

# Twenty-Six Years of Changing Vegetative Cover and Marsh Area

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Total Land loss 1930s to 2010 =  
1985 mi<sup>2</sup>

CWPPRA projects IF all work = 7.4  
mi<sup>2</sup> gain IF successful  
(for non-diversions)

What is the role of river diversions?  
Do they restore wetlands?

GAO

United States Government Accountability Office  
Report to Congressional Addressees

December 2007

## COASTAL WETLANDS

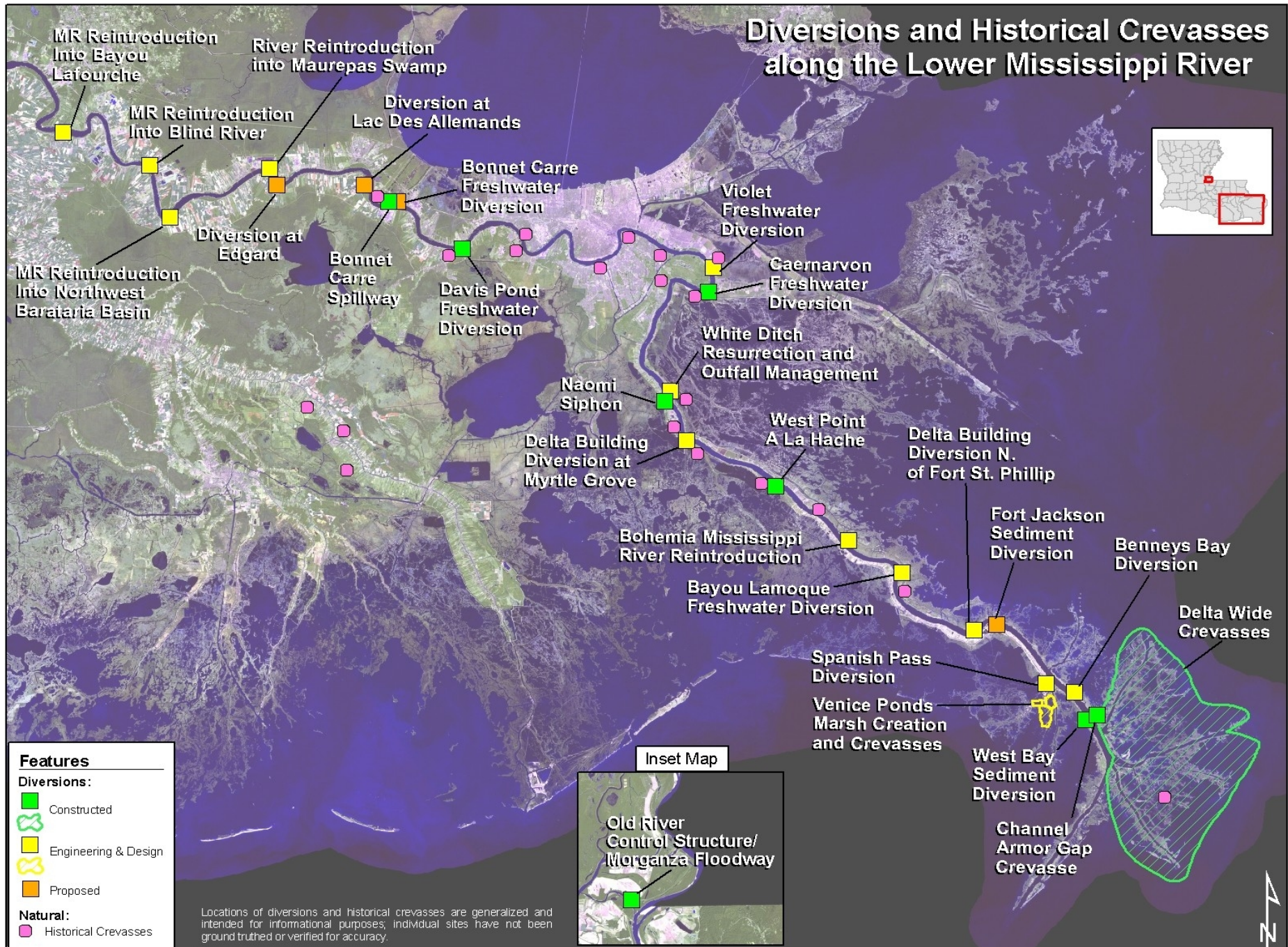
Lessons Learned from  
Past Efforts in  
Louisiana Could Help  
Guide Future  
Restoration and  
Protection



GAO-08-130

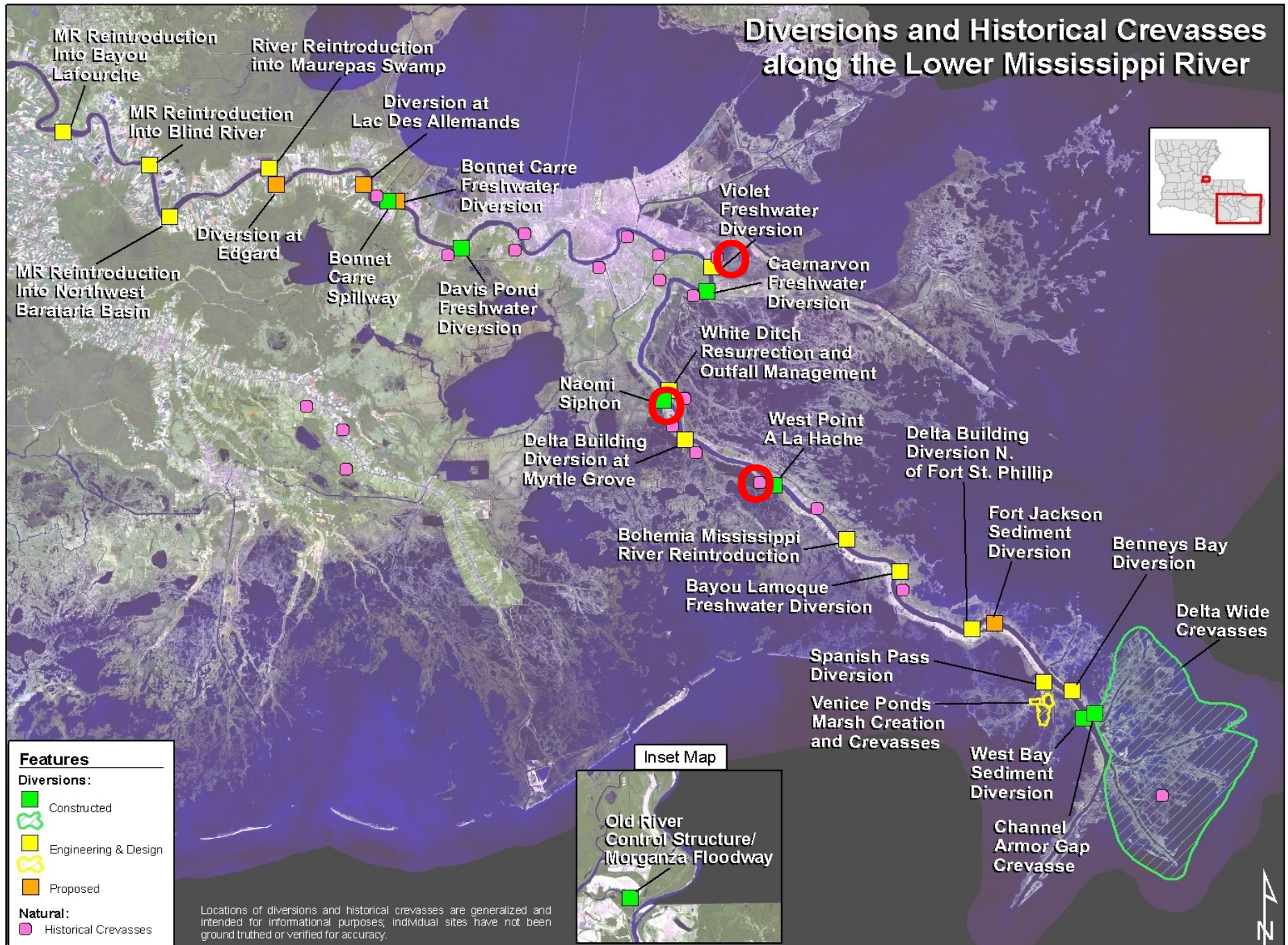


# Diversions and Historical Crevasses along the Lower Mississippi River





# Diversions and Historical Crevasses along the Lower Mississippi River



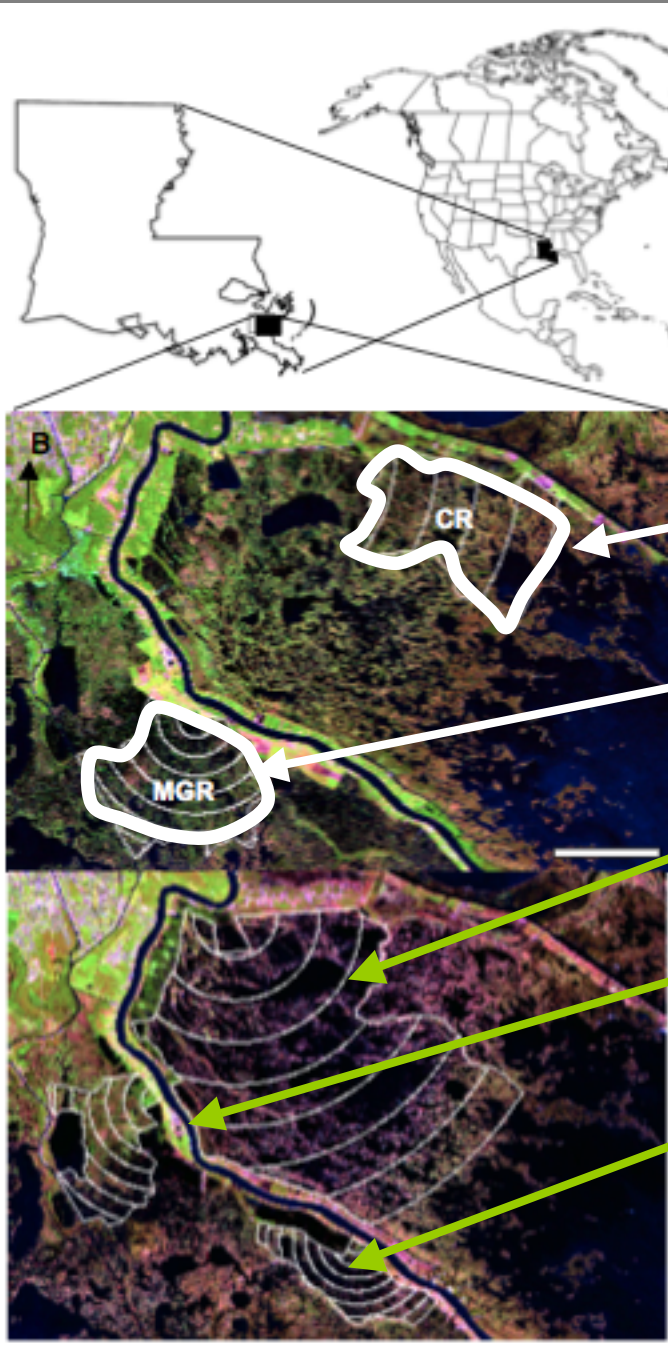


# Caernarvon Diversion of the Mississippi River: = restoration?



2-9 thousand cfs;  
opened in 1992

# Land change data sets from 1984 to 2010



East Reference

km<sup>2</sup>  
188

West Reference

162

Caernarvon (1991)

650

Naomi (1993)

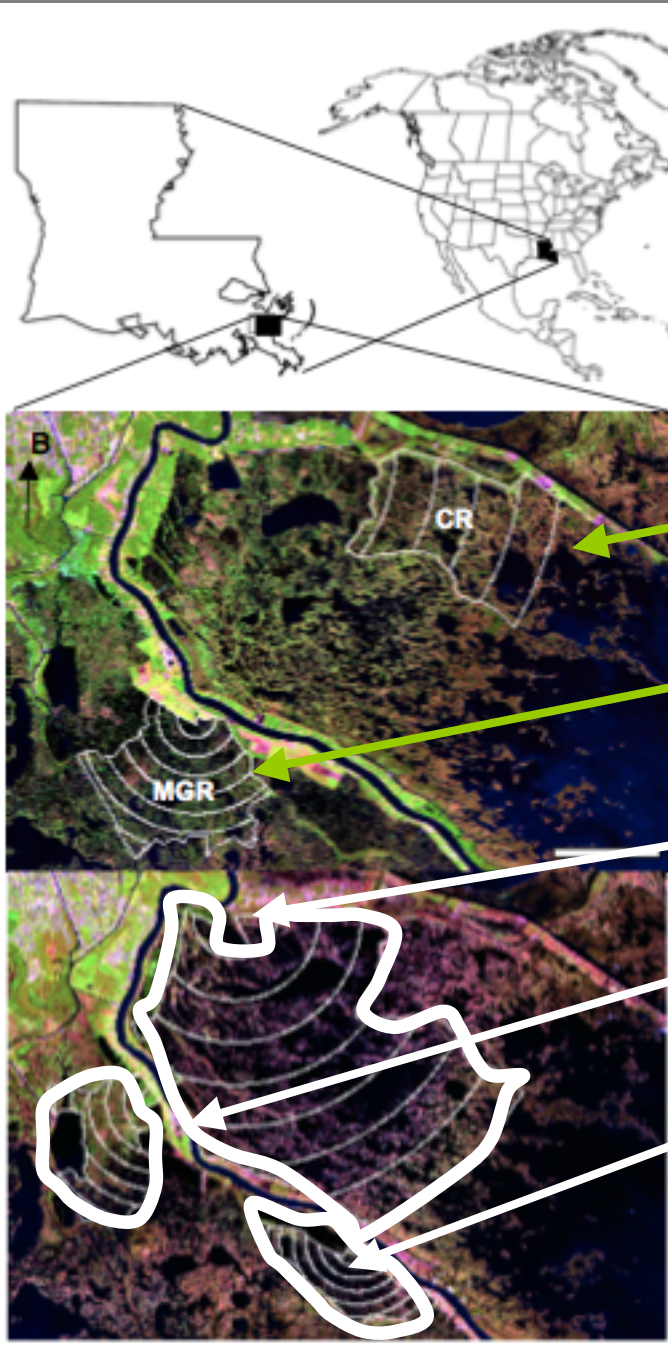
91

W. Pt. a la Hache (1992)

72



## Land change data sets from 1984 to 2010



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## Landsat Thematic Mapper imagery

Spectral mixture model developed in studies of low salinity, microtidal marshes (*Kearney et al. 2002*)

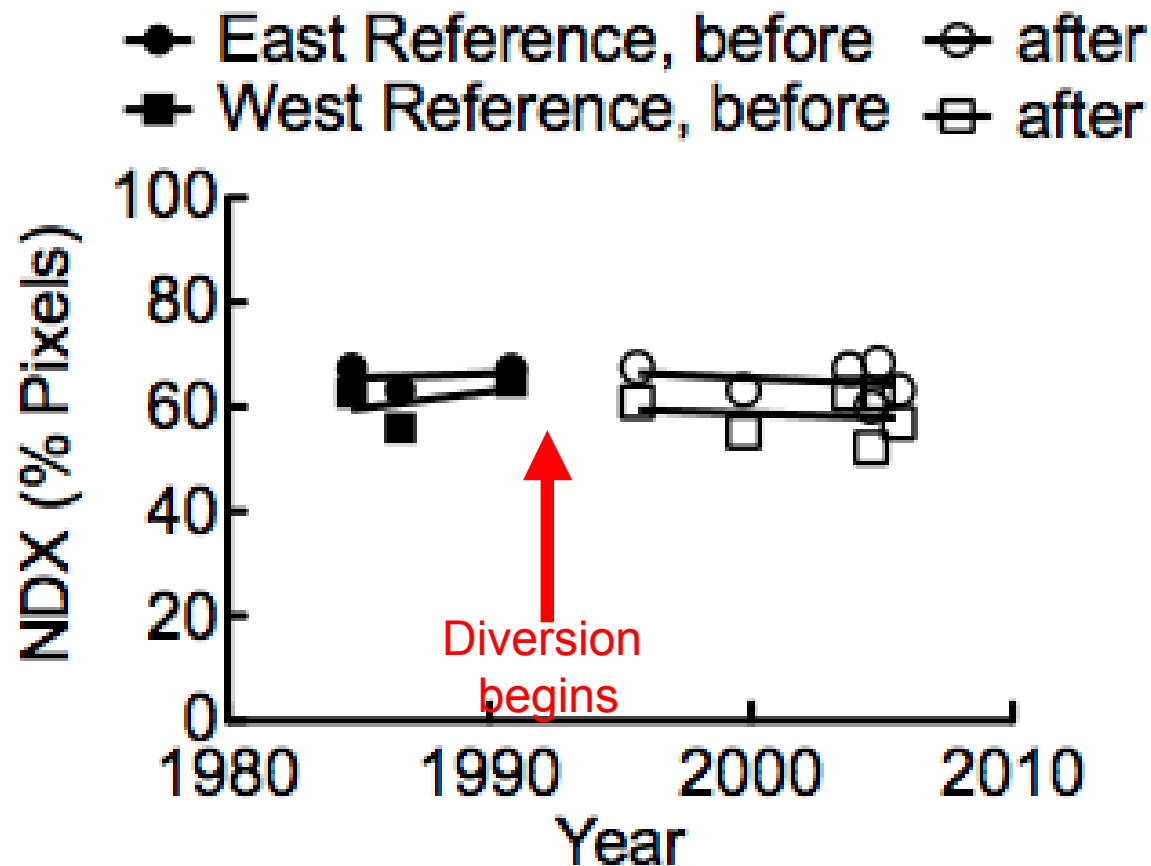
- dates coincide with peak or near-peak vegetation
- tidal stage near mean low low water MLLW);
- high atmospheric clarity
- regular intervals between observations; and,
- the inclusion of scenes bracketing major hurricanes



## Control Sites are equal

- before and after diversion opening  
before and after hurricanes Katrina/Rita

All data

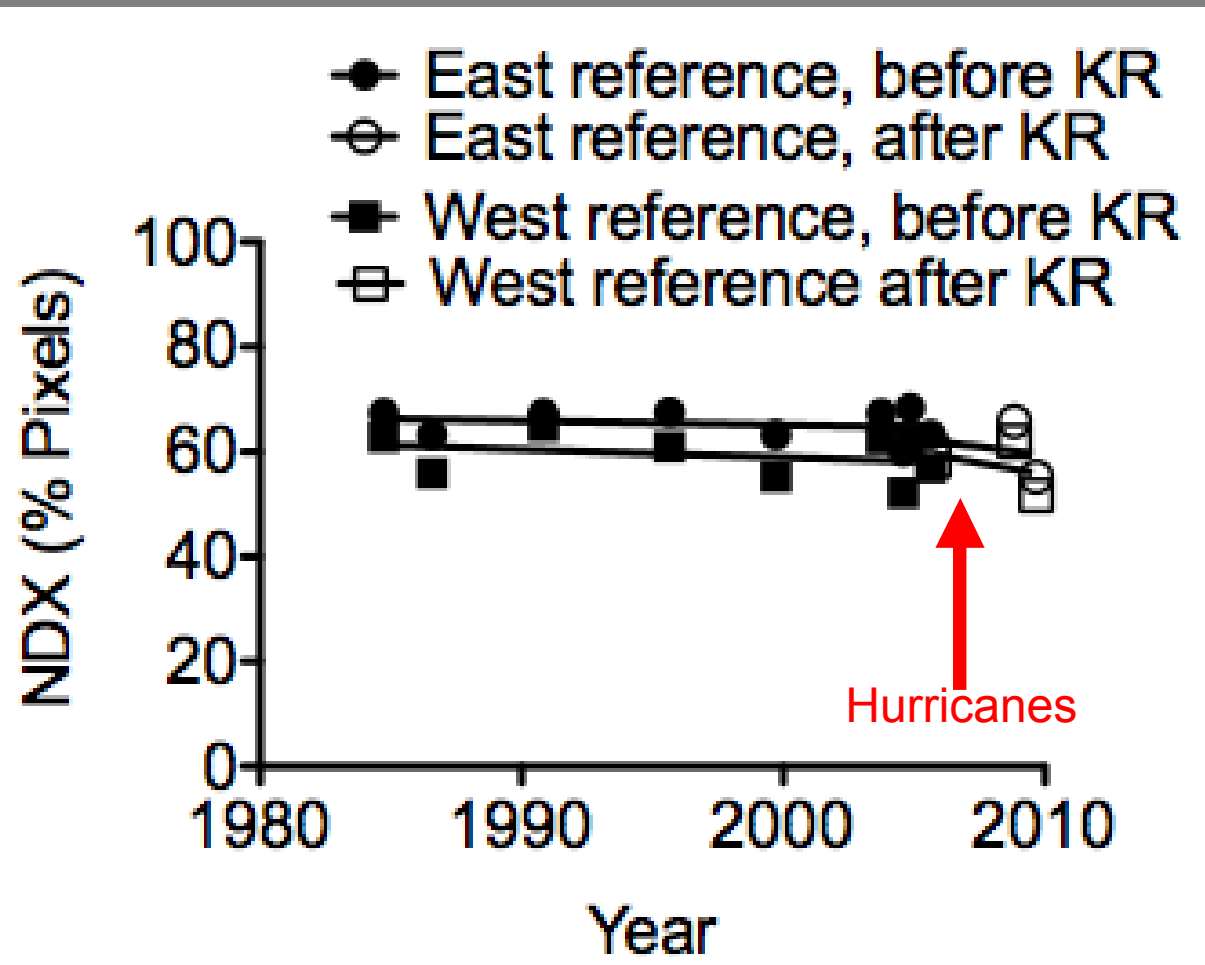


No  
differences

Control Sites are equal

before and after diversion opening

- before and after hurricanes Katrina/Rita

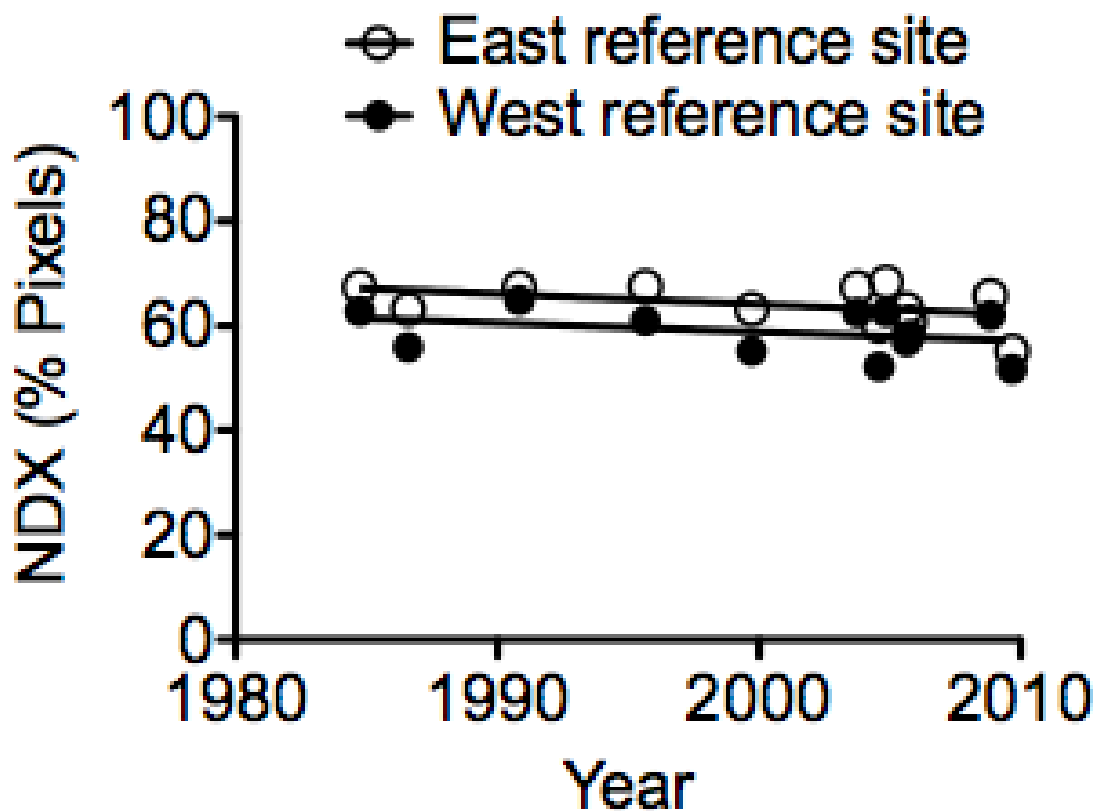


No  
differences



## Control Sites are equal

before and after diversion opening  
before and after hurricanes Katrina/Rita

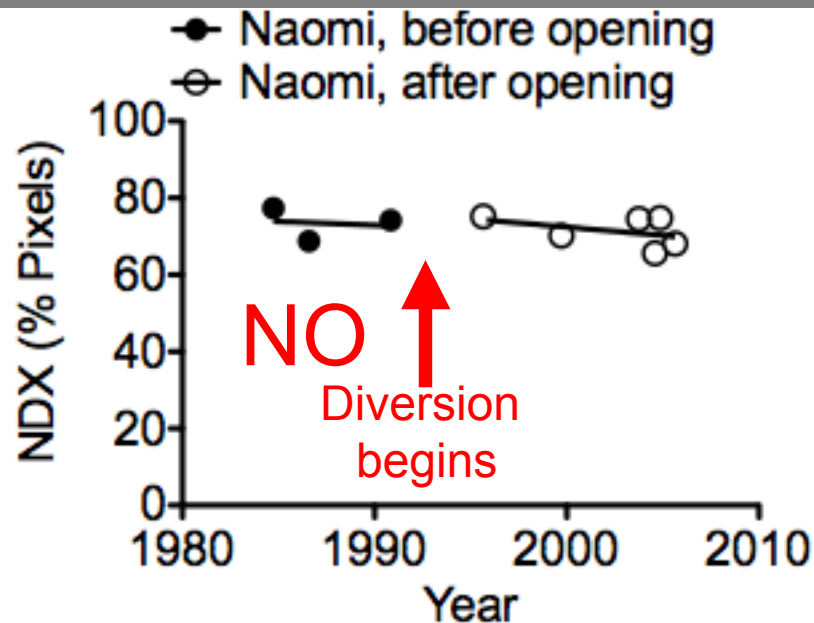


- All data

No  
differences  
between  
slopes,  
which are  
not different  
from zero

Is there a change  
(+ or -) after the  
diversion starts  
operating?

## Naomi



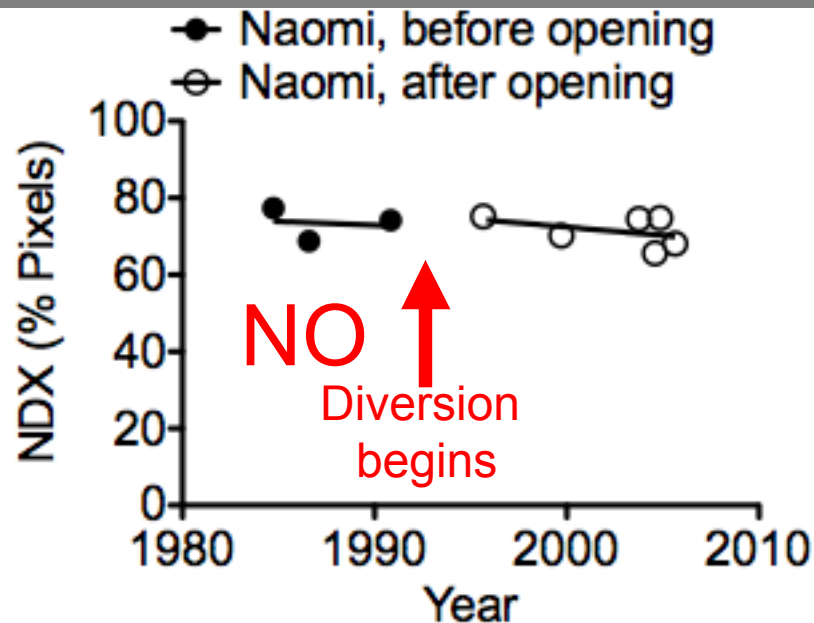
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Caernarvon

Pt a la Hache



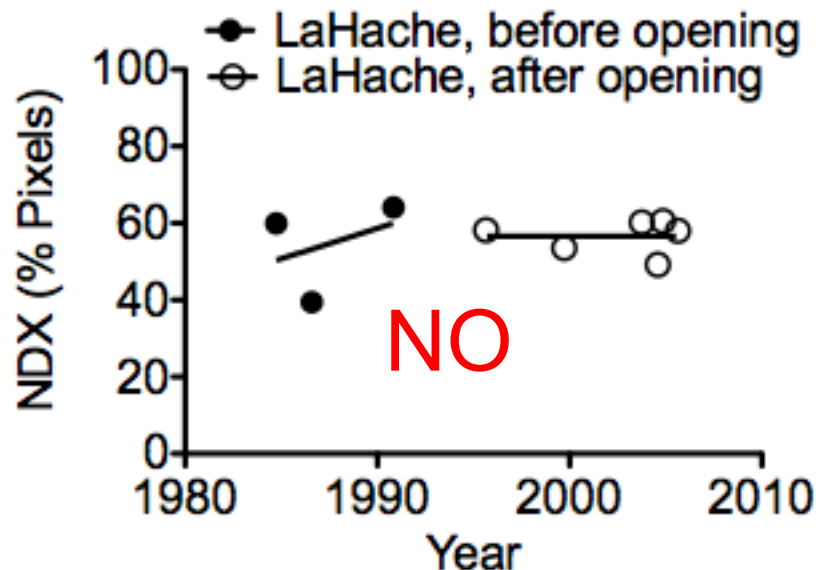
## Naomi



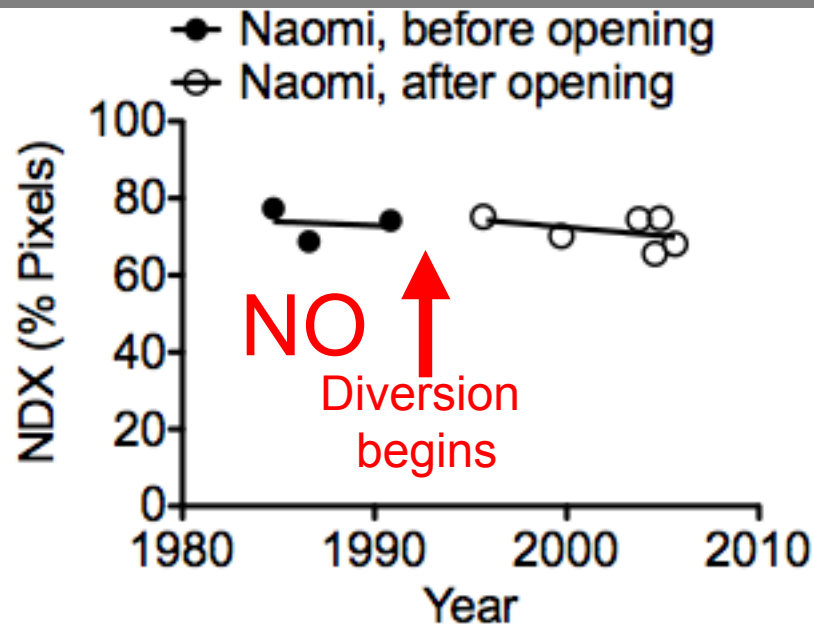
Is there a change  
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Caernarvon

## Pt a la Hache

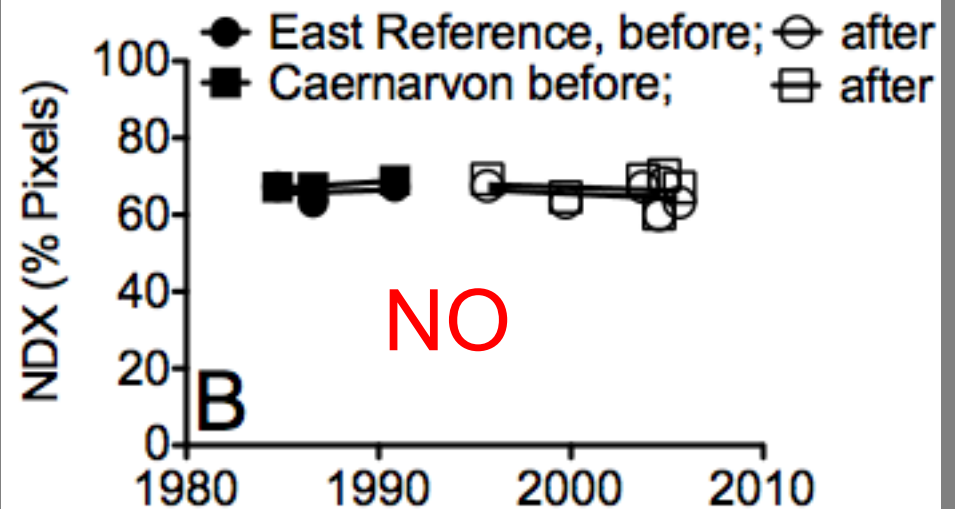


## Naomi

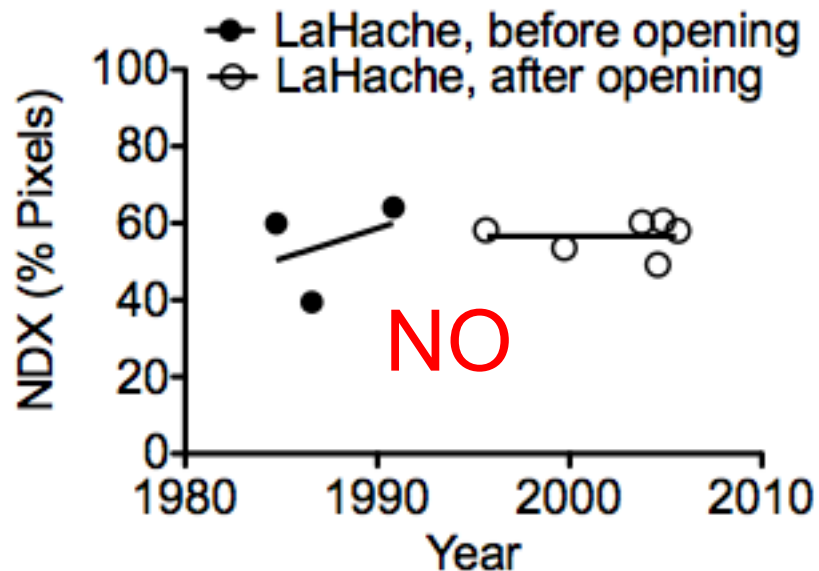


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## Caernarvon



## Pt a la Hache

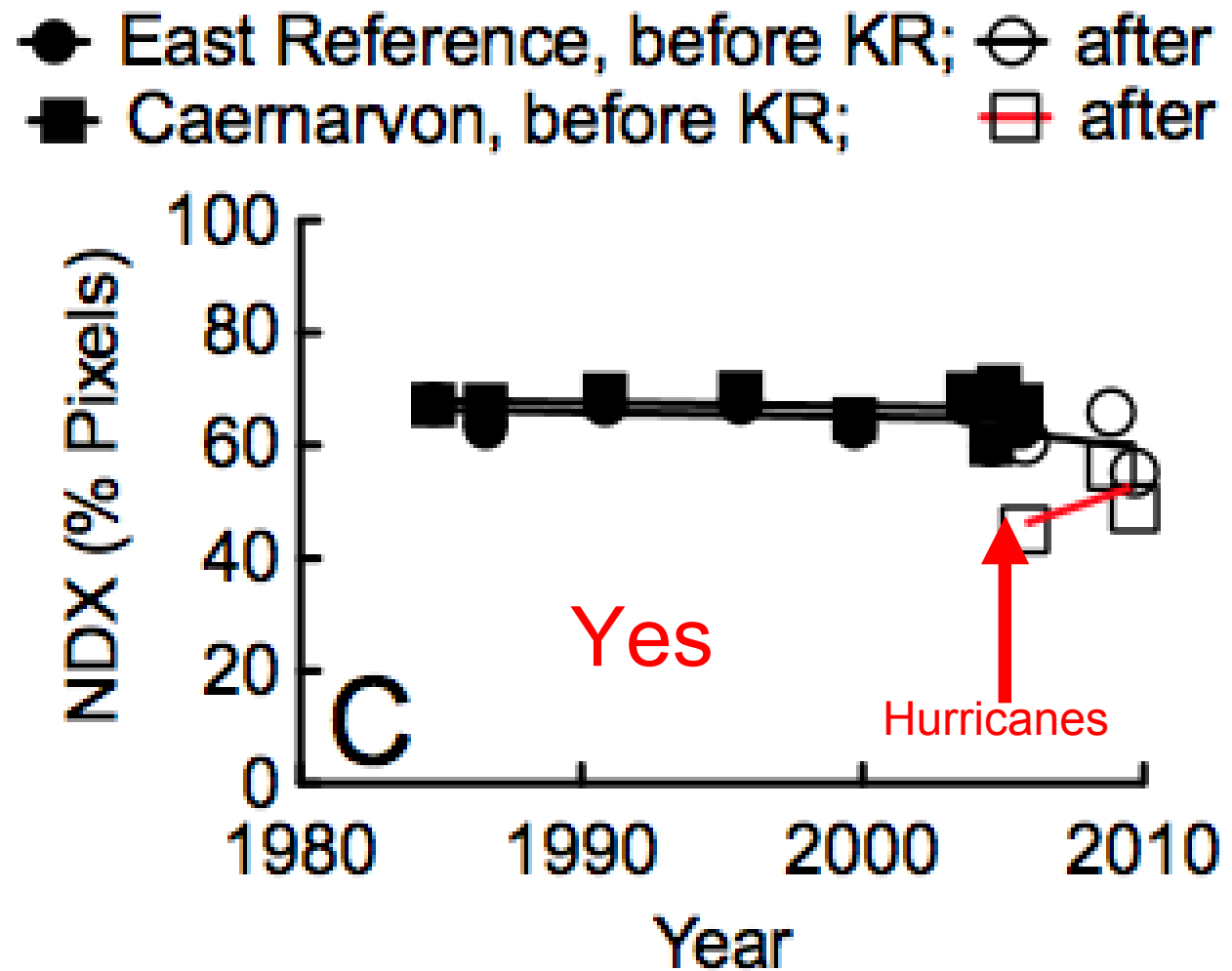


Is there a difference (+ or -) after Hurricanes  
KR between diversion and reference sites?



Is there a difference (+ or -) after Hurricanes KR between diversion and reference sites?

Yes - the %  
land in the  
diversion  
flow path  
*decreased*  
33% (55 mi<sup>2</sup>)



Alliance refinery



Caernarvon flow path  
12 Feb. 2009



This was 95% marsh in 1998 and in 2004

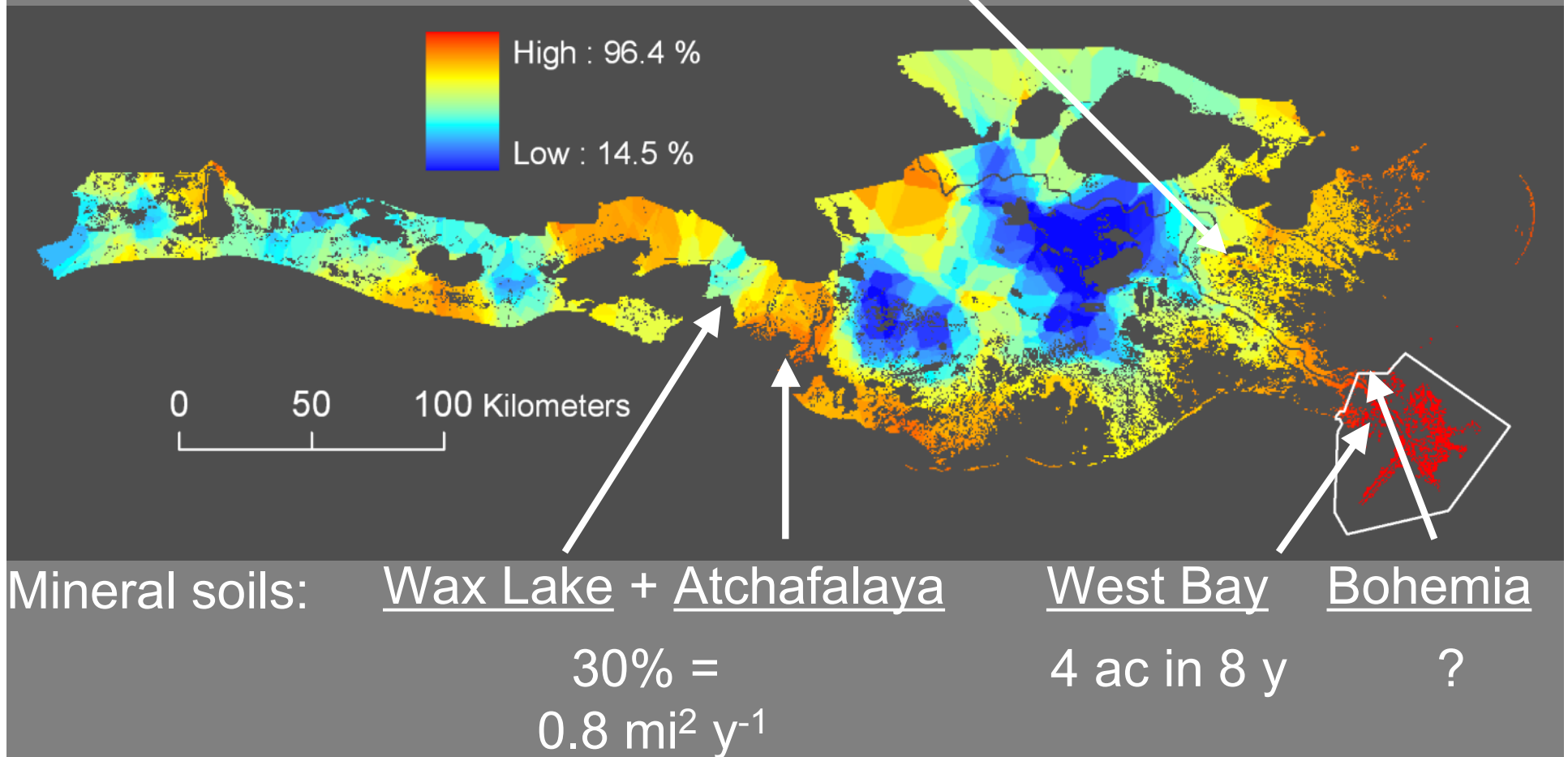


March 2011

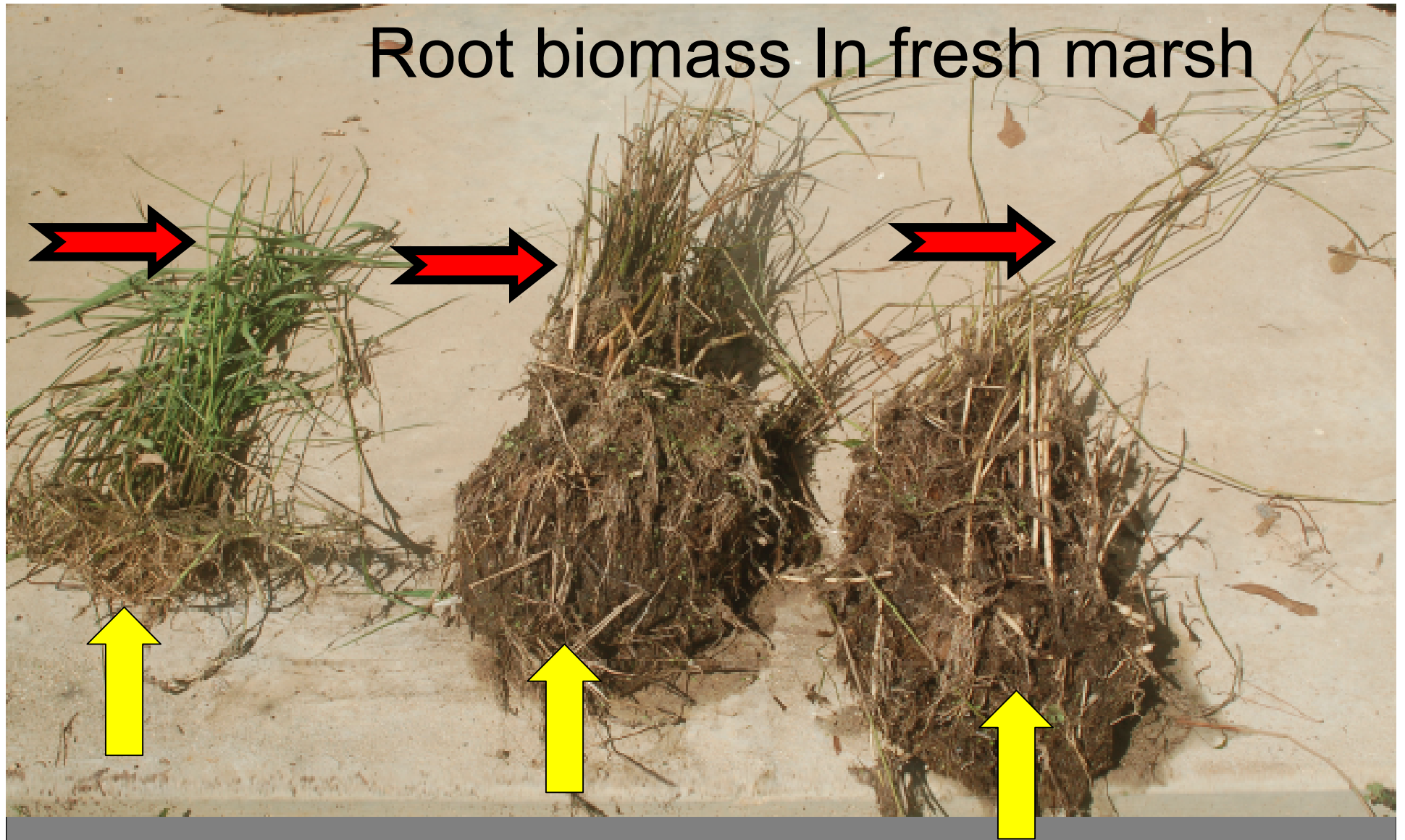


# WHY?

Is it because these are organic soils?



# Root biomass In fresh marsh



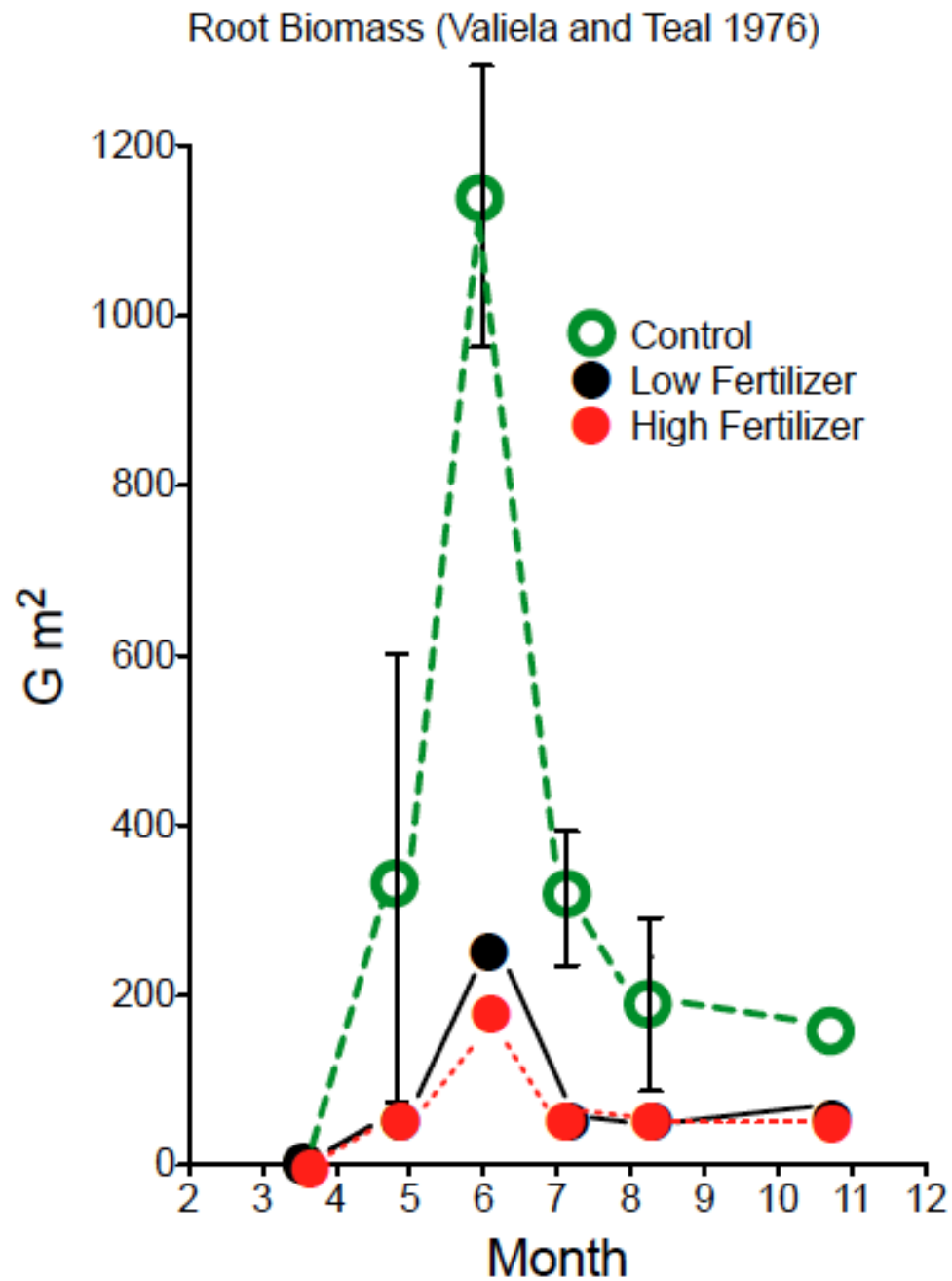
high N, P  
(more above and less below)

Lower N,P

Control N,P



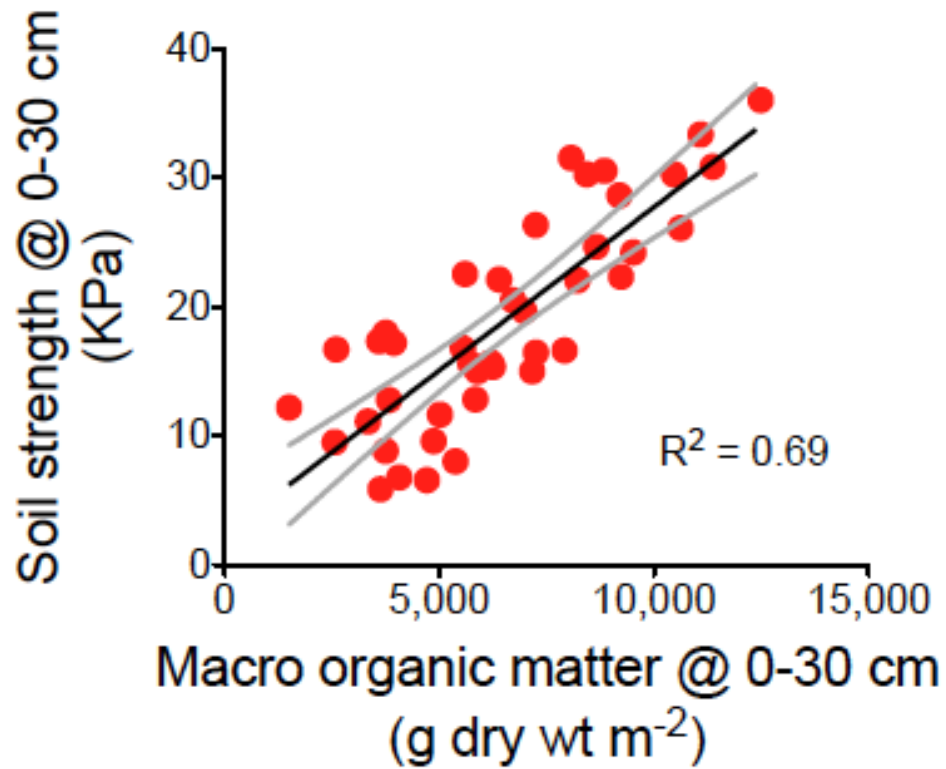
Close  
(high N)



Control

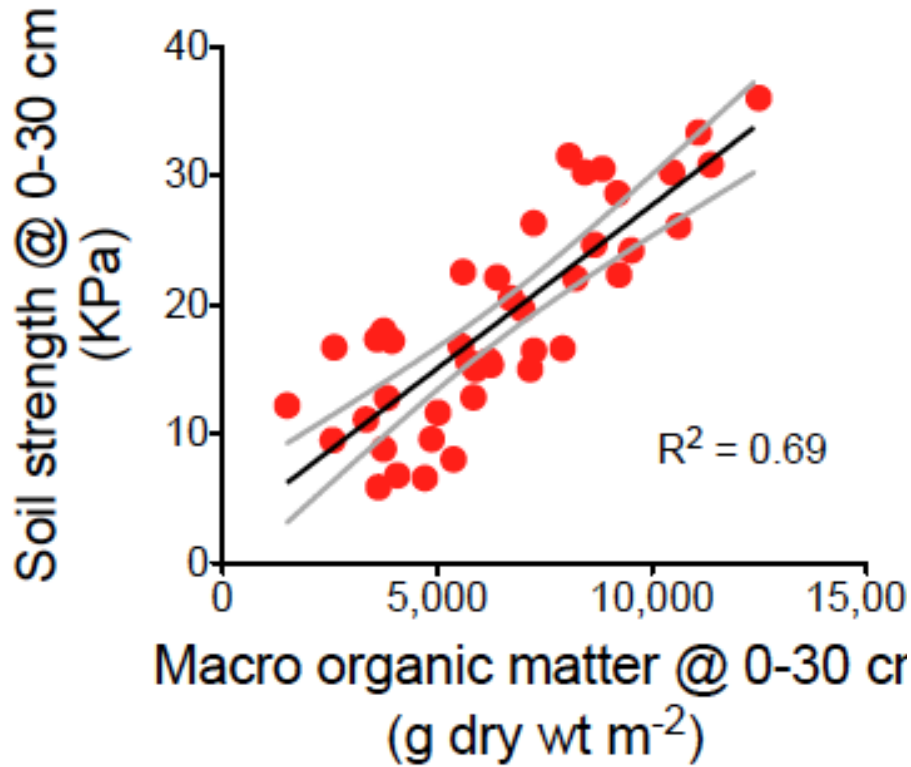


# Soil strength and root mass are strongly correlated



*Spartina sp.*

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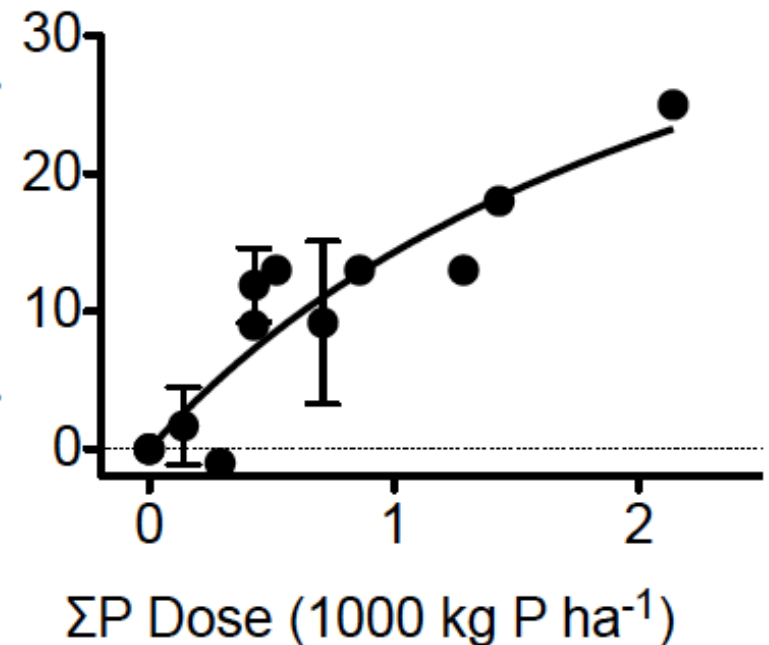


Soil strength decreases with nutrient loading

*Spartina sp.*

Shear vane loss (% control)

Loss of Soil Strength





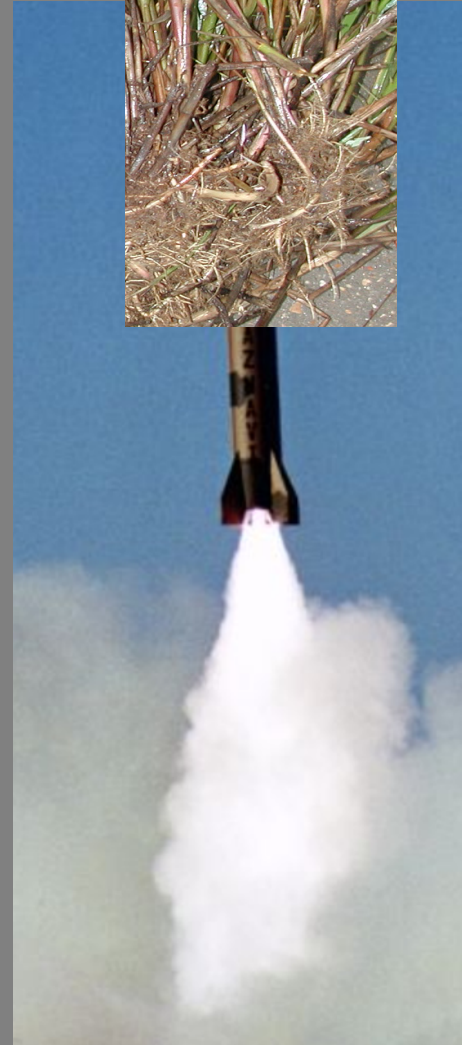


Poster 220





Post-hurricane in  
salt and brackish  
marshes





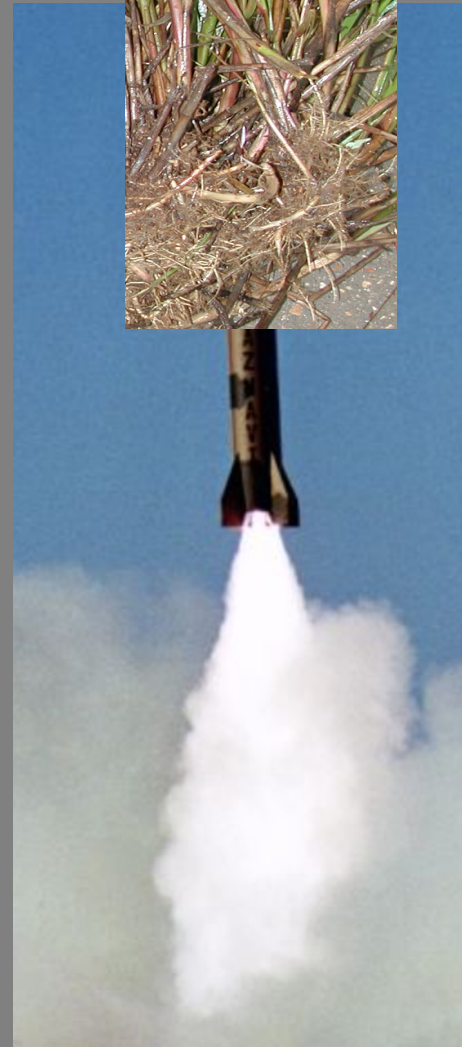
Data trumps  
concept

Test  
assumptions

‘Do no harm’



Post-hurricane in  
salt and brackish  
marshes



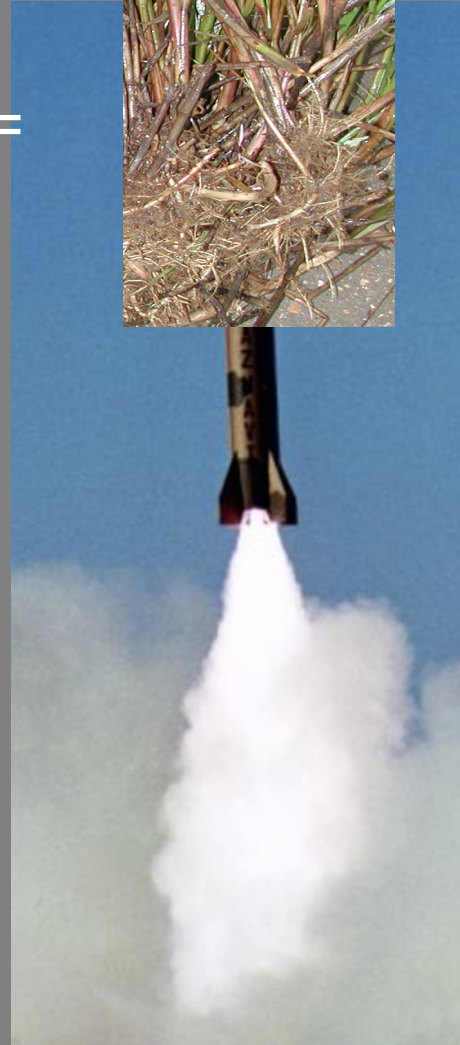
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55 sq miles =  
\$6 billion loss for this  
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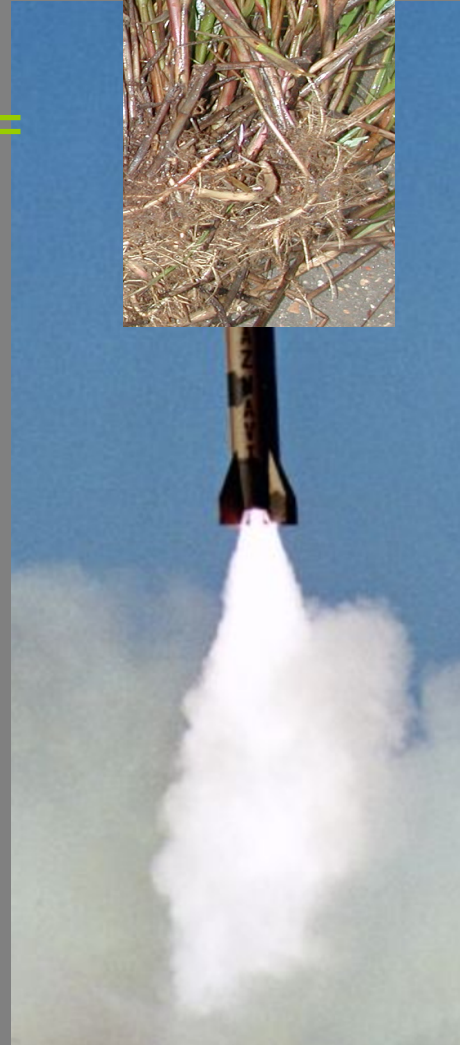
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*Thank you!*

