PENNSYLVANIA NRCS

Strategic Plan

FY 2011-2015

USDA NRCS

United States Department of Agriculture

Natural Resources Conservation Service

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Foreword

Dear Fellow Conservationists:

When I give my speech to new employees, I always give them the same introduction whether they are an accountant, soil scientist, or wildlife biologist. As an employee of the Natural Resources Conservation Service (NRCS), the new employee is first and foremost "A Conservationist." As part of the NRCS, our mission is to create a healthy environment so that we, in turn, can have productive and sustainable lands. Fifty years from now, no one will remember or care whether we had a commitment to tax or spend policies, but they will care about whether we had a commitment to preserve and conserve our natural resources, ensuring a sustainable food supply, abundant and diverse wildlife, and a livable landscape.

As Pennsylvanians in the 21st century, we have the opportunity to work in one of the most diverse states in one of the most exciting times. Nowhere else in the Nation do NRCS employees have the opportunity to work in a State granted with adequate rainfall, prime and important soils, plentiful streams, copious wildlife, and on a varied and interesting landscape. With over 98 percent of our farms considered to be small family farms and a significant portion of our forest lands held by individual woodlot owners, we, in Pennsylvania, continue to have the luxury of working in a State where the average farm size remains less than 150 acres and farms and forests are still owned by individuals who make a portion of their livelihood off their land. This is not necessarily the case in other States that have lost their rural lands to developers, absentee landowners, and large corporate entities. In these exciting times, we are blessed with the use of innovation and a commitment by Congress to finance conservation efforts.

Enclosed is a Statewide Agency Strategic Plan for conserving natural resources in the Commonwealth of Pennsylvania (PA). The purpose of this plan is to establish direction on where PA NRCS needs to focus its future efforts. Over the past year, PA NRCS employees provided input on how we can create a lasting conservation legacy that future generations will appreciate.

This document describes PA NRCS's conservation priorities, strategic measures for successfully achieving them, and expected outcomes. Conservation priorities are organized by major land use that describe priority natural resource concerns, the objectives for conserving them, and the strategic measures that will be completed by 2015.

I hope these next few pages assist us in setting the direction for the next several years. I also hope that it inspires you as your work inspires me to work so future generations benefit from healthy soils, clean water and air, clean energy, an abundant water supply, and healthy plant and animal communities.

Yours in Conservation,

Denise Coleman

Introduction

The USDA Natural Resources Conservation Service (NRCS) improves the health of our Nation's natural resources while sustaining and enhancing the productivity of America's agricultural land and forests. We achieve this by providing voluntary assistance through strong partnerships with private landowners, managers, and communities to protect, restore, and enhance the lands and waters upon which people and the environment depend.

NRCS in Pennsylvania works with its federal, state, and local partners, non-governmental organizations, and landowners to deliver conservation assistance. This strategic plan guides NRCS on how and where to direct financial assistance and technical assistance to address priority resource concerns.

NRCS's strategic plan focuses on major agricultural and forestry activities affecting Pennsylvania's natural resources. Each major land use is described, identifying the many different types of activities and their typical resource concerns. This strategic plan covers the five-year period from October 1, 2010 through September 30, 2015. NRCS will prioritize its efforts on five major land uses within the Commonwealth including:

- Livestock Production Areas
- Cropland
- Grazing and Forage Lands
- Streams and Wetlands
- Forests.

By focusing on these activities and resource concerns, NRCS will achieve its goal of creating and enhancing sustainable protected landscapes.

The current condition of natural resources is described for each of the five major land uses, along with NRCS's major objectives and strategies that the agency will undertake to achieve expected outcomes. Outcomes describe the public benefits expected by the undertakings. Each strategy identifies the technical assistance, financial assistance, and educational assistance and outreach that is needed to achieve the expected outcomes.

The objectives and strategies for each of the major land uses are listed below:

Livestock Production Areas

A. Protect and improve water and air resources

- Increase the number of Comprehensive Nutrient Management Plans (CNMPs) written and applied.
- Reduce the number of areas where livestock have unrestricted access to streams.
- Increase the implementation of conservation practices to improve water and air quality.

B. Conserve energy

- Increase the energy efficiency of equipment and facilities on farmsteads.

Cropland

A. Improve soil health and productivity

- Increase vegetative cover, residue and tillage management.
- Install structural practices to control runoff and reduce soil erosion.
- Reduce the loss of prime farmland at risk for development.

B. Reduce pesticide risks on specialty cropland

- Increase adoption of integrated pest management (IPM).

C. Protect and improve water and air resources

- Increase the number of farmers who apply nutrients in the right amount from the right source in the right place at the right time.
- Increase the use of edge of field practices to reduce nutrient and sediment transport.

D. Conserve water resources

- Conserve and improve efficient use of irrigation water by specialty crop producers.

E. Increase energy efficiency of field operations

- Increase energy efficiency of field operations.

Grazing and Forage Lands

A. Protect and improve water and air resources

- Encourage livestock operations to utilize sustainable grazing systems.
- Convert vulnerable cropland to prescribed grazing systems.

B. Improve the health of grassland communities

- Increase the application of prescribed grazing on permanent pastures.
- Minimize invasive species on grasslands.

C. Improve the health of permanent grasslands

- Maintain existing perennial grassland plant communities.
- Restore and protect additional native cool and warm season grassland communities.

Streams and Wetlands

A. Protect and improve streams in cropland and pasture areas

- Increase establishment and maintain existing riparian forested buffers.

- Stabilize 90% of severely eroded streams whose flow is disrupted by natural disaster.
- Reduce the negative impact of legacy sediment.
- Improve stream habitat and stream corridor conditions for eastern brook trout.

B. Protect and improve wetlands in cropland and pasture areas

- Create, enhance, and protect known wetlands targeting bog turtle and eastern massasauga rattlesnake.
- Restore degraded wetlands and adjacent plant communities.

C. Watershed Operations and Rehab

- Assist project sponsors in securing funds.
- Increase outreach efforts to encourage the protection and sustainable uses of watershed's natural resources.

Forests

A. Increase habitat for at risk and declining wildlife species

- Increase adequate size habitat and connected corridors for Golden-winged Warblers and other at-risk species.
- Create, enhance, and protect woodland habitat for the Indiana Bat.

B. Improve the health of forests and woodlands

- Increase the implementation of forest management plans that minimize invasive species, increase populations of declining species, and address water quality issues.
- Demonstrate the multiple benefits of agroforestry practices in Pennsylvania.

I. Livestock Production Areas

Manure is used on 20,449 farms, almost one-third of all farms in Pennsylvania.

This section addresses areas on a livestock farm where animals are confined and/or fed. It also includes other heavy-use areas where feed, manure, dead animals, and other agricultural material is handled, stored, or transferred. Livestock typically produced in Pennsylvania includes, but is not limited to, dairy and beef cattle, horses and other equine, sheep, goats, poultry, and swine.

Pennsylvania is also the nation's largest producer of mushrooms. Mushroom production that utilizes compost is also addressed in this section.

Total Livestock Number in Pennsylvania		Rank
Broilers	150,102,682	17
Layers	21,982,408	3
Cattle/calves	1,609,147	19
Hog/pigs	1,167,449	12
Horses/ponies	116,332	NA
Goats	59,214	NA
Sheep/Lambs	3,672	15

Source: 2007 Census of Agriculture, USDA-NASS

Too Many Nutrients

There are several threats to natural resources associated with livestock production areas. Most of the threats center around an overabundance of nutrients on farmsteads and cropland within the region.

An imbalance of nutrients, especially phosphorus, on livestock farms is one of Pennsylvania's greatest resource concerns. Feed and fertilizer imports and insufficient cropland create this imbalance. Furthermore, Pennsylvania's stream density, highly erodible lands, and large livestock populations exacerbate this condition. Once nutrients are transported to a water body, they combine with other sources of nutrients from rural septic systems, industrial discharges, stormwater, lawn fertilizer runoff, etc. The accumulation of nutrients degrades water quality, impairing its use for drinking, recreation, and wildlife.

Three-fourths of all CAFOs are located in south central Pennsylvania.

The amount of manure produced exceeds crops' needs. Livestock farms concentrated in the southeast region of the state primarily include poultry, hog, large dairy, or beef operations. As producers export manure to neighboring operations, phosphorous and nitrogen levels may begin to exceed the need of crops grown. Manure distribution is governed by economics, hauling manure in its large mass and waterlogged condition, and, in the case of dairy and hogs, wet condition is cost-prohibitive. This causes manure to be spread on already saturated fields.

A large portion of Pennsylvania's livestock is produced in the southeast portion of the Commonwealth. As a result, on-farm imbalance leads to a regional imbalance. On a statewide basis, the production of livestock feed is insufficient and feed is actually imported from the Midwest.

Most livestock farms in Pennsylvania must comply with water quality regulations. Less than 400 farms meet the definition of a concentrated animal feeding operation (CAFO) and require a Nutrient Management Plan and a National Pollutant Discharge Elimination System (NPDES) permit. Approximately 1,000 livestock farms meeting the Commonwealth's Act 38 definition of a concentrated animal operation (CAO) and another 1,500 that voluntarily participate in the state regulatory program follow a phosphorus-based Act 38 Nutrient Management Plan. As of October 2011, every farm in Pennsylvania, regardless of size or presence of livestock, that applies manure or agricultural process waste water by mechanical or other means, is required to implement a written Manure Management Plan as defined in Chapter 91 of the Pennsylvania Clean Streams Law.

Nutrient management plans are technical and may be difficult for some producers to comprehend. Record keeping is often regarded as a chore, sometimes associated with regulatory compliance, and is a social barrier to making conservation decisions. Nutrient management is complex. It involves not only manure storage and distribution, but also the handling and application of wastewater. The Cropland section of this document addresses nutrient application challenges for growing crops and forages.

The complexity of managing nutrients on livestock production areas and distributing manure to nutrient-deficient areas is a challenge. Many receiving lands, where it is economically feasible to transport manure, are small and adjacent to streams. High rural population densities, diverse neighbors, high real estate values, and heavy road traffic contribute to the challenges of hauling manure.

Stream Access

Cattle and other types of livestock with direct access to streams have an adverse impact on the quality of water for miles downstream. Livestock waste directly deposited in the stream contains bacteria and nutrients that may harm human health and degrade water quality. Unrestricted access to streams erodes streambanks, clogs waterways, and clouds the water which leads to excessive algal growth and harms aquatic life by reducing the amounts of dissolved oxygen. These impaired stream segments disrupt water flows and important connections between habitat elements required by fish and wildlife species.

Odor and Particulate Matter

Odors from livestock production areas are a resource concern in many regions, especially those areas with the combination of high animal and human populations. Livestock odors are caused when organic matter such as manure decomposes, releasing gases such as ammonia and hydrogen sulfide. Emissions from ventilation fans for enclosed animal production facilities and from outside animal concentration areas may further contribute odors and introduce pollutants into the atmosphere. This condition exacerbates poor air quality conditions in the southeast and southwestern portions of the Commonwealth, where air quality is degraded from urban sources. These counties are designated by the Environmental Protection Agency (EPA) as air quality non-attainment areas for particulate matter and ozone pollutants.

Agricultural odor emissions are becoming a contentious issue in some areas, spurring increased efforts to address the problem.

Energy Efficiency

Livestock production areas utilize a variety of equipment and facilities unique to each type of production system. Energy efficiency improvements to farm equipment reduce the need for fossil fuels. Ventilation fans, feed equipment motors, drinking water pumps, waste processing pumps and motors, lighting, wash water and food product processing equipment, cooling equipment, heating equipment, combustion engines, and livestock handling equipment are all items to be evaluated by an energy audit for potential improvements in efficiency.

Stream bank fencing reduces the amount of nutrients, sediments, farm chemicals, and bacteria entering streams.

Objective A: Protect and Improve Water and Air Resources

Did you know?

An AFO is a livestock farm that confines animals in a facility or on an area of land that is not covered with vegetation or residue during the growing season.

NRCS will help livestock producers protect and improve water and air resources by:

1. Implementing comprehensive nutrient management plans (CNMPs)
2. Restricting livestock access to streams
3. Increasing the implementation of conservation practices outside of CNMPs to improve water and air quality

Applying CNMPs

Managing manure on livestock production areas to protect and improve water and air resources is accomplished by implementing a type of conservation plan known as a CNMP. CNMPs must address the livestock production area and the land treatment area where manure or wastewater might be applied. CNMPs help producers meet their production and stewardship objectives, as well as any regulatory compliance requirements. Nutrient stewardship, which is critical to sustain and improve the productivity of Pennsylvania agriculture and the health of our Nation's natural resources, is especially challenging on livestock farms.

Comprehensive in nature, a CNMP addresses how a producer collects, handles, and applies manure, commercial fertilizers, and wastewater sources of nutrients. There are many combinations of conservation practices to improve water quality and address the unique needs of each farm. Feed management can also be addressed in a CNMP. While the poultry and hog industries have already made improvements to efficiently utilize feed, some dairy and beef cattle operations could benefit from feed management assistance. By reducing nutrients that are consumed, feed management helps protect and improve water quality by decreasing the phosphorus content of manure as well as stabilizing its nitrogen availability. In addition, a CNMP may also address amendments that can be added to manure to affect the content of its nutrients, improving on-farm nutrient balance.

Livestock farms that request manure storage systems must first have a CNMP before NRCS can assist them to manage manure. Other livestock farms such as year-round grazing operations that do not meet the definition of an animal feeding operation may receive NRCS assistance for managing manure without first getting a CNMP. Mushroom farms can get help to protect and improve water and air resources through a Mushroom Farm Environmental Management Plan (MFEMP). Similar to a CNMP, a MFEMP addresses the handling, temporary storage, and spreading of mushroom compost.

Many farms have already adopted waste storage facilities for the primary barn but need additional help collecting and storing manure and wastewater from other livestock production areas. On farms with a nutrient imbalance, an alternative to land application of manure and wastewater is needed. Manure-to-energy, off-farm export of manure, composted poultry litter, or other market-based solutions may be considered. Manure digestion, gasification, and poultry litter combustion not

Feed management uses an assortment of tools, including regular analysis of feeds, milk, and manure to more frequently review nutritional diet formulas, and reduce the uncertainties of feed delivery. This process enables maintenance efficiency, improvement in milk production, and/or increased health of livestock. Decreasing or stabilizing nitrogen and phosphorus nutrient levels in the manure are key objectives.

only produce heat, electricity, or other forms of energy, but they also reduce amounts of manure mass. Some examples of export and market-based opportunities are sales of dehydrated manure and compost. These practices may be eligible for nutrient trading.

Restricting Access to Streams

Restricting livestock access to streams goes a long way to keep streams clean. Temporary or permanent fence can be used to restrict livestock access to streams coursing through pastures. Coupled with alternative watering supplies and stabilized stream crossings, these access restrictions further protect and improve water quality by reducing stream erosion and direct manure deposition. Planting trees and shrubs along the stream is the best method to protect and improve water quality as they not only filter sediment and nutrients, but also contribute to shade and twig and leaf residues essential to in-stream processing of nutrients. This important strategy is described in the Streams and Wetlands section of this plan.

Improving Air Quality

Addressing air quality impacts, especially in nonattainment air quality counties, can be accomplished by implementing a few key changes to the livestock operation.

Air quality is protected and improved when practices reduce emissions of odors, ammonia, methane, and nitrous oxide. Covering manure storage facilities, adding roofs to heavy use areas, amending poultry litter with alum, utilizing feed management, establishing windbreaks around livestock facilities, and covering ventilation exhaust fans with biofilters are some examples.

Outcome A: Livestock operators manage nutrients in an environmentally responsible manner and in compliance with federal and state environmental regulations.

Strategy A1: Increase the number of Comprehensive Nutrient Management Plans written and practices implemented that address livestock production areas, particularly in counties with high numbers of animal units.

Technical Assistance

- Utilize Technical Service Provider (TSP) and SWAT agreements to implement conservation measures proposed by CNMPs within high-priority watersheds.
- Work one-on-one with conservation districts to educate NRCS employees, conservation district staff, and TSPs about incorporating Chapter 102 and manure management requirements into conservation plans.
- Work with conservation districts and the PA Department of Environmental Protection (DEP) to develop simplified record-keeping strategies.
- Focus financial assistance on 303(d) watersheds while continuing to provide adequate assistance to other watersheds to prevent such listing.
- Develop and roll out a new field office level quality control process for certifying CNMPs as written and expectations for payment scenarios.
- Carry out the Agricultural Conservation Enrollees/Seniors (ACES) program to meet TSP goals and provide technical assistance to livestock producers.
- Institutionalize quality assurance checks of CNMPs developed by Certified Conservation Planners working for NRCS, partners, or as registered TSPs. Include a field check component carried out by nutrient management coordinators.

Strategy A1 (Cont.)

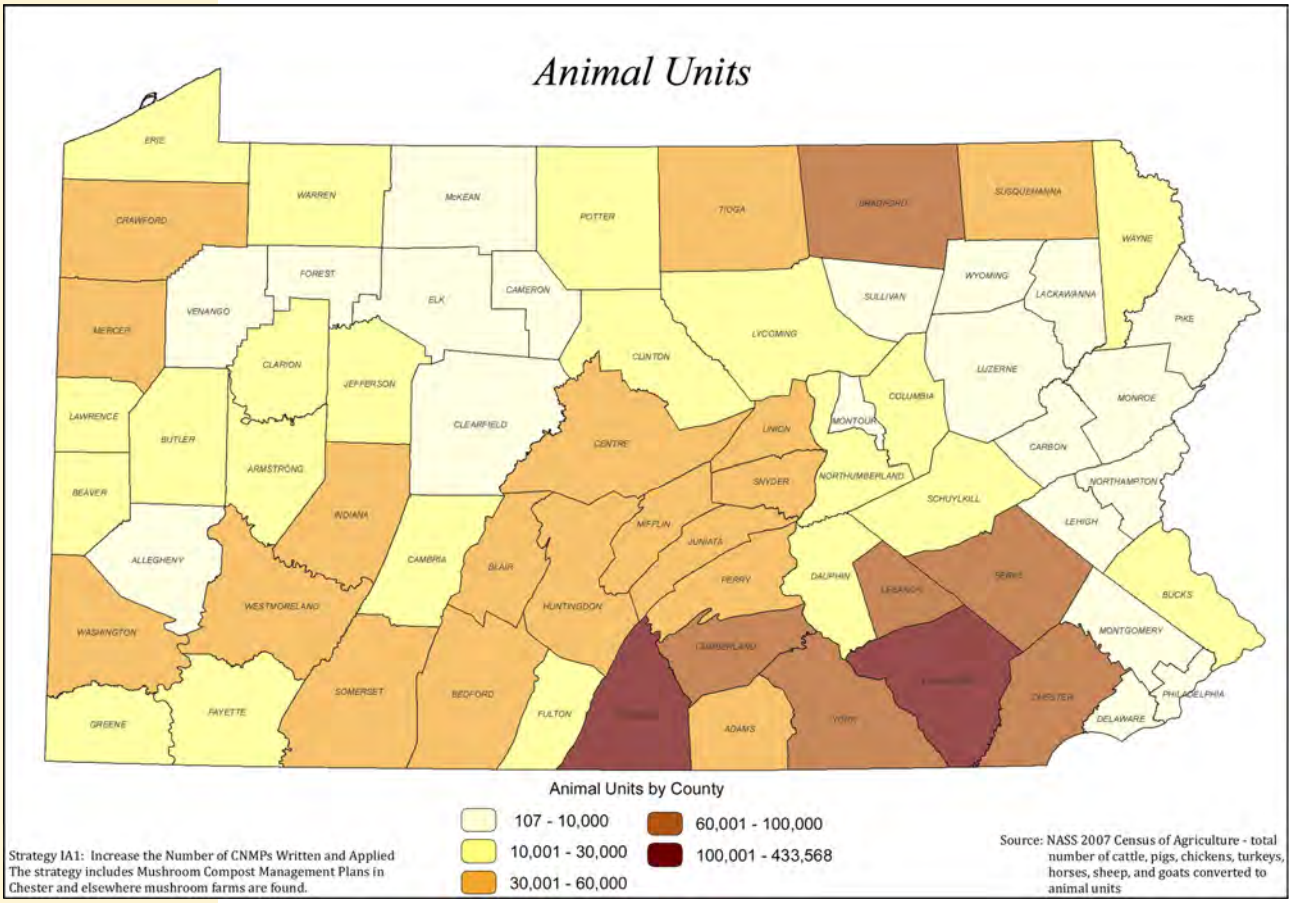
- Improve the curriculum for feed management plan writing and establish nutrient data needs.

Financial Assistance

- Offer financial assistance to farmers for manure testing, tissue testing, and soil testing.
- Encourage use of best available technology to reduce the amount of manure in high phosphorus watersheds. New technologies include, but are not limited to, anaerobic digesters, poultry litter incinerators, and solid/liquid separators.
- Give priority to livestock producers to solve water quality concerns associated with manure/wastewater handling and storage, and barnyard/animal concentration area (ACA) management.

Educational Assistance and Outreach

- Deliver NRCS assistance during Manure Management Manual workshops hosted by DEP.



Strategy A2: Reduce by 10% unrestricted livestock access to streams in watersheds with an agriculturally impaired stream segment and with high animal units of grazing animals.

Technical Assistance

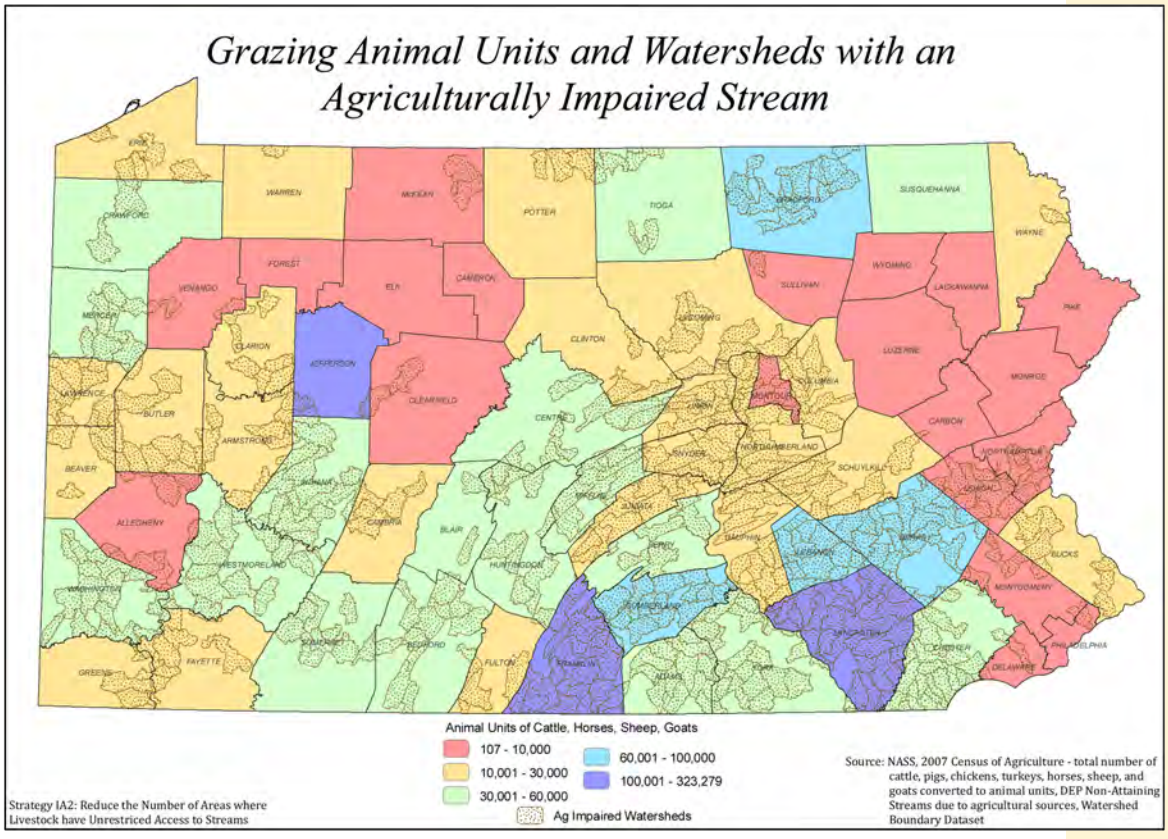
- Increase the focus, planning, and implementation of stream bank fencing to reduce animal access to streams and waterways and encourage the use of stream crossings where applicable.
- Continue ongoing evaluation and assessment of NRCS stream bank fencing and grazing management options.
- Partner with the Pennsylvania Fish and Boat Commission and Trout Unlimited to identify streams to fence to encourage native trout propagation.

Financial Assistance

- Dedicate up to 5 percent of financial assistance cost-share funds to achieve livestock access restriction strategy.

Educational Assistance and Outreach

- Develop materials to explain stream bank fencing options including exclusion, limited access, flash grazing of streamside pastures and other benefits of restricting access.
- Enter into agreements with the Capital Resource Conservation and Development (RC&D) Council and Chesapeake Bay Foundation to outreach to plain sect producers on the benefits of restoring livestock access.
- Support Farm Bureau's strategy to redirect livestock access to streams.



Strategy A3: Increase the implementation of conservation practices to improve water and air quality.

Technical Assistance

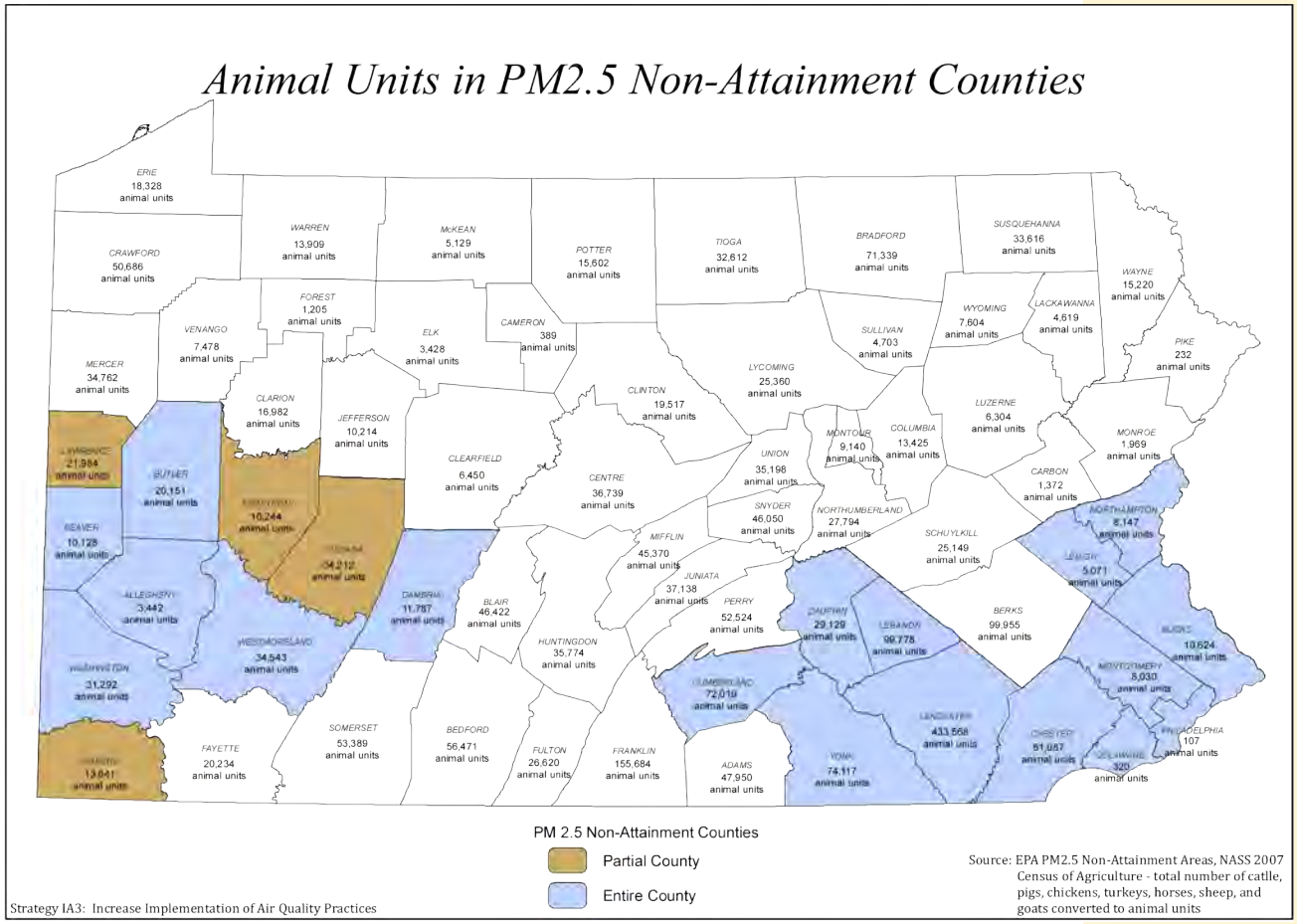
- Administer ag Best Management Practice (BMP) Architecture and Engineering (A&E) contracts to assist in the implementation of engineering practices.
- Develop and deliver training for staff and partners to address air quality impacts from agricultural activities.
- Work with Grazing Lands Conservation Initiative (GLCI) members to deliver grazing conversion assistance to animal feeding operators in order to reduce negative air quality impacts.
- Develop new operating procedure that has a designated certified conservation planner conduct field reviews of existing planners' work.

Financial Assistance

- Maintain ranking criteria to target funding to practices that are located on soils with high leaching and runoff potential.
- Set aside funds to further promote feed management.
- Ensure that existing grazing targeted fund pools offer financial assistance to minimize air emissions from manure wastes left on animal concentration areas in the EPA listed nonattainment counties for PM 2.5.
- During each of the years FY2012 through FY2014, financially assist 100 animal feeding operations with poorly vegetated or non-vegetated ACAs in the EPA listed non-attainment counties for PM 2.5.

Educational Assistance and Outreach

- Work with Penn State, Chesapeake Bay Foundation, and the University of Pennsylvania to train a cadre of nutritionists and feed management specialists to institute careful rationing of feeds within the Bay Strategy.
- Conduct outreach to focus on cleaning up winter feeding areas before temperatures rise and decomposition of the pile causes emissions of ammonia and other gases, and avoiding the formation of manure piles during winter through rotational outdoor feeding on operations where spring clean-up is not desirable or feasible.
- Publish new article promoting the clean up of winter feeding areas; develop and present displays on winter clean-ups; and publish success stories.
- Promote the installation of windbreaks that will reduce odors leaving farm operations.
- Work with partners on outreach and education activities that help producers understand the relationship between agricultural emissions and human health concerns.
- Provide training, as needed, to improve Revised Universal Soil Loss Equation (RUSLE) 2 proficiency and deliver RC&D coordinated training workshops to teach proper collection of field data and use of software.



Strategy IA3: Increase Implementation of Air Quality Practices

Objective B: Conserve Energy

NRCS will help farmers conserve energy by increasing the energy efficiency of agricultural equipment and facilities used on farmsteads, especially the livestock production areas.

Livestock production areas in Pennsylvania often include buildings and other facilities, and utilize machinery and equipment in their daily operations. In almost all cases, the energy source to complete the farming tasks comes from a fossil fuel either used on farm or in an off-site electric power plant. Fifteen percent of agricultural production costs are energy related, according to the USDA. As energy prices rise, these costs claim an ever bigger portion of farm budgets. Conservation of energy through energy efficiency will not only help with the economic viability of farms but will also bring environmental benefits such as the reduction in greenhouse gases that are associated with global climate change. In order to be more energy efficient, producers should make an assessment of the actual energy used before proceeding to implement conservation and efficiency measures. These assessments or energy audits can be done for the production buildings (including lighting, cooling, and heating) as well as for the production fields (including tillage and fertilizer). Energy audits conducted by NRCS certified TSPs, can identify opportunities to improve energy efficiency and recommend appropriate actions and practices to be implemented.

What is an energy audit?

An audit consists of a careful analysis of your farm's energy use, combined with scientific analysis of possible ways to reduce energy use in a cost-effective manner.

Outcome B: Increase the energy efficiency of agricultural facilities on farmsteads.

Strategy B: Increase the energy efficiency of equipment and facilities by 5% by conducting energy audits and implementing recommended practices in counties with high animal numbers.

Technical Assistance

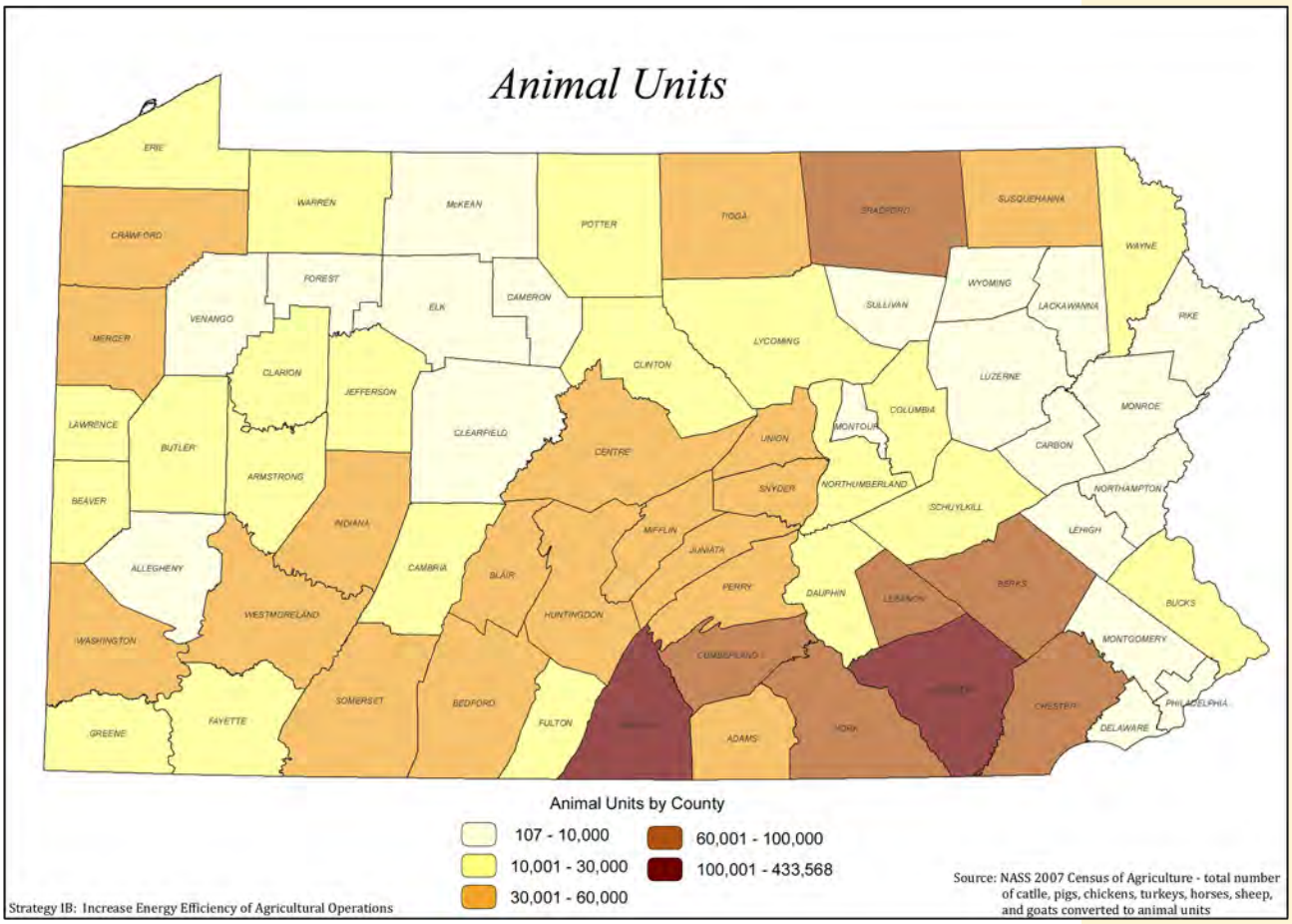
- Develop a wind power generation practice standard.
- Increase the use of prescribed grazing to reduce the use of fossil fuels and commercial fertilizers by developing cost benefit tools to help design grazing systems that reduce fuel and fertilizer use.
- Increase the production of renewable fuel on farm by promoting warm season grass as a biomass crop.
- Enter into agreements with non-government organizations to coordinate a website making on-line tools available that will enable producers to easily estimate the effect of management changes on fuel costs.
- Make energy a topic for discussion at each of the twenty local work group meetings each fiscal year and one state technical committee meeting.

Financial Assistance

- If authorized by legislation, increase adoption, production, and utilization of on farm renewable energy resources by providing incentives in PA Farm Bill programs up to 10% over 2009 baseline (wind turbines, anaerobic digester, biomass, and solar systems).
- Develop contracts for anaerobic digesters on dairy operations, and create an energy conservation and/or generation fund pool.

Educational Assistance and Outreach

- Train all NRCS field offices staff that will be providing energy conservation assistance on energy as a resource concern including whole farm energy audits, planning energy practices, and identifying renewable energy opportunities.
- Improve staff knowledge and confidence in energy related issues within ag systems by offering two trainings per region.


Animal Units
ERIE
WARREN
McKEAN
POTTER
TIOGA
BRADFORD
SUSQUEHANNA
WAYNE
CRAWFORD
FOREST
ELK
CAMERON
WYOMING
LACKAWANNA
PIKE
MERCER
VENANGO
SULLIVAN
LYCOMING
CLARION
JEFFERSON
CLINTON
LUZERNE
MONROE
LAWRENCE
BUTLER
CLEARFIELD
CENTRE
UNION
MONTOUR
COLUMBIA
CARBON
BEAVER
ARMSTRONG
SNYDER
NORTHUMBERLAND
NORTHAMPTON
SCHUYLKILL
INDIANA
MIFFLIN
JUNIATA
LEHIGH
ALLEGHENY
CAMBRIA
BLAIR
PERRY
DAUPHIN
LEBANON
BERKS
BUCKS
WESTMORELAND
HUNTINGDON
MONTGOMERY
WASHINGTON
CUMBERLAND
CHESTER
PHILADELPHIA
SOMERSET
BEDFORD
FULTON
ADAMS
YORK
DELAWARE
GREENE
FAYETTE
Animal Units by County
107 - 10,000
10,001 - 30,000
30,001 - 60,000
60,001 - 100,000
100,001 - 433,568
Source: NASS 2007 Census of Agriculture - total number of cattle, pigs, chickens, turkeys, horses, sheep, and goats converted to animal units
Strategy 1B: Increase Energy Efficiency of Agricultural Operations

II. Cropland

Cropland accounts for 62.4% of all farmland in Pennsylvania, of that 50.5% are harvested.

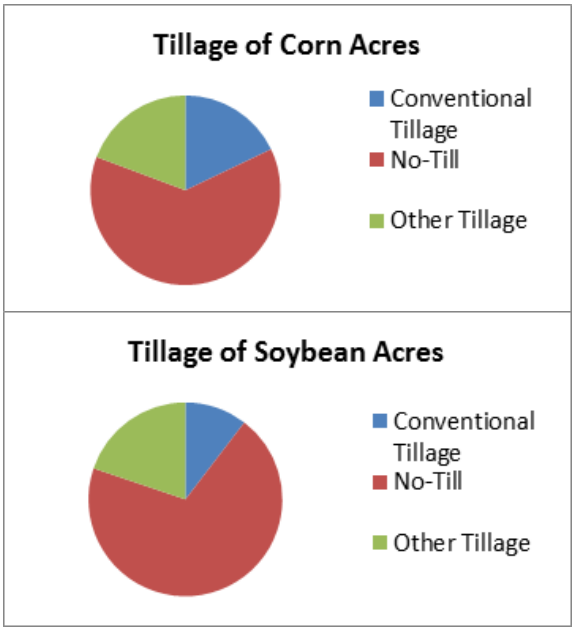
Corn and hay production account for 80% of crops grown while the other 20% are soybeans, small grains, oats, winter wheat, and barley.

In 2007, there were 775 farms that reported being organic on 45,181 acres.

Pennsylvania ranked third based on the number of organic sales nationwide.

In 2011, no-till was practiced on 63.5% of all major crops. Corn and soybeans are two of the crops with the highest tillage acreage.

This section addresses land used to grow crops in rotation including hay grown in short rotations. Hay grown without a crop rotation, except for reseeding purposes, is addressed in Section III.



Soil Condition

In Pennsylvania, degraded soil conditions are found primarily on cropland used to produce corn silage, soybeans, and other annual grains. There are several threats to natural resources associated with growing crops. These include lack of crop diversity and cover crops; excess removal of crop residues; driving heavy equipment on saturated soils; using high-risk fungicides and insecticides; herbicide-resistant weeds; and lack of proper nutrient application management.

Declining levels of organic matter where cover crops are absent results in the soil's inability to serve as a well drained, aerated medium and source of nutrients for the crop. When these crops are planted without no-till systems, the condition of the soil degrades at even faster rates. Vertical tillage chisels, discs, and moldboard plows highly aerate the soil, burning off the carbon stored in the organic matter. The worst conditions occur when these crops are grown on moderate to steep sloped fields, with silt soil textures that remove soil minerals and organic matter at an accelerated rate to pollute water bodies below. High water runoff rates on these same fields then carry sediment and nutrients to surface water bodies which may cause impairment.

Approximately 35,000 acres of statewide important agricultural soils are lost to development each year.

The lack of residue or vegetative cover on the soil's surface leaves it exposed to the full force of raindrop impacts. Raindrops on bare soil destroy the structure of the soil by breaking stable aggregates, while driving heavy equipment over the soil during saturated conditions compacts soil aggregates and closes voids. Thus, detached soil particles from these bare soils become suspended sediment in water. When bare soils are excessively well drained and not actively growing crops, there is also a concern for nutrient leaching below the root zone.

Protecting Farmland

Farmland provides substantial environmental benefits, including floodplain protection, groundwater recharge, and wildlife habitat. The loss of farmland due to development pressure is a major concern in Pennsylvania. The 2007 Natural Resources Inventory (NRI) determined that an average of 17,688 acres of prime agricultural soils were converted to other uses each year in Pennsylvania during the period 1982 to 2007. In addition, approximately 35,000 acres of statewide important agricultural soils are lost to development each year. The conversion of previously cultivated prime and important farmland causes more vulnerable soils to be cultivated, exponentially aggravating soil loss. In addition, cropland and pastureland in sensitive ecosystems within the Chesapeake Bay watershed are being converted into nonagricultural uses at a rate of 100 acres per day.

Commodity	PA Rank
Corn for grain	16
Corn for silage	4
Oats	5
Barley	10
Dry hay, all	18
Soybeans	19
Tobacco	7
Mushrooms	1
Apples	4
Cherries, tart	6
Grapes	4
Peaches	5
Pears	5
Cantaloupes	8
Strawberries	6
Maple syrup	8
Christmas trees	4

Source: 2007 Census of Agriculture, USDA-NASS

Excess Nutrients

According to the Conservation Effects Assessment Project (CEAP) for the Chesapeake Bay, nutrient management remains a difficult challenge for farmers throughout the area. About one-third of Pennsylvania's farms (22,200) apply manure and wastewater as a source of nutrients to 1.2 million acres of cropland and pastureland. The use of manure and wastewater as a source of nutrients poses significant planning challenges to crop producers trying to sustain crop productivity and protect water and air resources. The ratio of nitrogen to phosphorous available in the manure often does not match the rate of nutrients needed by the crop. Proper collection, handling and storage facilities as well as the right equipment to apply manure and wastewater is costly to install, operate, and maintain.

Additionally, there are significant challenges to applying manure as a source of crop nutrients. Nutrient application planning activities, such as the following, are as much of an art as a science:

- Assessing the soil's vulnerability to transporting nutrients to surface water bodies and groundwater
- Matching the right rates of manure applications to meet crop nutrient needs
- Applying manure at the right time close to periods of crop uptake
- Placing manure on or below the surface of the soil to prevent nutrient runoff or leaching of nutrients below plant roots

Without improvements of nutrient application management and alternative uses of manure, "hot spot" concentrations of nutrients exceeding crop needs will continue to increase nitrogen and phosphorus levels in the soils.

Soil Health

NRCS will help farmers improve soil health and sustain the productivity of their cropland by adopting:

1. Soil health management systems
2. Water runoff and erosion control structures
3. Prime farmland protection measures

Soil health is defined as the capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental health, and promote plant and animal health

Soil properties that determine soil health include:

- Soil texture
- Depth of soil
- Infiltration
- Bulk density
- Water-holding capacity
- Soil organic matter
- PH
- Electrical conductivity
- Microbial biomass
- Carbon and nitrogen
- Potentially mineralizable nitrogen
- Soil respiration

What is Prime Farmland?

Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods.

According to the American Farmland Trust, the U.S. is losing two acres of farmland every minute.

From 1992–1997, Pennsylvania lost 244,500 acres of agricultural land due to development, of which, 134,900 acres were prime farmland.

A soil health management system features site specific combinations of management practices that may include reduced tillage, a continuous cover of living plants and crop residues, beneficial crop rotations, traffic control, nutrient management, irrigation and drainage water management, as well as necessary supporting structural practices and land protection measures. Rotating sod-forming crops are also a key to improving soil health on corn-producing soils and many producers use hay in the rotation for this purpose.

Healthy soils are essential for agricultural producers in Pennsylvania to help the Nation and the world meet its needs for today and future generations. They are the foundation for clean air and water, bountiful crops and forests, productive grazing lands, diverse wildlife, and beautiful landscapes because they support plant root systems, suppress diseases and parasites, supply and retain nutrients, and provide habitat for a diversity of beneficial soil organisms.

More than just a medium for plant growth, healthy soils allow stormwater to pass through while at the same time holding on to plant available moisture. They resist erosive forces of water and wind, and help to avoid water runoff, flood damage, and sediment and nutrient transport. They also serve as buffers for water bodies by filtering and breaking down potential contaminants, and over time, increase overall yields and improve the resiliency of the land against storms, floods, droughts, and pests. Resilient soils sustain a diversity of soil organisms and provide terrestrial wildlife with a critical habitat component as they move across the landscape.

Structural conservation practices are necessary to slow water runoff velocities and divert water runoff to safe conveyances where they can outlet without causing concentrated flow erosion. These practices control water runoff which also helps to prevent nutrient transport.

Prime farmland is one of Pennsylvania's greatest agricultural resources. Stewardship of its natural resources and permanent preservation for continued agricultural production guarantees a future food supply, contributes to a healthier economy, and assures a cherished way of life for generations to come. Prime farmland is land that can be harvested as cropland, pasture or grazing land, and contains at least 50 percent land in soil capability classes' I-IV.

A. Objective: Improve Soil Health and Sustainable Production

Outcome A: Soil health on annually planted cropland is improved to sustain productivity and health of annually planted crops and improve the quality of surrounding water and air resources.

Strategy A1: Increase vegetative cover through cover crops, appropriate crop rotations, and residue and tillage management practices by 10% to improve soil health on annually planted cropland in watersheds with an agriculturally impaired stream.

Technical Assistance

- Initiate a soil health strategy to teach employees and agricultural producers about the benefits of soil health.
- Continue to develop soil ratings for stormwater management and no-till.
- Determine "most erosive areas or most potentially erosive areas" with Models (Strategic Watershed Action Teams (SWAT), Agricultural Policy/Environmental eXtender (APEX), Environmental Policy Integrated Climate (EPIC) or in house) to assist with planning and adjust rankings to prioritize the implementation of practices on these areas.

Strategy A1 (Cont.)

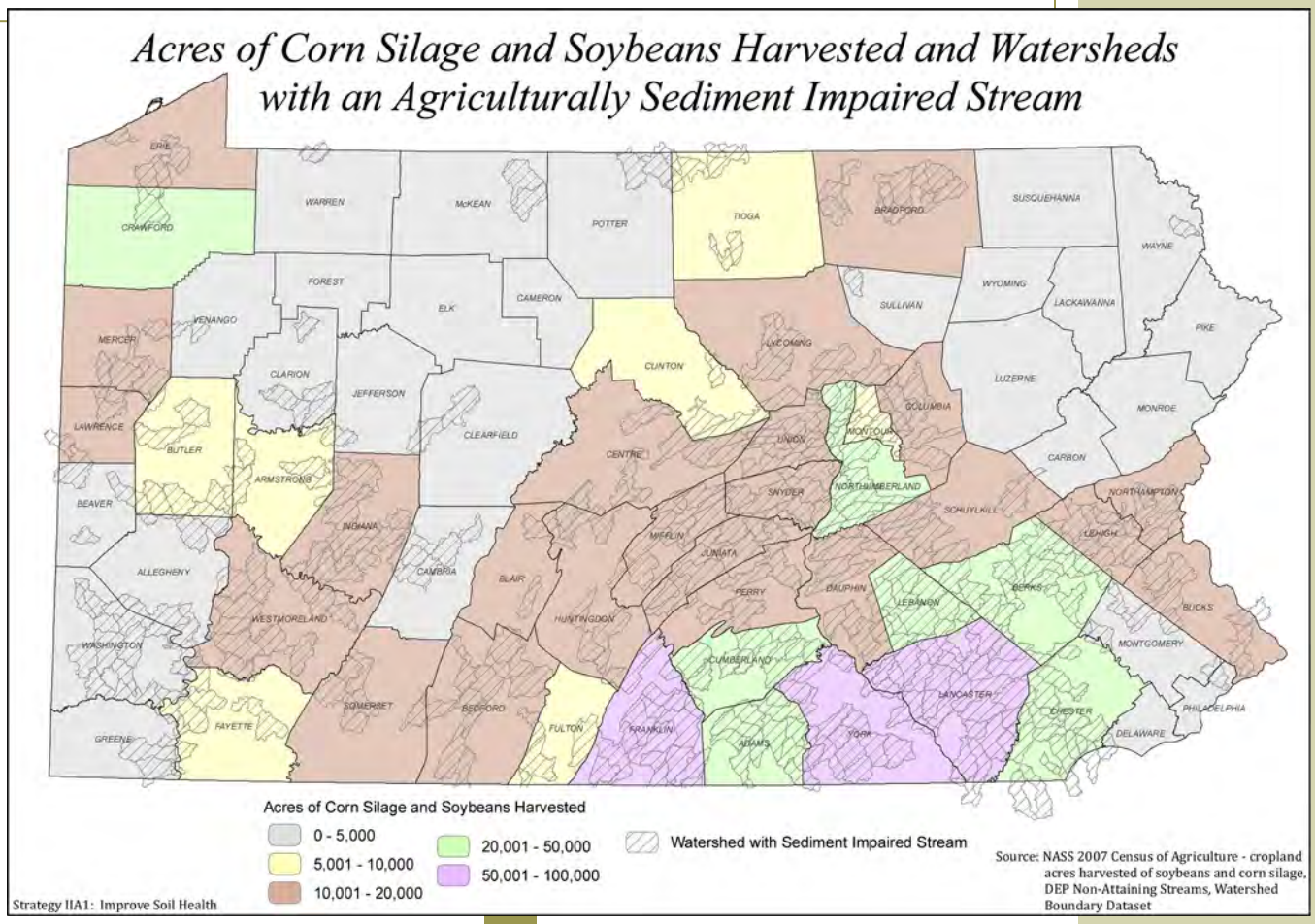
- Increase technical assistance in the Chesapeake Bay watershed by entering into cooperative agreements, such as SWAT agreements with conservation districts, to provide technical assistance to agricultural producers and landowners.

Financial Assistance

- Increase the amount of crop residues on the surface at planting (including no-till). Utilize reduced tillage, crop residue additions including cover crops and high residue crops, and less intense crop rotations.
- Modify state ranking systems to target funds and adopt precision conservation, i.e., putting the right practice in at the right place and at the right time.

Educational Assistance and Outreach

- Partner with commodity groups and conservation districts to provide more outreach to crop producers on the benefits of soil health.
- Work with plain sect and underserved communities and customers to demonstrate the benefits of soil health.
- Institute statewide trainings - Ag Compliance, 590, RUSLE, Conservation Boot Camp, Certified Conservation Planner - to ensure there is adequate knowledge and skills among NRCS and partnership employees.
- Partner with Penn Ag Industries to assist them in delivering their 4R program – using the Right Source at the Right Rate in the Right Place and the Right Time.



Strategy A2: Increase the installation of structural practices by 10% to control runoff and reduce soil erosion on annually planted cropland in the watersheds that have water body segments listed as agriculturally impaired by sediment or have a high erosion rate.

Technical Assistance

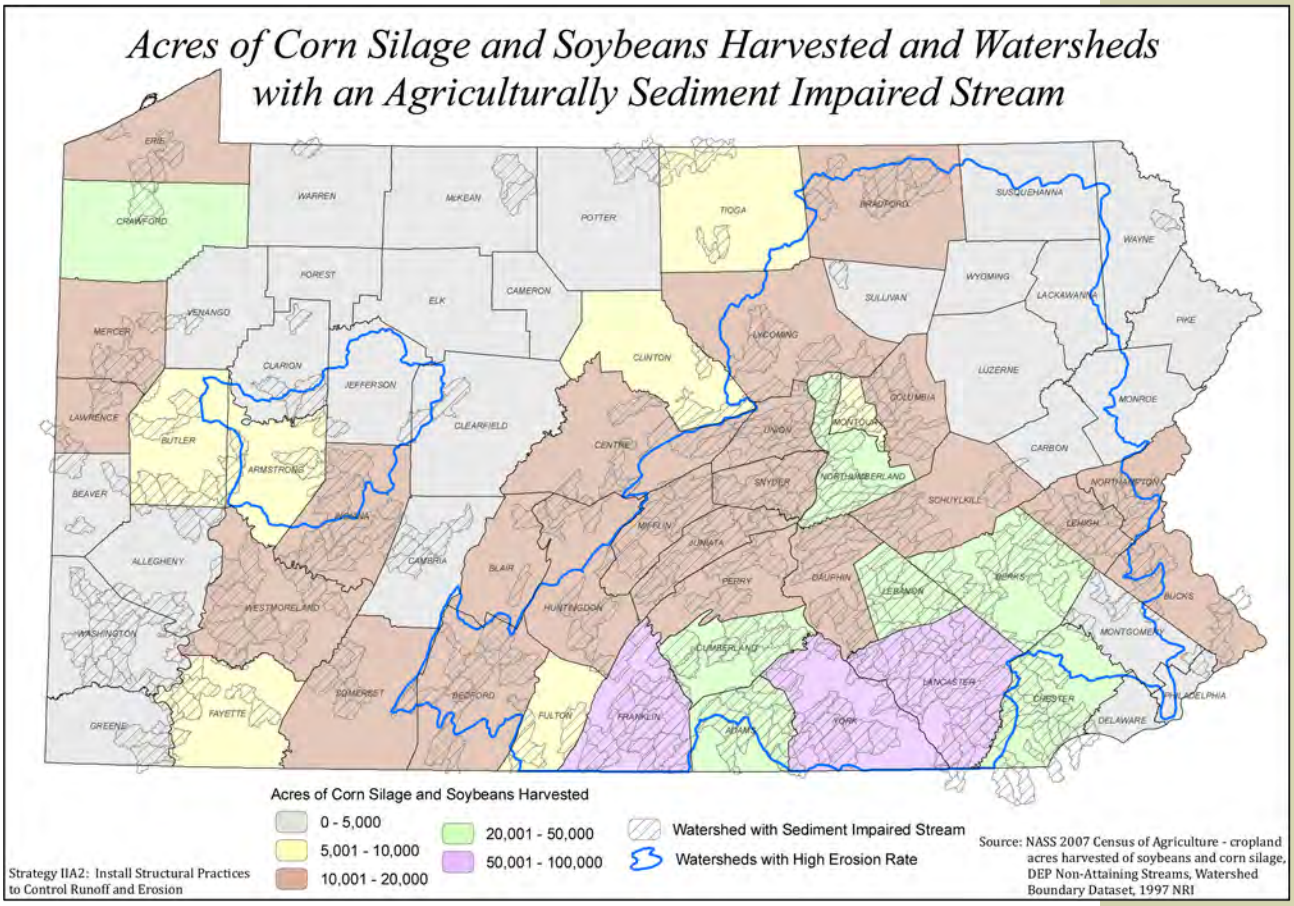
- Reduce the average soil erosion rate on cultivated cropland from an average of 5.3 tons per acre per year to less than 5 tons per acre per year or soil loss tolerance (T-value) whichever is less.
- Maintain a strong expertise on conservation planning and surface water management practices such as waterways, diversions, and terraces to go along with agronomic land treatment practices such as rotations, tillage, and cover crops.
- Ensure all CNMPs have a strong land treatment component.
- Work closer with TSPs in a cooperative/coordinated effort to promote conservation practice implementation.
- Ensure that NRCS staff and conservation planners understand the requirements for Pennsylvania Chapter 102 erosion and sedimentation control and can explain to agricultural producers and landowners whether their conservation plan meets these requirements.

Financial Assistance

- Continue to offer priority funding for traditional surface water control conservation practices such as waterways, diversions, and terraces as part of NRCS core conservation practices for cropland.
- Increase ranking points for producers applying practices on steep slopes for land not suitable for cropland or converting marginal ground to pasture or wildlife as based on set slope requirements.
- Provide financial assistance options for reconstructing "Old" waterways, diversions, and terraces that no longer meet NRCS Standards and Specifications.

Educational Assistance and Outreach

- Provide fact sheets to farmers on state compliance requirements for Chapter 102 erosion and sediment control and Chapter 91.
- Partner with local conservation districts and PA No-Till Alliance to increase farmer meetings and educational opportunities.



Strategy A3: Reduce the loss of prime farmland acres by 20% to maintain or increase locally grown products in critical areas at risk for conversion to developed land by protecting farmland.

Technical Assistance

- Continue to target areas in the southeastern part of Pennsylvania that have the highest concentration of Prime and Statewide Important soils and the largest "urbanization/ development" threat.
- Complete a land evaluation for farmland preservation for Erie update.
- Develop strategy to target easement programs in agriculturally impaired watersheds.

Financial Assistance

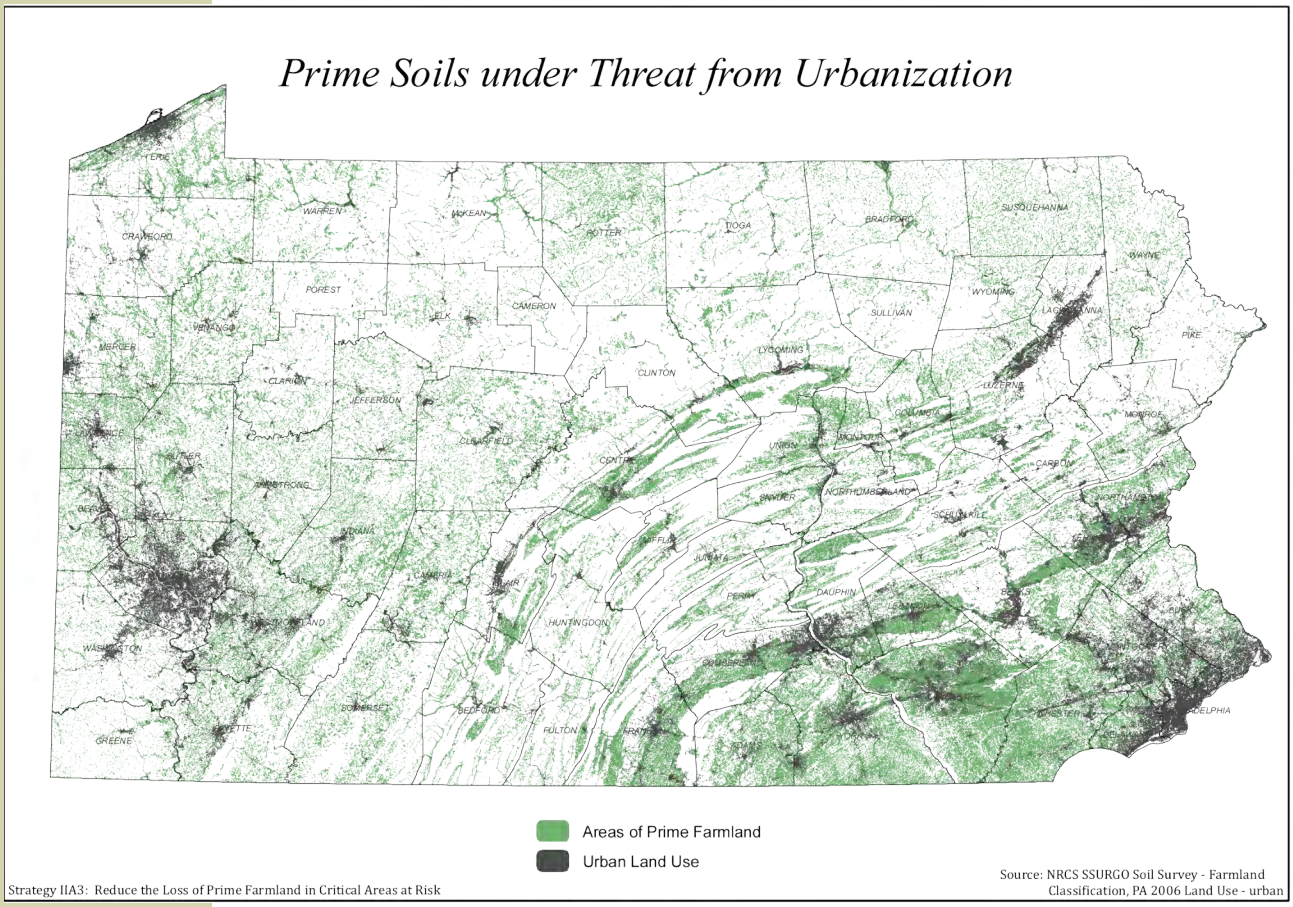
- Increase percentage of farmland preservation in developing watersheds to minimize adverse changes in hydrographs that contribute to bank erosion.
- Target funding for farmland protection for counties experiencing a high percentage of urban growth, population growth, and farmland loss.
- Target parcels for farmland protection in the Chesapeake Bay watershed for agricultural preservation to support Executive Order 13508 and help sustain the watershed in perpetuity.

Pennsylvania leads the nation in the number of farms and acres permanently preserved for agricultural production with 457,537 acres preserved in 4,229 easements.

Strategy A3 (Cont.)

Educational Assistance and Outreach

- Produce statewide fact sheet on the conversion of important, prime, and unique farmlands and the economic and ecosystem benefits they provide.
- Hold FRPP appraiser workshop and landowner stewardship workshops.
- Encourage new entities to participate in the FRPP program.



Strategy IIA3: Reduce the Loss of Prime Farmland in Critical Areas at Risk

B. Objective: Reduce Pesticide Risks on Cropland Used to Produce Specialty Crops

NRCS will help specialty crop producers reduce pesticide risks, adopt integrated pest management (IPM), mitigate pesticides, and establish and manage pollinator and beneficial insect habitats.

Chemical application drift into adjacent waterways must be mitigated. Mixing and handling facilities also need to be properly designed, installed, and maintained to protect water quality in both surface and groundwater. Only approved chemicals may be applied on organic operations. Although IPM addresses many of the concerns, producers must also be cognizant of chemical application drift and the negative impacts associated with it.

The production of all crops, but especially specialty crops, often requires the use of pesticides to control unwanted pests and damage to the crop. The elimination of unwanted pests must also be balanced with the protection of air and water quality, desirable pollinators, and other beneficial insects. IPM encourages use of compatible crop production and crop protection tactics to keep pest populations below those causing economic injury while protecting against hazardous risks to humans and the environment.

Effective use of IPM techniques can protect human health, water quality, adjacent crops, pollinator and/or fish and wildlife habitat, by minimizing or eliminating the need for chemical pest control. The use of IPM contributes to optimal crop health and improved net-profitability of crop production. Healthy crops use fertilizer more efficiently leaving less residual nutrients (especially nitrate) in the soil profile after harvest, are more competitive with weeds and less dependent on herbicides for weed control, and return more organic matter to the soil.

What is IPM?
Integrated Pest Management (IPM) is an approach to pest control that focuses on pest prevention by eliminating the root causes of pest problems. When infestations are present and require immediate intervention, the safest, most effective methods available for the situation are chosen.

Outcome B: Water and air quality, pollinator, fish and wildlife habitat, and human health are protected and improved while the soil health and sustainability of priority cropland used to produce specialty crops is improved.

Strategy B: Increase adoption of IPM by 25% to reduce pesticide risks and establish habitat for pollinators and other beneficial insects in counties with more than 1,000 acres of cropland used to produce specialty crops.

Technical Assistance

- Create areas of safety for wildlife, including pollinators, where incidental exposure to pesticides is extremely unlikely, since these areas are vital for nesting success, foraging, etc.
- Identify one person per area to provide training and act as subject matter expert on pest management to assist specialty crop producers and review pest management plans.
- Coordinate pollinator assistance being provided by Xcerces through New Jersey Plant Materials Center agreements.
- Develop technical guidance for effective buffer types and sizes to protect pollinator habitat.

Financial Assistance

- Increase ranking points for farm operations which are adopting practices that provide pesticide setback for habitat protection.

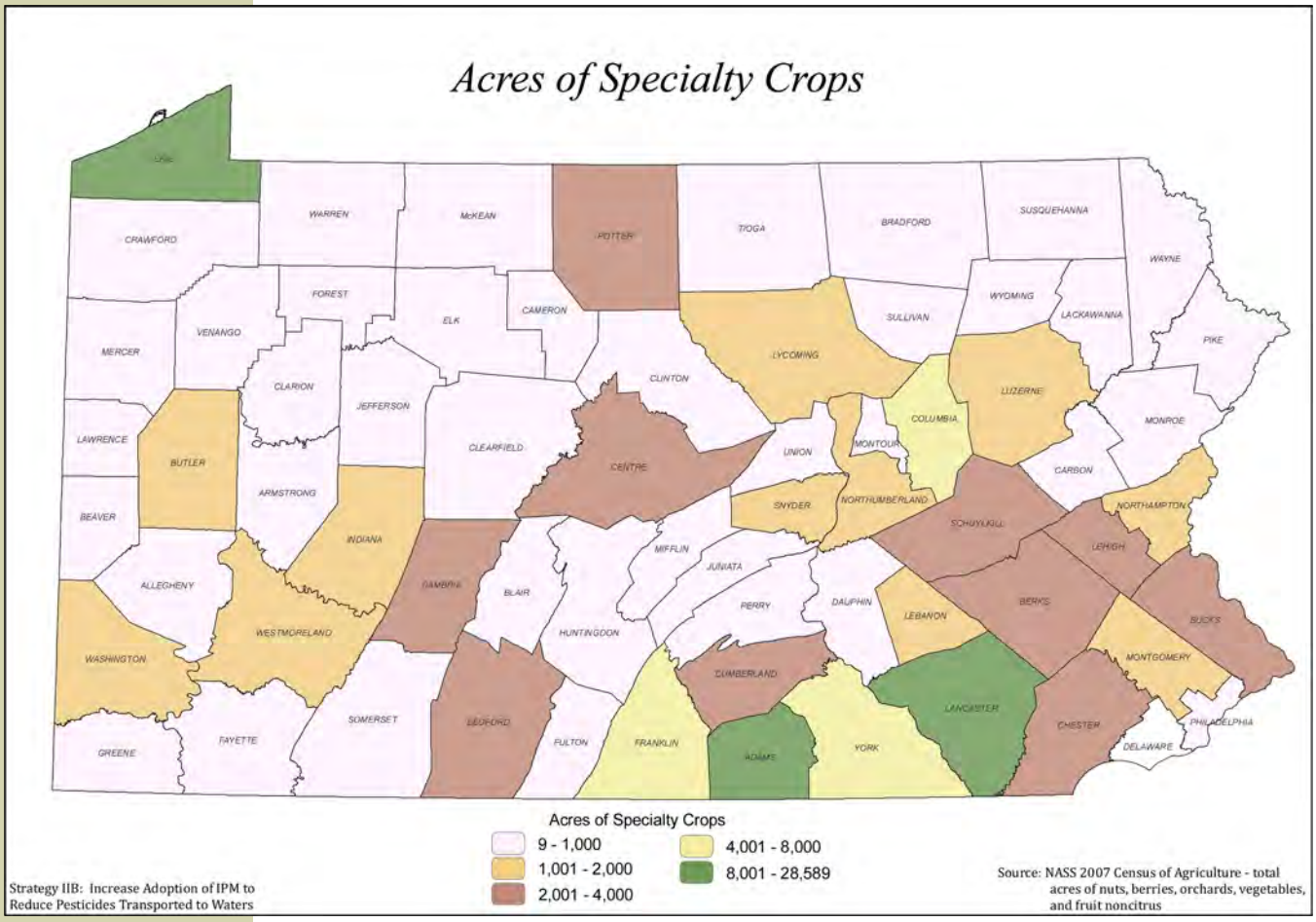
Animal pollinators are needed for the reproduction of 90% of flowering plants and one-third of human crops.

Strategy B (Cont.)

- Continue to offer assistance for Agrichemical Mixing Facility and Pest Management as primary practices available for producers.

Educational Assistance and Outreach

- Continue to work with producers, other agencies, and the agricultural support industry to minimize the current impact of pesticides on surface and ground water.
- Educate NRCS staff and public on the practices that can limit pesticide and chemical drift and transfer.
- Continue to support pollinator plantings at People's Garden displays, garden displays at fairs, on farms, etc.
- Provide outreach to Know Your Farmer, Know Your Food.
- Provide outreach to organic producers through workshops in key urban/suburban areas.
- Develop brochures to provide advice on how farmers and woodlot owners can increase pollinator habitat using cost-share assistance.



Strategy IIB: Increase Adoption of IPM to Reduce Pesticides Transported to Waters

C. Objective: Protect and Improve Water and Air Resources

NRCS will help crop producers protect and improve water and air resources as well as meet realistic crop yield goals by properly managing nutrient applications, and increasing edge-of-field practices as needed.

Nitrogen and phosphorus are essential inputs to profitable crop production. Farmers apply these nutrients to the land as commercial fertilizers, biosolids, and manure to promote plant growth and increase crop yields. Not all of the nutrients applied to the land are taken up by crops; some are lost to the environment and, when combined with naturally occurring levels of these elements or with other pollution sources, can create offsite air and water quality problems.

Nutrient management plans can help all farmers manage nutrients, improve farm profits, and protect the environment.

Nutrient management on all lands receiving soil amendments and sources of plant nutrients such as commercial fertilizers, manure, process wastewater, and compost involves their application at the right rate, the right time, and in the right place. Nutrient management plans can help all farmers manage nutrients, improve farm profits, and protect the environment.

Edge-of-field practices trap sediment runoff not controlled by in-field conservation practices, mitigate pesticide drift and runoff, and provide beneficial insect and pollinator habitat. They may also increase plant diversity and provide transitional zones of wildlife habitat around crop fields.

In order to improve water and air quality, NRCS will strive to improve nutrient application management and installation of edge-of-field practices. Since all waters are connected, the improvements affect places beyond Pennsylvania's borders to also benefit the Chesapeake Bay, the Great Lakes, and the Delaware and the Ohio Rivers.

Outcome C: Nutrient and sediment loads to impaired water bodies and air emissions are reduced, while the productivity and health of cropland is sustained and compliance with federal and state environmental regulations is increased.

Strategy C1: Increase the number of farmers by 10% using the 4 R approach for nutrient management (nutrients are applied in the right amount from the right source in the right place at the right time) on cropland with applied manure or fertilizer.

Technical Assistance

- Continue to require 590 Nutrient Management for the installation of a manure storage facility and other animal waste handling or treatment practices.
- Promote new nutrient management technologies (trailing shoe forage separator, shallow disc injection, chisel sweep injection, aeration infiltration, pressure injection, and poultry litter injection).
- Deliver 590 trainings for all partners, include nutrient tracking tool and other adaptive management guidance.
- Develop 4R strategy with core producer groups to achieve nutrient savings on the landscape.
- Continue to develop a scenario for adaptive nutrient management, promoting the use of Pre-sidedress Soil Nitrate Test (PSNT)/Chlorophyll Meter and Corn Stalk Nitrate Test (CSNT) for field specific adaptive nitrogen management.

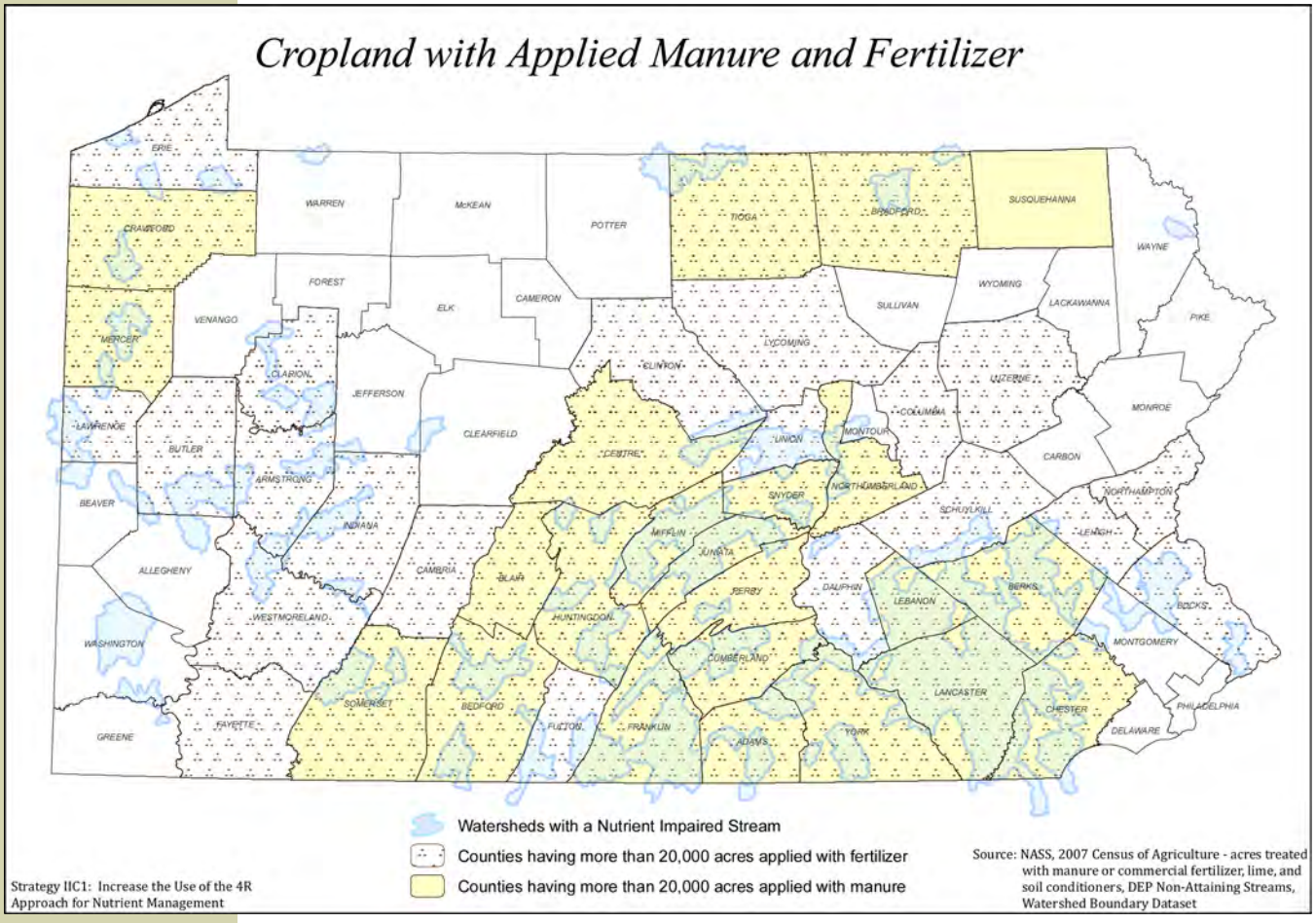
Strategy C1 (Cont.)

Financial Assistance

- Assist crop operators applying urea nitrogen with using urea inhibitors to prevent the hydrolysis of urea nitrogen into ammonia emissions especially in the EPA listed non-attainment counties for PM2.5 as well as the rest of the state.
- Increase ranking points for livestock operations that are adopting dust or emission controlling conservation practices.
- Financially assist animal operators and/or importers of animal wastes to reduce emissions of odorous compounds especially from animal wastes applied on cropland.

Educational Assistance and Outreach

- Work with partners on outreach and education activities that target assistance to priority customers managing sources of air emissions from croplands, especially those receiving manure applications, and promote the adoption of conservation practices or other measures to treat them.
- Educate staff on the conservation practices that can limit livestock-related particulate matter and emissions.



Strategy C2: Increase the use of edge-of-field practices by 10% where needed in non-riparian areas to reduce transport of nitrogen, phosphorous, and sediment to the edge of stream or other sensitive areas in cropland receiving manure or fertilizer applications in watersheds impaired by nutrients or sediments.

Technical Assistance

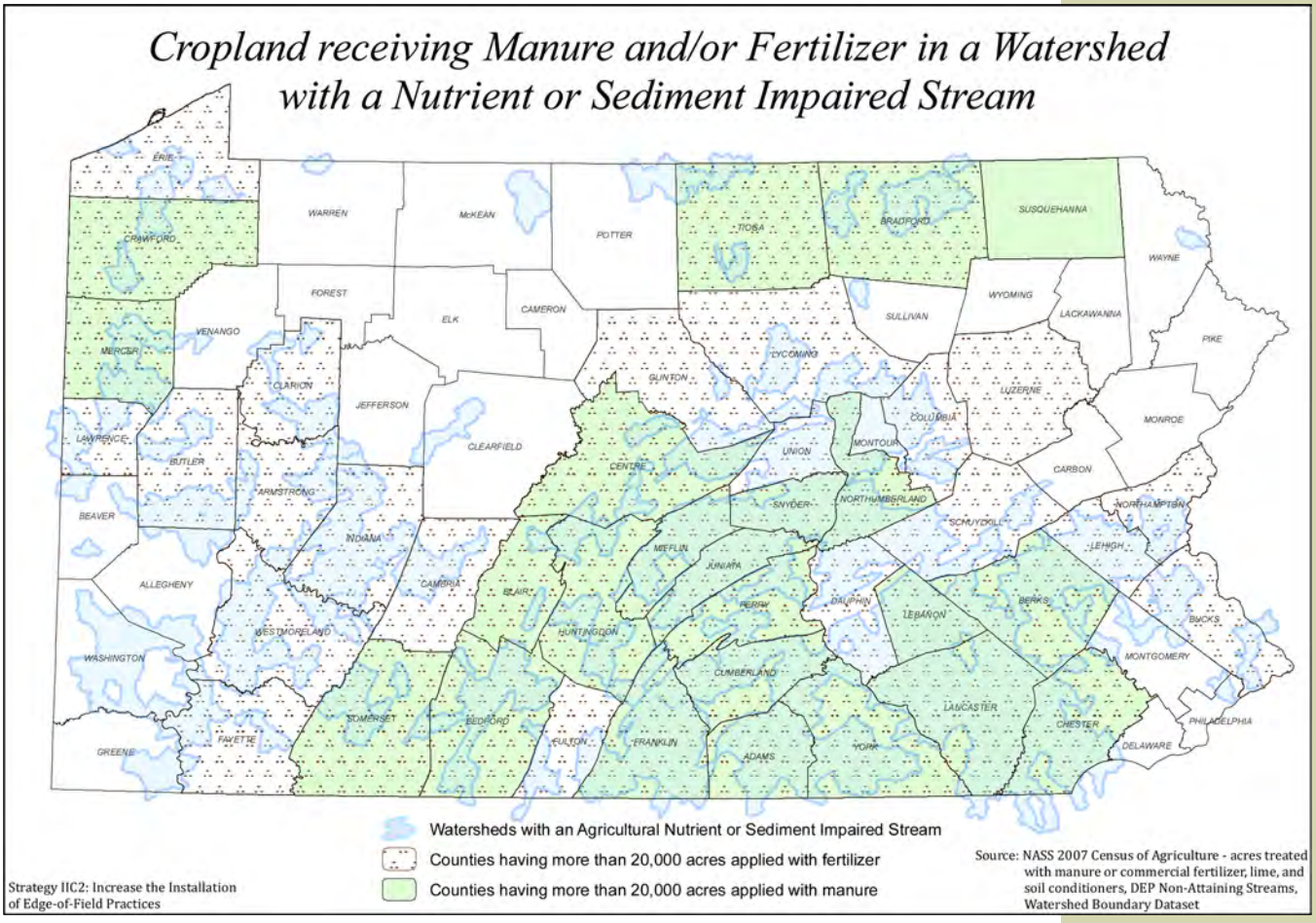
- Prepare detailed soil survey to identify areas of high phosphorus runoff in priority watersheds.
- Prepare detailed soil survey to identify areas of high leaching potential in priority watersheds.

Financial Assistance

- Develop ranking criteria to prioritize funds for edge-of-field practices.

Educational Assistance and Outreach

- Identify and provide training to NRCS staff on edge-of-field practices.



D. Objective: Conserve Water Resources

NRCS will help specialty crop producers conserve water by increasing water use efficiency.

Water conservation refers to practices, techniques, and technologies that improve the efficiency of water use, thereby reducing overall demand. Increased efficiency expands the use of the water resource, freeing up water supplies for other uses. Agricultural water users can optimize water use efficiency and protect the quality of water resources by applying basic information about irrigation systems, crop water use, and management practices. A properly working and managed irrigation system will conserve water.

Outcome D: Surface and ground water supplies are improved in cropland used to produce specialty crops.

Strategy D: Conserve and improve efficient use of irrigation water by specialty crop producers by 10% to increase water use efficiency in counties with more than 1,000 acres of specialty crops.

Technical Assistance

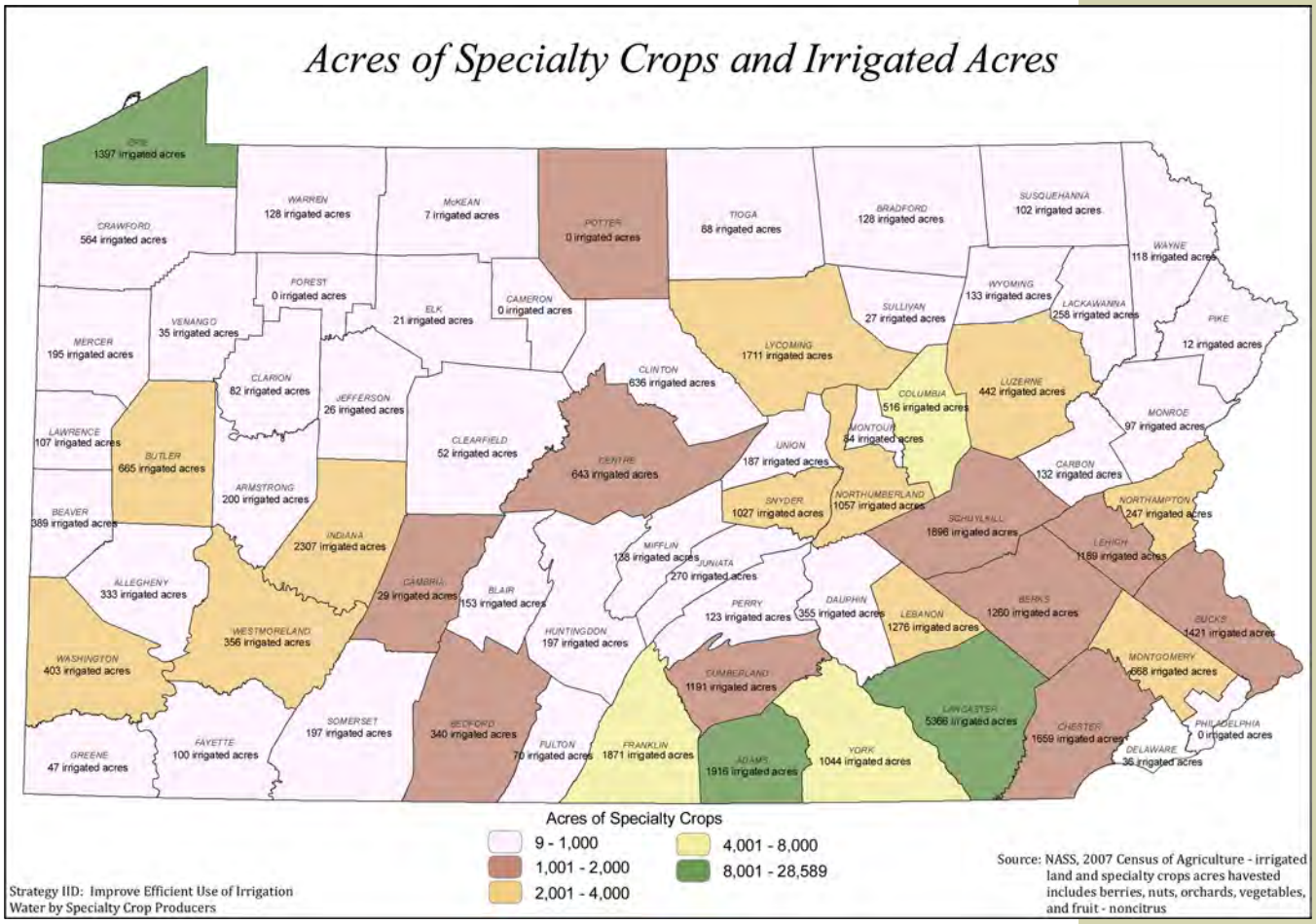
- Increase planning, implementation, and education of Water Management Plans for irrigation and composting operations.
- Establish a specialty crop committee as a subcommittee to the State Technical Committee to gather information on how to better address specialty crop needs.
- Develop a strategy to create wetlands in areas where crops may benefit from increased water retention.
- Develop a cost-effective alternative to help specialty crop producers establish or improve water supplies for crop production, including more efficient use of normal rainfall.

Financial Assistance

- Develop financial assistance options to help producers implement plans and practices to conserve and improve water use efficiency.

Educational Assistance and Outreach

- Provide training to NRCS and partner staff on the development of Irrigation Water Management Plans.



E. Objective: Increase Energy Efficiency of Field Operations

Reducing application overlap on 250 million acres of cropland could save up to $825 million in fertilizer and pesticide costs annually.

NRCS will help farmers increase the energy efficiency of field operations by promoting the same conservation practices used to improve soil health and productivity, water and air quality, and estimating the amount of fuel and cost savings.

Each gallon of fuel saved helps the nation reduce its dependence on imported fossil fuels. Where needed, a specific landscape energy plan can identify conservation practices that will provide energy saving benefits to an individual operation. Typical field operations may include planting and harvesting, pesticide application, manure application, and irrigation. Conservation practices that address energy efficiency of field operations include nutrient management, crop residue and tillage management, prescribed grazing, integrated pest management, precision agriculture, and irrigation water management.

Outcome E: Farmers utilize more energy efficient conservation practices.

Strategy E: Increase energy efficiency of field operations.

Technical Assistance

- NRCS staff, TSPs, and partners will provide assistance to agricultural operators to increase the energy efficiency of farming practices and field operations including nutrient management, crop residue and tillage management, prescribed grazing, integrated pest management, precision agriculture, and irrigation water management.
- Utilize TSPs to conduct on-farm Energy Audits and prepare Agricultural Energy Management Plans for agricultural operators.

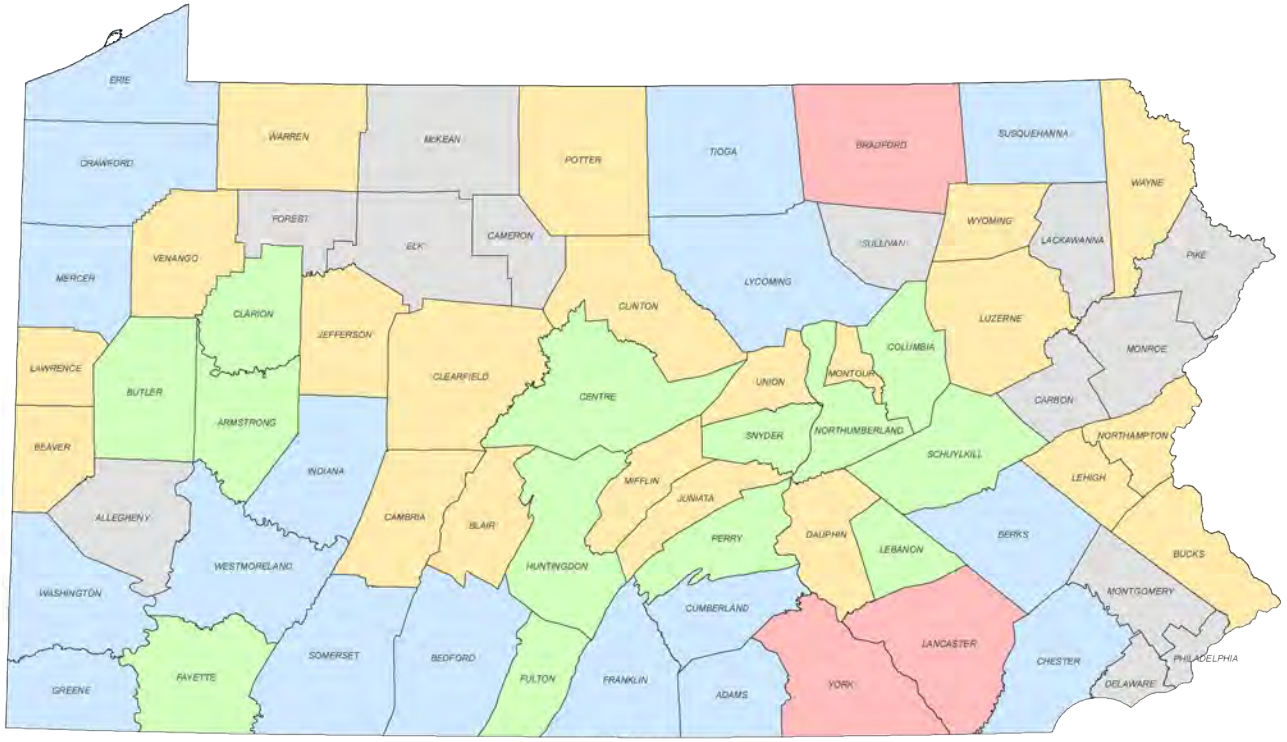
Financial Assistance

- Continue to provide financial assistance for on-farm Energy Audits and Agricultural Energy Management Plans.
- Continue to provide financial assistance for other conservation activity plans that increase energy efficiency such as Prescribed Grazing and Integrated Pest Management.
- Provide additional ranking points for financial assistance to agricultural producers that implement energy efficient conservation practices and activities such as Windbreaks/ Shelterbelt Establishment, Precision Agriculture, Irrigation Water Management, Nutrient Management, and Residue and Tillage Management practices in their energy management plans.

Educational Assistance and Outreach

- Provide outreach to agricultural producers on the use of TSPs to conduct Energy Audits and develop Agricultural Energy Management Plans.
- Provide training to Conservation Planners, Grazing Specialists, and Nutrient Management Specialists on energy-saving opportunities in common farm operations such as planting and harvesting, pesticide application, manure application, and irrigation, as well as the benefits of conservation practices.

Acres of Land used for Crops, Pasture, and Grazing



Strategy IIE: Increase Energy Efficiency for Field Operations

Source: NASS, 2007 Census of Agriculture - land in farms

III. Grazing and Forage Lands

Did you know?

Pennsylvania has over 1.7 million acres of forage lands.

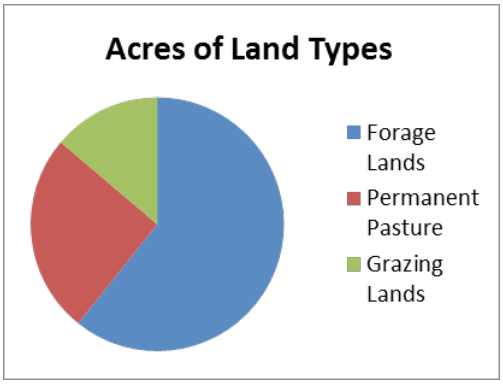
It is estimated that there are roughly 1,500 invasive plants established in the U.S. and over 20,000 potentially invasive plants that have not yet entered the U.S.

This section addresses lands used to grow crops not rotated except for reseeding purposes which includes the following categories: forage land, permanent pasture, and grazing lands.

Privately-owned grazing land and permanent pasture are important landscape features in Pennsylvania. Grazing and browsing animals are used to manage grasses, forbs, residues, and shrubs on pastures, as well as crop fields and forests, while farm machinery is used to harvest hay or biomass. Well-managed pastures and hay fields provide valuable products, conservation of natural resources, and valuable wildlife habitat, making them assets not only to private land users but to the entire rural community. While grazing lands may have their own natural resource problems, conversion of short rotation cropland, and permanent pasture and converting forage land to a grazing system may present excellent opportunities for livestock producers to distribute nutrients away from concentrated areas and reduce fuel inputs needed to produce feed. Converting short rotation cropland to perennial grasses for producing cellulosic biomass also presents new opportunities for conserving natural resources.

Grazing Systems

The most effective way to implement grazing practices is to work with the landowner to develop a prescribed grazing plan. A grazing system can incorporate practices such as fencing and crossings to facilitate livestock rotation and protect streamside areas, forage plantings to provide feed, as well as water development and shade areas to meet livestock needs. There can be considerable costs in terms of fencing and supporting practices for converting land to a grazing system. In terms of planning, landowners incorporating pastures and grazing into their livestock operation have access to technical and financial assistance through USDA programs, but there is a need for increased management on the part of the producer which seems to be a prohibiting factor for overall success. Working with partners such as GLCI and local producer groups can address the training and education need for producers.



Forage Land – land used for all hay and all haylage, grass, silage, and greenchop

Permanent Pasture – permanent pasture and rangeland that encompasses grazable land that does not qualify as woodland pasture or cropland pasture

Grazing Lands – cropland used only for pasture or grazing that could have been used for crops without additional improvement

Invasive Species

Pennsylvania pest species destroy farmland and forestland. Invasive plants are troublesome in many ways. They reduce the competitiveness of desirable plants by robbing water, light, space, and soil nutrients. Invasive plants can replace desirable plants, filling in gaps or voids and reducing biomass, stand longevity, and overall quality pastures and forages. Certain invasive plants can produce substances that inhibit the growth of crop plants. Plants such as poison hemlock, white snakeroot, and black locust have toxic properties that can cause livestock injury or loss under certain circumstances. In addition, certain plants such as Canada thistle, bull thistle, musk thistle,

Johnsongrass, and multiflora rose, which may be common weeds, are on the noxious weed list and must be controlled per state law. To plan an effective weed management program, a landowner must be able to identify weeds present and understand how the weeds' biology and ecology affect where they are found and how these ultimately impact management.

Annual, Biennial, and Perennial Weeds

Weeds are grouped into three categories – annuals, biennials, and perennials. Annuals complete their life cycle within one year and reproduce only by seed. Biennial weeds live during two growing seasons and reproduce only by seed. Perennial plants live for more than two years and generally reproduce by vegetative structures and seed. Biennial and perennial weeds pose the biggest problems for pasture producers; both produce seeds each year, potentially starting new infestations. Because of limited weed management options, pastures are often ideal environments for the growth and spread of perennial weeds.

In pastures weeds remain in the field where they continue to interfere with desirable forage. Reduction in forage quality often results in lower protein content, feed digestibility, and even reduced intake by the animal. Pasture invading weed species should be assessed for their competitive ability, or their potential to reduce desirable forage species; their invasiveness – their potential to multiply and increase; their yield, quality, and nutritive value relative to desirable forages species; and the cost and effectiveness of control measures.

Plants which may be common weeds, such as this Canada thistle, are on the noxious weed list and must be controlled per state law.

A. Objective: Protect and Improve Water and Air Resources

NRCS will help farmers protect and improve water and air resources by converting animal feeding operations to grazing systems, and converting vulnerable cropland to prescribed grazing systems.

Converting cattle feeding operations to a prescribed grazing system has many benefits for the operation as well as water and air resources. Bringing the cattle to the feed rather than bringing the feed to the cattle is a complete farm system change, reducing the need for larger, fuel-consuming tractors, combines, silage wagons, manure hauling equipment and storage facilities; and requiring more day-to-day intensive management of livestock and forages. On some farms, production yields drop but overall bottom line profits increase due to lower input costs while on other farms both yields and bottom lines improve.

Some farmers may not be able to convert their entire feeding operations but may be willing to convert a few crop fields to grazed pasture for one or more groups of livestock on the operation. Planting a permanent forage cover improves soil health and water quality by holding soil in place to prevent erosion into streams and wetlands. Soils under pasture accumulate organic matter, which removes carbon dioxide from the atmosphere. Converting cropland to pasture may also help offset changes in the global climate caused by helping to remove more carbon dioxide from the atmosphere and emitting less carbon dioxide and nitrous oxide emissions by reducing use of fuel needed to transport feed. Forage and grazing systems that have sufficient land base tend not to import very much feed onto their farm and thus are more likely to be in nutrient mass balance than other animal feeding operations like poultry and hogs or larger cattle operations with insufficient land base.

Pennsylvania's Top Ten invasive plants:

1. Japanese stiltgrass
2. Multiflora rose
3. Big chickweed
4. Japanese barberry
5. Garlic mustard
6. Watercress
7. Morrow's honey suckle
8. Yellow sweetclover
9. Queen Anne's lace, wild carrot
10. Bull thistle

About 40% of the species on the Threatened or Endangered species list are at risk primarily because of invasive species.

Outcome A: Animal feeding operators convert to grazing systems to help meet environmental regulations, improve sustainability, and provide cumulative conservation benefits including, but not limited to, balanced on-farm nutrient levels, reduced energy consumption, and improved soil health, water, and air quality.

Strategy A1: Encourage an additional 5% of cattle feeding operations to utilize sustainable grazing systems.

Technical Assistance

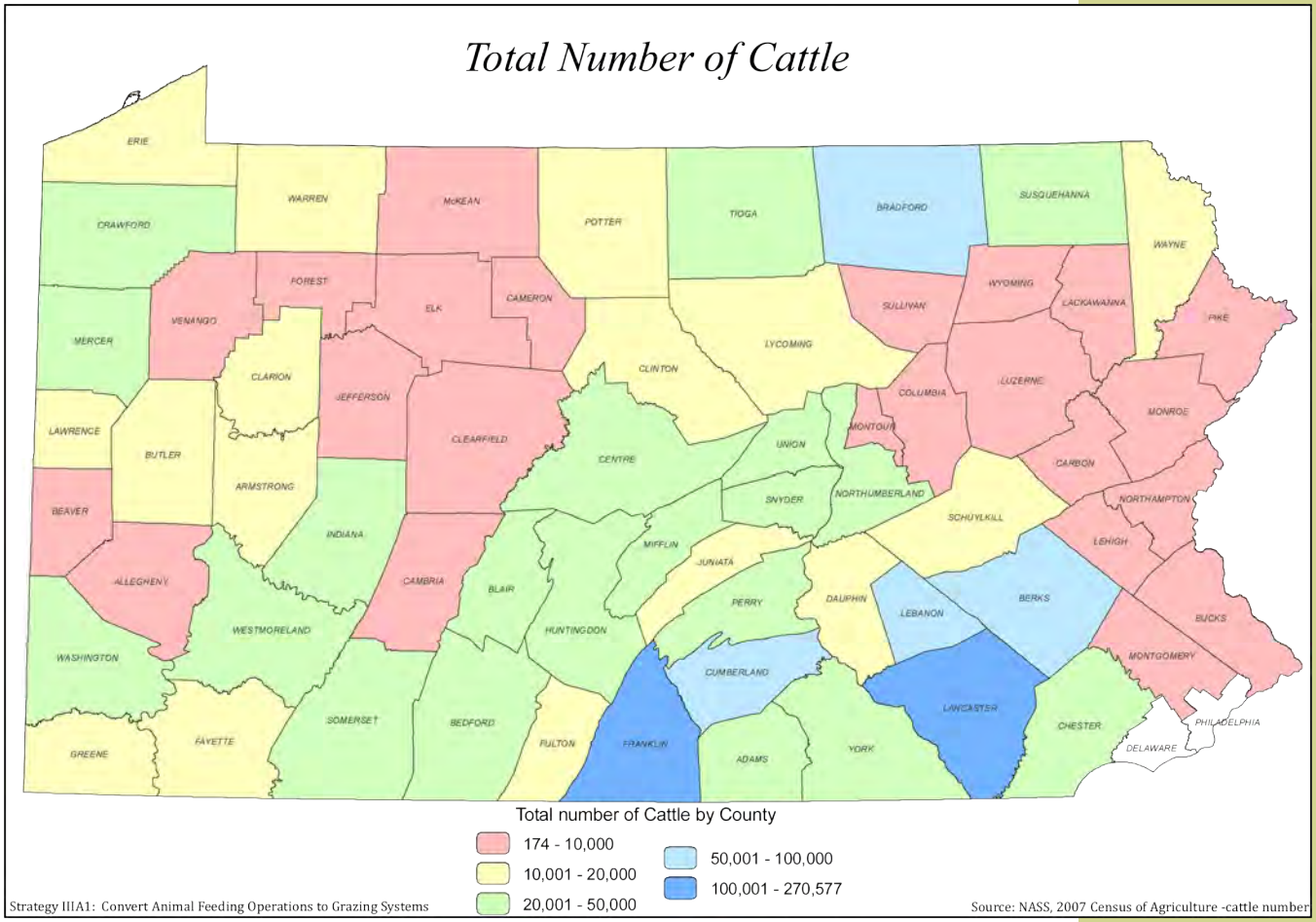
- Initiate soil health strategies to promote sustainable grazing systems.
- Collaborate with GLCI and other grazing organizations to develop energy efficient grazing systems.
- Expand partnerships among grazing organizations to encourage livestock producers to adopt forage-based systems.
- Promote the economic benefits of conversion to grazing as an added incentive for targeted audiences.
- Continue promotion of feed efficiency and feed management through the current NRCS initiative as well as present and future partnership efforts.

Financial Assistance

- Review ranking questions and payment schedules; where possible and applicable, tailor financial assistance to incentivize a shift to grazing systems/practices.
- Review ranking questions and payment schedules; where possible and applicable, tailor financial assistance to incentivize the adoption of feed management on dairy and beef farms.

Educational Assistance and Outreach

- Work with GLCI and other non-government partners (such as the Pennsylvania Game Commission, Pennsylvania Crop Advisors (PCA), Center for Beef Excellence, and Penn State) and other state and federal agencies to address goals of each in relation to conservation benefits of pasture and forages in a grazing management system.
- Develop and host training workshops for equine owners and conservation staff, in partnership with Penn State University and others, reaching all counties throughout the Commonwealth.
- Develop outreach materials of case studies where producers converted from cropland to grazing lands.
- Continue training workshops for livestock nutritionists and livestock producers on the environmental and economic benefits of feed management in partnership with Penn State Extension Dairy Team.



Strategy A2: Convert 5% of vulnerable cropland to livestock grazing systems.

Technical Assistance

- Promote the improvement of pasture forages through overseeding/interseeding of grasses and legumes.
- Improve livestock's resistance to climate extremes (too hot or too cold) through the adoption of grazing systems that address year-round weather conditions.
- Promote biomass initiative and conversion of cropland to pasture on sensitive lands or farms coming out of CREP – incorporate rankings with models or set slope requirements.

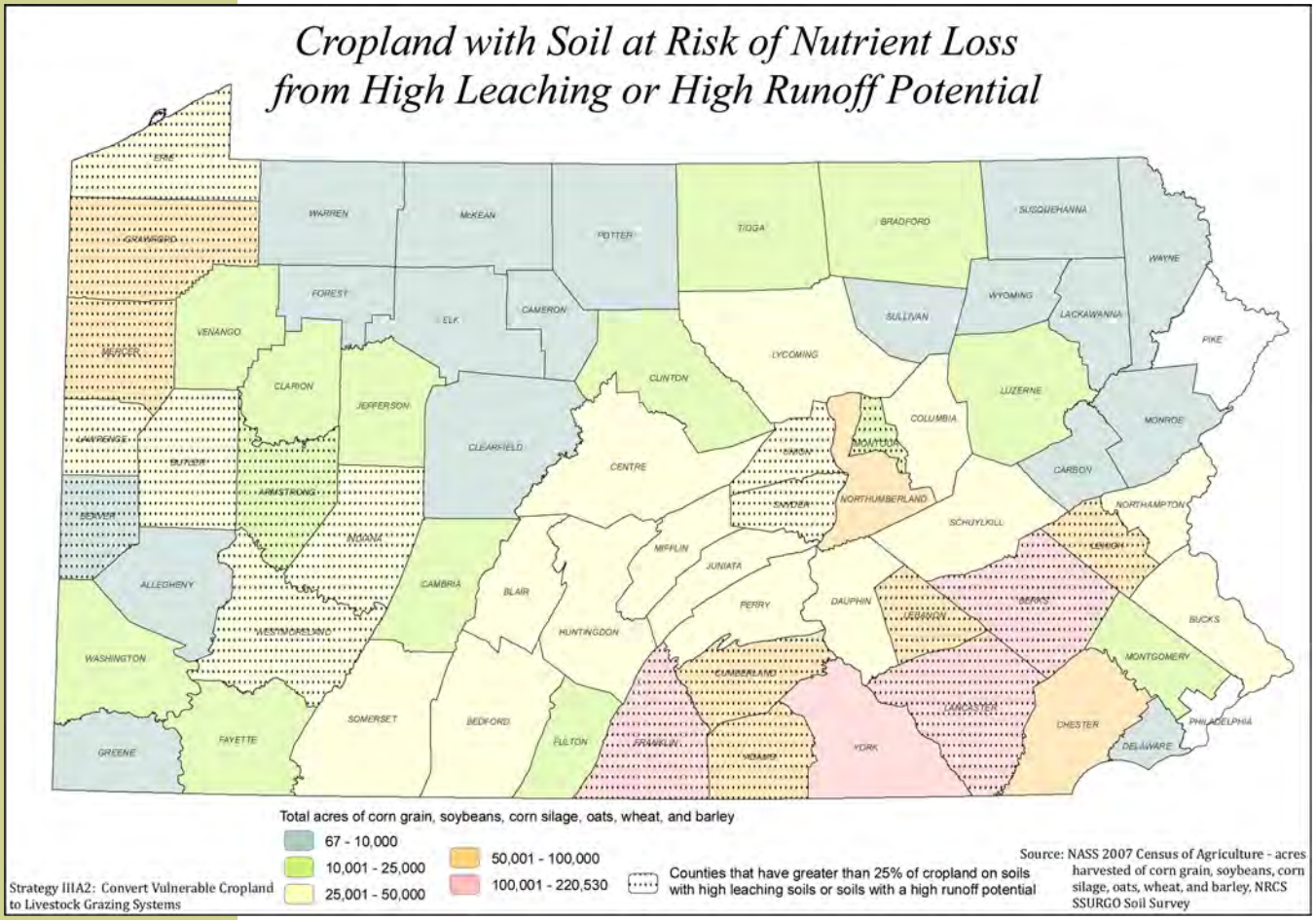
Financial Assistance

- Increase funding opportunities (via ranking points) for pastures or crop fields with erosion completion of the RUSLE2 pasture model.
- Increase funding for operators who will maintain and utilize existing forage stands (e.g., warm season grasses).
- Develop working relationships with The Nature Conservancy, Ducks Unlimited, and other wildlife groups to create additional incentives for landowners who convert from cropland to grazing systems.

Strategy A2 (Cont.)

Educational Assistance and Outreach

- Provide education to increase harvest and grazing efficiency of livestock, decreasing the amounts of feed imported onto the farm.
- Educate staff and producers on the importance of water availability as a limiting factor in forage utilization.
- Educate staff and producers on the importance of maintaining warm season grasses for summer slump of cool season grasses.
- Coordinate display for Keystone Farm Show, Pennsylvania Farm Show, Dairy Summit, Professional Crop Producers Seminar, and other appropriate events on the benefits of moving to livestock grazing systems.



B. Objective: Improve the Health of Grazing Land Plant Communities

Improving the health and productivity of plant communities means addressing poor plant community structure and function occurring across the state. When referring to plant communities, productivity pertains to the weight of plant production as compared to what is expected for a healthy site. Structure refers to whether or not all of the representative plant types that would be expected on a healthy site are present. Function refers to the ability of the vegetative groups to carry out their healthy life cycles and contribute to the plant community as a whole.

On existing pasture lands, the primary concern is to produce yields while maintaining healthy soil and adequate cover. Evaluating productivity includes inventorying for signs of stress due to management, disease, insect damage, or composition from invasive species. The benefits of improving plant communities impact soil erosion and quality, water quality and quantity, air quality, and animal concerns, both domestic and wildlife. Healthy, productive plant communities have positive impacts across all of the agricultural land uses. Almost all of the recognized resource concerns in our state could be addressed by having a productive and functioning plant community. Maintaining and improving plant communities is a priority strategy. It all starts with the interaction of soil and plants.

Using a prescribed grazing system involves managing cattle to graze certain paddocks while allowing other paddocks rest time to re-grow vigorous plants. It allows for cattle to access the forage that is the most nutritious and palatable. The benefits of this strategy may include higher forage yields, better forage quality, and more live weight gain per acre. A prescribed grazing system will more evenly distribute the manure and urine on the pasture and recycle the nutrients to the pasture plants. It reduces invasive seed production and stresses invasive exotic plants allowing desired plants to out compete them. Using a prescribed grazing management system improves water infiltration, maintains and improves riparian areas, protects stream banks from erosion, keeps fecal material away from water bodies, and helps to promote ecological and economically stable plant communities.

Outcome B: Grazing operators maintain and improve existing grazing systems to increase cumulative conservation benefits including but not limited to forage supply, healthy plant condition, excessive plant pest pressure, and improved soil health, water, and air quality.

Strategy B1: Increase the application of prescribed grazing management on permanent pastures by 5% to improve plant condition in counties with more than 10,000 acres of pasture.

Technical Assistance

- Organize a field team level "hands on training session" on the implementation of a Prescribed Grazing Plan. The training would focus on a farm that has an existing plan that is implemented or being implemented. The training would be organized by the Area Grazing Specialists while drawing on the expertise and resources of the Pennsylvania GCLI Committee.
- Organize additional field team level "hands on trainings" to focus on pasture condition scoring, biological indicators and other soil health aspects related to the implementation of prescribed grazing systems. This training should also be offered to producers needing basic pasture management skills (those with 528 contracts).

Strategy B (Cont.)

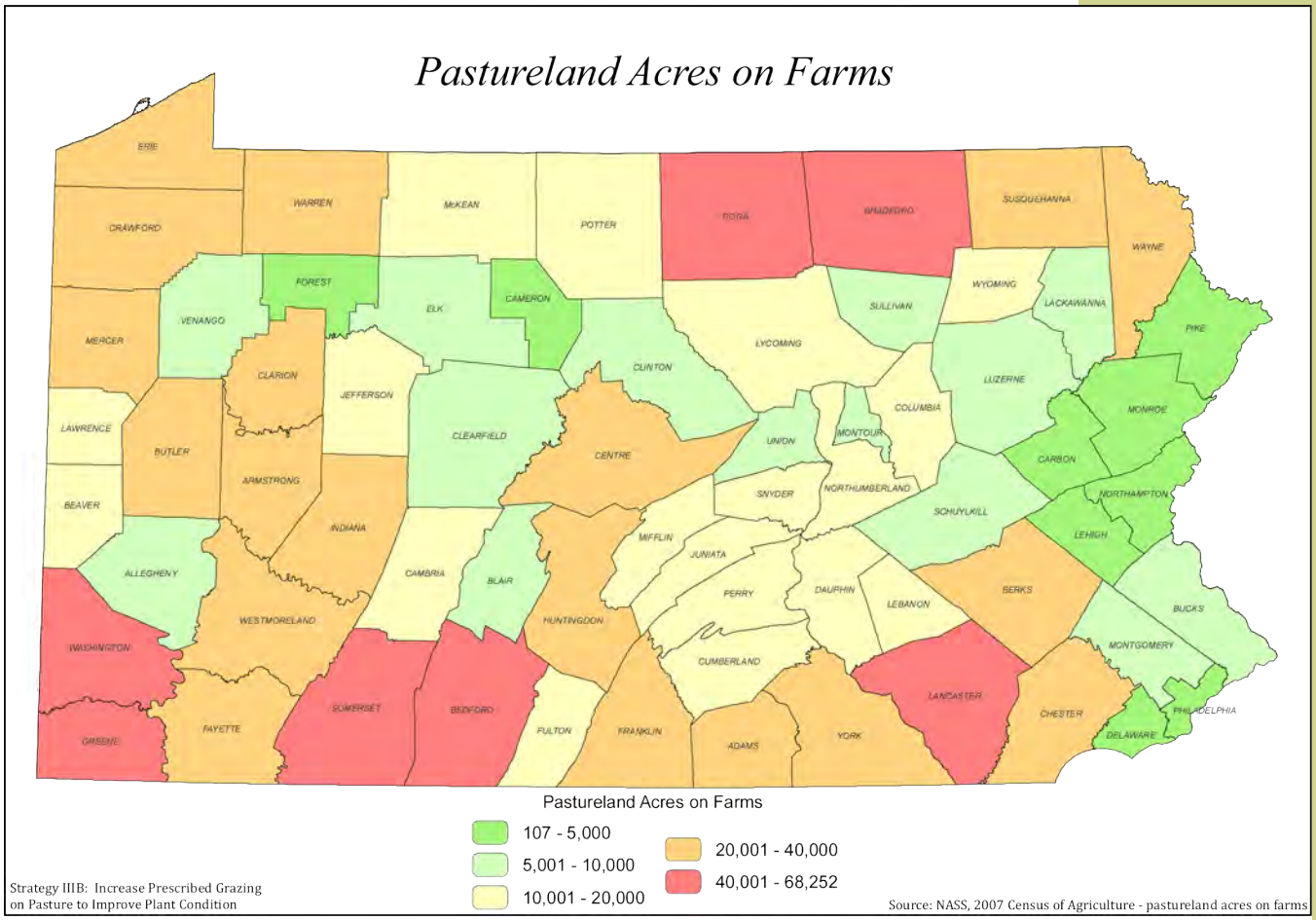
- Review and update applicable standards and technical support documents for Brush Management (314), Forage Harvest Management (511), Silvopasture Establishment (381), and Prescribed Burning (338).
- Develop technical guidance for innovative grassland management techniques for intensive management and/or mob grazing.
- Assist GLCI and other partners in developing technical guidance and practical application for innovative grassland management techniques such as intensive management and/or mob grazing.

Financial Assistance

- Provide financial assistance to 25 grazing operations in the EPA listed nonattainment counties for ozone by applying prescribed grazing practices to control undesired brush on pastures and reduce nitrogen oxide (Nox) emissions or applying mechanical brush management as an alternative.
- Financially assist 28 existing grazing operations to improve grazing management and reduce methane emissions from enteric fermentation.
- Increase the incentive payments for 314 and 315, Brush Mgmt. & Herb. Weed Mgmt., to give producers more incentives to manage noxious and invasive weeds in pastures.
- Make available a multi-year strategy to control invasive species within our programs, such as one year pay for mechanical removal or mowing and the next year or two pay for chemical follow up control.

Educational Assistance and Outreach

- Create a grazing display and videos for producers to increase prescribed grazing among Pennsylvania producers.
- Utilize existing technical outreach materials and websites to focus efforts on outreach to conservation field staff, private sector providers, partners, and producers regarding the importance of managing noxious and invasive weeds in pastures.
- Develop working relationships with The Nature Conservancy, Ducks Unlimited, and other wildlife groups regarding economic and environmental benefits of conversion from cropland to grassland.
- Through GLCI, PFGC, Project Grass Chapters, Penn State Extension, and other existing partners, promote the need for improved pasture management through the use of proven tools such as pasture condition scoring, biological monitoring, and practical application of other scientific protocols.



C. Objective: Improve the Health of Permanent Grasslands (Hay, Biomass, and Meadows)

NRCS will help farmers improve the health of permanent grasslands by: (1) establishing and maintaining existing perennial grass and other herbaceous cover; and (2) restoring and protecting additional native warm and cool season grassland.

A healthy perennial vegetative cover, such as grasslands, provides important conservation benefits such as preventing soil erosion and improving water quality and wildlife habitat. The Conservation Reserve Enhancement Program (CREP) has provided incentives to landowners to help establish perennial grasses and legumes and maintain vegetative cover since it began in Pennsylvania in 2000. As these CREP contracts expire, it is important that the perennial vegetative cover developed under this program be maintained into the future.

A conservation cover planted in native, warm season grasses can provide valuable wildlife habitat for a number of wildlife species. Maintaining areas of open fields and grasslands is important to the long-term viability of many wildlife species such as grassland nesting and other types of birds. The Pennsylvania Wildlife Action Plan identifies grassland species of concern as Barn Owl, Dickcissel, Eastern Meadowlark, Grasshopper Sparrow, Henslow's Sparrow, Marsh Wren, Northern Bobwhite, and Northern Harrier. Some of these birds are migratory grassland songbirds, which have experienced drastic continental population declines during the last three decades. By maintaining and restoring habitat for grassland birds, other plant and wildlife species will benefit.

Grassland habitat for wildlife can also be utilized for agriculture, including the grazing of livestock and mowing for hay, as long as it is conducted in a sustainable manner. In fact, grasslands are the only type of agricultural land that can also be used as vital wildlife habitat. In addition, native cool and warm season grassland can also be used to produce biomass that can be utilized as renewable energy feedstock.

Outcome C: Hayland and other perennial crops are healthy and productive.

Strategy C1: Maintain conservation practices treating hayland and perennial crops in expiring CREP contracts.

Technical Assistance

- Develop partnerships with key stakeholders, such as Chesapeake Bay Foundation, Pheasants Forever, Game Commission, USDA Farm Service Agency (FSA), RC&D councils, DEP, and others to re-enroll CREP acreage or promote sustainable use of those lands coming out of CREP.
- Continue to adequately manage CREP agreements with third parties to ensure these agreements assist in reducing field office workload.

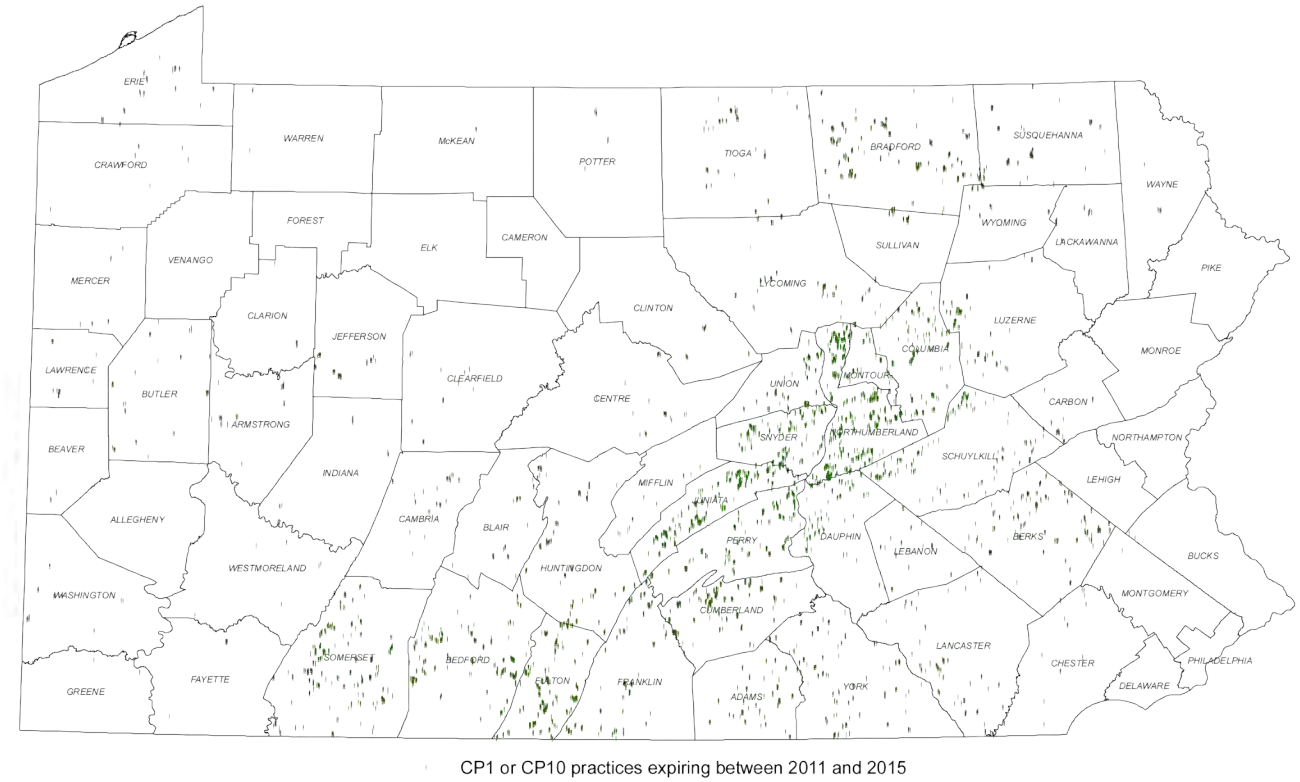
Financial Assistance

- Treat 90% of acres from expiring CREP contacts each year to address soil quality degradation from organic depletion.
- Offer additional financial incentives in program payments for the incorporation of expiring CREP acres into new or existing grazing systems.

Educational Assistance and Outreach

- Assist, as requested, with the organizing and holding of educational workshops to teach farmers and producers about invasive plants and healthy plant management.
- Initiate an annual postcard campaign to remind CREP and CRP participants with expiring contracts that their land may be eligible to reenroll.
- Inform CRP/CREP participants whose contract is expiring about alternatives to keep their lands in a sustainable system even if they do not reenroll through brochures, displays, and videos.
- Provide technical training to CRP/CREP consultants.
- Develop training modules for maintaining and grazing warm season grasses to be presented to landowners and staff.
- Work with partners to update and maintain the CREP website.
- Catalog outreach materials each partner, FSA, and NRCS have on hand. Reproduce valuable material needed for education and outreach about CRP and CREP.

Land with Expiring CREP Contracts with CP1 or CP10



CP1 or CP10 practices expiring between 2011 and 2015

Strategy IIIC1: Maintain Conservation Practices treating Hayland and Perennial Cropland

CP1 - Establishment of Permanent Introduced Grasses and Legumes
CP10 - Vegetative Cover - Grass Already Established

Source: USDA - Farm Service Agency

Strategy C2: Restore and protect an additional 5% of native cool and warm season grassland communities to improve biodiversity and habitat for grassland bird wildlife and produce renewable energy biomass feedstock.

Technical Assistance

- Develop vegetative establishment and weed management guidance, including associated training for establishing warm season grasses.
- Work one-on-one with NRCS Staff, Conservation Districts, and TSP planners to train and educate them on grassland planning requirements.
- Utilize the partnership with the PA Game Commission Wildlife Diversity Biologists, County Conservation Districts, Pheasants and Quail Forever, U.S. Fish & Wildlife Service, Audubon Society, and RC&D Councils to educate landowners on native grassland communities.

Financial Assistance

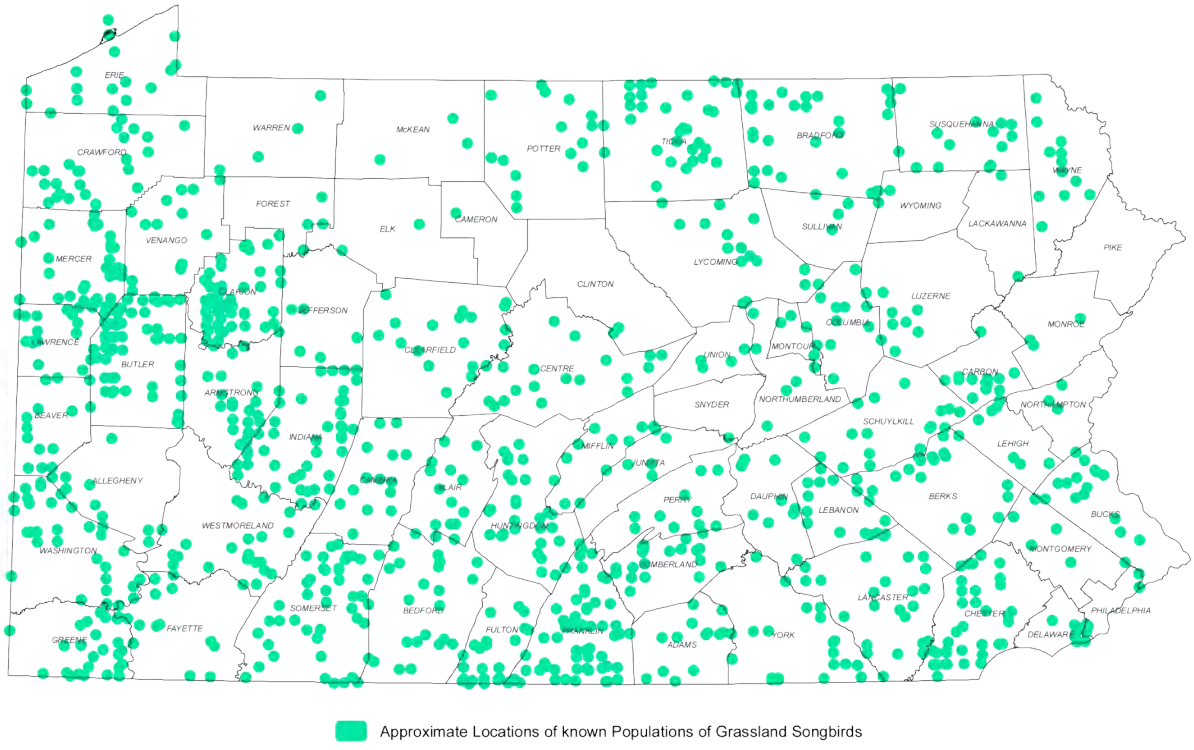
- Provide funding code and/or dedicated funding in EQIP for "wildlife habitat" which would focus on native grassland establishment.
- Increase questions and ranking points focused on native grassland establishment.

Strategy C2 (Cont.)

Educational Assistance and Outreach

- Host NRCS Staff training sessions and field days to promote native grassland establishment and management.
- Host partner and landowner training sessions and field days to promote native grassland establishment and management.

Areas of Known Population of Grassland Songbirds



Strategy IIIC2: Restore and Protect Grassland to Improve Biodivesity and Habitat

Source: PA Breeding Bird Atlas

IV. Streams and Wetlands

There are several threats to natural resources associated with streams and wetlands. These include the lack of forest buffers along streams, legacy sediments, loss of stream and wetland habitat for species of concern, and loss of wetland functions.

Streams convey fresh water from their source to the point of discharge into another water body. Streams and their receiving water bodies are used for a number of purposes including drinking water, recreation, and aquatic habitat. When the water is unable to support its designated use, it is considered impaired. Typical impairments are excess sediment, nutrients, and high temperatures. There are many sources of sediments and nutrients including construction activities, urban stormwater runoff, lawn and turf, and agriculture caused by lack of filtering of runoff. A lack of forest buffer near the stream also results in high temperatures due to a lack of shade and a sufficient supply of debris is essential for the nutrient cleaning process of the streams.

Forest buffers invaded by exotic species also do not provide the food and cover desired by either terrestrial or aquatic species. Land use changes near the stream can channelize the stream, resulting in increases in velocity and scouring.

Eastern Brook Trout are the only native stream-dwelling salmonid in Pennsylvania waters and are the official state fish. They are important to Pennsylvania not only from the many hours of recreational angling opportunities they provide but also as a symbol of our Commonwealth's rich outdoor heritage. Most Eastern Brook Trout are relegated to headwater streams, where forest cover is still prevalent. Unable to thrive in poor-quality water or degraded habitats, Eastern Brook Trout are excellent indicators of clean water and healthy aquatic systems. Their disappearance within a watershed indicates environmental decline. Through a coordinated and focused effort, we have a unique opportunity to reverse the trend of Eastern Brook Trout decline by restoring habitat and improving water quality to benefit both Eastern Brook Trout and human habitat for generations to come. Major threats to wild Eastern Brook Trout populations in Pennsylvania include poor land use practices stemming from agriculture and urbanization, sedimentation from road construction and dirt and gravel roads, water temperature elevations stemming from storm water runoff and the loss of riparian vegetation along the stream corridor, and the presence of non-native species such as Eastern Brown Trout. Other threats include acid precipitation and acid mine drainage that continue to have a negative impact on water quality on a regional basis across the state.

The Eastern Brook Trout is the official state fish of Pennsylvania.

Did you know?

Second only to Alaska, Pennsylvania has 85,000 miles of streams and rivers.

Floodplains and riparian areas would total approximately 1 million acres if there was an average of 50 feet buffer on either side of all rivers and streams.

Throughout the Commonwealth, streams have been altered by former mill dams and community settlements. Before Europeans arrived, water flowed out of the mountains, came to the surface in the form of springs and seeps and when it flowed to the floodplain it was absorbed by large valleys that were swamps, generally a foot above the flowing water. Attached to the stream channel, these large wetlands were inundated every time it rained. Today Pennsylvania experiences not only a significant loss of these natural areas but also deposits of legacy sediment.

The Massasauga is considered an umbrella species, that is, one whose habitat also benefits other species that share a similar environment.

Legacy sediments are fine sands, silt, and clay-size particles that are left behind from mill dams or past erosive land use activities. These sediments can have an impact on the ability of the floodplain to act as a natural system. Mill dams and other structures in the stream channel trapped sediment eroding from farms and clear-cut forest lands. When a dam is breached by a severe storm or lack of maintenance, the sediment behind the dam, 20 feet high in places, is cut through by the stream creating deeply incised banks. Streams throughout Pennsylvania need to be restored to their natural condition to restore the biological and chemical functions and improve downstream habitat.

Historically, there were 1.127 million acres of wetlands in the Commonwealth, or 4.5 percent of the Commonwealth. Today, less than 500,000 acres of Pennsylvania's 28 million acres are wetlands. Most of these wet areas are located in the northeast and northwest corners of the Commonwealth. Wetland loss in Pennsylvania is estimated at 75 acres a year, with 56 percent of its historical wetlands already lost. It is estimated that 677,986 acres of wetlands have been drained and filled for agricultural conversion or industrial and urban development. Since 1990, 4,660 acres of wetlands have been restored throughout the state.

NRCS estimates that there are 40,000 to 50,000 acres of wetlands on cropland and pasture assuming 10 percent of the wetlands occur on cropland and pasture. Some wetlands are isolated, while others are connected to a stream or river and its floodplain. NRCS estimates that there are 150,000 acres of floodplains and riparian areas on cropland and pasture assuming 15 percent of these areas occur on cropland and pasture.

Wetlands occur in various parts of the landscape, recharging surface and ground water in the upper and intermediate reaches of the watershed. In lower segments of the watershed, wetlands receive and treat surface water runoff. Wetlands also provide an important habitat element for aquatic and terrestrial wildlife. In addition, functioning wetlands reduce flooding and stream channelization because storm water is spread over a larger area. Today, wetland loss is less of an issue due to the current regulatory requirements to mitigate loss. In fact, the trend may be reversing. However, development and agriculture continue to encroach on wetlands, degrading their function because adjacent buffers and filters have been removed. Farmed or pastured wetlands can lose micro-topography which is essential to nutrient cycling and wildlife habitat.

One species that has faced significant decline due to the stream channelization and overall wetland loss is the Eastern Bog Turtle. Occupying the valleys of southeastern Pennsylvania, bog turtles are entirely dependent upon wetlands for survival. An indicator species, bog turtles represent the overall quality of water and health of a wetland. They depend on spring seeps and open, marshy meadows. These same areas are also in competition for sites to build homes and housing development to support urban and suburban areas sprawling near the cities of eastern Pennsylvania. In addition to this habitat degradation and fragmentation, are threats from succession of invasive exotic plants and illegal collection and trade of Bog Turtles.

Also, the Eastern Massasauga Rattlesnakes have been disappearing for years. Massasaugas are not widespread in Pennsylvania and only lived in certain areas in northwest Pennsylvania. Today, there are only few known sites.

The Eastern Massasauga Rattlesnake and Bog Turtle are two species in Pennsylvania that are significantly declining because of habitat loss.

Habitat destruction is the main reason for the decline of this rattlesnake in Pennsylvania, along with urban expansion, forest succession, surface mining, and agriculture. The Massasauga requires both wetlands and non-forested upland habitats, such as meadows and reverted agricultural fields within close proximity. For much of their active season, they prefer habitats such as abandoned fields, wet meadows, and grasslands. During the winter, they hibernate in wetlands within the groundwater and/or surface water flows. The Massasauga is considered an umbrella species, that is, one whose habitat also benefits other species that share a similar environment. The snake serves as an indicator of environmental quality because of its sensitivity to environmental degradation. Preserving the habitat for the snake will increase biodiversity that also attracts other animals. Recent conservation efforts have been undertaken to ensure its survival in the Commonwealth.

A. Objective: Protect and Improve Streams in Cropland and Pasture Areas

NRCS will help people protect and improve streams by:

1. Establishing and maintaining riparian forest buffers
2. Stabilizing severe eroded streambanks
3. Reducing the impacts of legacy sediments
4. Increasing in-stream fish habitat.

Forested riparian buffers protect and improve water quality by preventing sediment, nitrogen, phosphorus, pesticides, and other pollutants from reaching a stream. They are most effective when they include a native grass or herbaceous filter strip adjacent to the crop field or pasture and deep rooted trees and shrubs along the stream. The riparian area along the stream also provides food and cover for terrestrial wildlife and corridors connecting different habitats across the landscape. Riparian buffers slow floodwaters, stabilize stream banks, and protect downstream property. The water soaks into the ground recharging groundwater supply. The vegetation traps sediment in the buffer rather than allowing it to cause problems further downstream in the stream channel.

Riparian buffers protect and improve water quality by preventing sediment, nitrogen, phosphorus, pesticides, and other pollutants from reaching a stream.

Stream systems along the eastern portion of what is now the United States looked quite different from the streams we know today. Water ran down out of the mountains, welled to the surface from underground springs and seeps, and flowed in 'sheets' across slopes during rainfall and snow, just as it does today. Stream valleys originally were more like swamps, or big sponges. Unlike the familiar single channel we see today, these valley stream systems contained numerous and interconnected rivulets and wetlands.

When streams are stable, sediment loads moving into the stream valleys move the sediment through the system without disturbing the cobble and gravel streambed either through erosion or deposition. Changes did occur, as they do in all natural systems, but by and large those changes were gradual and nondestructive.

Historically, the floodplain system was well vegetated with plant species native to the region and adapted to wet conditions. These plants, both vegetation and roots, helped slow excess flow. Root systems in the shallow floodplains reached right down to the streambeds, holding stream bank soils in place even during high flows. The material in the channels and banks was ideal for an aquatic food web, the soils in the wet floodplains allowed plentiful groundwater recharge, and the riparian plant life housed and nourished a wide variety of native wildlife.

More than half of the wetland acres are in the northeast and northwest counties. Pike and Monroe counties lead in wetland habitat with 6.7 and 6.4 percent of land in wetlands.

Forest succession in previously grassy areas accounts for 75% of the Massasauga rattlesnakes' habitat loss.

Eroded soils, by volume, are the greatest pollutant of lakes and streams in the Unites States.

Today, NRCS and its partners are trying to recreate what nature intended. After decades of timber harvesting, farming, and mill dam construction, these streams have become unstable, straightened, and elevated from sediment deposition.

When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to reestablish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in the watershed, such as clearing land for agriculture or development, runoff increases. With the increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion.

Stabilizing stream banks can prevent the loss of land or damage to utilities, roads, homes, or other facilities adjacent to a watercourse. It helps prevent the loss of stream bank vegetation and can control unwanted meander of a river or stream. It can also reduce sediment loads to streams and help maintain the capacity of the stream channel. Streambank stabilization can not only reduce damage caused by floods, but also improve the stream for recreational use or as habitat for fish and wildlife.

Reducing the impact of legacy sediments protects and improves streams by stabilizing stream banks and channels so that the risks of legacy sediments moving further downstream to cause new impairments is reduced. It also restores the functions of the floodplain by reconnecting the stream with groundwater and adjacent wetlands.

When riparian areas grow to mature forests, they provide the stream with shade and an annual supply of leaves and twigs which are a source of organic matter for creatures living in the water. Cooling the water, reducing nutrient and sediment loads, and also adding log, rock vein, and other structures provides important cover for fish and improves stream habitat to restore populations of species in decline such as our state fish, the Eastern Brook Trout.

Outcome A: Floodplains, riparian areas, and streams are restored to healthy functioning conditions and water quality is improved.

Strategy A1: Increase the establishment of riparian forest buffers by 10% and maintain waterways protected by existing riparian forest buffers.

Technical Assistance

- Improve buffer guidance in catalog and compliance handbook to reflect good, better, and best alternatives and multipurpose production.
- Promote CREP applications and re-enrollments to accelerate riparian forest buffer adoption and maintain existing riparian forest buffers.
- Work with Farm Service Agency, Chesapeake Bay Foundation, and others to efficiently plan and maintain riparian forest buffers.
- Develop a strategy to implement in 2012 for preserving riparian areas through WRP.

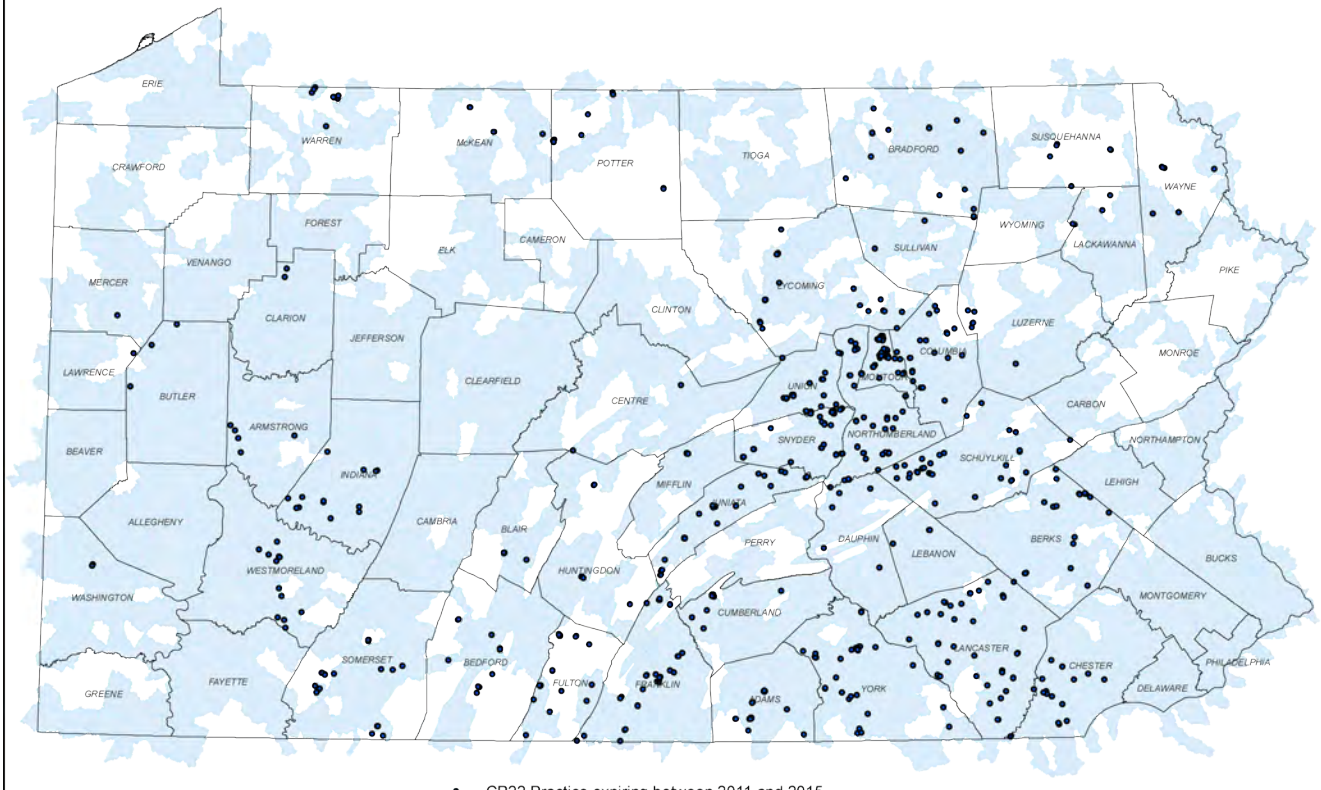
Financial Assistance

- Designate priority areas based on agriculturally impaired stream data to initiate stream restoration initiative.

Educational Assistance and Outreach

- Create a unified riparian buffer website on the benefits of buffers.

Watersheds with an Impaired Stream and Expiring CP22 Practices



Strategy IVA1: Increase Establishment and Maintain Existing Riparian Forest Buffers

Source: DEP Non-Attaining Streams, Watershed Boundary Dataset, USDA - Farm Service Agency

Strategy A2: Stabilize 90% of severely eroded streams whose natural flows were disrupted by natural disasters.

Technical Assistance

- Evaluate potential restoration sites within 90 days of an approved Emergency Watershed Protection (EWP) Program.
- Ensure sites are stabilized within one year of an approved EWP Program.
- Provide training to NRCS Staff and project partners on EWP program and installation requirements.
- Appoint a statewide EWP coordinator.
- Enter into agreement(s) with Pennsylvania DEP for them to assist with exigency sites.
- Conduct an EWP Program appraisal to evaluate accomplishments and provide improvement recommendations.
- Support riparian buffer educational efforts in order to reduce future severely eroded streams.

Financial Assistance

- Assist local sponsors in seeking funding support from state agencies, county governments, local municipalities, and nonprofit foundations to match federal and landowner funds.

Educational Assistance and Outreach

- Create and timely disseminate EWP Program information explaining the program and eligibility requirements via agency website, social media sites, and news releases.
- Increase awareness among potential funders about the EWP Program and the potential need for their support.
- Educate elected officials about the EWP Program and the funding requirements.
- Make presentations about EWP at the PA Assoc. of County Commissioners annual meeting and PA Assoc. of Township Supervisors annual conference.

Strategy A3: Reduce the impact of legacy sediments by developing one demonstration project to remove sediment trapped by a mill dam or other structure and restore the stream and floodplain to a stabilized healthy condition.

Technical Assistance

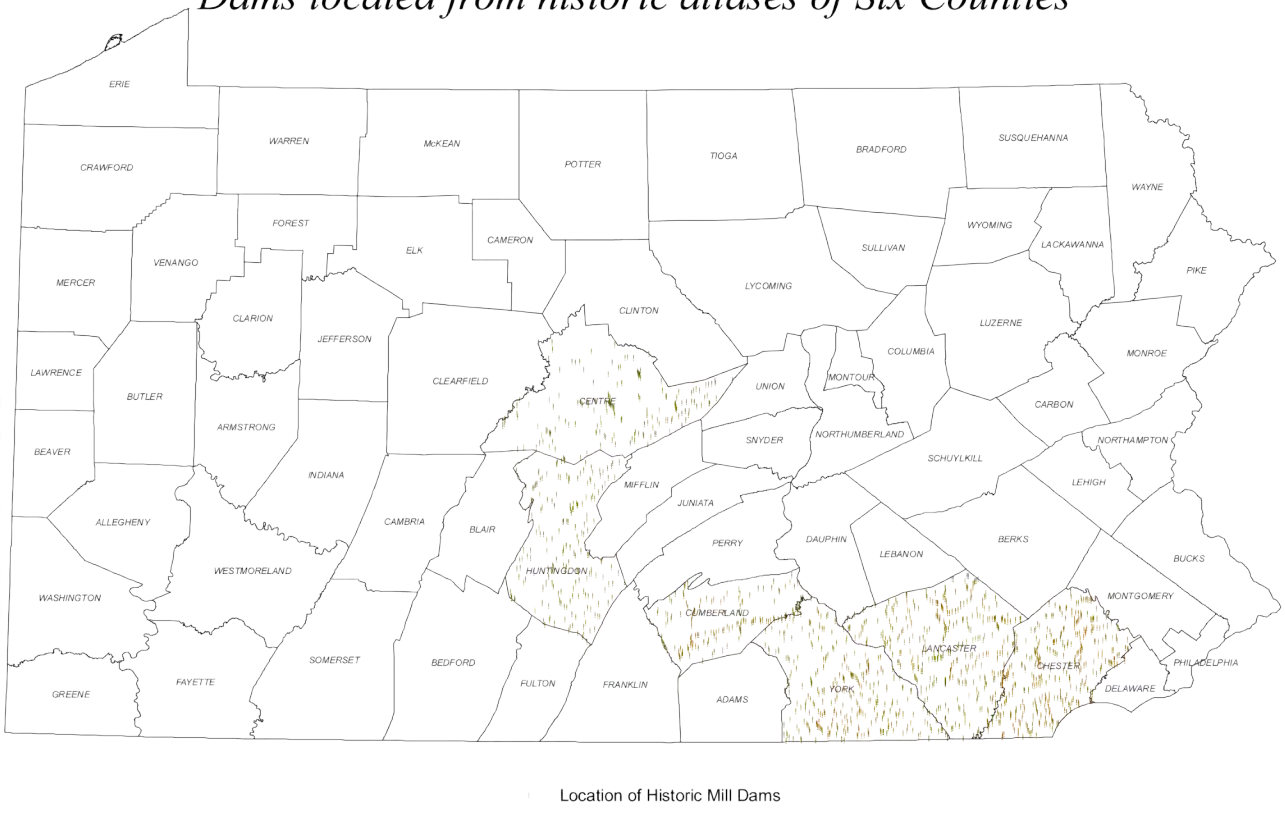
- Develop a policy and/or practice standard for addressing legacy sediment.
- Work with field staff to determine landowner interest for a legacy sediment project.
- Create a map of abandoned mill dams.

Financial Assistance

- Establish a new dedicated financial assistance funding pool for removal of old mill dams for stream bank stabilization and in-stream fish habitat practices.

Educational Assistance and Outreach

- Conduct a legacy sediment workshop for landowners to educate them on the legacy sediment mitigation strategies.



Strategy IVA3: Reduce the Impact of Legacy Sediment

Source: Franklin and Marshall College

Strategy A4: Increase stream habitat conditions for Eastern Brook Trout by 5%.

Technical Assistance

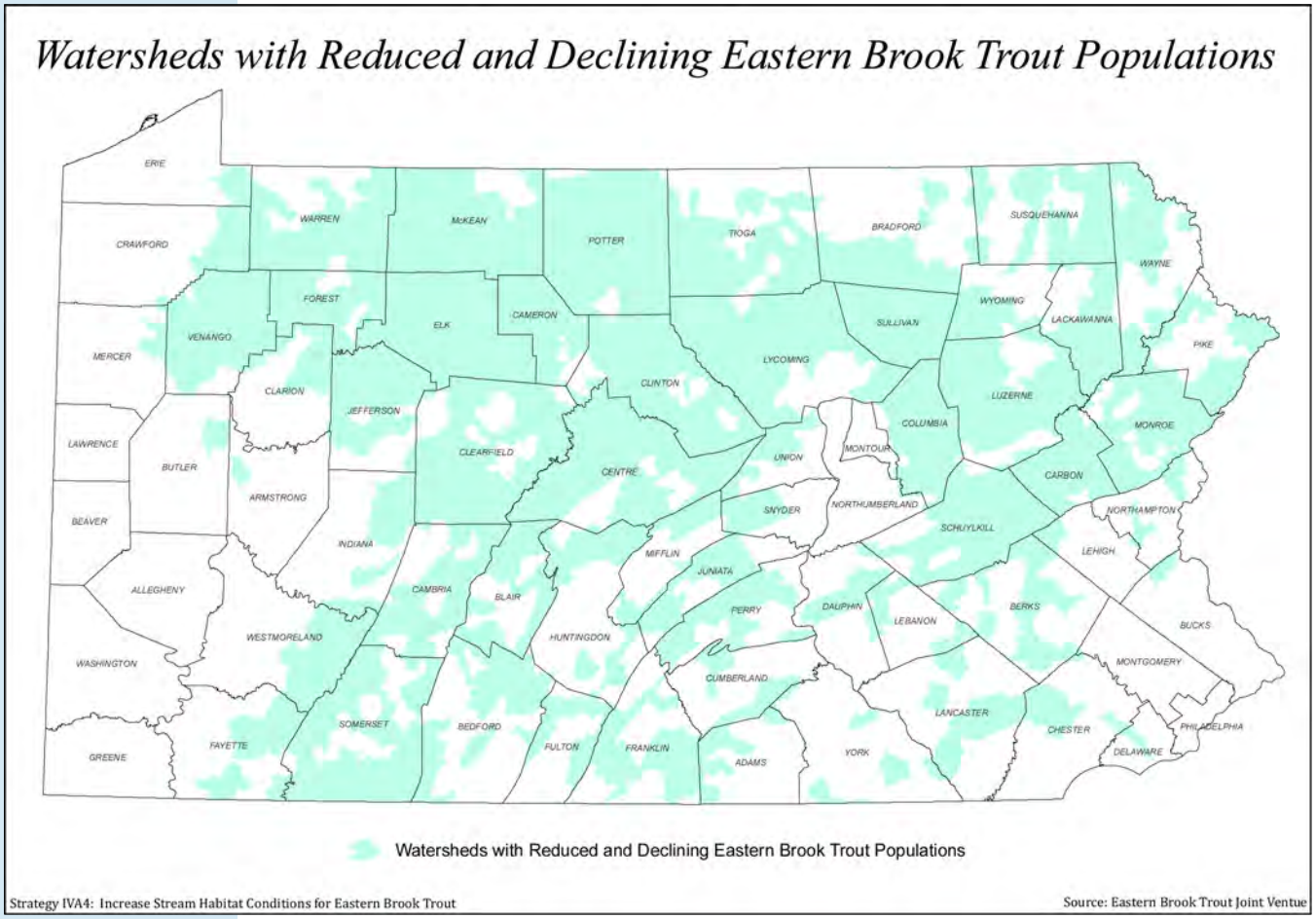
- Plan forest riparian buffers of at least 50 feet per side and livestock exclusions on exceptional value and high quality streams that originate in or flow through forested habitat or currently have eastern brook trout populations.
- Ensure all forest management plans restrict the harvest of trees within 100 feet of an exceptional value or high quality stream or any stream the Fish and Boat Commission indicates has eastern brook trout.
- Work with Trout Unlimited to use strategies to remove cattle from the streams.

Financial Assistance

- Designate three brook trout stream priority areas for funding.

Educational Assistance and Outreach

- Work with PA Fish and Boat Commission and Trout Unlimited to initiate outreach to landowners in headwaters.



B. Objective: Protect and Improve Wetlands in Cropland and Pasture Areas

NRCS will protect and improve wetlands by restoring degraded wetlands statewide,and creating, enhancing, and protecting Bog Turtle and Eastern Massasauga Rattlesnake habitat.

Restoring the functions of degraded wetlands to their natural state protects and improves the many services wetlands provide. Restoring wetlands in croplands and pasture areas of southeastern Pennsylvania provides excellent opportunities to create Bog Turtle habitat. The first step to restoring the functions of a wetland is to restore proper water flow by plugging drainage tile, constructing low impoundments, and excavating fill. The next step is to reconnect fragmented habitat to allow movement of wildlife from one wetland to another. Finally, vegetative management is applied. Proper grazing management conserves Bog Turtle habitat by slowing natural plant succession and minimizing the encroachment of invasive native and exotic plant species.

Degraded wetlands may be found anywhere in the state; however, they are predominantly found in the northwestern region.

Outcome B: Wetlands in cropland and pasture areas are functioning and healthy.

Strategy B1: Create, enhance, and protect an additional 5% of known or potential wetlands targeting Bog Turtle and Eastern Massasauga Rattlesnake wetland habitat.

Technical Assistance

- Plan non-forested stream buffers of at least 100 feet per side on low gradient streams and in wetland areas, allow for seasonal grazing to manage woody encroachment.
- Coordinate delivery of technical guidance to Bog Turtle Recovery Initiative.
- Work with the PA Department of Agriculture's (PDAs) farmland preservation staff to purchase easements for bog turtles on existing preserved farmland.
- Host meeting with U.S. Fish and Wildlife to determine potential for WRP bog turtle projects.
- Improve quality assurance on FRPP and WRP conservation easements.
- Prepare a map of potential wetland sites based on slopes on hydric soils.
- Carry out monitoring of all easements.

Financial Assistance

- Continue to support bog turtle habitat through WRP and Working Lands for Wildlife (WLFW).
- Utilize cost-share assistance on farms protected by PDA FRPP easements to further enhance bog turtle habitat on preserved farms.

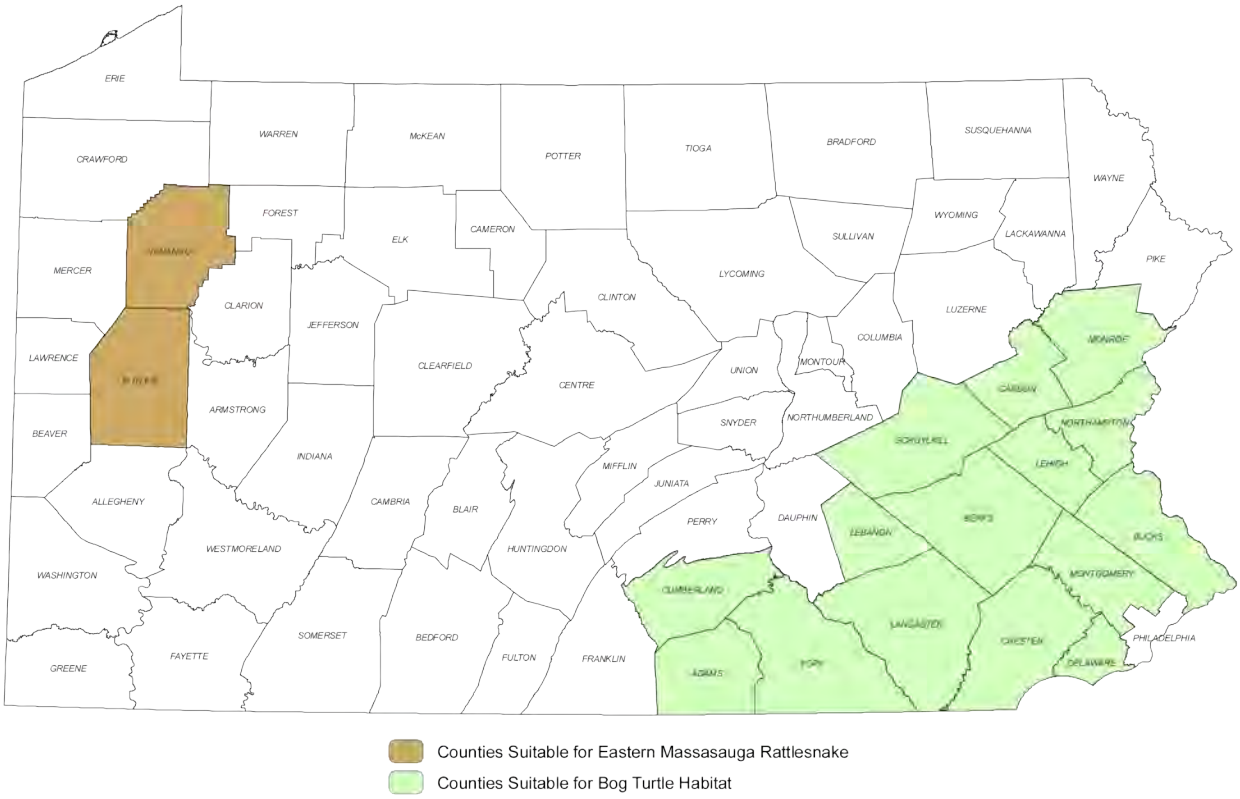
Educational Assistance and Outreach

- Conduct WRP outreach to all landowners with hydric soils or low gradient stream and soils with hydric inclusions.

Strategy B1 (Cont.)

- Train staff to conduct monitoring field reviews of WRP easements.
- Establish workshops for farmland preservation agencies and organizations to educate them on potential WRP site.
- Train staff to recognize bog turtle and massasauga rattlesnake habitat.

Counties Suitable for Bog Turtle or Eastern Massasauga Rattlesnake Habitat



Strategy IVB1: Create, Enhance, or Protect Known or Potential Wetlands

Source: US Fish and Wildlife Service

Strategy B2: Restore 5% of degraded wetlands and adjacent plant communities to improve plant community structure and composition, control invasive species, and improve plant productivity and health.

Technical Assistance

- Review easements with restoration activities planned and funds obligated but restoration not completed, emphasizing those easements where lack of restoration has exceeded one year.
- Utilize hydric soil mapping to determine areas of restoration emphasis.
- Encourage partnering entities to restore and create wetlands in strategic locations to improve surface water quality and quantity.

Strategy B2 (Cont.)

- Develop landscape-scale habitat protection plans in partnership with other stakeholders that create contiguous areas for wildlife to have access to water food and shelter.

Financial Assistance

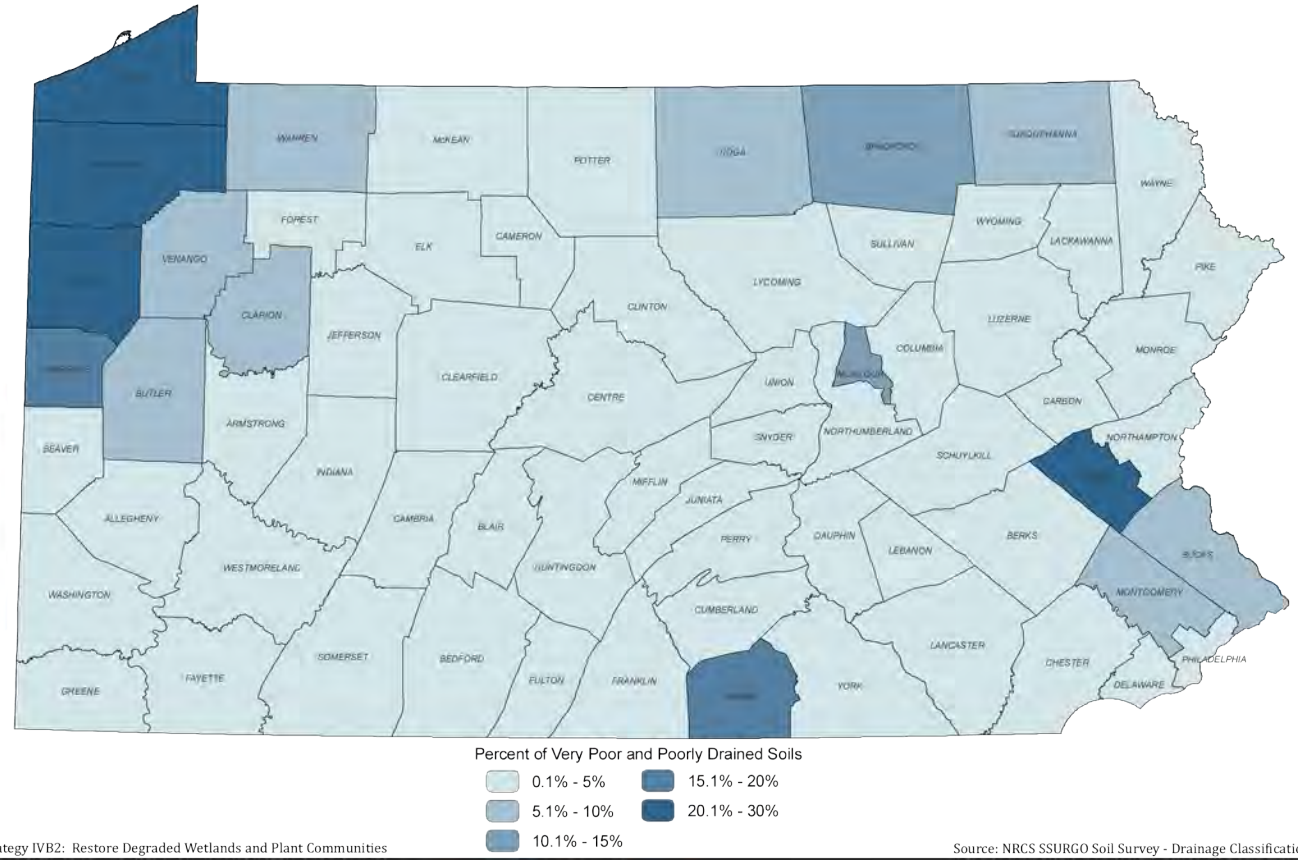
- Increase ranking points for practices and systems focused on wetland restoration and protection efforts in all programs.
- Focus funding resources in priority areas designated by NRCS, U.S. Fish and Wildlife Service, and Corps that can benefit most from increased wetland enhancement.
- Provide assistance to control invasive species in wetlands.

Educational Assistance and Outreach

- Improve outreach to non-traditional customers by further developing partnerships/ networks with the following:

  1. One on one interactions with landowners;
  2. Landowner derived membership groups such as watershed associations, conservation groups (Audubon, Ducks Unlimited, etc); and
  3. Professional organizations/non-profit organizations with professional staff.

Percent of Very Poor and Poorly Drained Soils on Crop, Hay, and Pasture



Strategy IVB2: Restore Degraded Wetlands and Plant Communities

Source: NRCS SSURGO Soil Survey - Drainage Classification

C. Objective: Watershed Operation/Rehab/ Emergency Streams Restoration

NRCS has assisted with the planning, design, and construction of 86 flood control dams located in Pennsylvania. The first dam was built in 1960 and the last dam was completed in 1993. The locations of the dams are spread throughout the state. All of these dams are classified as high hazard dams, although it is unlikely a dam failure may cause loss of life or serious damages to homes, highways, railroads, or utilities. A high percentage of these dams were built with a 50-year life design. Thirty-six of the 86 dams were built between 1960 and 1970.

NRCS will help local sponsoring organizations to:

1. Protect and restore watersheds from damage caused by erosion, floodwater, and sediment.
2. Solve natural resource problems and related economic problems on a watershed basis.
3. Sustainably use water and land resources.

Outcome C: Watersheds and their natural resources will be protected from future damage and will be wisely used in a sustainable manner to meet local needs.

Strategy C1: Assist project sponsors in securing funding by providing appropriate resources if federal funds or sponsor funds are available.

Technical Assistance

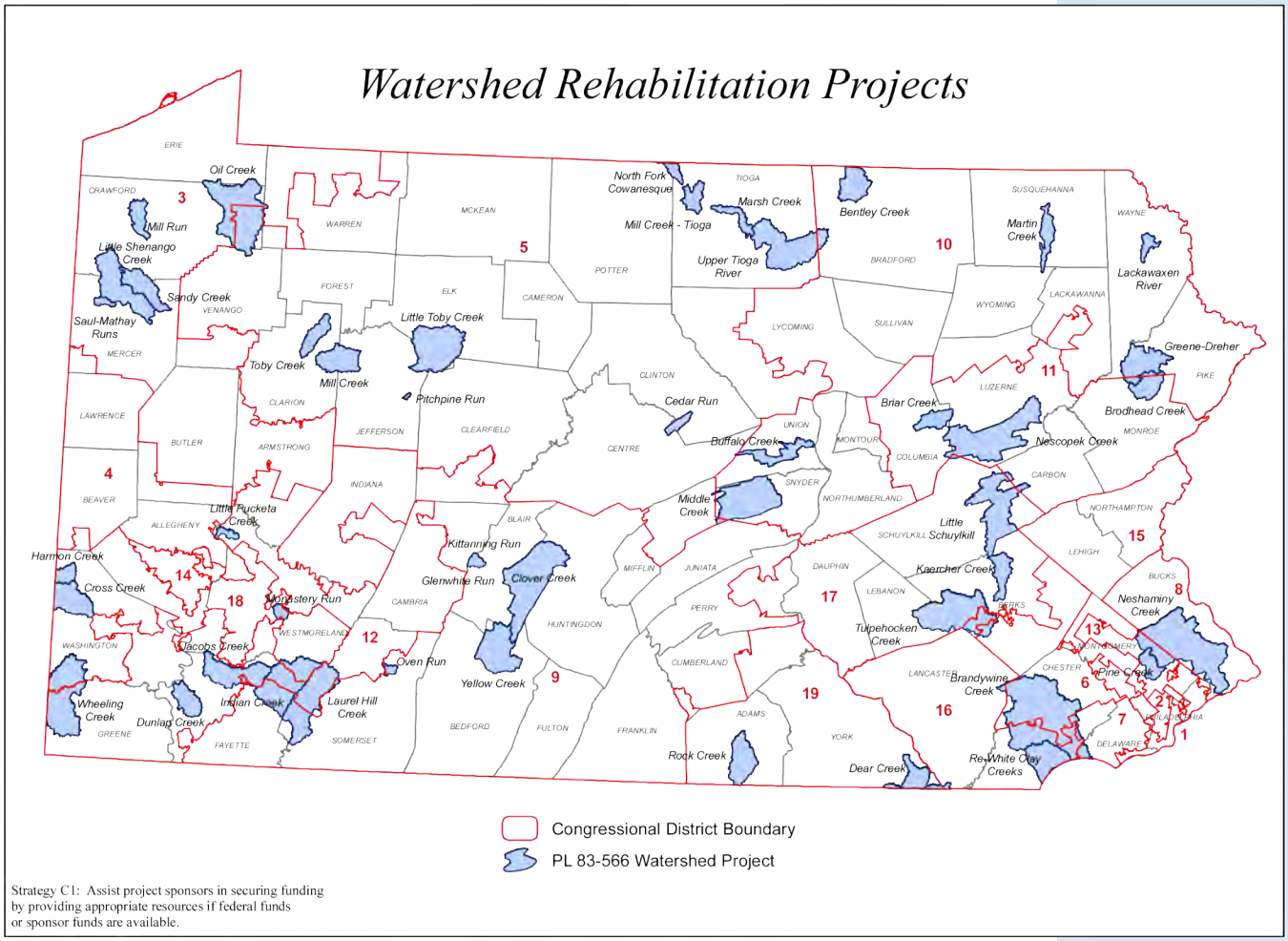
- Assist local sponsors in identifying the rehab needs, determining the rehab purpose, and in selecting the appropriate treatment alternative.
- Hire qualified firm(s) to assist NRCS and local sponsor(s) with the preparation of the Rehab Plan, Design, and Construction Phases.
- Provide local sponsors with an approved Watershed Project Plan.
- Provide local sponsors with an approved Rehab Design.

Financial Assistance

- Assist local sponsors in seeking financial support from state agencies, federal agencies including USDA Rural Development, county governments, private water companies, public water authorities, Penn Vest, and FEMA.

Educational Assistance and Outreach

- Ensure small, minority, and women-owned businesses are aware of the opportunity to bid on NRCS rehab contracts.
- Create and distribute watershed rehab informational materials on the web, social media sites, and print as needed to increase the public and local sponsors awareness about the program.
- Make presentations about the Watershed Rehab Program at the PA Assoc. of County Commissioners Annual Meeting and PA Assoc. of Township Supervisors Annual Conference.
- Educate existing NRCS dam sponsors about the NRCS Watershed Rehab Program.



Strategy C1: Assist project sponsors in securing funding by providing appropriate resources if federal funds or sponsor funds are available.

Strategy C2: Increase outreach efforts to develop and support partnerships that will encourage the protection and sustainable uses of a watershed's natural resources.

Technical Assistance

- Schedule and coordinate watershed partnership meetings, teleconferences, and video conferences.
- Expand and develop new partnerships to support watershed protection and restoration efforts.

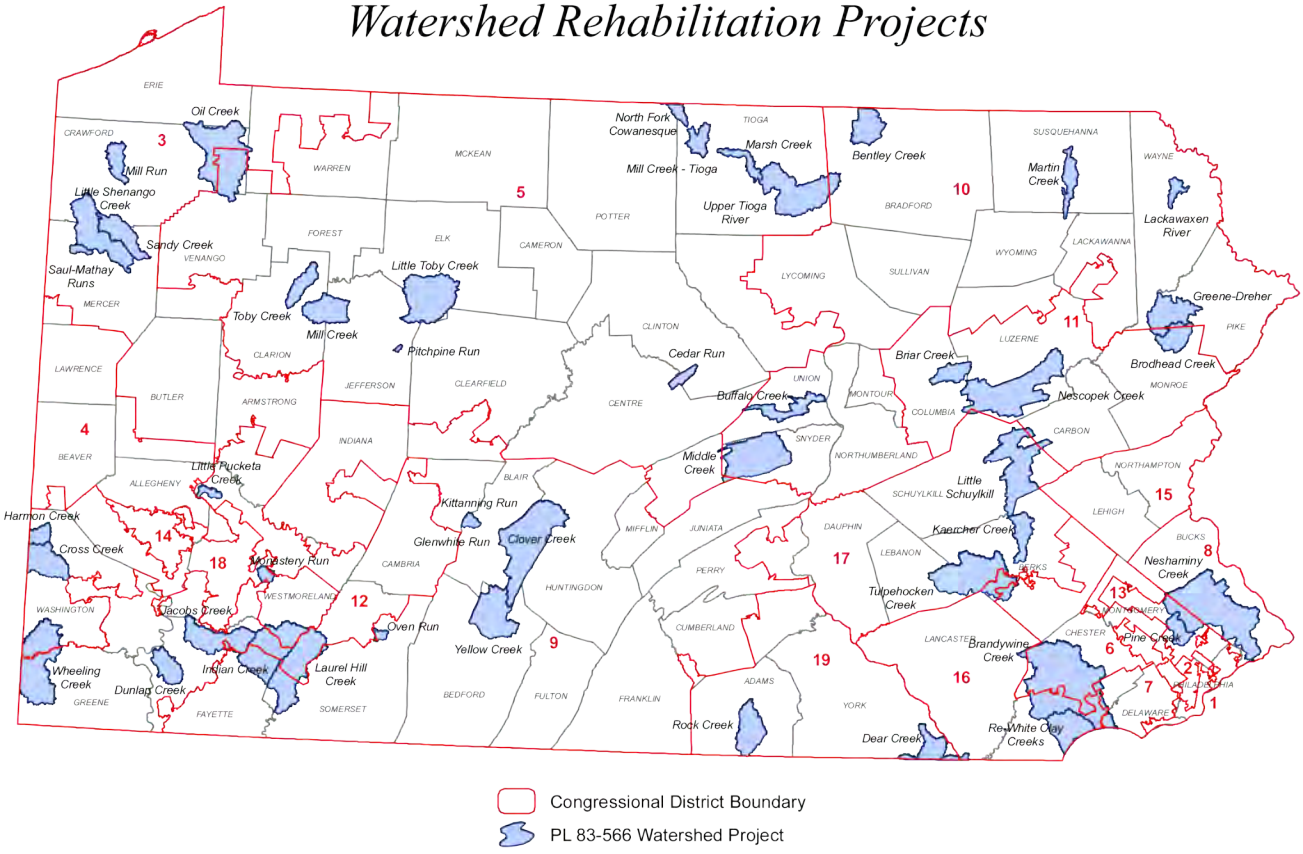
Financial Assistance

- Provide financial support through EQIP, WHIP, HFRP, WRP, FRPP, and special initiatives.
- Seek financial support for partnerships from non-profit foundations, state and federal agencies, and private businesses.

Educational Assistance and Outreach

- Develop watershed brochures and web materials emphasizing the benefits of partnerships.
- Encourage partnership participation by nontraditional groups.
- Disseminate watershed partnership information via e-mail, websites, and social media.

Watershed Rehabilitation Projects



Strategy C2: Increase outreach efforts to develop and support partnerships that will encourage the protection and sustainable uses of a watershed's natural resources.

V. Forests

This section addresses woodlands, shrub lands, and forests.

Sixty percent of Pennsylvania's 28 million acres are forests. Pennsylvania's nearly 17 million acres of forests are dominated by eastern hardwoods. The majority are Oak-Hickory forests, while some areas are northern hardwoods. Oak-Hickory forests contain primarily oaks, maples, and hickories, with an understory of mountain laurel and blueberry. Northern hardwood forests contain primarily black cherry, maples, American beech, and birch, with ferns, striped maple, and beech brush in the understory. Hemlock and eastern white pine are common to both forest types. The majority of the forests are in private ownership, with only about four million acres in public ownership. Over 600,000 private landowners control over 12 million acres.

Statewide, an estimated 28,000 acres of forest are lost to residential and industrial development yearly.

According to the Pennsylvania Statewide Forest Resource Assessment (June 2010) prepared by the Pennsylvania Bureau of Forestry, the most significant resource concerns are:

- Land use change and development
- Forest health
- Ownership demographics
- Poor management decisions, and
- Uncertainties of Marcellus shale development (Marcellus shale does not apply to the Ridge and Valley province and southeastern Pennsylvania).

Land use change and development and Marcellus shale development continue to fragment forests locally, while ownership demographics continue to fragment management statewide. Forest health is degraded by pests and diseases, invasive plants, inadequate regeneration, and overabundant deer populations in some areas. Poor management results from a lack of knowledge by landowners and/or unwillingness to utilize technical assistance.

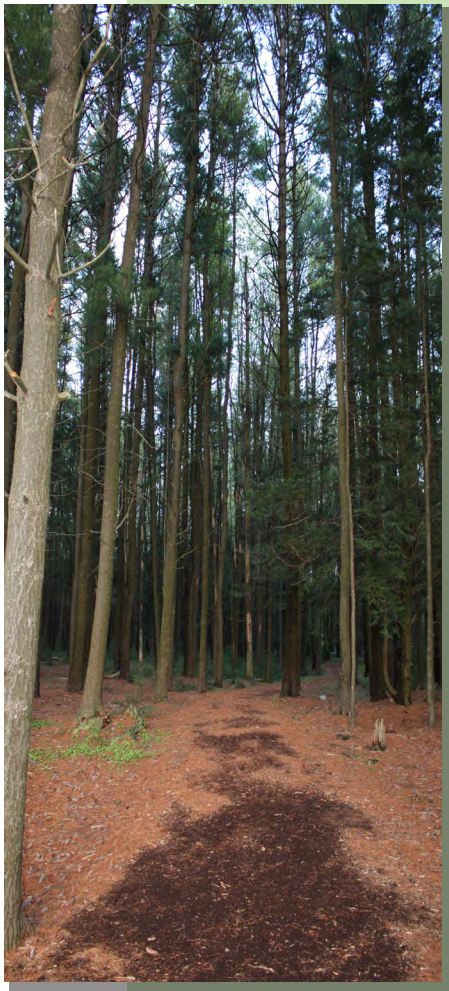
Forest fragmentation is the process of breaking up large patches of forest into smaller pieces. Historically, forest fragmentation in Pennsylvania could, for the most part, be attributed to the conversion of forests to agricultural use. In recent decades this trend has subsided and in some cases has reversed itself. The largest cause of forest fragmentation in recent years is urban development (sprawl).

Fragmentation of the forest can lead to many different impacts on the ecosystem. First, it produces a decrease in the forest interior, thus limiting the habitat for many species. The decrease in interior habitat leaves these animals more susceptible to predators. In addition to a loss of wildlife habitat, there is a loss of plant habitat. Much like animals, plants have a unique habitat which is often threatened by fragmentation. When certain sections of the forest are cut and not re-planted, the species that make up that forest die alongside. Fragmentation also leaves the forest interior more susceptible to exotic and threatening species which often destroy massive amounts of habitat when introduced into a new system, resulting in a loss of natural species biodiversity. Fragmentation results in more forest edge habitat, less forest interior habitat, and fewer forested corridors connecting large forested parcels. Thus, movement of plants, animals, and water across the landscape is altered.

Fragmentation is real and threatens working healthy forest systems. The focus now turns to methods

Do you know?

Sixty percent of Pennsylvania's 28 million acres are forested.



for achieving sustainable development. Education is the primary means of effecting changed land use patterns. Landowners of small forest parcels need information to effectively manage their land.

Impacts of Forest Fragmentation:

- Direct loss of interior habitat and biota
- Introduction and spread of invasive species
- Movement of some fauna away from linear feature
- Decrease in nest pairing and success in forest birds
- Increase in forest bird nest
- Predation and cowbird parasitism
- Interruption of movement and migration of terrestrial animals
- Creation of habitat for common edge and invasive species
- Increased cost of harvesting and transporting wood products

Some of the causes of forest degradation over time include both human activities and changing weather conditions affecting individual species or whole forest or woodland units. A hundred years ago, chestnut blight from China began extirpating American chestnut. American elm has also been impacted by an imported disease. And since the 1930's, gypsy moth has taken its toll on our oak forests. Today, Pennsylvania's state tree, the Eastern hemlock, struggles with hemlock wooly adelgid and elongate scale. This important species shades our streams and provides important habitat. Similarly, emerald ash borer is attacking all native ash species. A new major threat is Asian long horned beetle, which is beginning to play havoc with oak and maple species.

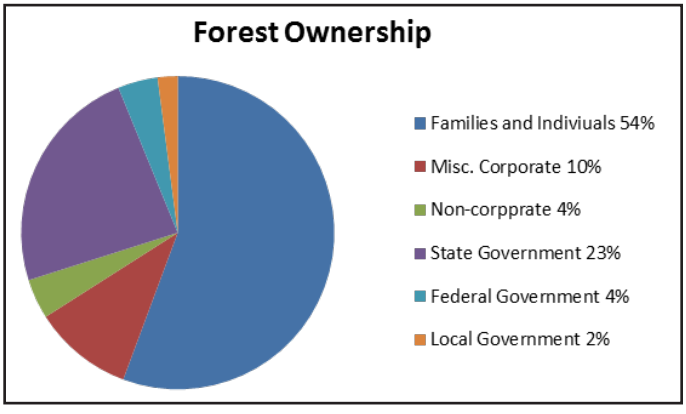
The invasion of exotic competitive plants is an issue affecting whole forest or woodland units, especially along woodland and forest edges.

The primary invasive species of concern in forests include the following:

- Multiflora rose
- Bush and Japanese honeysuckle
- Autumn and Russian olive
- Barberry
- Privet
- Native grapes
- Oriental bittersweet
- Tree of heaven
- Paulownia
- Mulberry
- Buckthorn
- Garlic mustard
- Dames' rocket
- Japanese stilt grass
- Japanese knotweed
- Mile-a-minute
- Tearthumb

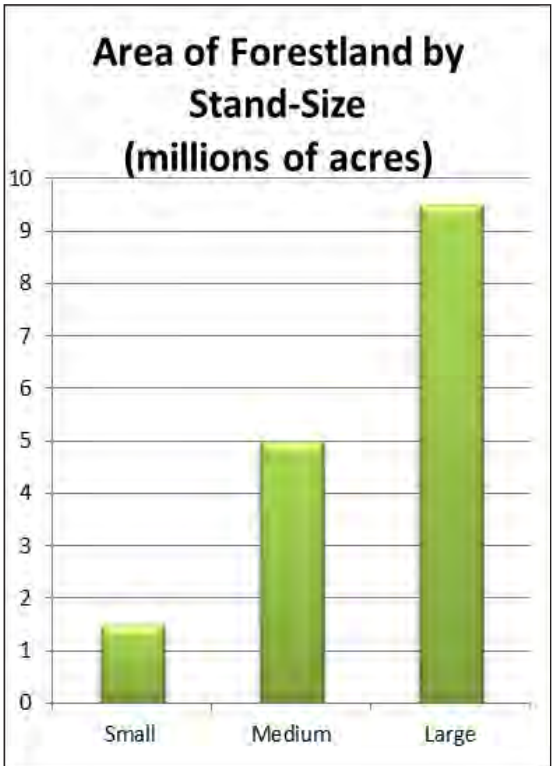
Many of these competitive plants begin as patches along roadsides and in old fields before they invade forest edges and eventually even the interior of native forests.

Changing weather conditions such as warmer summers, shifting rainfall and storm intensities are also affecting the composition of our forests and their health. Over time, there are fewer native species and the species composition of the forest becomes simpler. As these fewer species dominate more of the landscape, resilience to new threats diminishes. An insect, for example Asian long horned beetle, comes to the forest; its opportunity to wreak havoc is high; and overall resilience declines as yet another species enters a spiral of decline and there are fewer species to fill-in the niche that has opened.



As we look at forests, it is apparent that to maintain their health it is important to adapt to changing conditions. Clearly, there are many imposed change agents affecting forests -- insects, diseases, competitive plants, and maybe climate change. All of us will have to adapt to a landscape that will be imposed upon us and consider how we can, through our management and actions, help forests adapt to change by mitigating some existing problems and increasing resilience to new threats.

Improving forest management and therefore forest health may influence future decisions about land use change and development including mitigating the impacts of Marcellus shale development. A major challenge for providing adequate technical and financial assistance is ownership demographics such as more than 60 percent of forest landowners own 10 acres or less of forest and the average age of all forest landowners is 57.



Small - < 5" d.b.h

Medium – 5' – 11' d.b.h

Large - > 11" Hardwood - > 9" Softwood

D.B.H. - Tree diameter at breast height. Tree d.b.h. is outside bark diameter at breast height. Breast height is defined as 4.5 feet (1.37m) above the forest floor on the uphill side of the tree.

According to the State Wildlife Action Plan, two indicator species of concern that represent declining wildlife habitat in forests are Golden-winged Warbler and Indiana Bat.

A. Objective: Increase Habitat for At Risk and Declining Wildlife Species

NRCS will increase habitat for at risk and declining wildlife species by: (1) creating habitat and corridors for Golden-winged Warblers; and (2) creating, enhancing and protecting habitat for Indian Bats.

Two species of concern that represent at-risk and declining wildlife habitat in forests are the Golden-winged Warbler and Indiana Bat. These are indicator species and managing for indicator species benefits a wide range of species that utilize the same type of plant communities.

The Golden-winged Warbler is declining dramatically in the northeastern United States. Golden-winged Warblers require early successional habitat. Breeding Golden-winged Warblers require a diverse vegetation structure, often found in early successional patches within forested landscapes. Habitat types used for nesting include young forest created by timber harvests, wind or wildfire, abandoned farmland, scrub barrens, managed shrublands, utility rights-of-ways, edges of reclaimed strip mines, grazing land, beaver glades, oak savannas, and swamp forests with partially open canopies. Because early successional habitat is an ephemeral resource for breeding Golden-winged Warblers, patches need to be created or maintained continuously across the landscape to ensure viable long-term breeding populations.

The Indiana Bat is vulnerable to human disturbance of its roosting sites. Sites must be protected from vandalism and human disturbance in the winter hibernacula. Contamination of their food supply through the use of pesticides in agricultural areas and loss of summer habitat may also be contributing to the species'

The Golden-winged Warbler is a species of concern because of declining forest habitat.

decline. Although more research is needed to understand the summer habitat requirements of the Indiana Bat, it is known that they roost under the bark of mature trees or dead snags in forests. Increase of old growth forest acreage and forest contiguity, especially within several miles of hibernation sites, will likely improve prospects for this species. Summer roosts and surrounding forest and foraging areas may need to be maintained in as natural a state as possible. In addition, while winter hibernacula themselves must be protected, the forests above and around hibernacula should not be dramatically altered.

Outcome A: Additional habitat for at-risk and declining species is created.

Strategy A1: Increase adequate size habitat and connected corridors by 5% for Golden-winged Warblers and other at-risk species by creating 'young forest' early successional habitat.

Technical Assistance

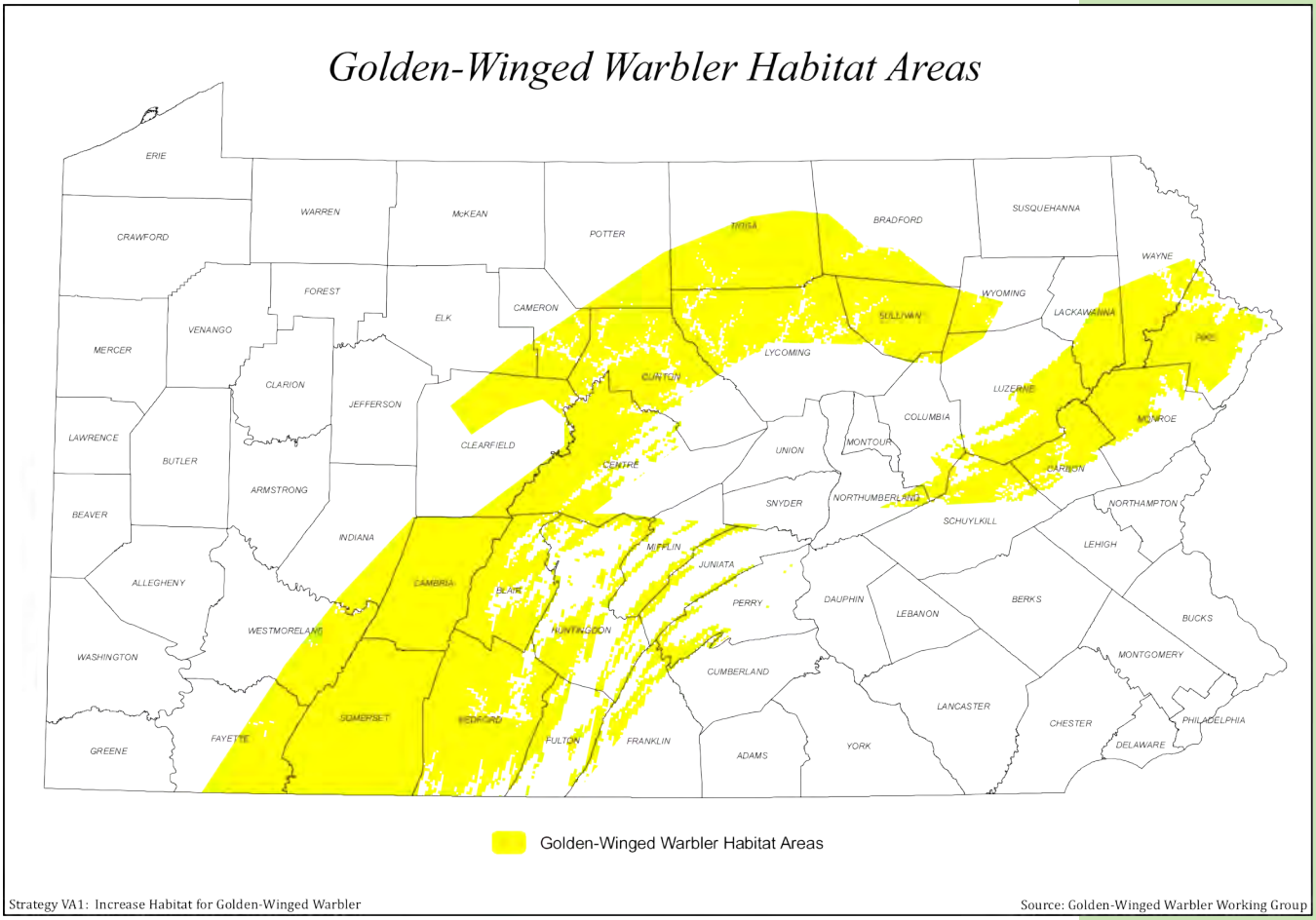
- Enter into agreements with DCNR, Indiana University of Pennsylvania, National Wild Turkey Federation, and PA Game Commission to maximize outreach and forest management plans to forest landowners.
- Develop wildlife management plans for all acres enrolled under EQIP or WHIP contracts.
- Train staff to develop or improve Golden Winged-Warbler habitat.

Financial Assistance

- Establish 250 acres per year of native shrubland on strip-mines within 100 yards or adjacent to mature forest.
- Establish 500 acres per year of early successional forest habitat by non-commercial forest harvesting.
- Create fund pools to protect at-risk species.
- Focus funding resources in areas with the greatest potential to restore early successional habitat.

Educational Assistance and Outreach

- Develop program and public information materials for WLFW.



Strategy VA1: Increase Habitat for Golden-Winged Warbler

Source: Golden-Winged Warbler Working Group

Strategy A2: Create, enhance, and protect an additional 5% habitat for the Indiana bat in the Healthy Forest Reserve targeted area.

Technical Assistance

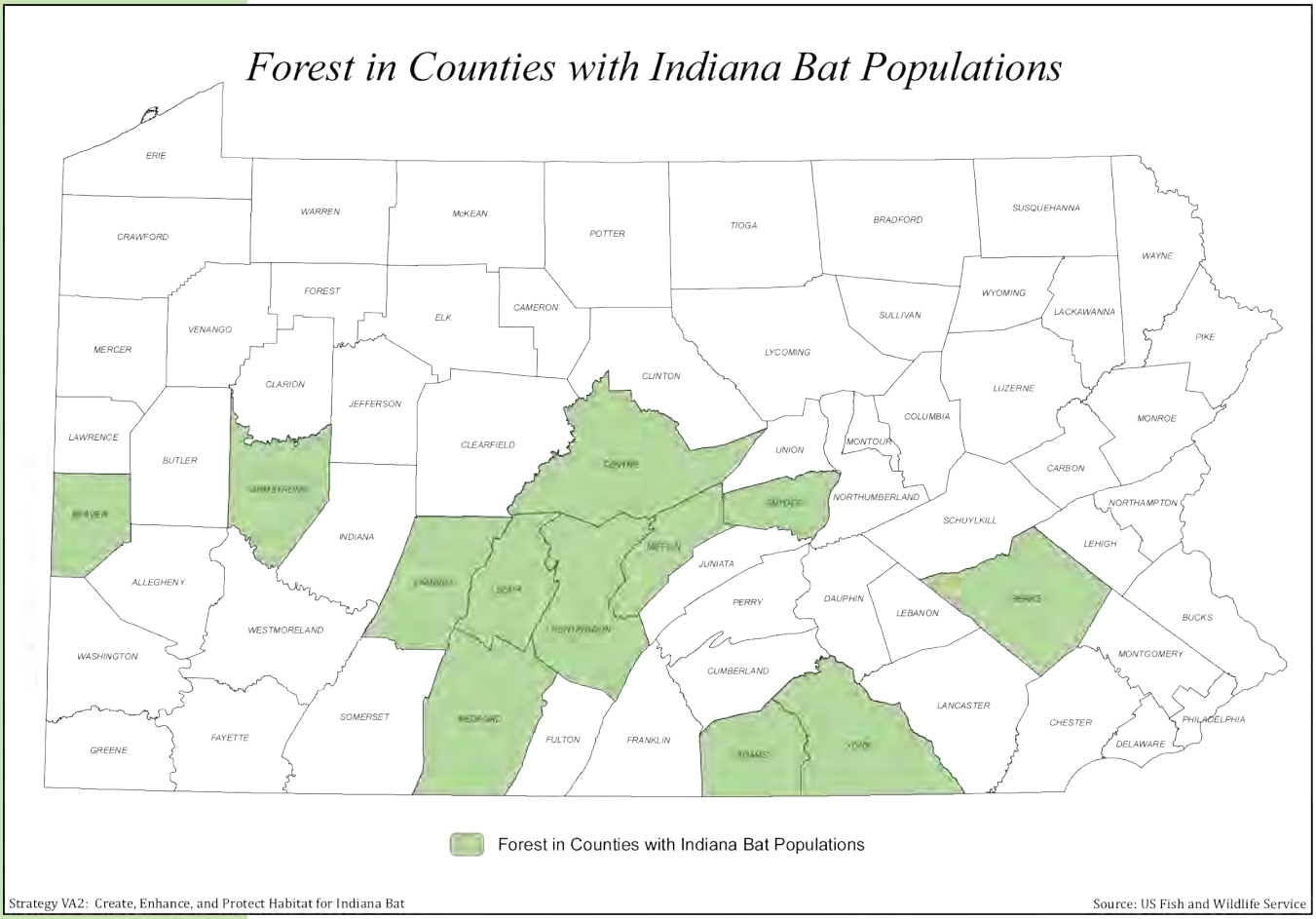
- Ensure that a minimum density of shagbark and snags are included in the forest management plan.
- Ensure that forest management plans restrict commercial timber harvesting within 100 feet of waterways unless for the purpose of increasing habitat for Indiana Bat.
- Work with DCNR to protect contiguous blocks of forestland through easement programs especially HFRP.

Financial Assistance

- Fully expand all HFRP easement funding.
- Utilize other financial assistance programs to maximize assistance to other landowners.

Educational Assistance and Outreach

- Host partnership meetings with US Fish and Wildlife Service, PA Game Commission, Chesapeake Bay Foundation, DCNR, and others to develop innovative ways to protect the species and its habitat.



Strategy VA2: Create, Enhance, and Protect Habitat for Indiana Bat

Source: US Fish and Wildlife Service

B. Objective: Improve the Health of Forests and Woodlands

NRCS will improve the health of forests and woodlands by increasing the implementation of forest management plans.

A Forest Management Plan is a site-specific plan that addresses resource concerns on land where forestry-related conservation activities will be applied. The plan includes planned practices, the amounts of each to be applied, the schedule for implementation, and appropriate specifications for each practice. Practices included in a plan are designed to meet the client's objectives to address natural resource concerns such as soil quality and condition, water quality, wildlife habitat, and forest productivity and health. Typical practices found in a forest management plan might include forest stand improvement, wildlife habitat management, invasive species control, and erosion control on forest trails and landings.

Improving forest health and productivity provides benefits beyond increased timber supply. Improved growth and reduced mortality can reduce fire danger, advance forest stands so they mimic characteristics of older communities sooner, broaden opportunities to change forest structure, make forests more resistant to disease and insect outbreaks and expand opportunities to manage for a wide range of land management objectives. Improved productivity can also occur by thinning densely stock stands, cutting mature and over-mature stands and converting them to younger more vigorously growing stands. Land that is managed as forestland is an integral part of other agricultural production systems such as cropland and livestock production.

Agroforestry is the intentional integration of trees and or shrubs into agricultural systems to provide an optimal mix of ecosystem services and economic benefits. It is distinguished from forestry by its designed interaction with agricultural crops and or livestock. Agroforestry

practices add trees and/or shrubs to the landscape which improve water quality on productive agricultural lands. Agroforestry can also serve to connect forest fragments and other critical habitats in the landscape. It combines agricultural and forestry technologies to create more diverse productive, profitable, healthy and sustainable land-use systems.

Today, working lands must meet more than simply the demand for food. In addition to providing an array of ecological services like clean water, soil conservation, and wildlife habitat, working lands – both forestry and agriculture – are being challenged to develop sustainable approaches to produce renewable biomass crops to help meet our nation's energy needs. To create integrated biomass production systems, it is essential that agriculture and forestry work together. The objective of this strategy is to demonstrate the use of agroforestry practices to produce woody biomass in association with an agricultural crop or livestock.

Outcome B: Forests and woodlands are healthy and productive.

Strategy B1: Increase the number of implemented forest management plans that minimize invasive species, increase populations of declining species, and address water quality issues.

Technical Assistance

- Dedicate no less than one employee per area with knowledge of degraded vs. healthy forestland.
- Add erosion and sediment guidance for forest and woodland section to compliance handbook.
- Work through an agreement with DCNR to have adequate forest management plans on WRP buffer acreage.
- Work with forestry consultants to better communicate Farm Bill expectations.

Strategy B1 (Cont.)

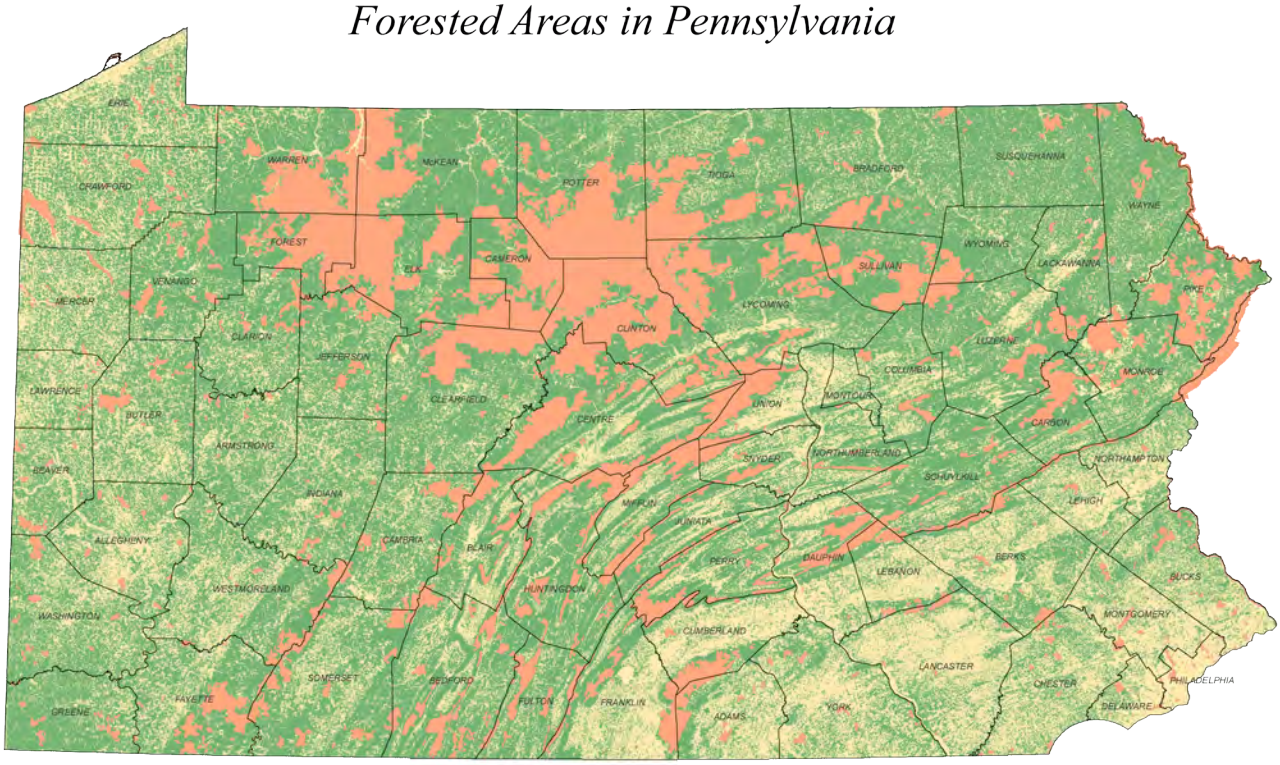
Financial Assistance

- Focus funding resources in priority areas designated by NRCS in partnerships with DCNR, the forestry subcommittee, and Local Working Groups.

Educational Assistance and Outreach

- Hold training once a year with DCNR specifically for forest health in designated areas throughout the Commonwealth.
- Develop training materials for NRCS employees, DCNR employees, and consultants on implementing forest improvement practices.
- Host regional workshops among forestry partners to communicate forestry objectives, roles, and responsibilities.

Forested Areas in Pennsylvania



Source: 2006 PA Land Use, The Nature Conservancy - Forest Stewardship Lands - managed conservation lands throughout the Commonwealth, includes federal, state, county, and privately owned lands

Strategy VB: Increase the Number of Implemented Forest Management Plans

Strategy B2: Demonstrate the multiple benefits of Agroforestry practices in Pennsylvania: (1) Riparian Forest Buffer, (2) Windbreaks\Shelterbelts, (3) Forest Farming, (4) Silvopasture, (5) Alley Cropping, (6) Special Applications Woody Biomass

Technical Assistance

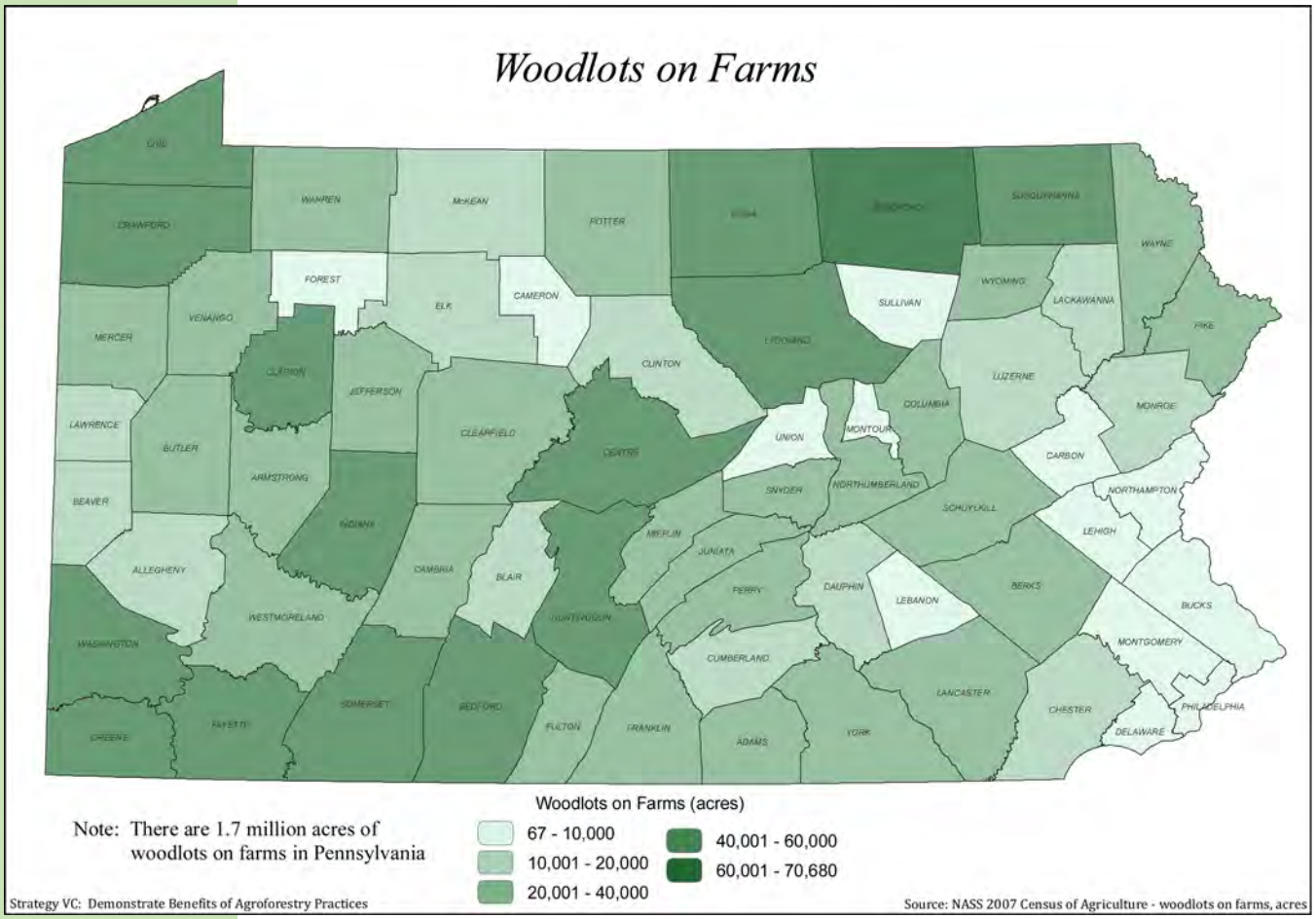
- Develop case studies describing successful applications of Agroforestry practices in Pennsylvania.
- Establish Silvopasture demonstration sites showcasing the production of forage and specialty wood products simultaneously.
- Establish Alley Cropping demonstration sites showcasing nut production in association with agricultural or forage crops.
- Establish short rotation woody biomass production demonstration sites.
- Develop high priority woody products plant guides for working trees and shrubs used in agroforestry practices in Pennsylvania.
- Conduct field trials of direct seeding methods for establishing riparian forest buffers threatened by high density deer populations.

Financial Assistance

- Focus funding resources to establish multipurpose windbreaks around poultry operations in the southeast.
- Focus funding resources to establish economically productive riparian forest buffers in the Piedmont region.

Educational Assistance and Outreach

- Develop and distribute brochures educating landowners with riparian forest buffers or small woodlots about non-timber forest production opportunities.
- Cooperate with partners to develop and distribute fact sheets describing each of the major agroforestry practices.
- Sponsor field day visits at newly established demonstration sites.



Note: There are 1.7 million acres of woodlots on farms in Pennsylvania

Strategy VC: Demonstrate Benefits of Agroforestry Practices

Source: NASS 2007 Census of Agriculture - woodlots on farms, acres

APPENDIX A

Emerging Natural Resource Issues and Conservation Technologies

Marcellus Shale

Pennsylvania is currently facing a major landscape change with the recent exploration of natural gas within the Marcellus Shale formation. The Marcellus Shale is a formation deposited over 350 million years ago. This shale contains a significant quantity of natural gas. Marcellus Shale extends from southern New York across Pennsylvania and into western Maryland, West Virginia, and eastern Ohio. Between January 2008 and July 2012, there were 5,654 unconventional wells drilled and 11,123 wells permitted in Pennsylvania according to PA Department of Environmental Protection (DEP) records. The process to extract gas from the shale can take 3-5 million gallons of water per well and can take several days to complete. Concerns about the disposal, along with degradation of small watersheds and streams, have arisen. The water that is withdrawn is typically trucked to a water impoundment that on average is a 3-10 acre impoundment that holds up to 15 million gallons of water or more, depending on the site, until it is needed for the fracking process. It is then transported to the well site via truck or pumped using temporary pipe that is laid on top of the ground or buried pipeline.

The biggest challenges that face the Marcellus Shale are the environmental issues that occur from the extraction of the gas reserves on agricultural and forest land. Water impoundments, pipeline, and staging areas have decreased the amount of land used for agricultural and forestry products and has affected all of the resources that our agency helps landowner's manage and conserve (Soil, Water, Animals, Plants, and Air [SWAPA]).

Soil has been impacted from the major disturbances and displacement of soils. This disturbance has changed the characteristics of those soils that affect infiltration and percolation rates and the production value of those soils from compaction. The degree of soil impact varies with the individual soil type; however, during the construction of the related infrastructure the upper soil horizons are being altered that can cause composition and drainage characteristics to be permanently changed. Pennsylvania DEP does regulate erosion and sedimentation of the oil and gas disturbances; however, Pennsylvania does not have specific guidelines and requirements for reducing impacts of soil compaction, particularly for pipeline installation, to prevent long term production impacts or the protection of prime and statewide importance soil.

The affects on water not only on surface and subsurface hydrology is a concern from a water quality and water quantity perspective. As noted during the fracking process millions of gallons of water are being used per well that is being withdrawn from aquifers, streams, and rivers. The drilling and fracking process possesses a threat to residential and agricultural water usage as well as potentially spilling to surface water. Subsurface water impacts have been harder to gauge; however, there have been instances where landowners have reported noticeable changes. Most landowners in rural areas are dependent on the groundwater aquifer for their sole source of water.

Local air quality has been impacted by the increase in construction vehicle use and windblown sediment associated with the additional construction activities. Current studies are documenting affects, if any, on the air quality associated with compressor stations and metering facilities. Internal combustion

engines running in permanently constructed compression stations along gas line routes also contribute to air quality concerns.

The installation of the infrastructure occurring for the most part on agricultural and forested land has impacted plants and animals. Impacts from installation of the infrastructure have created concern over forest fragmentation within a larger forest system which can be detrimental to certain species that depend on continuous, unfragmented habitat. Disturbed areas are also highly acceptable to invasive (non-native) and noxious weeds that are spread by the aggressive nature of the plants themselves, by seeds transported on vehicles or in low quality seed mixtures. The hydrologic changes from displacing the soil and its structure impacts plants and animals that rely on the nature of hydric soil. Although mitigation processes are in place by regulatory agencies, wetlands have been impacted by earth disturbances.

Little is known how the Marcellus Shale drilling boom might adversely affect the land, streams, and available water supply in the Appalachian Basin. Under current production levels, complaints of rural roads damage and traffic disruption have been received indicating that it can become a significant problem if it is carried out across thousands of drill sites. Slightly more than 50% of the gas drilling pads are located in farmland, with the rest in forest. The heaviest gas development is occurring in the Susquehanna River Basin, thus posing a substantial new risk to the water quality of Chesapeake Bay, which people have already been struggling for decades to improve.

Biomass and Other Renewable Energy Production

As a federal department, the United States Department of Agriculture encourages the domestic production of biomass as a source of renewable bioenergy and alternative to fossil fuels. Biomass is any organic material that can be produced on a renewable basis, and can be used as a feedstock for the generation of heat, fuels, electricity, materials, chemicals, and other products. Pennsylvania has a long history of grain, hay and forage production so biomass production appears to be a viable option in Pennsylvania. Since the infrastructure and experience required for growing, harvesting, and transporting these grain, hay, and forage crops is already available to most Pennsylvania farmers, it can be easily adapted for biomass.

The missing portion of a bioenergy economy in Pennsylvania is processing of biomass into either solid fuels, usually used to meet thermal energy needs, or liquid fuels usually used for transportation and feasible distribution infrastructure. One solid fuel scenario includes having localized small scale densification centers in close proximity to the farms where the biomass is grown.

As farmers in Pennsylvania pursue opportunities for biomass production, NRCS will most likely have an increased role for providing technical assistance in sustainably producing more biomass while conserving natural resources for the future. When these new biomass production systems include perennial crops and mixed species, the cumulative conservation benefits to the landscape are greater than with annually planted monocultures. These cumulative benefits of multispecies perennial crops include improved soil health and sustainable nutrient cycling, increased rates of removal of carbon dioxide from the air, better water quality and thus healthier water bodies teaming with fish and other creatures, and additional diversity to the plant structure providing for more wildlife.

Ecological Site Inventories and Descriptions

NRCS in Pennsylvania is beginning an interagency and interdisciplinary effort to cooperatively identify and describe ecological sites. An ecological site is a conceptual division of the landscape–a distinctive kind of land with specific soil and physical characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation, and in its ability to respond similarly to management actions and natural disturbances. Natural disturbances may result from wildfires,

windstorms, flooding, drought, pests, and other natural events. Management actions may include burning, grazing, mechanical, chemical, or other vegetative treatments needed to achieve the desired vegetative outcome. Lands in Pennsylvania on which ecological sites may be inventoried and described include wetlands and riparian areas, herbaceous lands, forests and woodlands. Related efforts are also being undertaken to inventory national resources on pasturelands and soil carbon levels on cropland. Inventories and descriptions will eventually be made available to planners and the public through tools such as the Web Soil Survey or the Mobile Conservation Planner. Each of these efforts will increase the availability of information for conservation planners to better understand the kinds and amounts of vegetation on a landscape and how the land will respond to different management actions.

APPENDIX B

NRCS National Landscape Initiatives

Clean water, abundant wildlife, and productive agriculture are interconnected. Because conservation does not have man-made boundaries, NRCS is addressing natural resource priorities on a landscape scale. The National Landscape Initiatives:

- Benefit both landowners and the environment
- Provide wildlife habitat
- Improve agricultural production

Pennsylvania is within two of the eleven NRCS National Landscape Initiatives, the Chesapeake Bay and the Great Lakes.

Chesapeake Bay

The Chesapeake Bay Watershed is the largest estuary in North America draining more than 150 rivers and streams over a 64,000 square mile area. A large variety of wildlife call the watershed home, including over 300 species of fish, numerous shellfish, and crab species. While the health of the Chesapeake Bay has improved since the 1970's, pollution and sedimentation are still impairing water quality at the local level and contributing to hypoxic waters in the Bay.

The 2008 Farm Bill included $188 million in funding for the Chesapeake Bay Watershed Initiative (CBWI) for FY 2009-2012. As part of CBWI, NRCS and its conservation partners provide assistance to agricultural producers to improve natural resource conditions in the watershed. NRCS is providing technical and financial assistance to farmers in the watershed to plan and apply conservation practices to improve water quality, restore wetlands, and enhance wildlife habitat. Other NRCS 2008 Farm Bill conservation programs, such as the Environmental Quality Incentives Program (EQIP), Agricultural Management Assistance (AMA), Wetlands Reserve Program (WRP), and Wildlife Habitat Incentive Program (WHIP), are also providing financial assistance. States participating in the initiative include portions of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia.

Great Lakes Restoration Initiative

NRCS is helping landowners and land users plan and implement activities to improve and protect the natural resources in locally identified watersheds within the eight Great Lakes Restoration Initiative (GLRI) states -- Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. NRCS conservation professionals are providing technical assistance to farmers and communities to install scientifically-proven conservation practices on the land.

The GLRI Action Plan calls for aggressive efforts to address five urgent priorities:

- Clean up the most-polluted areas in the lakes
- Combat invasive species
- Protect watersheds and shoreline from run-off
- Restore wetlands and other habitats
- Work with strategic partners on education, evaluation, and outreach

The plan also provides accountability by including measures of progress and benchmarks for success over five years. Conservation practices installed through GLRI help to improve and protect the waters of the Great Lakes Basin for the benefit of residents and citizens of the United States and Canada.

APPENDIX C

Acronyms Used in this Document

4R – Right Source, Right Rate, Right Place, Right Time

A&E – Architecture and Engineering (A&E)

ACA – Animal Concentration Area

ACES – Agricultural Conservation Enrollees/ Seniors

AMA – Agricultural Management Assistance

APEX – Agricultural Policy/Environmental eXtender

AFO – Animal Feeding Operation

BMP – Best Management Practice

CAFO – Concentrated Animal Feeding Operation

CAO – Concentrated animal operations

CBWI – Chesapeake Bay Watershed Initiative

CEAP – Conservation Effects Assessment Project

CNMP – Comprehensive Nutrient Management Plan

CREP – Conservation Reserve Enhancement Program

CRP – Conservation Reserve Program

CSNT – Corn Stalk Nitrate Test

DCNR – Department of Conservation and Natural Resources

DEP – Department of Environmental Protection

EPA – U.S. Environmental Protection Agency

EPIC – Environmental Policy Integrated Climate

EQIP – Environmental Quality Incentives Program

EWP – Emergency Watershed Protection

FEMA – Federal Emergency Management Agency

FRPP – Farm and Ranch Lands Protection Program

FSA – USDA Farm Service Agency

GLCI – Grazing Lands Conservation Initiative

GLRI – Great Lakes Restoration Initiative

HFRP – Healthy Forests Reserve Program

IPM – Integrated Pest Management

MFEMP – Mushroom Farm Environmental Management Plan

NASS – National Agricultural Statistics Service

Nox – Nitrogen Oxide

NPDES – National Pollutant Discharge Elimination System

NRCS – USDA Natural Resources Conservation Service

NRI – Natural Resources Inventory

PA – Pennsylvania

PCA – Pennsylvania Crop Advisors

PDA – Pennsylvania Department of Agriculture

PFGC – Pennsylvania Forage and Grasslands Council

PM – Particulate Matter

PSNT – Pre-sidedress Soil Nitrate Test

RC&D – Resource Conservation and Development

RUSLE – Revised Universal Soil Loss Equation

SWAPA – Soil, Water, Animals, Plants, and Air

SSURGO – Soil Survey Geographic Database

SWAT – Strategic Watershed Action Team

TSP – Technical Service Providers

US – United States

USDA – United States Department of Agriculture

VOC – Volatile Organic Compounds

WHIP – Wildlife Habitat Incentives Program

WLFW – Working Lands for Wildlife

WRP – Wetlands Reserve Program

APPENDIX D

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