



Constraining the Timing, Magnitude, and Likely Causes of Historic Subsidence and Wetland Loss, Mississippi River Delta Plain, South-Central Louisiana

Julie C. Bernier¹, Robert A. Morton¹, and John A. Barras²

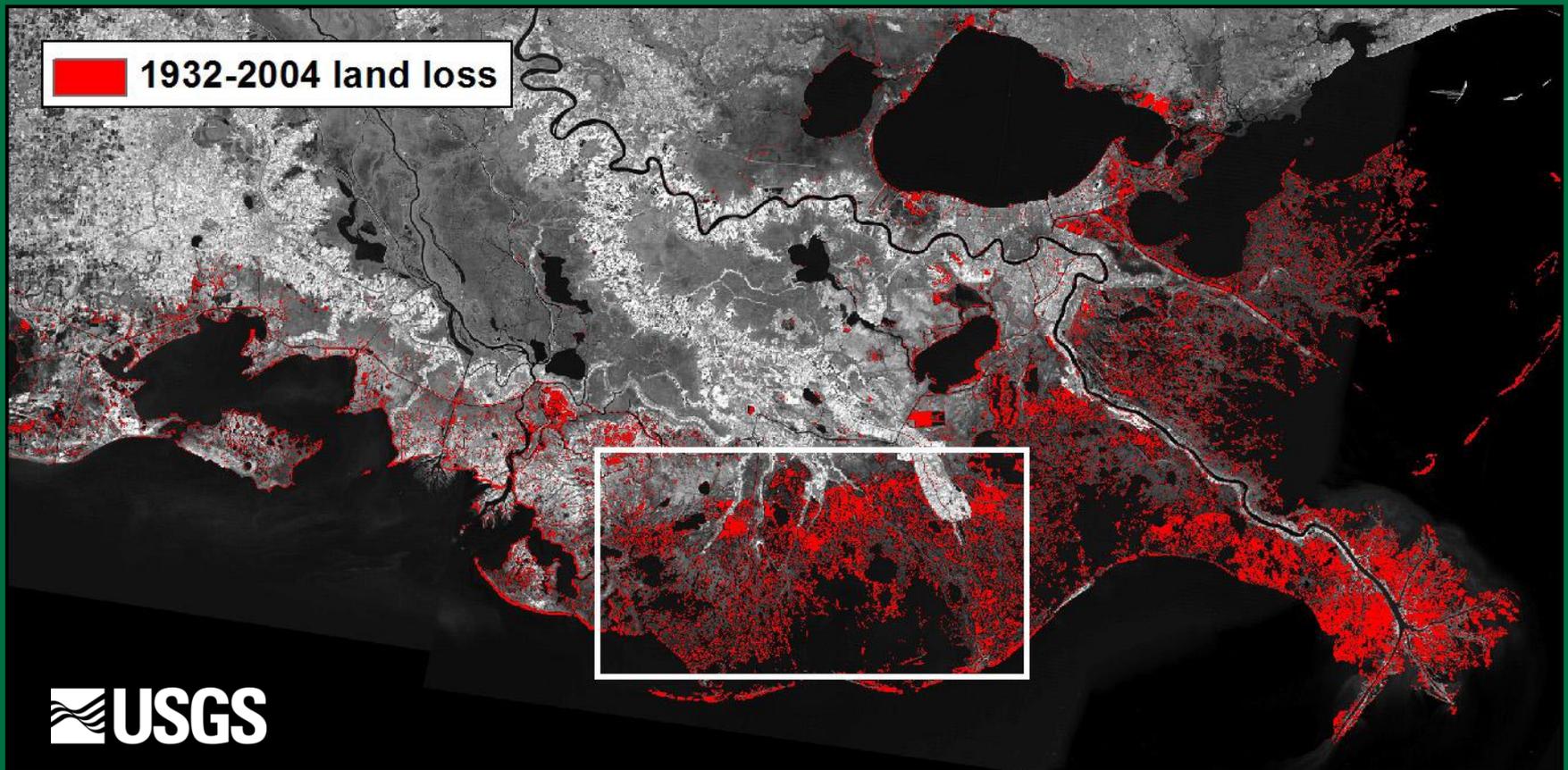
¹USGS Florida Integrated Science Center, St. Petersburg, FL

²USGS National Wetlands Research Center, Baton Rouge, LA



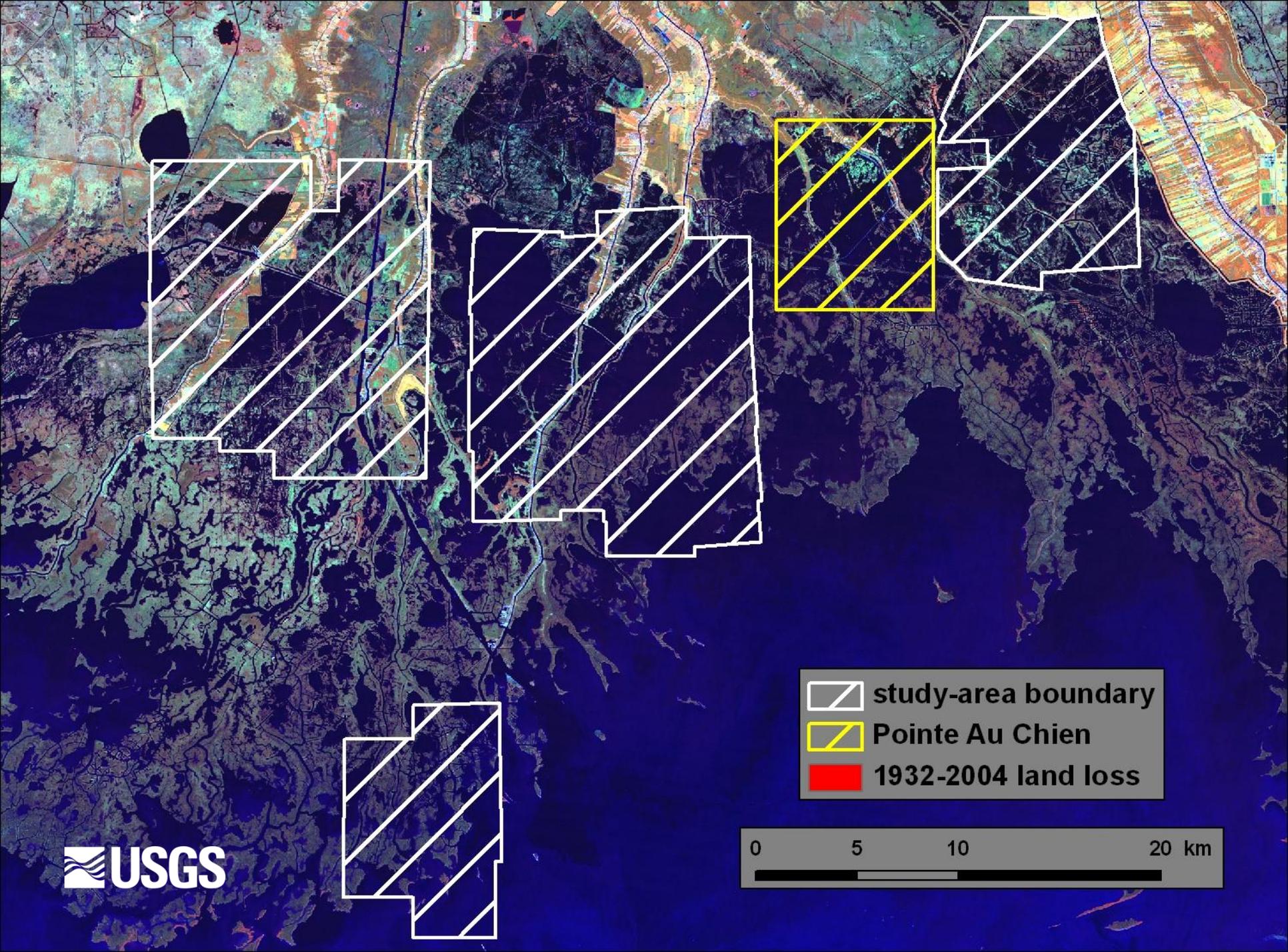
Introduction – Louisiana Land Loss

- Delta plain: ~ 4000 km² land loss since 1930s



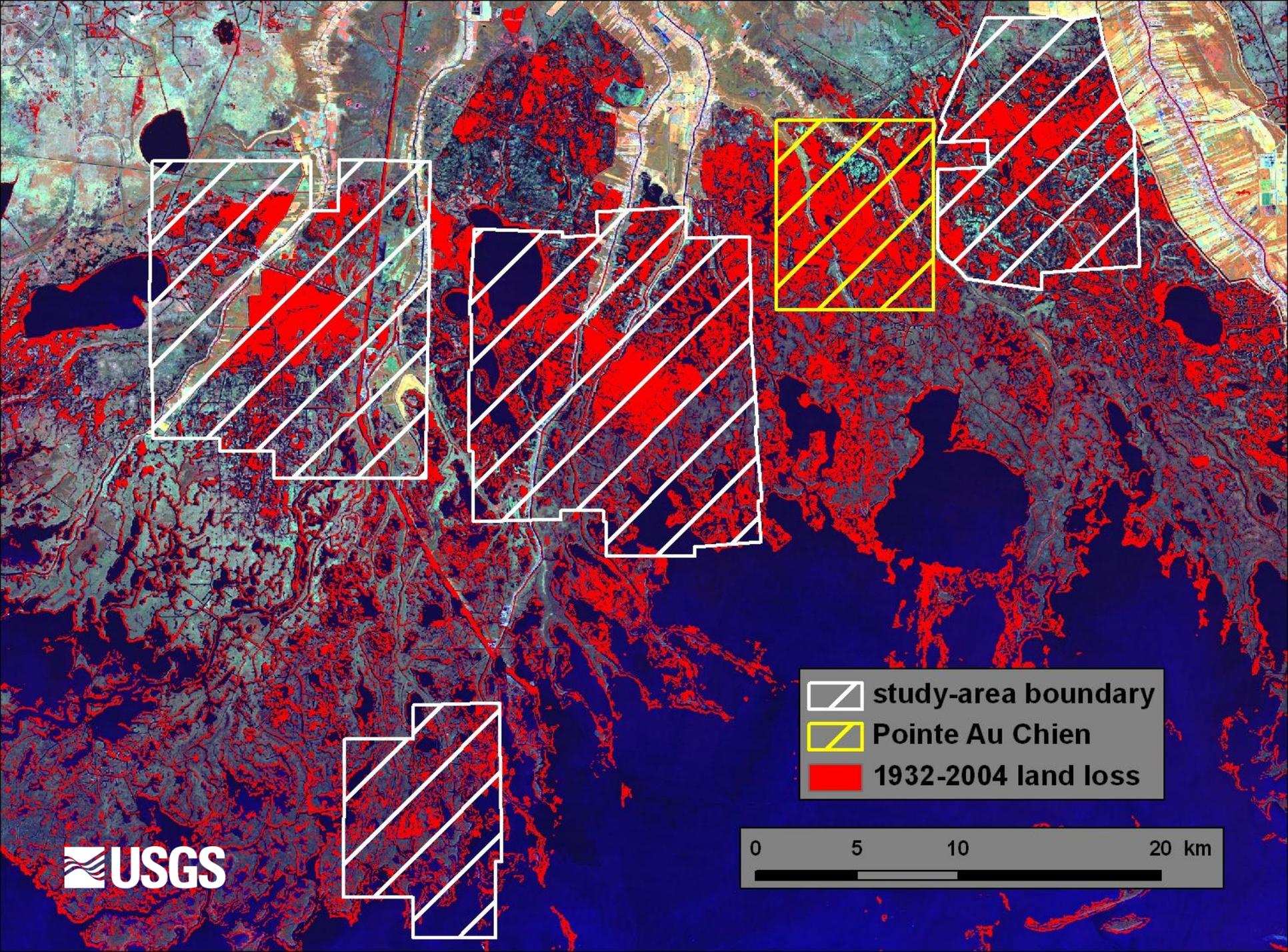
Objectives

- **High-resolution temporal analysis of land-water changes at selected wetland-loss hotspots**
- **Quantify subsidence vs. erosion at wetland-loss hotspots**
- **Compare historical vs. geological delta-plain subsidence**



 study-area boundary
 Pointe Au Chien
 1932-2004 land loss





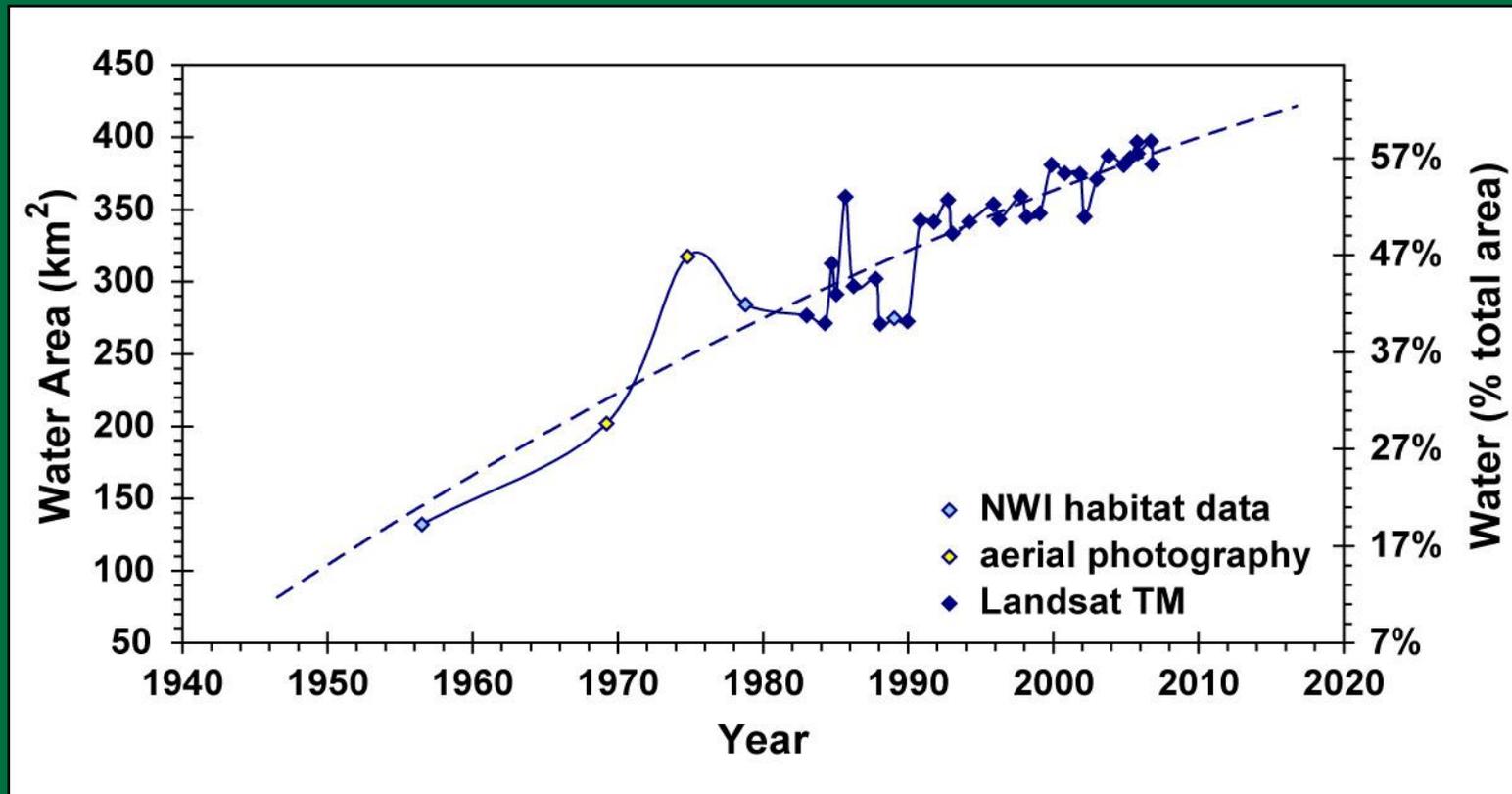
 study-area boundary
 Pointe Au Chien
 1932-2004 land loss



 USGS

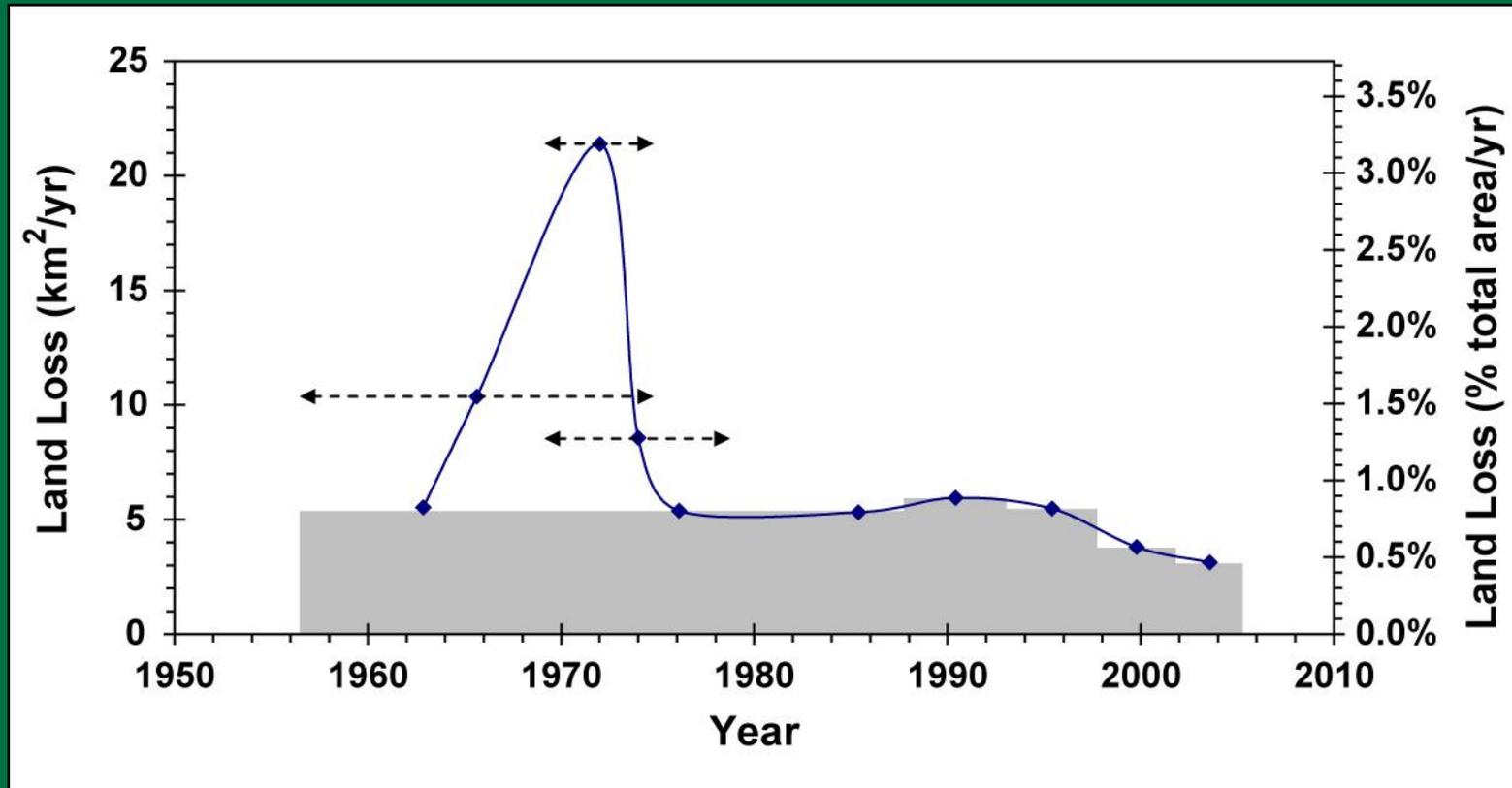
Delta Plain Land-Loss Hotspots

- 1956-2005: 255 km² land → open water



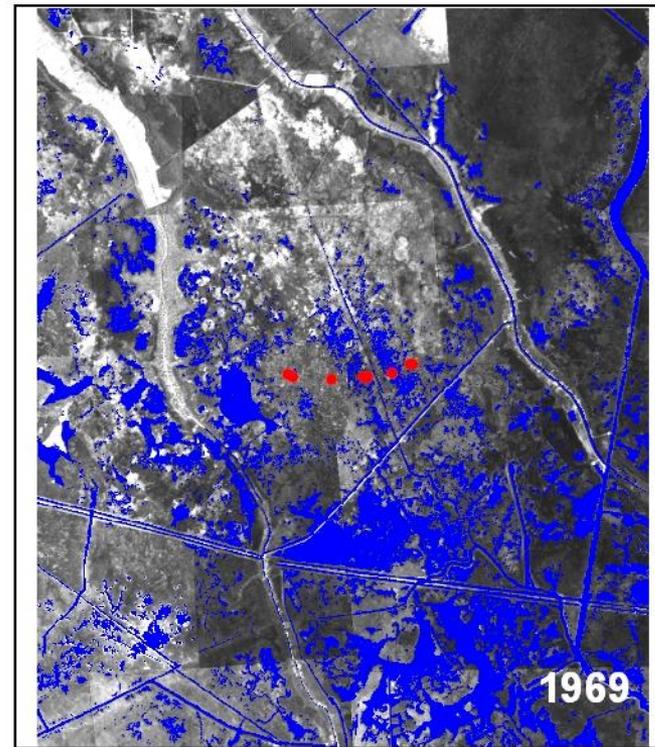
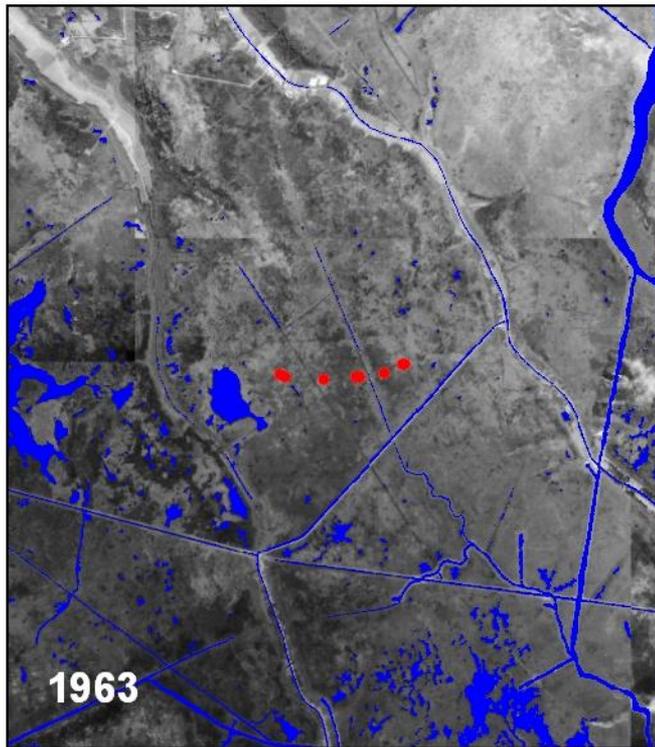
Delta Plain Land-Loss Hotspots

- Peak land-loss rates: 2-4x higher than background



Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water

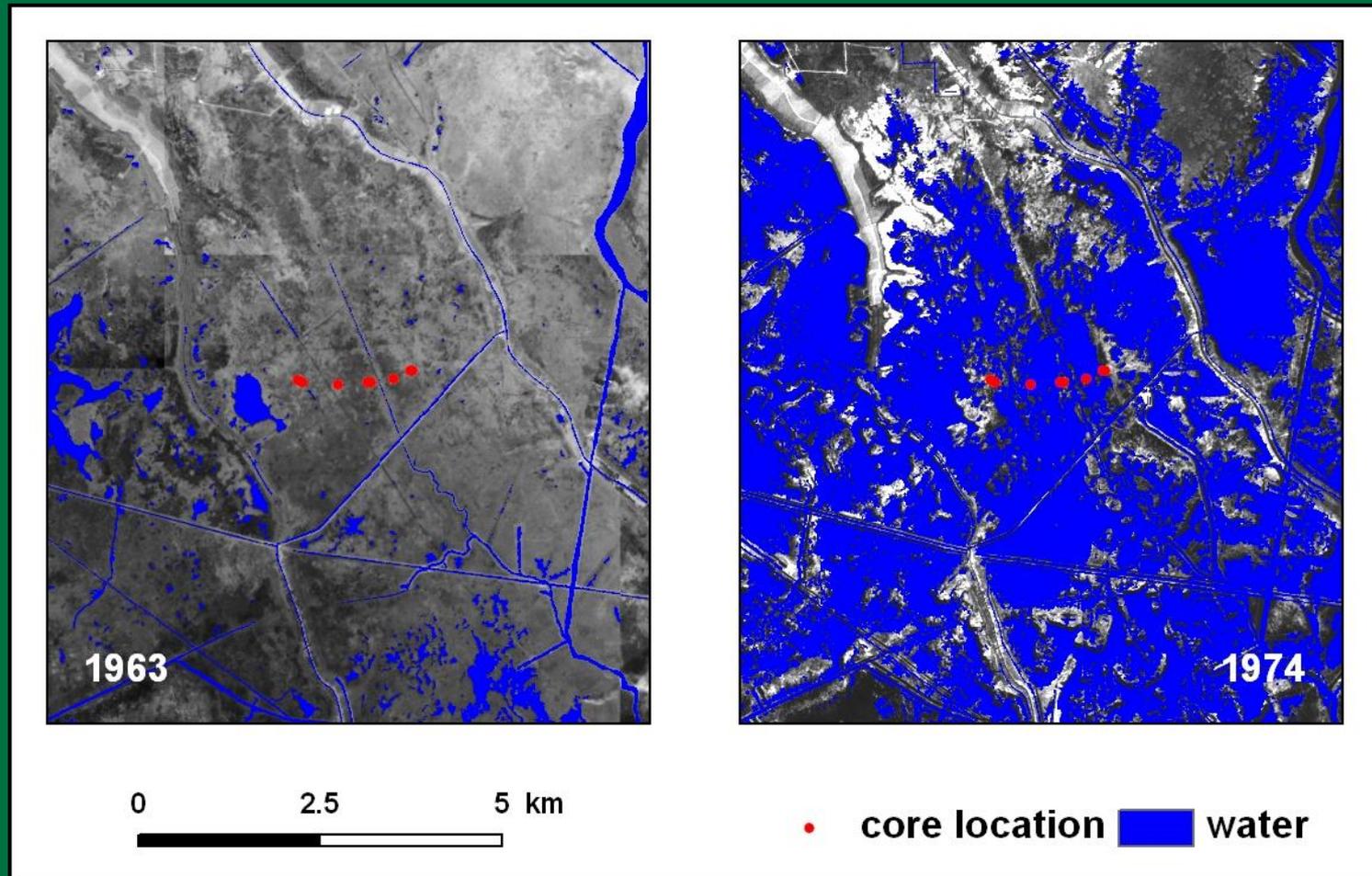


0 2.5 5 km

• core location  water

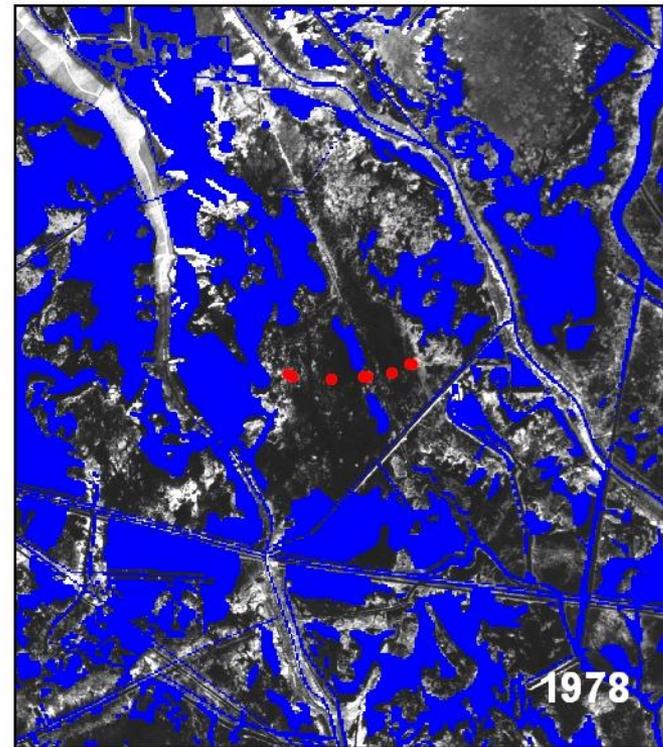
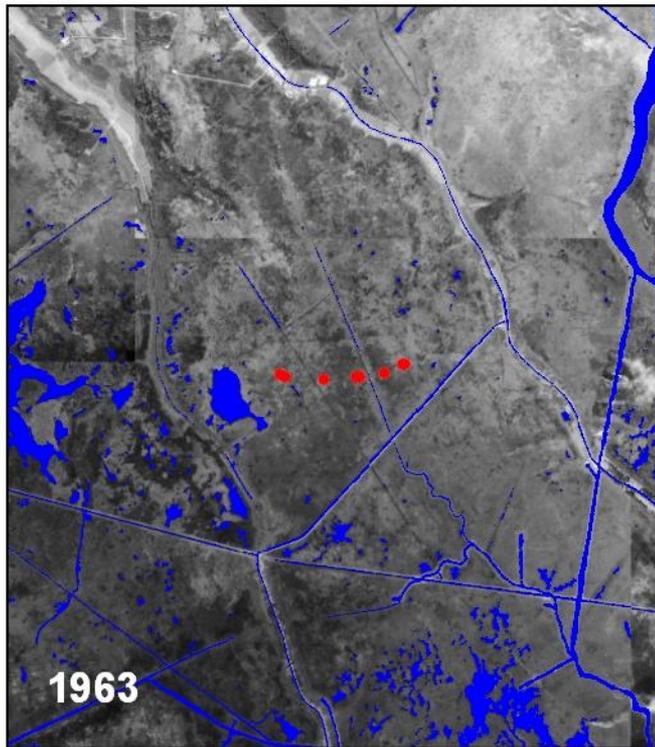
Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water



Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water

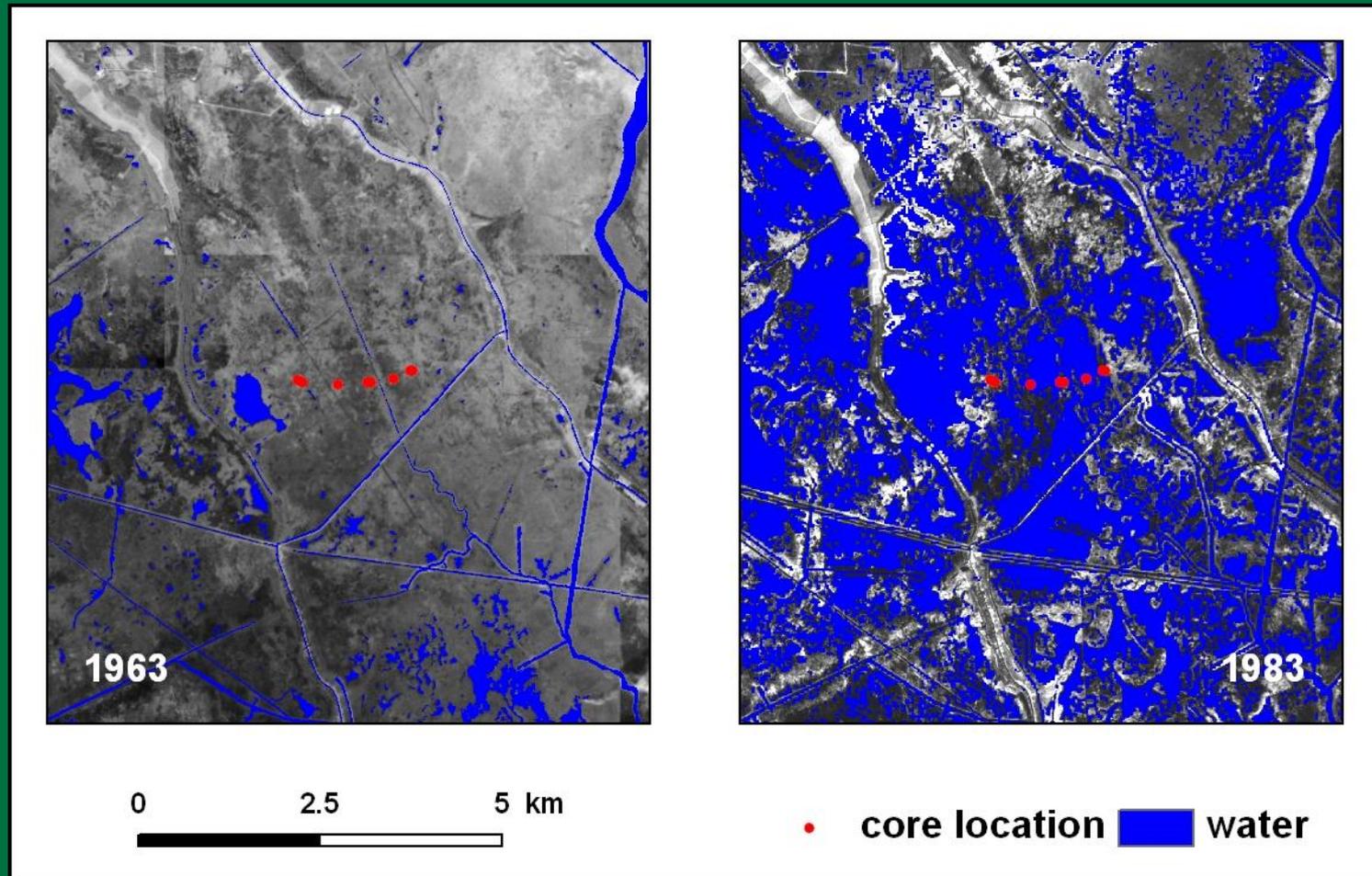


0 2.5 5 km

• core location  water

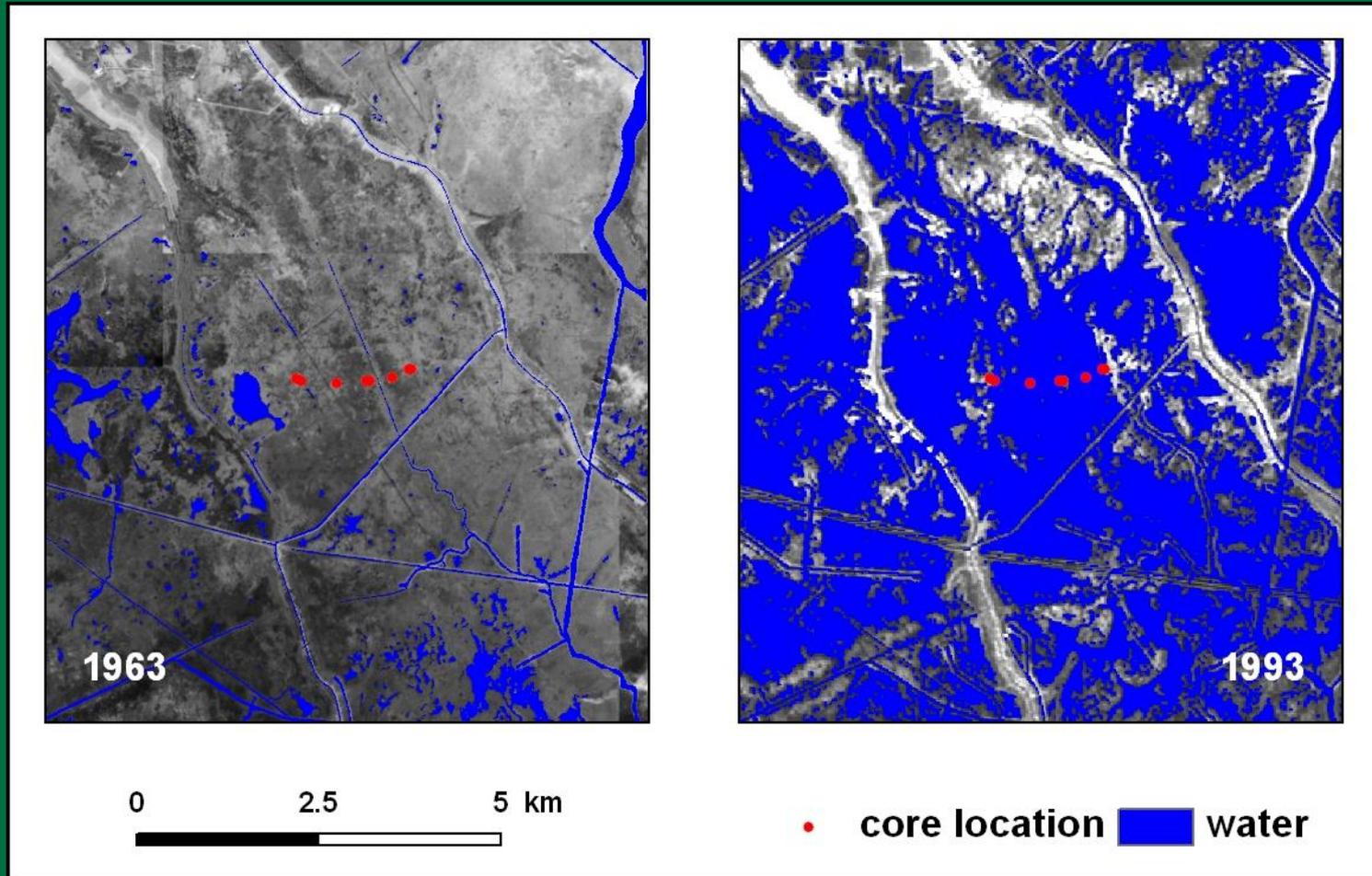
Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water



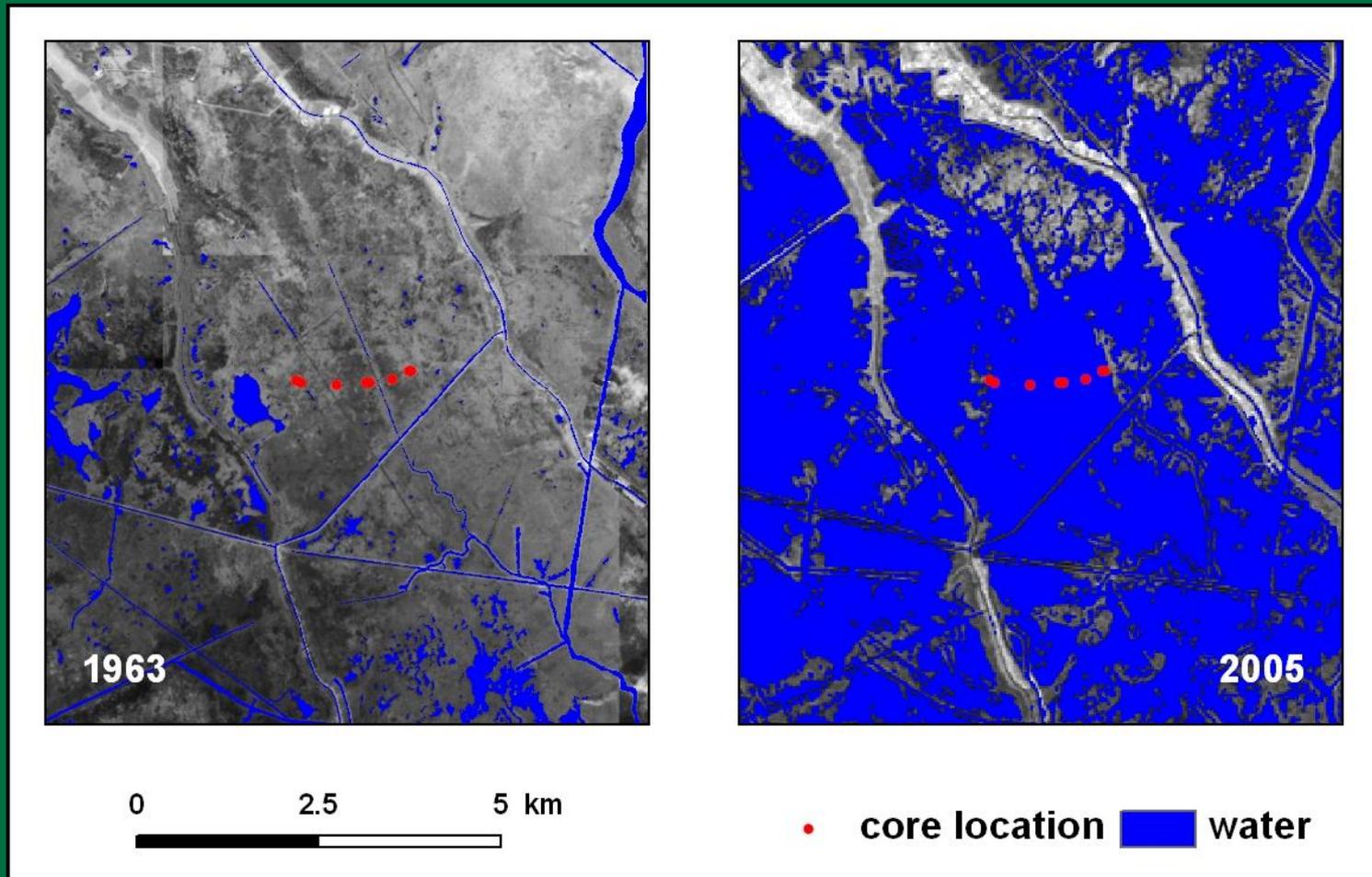
Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water



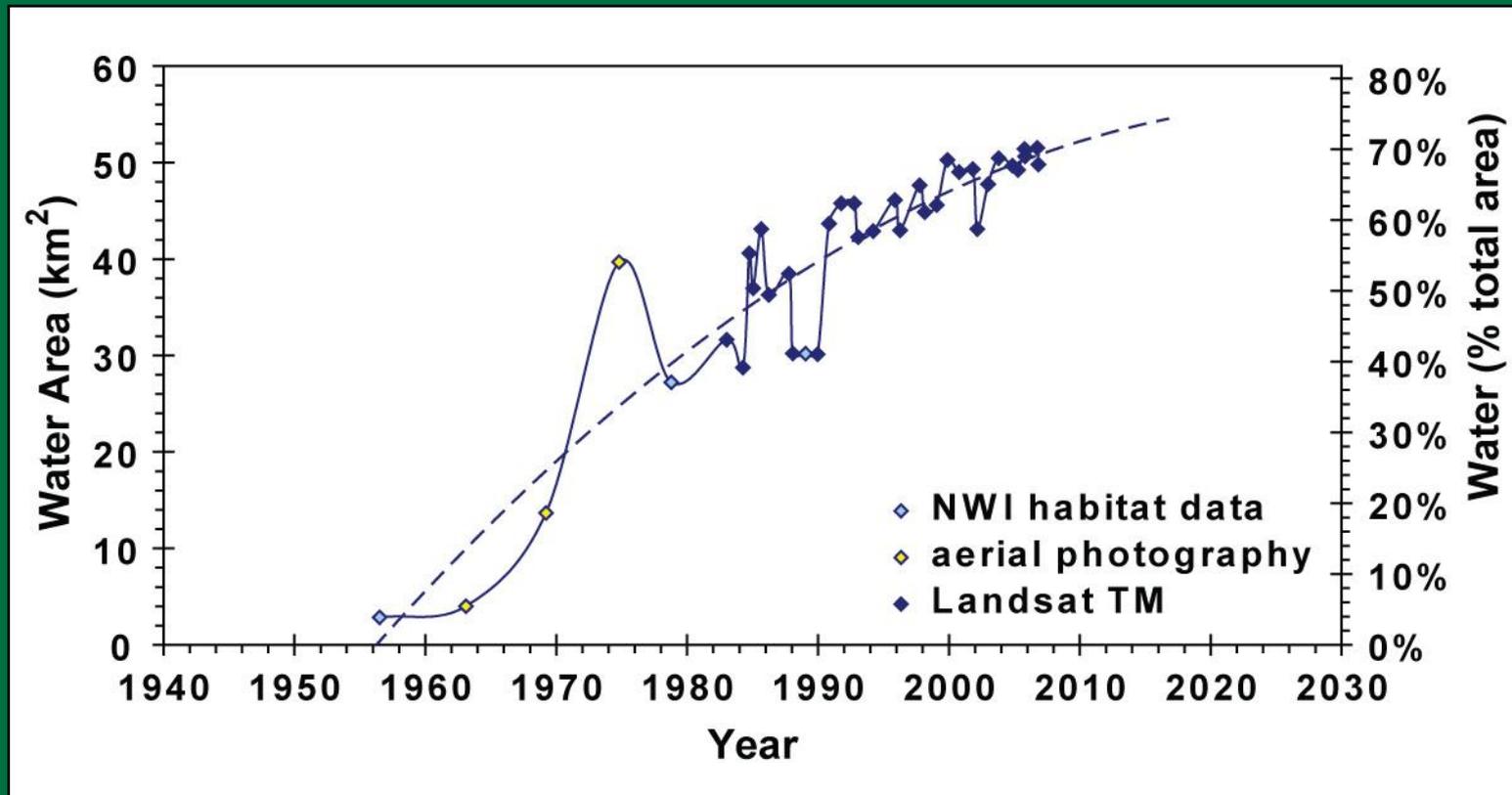
Example: Pointe Au Chien Study Area

- 1956-2005: ~46 km² land → water



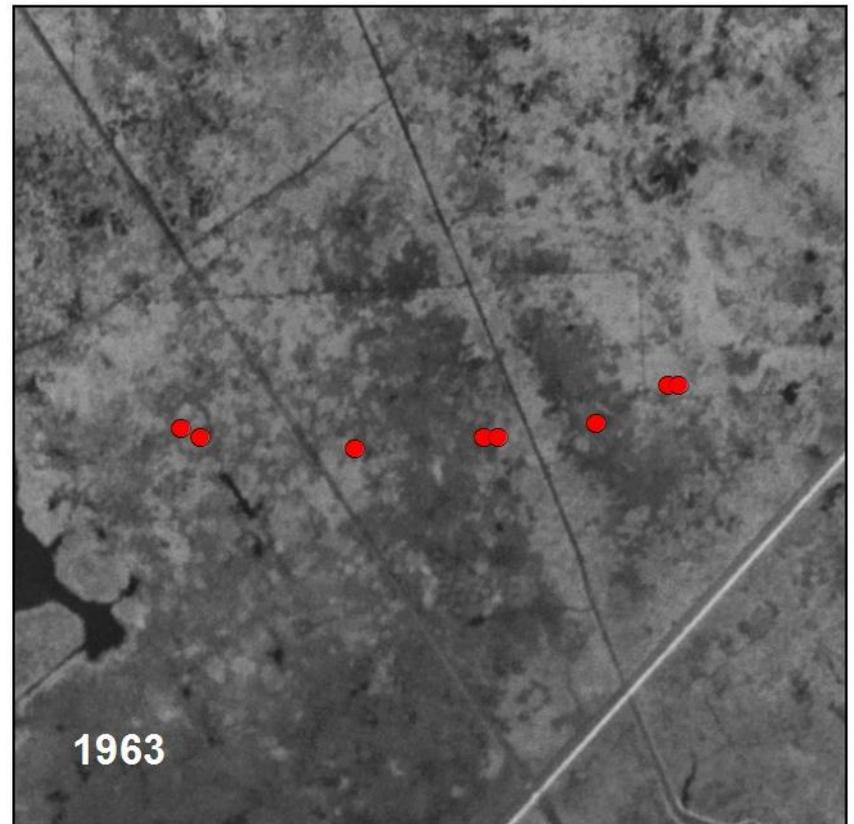
Pointe Au Chien Study Area

- 1960s to early 1980s: rapid land loss



Pointe Au Chien Study Area

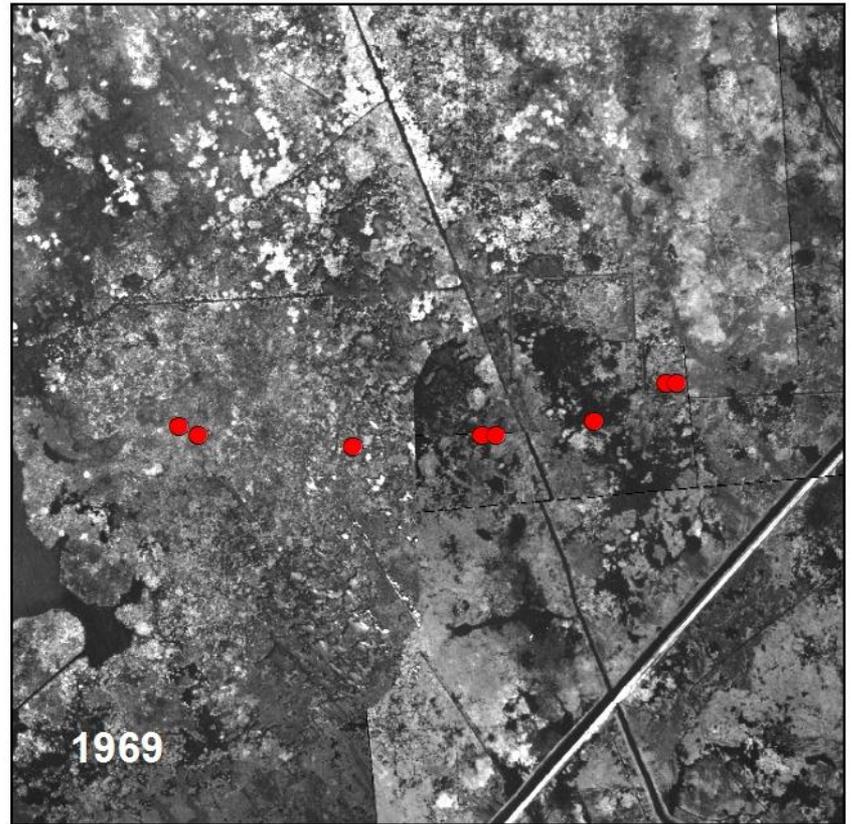
- Core sites transect historic marsh surface



0 750 1,500 m

Pointe Au Chien Study Area

- Core sites transect historic marsh surface

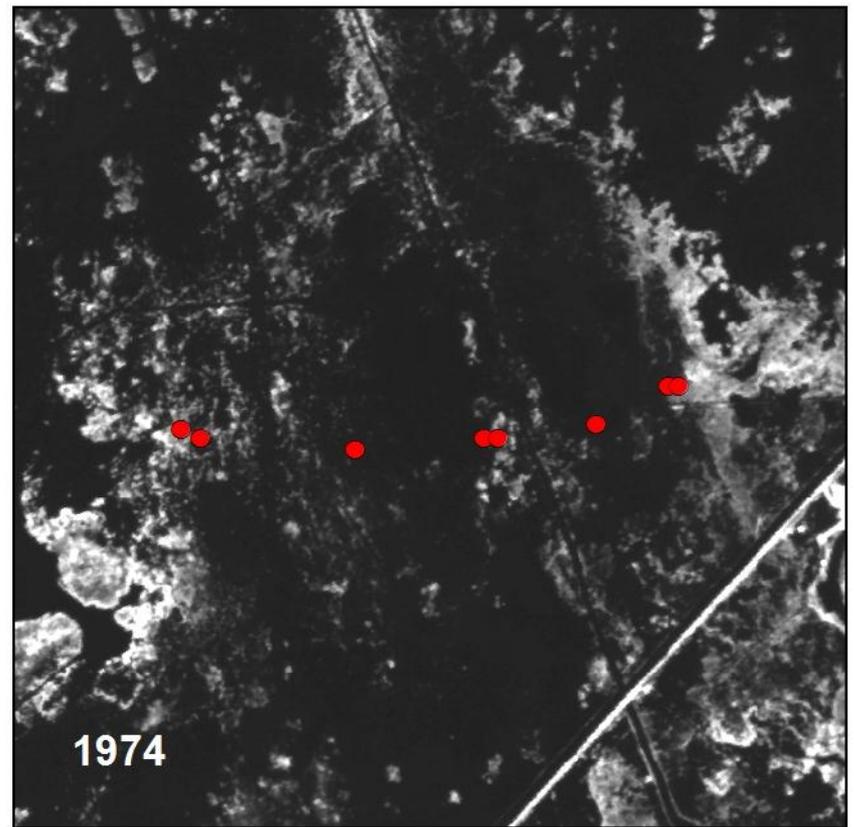


0 750 1,500 m



Pointe Au Chien Study Area

- Core sites transect historic marsh surface

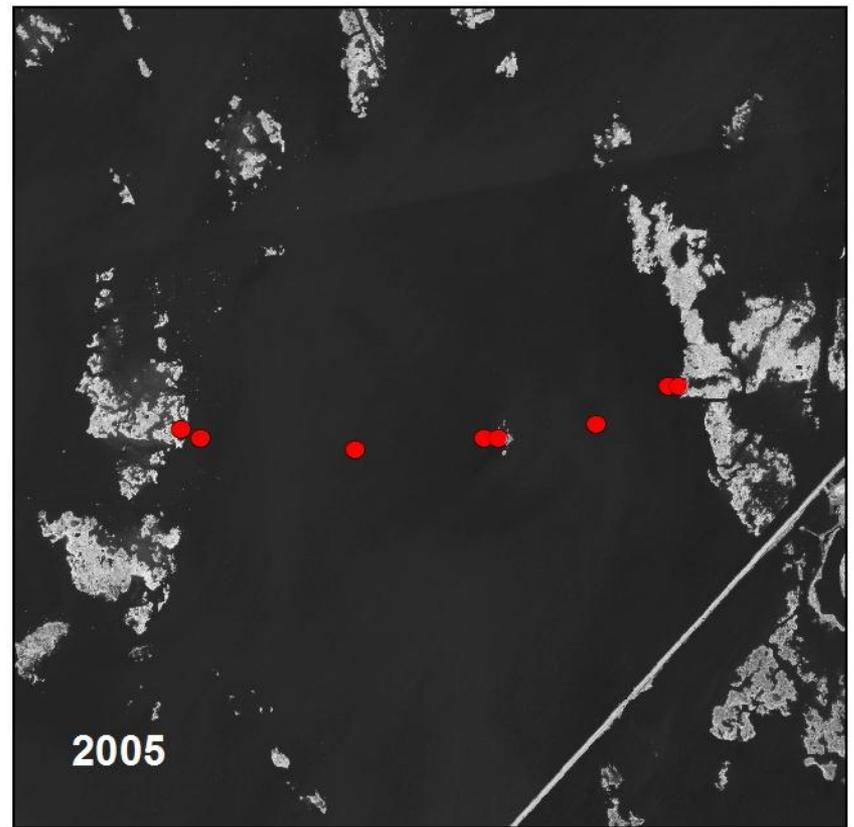


0 750 1,500 m



Pointe Au Chien Study Area

- Core sites transect historic marsh surface

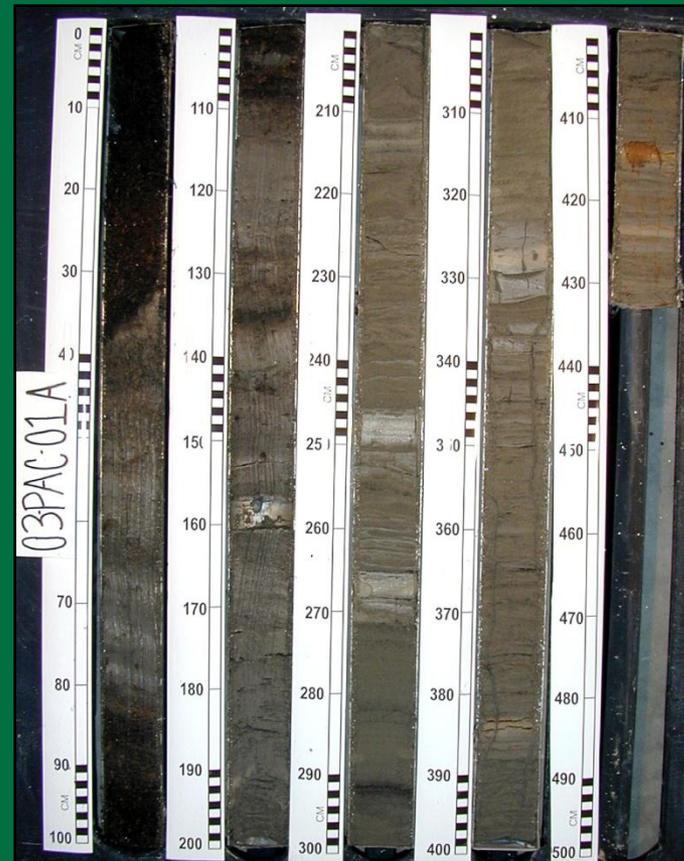
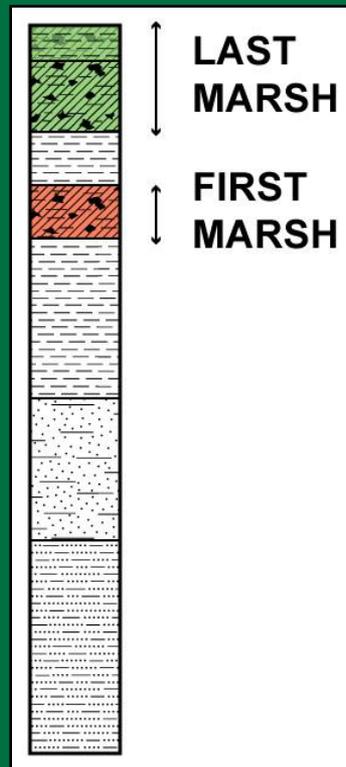


0 750 1,500 m



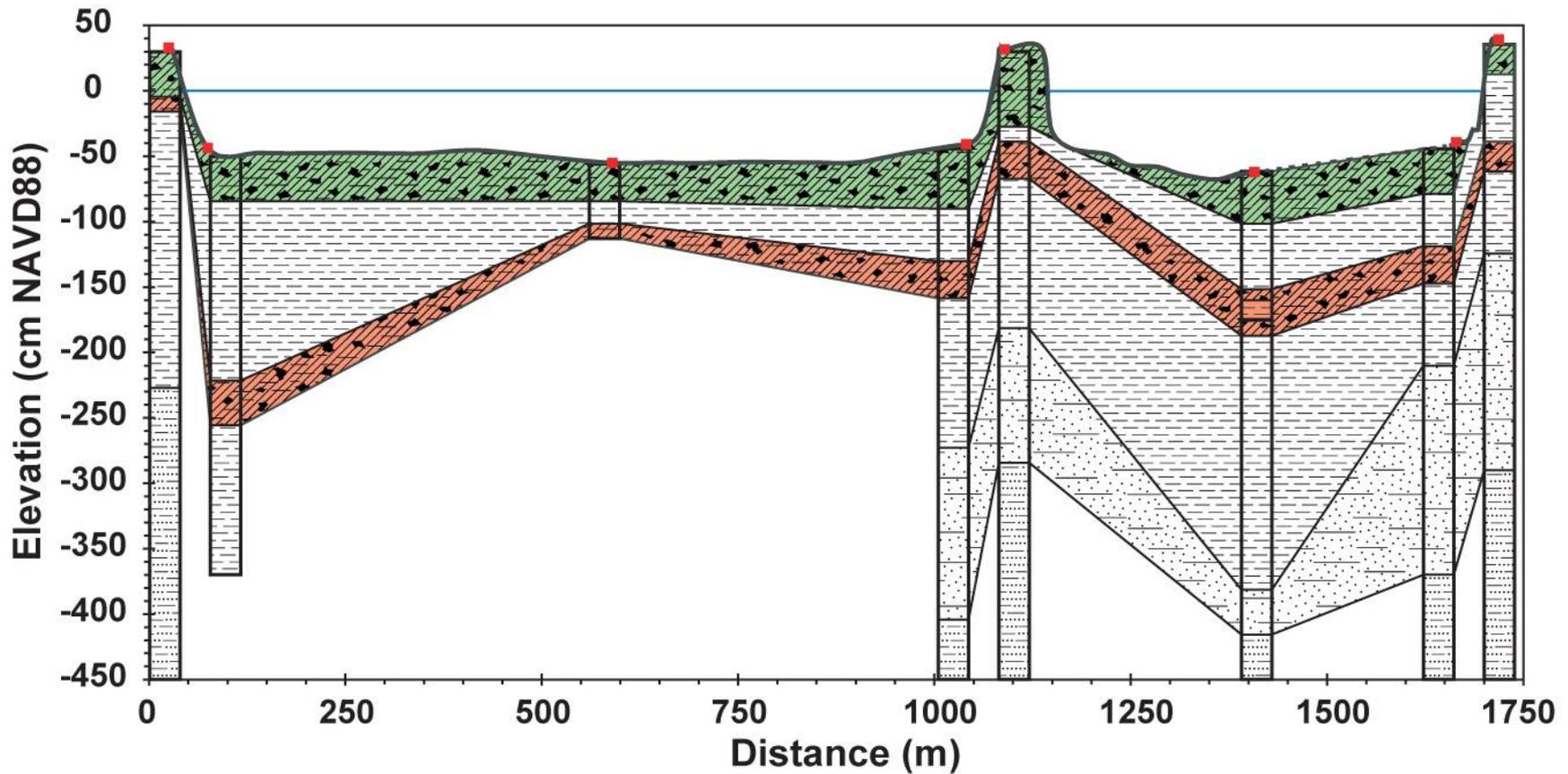
Pointe Au Chien Study Area

- Correlate organic (marsh) sediments to estimate subsidence and erosion relative to emergent marsh



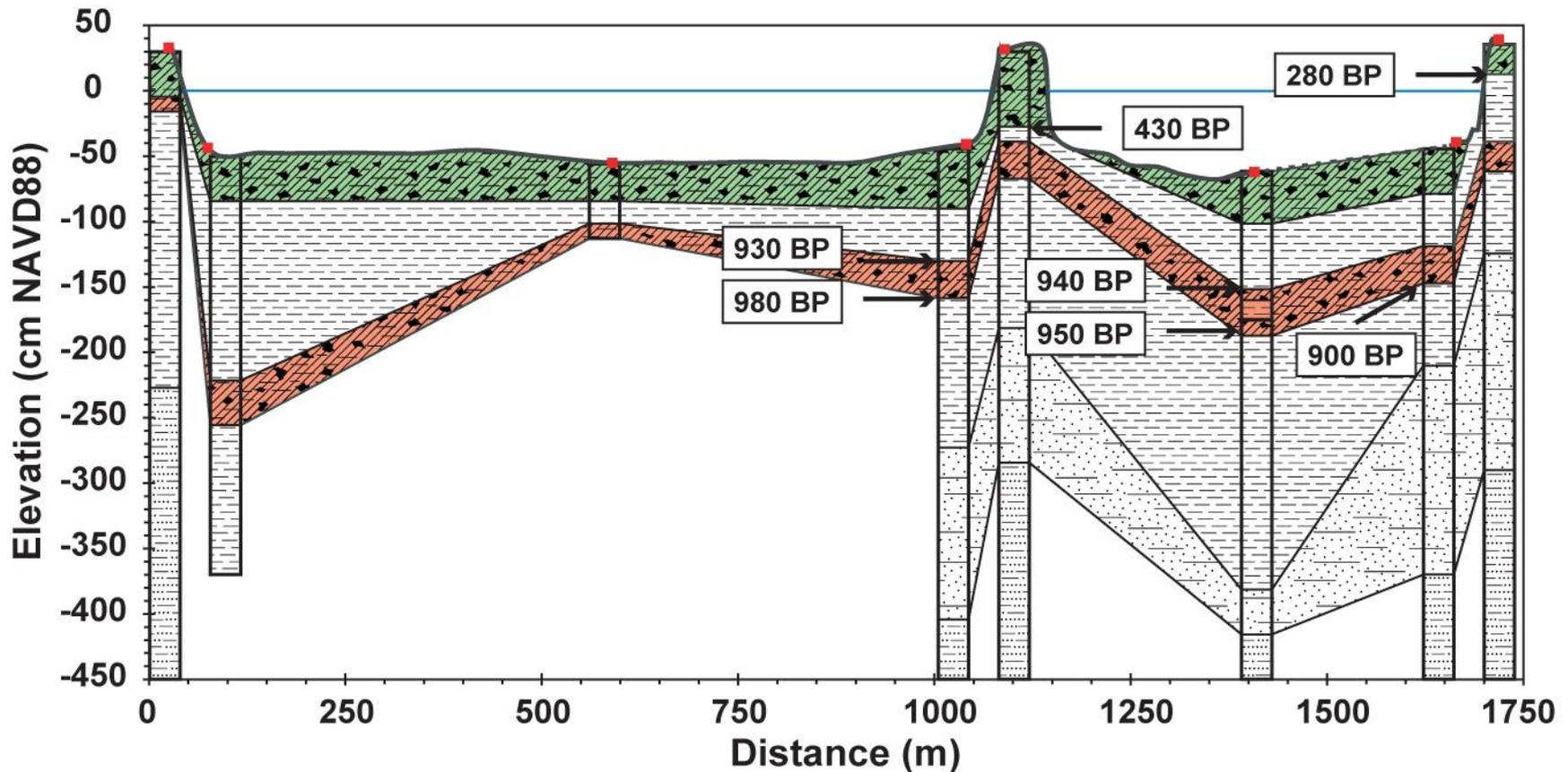
Pointe Au Chien Study Area

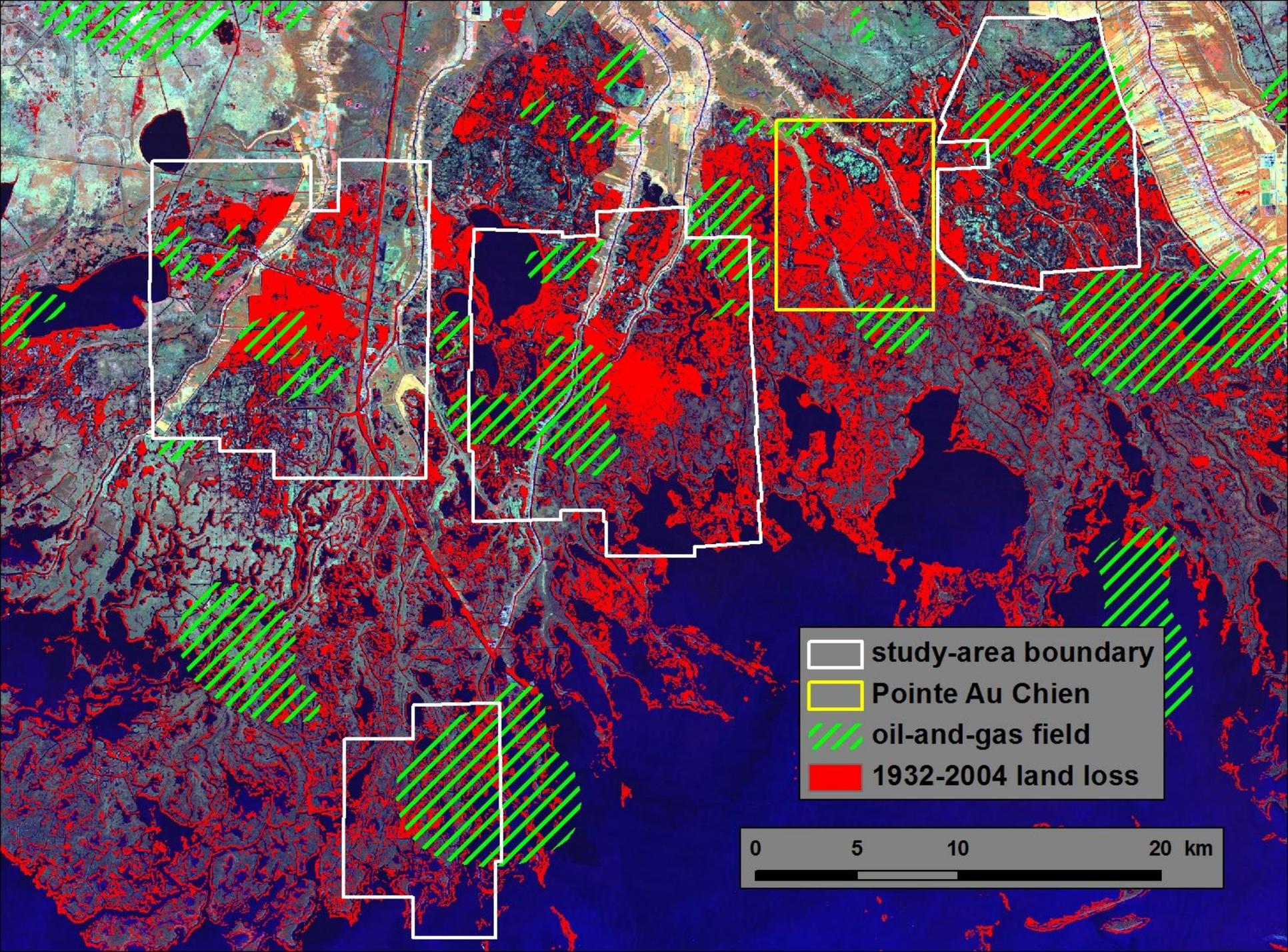
- 75-115 cm subsidence vs. 0-14 cm erosion



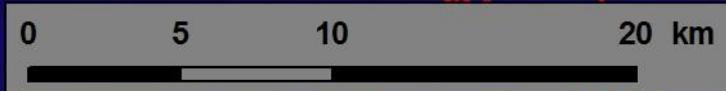
Pointe Au Chien Study Area

- 75-115 cm subsidence vs. 0-14 cm erosion



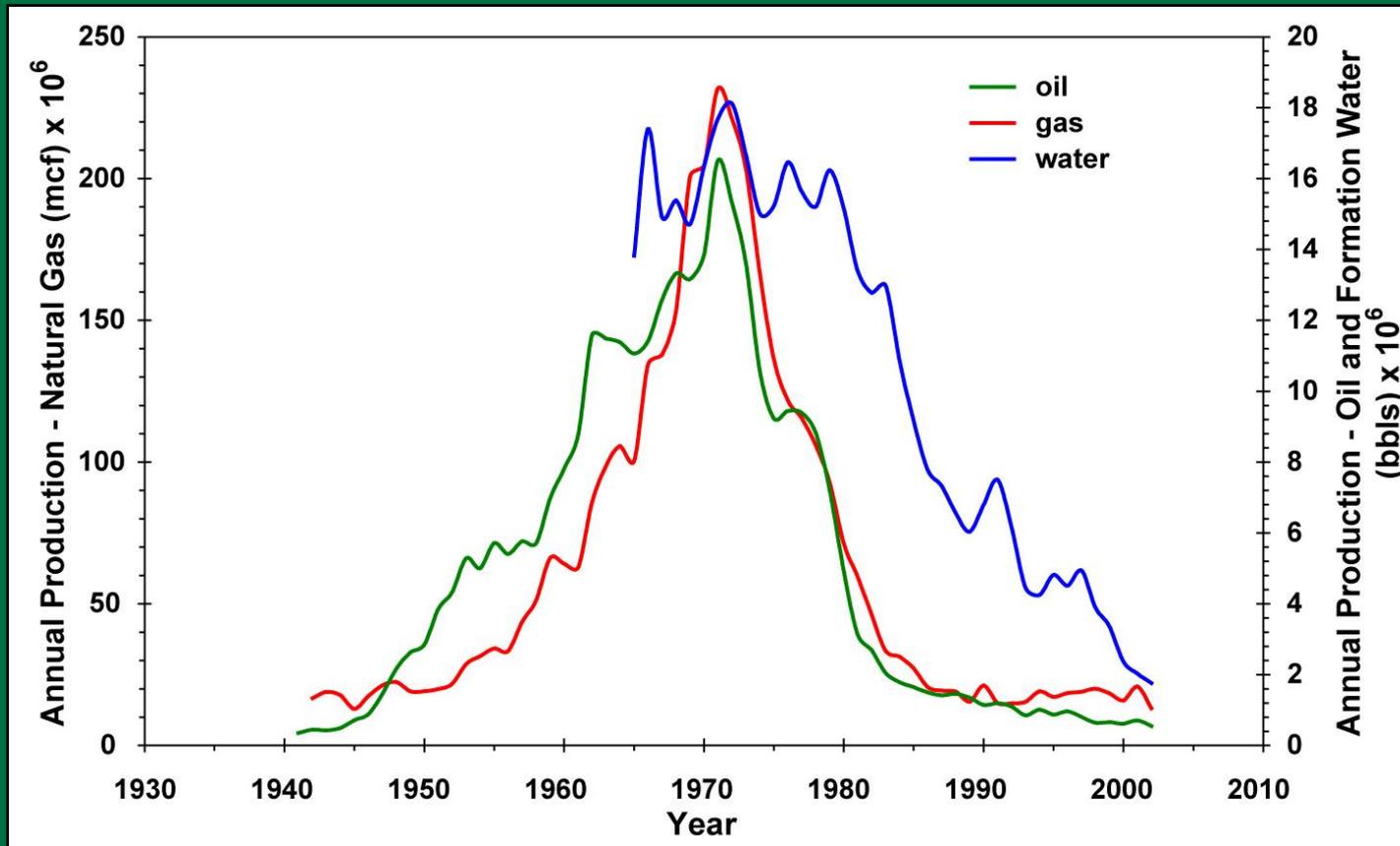


study-area boundary
Pointe Au Chien
oil-and-gas field
1932-2004 land loss



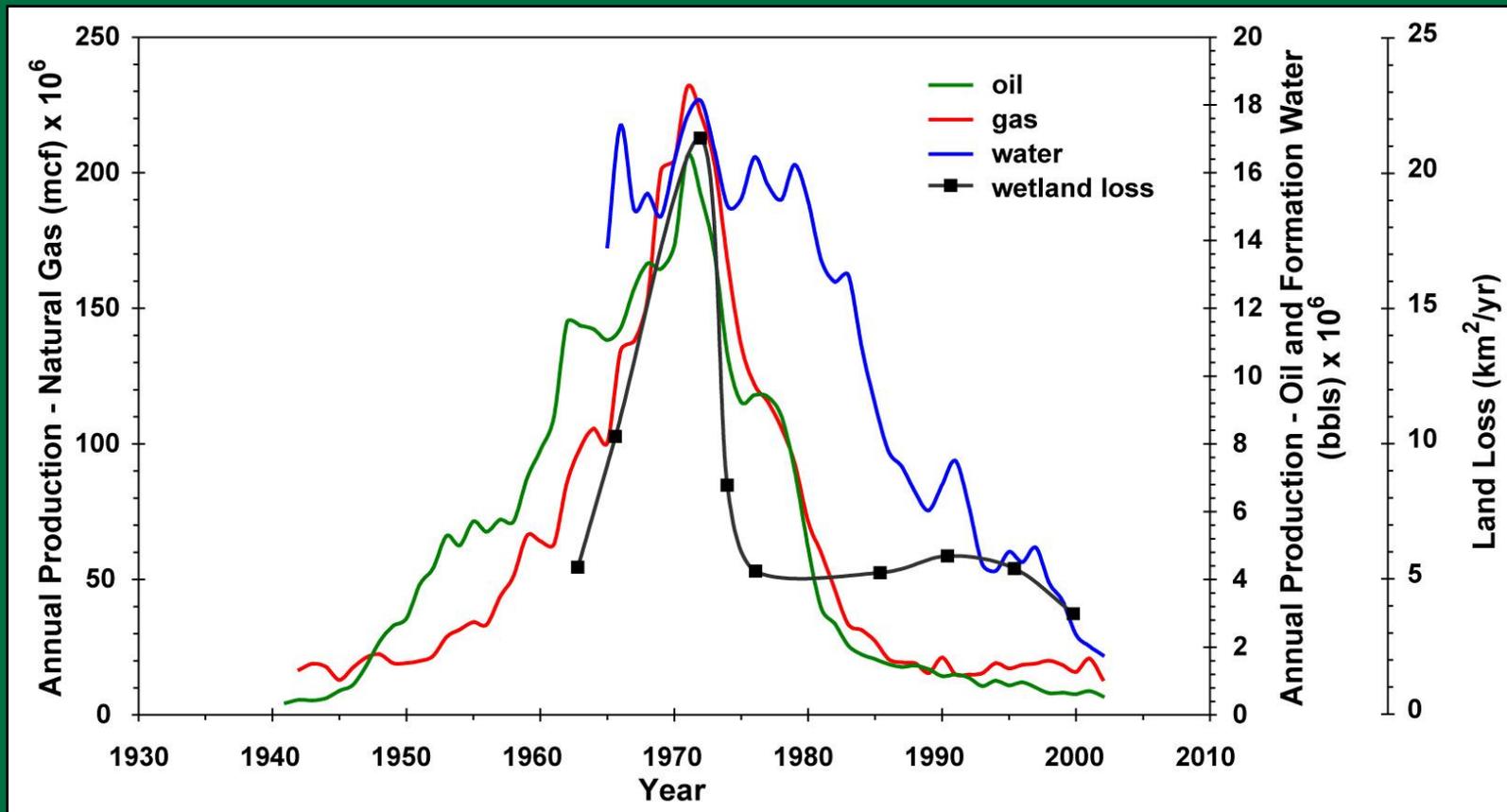
Delta-Plain Oil-and-Gas Production

- Good temporal correlation of peak hydrocarbon production and peak wetland loss rates



Delta-Plain Oil-and-Gas Production

- Good temporal correlation of peak hydrocarbon production and peak wetland loss rates



Conclusions and Implications

- **Most recent land-loss rates comparable to pre-1970s background rates**
- **Subsidence is primary mechanism of wetland loss**
 - **Historic subsidence rates >> geological subsidence rates**
- **Current research:**
 - **Investigate hotspots that developed more recently and/or not immediately adjacent to oil-and-gas fields**
 - **Subsidence vs. erosion around existing water bodies?**
 - **Extend study to chenier plain**