

# Generalidades de los humedales: Humedales como recursos a escala continental y su valor para especies dependientes de ellos

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Manejo de humedales para técnicos en México II  
CHIHUAHUA MEXICO  
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**NORTH AMERICA**  
**A CONTINENT RICH IN**  
**WETLAND RESOURCES**

Overview of North  
American Wetlands and Their  
Relationship with Formative  
Processes and the  
Interconnections Across a Large  
Scale

# IZEMBEK LAGOON





# COPPER RIVER DELTA, ALASKA



# BUTTE SINK CALIFORNIA



**LAGUANA BUSTILLOS CHIHUAHUA, MEXICO WET**



08.07.2013



# MANY FORMATIVE PROCESSES

- WITH MANY DIFFERENT CLIMATIC SETTINGS
- WITH VERY DIFFERENT LAND USE HISTORIES
- WITHIN A NATION THAT IS DEVELOPING A VISION, INTEREST, AND RESOURCES TO PROTECT AND MANAGE WETLAND RESOURCES WITH SUCCESS



# Fluvial Dynamics

- Floodplains
- Lake beds

# FORMATIVE PROCESSES

## STATE

- Chihuahua
- Coahuila
- Nuevo Leon
- Zacatecas
- Tamaulipas

## PROCESS

- Fluvial dynamics, Wind deflation
- Fluvial dynamics, Wind deflation
- Fluvial dynamics, Wind deflation
- Fluvial dynamics, Wind deflation
- Fluvial dynamics,

# FORMATIVE PROCESSES

## STATE

■ Durango

■ Sinaloa

■ Guanajuato

■ Mexico

■ Puebla

■ Distrito Federal

## PROCESS

■ Fluvial dynamics, Wind deflation

■ Fluvial dynamics, Tectonics?

■ Fluvial dynamics, Wind deflation

■ Fluvial dynamics, Wind deflation, Tectonics?

■ Fluvial dynamics,

■ Fluvial dynamics

# FORMATIVE PROCESSES

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



I SAY WE HAVE BEEN IN THE  
ANTHROPOCENE FOR 200  
YEARS

THIS MEANS WE MUST MAKE  
DECISIONS IN HIGHLY MODIFIED  
SETTINGS!!

# GENERAL CONDITIONS

- More than one formative factor is often involved in wetland creation
- Major formative process may have occurred millions of years ago
- Formative processes are on going but most often in subtle ways that are difficult to detect over small temporal scales.
- Biological factors may be important

# YOUR ROLE

## ■ IS IMPORTANT

- REGARDLESS OF LOCATION

- REGARDLESS OF SIZE OF MANAGED SITE

## ■ TO OPTIMIZE THE INTERCONNECTIONS AMONG WETLANDS

- THROUGH THE HABITATS AND FOODS REQUIRED FOR LIFE HISTORY SUCCESS OF ANY SPECIES

- CONSISTENCY OF RESOURCES ACROSS WETLAND CYCLES TO ASSURE THE BUILDING OF WILDLIFE TRADITIONS.



# 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

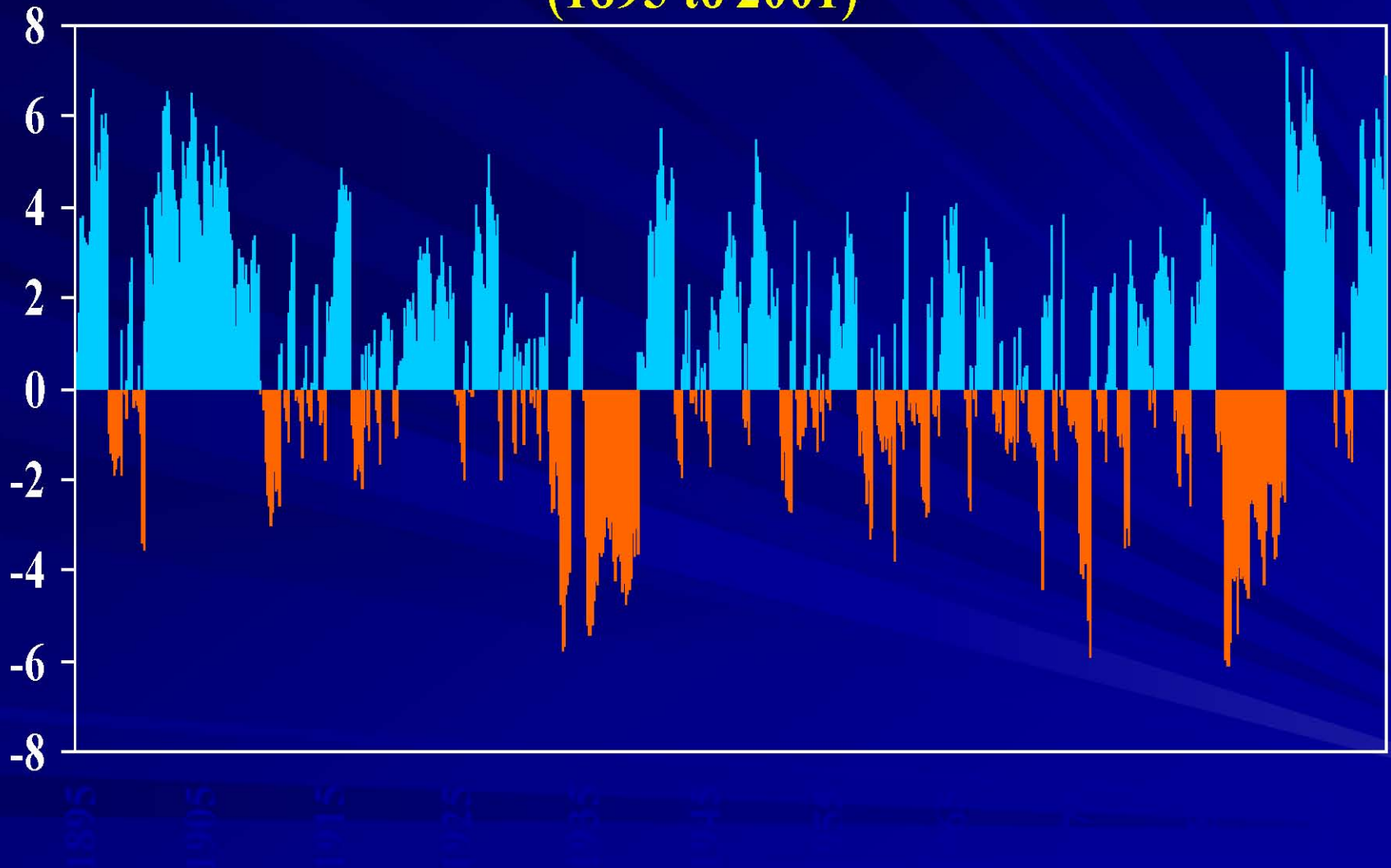


# EXAMPLES OF GLACIATION

Pothole region has many different features

- 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





# Southern Saskatchewan



Transition to Boreal Forest

Grasslands



Parklands

Coteau

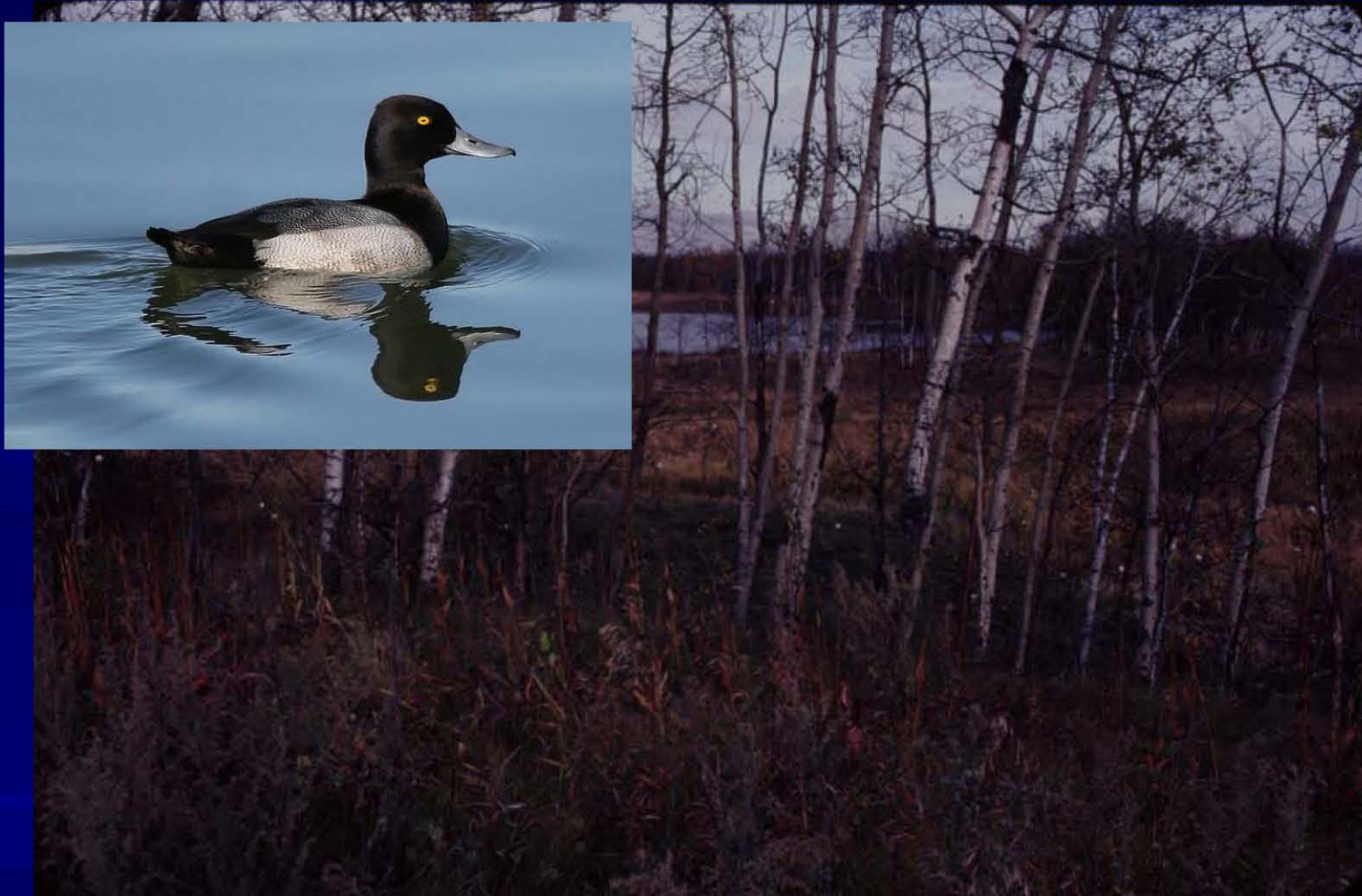


Prairie Potholes





# PARKLANDS, MANITOBA





# AGASSIZ NATIONAL WILDLIFE REFUGE





# DEWEY'S PASTURE, NW IOWA























NO  
MOTOR  
VEHICLES  
EXCEPT  
SNOWMOBILES





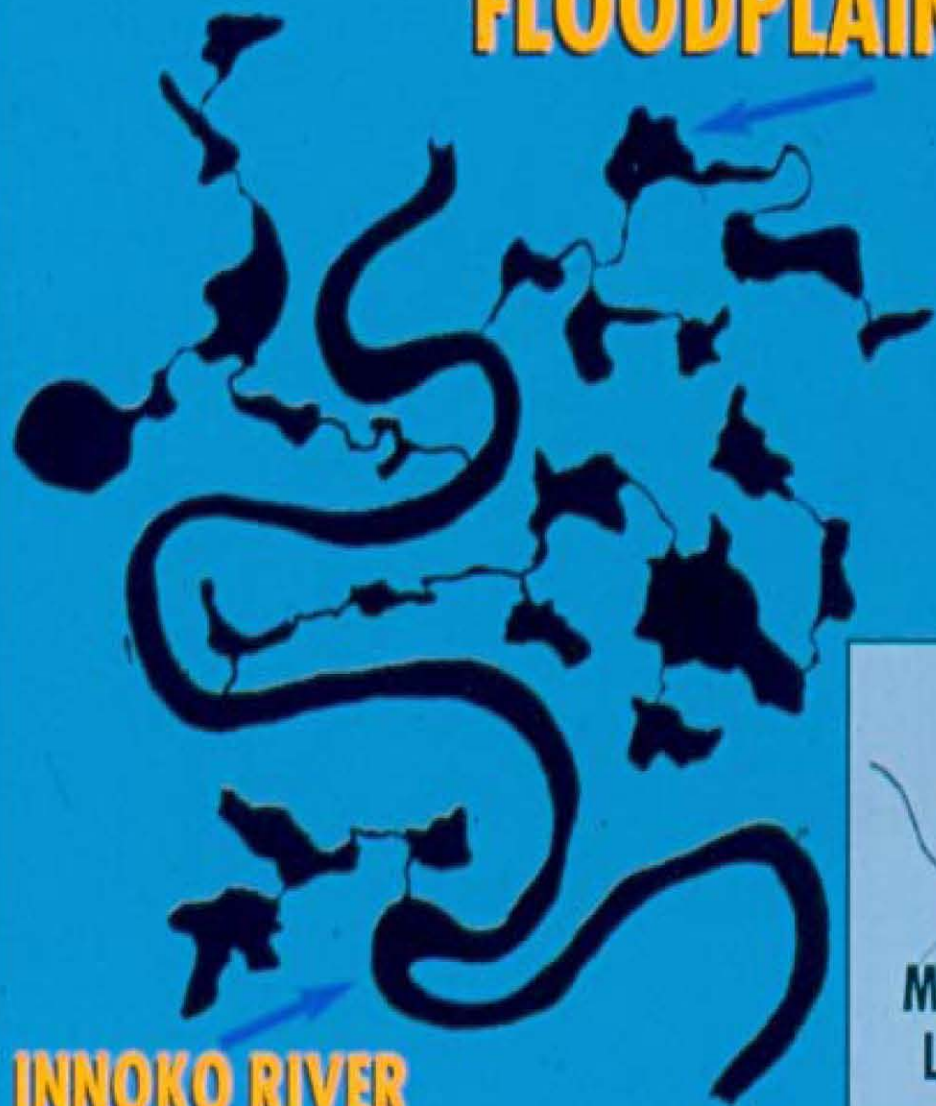




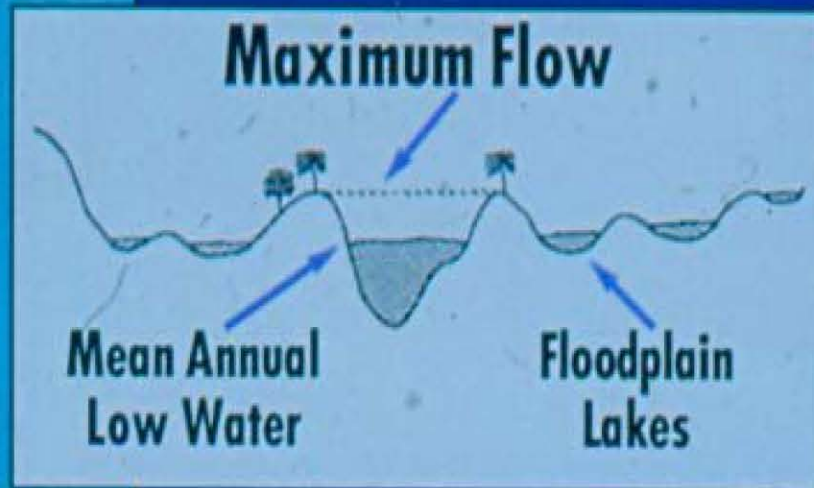




# FLOODPLAIN LAKES



**INNOKO RIVER**





# Western Alaska River System







NATURAL LEVEE

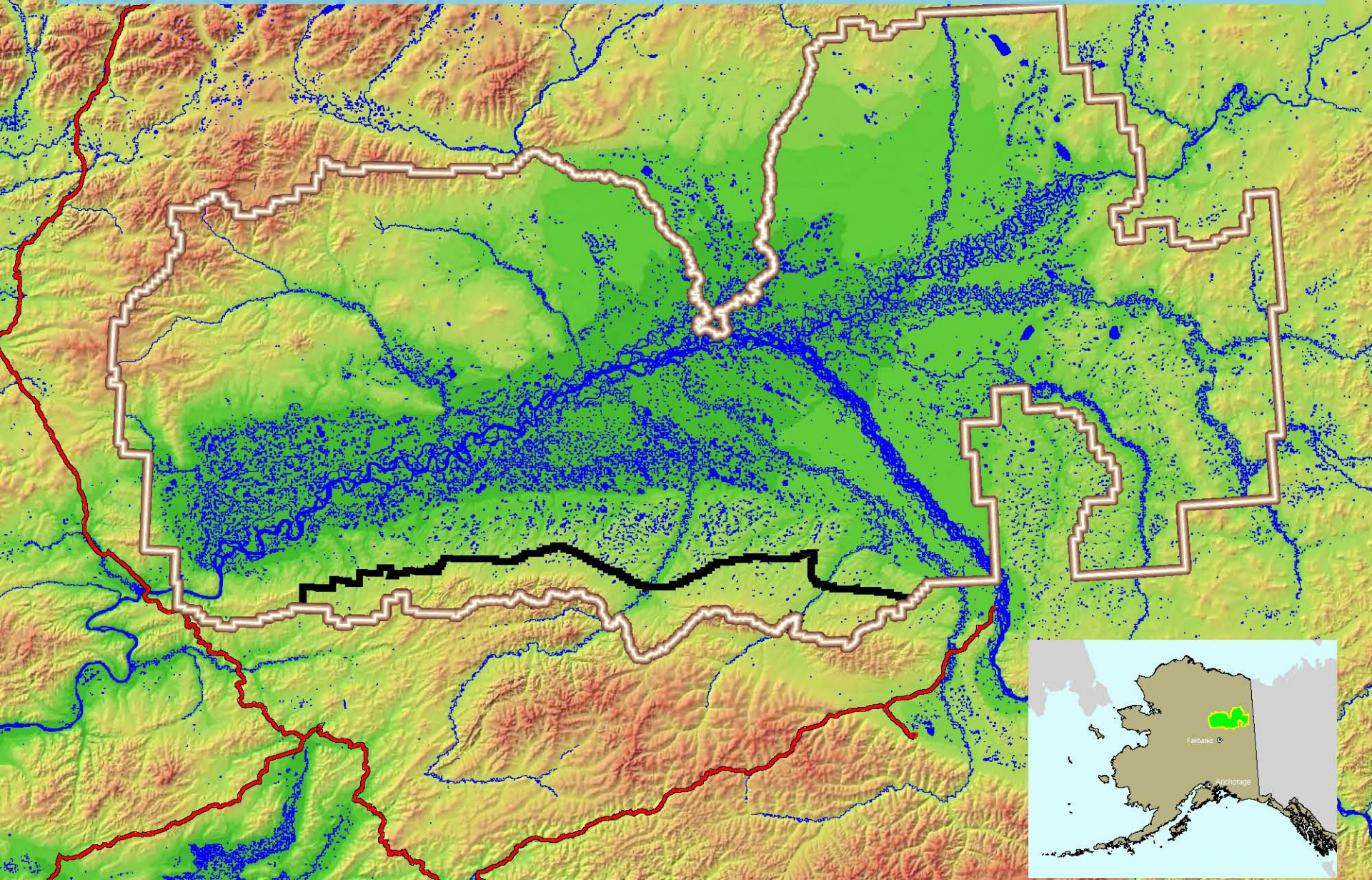


# YUKON FLATS NATIONAL WILDLIFE REFUGE





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





# Wetlands of Yukon Flats





# Wetlands of Yukon Flats







U.S. Fish & Wildlife Service

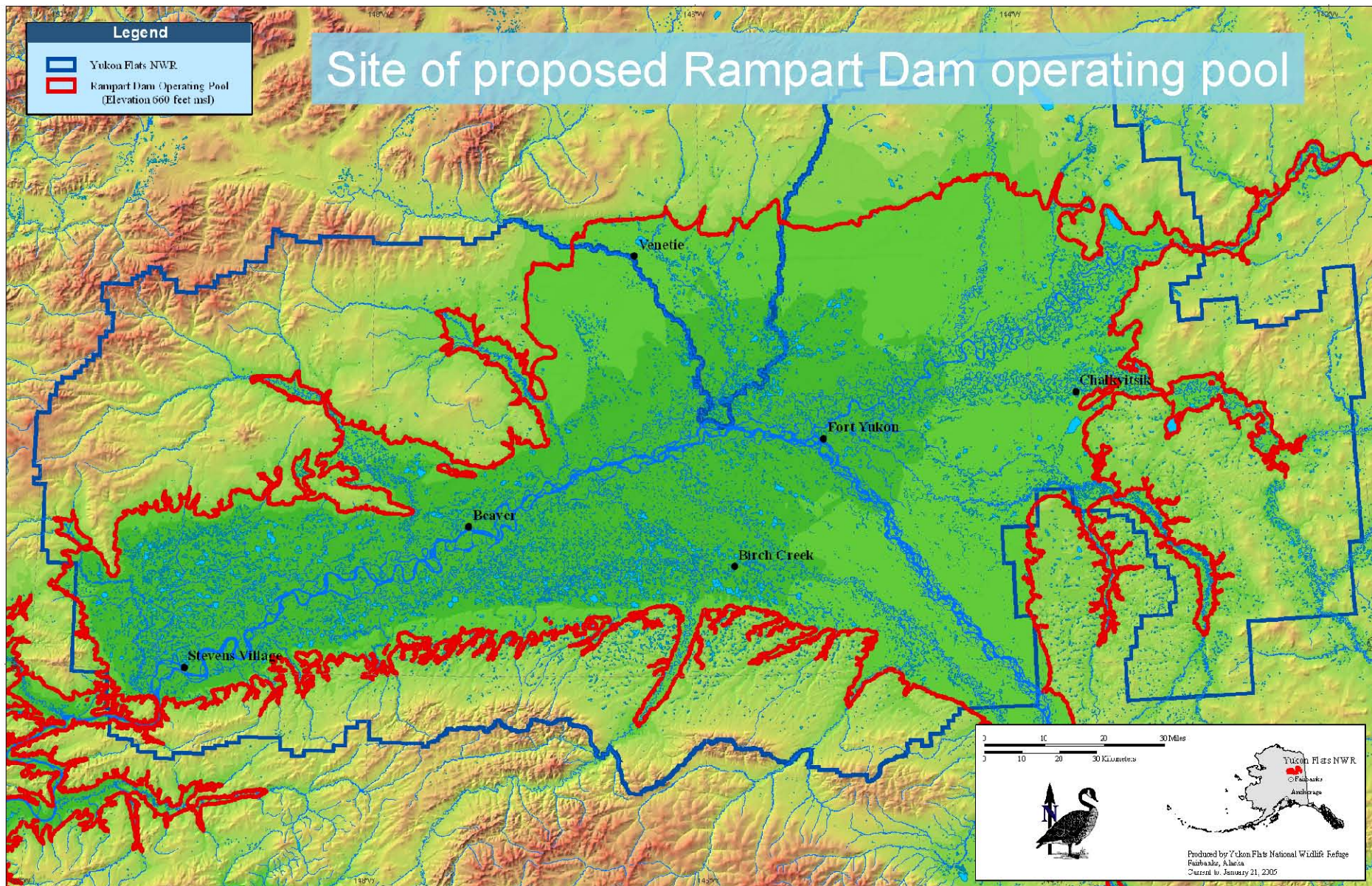
Yukon Flats National Wildlife Refuge, Alaska

Rampart Dam Operating Pool

# Site of proposed Rampart Dam operating pool

### Legend

-  Yukon Flats NWR.
-  Rampart Dam Operating Pool (Elevation 660 feet msl)





# Lower Klamath NWR



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

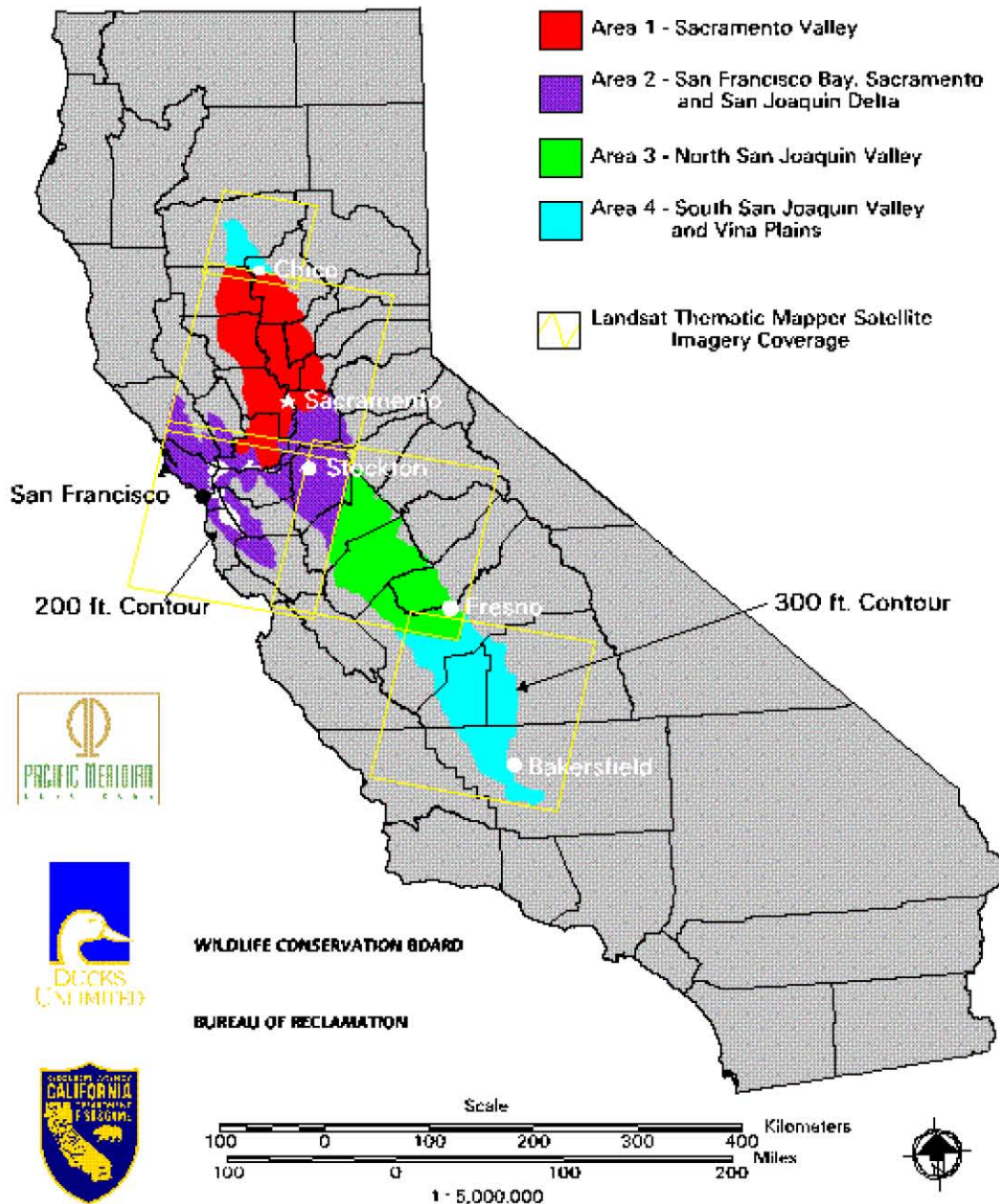








# California Wetland and Riparian Geographic Information System Project Boundaries

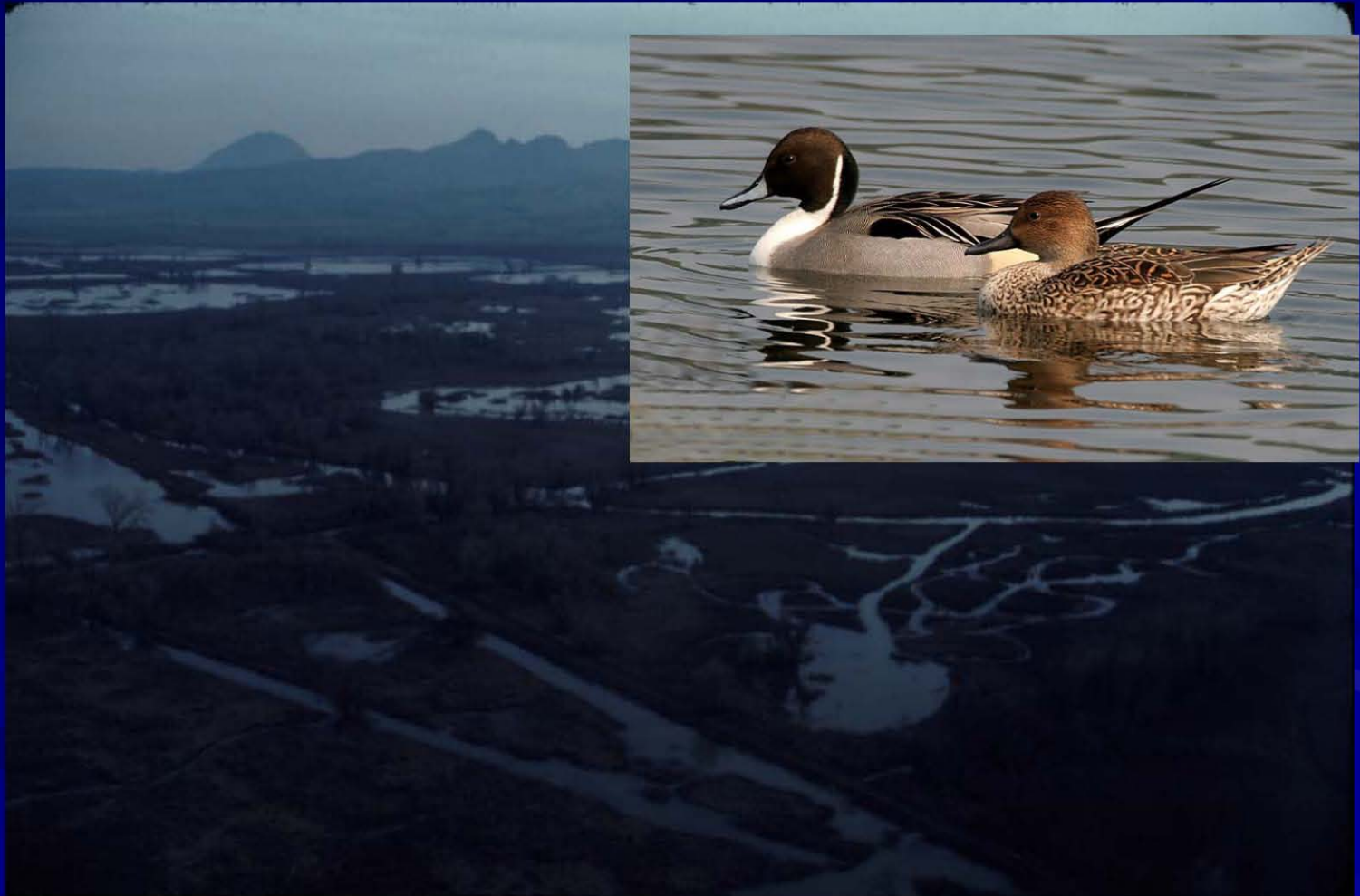








# BUTTE SINK CALIFORNIA



# BUTTE SINK





# SACRAMENTO NATIONAL WILDLIFE REFUGE





# SACRAMENTO NATIONAL WILDLIFE REFUGE





# COLUSA NATIONAL WILDLIFE REFUGE





# DELEVAN NATIONAL WILDLIFE REFUGE





# LLANO SECO NATIONAL WILDLIFE REFUGE





# SACRAMENTO RIVER NATIONAL WILDLIFE REFUGE





# SUTTER NATIONAL WILDLIFE REFUGE















# MISSISSIPPI ALLUVIAL VALLEY



**LAGUANA BUSTILLOS CHIHUAHUA, MEXICO WET**



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# HIHUAHUA, MEXICO WET



# LAGUNA MEXICANOS CHIHUAHUA, MEXICO DRY





LAGUNA BABICORA  
CHIHUAHUA, MEXICO DRY



# FORESTED WETLAND





# Factors influencing water movement through the soil

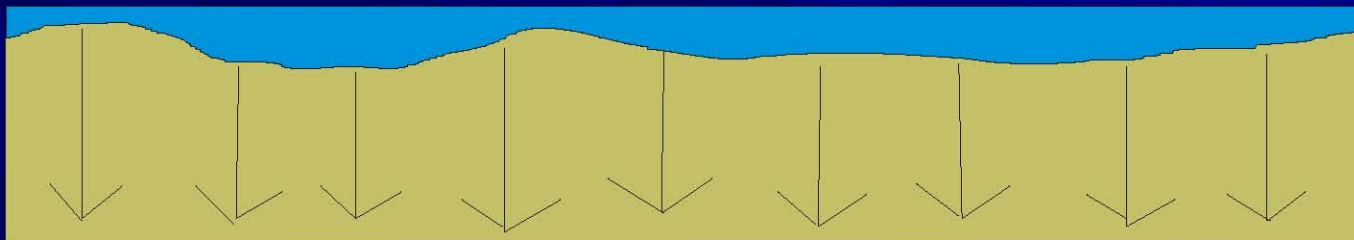
- Structure
- Texture
- Chemistry
- Pore size
- Root distribution of different species
- Length of time between rain events, flood/irrigation, etc. (antecedent water)







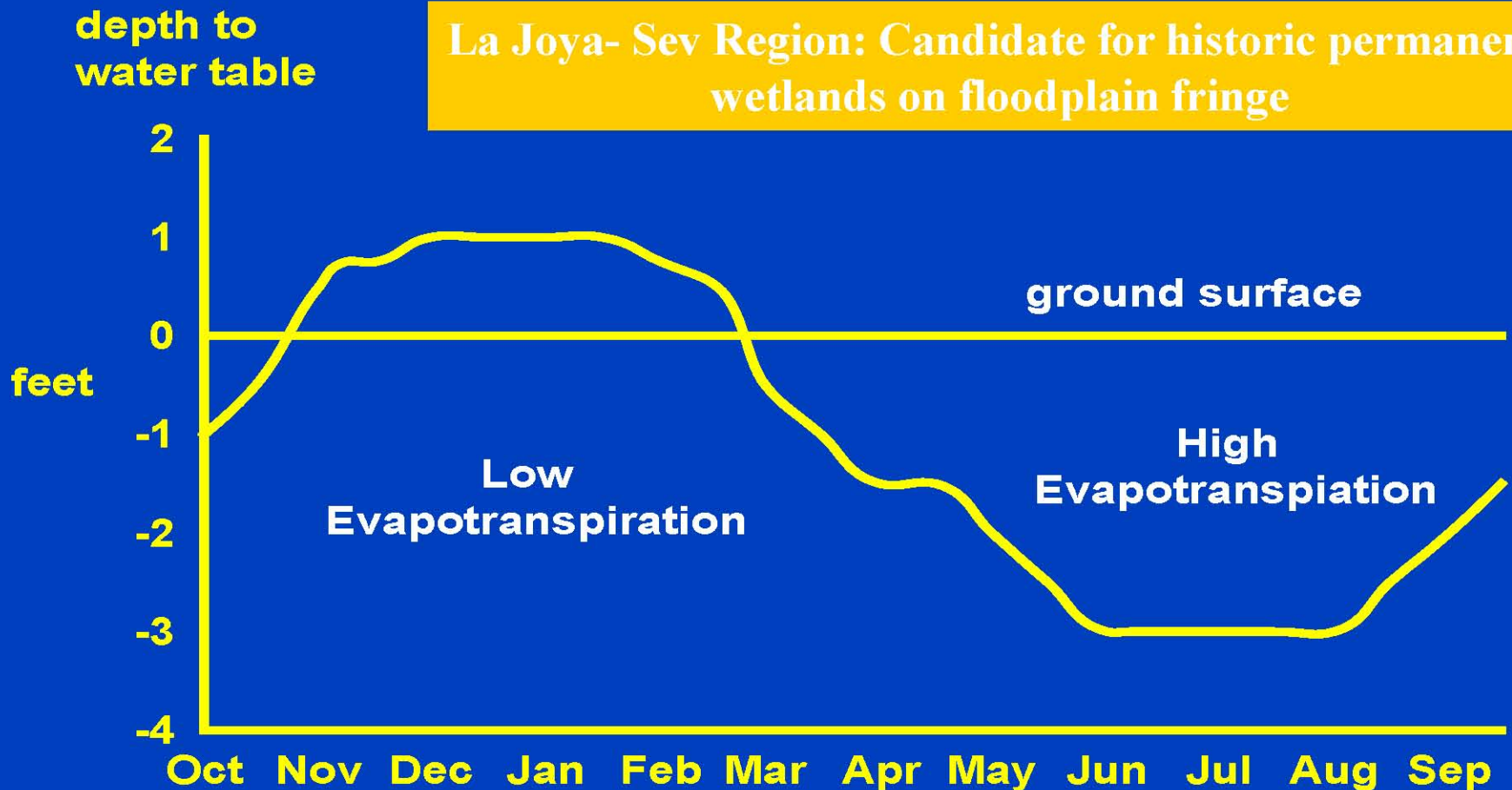
# *Groundwater flow*



*Groundwater flow (direction and speed) is dynamic!*

# Saltgrass Community Groundwater

La Joya- Sev Region: Candidate for historic permanent wetlands on floodplain fringe







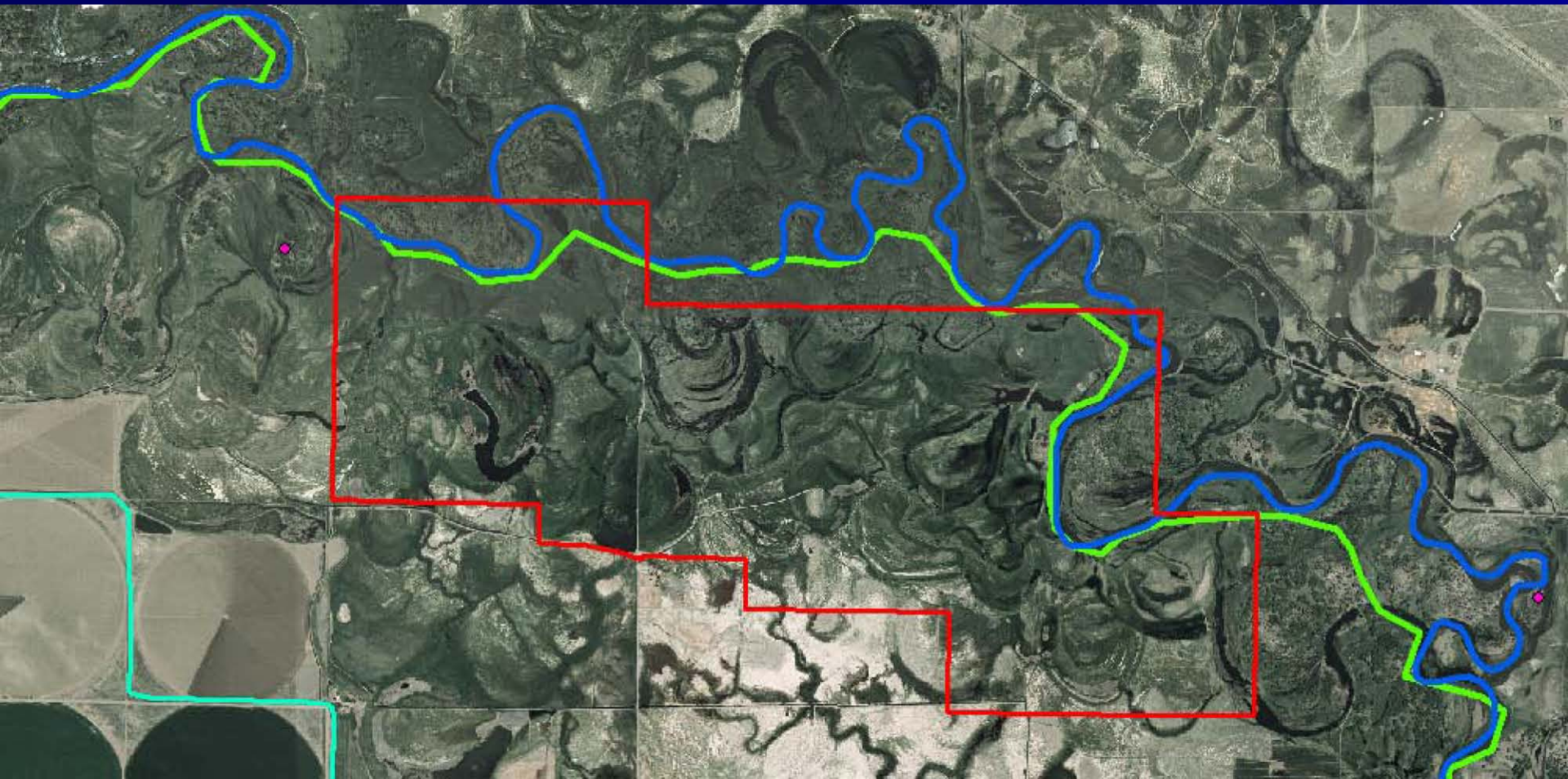


# Location of HSWA





# HSWA: Rio Grande Floodplain





# Topographic Features on the HIGIEL STATE WILDLIFE AREA

Active River Channel

Ridge and Swale

Chute Channel

Point Bar Development

Levee

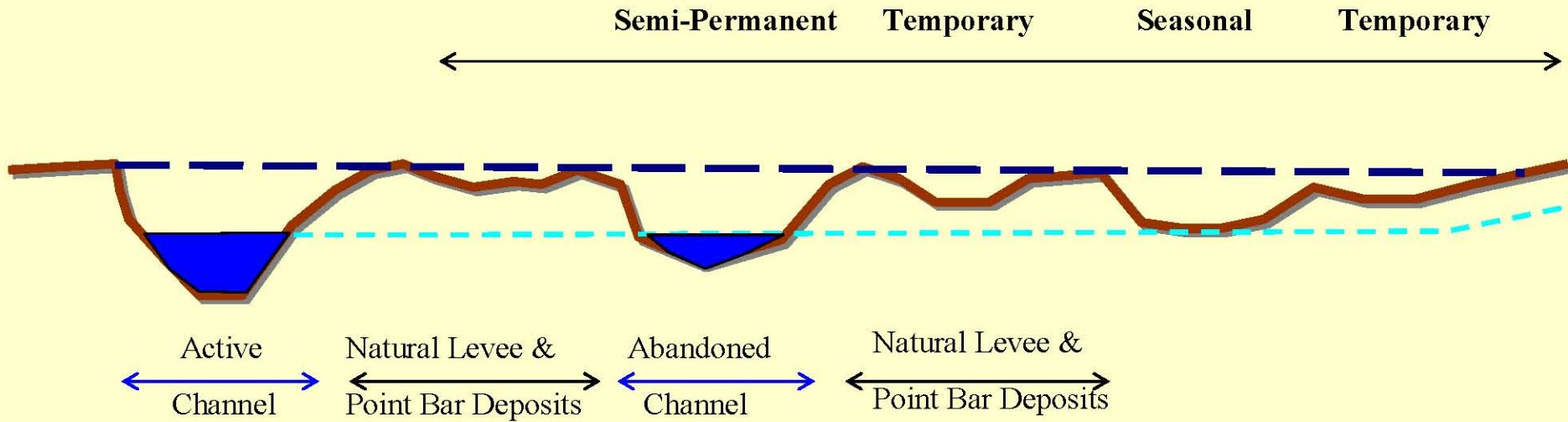
Bank Erosion





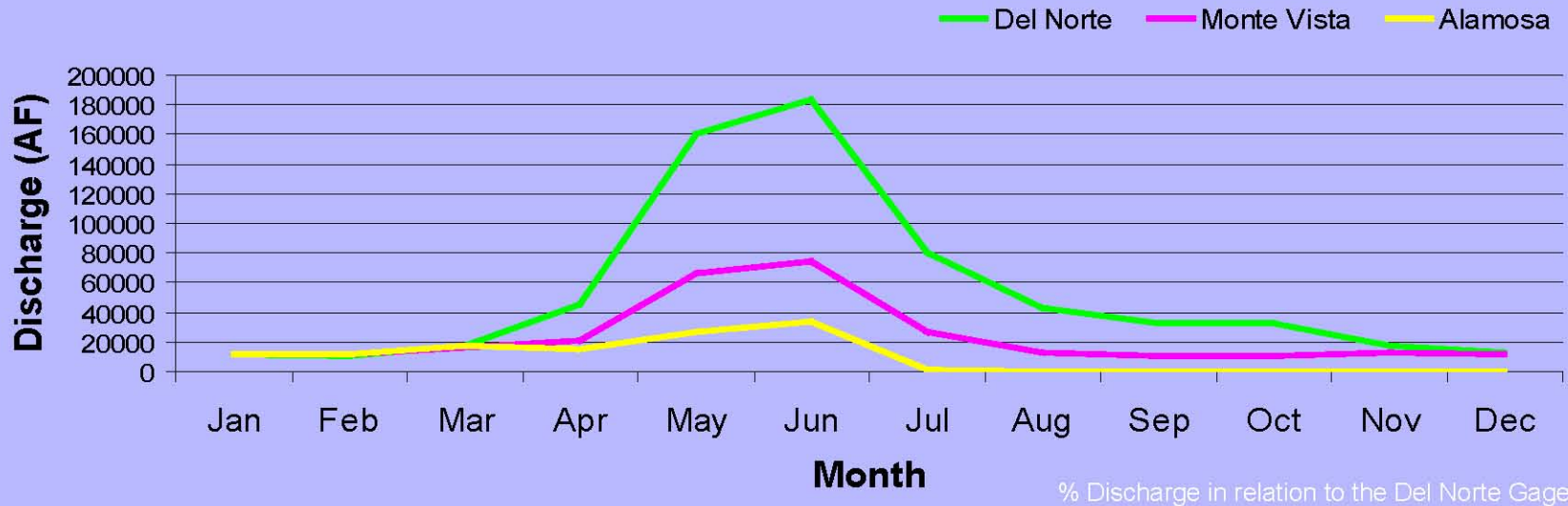


# Hydrologic Linkage and Juxtaposition of Riparian Wetland Environments





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



% Discharge in relation to the Del Norte Gage

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

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

# OURAY NATIONAL WILDLIFE REFUGE

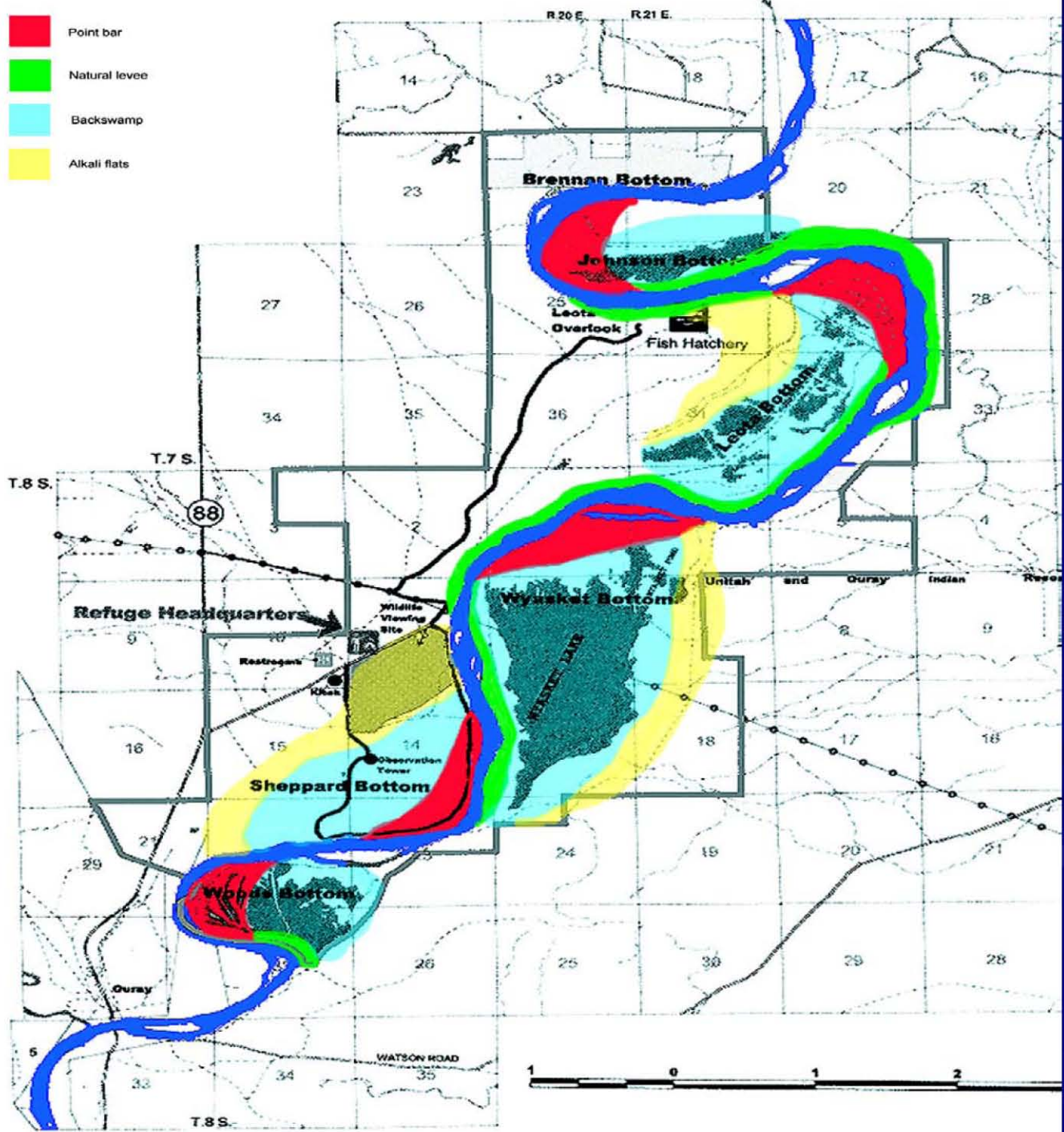




# OURAY NATIONAL WILDLIFE REFUGE



- Point bar
- Natural levee
- Backswamp
- Alkali flats





# SQUAW CREEK NATIONAL WILDLIFE REFUGE



# HANALEI NATIONAL WILDLIFE REFUGE





# HULEIA NATIONAL WILDLIFE REFUGE



# WIND DEFLATION

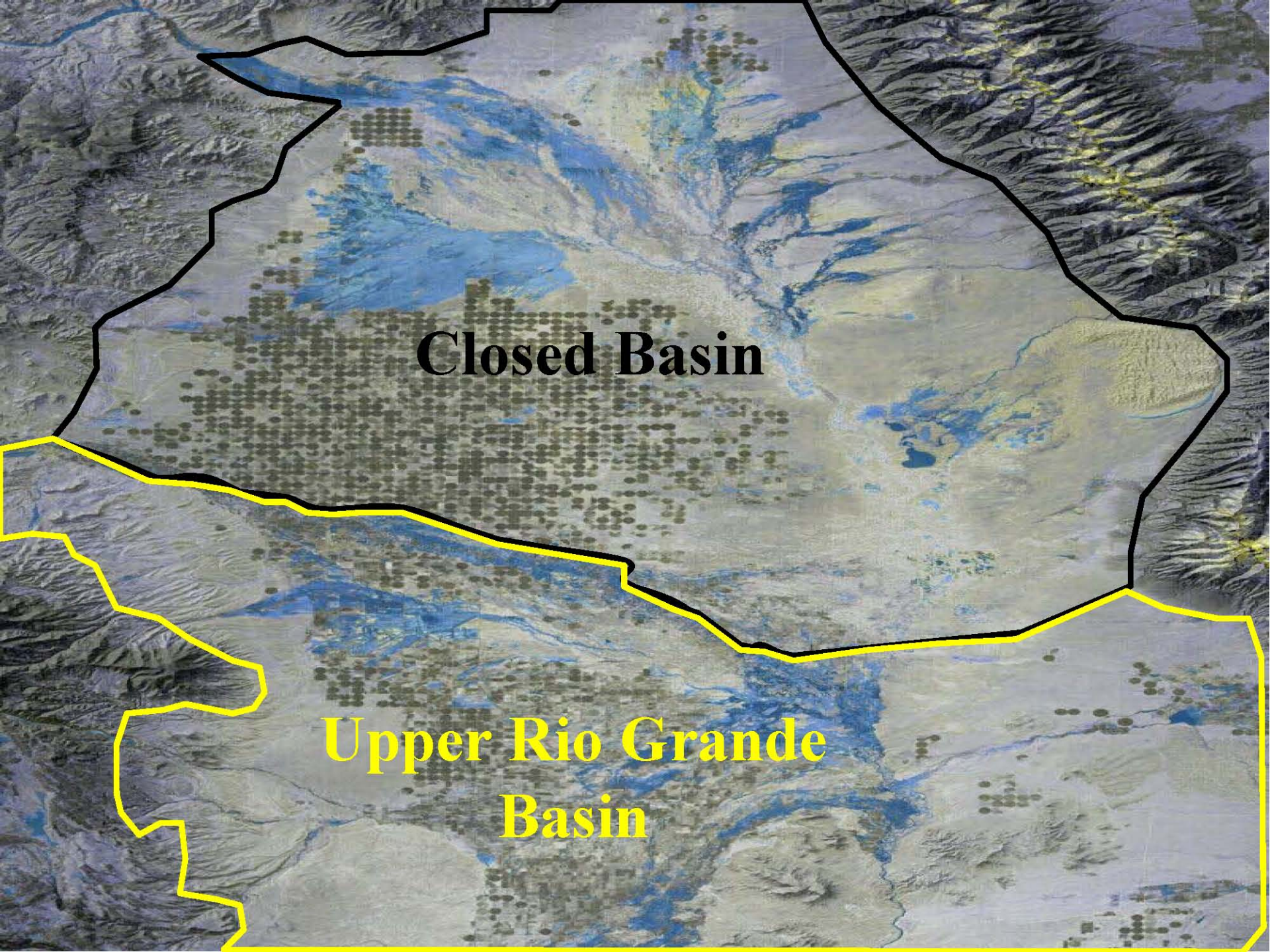
■ PLAYAS



# KEALIA POND NWR







**Closed Basin**

**Upper Rio Grande  
Basin**















TECTONIC



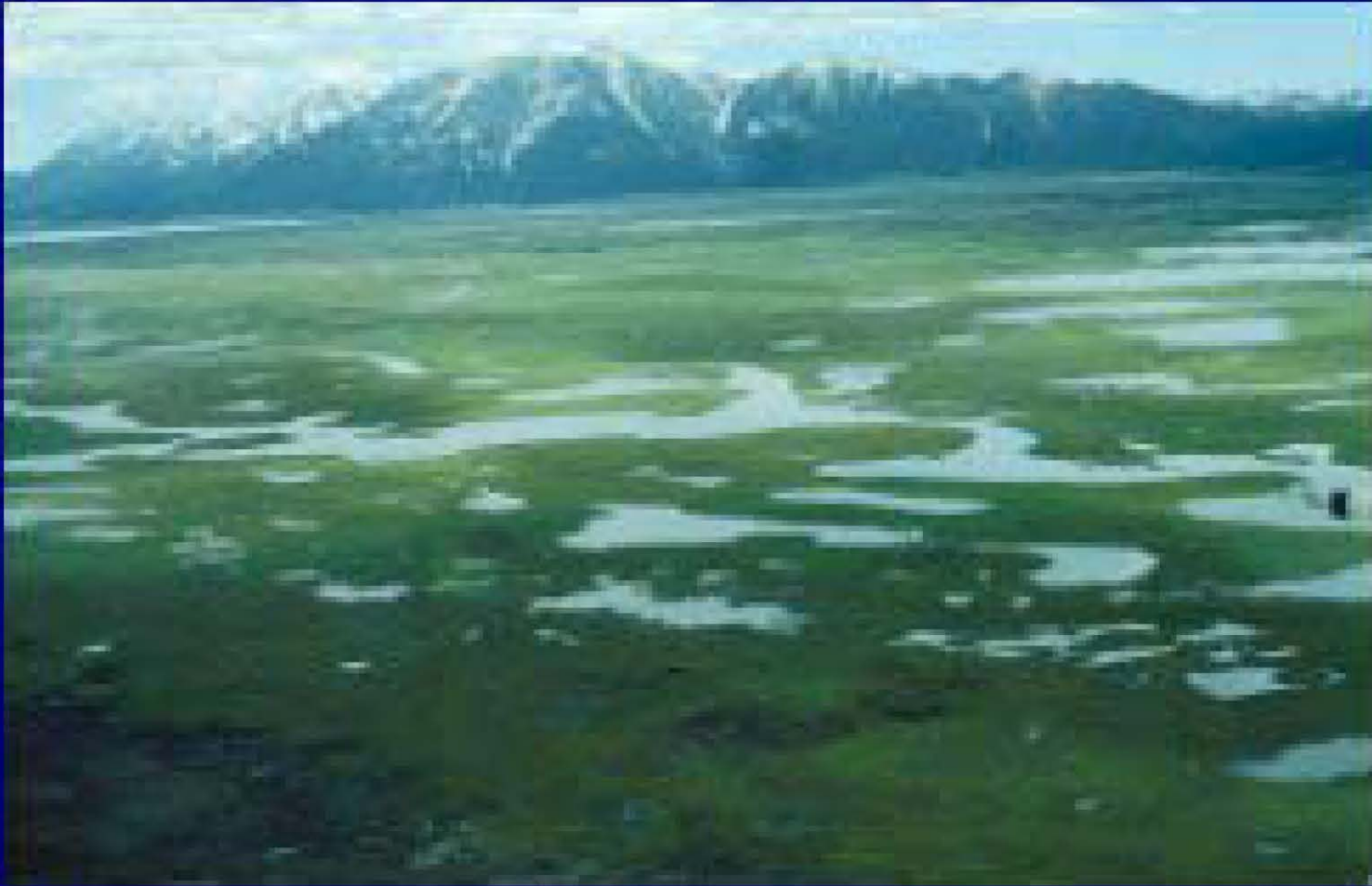








# RED ROCK LAKES NATIONAL WILDLIFE REFUGE











# COASTAL FRESH WETLAND



ST MARKS NATIONAL  
WILDLIFE REFUGE





# 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

- THE VARIATION IN SOIL TEXTURES HAVE A RECOGNIZABLE PATTERN IN RELATION TO LOCATION
- VARIATION IN SOILS AND HYDROLOGIC CONDITION MAY OCCUR OVER A SHORT DISTANCE
- ABIOTIC VARIABILITY DETERMINES THE STRUCTURE, PRODUCTIVITY, AND COMPOSITION OF THE PLANT COMMUNITY
- THE PLANT COMMUNITY IN COMBINATION WITH ABIOTIC FACTORS DETERMINE WHAT NICHEs ARE PRESENT
- THE ADAPTATIONS OF SPECIES DETERMINE WHO WILL FILL THE AVAILABLE NICHEs WHETHER VERTEBRATE OR INVERTEBRATE
- INVERTEBRATES ARE VERY RESPONSIVE TO BOTH ABIOTIC AND BIOTIC CONDITIONS AND PROVIDE AN ABUNDANCE AND DIVERSITY OF NUTRITIONAL BENEFITS FOR MANY SPECIES



# WHAT SHOULD BE LEARNED

- FORMATIVE PROCESSES ARE DIVERSE ACROSS THE CONTINENT
- FORMATIVE PROCESSES ARE ONGOING
- THE SAME SPECIES MAY HAVE A WIDE DISTRIBUTION WHERE CLIMATE AND WETLAND FUNCTIONS ARE SIMILAR
- ALL ORDERS OF BIRDS DO NOT USE AN EXTENSIVE AREA OF WETLANDS ACROSS THE CONTINENT