientists in many areas are spending a significant amount of time doing activities not related to mapping and publication. Examples of these activities include:

(1) On-site investigations

(2) Development and revision of Technical Guides

(3) Special studies such as Environmental Impact Statements, River Basin studies, etc.

(4) Soil Interpretations mandated by legislation, i.e. Surface mines, RCA, 208 activities, tax assessment, state sediment and erosion control regulations

(5) Working with city, county or local groups

(6) Prime farmland and other LIM activities (National Erosion Inventory)

(7) Training non-SCS users of soil surveys, SCS users of soil surveys, and soil scientists.

Preparation of workload analysis to complete the field mapping for the National Cooperative Soil Survey by 1998, all Forest Service lands by 1985, and all Bureau of Land Management areas by 1990 must consider what percent of the soil scientists time is needed for activities not related to mapping. There are many excellent opportunities for field soil scientists to become involved in providing soil interpretations. We must determine at what level we wish acreage production to be, which is in part contingent on soil scientists involvement in other activities and also length of field season.

There was general consensus of State Soil Scientists that District Conservationists, Soil Conservationists and other SCS personnel need training in more effective use of basic soil survey data. This would (1) provide some relief on the request of field soil scientists and provide more time for field mapping, and (2) enable the District Conservationists, and Soil Conservationists to be more effective end better informed on the use of soils data.

The use of the home study course by "on-soil scientists o" Soil Survey Interpretations was strongly encouraged. There have been several suggestions for improvement of various sections of this course. All suggestions for improvement should be sent to the Director of Soil Survey Interpretations.

1.2 Workload analysis - National end State. Various aspects of long range and multi-year plans were discussed. Emphasis is needed to insure the State Conservationists, Asst. State Conservationists for Operations, and Area Conservationists are involved in preparation of these plans. The long range plans should identify the time and amount of work required for mapping, publication end other nonmapping activities soil scientists do. The long range plan serves as a vehicle for how the soil survey field work can be completed. The multi-year plan provides realistic defined objectives and goals. Often there are specific crises either in terms of monies or additional jobs to do which influence use of soil scientists time. Through a multi-year and long range plan, the State Soil Scientist can effectively provide the State Conservationist priorities and the impact that each situation will have on publication schedules end other related activities. This will enable the Stare Conservationists to effectively evaluate the total SCS program in setting priorities to making the needed adjustments. The soil survey program is a part of the total intergraded SCS delivery system.

Workload analysis is needed at all levels, i.e. (1) All field soil surveys, (2) area level (3) State offices (4) TSC and (5) National. It was felt that the state long range plans should serve an a basis for preparation of a detailed national long range plan to complete field mapping for all lands. Each state long range work plan should clearly identify the assumptions and kinds of priorities used.

Wayne Maresch gave en excellent brief discussion on the budgeting process and how CO-02 funds compete with other funds at the state level, in the allocation of CO-02 funds to each state, the relation of CO-02 funds to other SCS monies and activities at the Washington level, the competition of total SCS funds within the Department of Agriculture, and the allocation of funds between USDA and other federal agencies. CO-02 funds are a line item in the SCS allocation of funds from OMB and the Department.

II. Effect of Non-SCS Monies on Priorities

2.1 Overall the "se of "on-SCS monies has had a very positive effect on the total soil survey program. Last fiscal year about 8.5 million dollars of non-SCS monies were contributed to the National Cooperative Soil Survey program. I" most instances, "on-SCS monies have resulted in local acceleration of soil surveys. However, in some cases the additional non-SCS monies have enabled us to maintain a current level of soil survey activity rather than a deescalation of soil surveys.

2.2 There was considerable discussion on additional training demand o" SCS soil scientists. The turnover of non-SCS soil scientists is reported to be the highest for those employees hired by local counties rather than State agencies. Often new trained "on-SCS soil scientists are employed by other federal agencies. This, perhaps, is a lose of personnel to the current SCS effort, but not a lose to the total National cooperative Soil survey program. The Bureau of Land Management and Forest Service are providing en increased "umber of field soil scientists. This has and will continue to require more training, and quality supervision on the part of SCS personnel.

2.3 Cooperative agreements for acceleration of soil surveys are often directed toward acreage production. The increase in acreage production has created a situation of need for additional quality control and the demand for more monies in the area of publication. several western states stared the BLM and FS acceleration was causing a" additional workload in correlation and interpretation responsibilities of the SCS. If the local concern is only for field mapping, one probable recourse will be taking what has bee" CO-02 monies for state operations and using them at the national level to handle the additional publication cost. The other recourse is to receive additional CO-02 congressional appropriations to accomodate this need. Some situations

have developed in an inability to carry over funds by fiscal years between federal agencies having cooperative agreements to accelerate soil survey activities.

2.4 As would be expected, a large portion of the non-SCS monies are buying additional acres. However, in many states, these monies are being used for a variety of activities which significantly contribute to the total job. These include items such as (1) aerial photography, (2) equipment including power probe truck@, (3) laboratory data, (4) interim and interpretative reports, (5) map finishing, (6) providing training, (7) office space, and (8) secretarial assistance.

III. Soil survey Work Plans

3.1 Section 201 on Soil Survey Work Plans of the National **Soil** Handbook is being prepared for review and was routed along with some examples of soil survey work plans from survey areas in California and New Mexico to members of the discussion group. Basically the soil survey work plan can be defined as the design far the survey.

Early input is needed from the potential users of the soil survey on the kinds of interpretations that will be required for present and projected use. This will serve as a guide in determining the level of mapping and scale required.

3.2 An adequate soil survey work plan discusses the following items:

(a) the defined level of mapping for the survey area including minimum and maximum size of soil delineation,

(b) the kinds of interpretative uses to be made of surveys,

(c) need or kinds of special studies, laboratory data, and who will have this leadership,

(d) party leader and soil scientists by agencies involved with field mapping,

(e) when field work will begin and end along with amount of time required for doing all phases of the sail survey, and

(f) publication responsibilities.

3.3 There was concern on the need to make amendments to soil survey work plans for minor adjustments in acreage changes, completion dates, etc. The discussion group concluded the amendments to soil survey work plans should only be those changes which are significant to the conduct of the survey. Minor changes can be acknowledged by a letter from the State Conservationists to concerned agencies.

IV. Soil Survey Operations

4.1 CASPUSS – There was a general feeling this is a valuable tool for scheduling at all levels, providing dates are realistic.

There are some problems in keeping completion dates realistic and current, particularly on the completion dates for soil map finishing. It was felt that the states should have the responsibility of maintaining the current dates for completion of field mapping, soil map finishing and soil survey manuscripts. Also the column on progress field reviews could be changed or expanded to include the comprehensive field review. The projected dates for publication are often not realistic. This is a significant date from the standpoint of planning educational meetings to introduce the survey to the public. It was emphasized that states have the option to substitute counties or to move counties ahead on the publication schedule.

4.2 Interstate Detail of Soil scientists. There was some goad discussion an the advantages and disadvantages of these details. Overall, these assignments have a positive affect on the program. Discussed advantages included:

(1) broader training for soil scientists,

(2) increased acreage production in off seasons, and

(3) increased number of field mapping days for soil scientists having a short or adverse field season due to climatic conditions.

Disadvantages includea:

(1) travel casts, and

(2)detail of soil scientists between states with similar mapping seasons.

It was emphasized that soil scientists selected for interstate details should have high potential for doing the job and more responsible positions. A nationalroster of soil scientists interested in interstate detail would be most helpful. Arrangements for interstate details were encouraged to be worked out jointly between concerned State Conservationists. It was thought that details should be at least two months, and preferably three months or longer if the soil scientist is to significantly contribute to acreage production.

4.3 Interface of Principal Soil Correlator's office. There was concern on the part of some state soil scientists using soil series and interpretations common to two TSCs that a continued strong effort is needed to resolve differences in series concepts or interpretations which may arise. Field studies involving sails with paralithic contact were conducted quite nicely between all four TSCs and selected states during the past three years. This kind of cooperation and coordination is essential to maintain uniformity between and within all states.

V. Financial Concerns

5.1 There was some general discussion relative to transfer of soil scientists positions from completed states to other states. Speakers during the first day of the workshop indicated this would be done as the field work for state soil survey programs is completed.

5.2 Several factors influencing the allocation of funds to states were discussed during the session. The percent of the state mapped. has bee" used as one of the indicator items far allocations to the state.

5.3 Congressional awareness on the need and usefulness of soil surveys was briefly reviewed. Since soil survey monies are a budgeted line item, it is advantageous for congressional people to be well informed on sail surveys and their multiple uses.

Recommendations

1. Increase emphasis on soil scientists providing training to district conservationists, soil conservationists, and other SCS personnel on effective use of basic soil survey data for interpretation.

2. Each state prepare a derailed long-range plan and this data be utilized in development of a National cooperative Long-Range Plan.

3. Consideration be give" in cooperative accelerated sail survey agreements to provide resources for quality control, equipment, photography, publication, etc.

4. Soil Survey Work Plans for starting project soil surveys include basic data needed to design the soil survey and an operation plan setting forth the specifics of carrying the survey to completion.

5. CASPUSS dates for completion of field mapping, comprehensive reviews, soil map finishing, and sail survey manuscripts be the responsibility of the State.

6. Encourage interstate detail of soil scientists to be arranged between State Conservationists. Recommend a national listing of interested soil scientists available for detail to other states be maintained.

7. The four Principal Soil Correlators Offices give high priority to achieve soil correlation uniformity and coordination of interpretations across regional boundaries.

Participants of Discussion Group I

The discussion Leader wishes to express appreciation for the excellent manner in which participants contributed and, in particular, to the input of the State Conservationists.

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FOLLOWUP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP #1

Recommendation

1. Increase emphasis on soil scientists providing training to district conservationists, soil conservationists, and other SCS personnel on effective use of basic soil survey data for interpretation.

Action

The effective use of soil survey information is essential for meeting the objectives of the SCS. The responsibility for identifying the need for and providing this training is primarily at the State and local level. The SCS Training Handbook provides the guidelines. Training needed should be scheduled in APO's.

Recommendation

2. Each state prepare a detailed long-range plan and this data be utilized in development of a National Cooperative 'Long-Range Plan.

Action

A State soil survey plan of operations consisting of long-range and annual plan information is in agreement with SCS policy. These plans should be based on the best estimates possible. The National Soils Handbook is being revised to update the guidelines for preparing soil survey plans of operation. A national soil survey plan based on State data is being developed.

Recommendation

3. Consideration be given in cooperative accelerated soil survey agreements to provide resources for quality control, equipment, photography, publication, etc.

Action

Cooperative agreements for accelerating the soil survey program at the State level are the responsibility of the State conservationist. Proposed agreements should be carefully reviewed before they are formalized to insure that provisions for adequate reimbursement are identified.

The conditions and requirements for all cooperative agreements are not the same. Some agreements cover the exchange of relatively small funds to accelerate an on-going SCS soil survey. Other agreements may be for initiating and completing new surveys requiring large resource inputs by the SCS. It is essential that all cooperative agreements be consistent with SCS soil survey objectives and available resources for completing surveys through publication.

Recommendation

4. Soil Survey Work Plans for starting project soil surveys include basic data needed to design the soil survey and an operation plan setting forth the specifics of carrying the survey to completion.

Action

Soils Memorandum - 4 (Rev. 3) states SCS policy and procedures for preparing soil survey work plans for soil survey areas in which progressive soil surveys are planned. Soil survey work plans should document the special purposes for making the survey and the standards and specifications needed for making and publishing the survey. More specific guidelines are being prepared and will be included in the appropriate section of the National Soils Handbook.

Recommendation

5. CASPUSS dates for completion of field mapping, comprehensive reviews, soil map finishing, and soil survey manuscripts be the responsibility of the State.

Action

The National Soils Handbook places responsibilities for scheduling these dates with States. The CASPUSS scheduling procedures will be strengthened in a revision of the NSH that is in preparation.

Recommendation

6. Encourage interstate detail of soil scientists to be arranged between State conservationists. Recommend a national listing of interested soil scientists available for detail to other States be maintained.

Action

The need for an effective program for interstate details of soil scientists is recognized. Soil Survey Operations Division will work with the Personnel Division to develop procedural guidelines.

Recommendation

7. The four Principal Soil Correlators Offices give high priority to achieve soil correlation uniformity and coordination of interpretations across regional boundaries.

Action

Efforts will be made to strengthen coordination between Principal Soil Correlators by encouraging more direct communication and emphasis on resolving differences in the interpretation of procedural guidelines. Where needed, present guidelines will be revised and strengthened.

Discussion - Group 2
Field Procedures & Techniques

Group Leader: C. M. Thompson, Texas

Advisor: Joe Nichols, STSC, Texas

Recorders: Arville Toucher, Louisiana
Ray Sinclair, Indiana

Groups: L. H. Rivera, Puerto Rico
W. C. Kirkham, New Jersey
B. G. Watson, Vermont
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S. Rieger, Alaska
E. A. Naphan, Nevada
J. M. Allen, Oregon
0. F. Bailey, New Mexico
H. R. Finney, Minnesota
C. W. McBee, Kansas
A. J. Klingelhoets, Wisconsin
M. E. Shaffer, Georgia
D. C. Hallbick, South Carolina

Methods of Field Transportation

A discussion on conventional transportation equipment included the 1/2-ton pickup, 4-wheel drive pickup with electric winch, carry-all, 4-wheel drive utility cargo, such as Scout or Blazer, and vans. Other, more specialized equipment now in use in some places are the two wheel motor tractor (Rokon), trail bike, 3-wheel flotation ATV (Honda), various multi-wheel and track type ATV, 3-point hitch tractor, horseback, helicopter, and air or jet boat.

Before special purpose equipment is placed into use, a study should be given to cost-effective information, safety requirements, and equipment storage.

Various States expressed their experience with the use of the helicopter. Cost per hour figures varied from $160 to $325 per hour. Experience in Pennsylvania indicates that the helicopter can speed survey work by as much as 10 fold. The cost per acre to map remains about the same but the quality of mapping is improved. Experience in Alaska indicates that a 3 to 4 man party is the most efficient, when using helicopter transportation.

A further discussion of conventional 4-wheel drive pickups indicates good results in certain work areas. Electric winches are dramatic time savers and can be installed for about $600 on either Z-wheel or 4-wheel drive vehicles. This cost can be amortized over the life of about 3 vehicles. Electric winches are also of exceptional value as a safety feature.

Two wheel motor tractors ate cost-effective in some areas, especially where wet or sandy soils create access problems. These vehicles can be purchased for about $1200 each. The expected life is probably 4 to 6 years, depending on use. Storage of the vehicles and theft are problems associated with small, special purpose equipment.

@commendations:

(1) Further explore why SCS charges helicopter rental to "travel" while other agencies charge rental to "transportation of things."

(2) Explore the availability, cost and operation of the jet-pack one man transporter similar to those in use by the military. Also the use of the hovercraft should be explored.

(3) Consider the use of vans for transporting and storage of small special purpose vehicles such as motor tractors or small ATV's.

(4) Careful management should be applied when considering any special purpose vehicle.

Other Tools and Equipment for Field Operations:

Recommendations:

(1) Explore the possibility of installing moisture and temperature sensors and monitor by the same procedure as the Snotel Program.

OR

SCS install moisture and temperature sensors and the National Weather Service monitor and distribute data.

OR

Experiment Stations install sensors and SCS monitor the equipment.

OR

Experiment Station and Extension Service install equipment and work with local people to monitor a report by the use of such equipment as the touch-tone telephone.

(2) Explore the possibility of using radar or other electronic equipment to determine the depth to rock. Are there other effective devices available for quick determinations of depth to bedrock and soil resistivity?

(3) Recommend more effective use of backhoe or trenching equipment to explore soil profiles for detailed study and sampling. A few States are using SCS owned, pickup mounted equipment to excellent advantage. Can small trenching machine be modified to open soil pits quickly and economically?

A pickup mounted backhoe owned by New Mexico cost about $4,100 and $1,160 for installation, plus the cost of the vehicle. This unit has a blade attachment for the backhoe to speed covering the pit. The unit will operate satisfactorily on slopes up to about 15 percent.

(4) Explore the availability and cost of electronic automatic levels for use in the microstudy of soil surfaces, and the relationship of surface elevation to underlying horizons or materials.

(5) Recommend that States list their needs for field teat equipment in the annual request for assistance from the National Soil Survey Laboratory.

There is a need for rapid checks for soil salinity. The equipment should be small, compact and accurate at field moisture range.

Other rapid test equipment may also be needed. Suggestions for rapid test equipment include organic matter and clay mineralogy indicator.

(6) Procedures for soil pH determination should be standardized.

Imagery Needs Related To Field Operations

The discussion of this topic can be summarized by listing some of the problems that were recognized.

(1) Funding - Many States have not been able to catch up on aerial photography acquisition and are, therefore, unable to have photography and materials on hand to initiate a new survey on a timely basis. The management answer to this problem, assuming no significant change in funding levels, is to reduce staffing. The other alternative is to secure adequate funding for personnel, equipment, and imagery.

(2) The problem of aerial contracts not being completed on a timely basis was discussed. The possibility of penalty clauses and incentive clauses being used to assist in timely acquisition was mentioned. These devices have been tried before, but with no significant success.

(3) Is there a need for SCS observers o" weather conditions for flying contracts? This activity takes time from other duties and apparently is worth very little. We recommend this assignment be eliminated.

(4) Recommend that we continue to pursue the "se of classified imagery, eve" if we are able to obtain only 1/2 tone quality.

(5) The potential of LANDSAT imagery for base maps should be seriously considered, especially for areas without photographic coverage or area of high relief.

(6) Recommend the use of LANDSAT and false color maps for identifying parent materials, cropland area, broad vegetative zones, etc. for regional or state general maps.

(7) Recommend more involvement of the Washington staff in State remote sensing projects to assure adequate technical guidance, coordination, and dissemination of information. Other assistance that is needed is in funding of key projects.

(8) Party leaders in remote sensing projects should be carefully selected and possibly graded at above the normal party leader grade level. Perhaps a highly qualified geophysical expert should assist in interpretations of LANDSAT.

(9) Soil scientists working on remote sensing projects need to be closely involved with a Scientific Program Analyst in integrating ground truth information with the computer program on remote sensing.

(10) Consider at least one SCS employee. to attend the remote sensing course offered in Holland.

(11) Several States have had success in using color IR and black and white IR as tools in mapping. Where several layers of photography or other imagery is available for an area, we should consider a" imagery package for that survey area.

Training Needs Related to Field Operations:

The impact of the accelerated BLM Program was discussed. This acceleration will likely generate a need for some 20 highly qualified party leaders. Some of these will probably be coming from other States. This will create a need for excellent training programs, especially in the area of field operations.

(1) **Training** emphasis is needed on how to start a new survey.

(2) Training in the conduct of order 3 surveys.

(3) Consider sending other then party leaders, (newer employees) to the Basic Soil Correlation Course or upgrade the Soil Correlation Course to include only high potential party leaders. Possibly the course could be conducted in a" academic atmosphere such as a University Campus (2 weeks).

(4) Stress the use of the Laboratory Procedures Course held by the NSL as a tool in training field soil scientists.

(5) Recommend copies of the New York symposium on Soil Survey Quality be distributed to states.

(6) Utilize remote sensing training now available from Purdue or NASA: Schedule selected personnel for appropriate courses.

(7) Consider the use of undergraduate and graduate students for summer employment such as the Student Training Program or by other types of employment. This can be done by using WAE employement, Work Study Program, or Cooperative Education Program.

(8) Recommend the use of College Professors for part-time employment, by the use of either IPA, Contract, WAE or other.

(9) Recommend reevaluation and use of the Geomorphology study areas as training items. Consider further training in soil-geomorphic relationship at the Desert Project, North Carolina Coastal Plain, and the Iowa Project.

Procedure for Field Technique for Designing Soil Surveys (Mapping Units):

(1) Recommend that a geomorphologist be involved early in the survey to assist in the design of mapping units. This item could be high priority assistance from the TSC at the initial or pre-initial field review. It may be equally as important. as the assistance on Soil Classification.

(2) Recommend, when practical, the use of LANDSAT and the statistical Analysis Programs to assist in the design of mapping units.

FOLLOWUP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP # 2

Methods of Field Transportation

Recommendations

1. Further explore why SCS charges helicopter rental to "travel" while other agencies charge rental to "transportation of things."

   Response: For most government agencies, use of helicopters is charged to travel. For agencies such as the BLM and Forest service the policy differs because they have specific areas under their jurisdiction.

2. Explore the availability, cost and operation of the jet-pack one man transporter similar to those in use by the military. Also the use of the hovercraft should be explored.

   Response: WO will follow up.

3. Consider the use of vans for transporting and storage of small special purpose vehicles such as motor tractors or small ATV's.

   Response: Individual states should follow up and report to WO where use has been beneficial so information can be publicized.

4. Careful management should be applied when considering any special purpose vehicle.

   Response: Responsibility of individual states.

Other Tools and Equipment for Field Operations

Recommendations

1. Explore the possibility of installing moisture and temperature sensors and monitor by the same procedure as the Snotel Program

   OR

   SCS install moisture and temperature sensors and the National Weather Service monitor and distribute data

   OR

   Experiment Stations install sensors and SCS monitor the equipment

   OR

   Experiment Station and Extension Service install equipment and work with local people to monitor a report by the use of such equipment as the touch-tone telephone.

   Response: Add- Sampling with an auger or a power probe can provide quick results. It is possible that if sites are selected near a weather station as little as 3 sets of replicated samples repeated for no more than 2 years would be sufficient to evaluate the relationship of actual soil moisture to calculated values from weather records. Required equipment is minimal.

2. Explore the possibility of using radar or other electronic equipment to determine the depth to rock. Are there other effective devices available for quick determinations of depth to bedrock and soil resistivity?

Response: NASA doing research now. No suitable equipment now for determining depth to bedrock over large areas, although there is equipment available for determining depth at points. WO will continue to followup.

3. Recommend more effective use of backhoe or trenching equipment to explore soil profiles for detailed study and sampling. A few States are using SCS owned, pickup mounted equipment to excellent advantage. Can small trenching machine be modified to open soil pits quickly and economically?

A pickup mounted backhoe owned by New Mexico cost about $4,100 and $1,160 for installation, plus the cost of the vehicle. This unit has a blade attachment for the backhoe to speed covering the pit. The unit will operate satisfactorily on slopes up to about 15 percent.

Response: Add - Where backhoes or trenching equipment are available locally, contracting may be the most efficient way to obtain their services. Provision for these should be made in the budget.

4. Explore the availablity and cost of electronic automatic levels for use in the microstudy of soil surfaces, and the relationship of surface elevation to underlying horizons or materials.

Response: Equipment should be available in Engineering and Watershed Divisions. Needs should be coordinated with Soil Survey Division. states should consult with NSSL on test equipment to solve individual problems.

5. Recommend that States list their needs for field test equipment in the annual request for assistance from the National Soil Survey Laboratory.

There is a need for rapid checks for soil salinity. The equipment should be small, compact and accurate et field moisture range.

Other rapid test equipment may also be needed. Suggestions for rapid test equipment include organic matter and clay mineralogy indicator.

Response: Equipment needs should be discussed with NSSL.

WO has ordered probes. Technical note on measuring salinity in field being written.

6. Procedures for soil pH determination should be standardized.

Response: The standard of reference for pH is a glass electrode containing 0.1M $CaCl_2$. States should select and standardize a field method that works best for a given group of soils. The NSSL will provide assistance when needed.

Imagery Needs Related To Field Operations

Topics

1. Funding - Many States have not been able to catch up on aerial photography acquisition and are, therefore, unable to have photography and materials on hand to initiate a new survey on a timely basis. The management answer to this problem, assuming no significant change in funding levels, is to reduce staffing. The other alternative is to secure adequate funding for personnel, equipment, and imagery.

   Response: Individual states have responsibility to identify needs. Liberal provisions have been made by WO for acquisition of imagery.

2. The problem of aerial contracts not being completed on a timely basis was discussed. The possibility of penalty clauses and incentive clauses being used to assist in timely acquisition was mentioned. The devices have been tried before, but with no significant success.

   Response: The Cartographic Division is aware of the problem and is doing everything possible to resolve it. Penalty clauses have been tried in the past but these increase the contract price and are almost impossible to enforce.

3. Is there a need for SCS observers on weather conditions for flying contracts? This activity takes time from other duties and apparently is north very little. We recommend this assignment be eliminated.

   Response: Assignment no longer required. States should work with respective Cartographic staffs to decide on best procedure to follow.

4. Recommend that we continue to pursue the use of classified imagery, even if we are able to obtain only 1/2 tone quality.

   Response: A pilot program has been initiated in Texas.

5. The potential of LANDSAT imagery for base maps should be seriously considered, especially for areas without photographic coverage or area. of high relief.

6. Recommend the use of LANDSAT and false color maps for identifying parent materials, cropland area, broad vegetative zones, etc. for regional or state general maps.

7. Recommend more involvement of the Washington staff in State remote sensing projects to assure adequate technical guidance, coordination, and dissemination of information. Other assistance that is needed is in funding of key projects.

   Response: The Washington Office has established a position at LARS to assist states in utilizing LANDSAT imagery. States should inform the Washington Office of work in remote sensing.

8. Party leaders in remote sensing projects should be carefully selected and possibly graded at above the normal party leader grade level. Perhaps a highly qualified geophysical expert should assist in interpretations of LANDSAT.

9. Soil scientists working on remote sensing projects need to be closely involved with a Scientific Program Analyst in integrating ground truth information with tho computer program on remote sensing.

10. Consider at least one SCS employee to attend the remote sensing course offered in Holland.

11. Several States have hhd success in using color IR and black and white IR as tools in mapping. Where several layers of photography or other imagery are available for an area, we should consider an imagery package for that survey area.

    Response: WO considering all possibilities of application of remotely sensed data to soil surveys.

Training Needs Related to Field Operations

Topics

1. Training emphasis is needed on how to start a new survey.

2. Training in the conduct of order 3 surveys.

   Response

   Responsibility of individual states. TSC and WO personnel available to help.

3. Consider sending other than party leaders, (newer employees) to the Basic Soil Correlation Course or upgrade the Soil Correlation Course to include only hiyh potential party leaders. Possibly the course could be conducted in an academic atmosphere such as a University Campus (2 weeks).

   Response

   Being considered.

4. Stress the use of the Laboratory Procedures Course held by the NSSL as a tool in training field soil scientists.

   Response

   Responsibility of individual states. Course is available.

5. Recommend copies of the New York symposium on Soil Survey Quality be distributed to States.

   Response

   Copies distributed.

6. Utilize remote sensing training now available from Purdue or NASA: Schedule selected personnel for appropriate courses.

   Response

   Responsibility of individual states. Training is available.

7. Consider the use of undergraduate and graduate students for summer employment such as the Student Training Program or by other types of employment. This can be done by using WAE employement, Work Study Program, or Cooperative Education Program.

8. Recommend the use of College Professors for part-time employment, by the use of either IPA, Contract, WAE or other.

Response

Have authority now. Justification for such employment must be documented.

9. Recommend reevaluation and use of the Geomorphology study areas as training *items. Consider* further training in soil-geomorphic relationship at the Desert Project, North Carolina Coastal Plain, and the Iowa Project.

Response

Being done.

Procedure for Field Technique for Designing Soil Surveys (Mapping Units)

Recommendations

1. Recommend that a geomorphologist be involved early in the survey to assist in the design of mapping units. This item could be high priority assistance from the TSC at the initial or pro-initial field review. It may be equally as important as the assistance on Soil Classification.

Response

Responsibility of individual states. Some states already doing this. TSC personnel available to assist.

2. Recommend, when practical, the use of LANDSAT and the statistical Analysis Programs to assist in the design of mapping units.

Response

WO evaluating cost effectiveness through actual projects. Four projects being funded this fiscal year.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

STATE SOIL SCIENTIST NATIONAL WORKSHOP
Chicago, Illinois
March 6-8, 1978

Discussion Group #3 - Quality of Soil Surveys

Nd . . . . . R. L. Shields
WV . . . . . W. F. Hatfield
NY . . . . . F. L. Gilbert
NH . . . . . S. A. Pilgrim
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Mt . . . . . J. W. Rogers
Id . . . . . S. H. Brownfield
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Fl . . . . . R. W. Johnson
Ms . . . . W. M. Koos
Tn . . . . . D. E. Snyder
NC . . . . . H. J. Byrd

LEADER: G. E. Otte

ADVISOR: J. M. Williams

RECORDER: S. H. Brownfield

The following items were to be considered by this discussion group:

- Field reviews and map reviews, frequency, procedures. report content.

- Field operations and purposes of the survey, intensity of field observations, cartographic detail, and kinds of soil interpretations.

- Field notes and records.

- Cooperative quality control responsibilities in the NCSS.

Quality control is an essential element of all soil surveys. Procedures are used throughout the NCSS to ensure that standards and specifications are met so the purposes of the survey are attained.

Quality control starts with the soil survey work plan. It sets the base for determining quality as the soil survey progresses through to publication. In the past soil survey work plans have generally been written up on the SCS-244. This form is not adequate for developing work plans for most soil survey areas.

Recommendation: This discussion group recommends that a new format be developed in order that as a minimum the soil survey work plan will address the following:

1. Objectives of the soil survey.

2. Description of area.

3. Publication and mapping scales.

4. Listing of kinds of interpretations to be made.

5. Kind of general soil map to be produced.

6. Levels of mapping intensities and how they will be displayed in the legends.

7. Cooperating agencies and each of their responsibilities.

8. Estimated man/days to finish the survey.

9. Publication plans.

The need for annual Field reviews has been challenged, primarily on the basis that they generally contain mostly technical information, classification or pedon descriptions with little information about status, needs, management evaluation, meaningful agreed-to actions. and adequacy of mapping units for the purpose of the soil survey. Either the field review reports do not contain the information line officers need or it is buried so deep in technical material that it is too difficult to dig out. Positive as well as negative items should be stated but often are not. Some surveys have been completed or nearly completed before it has been discovered that mapping is inadequate. Some states are conducting mapping reviews to check taxonomic consistence with the series used to name mapping units. These reviews are often not part of Field review reports; documentation of what is found in Field and what is to be done by whom is inadequate. Mapping reviews are more informal and have no recognized procedure. Often reviews do not check adequacy of unit to meet purposes of the survey. Field reviews are an essential part of quality control. Present policy is that soil survey material is to be correlated after each field review. This insures that the standards of the NCSS and the objectives of the soil survey work plan are being met at each stage in the progress of the soil survey.

The discussion group felt that field review reports should be Flexible but be centered around the SCS-233. Additional narrative may be required and could include some or all of the following:

1. Commendable items.

2. Agreed-to actions.

3. Notes on disposition of each soil mapping unit as changes are made in the legend.

4. List of field stops. problems to be resolved. and decisions made at each stop.

5. Maps reviewed and comments on each of them.

The field reviews as identified in NSH- Part II, 303.2, should be scheduled as needed instead of on a calendar basis. Line officers should participate in exit discussions and entrance discussions if possible.

Problem solving and correction *of deficiency reviews should be scheduled as needed.* These may require both line and staff attendance.

Recommendation: This discussion group recommends that a packet of example forms and narratives being used by the various states to supplement the SCS-233 be circulated to each of the states for their review and guidance. Samples will be sent to rhe discussion leader.

Documentation by Field notes and other related records is an essential part of quality control in a soil survey area. They will also be a valuable source of information for future supplemental mapping, remapping, and reinterpretations.

The group discussed the possible need to take notes on mapping units as well as pedons and soil interpretations. A form similar to the SCS-232 may be needed for mapping units. Field parties should have the equipment needed to collect data.

A way needs to be designed to preserve notes and related records after the soil survey area has been published. Storage of microfilm would be one method to consider.

Recommendation: This discussion group recommends that examples of Forms or systems being used by the states for taking notes should be circulated to each of the states for their review and guidance. Examples are to be sent to the discussion leader.

The SCS has primary leadership responsibilities For quality control in the NCSS.

Agencies such as the Forest Service, Bureau of Land Management, Bureau of Indian Affairs, and state and county agencies have soil survey parties and/or private consultants making soil surveys on their lands. This has created a variety of problems for the SCS in quality control for these kinds of soil surveys. This discussion group did not have time to explore this charge or develop any recommendations for the workshop.

The following summarize5 the discussion lead by Dr. Klaus Flach following Group #3's report:

1. Examples of forms listed in the report recommendations should be submitted bv April 1.

2. There is a need to make a new work plan when there is a material change in the old work plan.

3. Field reviews should cover operations, mapping units, and classification.

4. Field reviews should be conducted primarily for quality control and not be a tour for nonsoil scientists.

5. Field notes are needed on observations of what is working and not working.

6. Field notes should emphasize data related to maior components and inclusions of mapping units that influence soil use.

7. There is a need to improve quantification of some soil data during field operations and quick-test field kits may be helpful for this purpose.

FOLLOWUP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP #3

Recommendation

1. This discussion group recommends that a new format be developed in order that as a minimum the soil survey work plan will address the following:

    a. Objectives of the soil survey.
    b. Description of area.
    c. Publication and mapping scales.
    d. Listing of kinds of interpretations to be made.
    e. Kind of general soil map to be produced.
    f. Levels of mapping intensities and how they will be displayed in the legends.
    g. Cooperating agencies and each of their responsibilities.
    h. Estimated men/days to finish the survey.
    i. Publication plans.

Action

Policy and procedures for soil survey work plans will be revised and incorporated into the National Soils Handbook in the near future. More detailed guidelines than now contained in SOILS Memorandum-4 (Rev. 3) will be included. Present policy is that work plane establish a clear understanding of the kind of survey to be made, the general plans and specifications (also special purposes) for making and publishing a survey, and for making special soil reports, and the responsibilities of each agency. This policy should be carried out.

Recommendation

2. This discussion group recommends that a packet of example forms and narratives being used by the various States to supplement the SCS-233 be circulated to each of the States for their review and guidance. Samples will be sent to the discussion leader.

Action

The discussion leader will circulate the examples received concerning this recommendation. From comments received, he will prepare exhibit material for inclusion in the National Soils Handbook for reference.

Recommendation

3. This discussion group recommends that examples of forms or systems 'being used by the States for taking notes should be circulated to each of the States for their review end guidance. Examples are to 'be sent to the discussion leader.

Action - Same as for Recommendation #2.

NATIONAL STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

Report of Discussion Group 4

TOPIC: DATA TO MEET FUTURE OBJECTIVES

Chairman: R. L. Guthrie
Advisor: R. B. Daniels
Recorder: W. F. Hatfield

As more soil surveys are completed and the soil information is used for a greater variety of purposes there is an increasing need for more efficient handling of present data and the acquisition of additional data. With this statement as our charge, discussion group 4 addressed the following key issues:

1. Basic data to support interpretations
   a. Mined lands
   b. Waste disposal
   c. RCA
   d. Clean Water Act
   e. Soil potentials
2. ADP
3. Retention of field records for future needs

This report is a summary of the discussion nnd a list of recommendations regarding the issues discussed.

1. Basic data to support interpretations

a. Mined lands - The kind of data which appears to be most needed for interpretations an mined land is erodibility estimates. If conservation measure6 are to be planned and installed on mined land or on other disturbed areas, estimates of soil loss are needed. Experimentally derived K-factors need to be determined for disturbed soils so that the Universal Soil Loss Equation can be evaluated on these lands. Data on potential acidity is needed. Others expressed a need for data to support the yield predictions on soils before mining. Although there are some yield data available, many of the soils which are likely to be mined have not been studied.

b. Waste disposal - Soil properties that are important in making soil survey interpretations for waste disposal were listed. Cation exchange capacity, organic matter content, clay content, infiltration, available water capacity, and hydraulic conductivity were considered to be important. The group concluded that the need for these data is not unique to waste disposal and furthermore much of this data is already available. Where data are not available, reliable estimates are available in many cases.

EPA's need for data on background levels of heavy metals in representative "benchmark" soils was discussed. The group's recommendation favored inclusion of measurement of heavy metals during future routine characterization studies on pedons of benchmark soils.

c.d.e. RCA, Clean Water Act, and Soil Potentials - RCA, the Rural Clean Water Act, and the soil potential program have needs for data which are overlapping. Crop yield data by kind of sail was identified as the data needed most urgently. Comparisons of crop yield need to be made on eroded vs. non-eroded soils, drained vs. undrained soils, as well as on different phases of the same soil series. These kinds of comparisons are needed to document the economics and effectiveness of Best Management

Practices. Differences in potential for agricultural use cannot be documented without data of thia kind. A need far data to support potential ratings far all uses was discussed. We need to encourage and provide a standardized mechanism for collecting performance data in project soil surveys. A system for recording,, storing, and publishing this data needs to be developed. Footnotes on farm SCS-5 could be used to reference this data. Notes in correlation documents could also provide references to the data. The group agreed that data to support these interpretations should be stored so that they can be accessed and manipulated.

2. ADP

The Pedon Data Subsystem was the major topic discussed under the key issue ADP. A progress report on the system indicated that it is about ready to accept data. The mark sense system is being updated so that descriptions can be stored with data. We need to determine if part or all of the existing data should be stored. Can we store and use data from pedons classified at a level higher than the series level? How do we classify pedons sampled under earlier concepts which are now obsolete? The discussion group emphasized a need for statistical programs to establish data relationships for use by field soil scientists in estimating soil properties.

A small-scale project to test the PDS was suggested. Perhaps all the data available for a MLRA could be stored with accompanying descriptions. The data could be manipulated to demonstrate the usefulness of existing statistical programs or needs for new ones.

3. Retention of field records for future needs

Several methods for retaining field records were discussed. Mark sense forms may be useful in staring some information, particularly pedon descriptions, although mark sense readers may not be universally available. Private computer facilities may have programs which could be used to store this information, but might be expensive and the data might not be readily accessible. Microfilm and microfiche appear to be practical methods of staring information. MS and Ph.D. theses at most universities are stored on microfilm by a single private concern. Perhaps a similar arrangement could be worked out for storage of soil survey field notes.

Recommendations

1. A national program to collect data to support interpretations for mined lands, waste disposal, RCA, and the Rural Clean Water Act should be formulated. The two most critical needs are for crop yield data by kind of soil and data to support erodibility estimates (K-factors).

2. The Pedon Data Subsystem should be made operational. Specifically, statistical programs should be developed that are capable of manipulating data so that it can be used by soil scientists to establish data relationships.

3. A data management and retrieval system should be developed that can manipulate various kinds of computer stored data.

4. A system to store field records for future use should be developed.

The discussion leader appreciates the assistance of R. B. Daniels, advisor and W. F. Hatfield, recorder and the contributions of all those who participated in the discussion. Only those listed below were assigned to the group, but others made significant contributions.

Participants

E. H. Sautter, CT	S. Rieger, AK	E. E. Voss, IL
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FOLLOWUP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP #4

Recommendation

1. A national program to collect data to support interpretations for mined lands, waste disposal, RCA, and the Rural Clean Water Act should be formulated. The two most critical needs arc for crop yield data by kind (of soil and data to support erodibility estimates).

Response

A national program to collect data to support interpretations is being worked on, but it may require 2 or more years to develop a satisfactory program. Dr. G. Nielsen, Montana, is on temporary appointment to the SCS to complete data on mined lands and develop a soil-performance data system.

Recommendation

2. The Pedon Data Subsystem should be made operational. Specifically, statistical programs should be developed that are capable of manipulating data so that it can be used by soil scinetists to establish data relationships.

Response

The Pedon Data Subsystem will be implemented in early 1979. All National Soil Survey Laboratory data and all Riverside Laboratory data will be on tape and in the proper format. Additional money has been requested to put the pedon descriptions on tape. Work is continuing on transferring the Lincoln and Beltsville laboratory data and pedon descriptions into the subsystem.

Recommednation

3. *h* data management and retrieval system should be developed that can manipulate various kinds of computer stared data.

Response

The data management and retrieval system is being developed concurrently with the pedon data subsystem.

Recommendation

4. A system to store field records for future use should be developed.

Response

The costs and feasibility of storing field records for future use is being investigated. The results will be released as soon as the investigation is completed.

PROCEDURE FOR MAP AND TEXT PREPARATION FOR PUBLICATION

COMMITTEE #5 REPORT - NCSS STATE SOIL SCIENTISTS' WORKSHOP

MARCH 6 - 8, 1978

Committee #5

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R. L. Googins, SSS, VP
Advisor: D. E. McCormack, Wash., D.C.

Committee #5 listed six (6) areas of concern with regard to maps and map preparation for publication.

1. AMS.
2. Procurement of base maps with regard to state involvement.
3. General soil maps - scale.
4. Equipment for map compilation.
5. Outside involvement in map compilation and finishing.
6. Quality control.

AMS

Jerry Gockowski discussed the present status of AMS and its capabilities with regard to kind and quantity of output. There was wide misunderstanding concerning the ultimate use of AMS. Several state soil scientists thought that AMS would have map finishing capabilities. Such is not presently intended according to Mr. Gokowski. Another apparent misunderstanding concerned the cost of using AMS over present methods of production of interpretive maps. There is apparently little or no cost saving. Alternatives to AMS and related problems concerning digitizing soils information were discussed. Manual digitizing at the TSC level was discussed as was contracting with a private firm having capabilities in this field. T. W. Priest noted that Colorado and California both had contact with a firm in California claiming to have the capability to produce digitized, computerized maps suitable for publication.

Committee #5 recommended that Colorado and California be authorized to negotiate with the California firm relative to production of naps for publication. Costs, benefits, time frame, etc., should be made available to all stales and Washington offices.

Base maps and state involvement in procurement - There was some concern over the quality of base map imagery, both ortho and aerial photographs, and lack of state involvement in determination of quality prior to acceptance of the negatives. General concern over the quality of orthophotos and length of time to receive them was noted. It was noted that other aerial photography may be locally available from State Highway Departments, planning groups, etc. As a result of this discussion, Committee #5 recommended that states should have the option to procure imagery and map compilation materials from any source that can produce material suitable for publication purposes. The committee felt that all states should explore all source possibilities. Additionally, Cartographic is encouraged to coordinate acceptance of base map imagery more closely with state soil scientists.

No problems were noted or discussed concerning general soil map preparation. One item of concern expressed following the general meeting is the lack of state office review of general soil maps prepared by Cartographic just prior to final publishing.

The discussion concerning equipment for map compilation did not address any specific problems. Of concern, however, was the ability to consistently, maintain line widths for soil boundaries and drainage lines. There was some feeling that a two (2) pen size difference in line weights should be used. There was no committee recommendation concerning this item.

There was good discussion concerning in-house map compilation and map finishing vs outside contracting. The expanding Federal Prison System capability in this field was noted. There was a general consensus that states should be responsible for contract-map finishing and compilation where needed in order to be able to adequately control quality.

Quality control of map preparation was discussed in the preceding discussion. It was noted that map scribing may be a better procedure than inking where unskilled personnel are used.

Committee #5 listed six areas of concern with regard to text preparation for manuscripts:

1. Soil handbooks and record retention.
2. SCS-Soils-5's.
   Standard tables vs non-standard tables.
2: Prewritten material.
5. Modular writing.
6. Word processing equipment.

Soil handbooks should and do serve as the basis for the soil survey manuscript to be published. Not all data and information collected during a survey is published. There was some concern that

some of this information is lost after publication. Is there need for policy to safeguard unpublished data for future use? A question arose concerning inclusion of technical descriptions and data with non-technical descriptions and interpretations in one publication. This resulted in the observation that we need to be flexible with regard to our publications.

Committee #5 then recommended that individual states should have the option to publish in the regular USDA series or in a two-volume series; i.e., one volume technical, pedon descriptions and data; and one volume non-technical, map unit descriptions and interpretations.

SCS-5's and time involved in preparation and revision was discussed. Problem areas discussed included:

1. When to revise and circulate for review.
2. Differences in crop yields, range site, etc., over a span of several states.
3. Heed to revise the SCS-5 format and content.
4. Indecision concerning latest revisions available.

TSC representatives noted that there is generally no revision of information in the computer until several significant requests for revision have been accumulated. This can cause a lag time between requests for revision and such information appearing on printout tables. Discussion of items 1 and 4 above resulted in a committee recommendation to request Ames, Iowa to forward a copy of each revised SCS-5 to each state using the series. This revised copy would then be reproduced at the state level for distribution to the field.

Don McCormack noted the time and effort in developing the computerized system now in use. He noted the presence of errors on the SCS-5's and suggested that we need to spend more time coordinating interpretations. This is in part due to some TSC's using criteria that differs from current criteria for national use. One suggestion brought before the committee concerned elimination of the columns for percentage passing sieve sizes. There was no general consensus regarding this proposal. Some of the committee members did not approve this suggestion. Several members, however, agreed with the suggestion.

Further discussion of the SCS-5 forms concerned the need to include additional information and the need to find a way to make the SCS-5's more applicable to local use. Committee #5 then recommended that a task *force of* state soil scientists be delegated to work with Don McCormack to evaluate the SCS-5 format and content. This committee should investigate the possibility of having the computer programmed to handle SCS-5 revisions.

There were no special problems noted with regard to the standard tables presently used in manuscripts. The problems related to non-standard tables were discussed, and their occasional use was defended. The Midwest TSC representative noted that they did not accept non-standard tables because of extra work involved in

preparation, etc. Discussion then centered on the need for TSC's to cooperate with states to meet their needs and states' production of camera-ready copies of non-standard tables for publication. Committee #5 recommended close cooperation between TSC's and states in exploring all ways to produce needed non-standard tables For publication. It has been noted that modern electronic text procedures do not economically provide for inclusion of material from other sources with text produced from Linolex tapes.

Prewritten materiel was discussed briefly without any general recommendations. It was noted, however, that there should be room for critical local editing to meet local conditions.

The discussion regarding format or modular writing centered on the format for mapping unit discussions. Minor changes in format from the initial review through to publication was nailed to the wall and shot at by the entire committce. As a result, Committee #5 recommends that there be a freeze on format after acceptance by the TSC early in the survey. The accepted format should be acceptable without change through publication without nit-picking changes.

The desirability of using word processing equipment at the state level was discussed. Several states noted the advantages of such equipment. Also noted was the need for such equipment to interface with TSC linolex equipment. Committee #5 recommends that TSC's should formulate a plan to encourage use of word processing equipment at the state level that is compatible with TX equipment.

Respectfully submitted,

R. L. Googins

R. L. Googins
Discussion Leader

FOLLOWIJP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP #5

@commendations:

I. Authorize Colorado and California to negotiate with the California firm relative to production of maps for publication. Costs, benefits, time frame, etc., should be made available to all states and Washington offices.

Response

Such negotiations arc encouraged as are all efforts to make our work more effective. Keep the WO informed of the most encouraging opportunities and the details of their cost and benefit.

2. Give States the option to procure image-y and map compilation materials from any source that can produce material suitable for publication purposes.

Response

we agree. States should advise the TSC ot the availability of such imagery and map compilation materials.

3. Give States the option to publish in the regular USDA series or in a two-volume series, i.e., one volume technical and one non-technical.

Response

This is acceptable if the extra costs are provided from sources outride SCS.

4. Request Ames, Iowa to forward a copy of each revised SCS-5 to each State using the series.

Response

Updates are made by the State that has responsibility for the series. After approval of an update, the HSS submits it to the Statistical Laboratory. The Laboratory sends camera-ready copies to the HSS, who distributes them (Section 407.l(e), NSH).

5. Appoint a task force of state soil scientists to work with Don McCormack to evaluate the SCS-5 format and content.

Response

We encourage all States to submit recommendations for changes in the format and content of the Soils-5 forms to the. HSS for coordination and transmittal to the Soil Survey Interpretations Division.

Recommendations:

6. Need close cooperation between TSC's and States in exploring ways to produce the necessary non-standard tables for publication.

   Response

   We agree. Some degree of standardization will be helpful to reduce cost.

7. Place a freeze on format after acceptance by the TSC early in the survey.

   Response

   we agree. At an early stage in the preparation of the manuscript the State Conservationist and TSC Director should agree on a format.

8. Encourage use of word processing equipment at the state level that is compatible with TSC equipment.

   Response

   The Mag card converter that converts mag cards to Linolex tapes has been obtained at Glenn Dale. It functions well and will reduce the. extent of keying needed in the TSC's.

NATIONAL STATE SOIL SCIENTIST WORKSHOP
Chicago, Illinois
March 6-8, 1978

Report of Discussion Group 6

TOPIC: PLANNING AND MEETING FUTURE NCSS NEEDS

Chairman: F. L. Gilbert
Advisor: J.D. Rourke
Recorder: R. W. Fenwick

The central theme that the group discussod concerned the change in the national and State soil survey program that will come about as the field mapping is completed in some places. The group concerned itself with the changing staffing pattern that will logically occur during this period and the new and ongoing soil survey interpretations program that we can expect. This report will contain a brief summary of some of the important items discussed which will be followed by a list of recommendations that were agreed to.

I. FEDERAL, STATE, AND LOCAL NEEDS FOR SOIL SURVEY AND RELATED INFORMATION:

PRESENT NEEDS vs. FUTURE NEEDS

There was some discussion of the probability of the increased use of sail surveys in litigation. Professionalism will need to be stressed. The credentials of soil scientists will need to be made clear to the public.

Another specific area of concern is in the area of using soil surveys in relating to soil erosion -- both past erosion and future erosion potentials. It was pointed out by one member of the group that we were doing a more complete job of accounting for past erosion in our soil surveys of twenty years ago than we are doing today.

Recommendation #1

Each State should prepare a workload analysis of the availability of soil survey information that *is* adequate for today's needs in resource and conservation planning. All of the soil survey work remaining (new mapping, updating interpretations and correlations) would be incorporated into the States' multi-year plan.

II. PRIORITIES: NEW HAPPING, RE-MAPPING, RECORRELATION, AND UPDATING

The direction of this discussion was generally toward resolving the issue of giving priority to getting over the entire country with some kind of a soil survey that meets most user needs versus bringing all survey areas to a current level of accuracy and usability. The general consensus was that surveys that were adequate for most planning activities should not have a substantial amount of Federal resources expended on them for revision until all areas had been mapped once-over.

Recommendation #2

Each State should prepare a workload analysis of the man-days and money needed to secure the sail surveys needed for present and future needs for conservation and resource planning. The analysis should include the mapping of acres not presently surveyed and the updating of published soil surveys that are judged to be inadequate. The analysis should include all supporting activity. The results of the workload analysis would then be incorporated into the States' multi-year plan.

III. CURRENT PUBLISHED SOIL SURVEY AND NTURE NEEDS FOR PRESENTING SOIL SURVEY INFORMATION

There was general agreement that soil survey information becomes more useful when they are accompanied by interpretative maps. The need for interfacing with data-bank systems was discussed. There are a number of interpretations that will become more important. Some of these are:

1. Uses of the soil as a disposal or treatment body for various kinds of waste material.

2. Retentive and/or transmittal capacity of soil for those possible (or probable) surface and groundwater pollutants.

3. Energy requirements for tilling specific soils.

4. Woodland uses -- sails that can produce wood for fuel.

5. More precise interpretations far producing food and fiber.

Recommendation #3

A national committee bc formed to assess whether our published soil surveys are meeting user needs. Some State soil scientists should bc on this committee.

Recommendation ii4

Important farmland interpretations should be included in soil survey reports at the State's option.

I". TRAINING NEEDS - MAKERS AND USERS

Recommendation #5

A summer camp, college-credited course should be offered as a qualifying course for soil scientists. This course would be similar to the range course offered in many States.

Recommendation #6

A short (Z-weeks) course be offered for updating soil scientists. This course could be offered at local universities.

Recommendation #7

A course be offered to teach soil scientists to prepare, interpret, and use Order 3 soil surveys.

PARTICIPANTS

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B. A. Touchet - LA
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FOLLOWUP TO RECOMMENDATIONS

STATE SOIL SCIENTIST NATIONAL WORKSHOP

DISCUSSION GROUP #6

Recommendations:

1. Maintain a current analysis of the availability of soil survey information that is adequate for today's needs in resource and conservation planning. All of the soil survey work remaining (new mapping, updating interpretations and correlations) would be incorporated into the State's multi-year plan.

   Response

   The basic guidelines for such analysis are given in Soils Memo-63. Policy and procedures for recorrelation need to be developed.

7.. Have each state prepare a workload analysis of the man-days and money needed to secure the soil surveys required for present and future conservation and resource planning. Include in the analysis the acreage not presently surveyed and the acreage that has been surveyed and published but needs to be updated. The analysis should include all supporting activities. Incorporate the results of the workload analysis into the state's multi-year plan.

   Response

   We agree. Most of this is covered in Section 200 of the NSH, and revisions to that section are underway to incorporate the part of the recommendation not covered.

3. Form a national committee to assess whether our published soil surveys are meeting the needs of users. Some state soil scientists should be on this committee.

   Response

   Assessments of whether published soil surveys are meeting the needs of users must be made at local levels rather 'than at the national level. States are responsible for this assessment. This should be a continuing activity. We put forth a lot of effort to publish soil surveys and need to put a lot of effort into assuring ourselves that they meet the needs that they were intended to meet. We believe that more flexibility is needed and will continue to try to provide for optional formats; however, the effect that increasing flexibility has on efficiency must be considered.

4. Include important farmland interpretations in published soil surveys at the State's option.

   Response

   We agree.

Recommendations:

5. Offer a course as a summer camp for which college credit could be given as a qualifying course for soil scientists. This course would be similar to the range course offered in many states.

Response

We concur in this recommendation except that the course should not be required as a Civil Service qualification.

6. Offer a short (Z-week) course for updating the technical ability of soil scientists. This course could be offered at local universities.

Response

For training in soil correlation see item 3, Discussion Group #2. Other courses in updating the technical ability of soil scientists are being offered in some states and we encourage such courses.

7. Offer a course to teach soil scientists to prepare, interpret, and use Order 3 surveys.

Response

Such orientation is certainly needed, but it is the responsibility of individual states. TSC and WO personnel are available to help. Our preference is that it should be performed as a field activity under the leadership of the state soil scientist or Head, TSC Soils Staff or a member of his staff. States and TSC's where there are numerous Order 3 surveys, should be making specific plans for such orientation.

* U.S. GOVERNMENT PRINTING OFFICE : 1978 0-261-519/SCS 145