

AN OVERVIEW OF NORTH AMERICAN WETLANDS

LEIGH H FREDRICKSON

ECOLOGICAL CONSIDERATIONS FOR WETLAND MANAGEMENT
IN NEBRASKA

Crane Trust

Wood River, Nebraska

9-11 September, 2026

NORTH AMERICA

A CONTINENT RICH IN WETLAND RESOURCES

IZEMBEK LAGOON 55 DEGREES NORTH



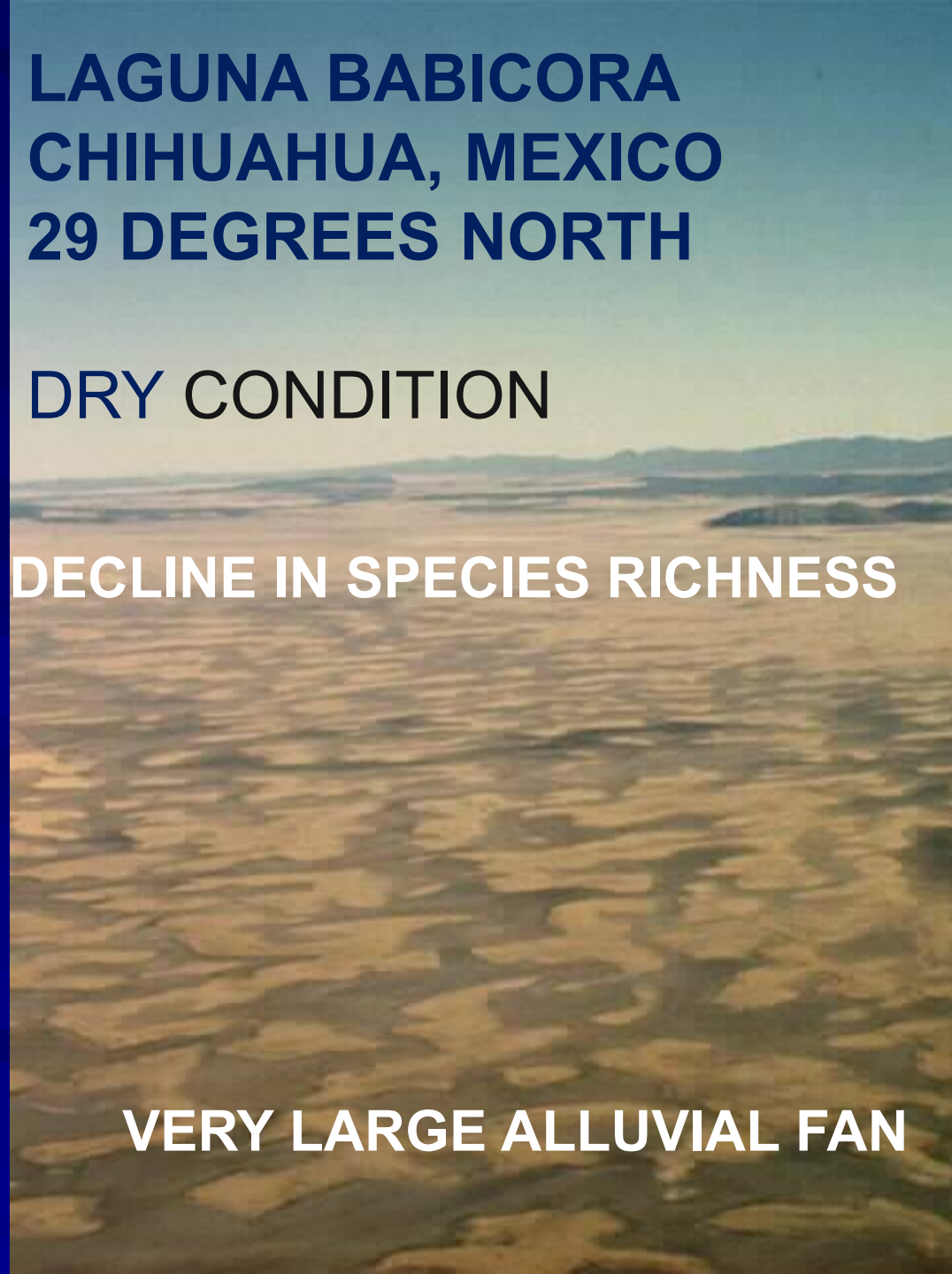
LARGEST EELGRASS BED IN THE WORLD

**LAGUNA BABICORA
CHIHUAHUA, MEXICO
29 DEGREES NORTH**

DRY CONDITION

DECLINE IN SPECIES RICHNESS

VERY LARGE ALLUVIAL FAN



Overview of North American Wetlands and Their Relationship with Formative Processes

MANY FORMATIVE PROCESSES

- WITH MANY DIFFERENT CLIMATIC AND GEOMORPHIC SETTINGS
- WITH VERY DIFFERENT LAND USE HISTORIES
- WITHIN A NATION WITH THE HISTORIC VISION, INTEREST, AND WEALTH TO PROTECT AND MANAGE THESE RESOURCES WITH SOME SUCCESS (Migratory Bird Treaty) AND A GOOD MEASURE OF FAILURE AS WELL

FORMATIVE PROCESSES

- GLACIATION
- FLUVIAL DYNAMICS
- WIND DEFLATION
- TECTONICS
- CRYOGENETIC DYNAMICS
- BIOTIC (BEAVERS)
- MAN (ANTHROPOGENIC)

GENERAL CONDITIONS

- More than one formative factor is often involved in wetland creation.
- Major formative process may have occurred millions of years ago.
- Much of the contemporary surface in the Midwest represents Pleistocene and/or Holocene events.
- Fluvial dynamics is the most common formative process on the vast majority of intensively managed wetlands.
- Formative processes are **on going** but most often in subtle ways that are difficult to detect.
- Biological factors may be important

GLACIAL

■ Continental

- Largely shaped many of the wetland habitats in the northern hemisphere either directly or indirectly
- Four glacial epochs Nebraskan, Kansan, Illinoian, and Wisconsin

■ Montane

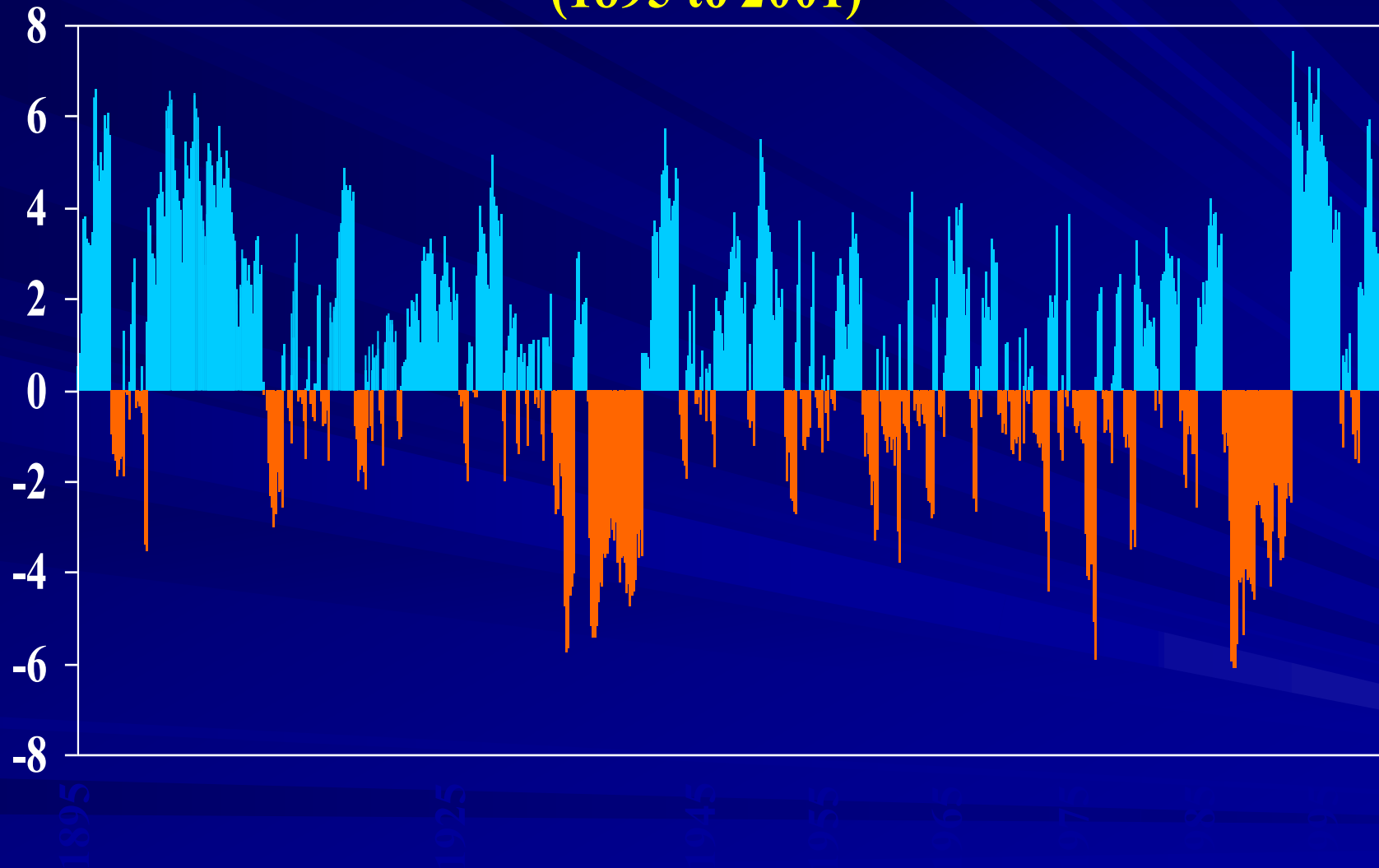
- Also during Pleistocene
- Active today

EXAMPLES OF GLACIATED SETTINGS

Pothole region has many different features as do all systems. Terminology is important to carefully identify what occurred and where

- COTEAUS
- DRIFT PRAIRIES
- HISTORIC LAKE BEDS
- BEACH RIDGES
- FLOODPLAINS
- HYDROLOGIC CHARACTERISTICS
 - RECHARGE
 - FLOW THROUGH
 - DISCHARGE

Palmer Drought Severity Index, Division 5, ND (1895 to 2001)



PRAIRIE POTHOLES



TYPICAL AGRICULTURAL DISRUPTION

PARKLANDS, MANITOBA



PRAIRIE POTHOLE

PRAIRIE POTHOLE Southern Saskatchewan



Transition to Boreal Forest

Grasslands



Parklands

Coteau

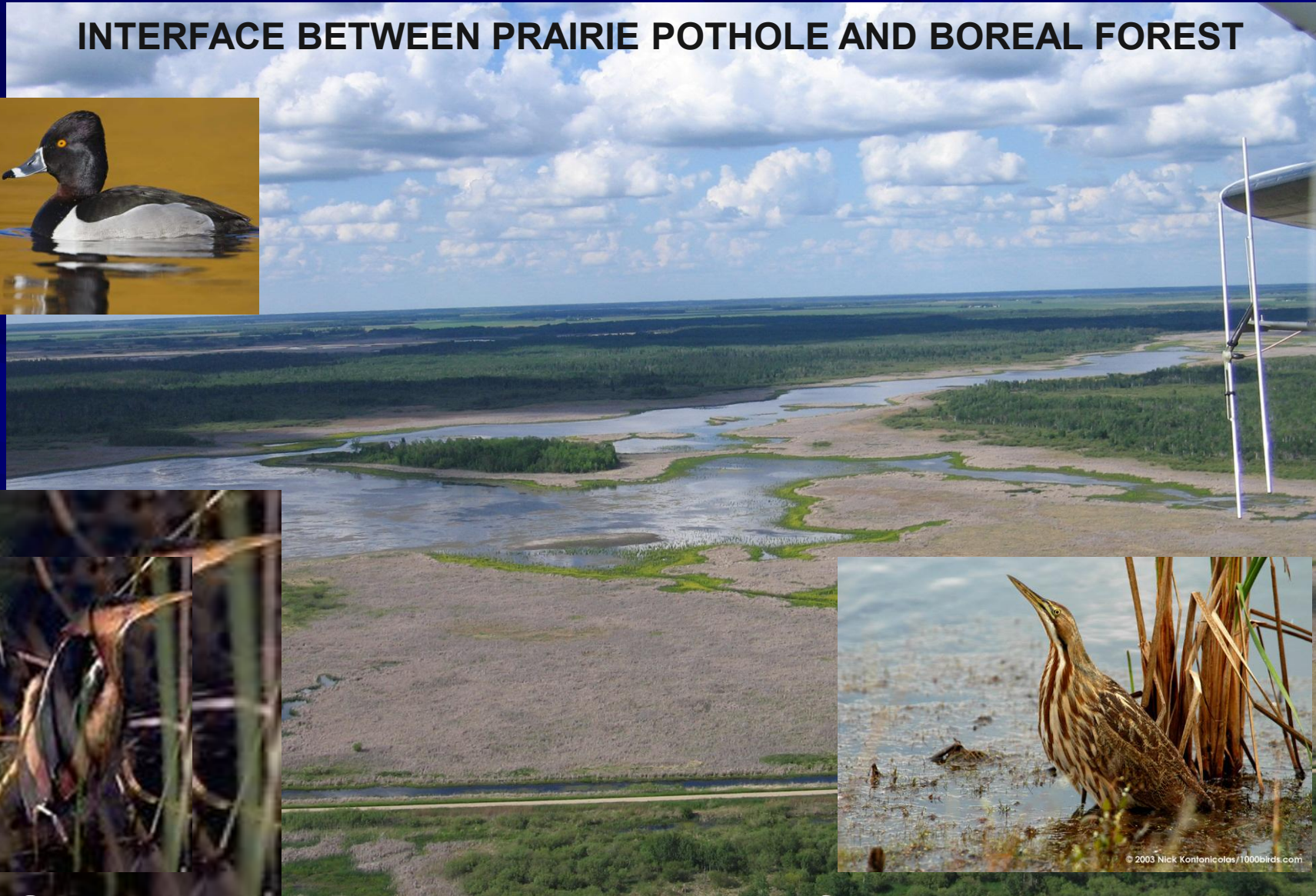


Prairie Potholes



AGASSIZ NATIONAL WILDLIFE REFUGE 1990s

INTERFACE BETWEEN PRAIRIE POTHOLE AND BOREAL FOREST



Stable water No drawdown for 100 years

DEWEY'S PASTURE/SMITH'S SLOUGH, NW IOWA 1960S





Lake Christina A Wild Celery Lake











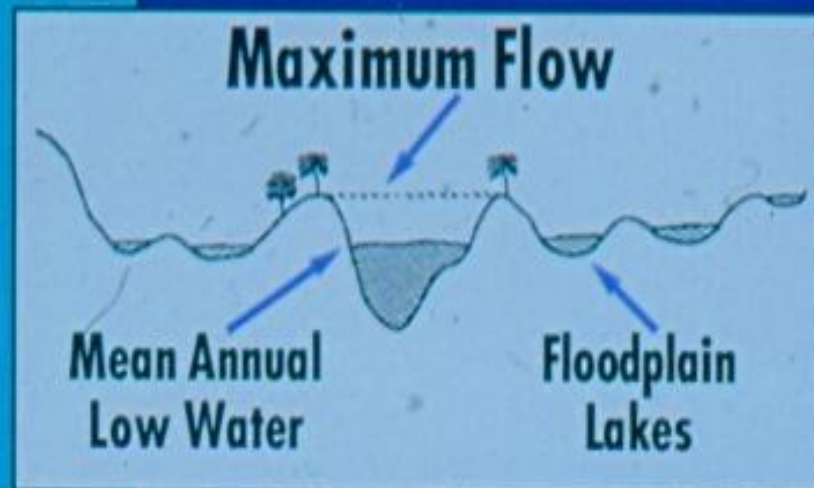
Fluvial Dynamics

- Floodplains
- Lake beds

FLOODPLAIN LAKES



INNOKO RIVER



Western Alaska River System



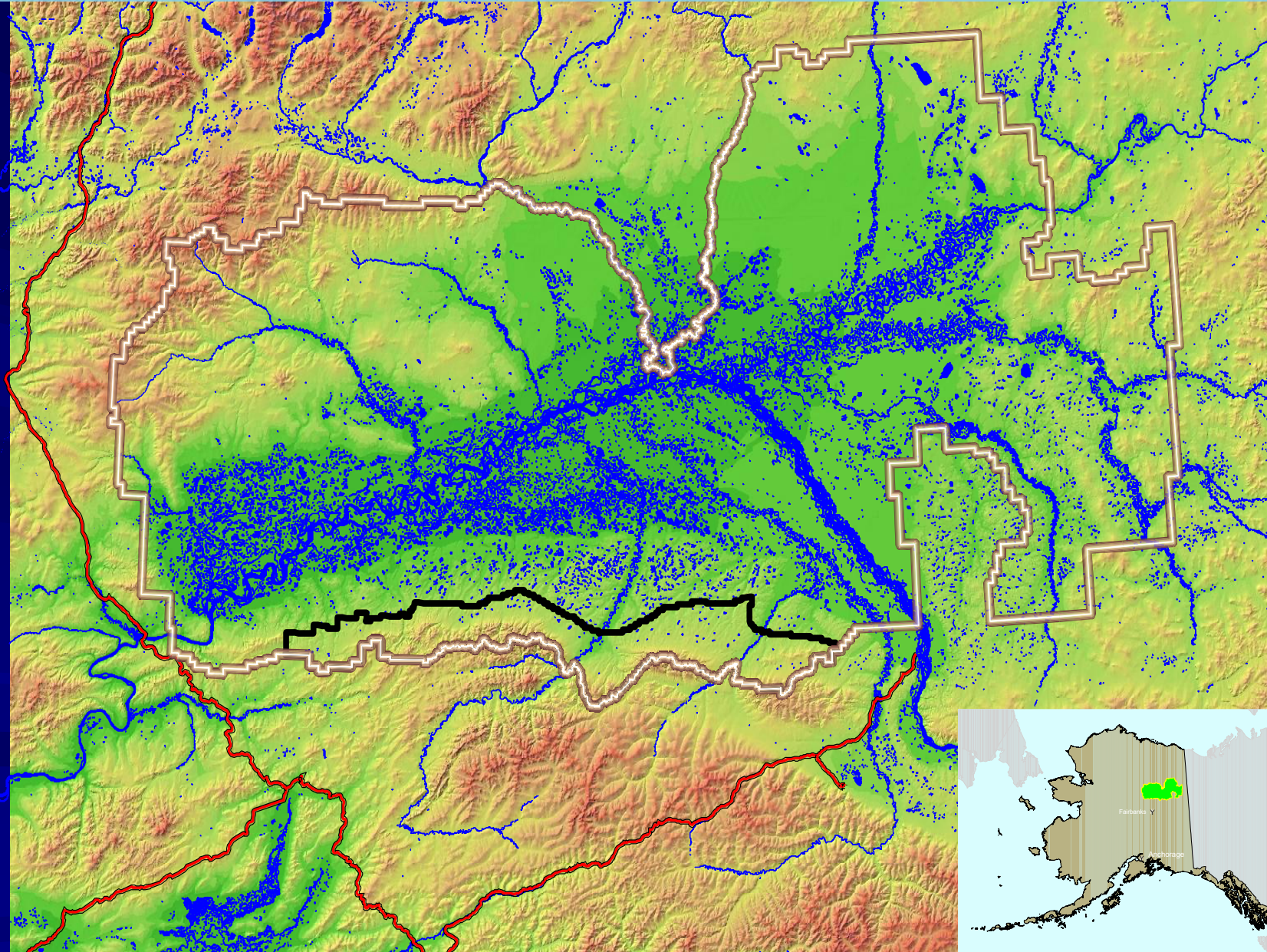


NATURAL LEVEE

YUKON FLATS NATIONAL WILDLIFE REFUGE



The 3rd largest refuge in the US at 8.6 million acres
The Yukon Flats Basin includes over 10,000 square miles



Wetlands of Yukon Flats



Wetlands of Yukon Flats

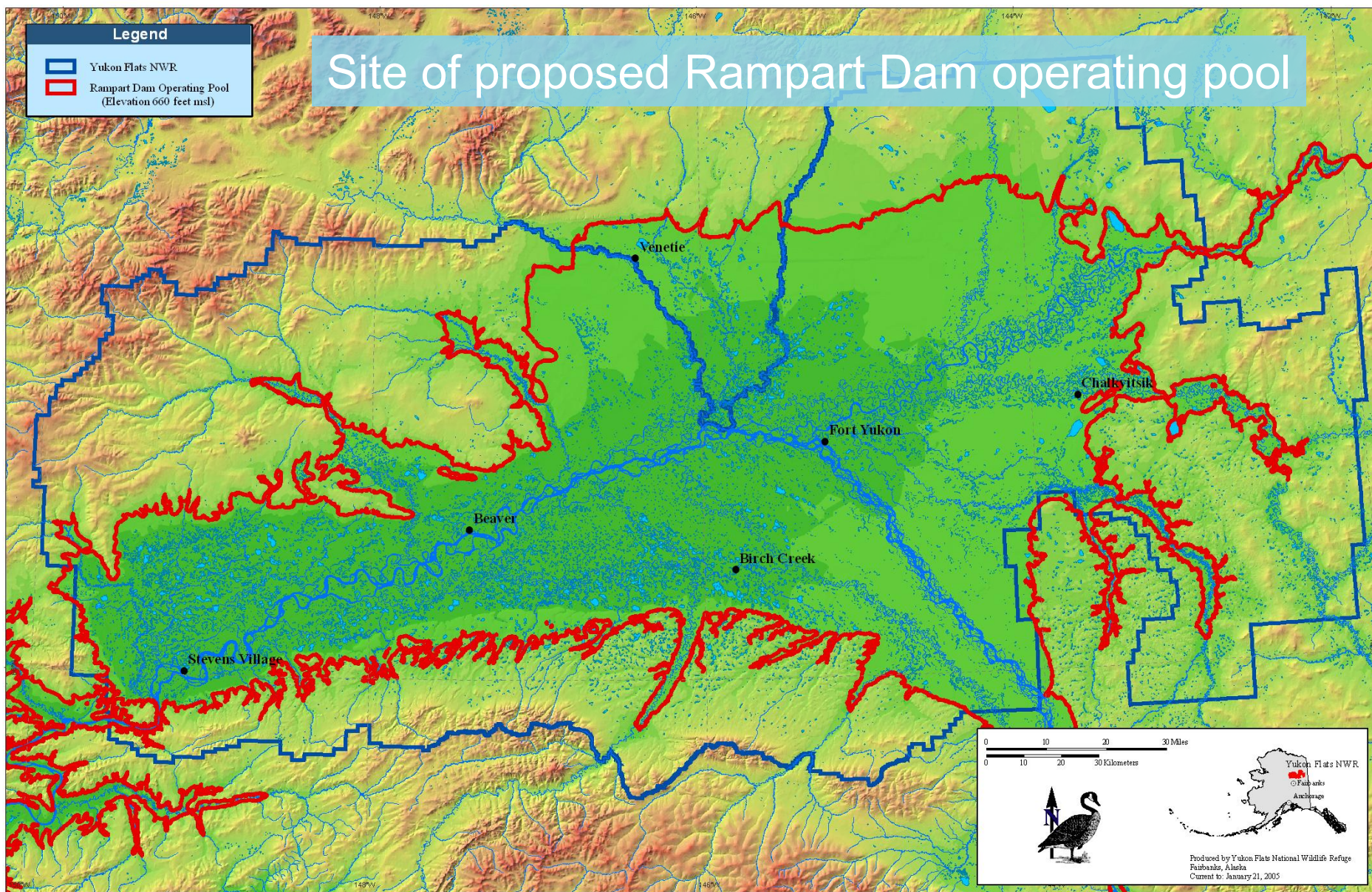




U.S. Fish & Wildlife Service

Yukon Flats National Wildlife Refuge, Alaska

Rampart Dam Operating Pool



16-0045

Lower Klamath NWR 1970S



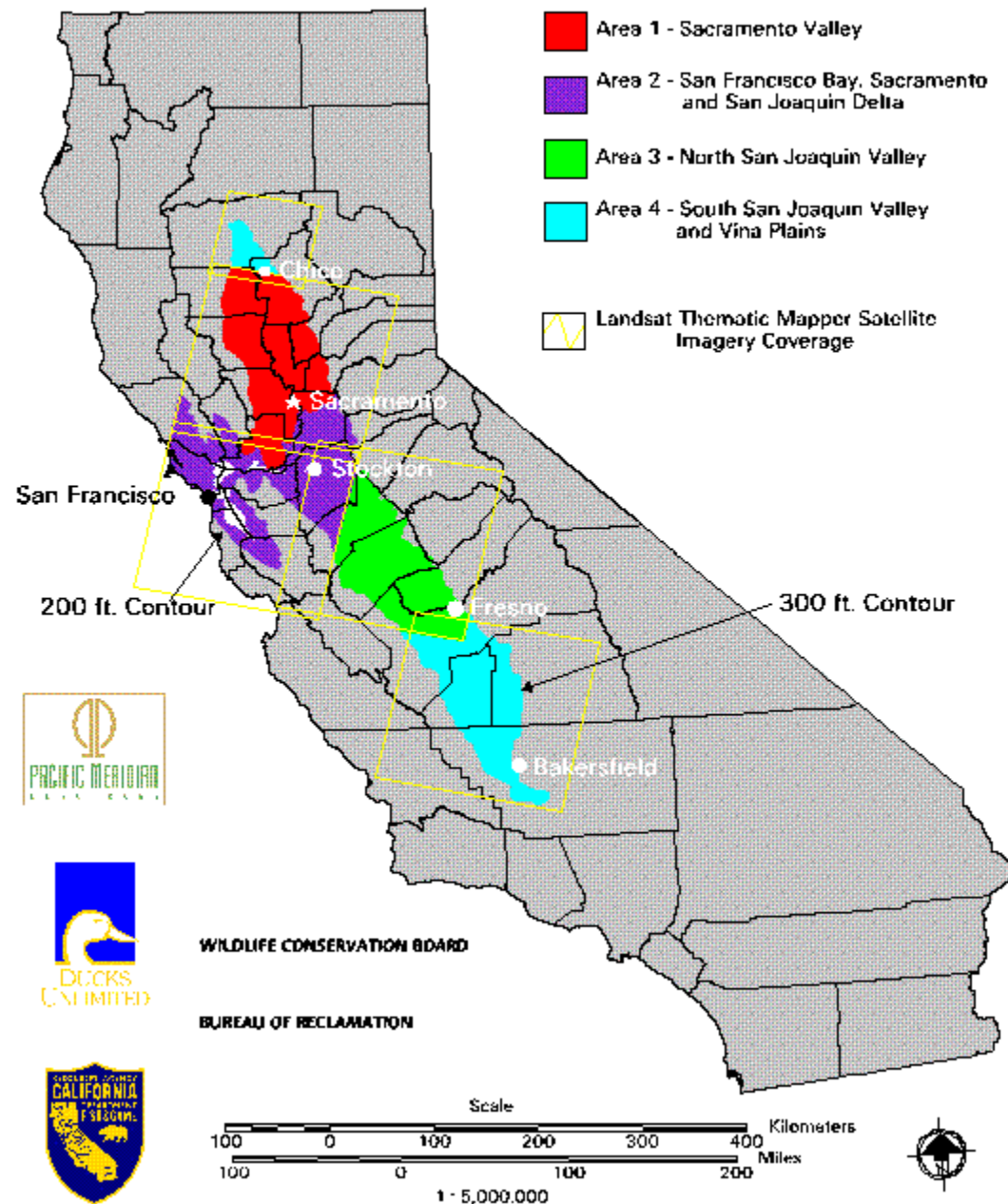
Cackling Goose
Reno, NV
12/14/04
Martin Meyers



PHYSID SNAIL ABUNDANCE IN SALT GRASS COMMUNITY



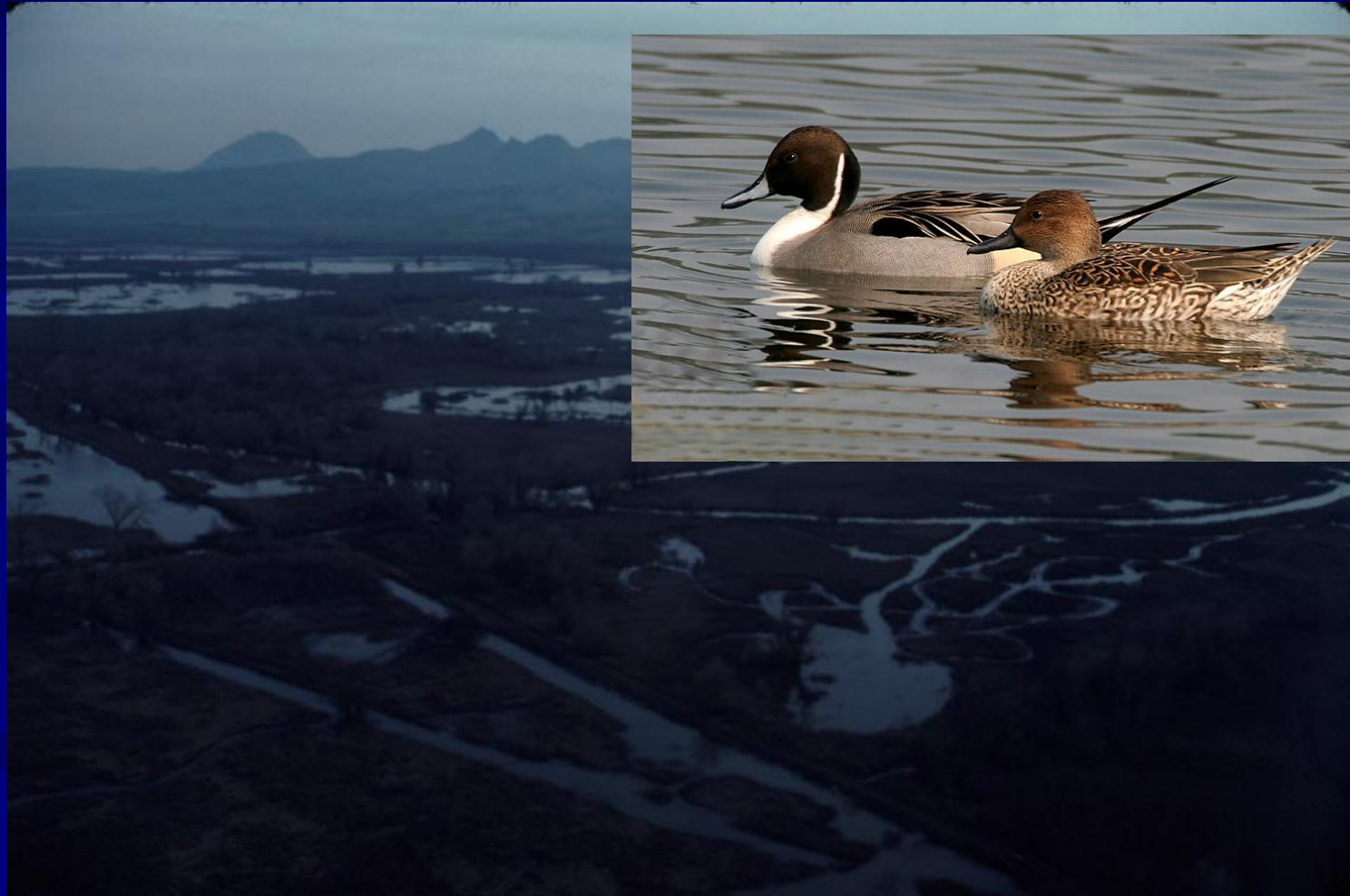
California Wetland and Riparian Geographic Information System Project Boundaries





NORTHERN CALIFORNIA RICE CULTURE

BUTTE SINK CALIFORNIA



SACRAMENTO NATIONAL WILDLIFE REFUGE

ALLUVIAL FAN



SACRAMENTO NATIONAL WILDLIFE REFUGE



COLUSA NATIONAL WILDLIFE REFUGE ANOTHER ALLUVIAL FAN



DELEVAN NATIONAL WILDLIFE REFUGE
SEASONAL FLOODED DEPRESSIONAL AREA



LLANO SECO NATIONAL WILDLIFE REFUGE



SACRAMENTO RIVER NATIONAL WILDLIFE REFUGE

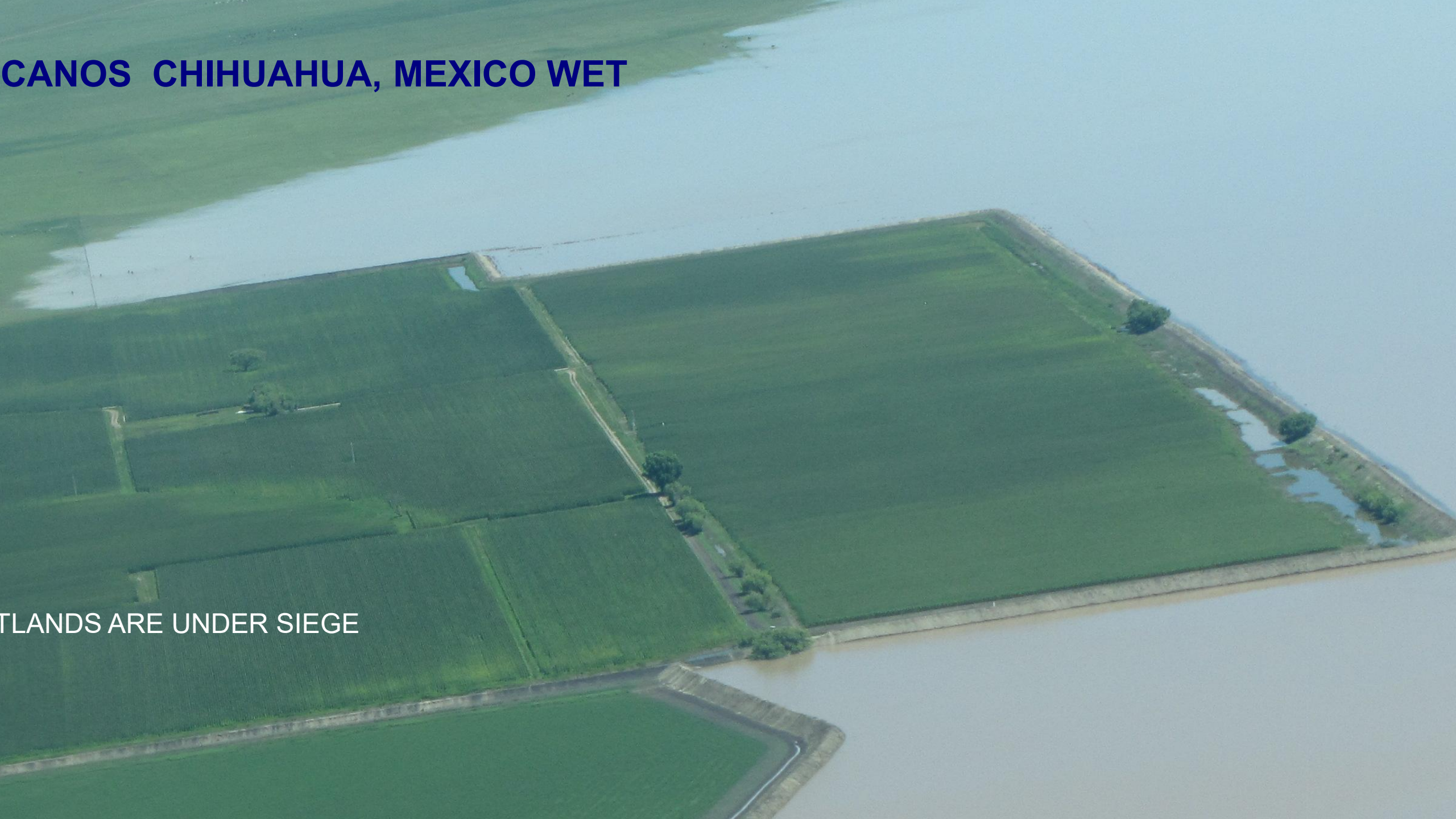






CANOS CHIHUAHUA, MEXICO WET

LANDS ARE UNDER SIEGE



LAGUNA MEXICANOS CHIHUAHUA, MEXICO DRY



MISSISSIPPI ALLUVIAL VALLEY



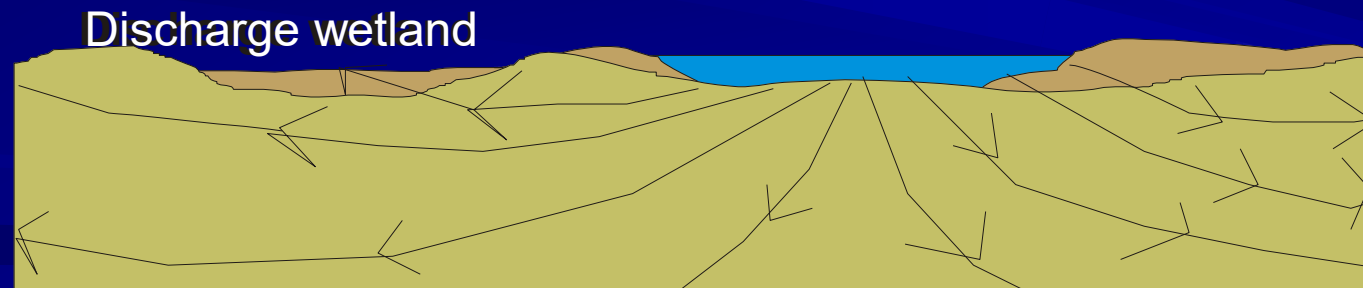
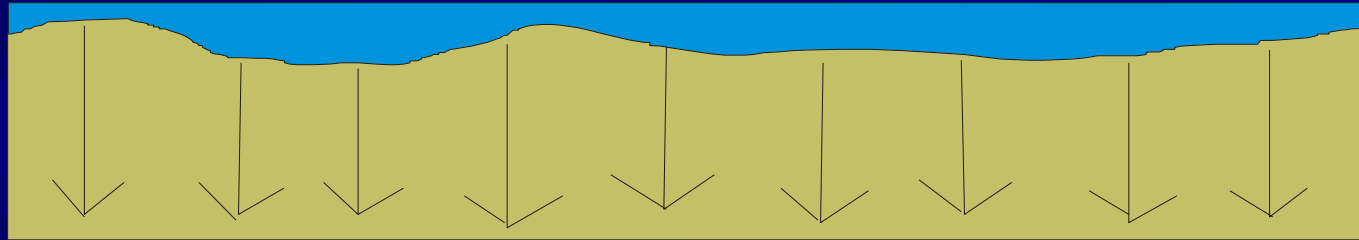
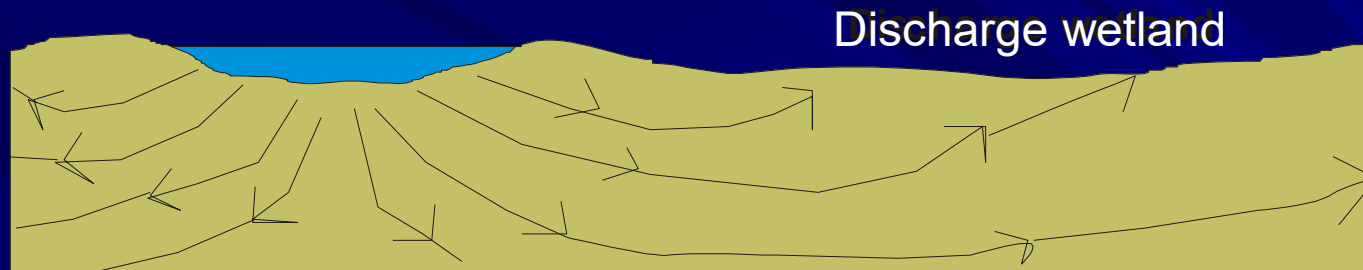
FORESTED WETLAND



MIDDLE RIO GRANDE BOSQUE DEL APACHE NWR

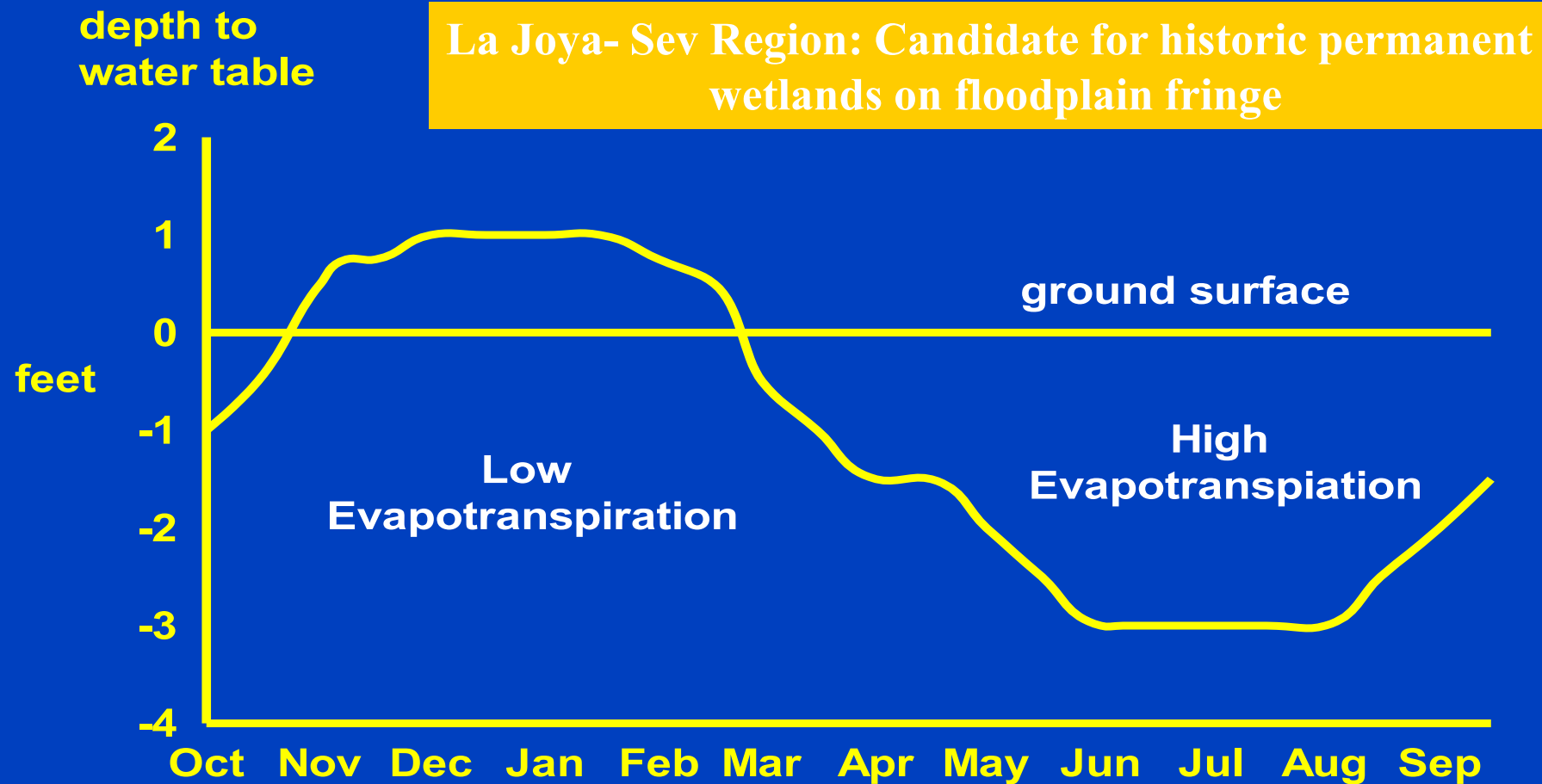


Groundwater flow



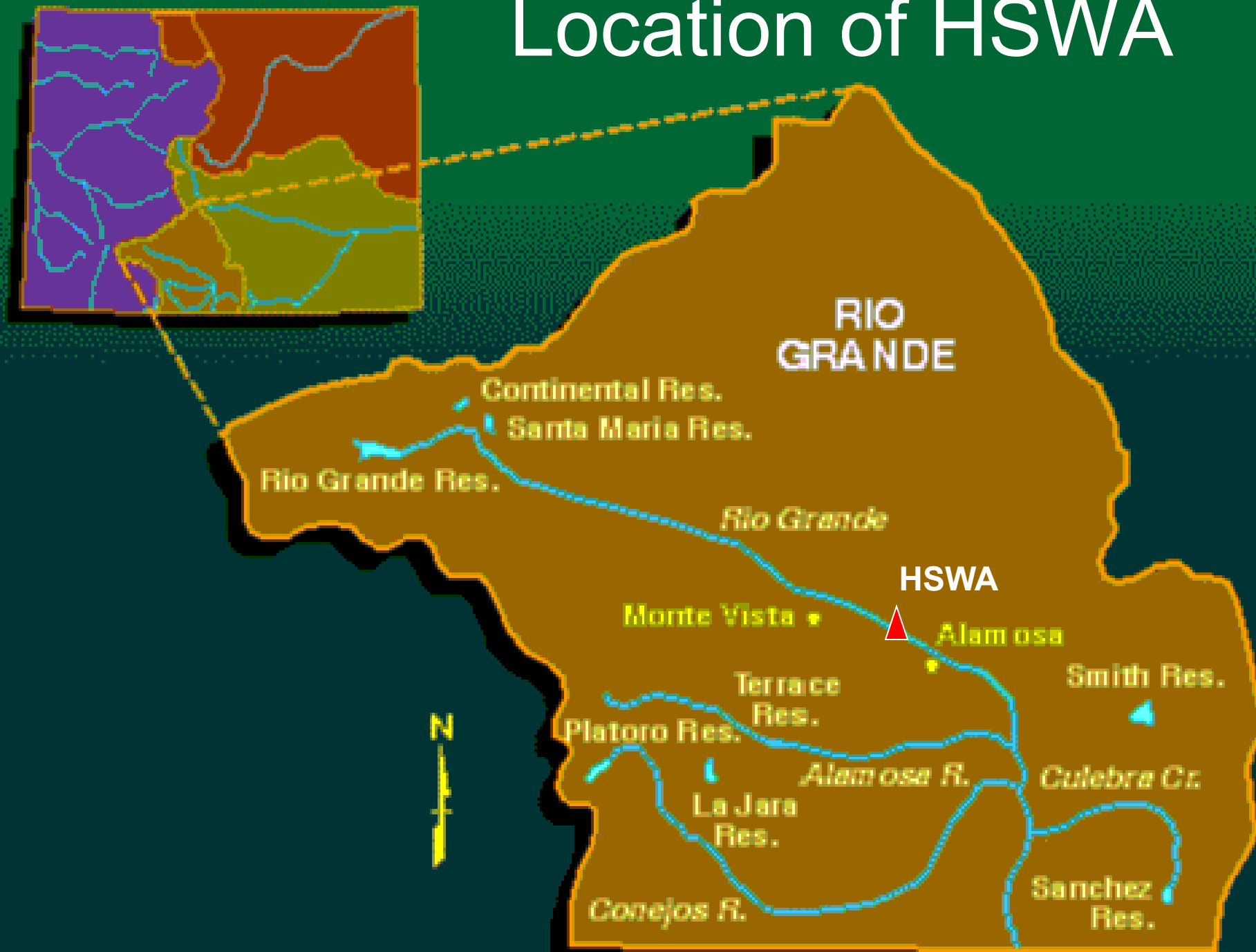
Groundwater flow (direction and speed) is dynamic!

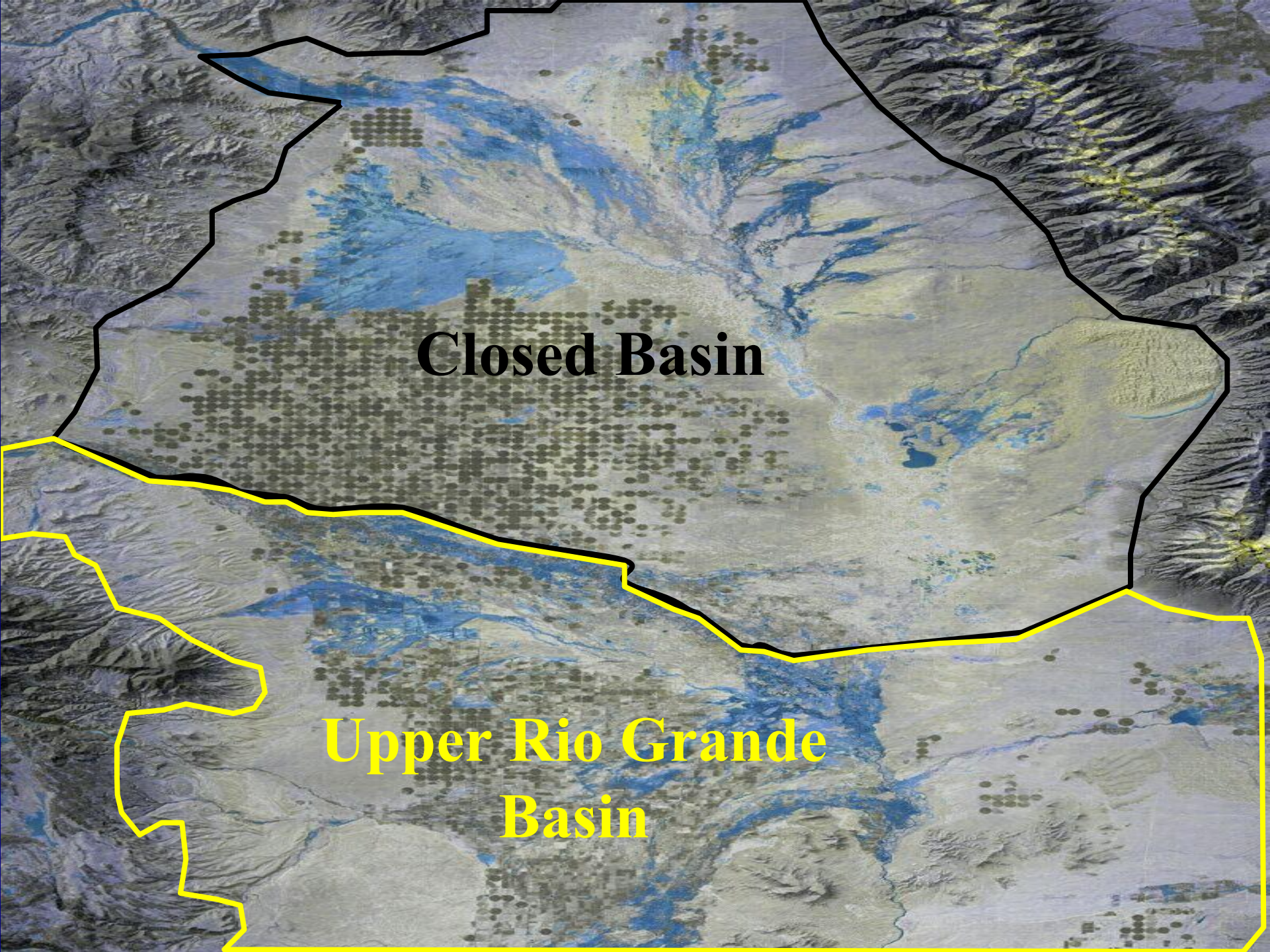
Saltgrass Community Groundwater





Location of HSWA



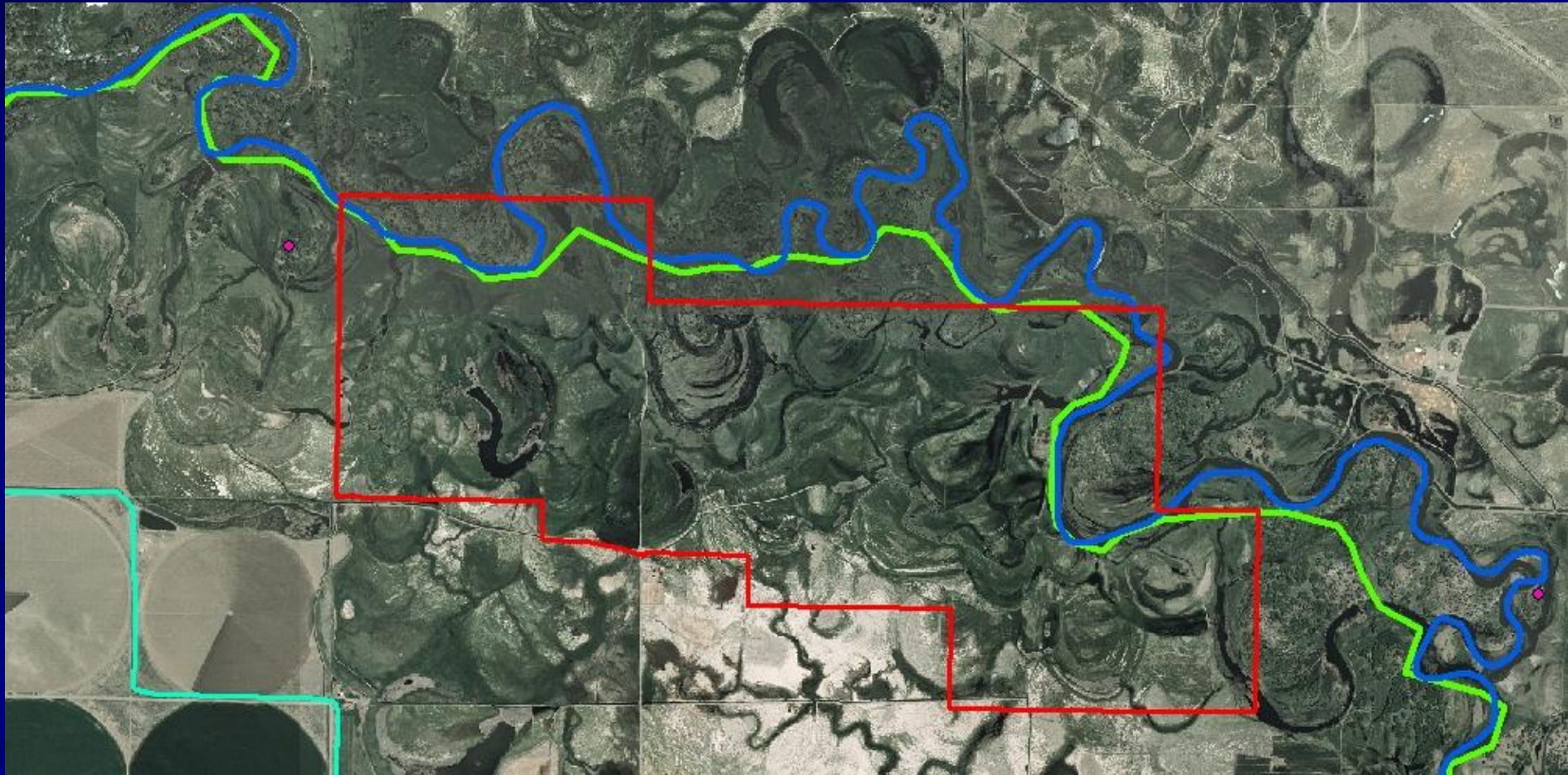


A topographic map showing a river basin. The map is color-coded by elevation, with darker shades of blue and purple representing higher elevations and lighter shades of tan and yellow representing lower elevations. A network of rivers and streams is visible, flowing through the landscape. Two specific areas are highlighted with colored outlines: a black outline for a 'Closed Basin' in the upper central part of the map, and a yellow outline for the 'Upper Rio Grande Basin' in the lower part of the map. The text labels are placed within their respective outlined areas.

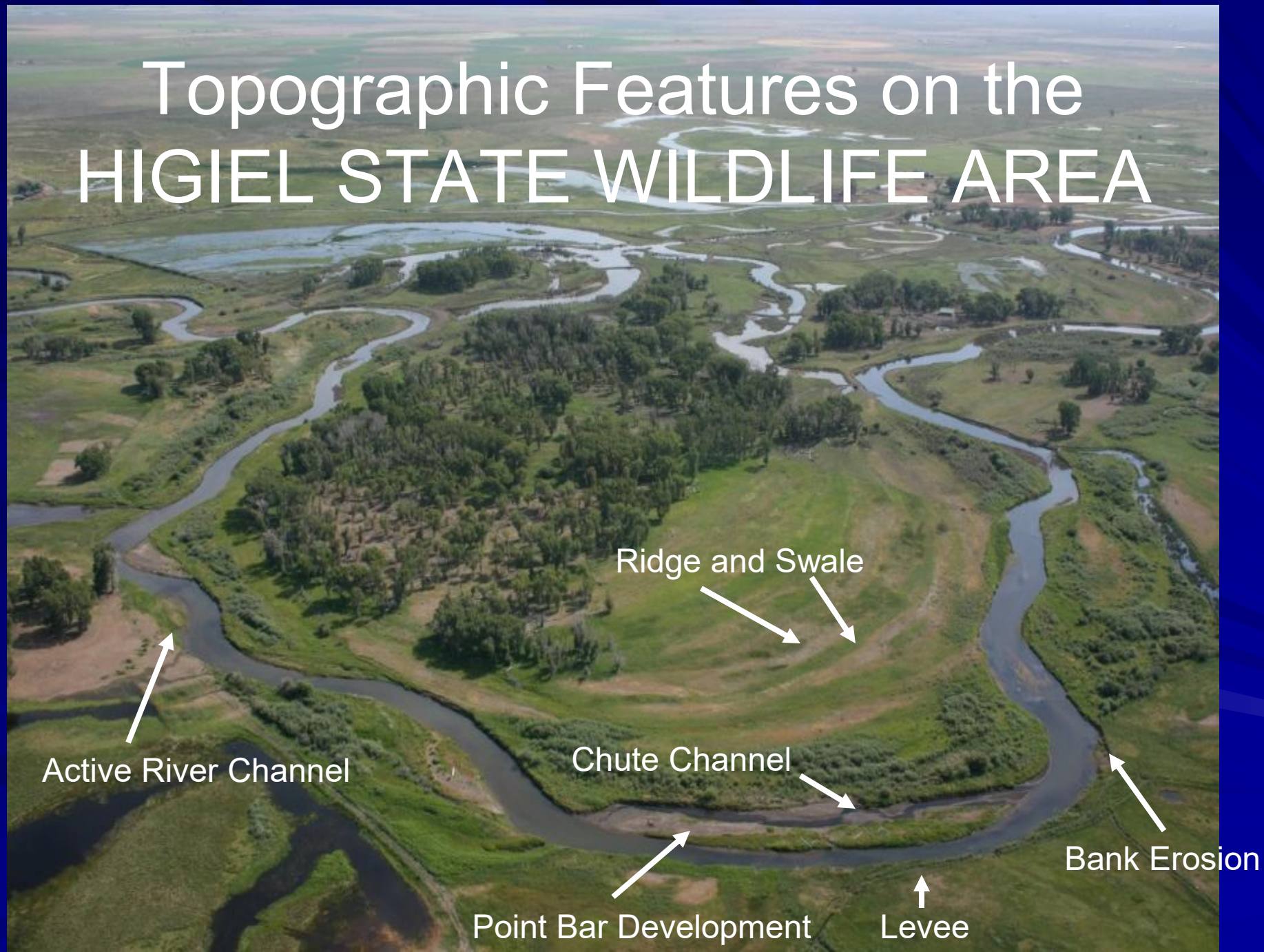
Closed Basin

**Upper Rio Grande
Basin**

HSWA: Rio Grande Floodplain

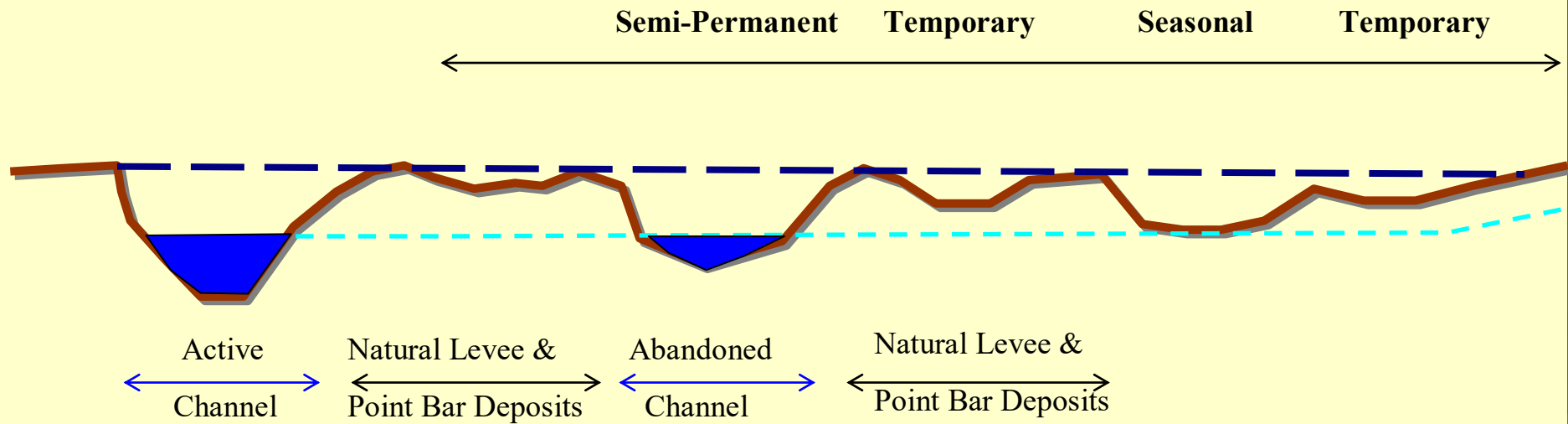


Topographic Features on the HIGIEL STATE WILDLIFE AREA

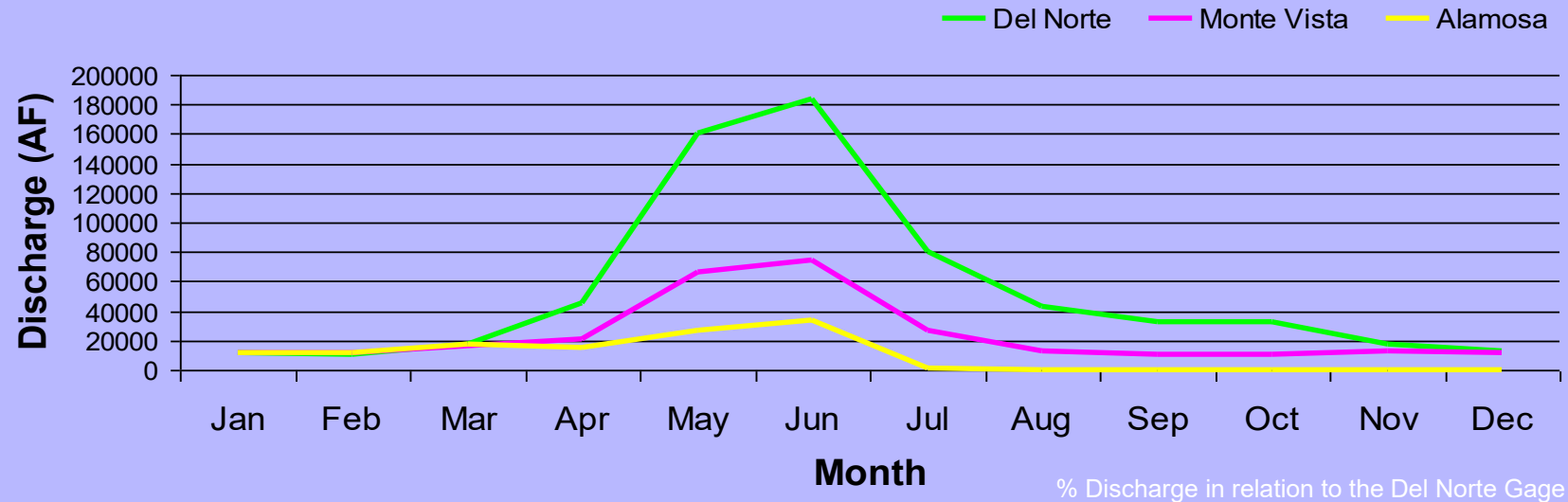




Hydrologic Linkage and Juxtaposition of Riparian Wetland Environments



Average Monthly Discharge of Rio Grande at Del Norte, Monte Vista and Alamosa, CO 1980-2008



- Dampening of the hydrograph
- Alterations of fluvial processes
- Non-connectivity between the River and Floodplain

Month	% Monte Vista	% Alamosa
Jan	102.71	108.81
Feb	105.82	114.28
Mar	91.75	102.14
Apr	46.21	33.82
May	41.74	16.81
Jun	40.42	18.51
Jul	33.74	1.16
Aug	30.84	1.06
Sep	33.77	1.16
Oct	32.99	1.18
Nov	74.23	2.65
Dec	96.95	3.46

OURAY NATIONAL WILDLIFE REFUGE



LOESS HILLS NATIONAL WILDLIFE REFUGE



HANALEI NATIONAL WILDLIFE REFUGE



HULEIA NATIONAL WILDLIFE REFUGE



WIND DEFLATION

■ PLAYAS

KEALIA POND NWR









TECTONIC







RED ROCK LAKES NATIONAL WILDLIFE REFUGE





COASTAL FRESH WETLAND



BIOLOGICAL

- Beavers
- Woody Drifts
- Plant Biomass



ANTHROPOGENIC

- ENTIRELY MAN MADE
- EXTENSIVE HUMAN ACTIVITIES CREATE A NEW SETTING

JAMES CAMPBELL NWR KII UNIT



'Alae 'ula Hawaiian Moorhen Endangered



Pop'n est. unknown

Distribution: Kaua'i,
O'ahu

Habitat: Emergent
wetlands,
waterways, uplands

'Alae ke'oke'o Hawaiian Coot Endangered



Pop'n est. 1500-3000

Distribution: Ni'ihau,
Kaua'i, O'ahu,
Moloka'i, Lana'i, Maui,
Hawai'i

Habitat: Emergent
wetlands, uplands



Ae'o Hawaiian Stilt Endangered

Pop'n est. 1200-1500

Distribution: Ni'ihau,
Kaua'i, O'ahu, Moloka'i,
Lana'i, Maui, Hawai'i

Habitat: Early-
succession wetlands,
mudflats

WHAT SHOULD BE LEARNED

- FORMATIVE PROCESSES ARE DIVERSE ACROSS THE CONTINENT
- FORMATIVE PROCESSES ARE ONGOING
- A SPECIES MAY HAVE A WIDE DISTRIBUTION WHERE CLIMATIC AND WETLAND FUNCTIONS ARE SIMILAR
- ANSERIFORMES AND CHRADRIIFORMES HAVE A NEAR GLOBAL DISTRIBUTION WHEREAS OTHER ORDERS OF WETLAND DEPENDENT BIRDS HAVE MORE LIMITED DISTRIBUTIONS