

ECOLOGICAL COMMUNITIES OF PLAYA WETLANDS





ROLES OF PLAYAS IN THE HIGH PLAINS

- **Natural Flood Control**
- **Wildlife Habitat**
- **Conservation of Native Plants**
- **Aquifer Recharge**
- **Recreation and Aesthetic**

- **KEYSTONE ECOSYSTEMS**
- **LINKAGE OF LIFE AND SYSTEMS**

WHAT MAKES A PLAYA A PLAYA?

- **The Soil Defines Playa Location**





TPDES Permit Number:

TXR150000

Contact Name and Phone Number:

Kevin Elmore 720-7312
535-2110

Project Description:

Physical address or description of the site's location, and

Estimated start date and projected end date, or date that disturbed soils will be stabilized.

Construction of Chaparral Golf Course and enlargement of Playa Lake 41.

Start Sept. 15, 2005
finish July 28, 2006

Location of Storm Water Pollution Prevention Plan (SWP3):

Lubbock Christian University administration Building Room 103





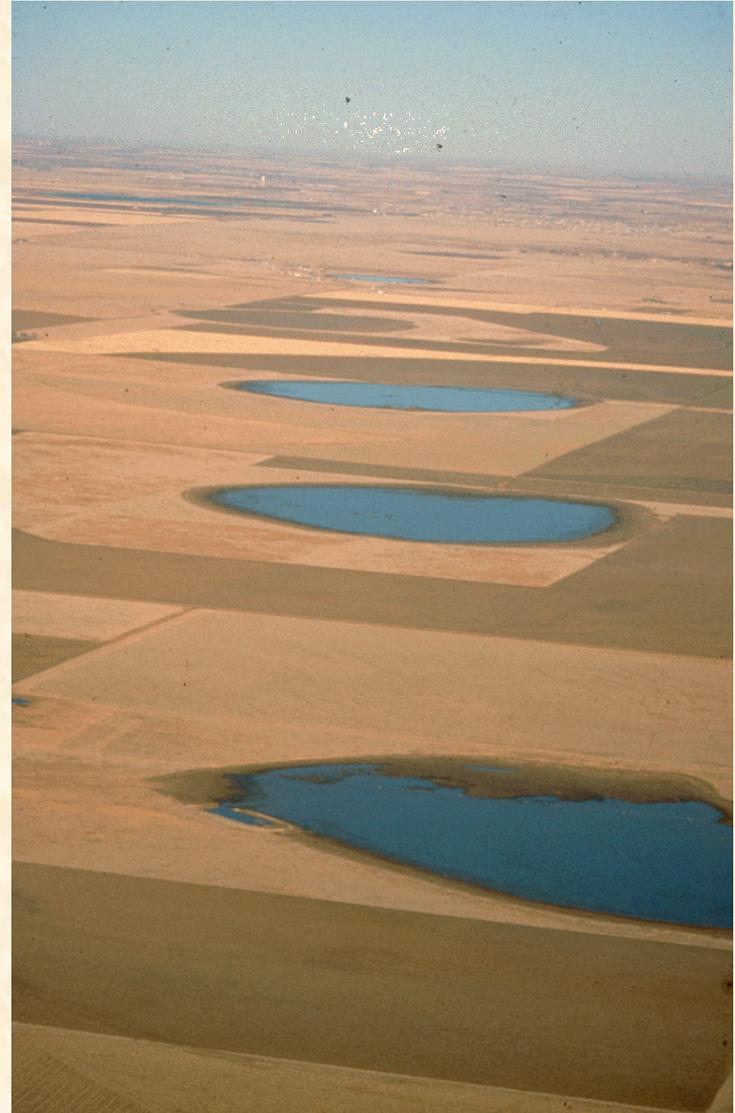
WHAT MAKES A PLAYA A PLAYA?

- **Closed Watershed and Depression**



WHAT MAKES A PLAYA A PLAYA?

- **However, just because a depression exists and water collects does not mean that the playa remains!**



WHAT MAKES A PLAYA A PLAYA?

- **Dynamic Environment**

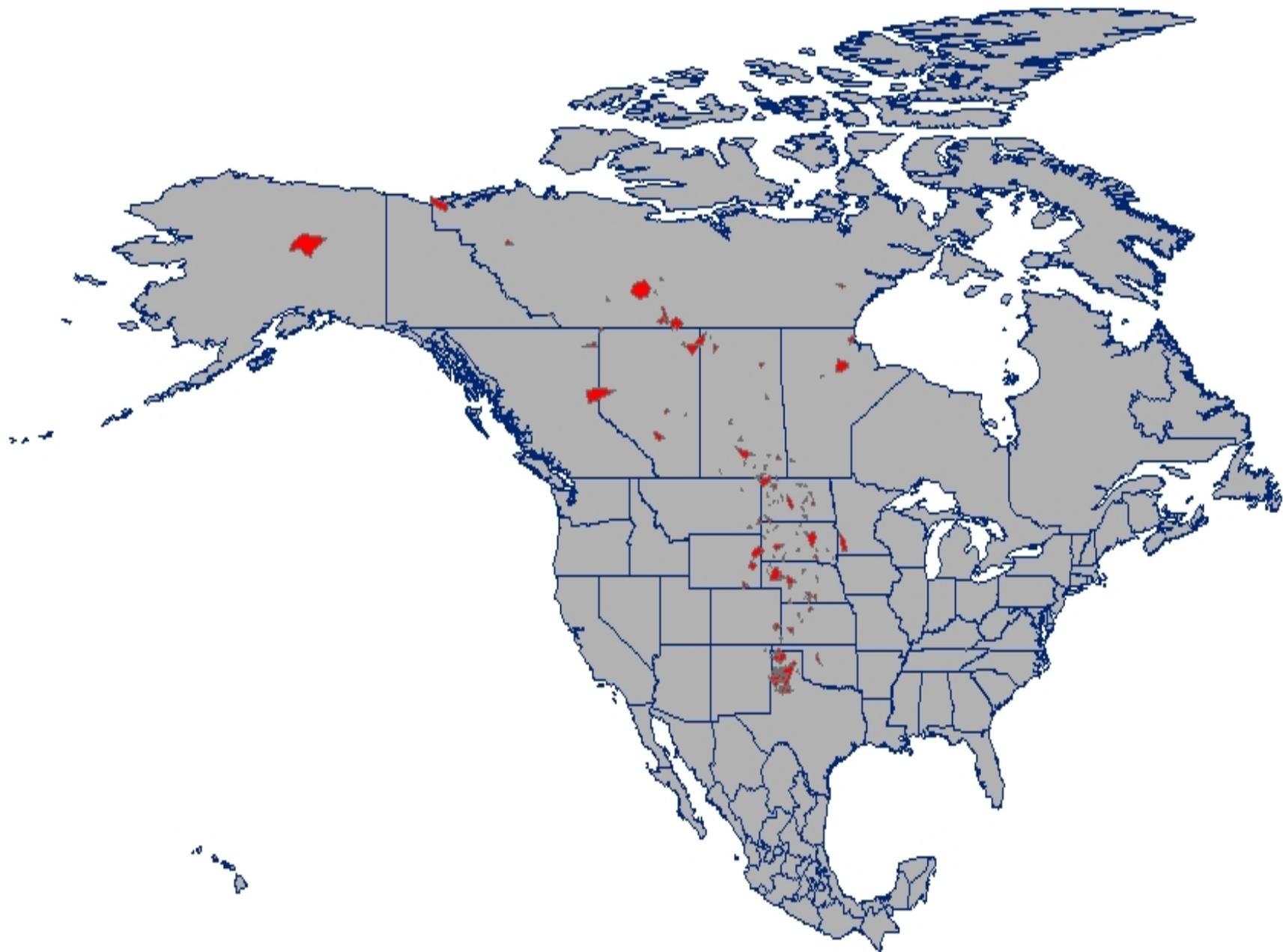


Diversity of Playas Creates the Diversity of Life

- To understand playa systems, one must realize that all communities are responding to playa soils, surrounding landscape, and dynamic, unpredictable environment.
- Loss or alteration of any of these elements reduces the ability of a playa to support life.

Influence of Isolation

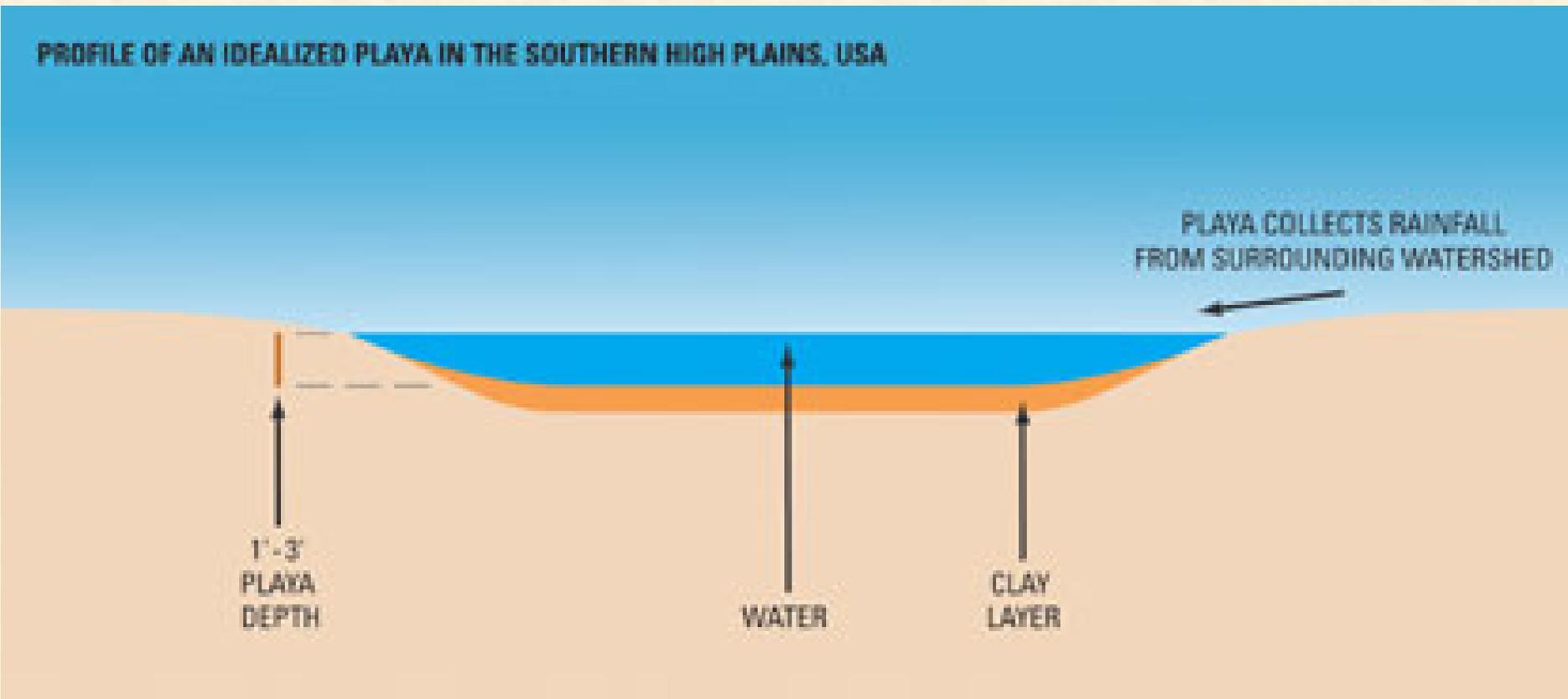
- Hydrological isolation does not equal ecological isolation
- Sheer number of individual playas is not an indication of the cumulative value of playas
- Influence of playas is hemispheric rather than 150 miles of Lubbock, Texas



Relative Complexity

- Simple physical structure

PROFILE OF AN IDEALIZED PLAYA IN THE SOUTHERN HIGH PLAINS, USA



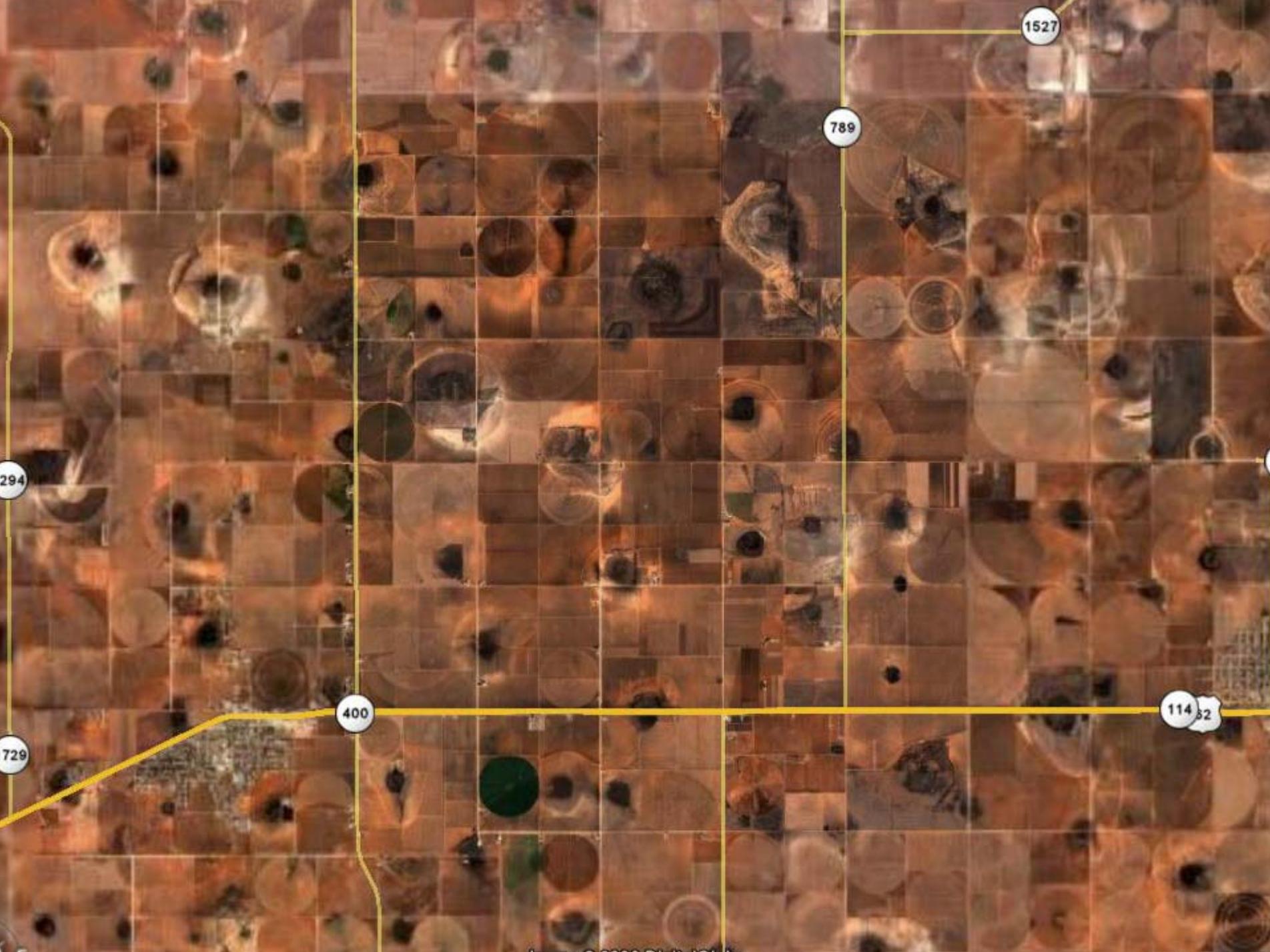
Relative Complexity

- Complex environmental responses



Consideration of the Simple Structure and Complex Environment

- Necessary to understand and model ecological systems
- These features are interactive in the determination of biological communities
- Persistence for thousands of years
- During past 130 years, massive landscape changes



1527

789

294

729

400

114 82

Data on Playa Communities

- Primarily from traditional Playa Lakes Region

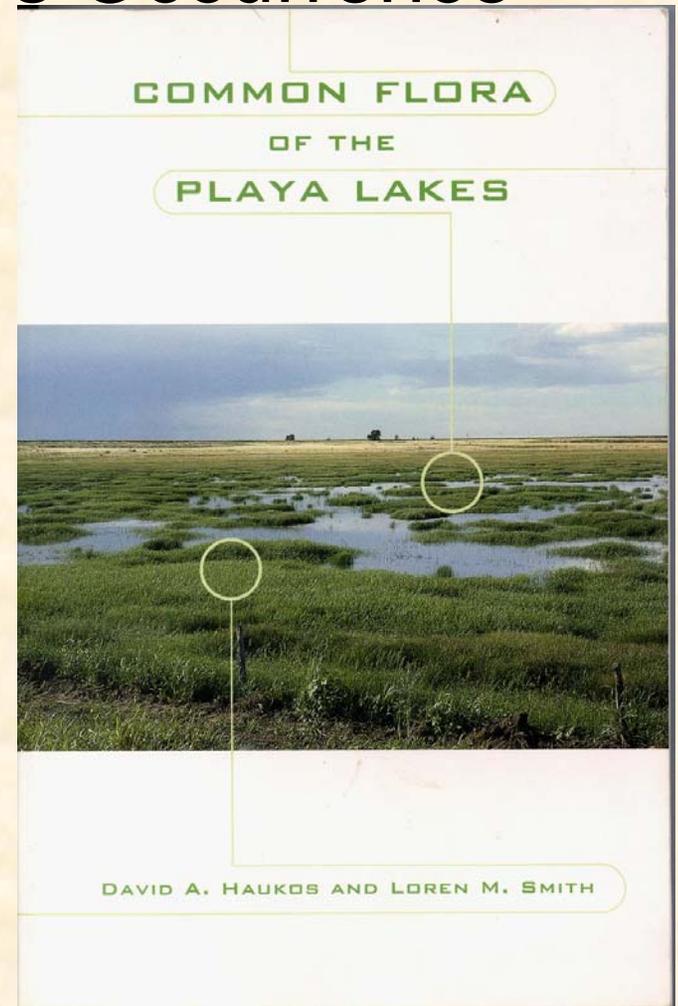


Data on Playa Communities

- Predominantly data on plants and birds
- Just beginning to understand the playa system
- Concentrate on plant dynamics and avian response to resultant habitats

Playa Plant Communities

- Research Efforts – Species Occurrence
 - Reed 1930
 - Penfound 1953
 - Rowell 1971 and 1981
 - Site Specific
 - Pantex Site – 1993/1995
 - Kansas – 1993/1994
 - Colorado – 1991



Playa Plant Communities

- Research Efforts – Management
 - Nelson et al. 1983
 - Guthery et al. 1984
 - Haukos and Smith
 - Moist-Soil Management
 - Plant Nutrition
 - Soil Nutrients
 - Invertebrate Response
 - Nongame Response
 - Soil Moisture and Photosynthesis

Playa Plant Communities

- Research Efforts – Ecology
 - Hoaglund and Collins 1997
 - Haukos and Smith
 - Seed banks
 - Community development
 - Distribution within and among playas
 - Temporal emergence
 - Influence of surrounding landuse
 - Invertebrate and vertebrate herbivory
 - Species – Area relationships

Playa Plant Communities

- Research Efforts – Ecology
 - Haukos and Smith
 - Role of disturbance
 - Diversity
 - Species Associations
- Nearly 350 plant species have been reported in playas
- Any change in the environment (i.e., soil moisture) will result in a change in the plant community for a functional playa.

Playa Plant Communities

- Seed Banks
 - Critical for the playa response to dynamic environment



Playa Plant Communities

- Seed Banks
 - Stores plant diversity
 - Disruption to seed bank eliminates the ability of the playa to respond to a changing environment
 - No differential distribution within playas
 - In extant plant communities, a few species are only found on the playa edge.
 - Extant plant community determined by current environmental conditions for germination, past environmental conditions creating the seed bank, and any physical restraints to germination.
 - There are mixed temporal emergence strategies as a hedge against the unpredictable, dynamic conditions

Playa Plant Communities

- Moist-Soil Management
 - Flood or drawdown to grow wildlife habitat



Playa Plant Communities

- Moist-Soil Management
 - Mimics wet conditions in playas
 - Natural foods in functioning playas are preferred by wildlife
 - Produces cover and nutritious forage
 - The 50% cover to 50% open water ratio results in highest bird diversity
 - Soil moisture at field capacity results in greatest seed production

Playa Plant Communities

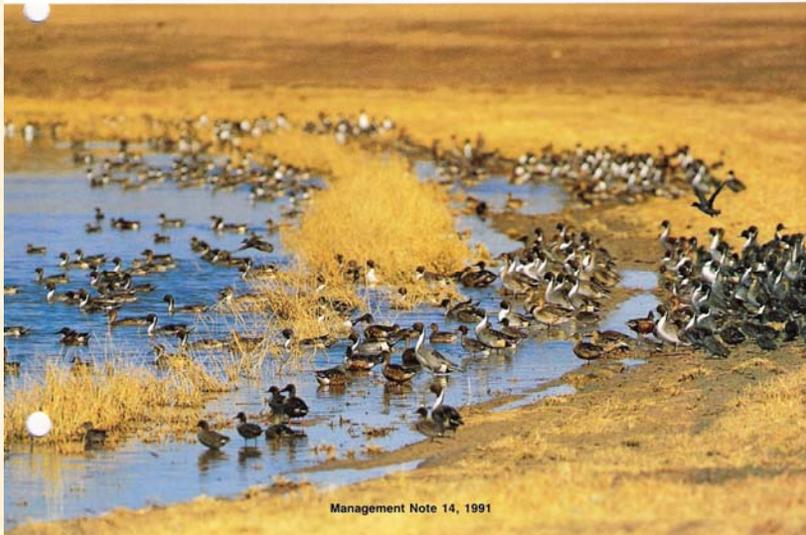
MANAGEMENT NOTES



RANGE AND WILDLIFE MANAGEMENT

College of Agricultural Sciences
Texas Tech University

VEGETATION MANAGEMENT IN PLAYA LAKES FOR WINTERING WATERFOWL



Moist-Soil Management

- Acceptable to private landowners
- More cost-effective than purely flooding playa for winter water
- Relatively inexpensive for increase in carrying capacity

Playa Plant Communities

SPECIAL PUBLICATIONS

Museum of Texas Tech University

NUMBER 47

10 December 2004

PLANT COMMUNITIES OF
PLAYA WETLANDS IN THE
SOUTHERN GREAT PLAINS



Polygonum amphibium

DAVID A. HAUKOS AND LOREN M. SMITH

Ecology

- Amazing predictability of community composition among playa locations, watershed type, soil moisture condition, and size.
- Likely due to simple structure and few ecological gradients

Playa Plant Communities

Diversity

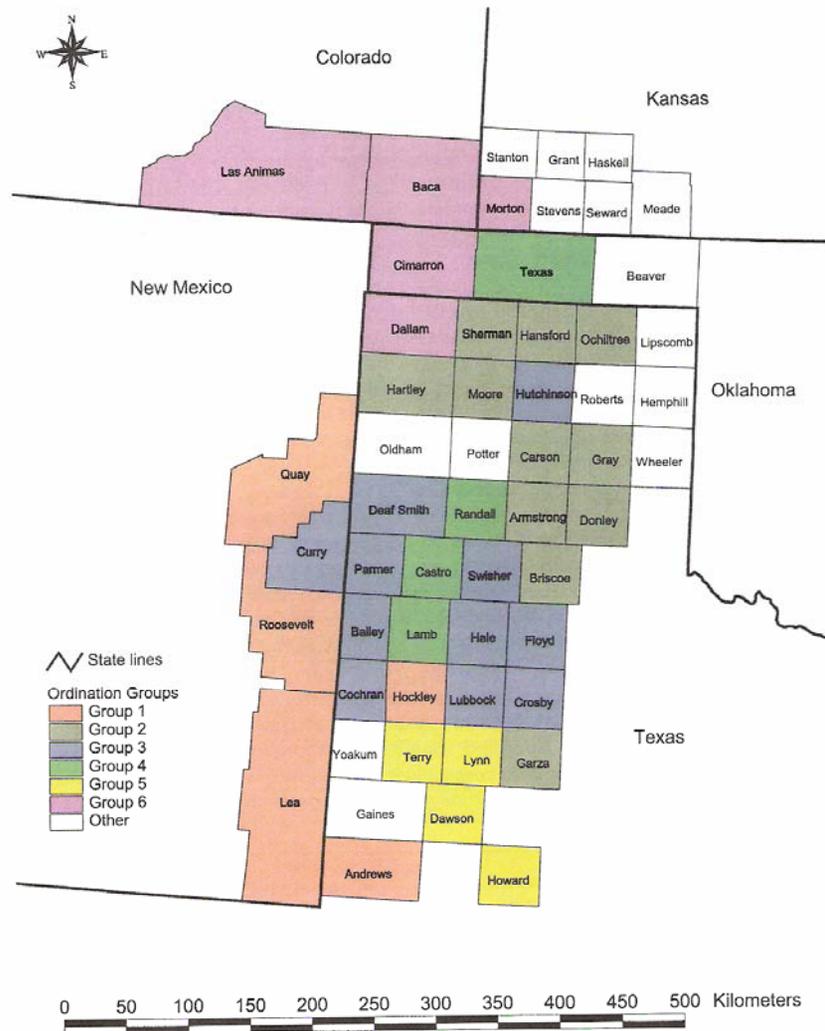
- Playa size influences diversity only under flooded conditions
- 30% turnover in plant species from early to late in growing season even if no drastic change in hydrological conditions
- At any point in time, hydrological condition, location, playa size, and surrounding landscape, one would expect to find 12-13 species in the extant vegetation
- Across the growing season, we expect to find 19 species per playa in extant vegetation

Playa Plant Communities

Plant Associations

- Rare species separate watershed types and other groupings
- 12 identified plant associations for all playas.
- Increase to 14 and 16 associations when separating cropland and grassland playas, respectively.

Spatial Relationships of Plant Communities

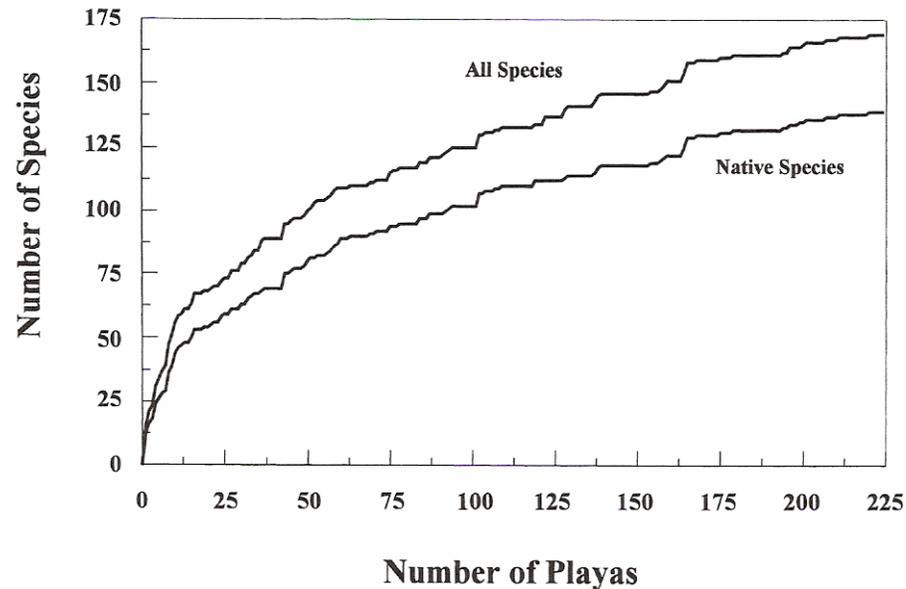


- Plant species are distributed both north-south and east-west
- Ecological equivalents exist throughout the region
- Each grouping represents about 100 species
- Each county represents an average of 43 species

Playa Protection to Conserve Plants

36

SPECIAL PUBLICATIONS, MUSEUM OF TEXAS TECH UNIVERSITY



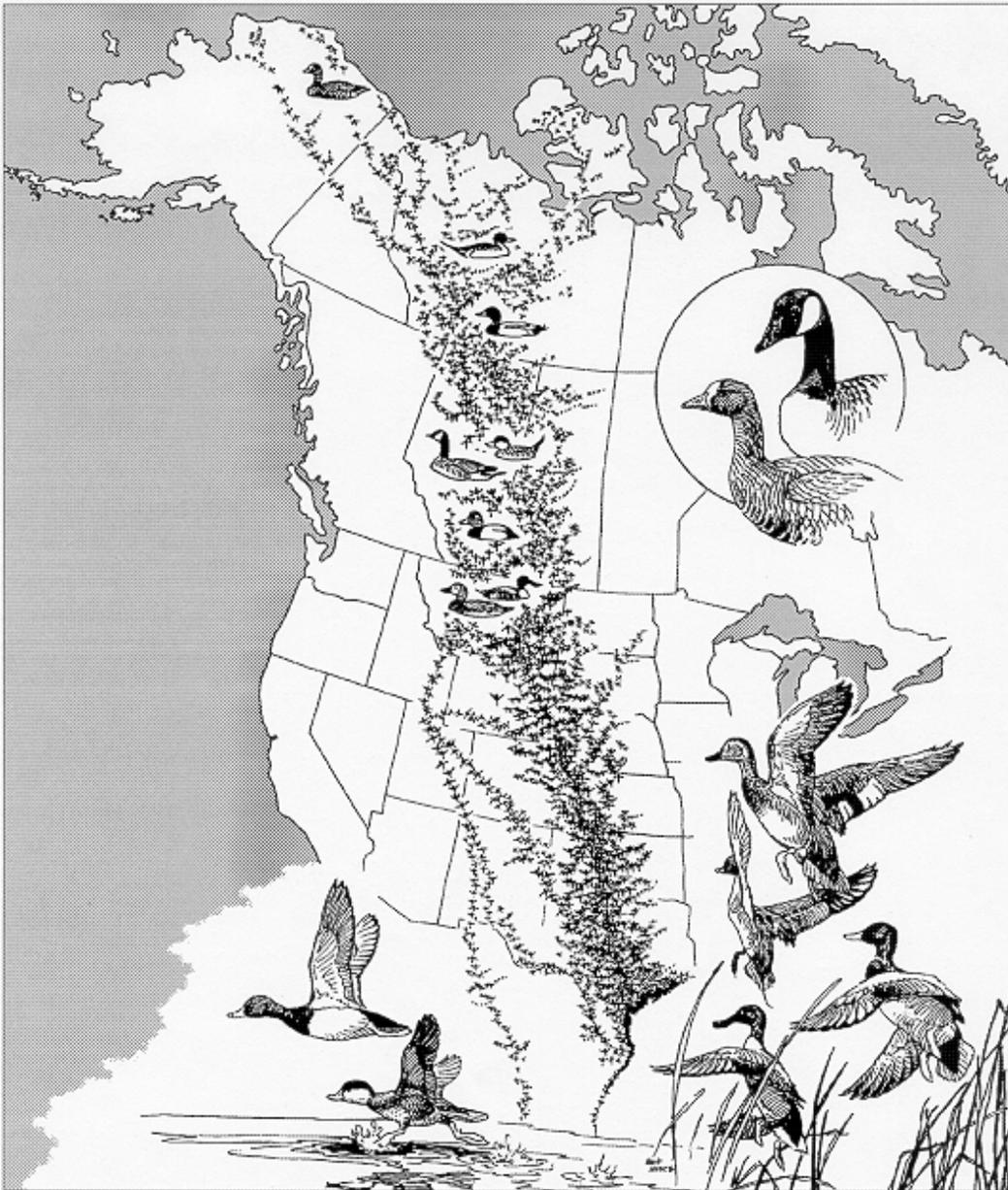
- Because of diversity among playas, a relatively large number are needed to conserve the entire flora of playas

Avian Communities

- Nearly 200 species reported in playas
- Attracted to habitats created by plant communities responding to a changing environment



Central Flyway



Usually reported as second most important migration and wintering area for waterfowl and other migratory birds in the Central Flyway

However, evidence that playas are the most valuable habitats for many species in the Central Flyway is increasing



- Few data on densities or abundance because of lack of rigorous surveys and habitat availability data
- Recent Midwinter Inventory Data are exceptions
- Measured survival rates for birds using playas are greater than for other wintering areas
- Importance of natural foods increasing as availability of cereal grains is decreasing

30 shorebird species – migration, feeding

25 waterfowl species – migration, wintering, nesting

Playas are stepping stones for journeys across the Americas for many species of concern



