



**STUPID HUMAN TRICKS**

**Mississippi River**

## A Less Mighty Mississippi

During the past 7,000 years, much of the Louisiana coast was created as the mouth of the Mississippi River meandered across the region filling the coastline with sediment. Now, levees and dams are preventing much of that sediment from replenishing the coast.

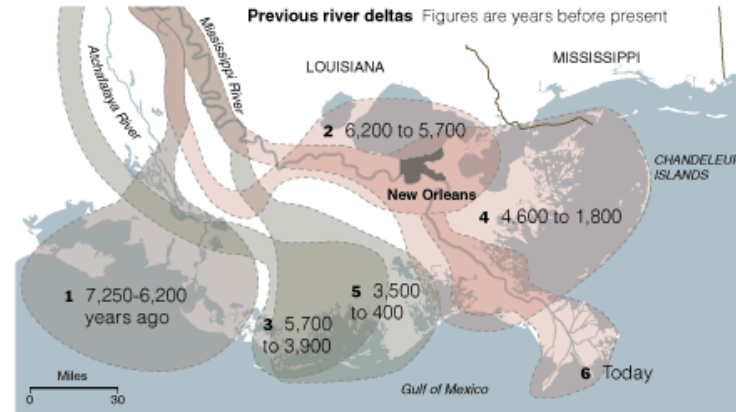
### DRAINAGE BASIN

The Mississippi drains more than 40 percent of the continental United States.



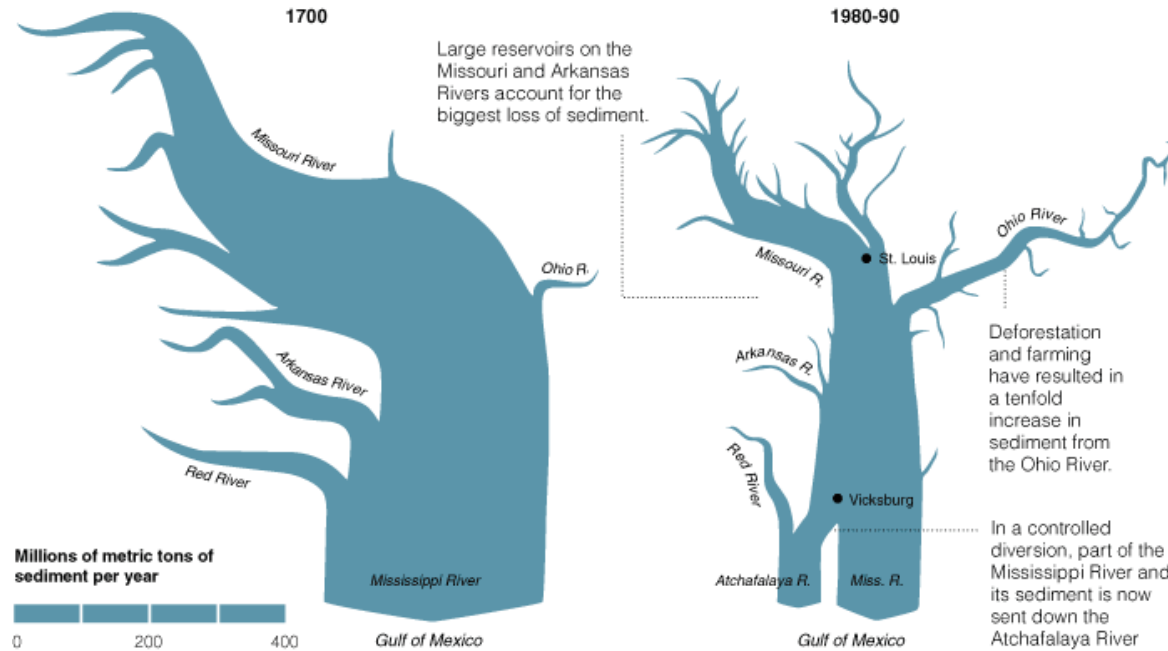
### MISSISSIPPI'S MANY DELTAS

The Mississippi has always meandered but levees are preventing the river from making its next move, most likely to the Atchafalaya River.



### A LOSS OF SEDIMENT

The Mississippi River transports 200 million tons of sediment per year to the Gulf of Mexico. But that is half of what the river carried three centuries ago, before European colonists first moved to the area and built levees and dams to protect themselves from floods.

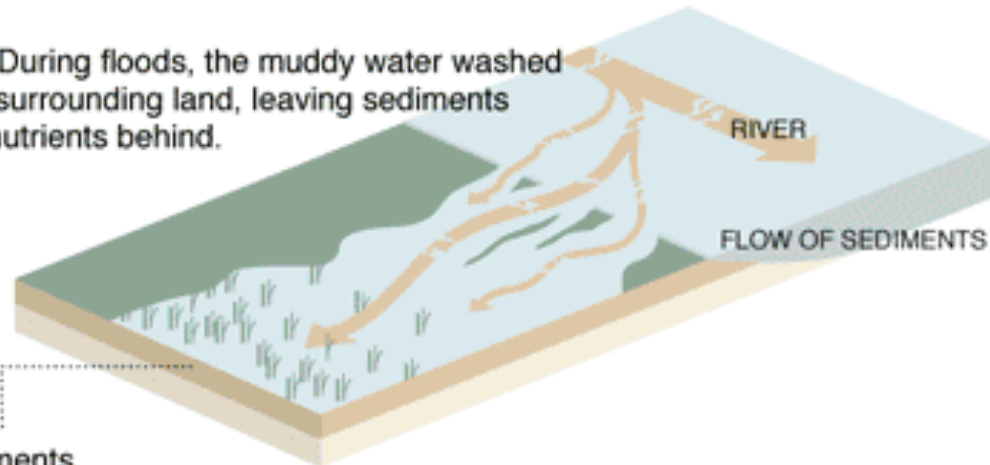


Sources: United States Geological Survey; "Contaminants in the Mississippi River"

# Coastal Defenses Are Disappearing

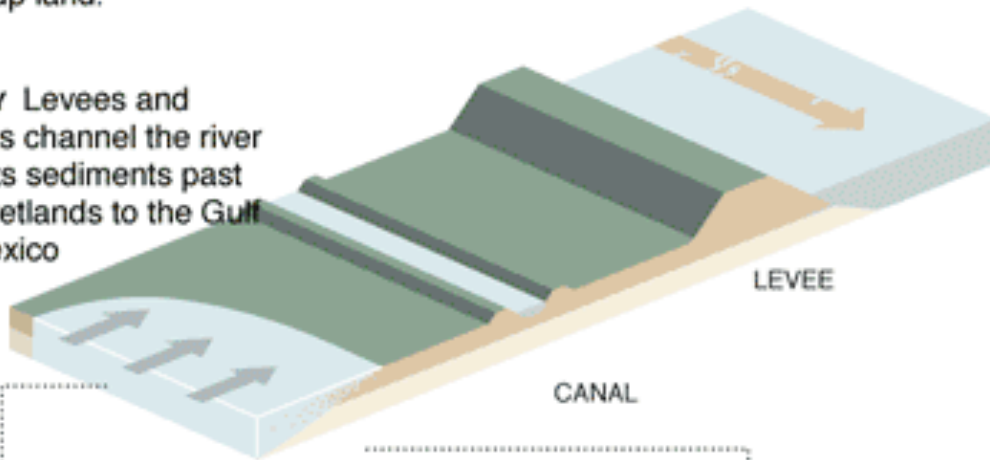
Ever since the early 1700's, when New Orleans was founded and settlers began building levees and canals to control the Mississippi River, Louisiana's coastline has been sinking. Marshes and barrier islands, which protect New Orleans from hurricanes, are eroding fast.

1700 During floods, the muddy water washed over surrounding land, leaving sediments and nutrients behind.



Sediments built up land.

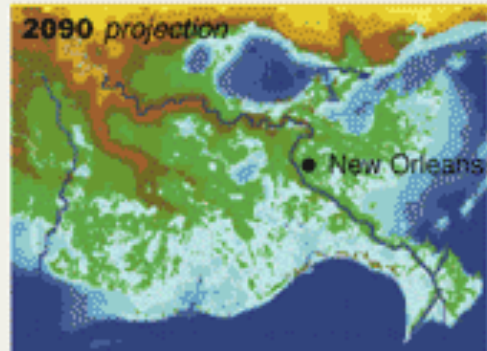
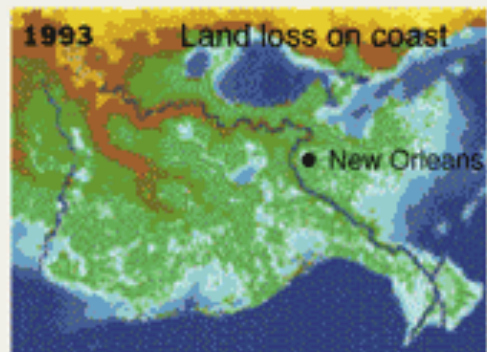
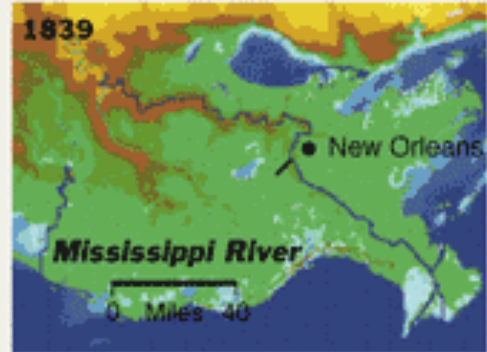
TODAY Levees and canals channel the river and its sediments past the wetlands to the Gulf of Mexico



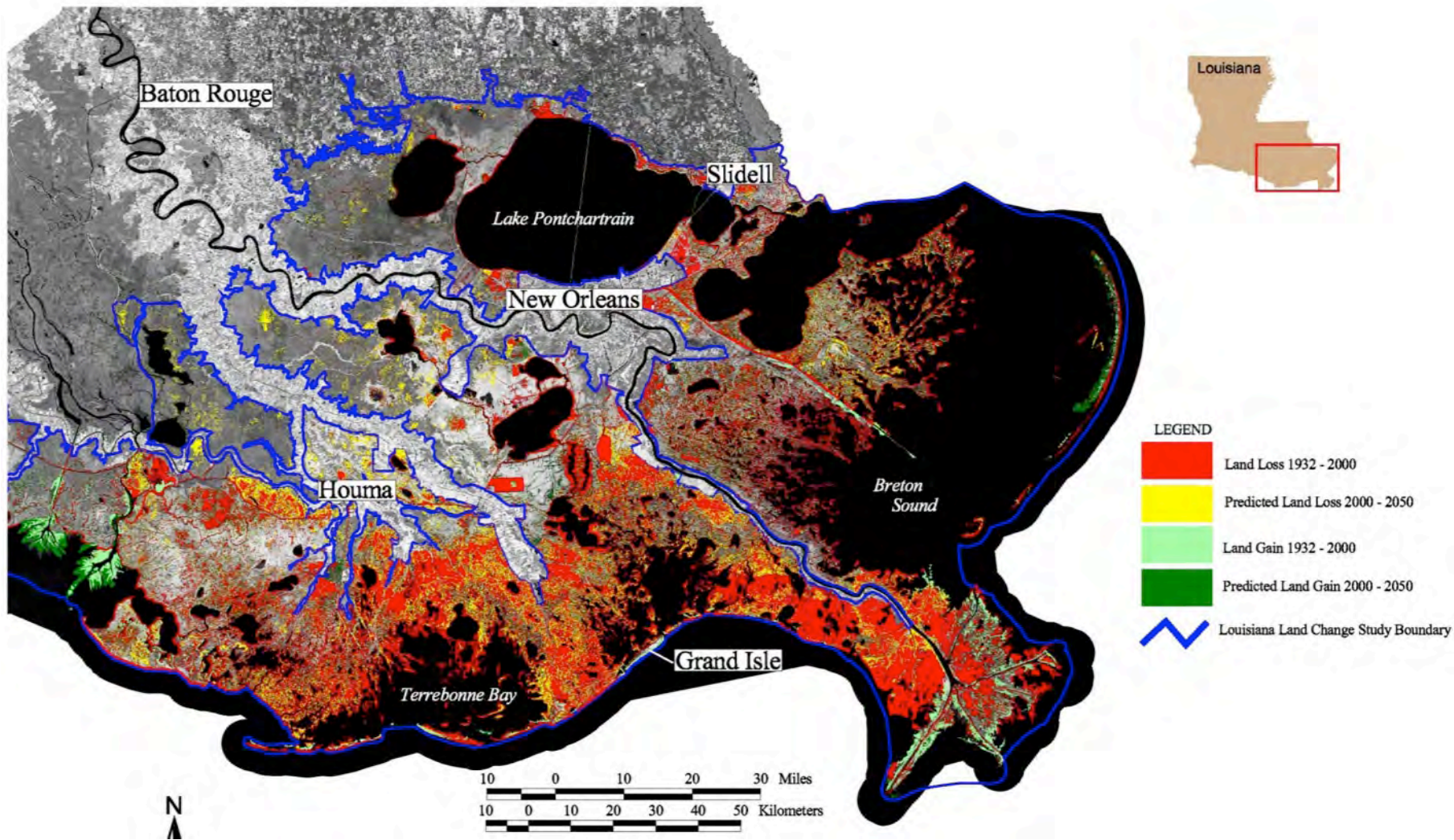
Saltwater moves in, killing marsh plants. Nothing remains to hold the marsh together.

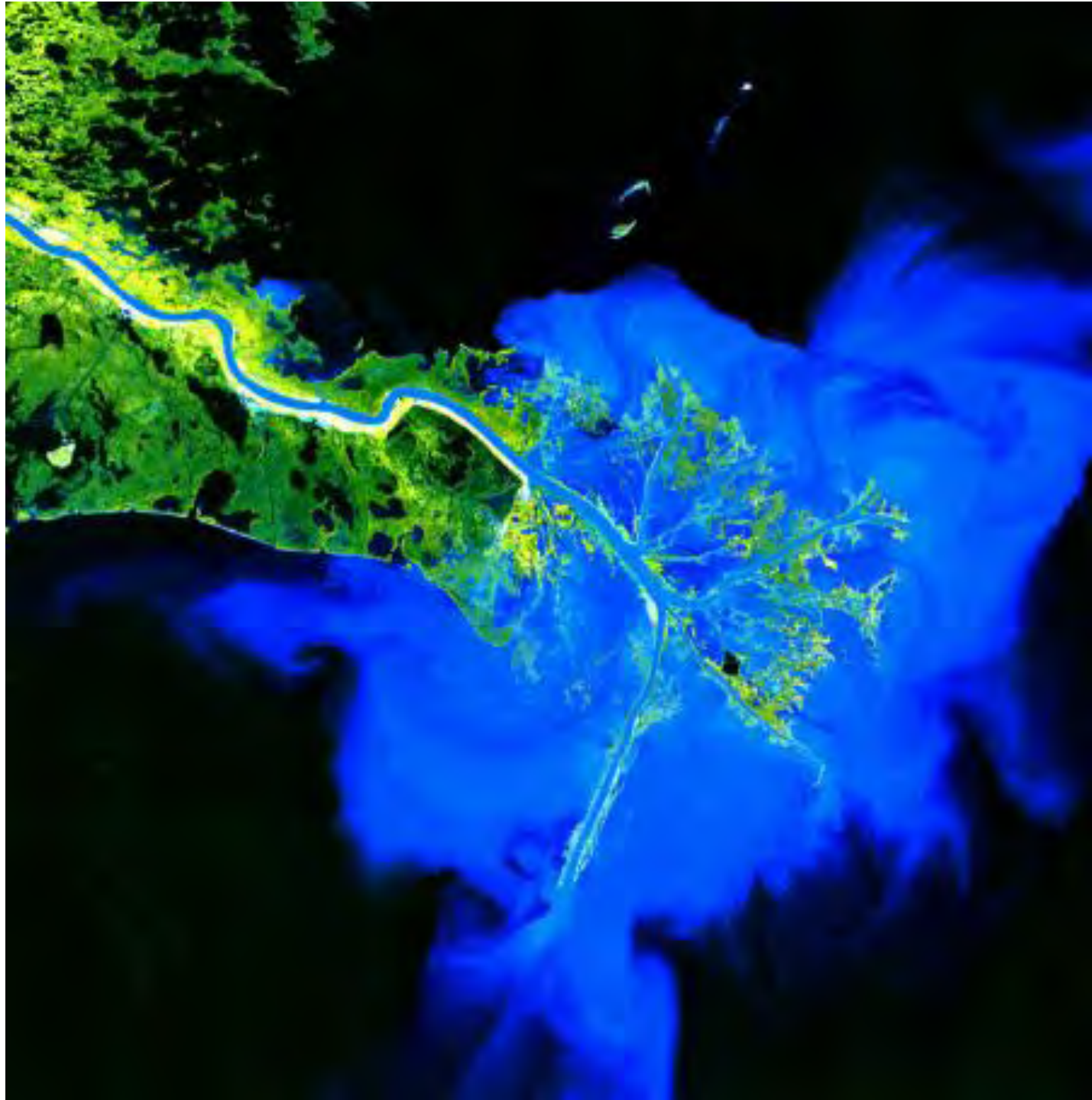
As sediment compacts, sinks and erodes, nothing comes in to replace it.

## DECONSTRUCTING A COAST







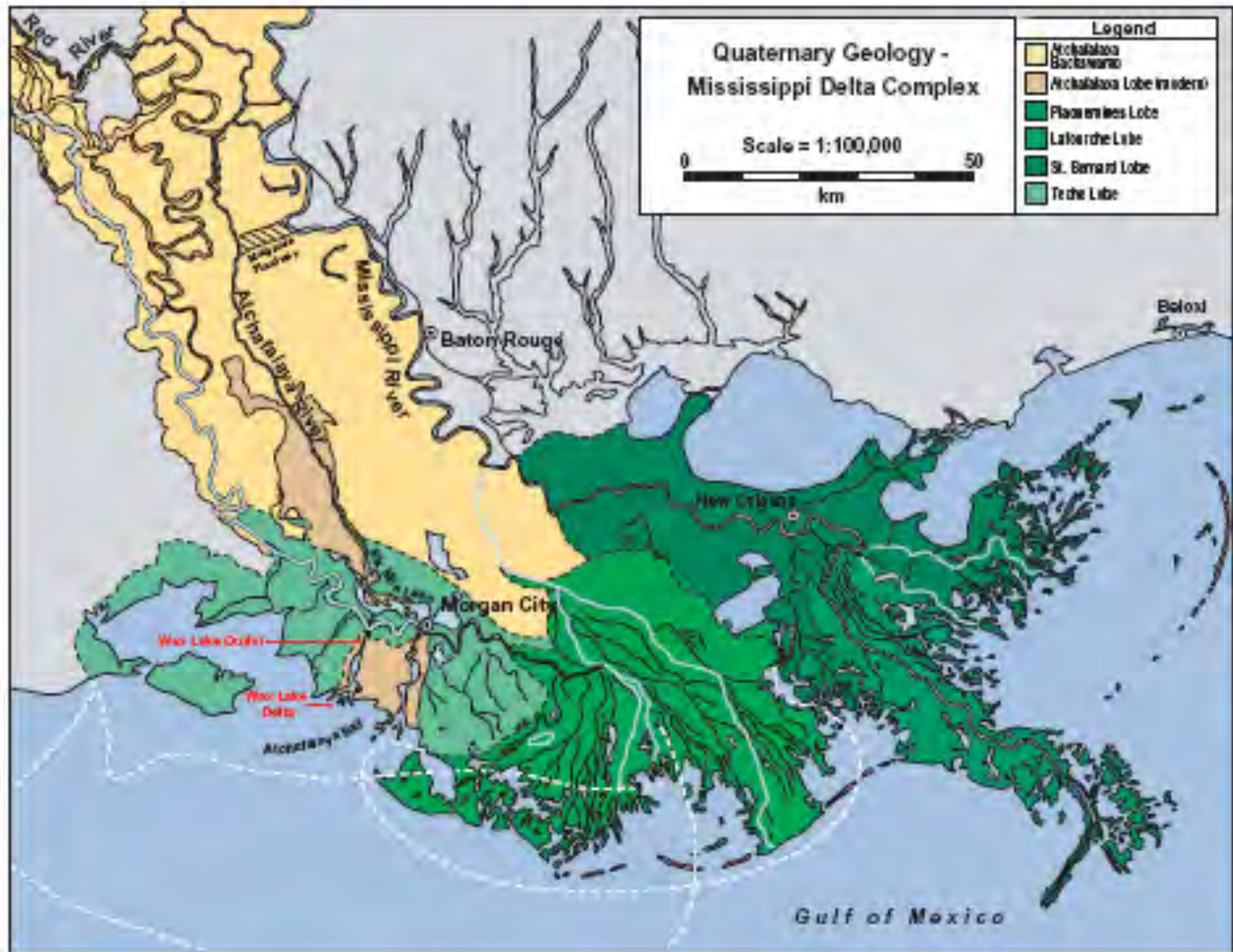




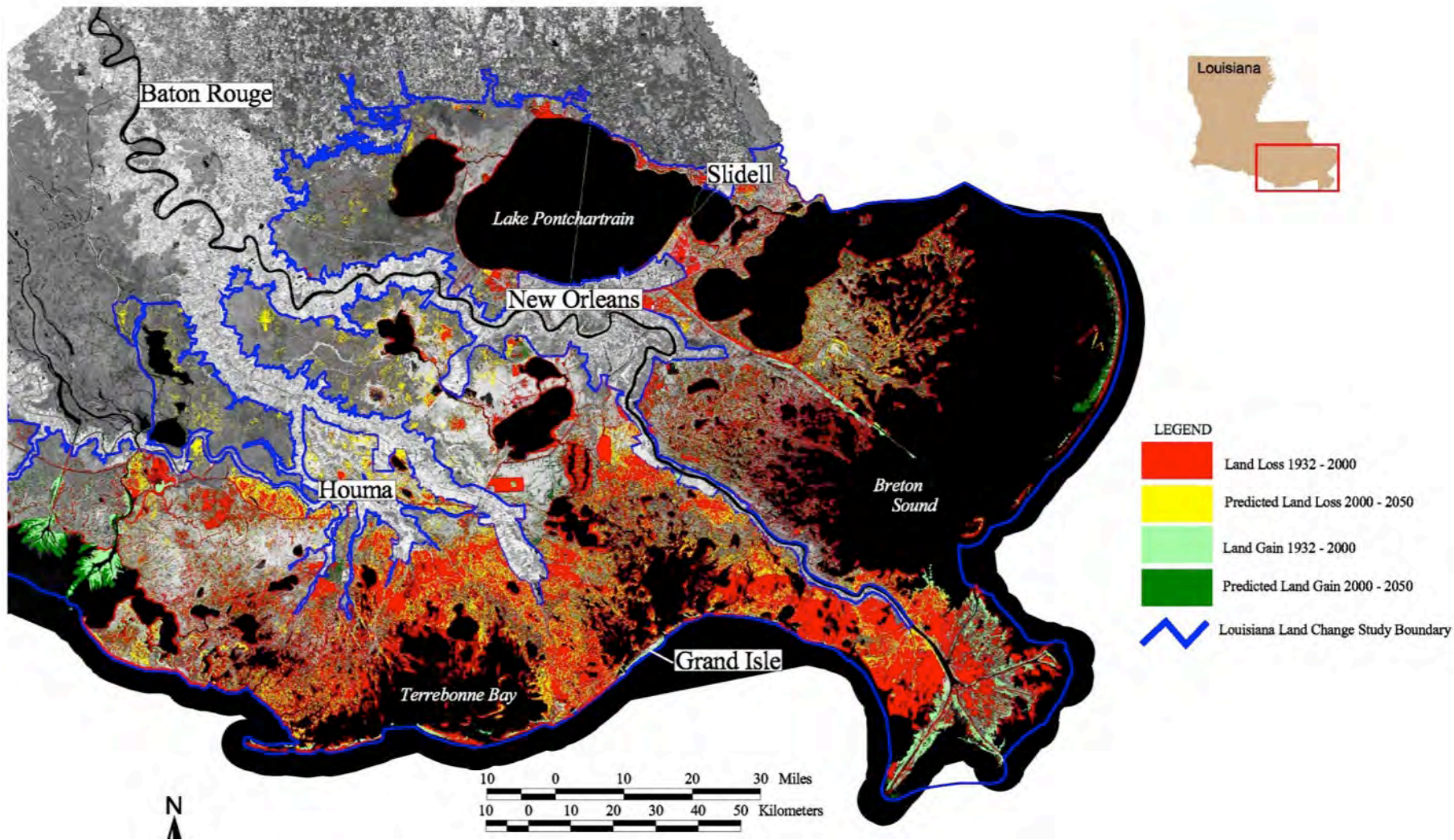


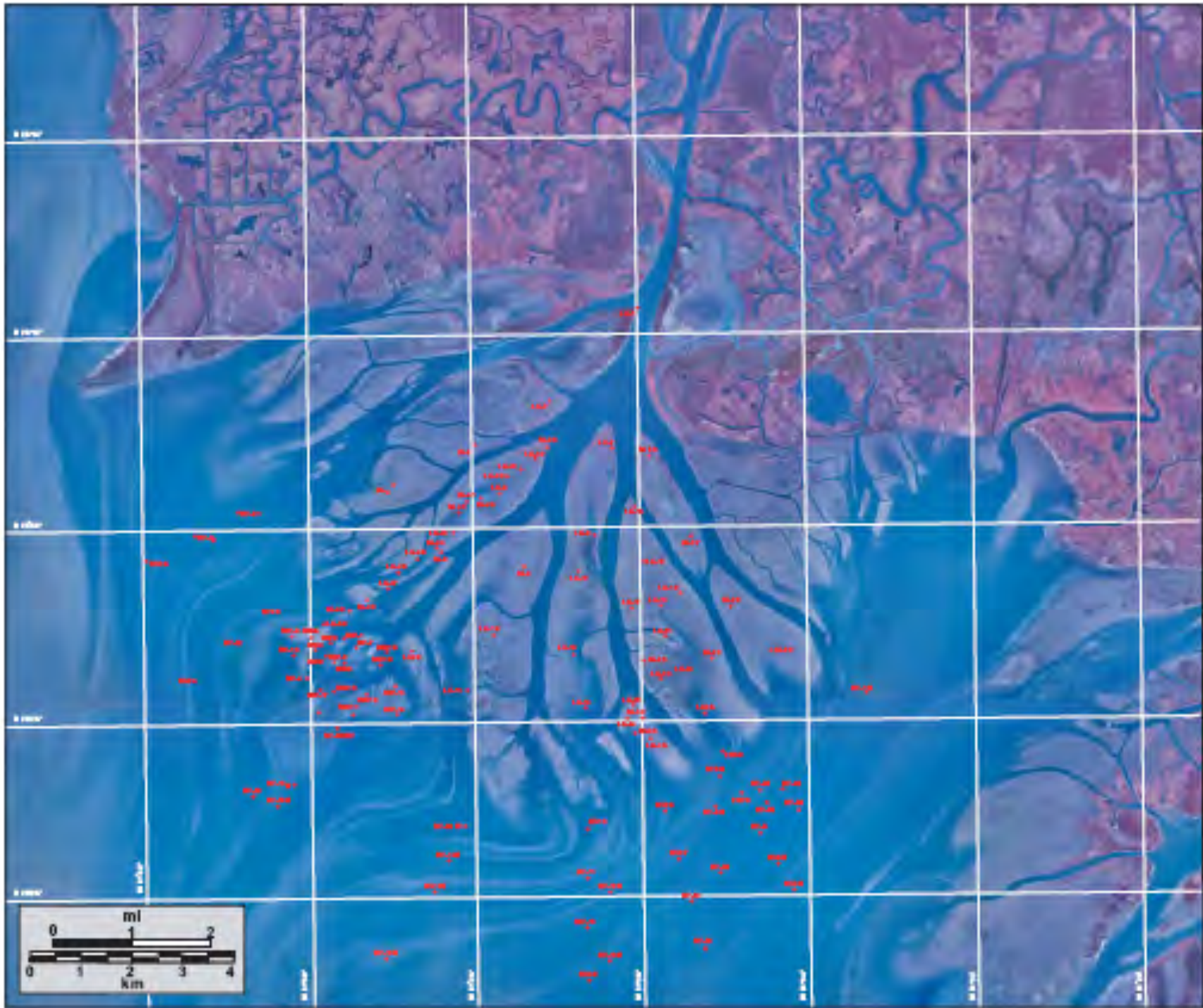








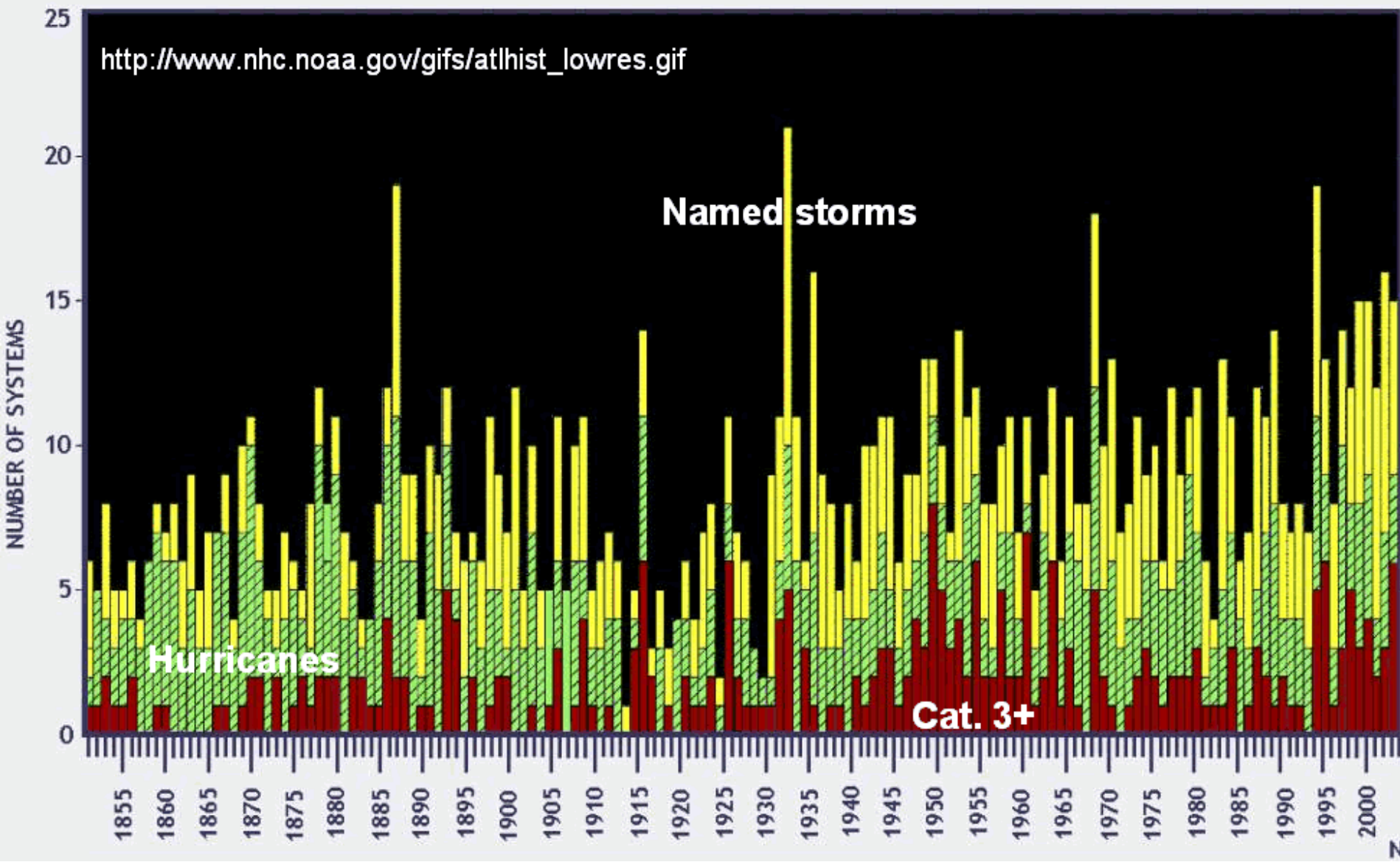




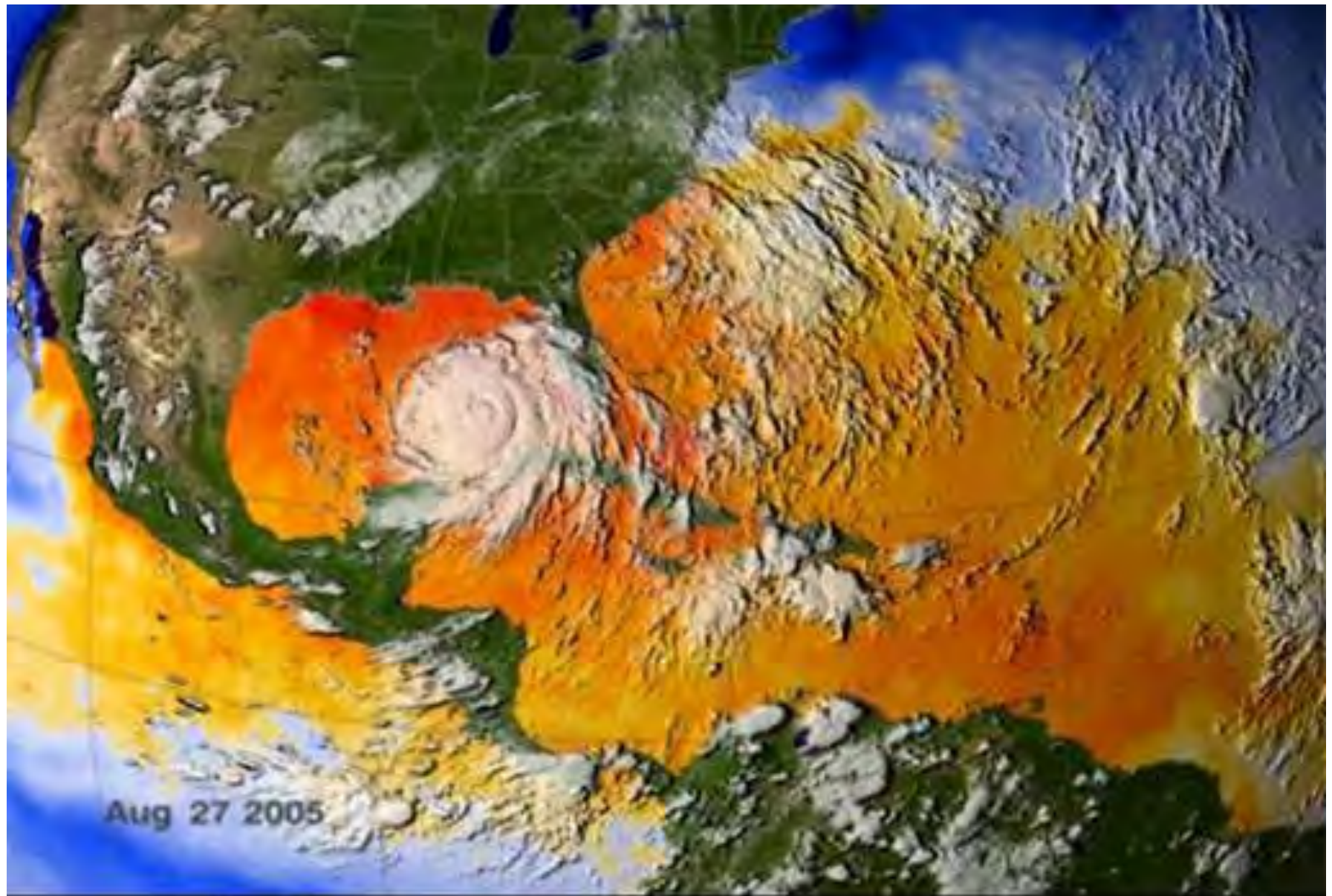




[http://www.nhc.noaa.gov/gifs/atlhist\\_lowres.gif](http://www.nhc.noaa.gov/gifs/atlhist_lowres.gif)







Sea Surface Temperature















## List of some things we did

Dammed river – reduced sediment supply, 400 million t/y to 200 t/y

Prevented lobe switching – eliminated sediment supply to other parts of delta plain

Built artificial levees – reduced nourishment of flood plain

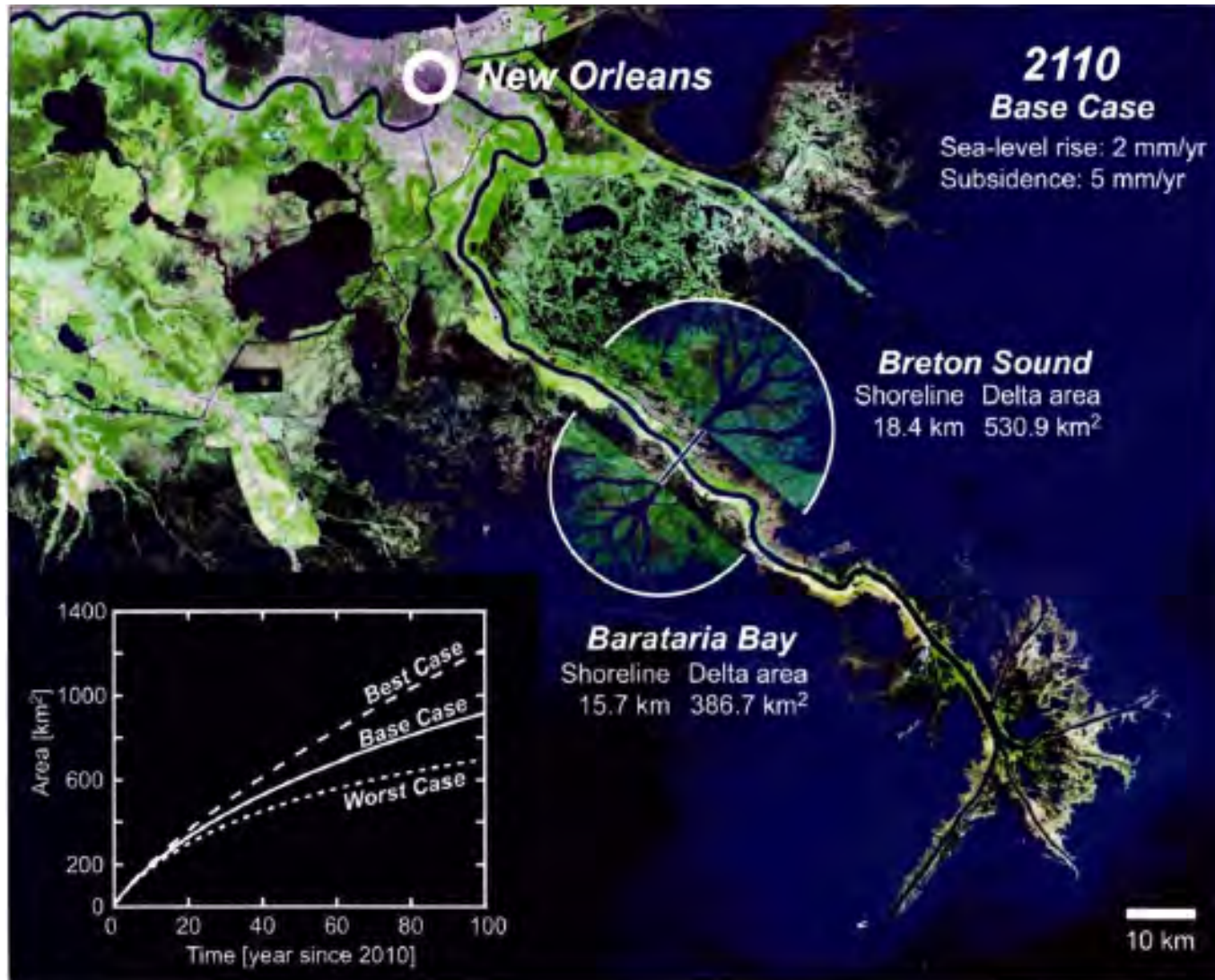
Constrained flow to modern Balize delta – caused delta to build to shelf break, and lose sediment to continental slope

Removed water and natural gas – accelerated consolidation of deltaic sediment and subsidence of land surface

Dredged channel – created depressions that act as sediment traps and pathways for storm surge



# Potential alteration to Mississippi River mouth to help promote development of wetlands

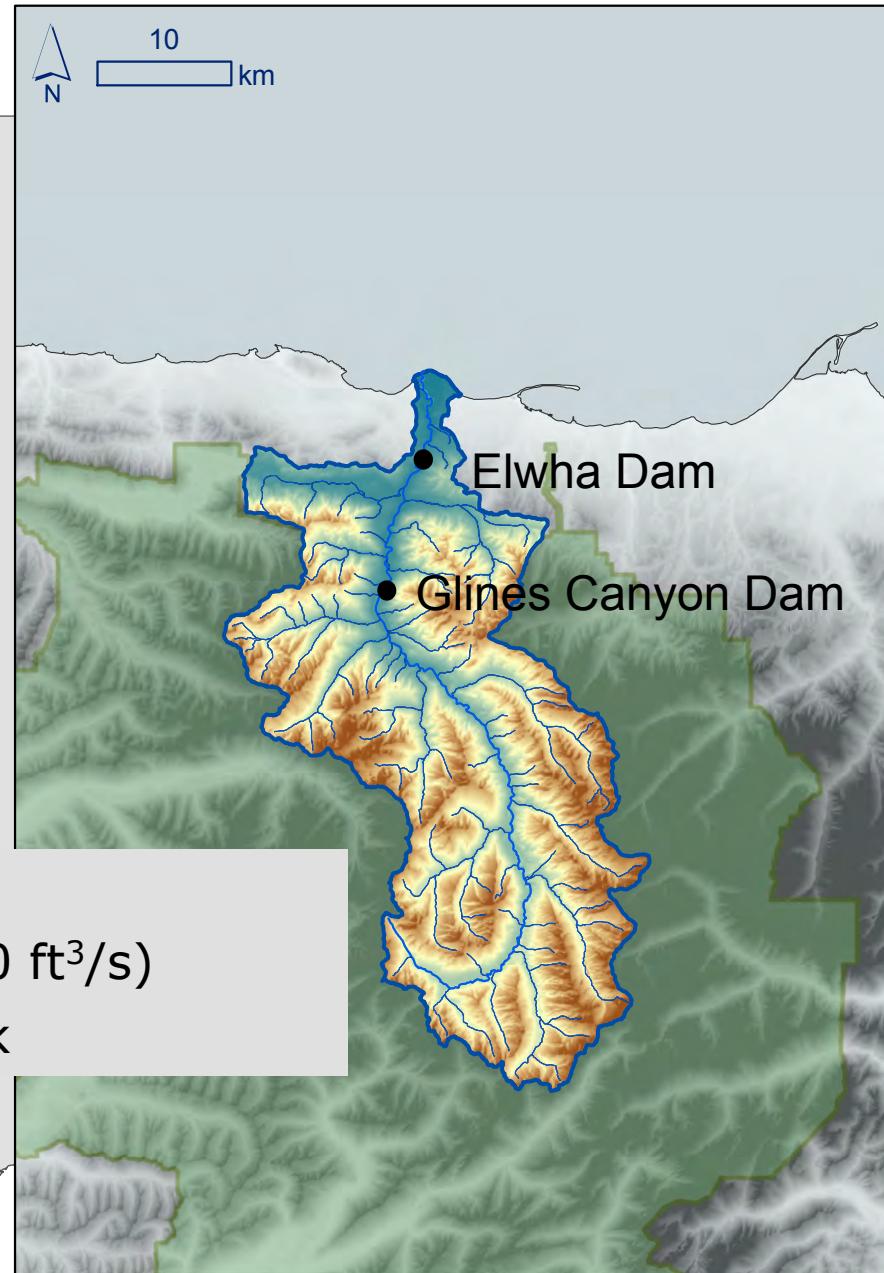


# A different story... Elwha River restoration



Tom Roorda

## Small mountainous river (SMR)



- 72 km long
- Typical discharge  $\sim 40 \text{ m}^3/\text{s}$  ( $1500 \text{ ft}^3/\text{s}$ )
- 83% inside Olympic National Park

# Before the dams... (early 1900s and before)



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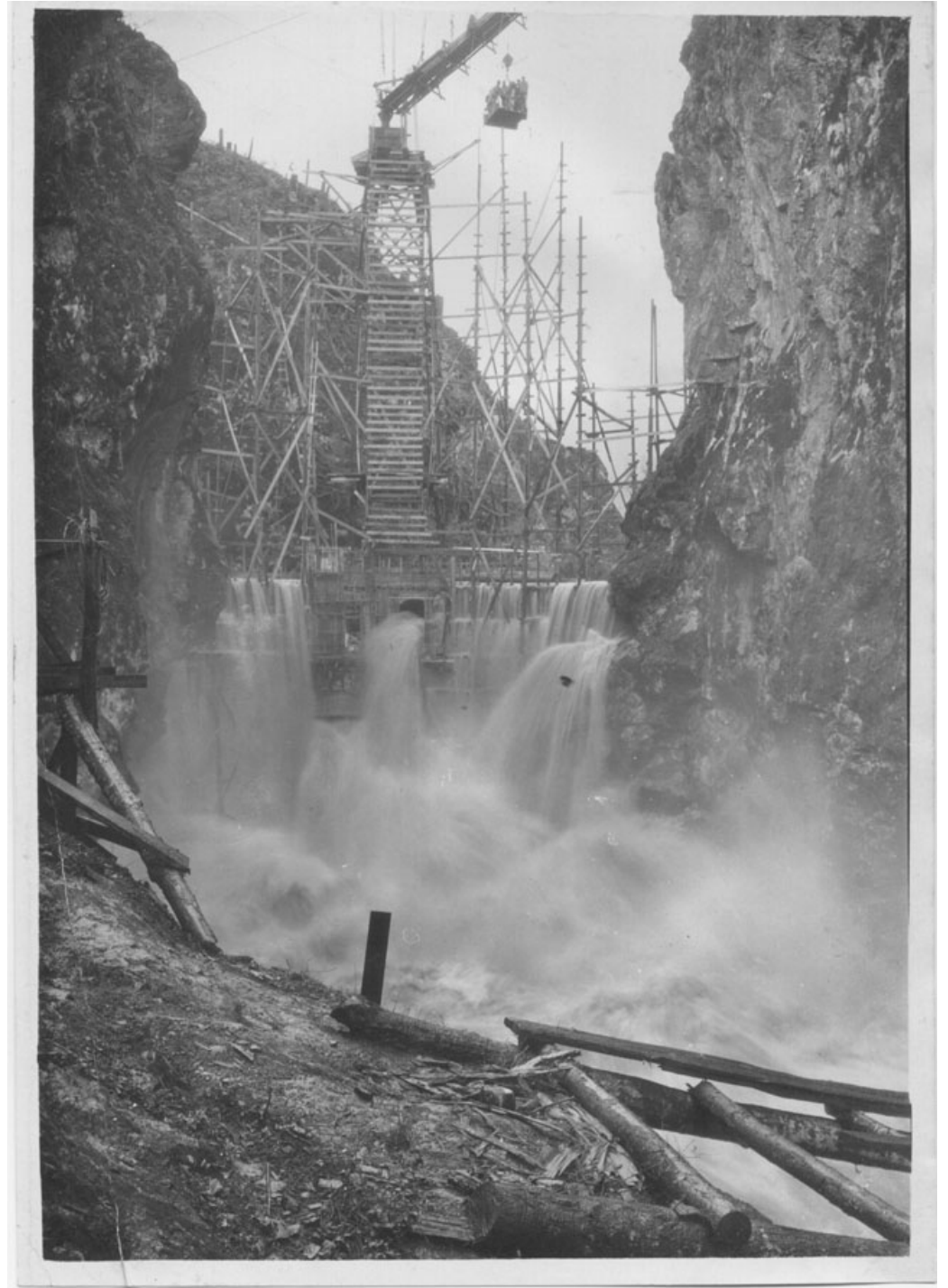
Elwha Dam construction, c. 1912  
(River km 7.9)



Copyright HistoricPhotoArchive.net

<http://historicphotoarchive.photoshelter.com/image/I0000Sr.JXrGkYeg>

Glines Canyon Dam  
Construction, c. 1927  
*(River km 21.6)*



*Photo courtesy Clallam County Historical Society*

29 11 07:03:12 Cam Temperature:12.9 Battery Voltage: 12.6



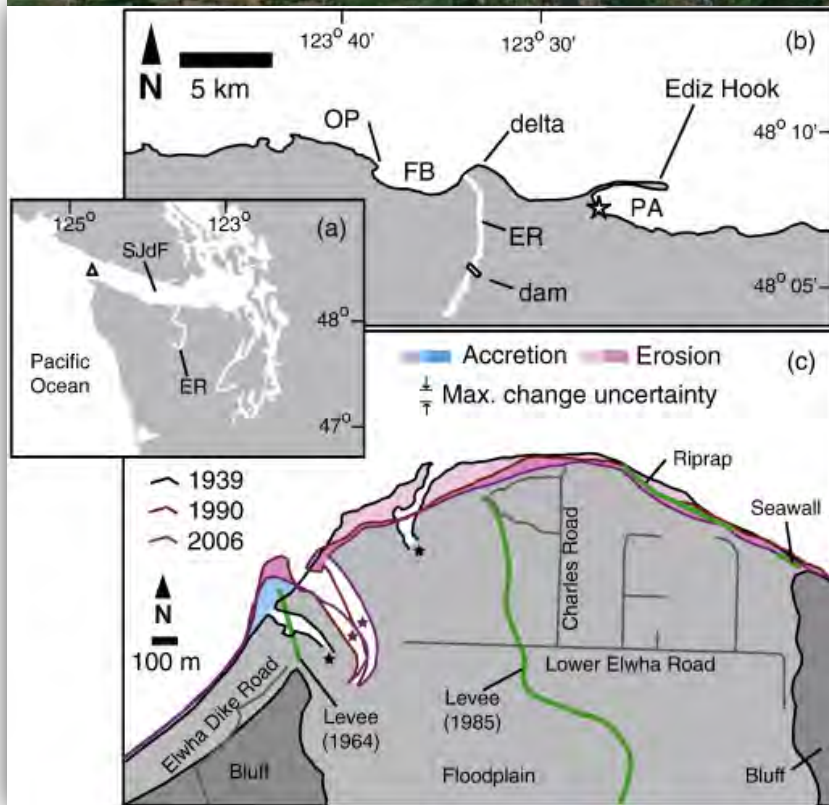
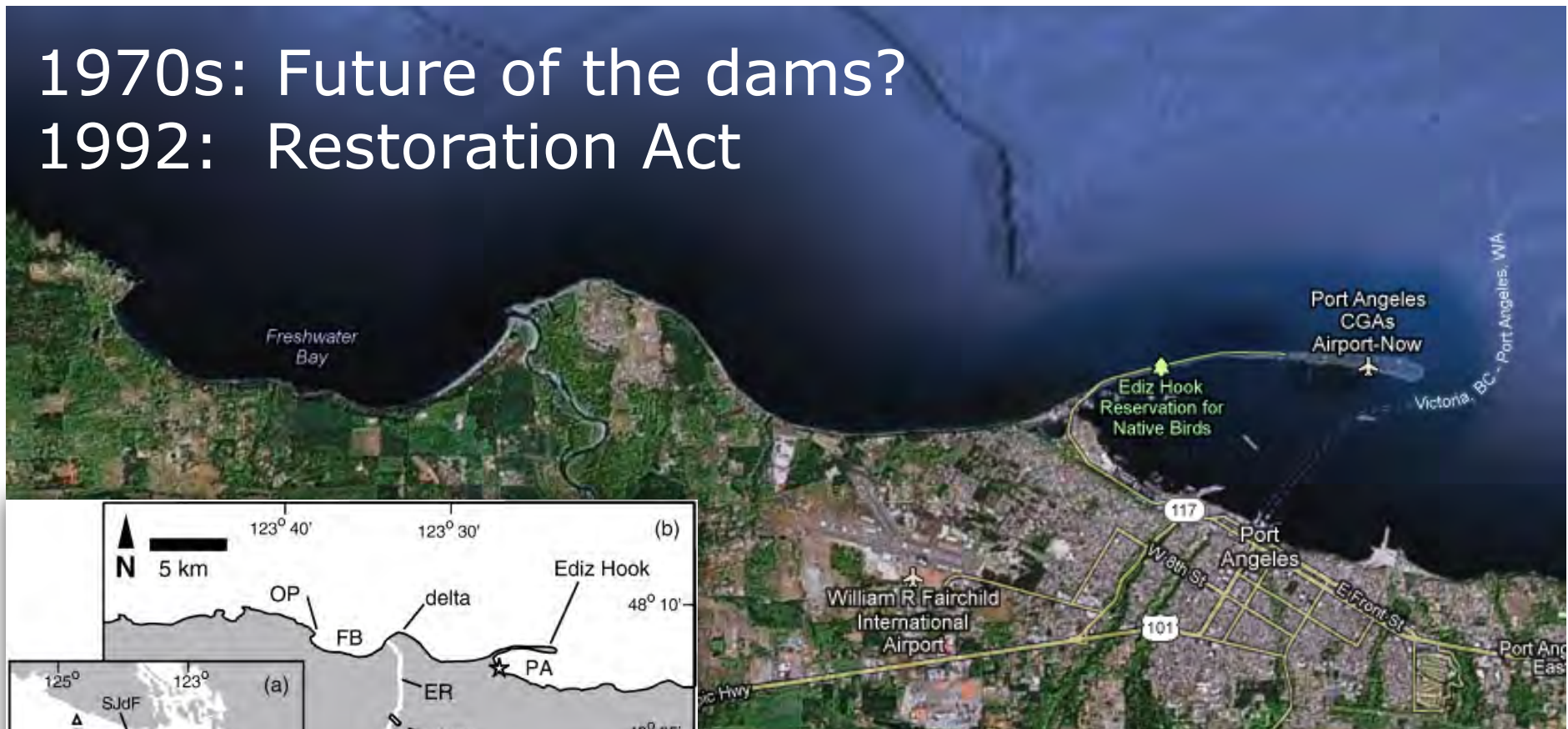
Sep 15 11 07:34:33



NPS



# 1970s: Future of the dams? 1992: Restoration Act



## *Why remove the dams?*

- Old infrastructure
- (Relatively) little power production
- No fish passage
- Sediment loss downstream  
→ beach erosion



Jun 29 12 09:32:10

51.0 15.0



Oct 27 11 14:08:23



NPS

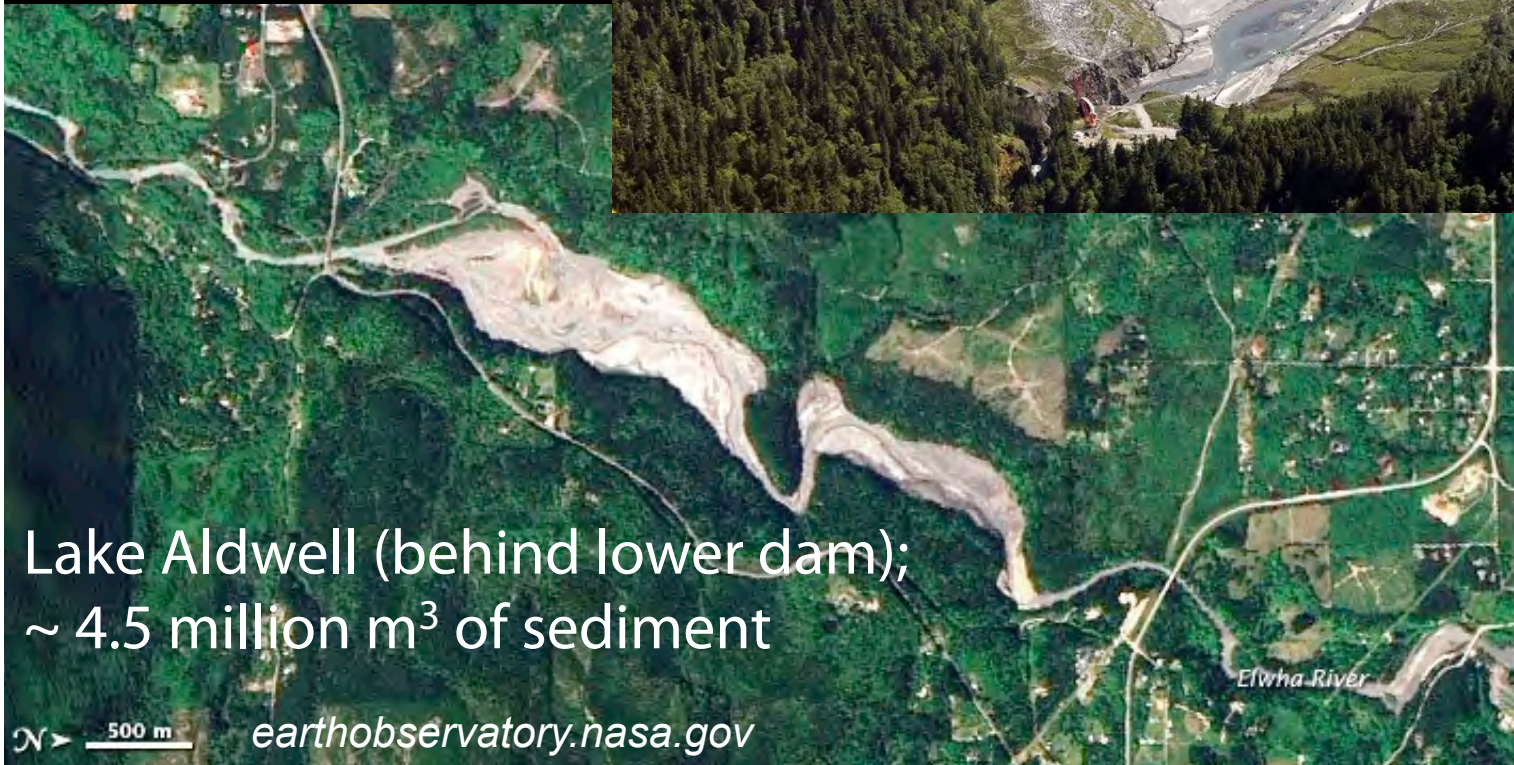


Seattle Times

Lake Mills (behind upper dam);  
~ 21 million m<sup>3</sup> of sediment



Lake Aldwell (behind lower dam);  
~ 4.5 million m<sup>3</sup> of sediment



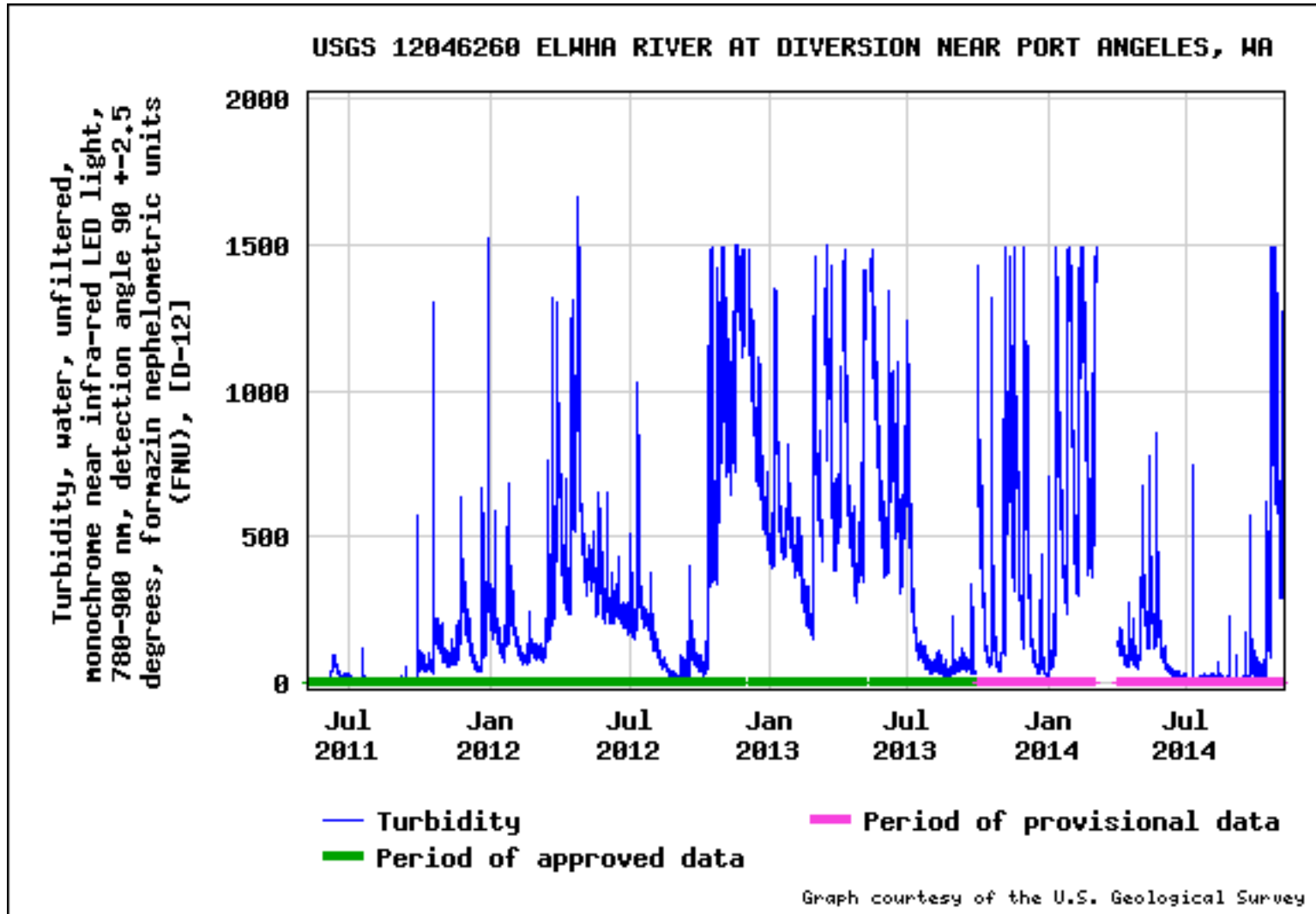
500 m [earthobservatory.nasa.gov](http://earthobservatory.nasa.gov)

NPS



# River turbidity since May 2011

(a measure how much suspended load is carried by the river)







Lower river, August 2012



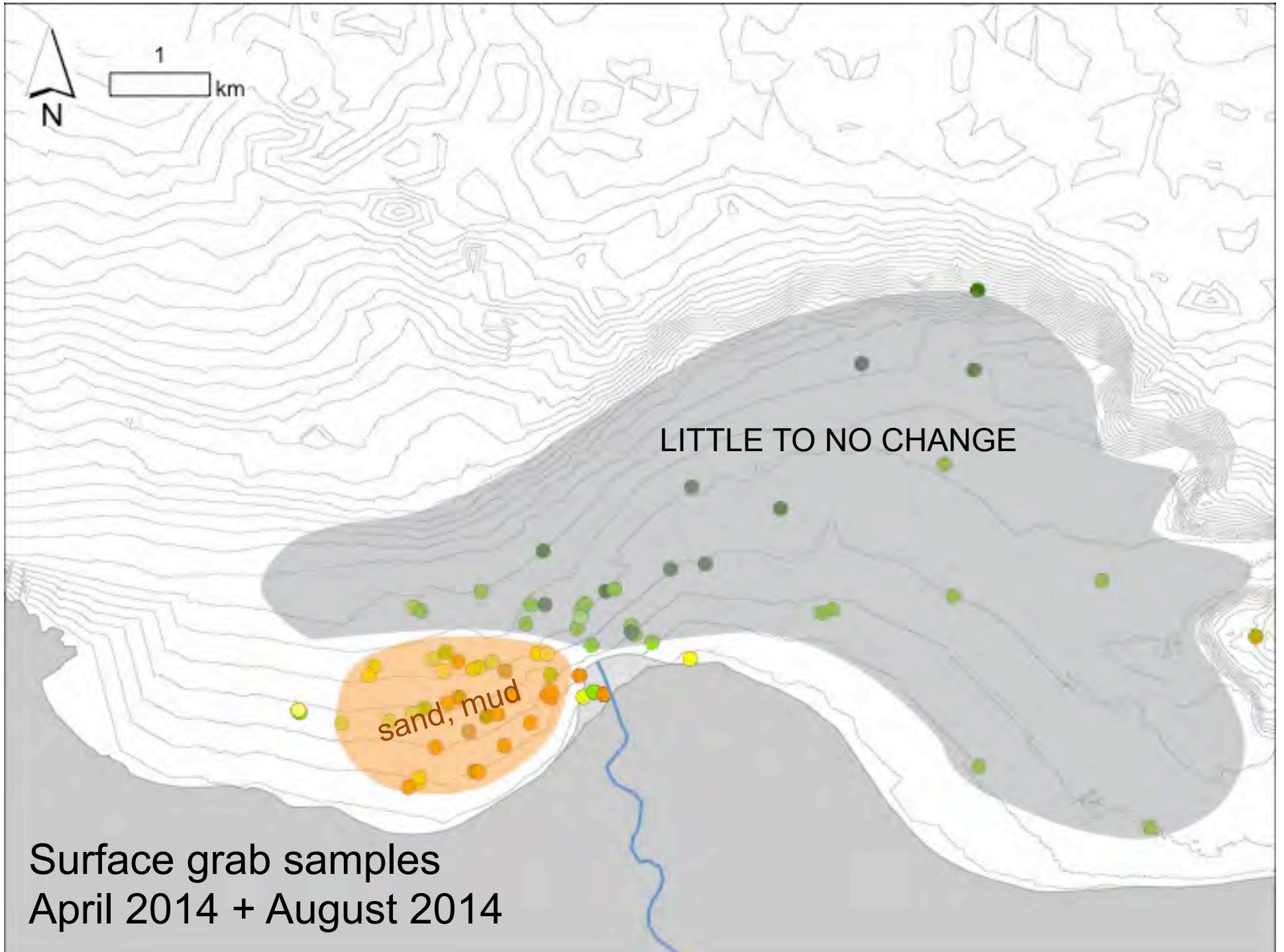
Elwha nearshore 15 April 2014 Tom Roorda and CWI. © All Rights Reserved.



*(C) Tom Roorda*

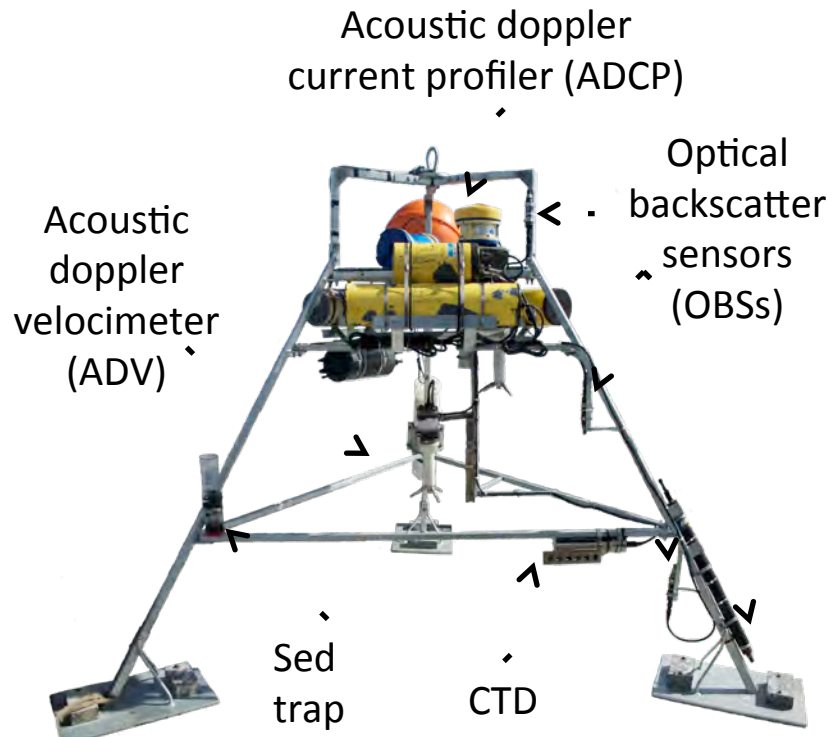


*Steve Ringman/The Seattle Times*

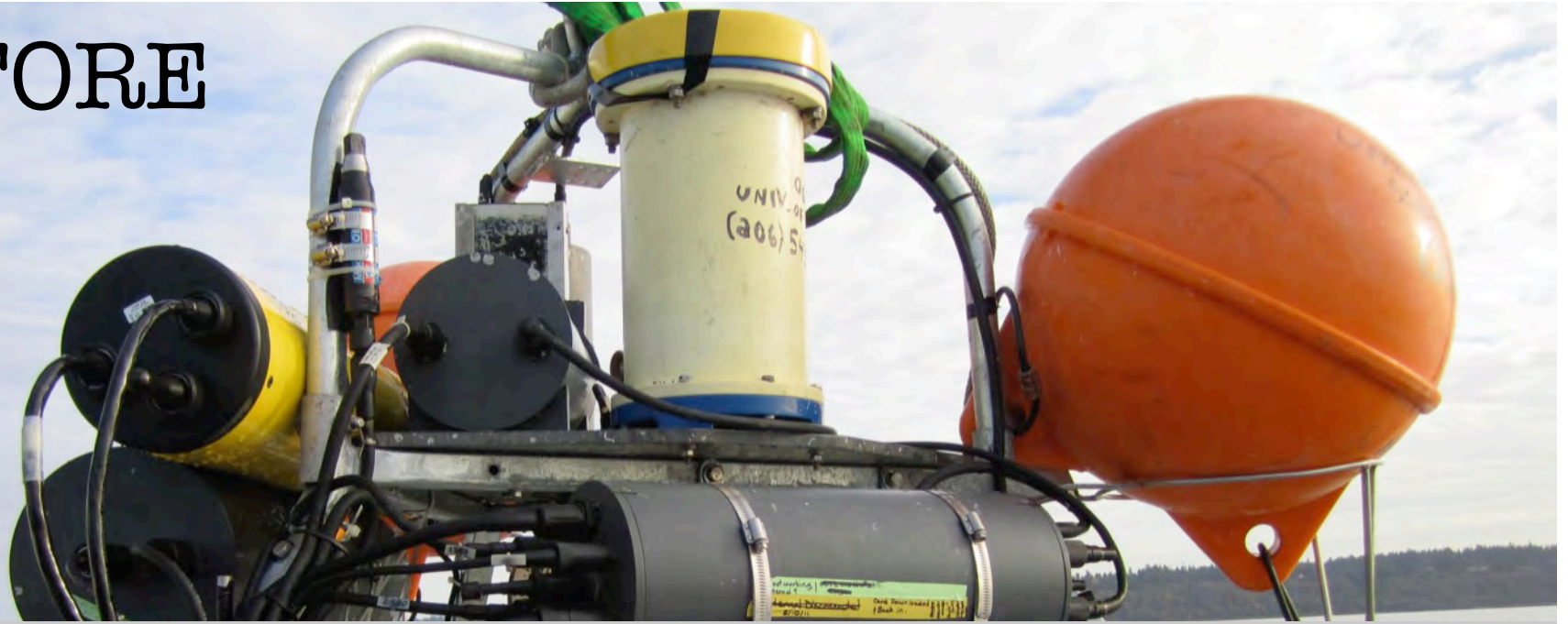


Surface grab samples  
April 2014 + August 2014

# 1 of 2 instrument systems



BEFORE



AFTER  
(4 Mo.)



