

Biological Resources Discipline Vision and Mission

**Partnering to Understand, Predict, and Address Complex
Biological Change on Landscapes**

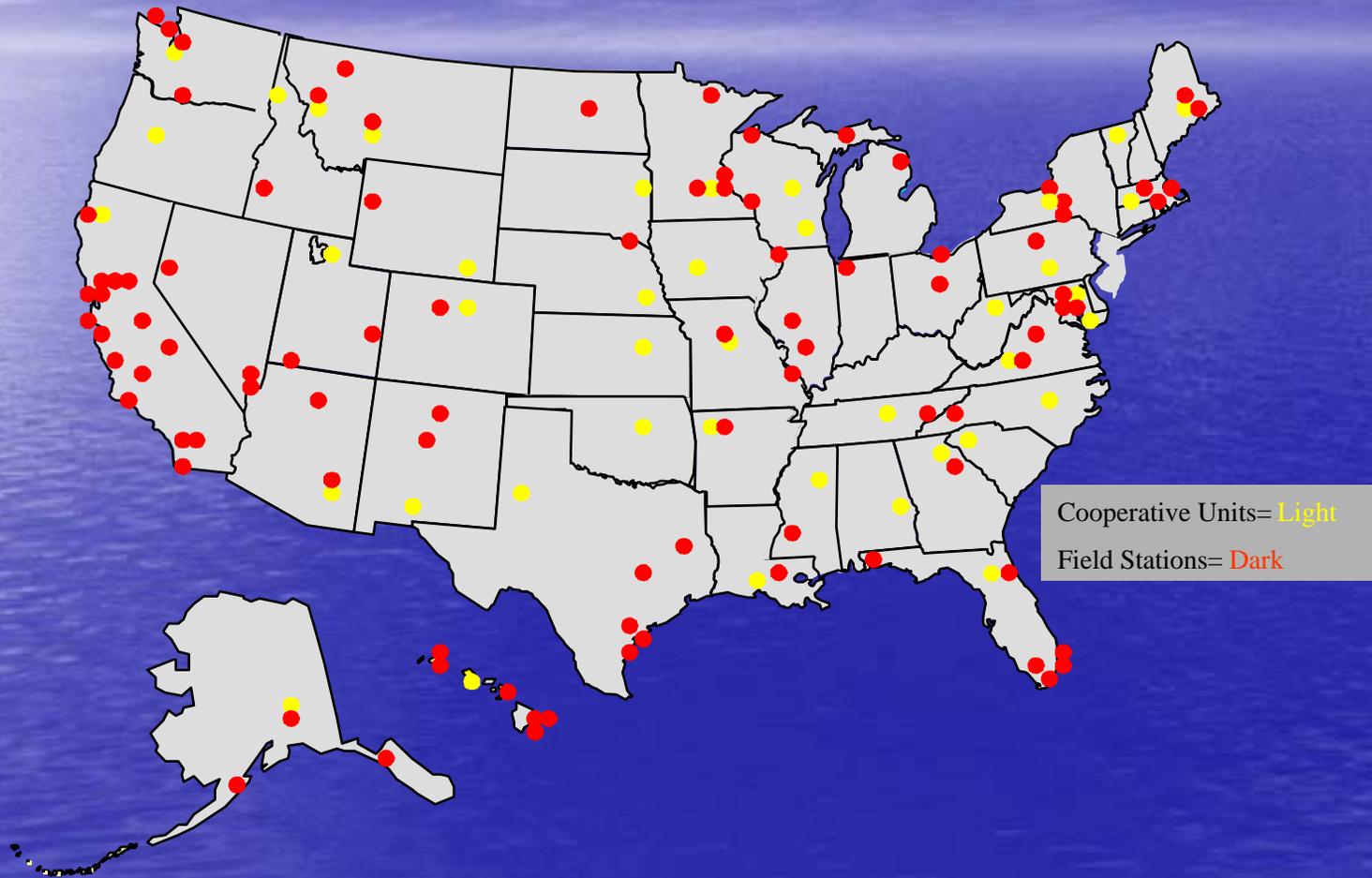
“The Biological Resources Discipline (BRD) works with others to provide the scientific understanding and technologies needed to support the sound management and conservation of our Nation's biological resources.”



Research Centers



Cooperative Fish & Wildlife Research Units and Science Center Field Stations



Biological Research & Monitoring (BRM)

\$140.1M in FY2006

- Status and Trends
- Contaminants
- Fisheries, Aquatic and Endangered Resources
- Wildlife, Terrestrial and Endangered Resources
- Terrestrial, Freshwater, and Marine Ecosystems
- Invasive Species
- Priority Ecosystem Science

Terrestrial, Freshwater, & Marine Ecosystems (\$31M FY2006)

*Understand ecosystem
structure and function
to improve land
management and
restore degraded
landscapes*

- Natural variability
- Key driving forces
- Vulnerability to stressors
- Restoration strategies
- Adaptive Management



Emerging Issues in Terrestrial, Freshwater, & Marine Ecosystems



- Loss of coastal wetlands & habitats
- Carbon sequestration in wetlands & alluvial forests
- Impacts of global change & sea level rise
- Fragmentation & land use changes
- Post-fire restoration & rehabilitation
- Restoration & adaptive management frameworks
- Ecosystem models & decision support systems
- Coral disease & sedimentation impacts
- Vulnerability to human & natural stressors

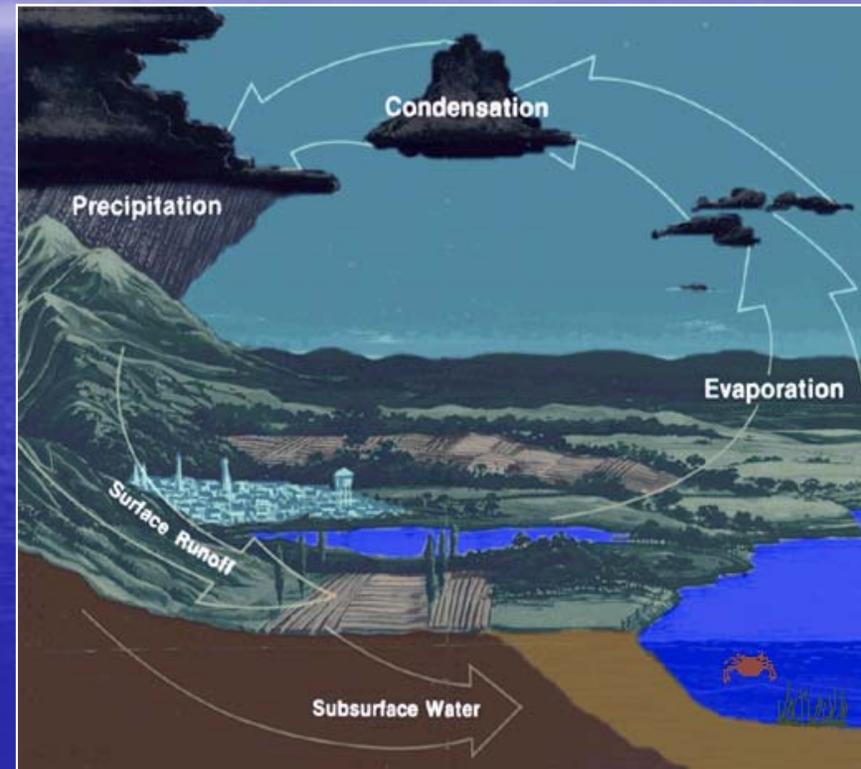
Coastal Wetlands and Marine Issues

- Coastal and estuarine habitats and impacts
- Wetlands loss
- Restoration
- Sea level rise
- Outer Continental Shelf
 - Minerals Management Service Environmental Studies
 - Gulf of Mexico, Alaska, West Coast



USGS Chesapeake Science Goals

- Land use and watershed data and analysis
- Sediment, water clarity, and biota
- Nutrient and contaminant delivery to Bay
- Factors affecting health of fish, wildlife, and their habitat
- Synthesize information and enhance decision support



San Francisco Bay

Develop and implement a long-term plan that will restore ecological health and improve water management of the Bay-Delta System

Restoration Goals

- Flooding/Levee integrity
- Contaminant mobilization
- Waterbird habitat
- Species concerns
 - Protected: CA clapper rail
 - Invasive: Atlantic cordgrass
 - Mosquitoes
- Sediment supply



PES focus

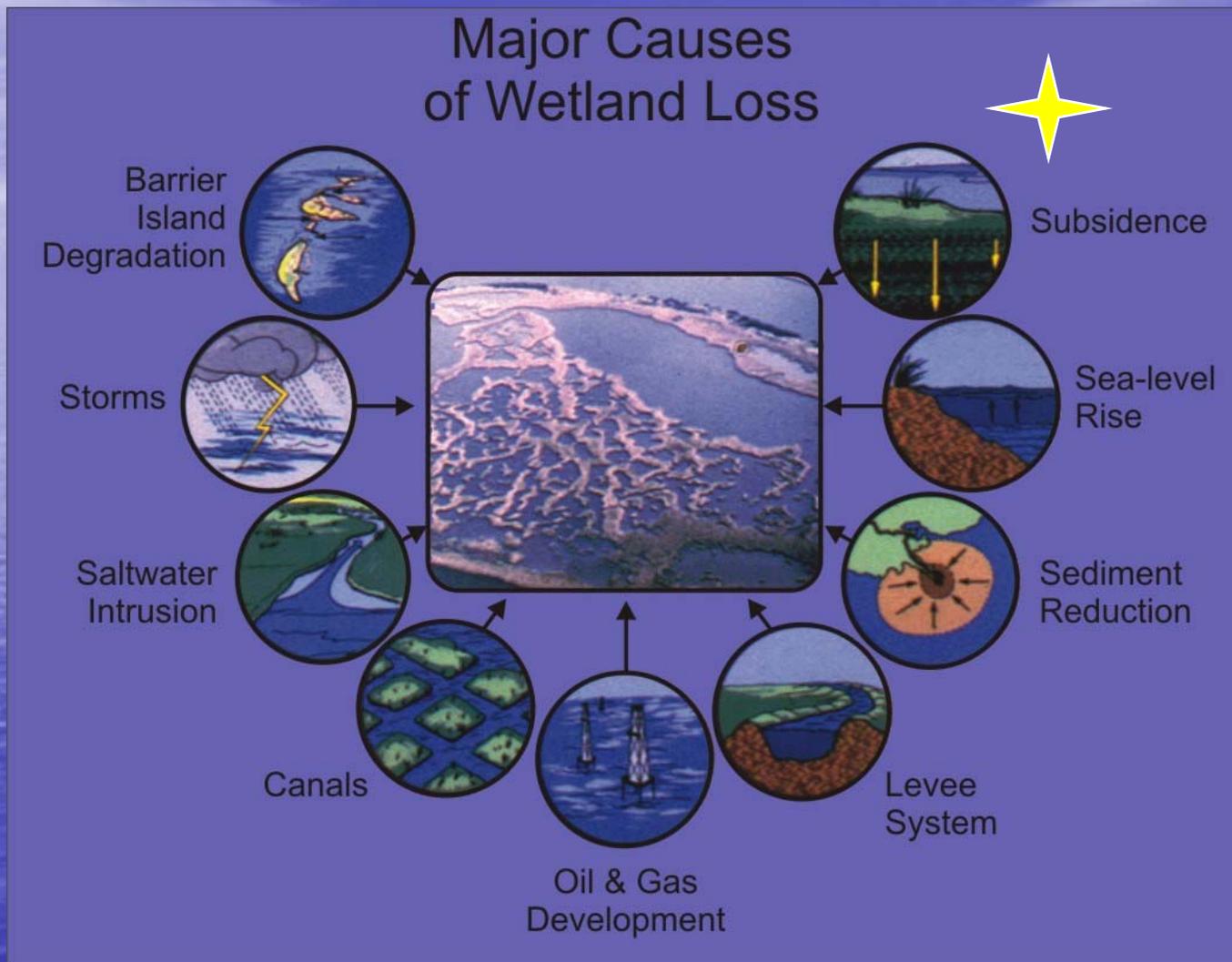
'99 – '04

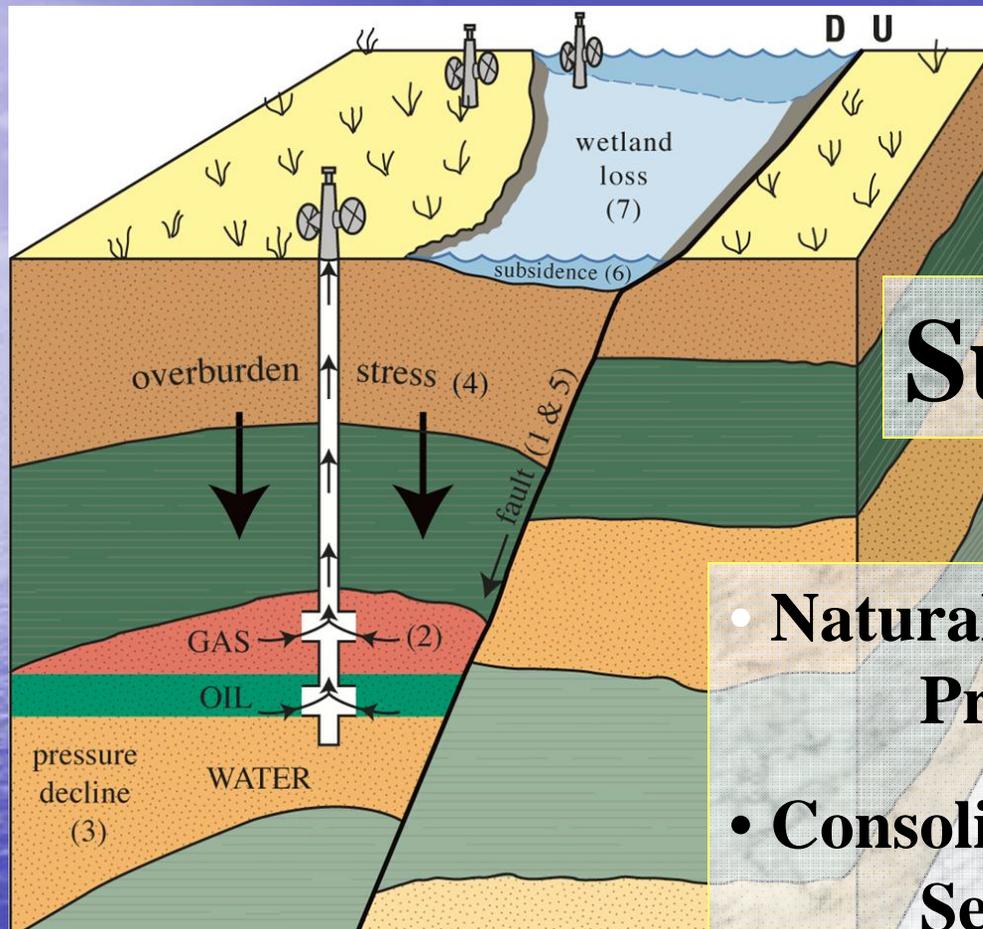
- Flows and Contaminants in Suisun Bay
- Napa Salt Pond Restoration

'05 – '10

- Suisun Marsh Restoration Potential: Role of Transport and Fate of Contaminants, Carbon, and Sediment
- Wetland Restoration of Cargill Salt Ponds
- Responses of the SFB-Delta-Watershed to Scenarios of Changing Climate, Land Use, and Water Storage-Conveyance

Major Causes of Wetland Loss





Subsidence

- Natural Geological Processes (Fault)
- Consolidation / Dewatering Sediments
- Oil & Gas Extraction

Other Environmental Factors

- **Sea-level Rise**
- **Saltwater Intrusion**
- **Erosion**
- **Barrier Island Degradation**
- **Storms**



Other Environmental Factors

- **Canals (gas & oil development)**
- **Invasive species (nutria)
eats marsh plants - destabilizes**



Restoration of Coastal Louisiana
**Coastal Wetlands Planning, Protection and Restoration
Act (~\$58 million, USD per year)**
Federal-State Project-Based Effort



Large-Scale Restoration Projects

- **Sediment Trapping**
- **Shoreline Protection**
- **Vegetative Planting**



Large-Scale Restoration Projects

- **Barrier Island Restoration**
- **Hydrologic Restoration**
- **Marsh Creation**



Large-Scale Restoration Projects

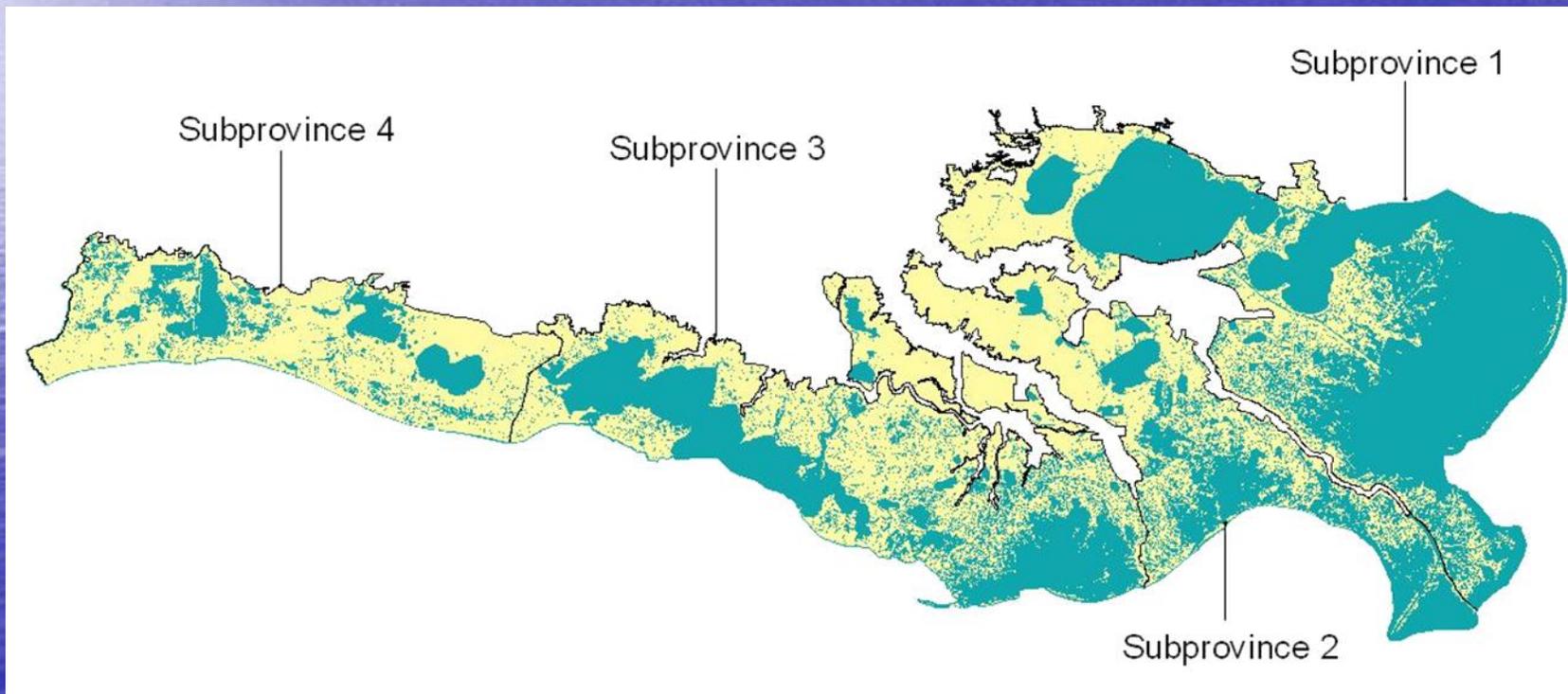
- **Outfall Management**
- **Freshwater Reintroduction**



Restoration of Coastal Louisiana

LCA: Louisiana Coastal Area Ecosystem Study

(U.S. Army Corps of Engineers Funding)

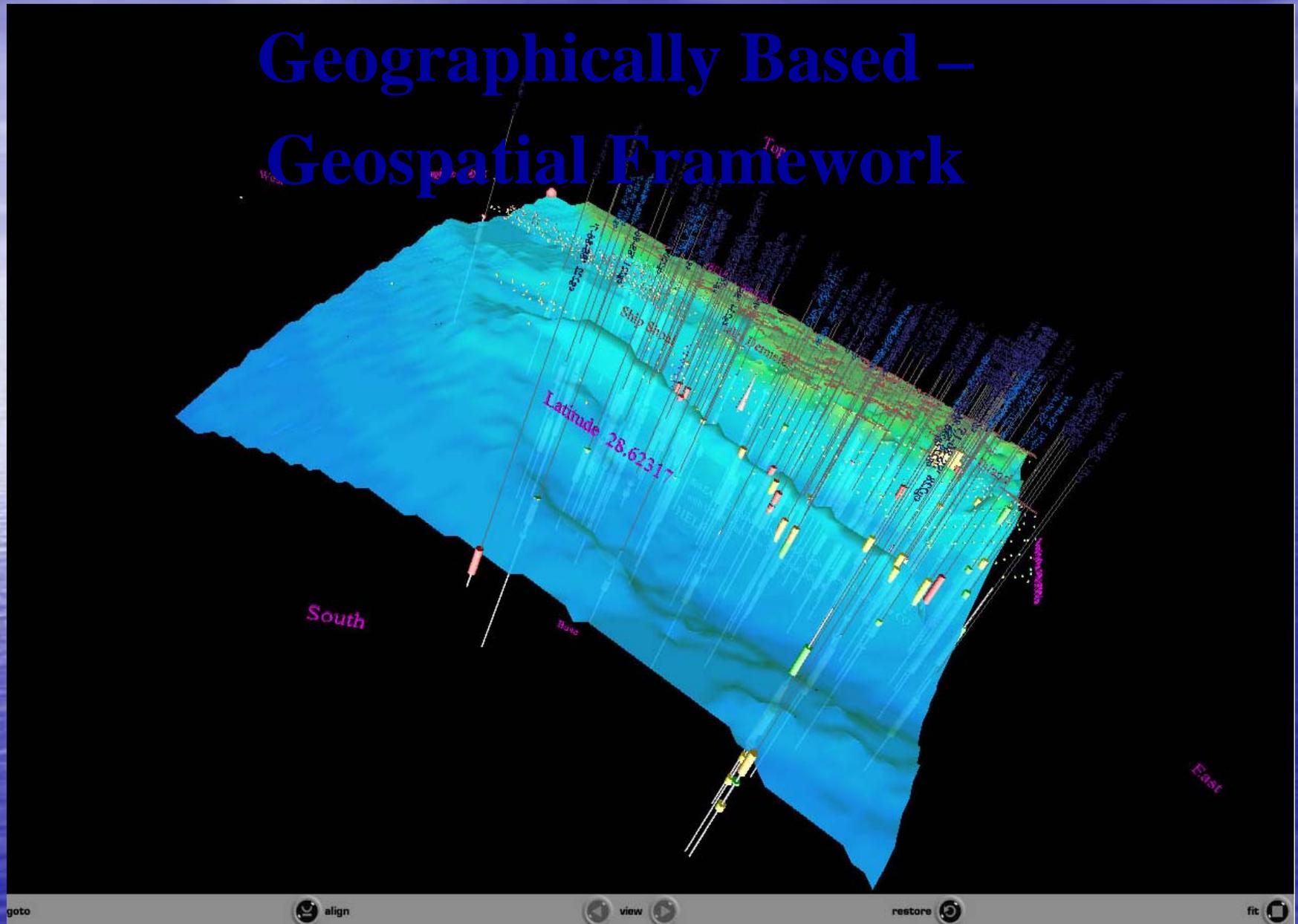


Scientific Approach

- Geographically Based
- Conceptual Modeling/ Process
- Predictive Models



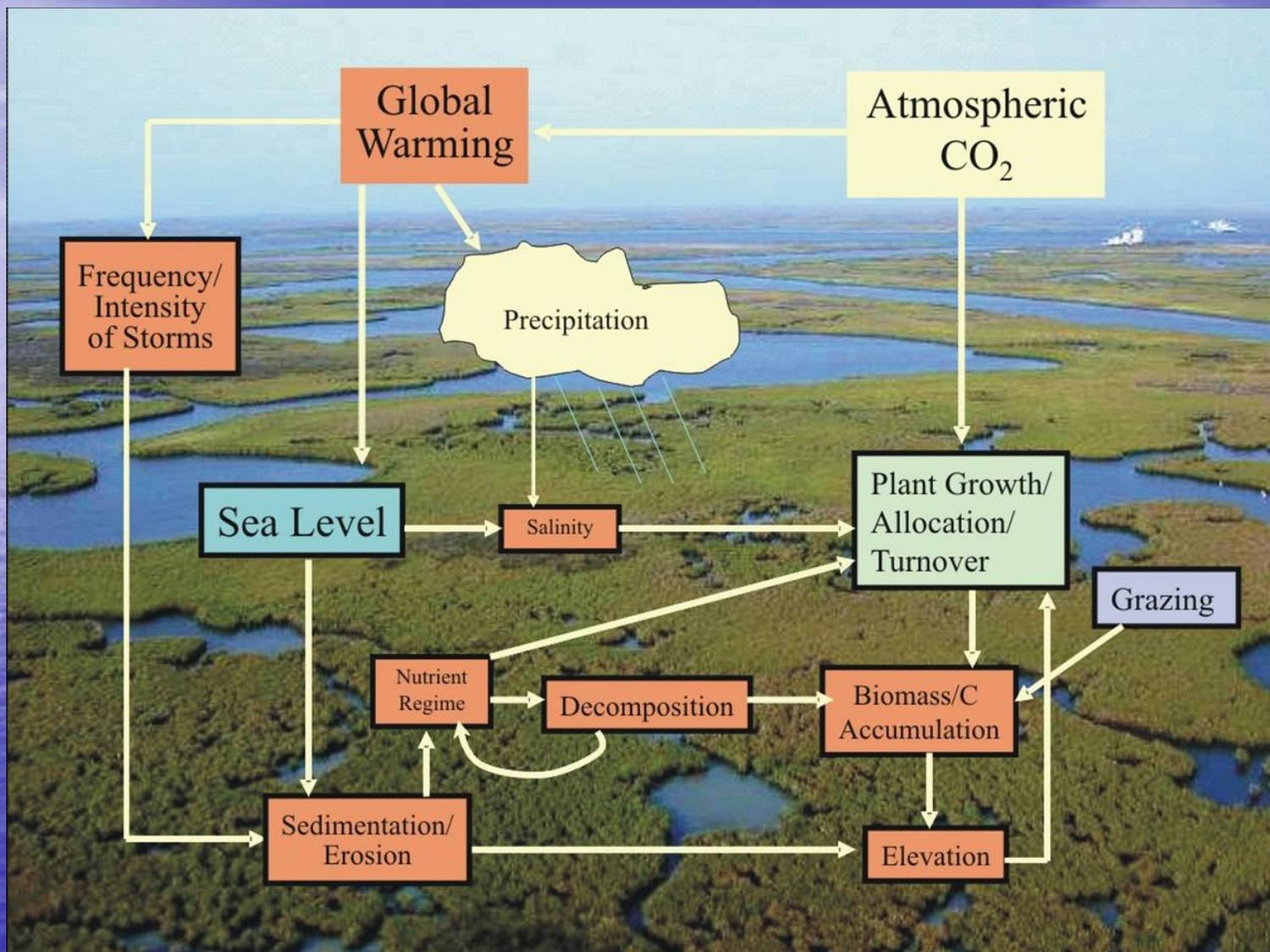
Geographically Based – Geospatial Framework



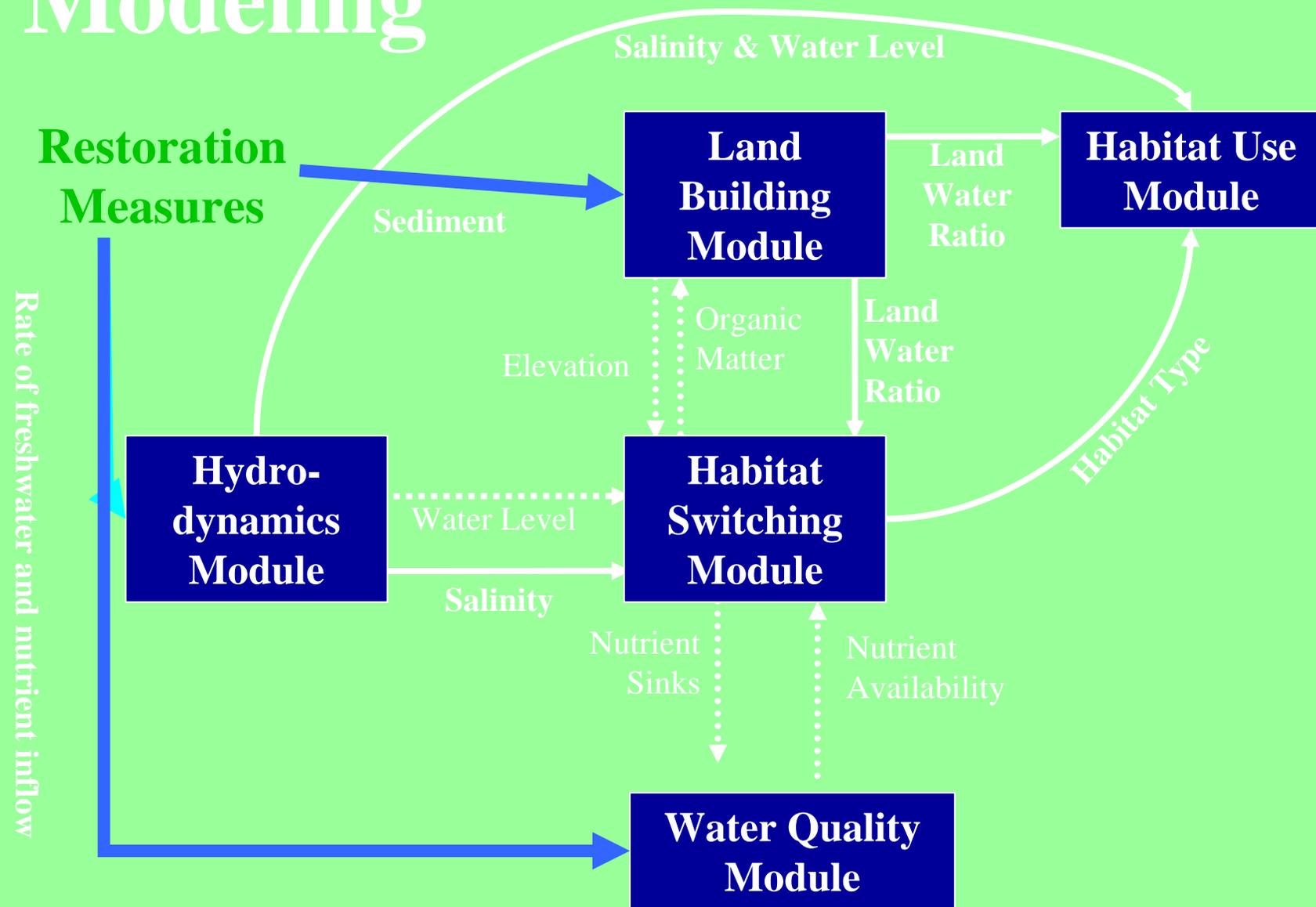
Science Approach

Conceptual Modeling Research to Understand Ecosystem Processes

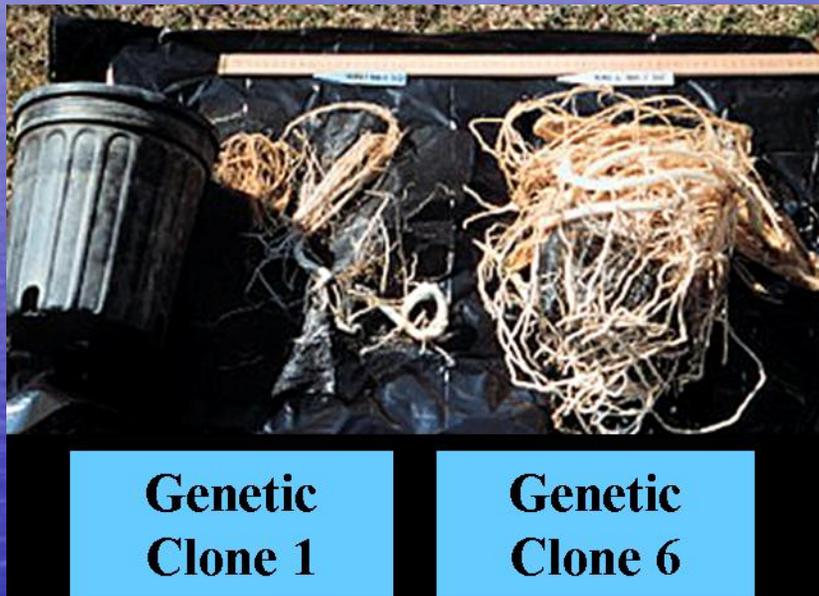




Modeling



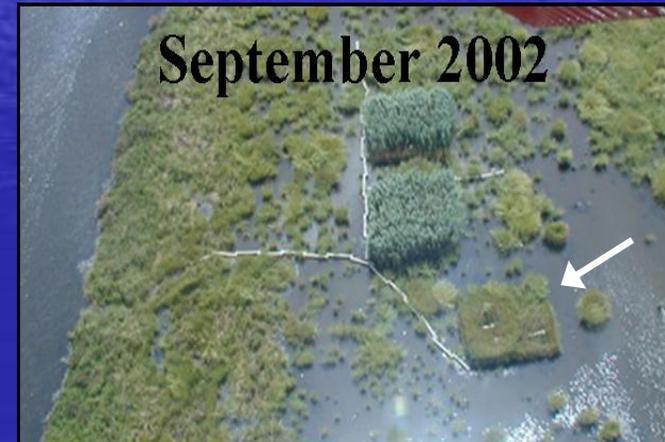
Wetland Stabilization Research: *Plant Species & Genetics*



Phragmites: Belowground biomass experiment

Field Experiments: Vegetation

Natural colonization vs planting



Guides Restoration & Management



Predictive Models – Ecological Forecasting & Setting Baseline for Adaptive Monitoring



Science for Restoration

High Degree of Complexity

- **Biology**
- **Geology**
- **Hydrology**
- **Engineering**
- **Biogeochemistry**



Science for Restoration

**Long Term
Adaptive Science
Adaptive Management
Adaptive Monitoring**



Geographic Context

Conceptual Models

Process Studies

Predictive Modeling

Assessment/Monitoring

Adaptive Science