

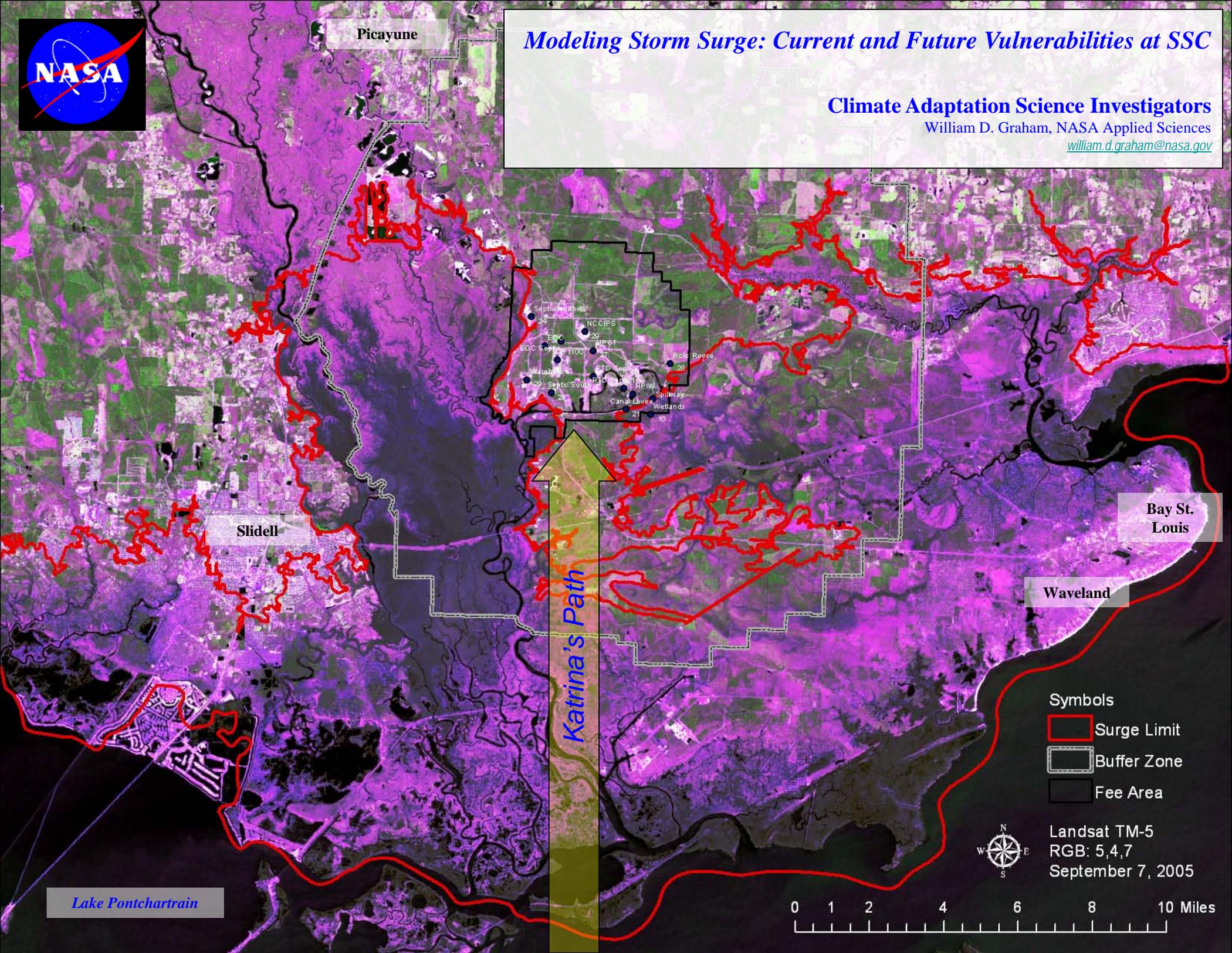


Modeling Storm Surge: Current and Future Vulnerabilities at SSC

Climate Adaptation Science Investigators

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Picayune

Slidell

Bay St. Louis

Waveland

Katrina's Path

Lake Pontchartrain

- Symbols
- Surge Limit
 - Buffer Zone
 - Fee Area



Landsat TM-5
RGB: 5,4,7
September 7, 2005





Science & Operations

Assess Climate Risks

- Fire/smoke
- Sea level rise
- Flooding
- Hurricanes & storm surge

Identify Vulnerabilities

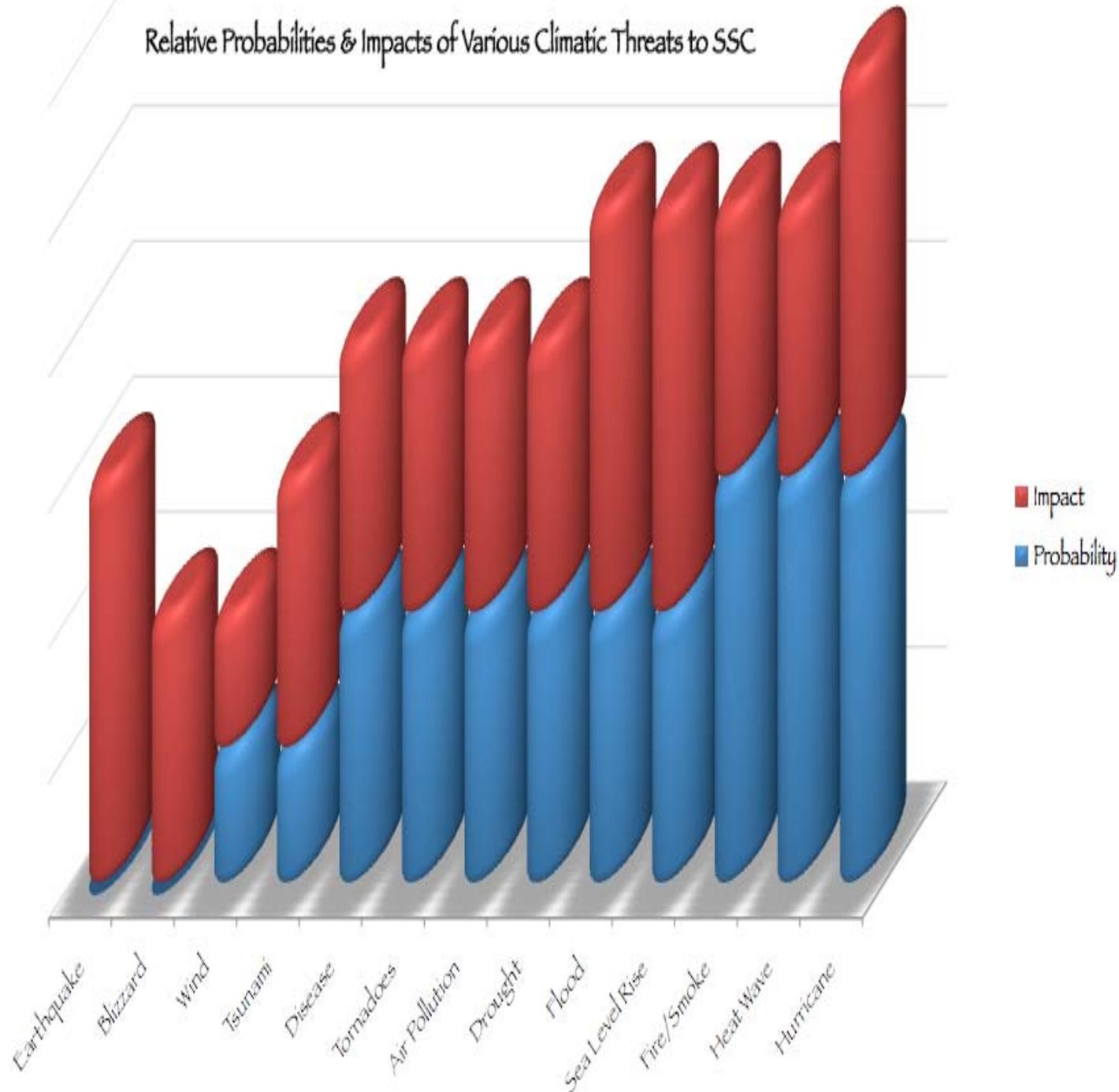
- Air quality & natural resources
- Coastal communities
- Accessibility
- Asset/infrastructure damage

Enable Adaptation Strategies

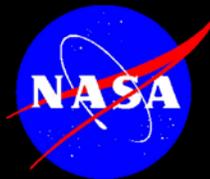
from science modeling

- Planning
- Advisories
- Mitigation

Relative Probabilities & Impacts of Various Climatic Threats to SSC



Katrina's Storm Surge



Now Scenarios

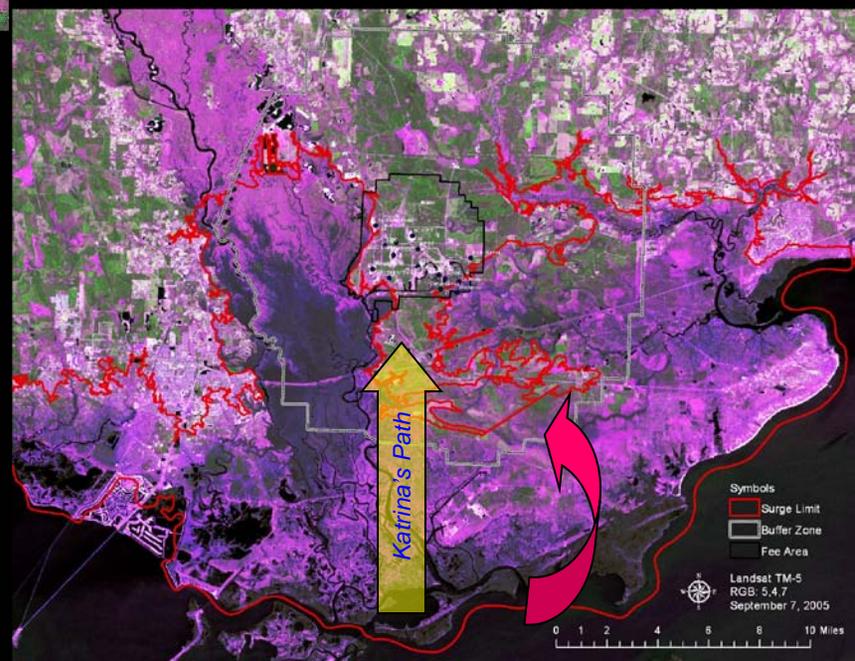
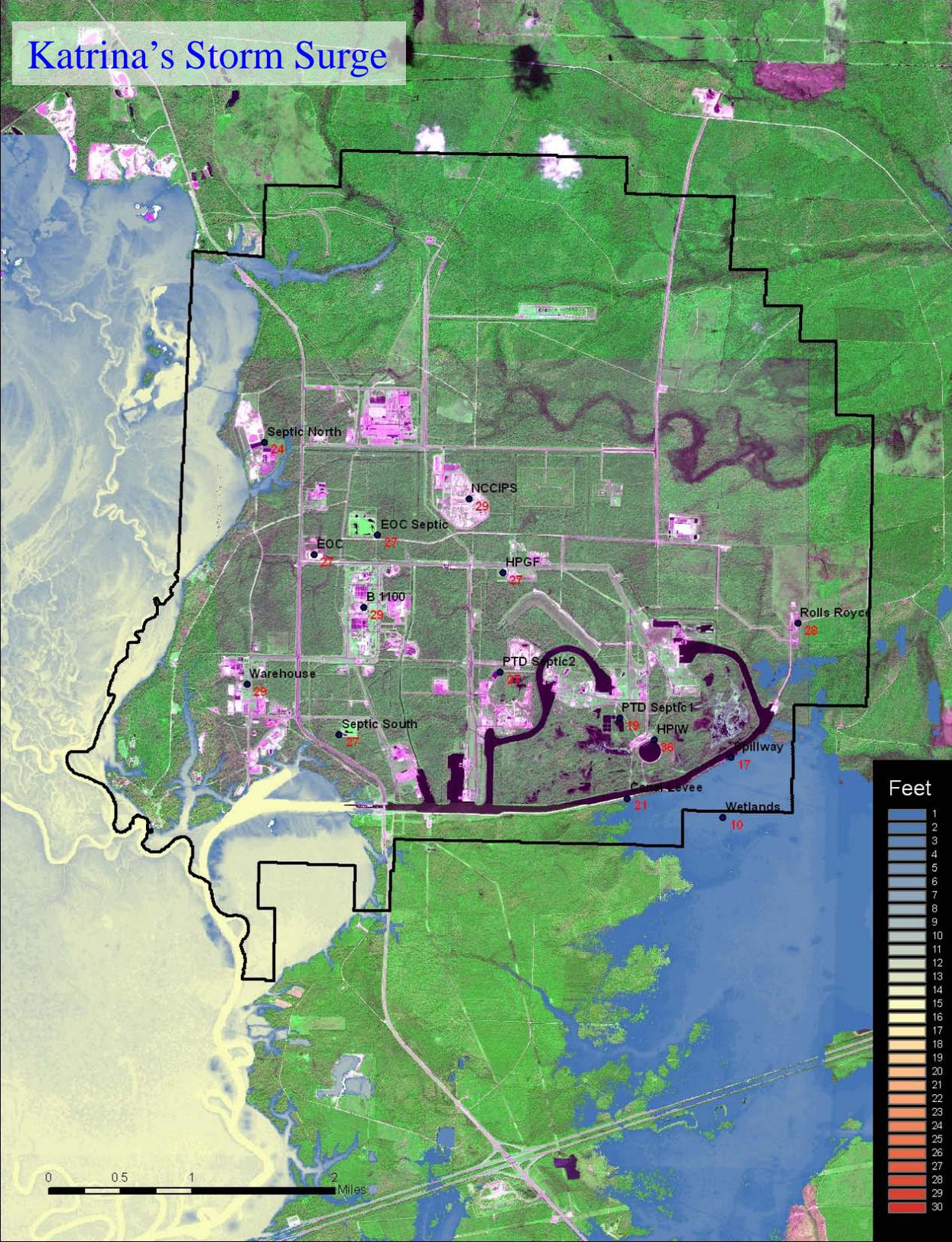
What happens if Katrina

- Approaches from the ESE, traveling WNW
- Hits roughly 4 miles west, same path, same storm

Future Scenarios

What happens if Katrina

- Is coupled with 10" sea level rise
- Maintains Cat 5 intensity





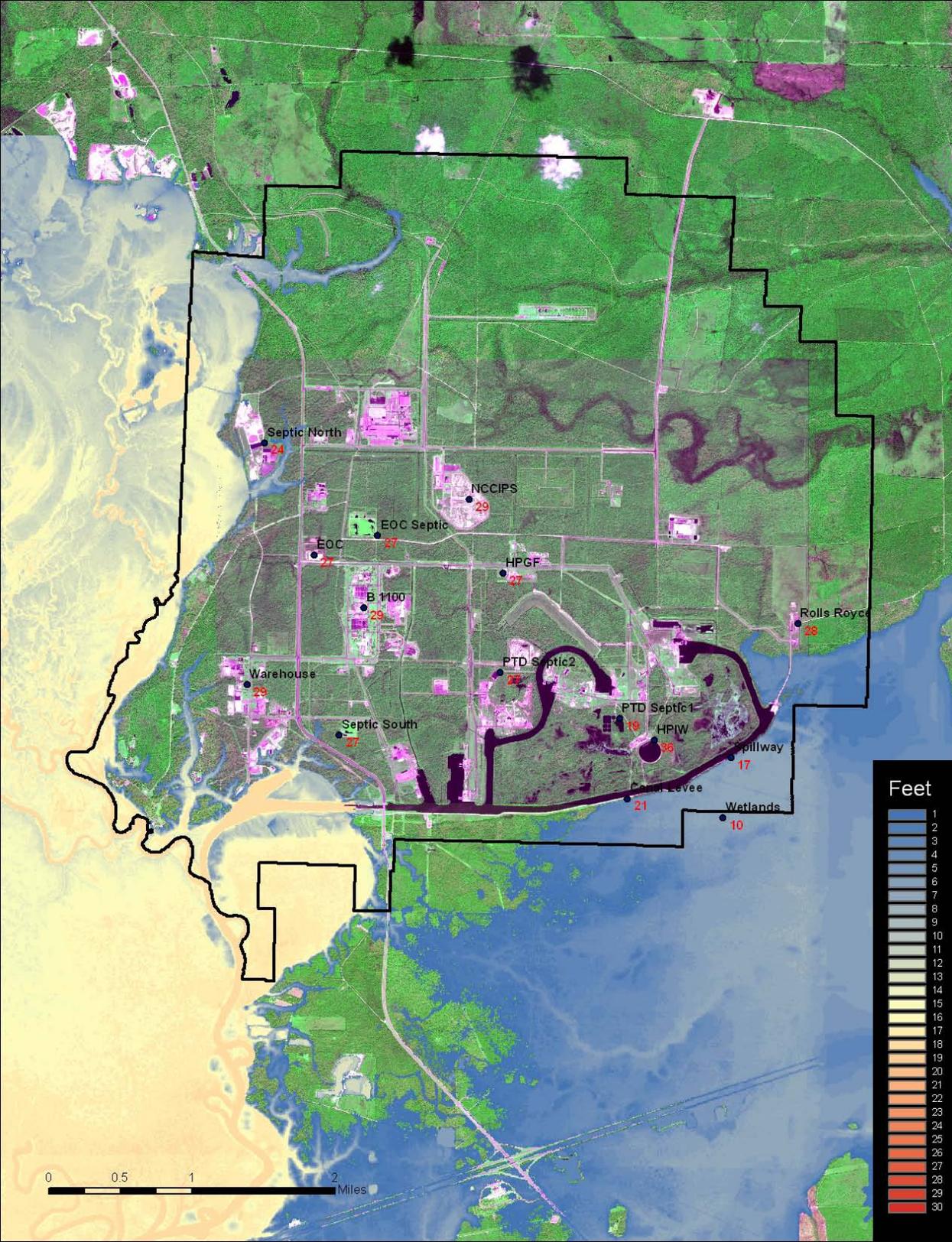
Now Scenario

Hurricane Toufectis

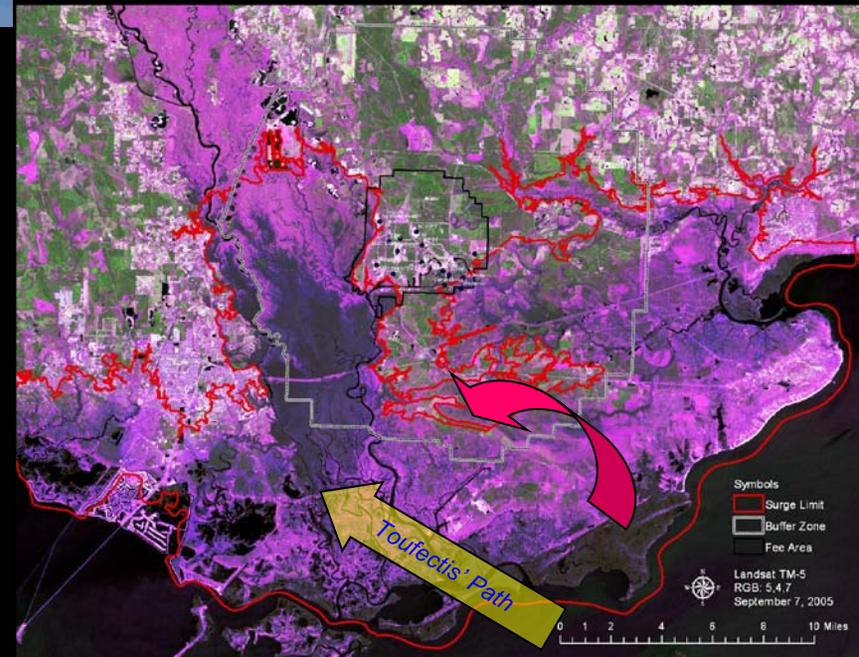
- Approaches from the ESE, traveling WNW
- SSC in front right quadrant
- Surge compressed between eye-wall and coast

Impacts

- Not significantly different to Katrina



Feet





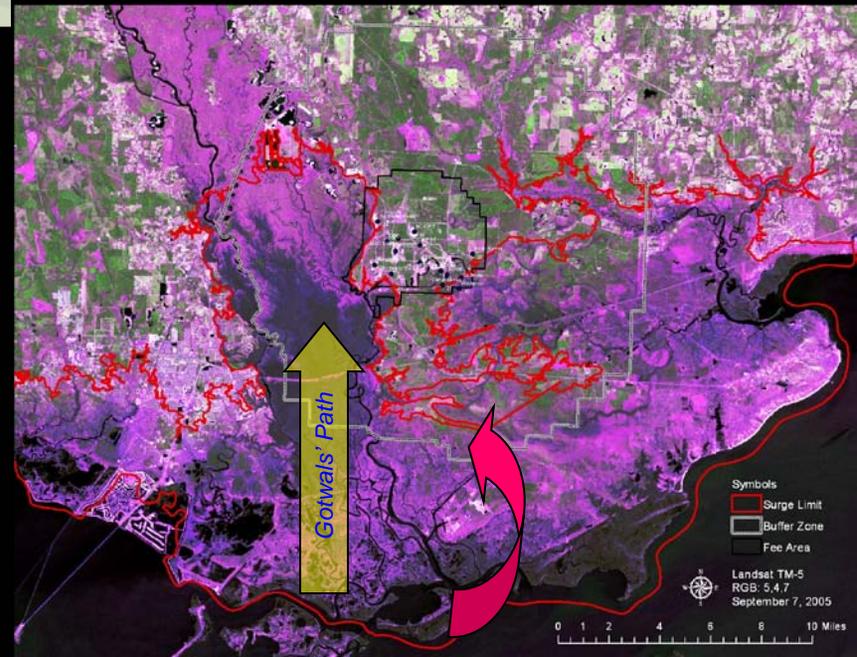
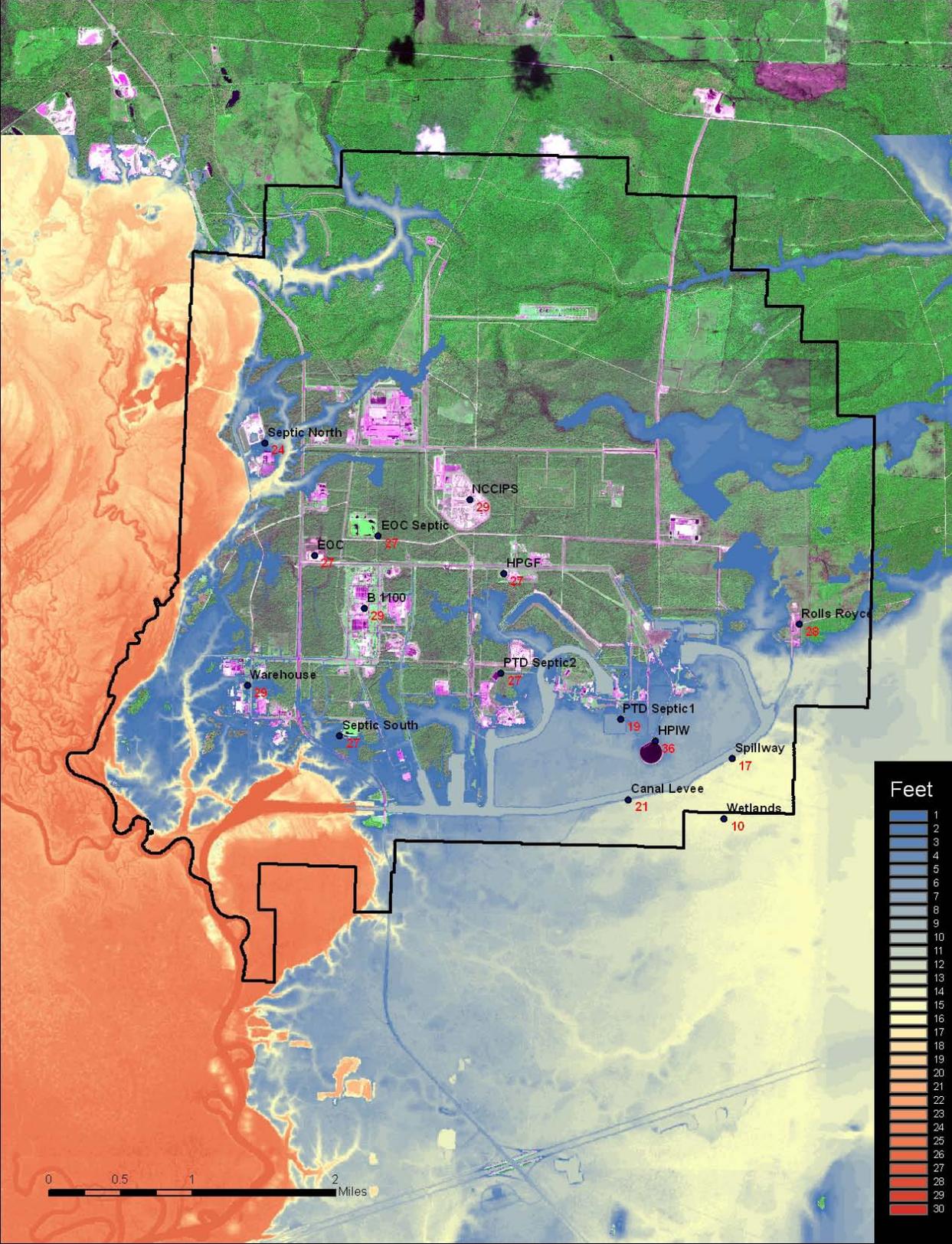
Now Scenario

Hurricane Gotwals

- Katrina is as Katrina was
- Storm track moved 4 miles to the west
- Eye-wall pushes into Pearl River floodplain

Impacts

- Spillway overtopped into canal
- Ingress/Egress compromised
- Test complex & Navy facility flooding





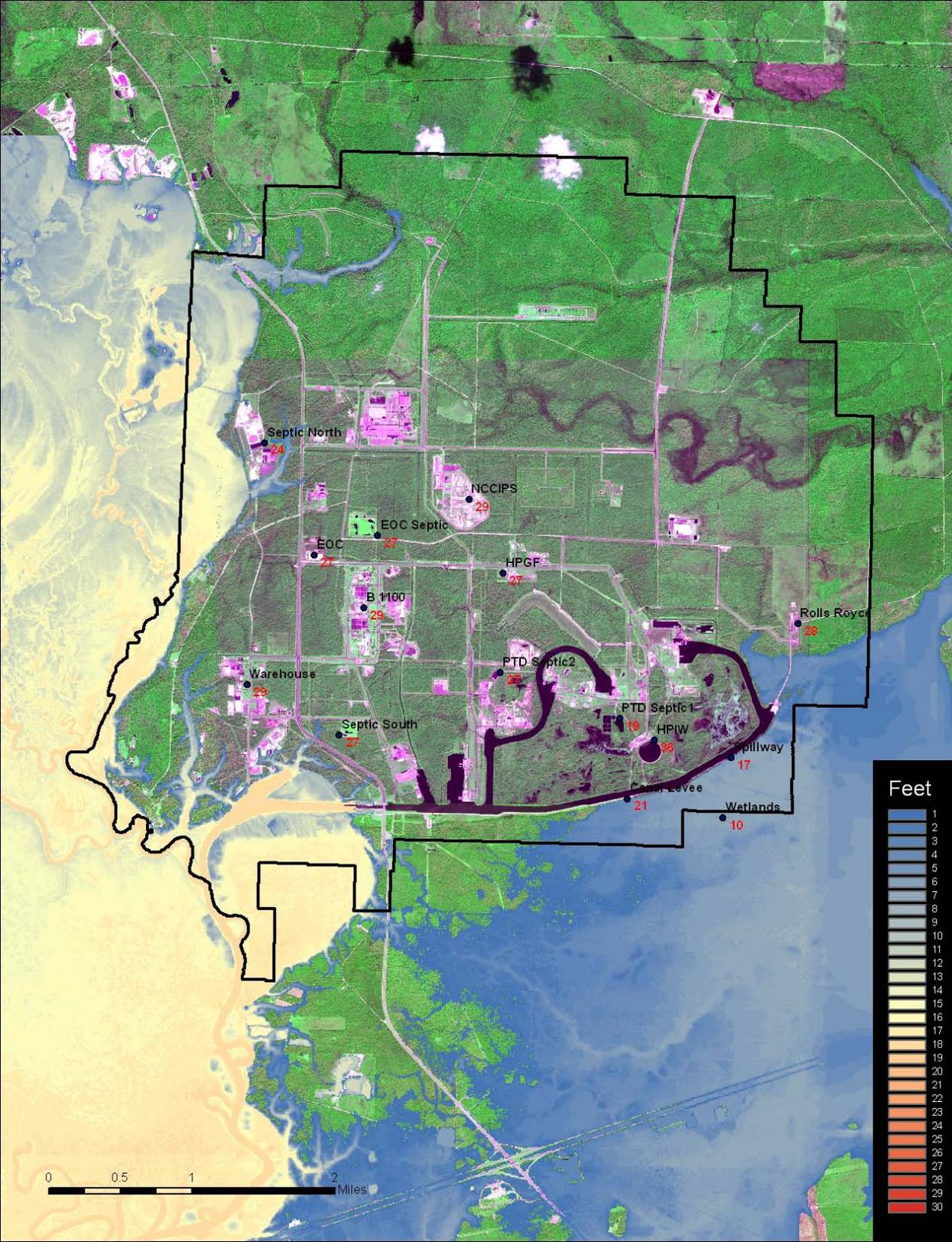
Future Scenario

Hurricane Horton

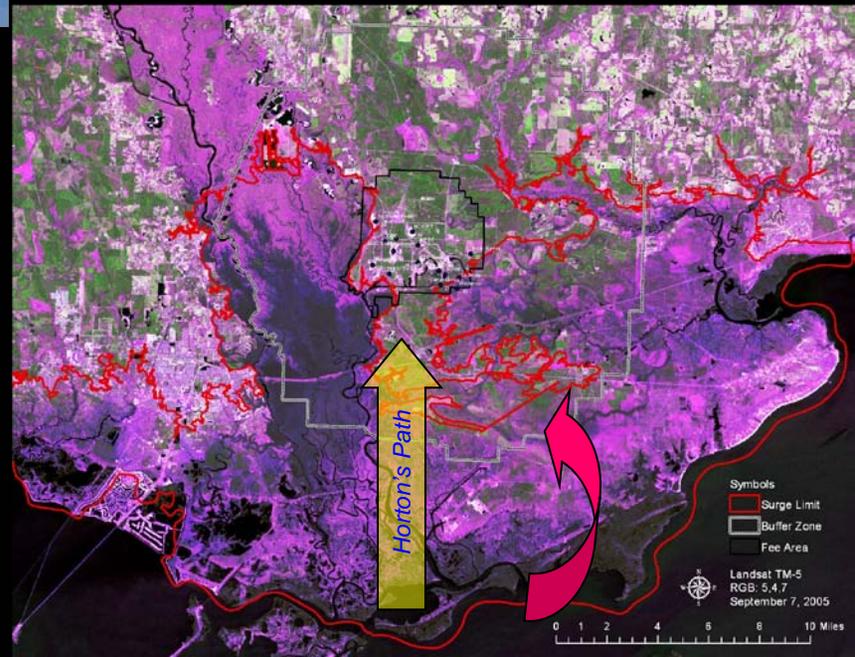
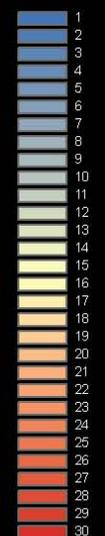
- Katrina is as Katrina was
- Adding roughly 10" sea level rise (25cm)

Impacts

- Similar to Katrina
- Spillway possibly overtopped into canal
- South egress compromised
- Coastal communities flooded



Feet



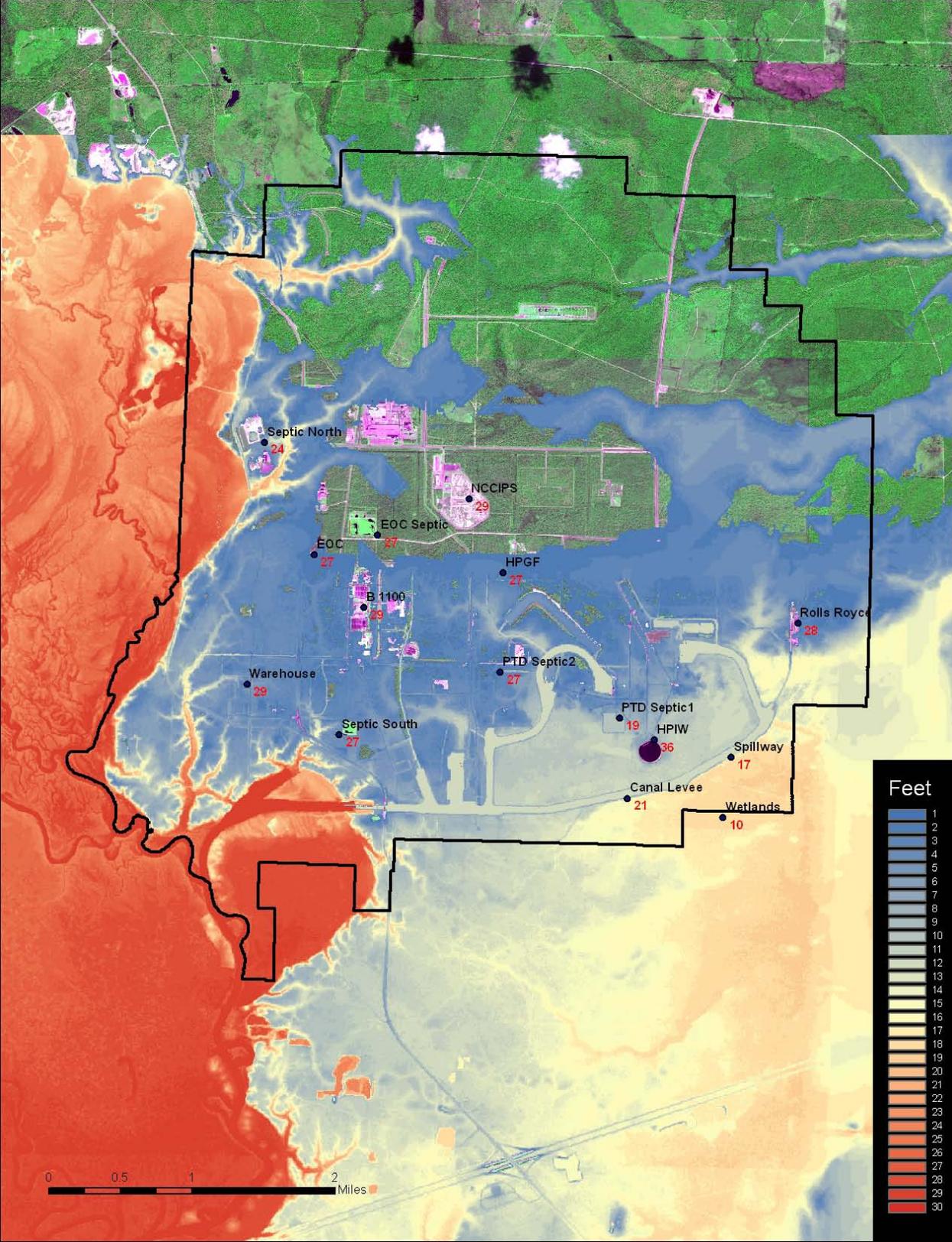


Now and ~~Future~~ Scenario ~~Future~~ Hurricane Hudson

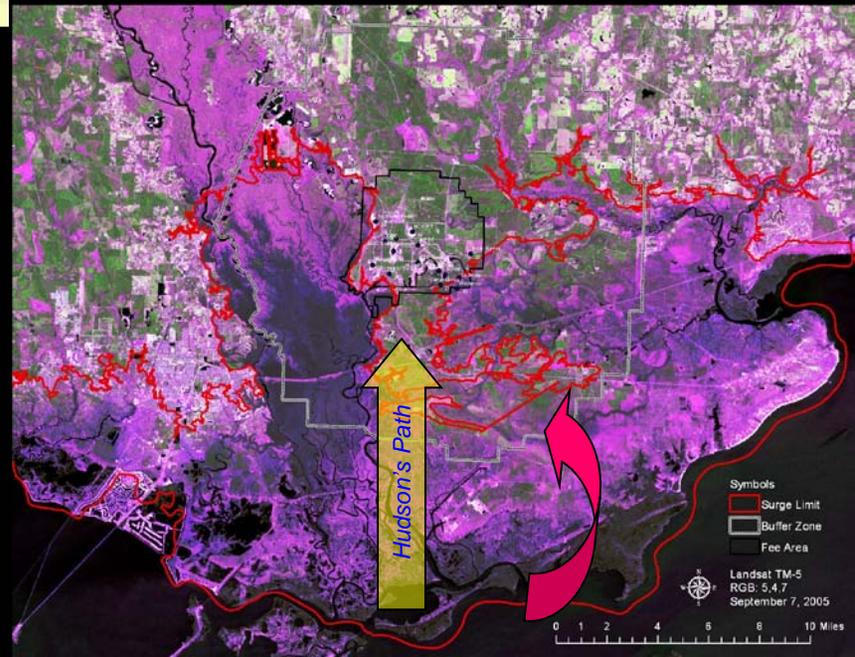
- Same Katrina path
- Intensity increased to Category 5

Impacts

- Coastal communities flooded
- Fee Area 50% flooded
- Built systems ... ?
- Resources ... ?
- PEOPLE ... ?



Feet



Key Points



1. We are vulnerable now

Katrina was 4 miles of pure luck

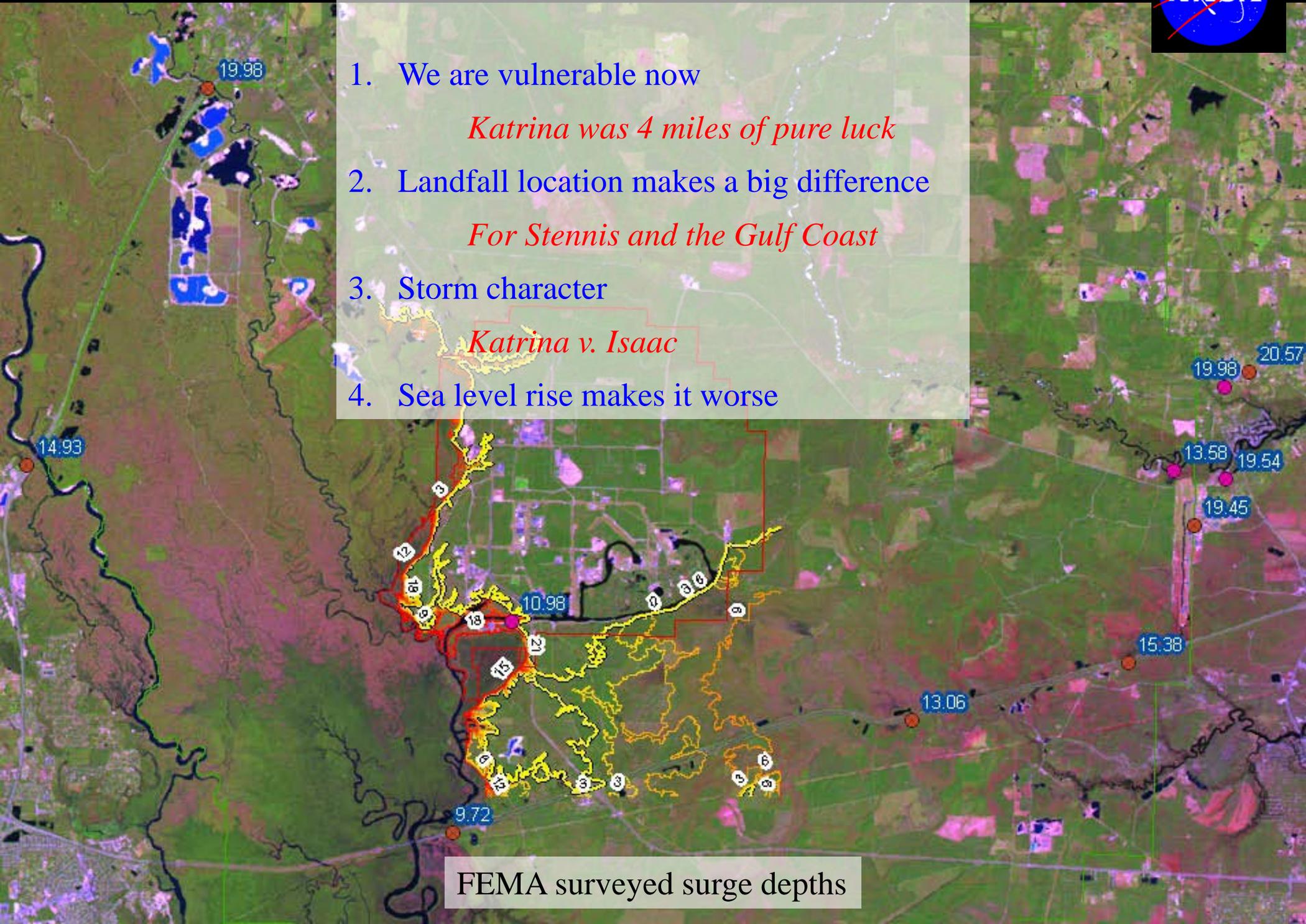
2. Landfall location makes a big difference

For Stennis and the Gulf Coast

3. Storm character

Katrina v. Isaac

4. Sea level rise makes it worse



FEMA surveyed surge depths



Interstate 10

Jourdan River Basin

Pearl River Basin

Katrina Center
(~40 mile diameter eye)

Test Complex

Building 1100
You Are Here

HPGF

Rolls Royce

Baseline Scenario
Hurricane Katrina
• Category 3
• 15mph forward speed





Interstate 10

ESE Approach
(Katrina Baseline)

Pearl River Basin

Jourdan River Basin

Test Complex

Building 1100
You Are Here

HPGF

Rolls Royce

Now Scenario

Hurricane Toufectis

- Approaches from the ESE, traveling WNW
- SSC in front right quadrant
- Surge compressed between eye-wall and coast

Impacts

- Not significantly different than Katrina





Site 10

4 Miles West
(Katrina Baseline)

Pearl River Basin

Jourdan River Basin

Rolls Royce

Test Complex

HPGF

Building 1100
You Are Here

Now Scenario
Hurricane Gotwals

- Katrina is as Katrina was
- Storm track moved 4 miles to the west
- Eye-wall pushes into Pearl River floodplain

Impacts

- Spillway overtopped into canal
- Ingress/Egress compromised
- Test complex & Navy facility flooding





Interstate 10

Jourdan River Basin

Pearl River Basin

10" Sea Level Rise
(Katrina Baseline)

Test Complex

Building 1100
You Are Here

HPGF

Rolls Royce

Future Scenario

Hurricane Horton

- Katrina is as Katrina was
- Adding roughly 10" sea level rise (25cm)

Impacts

- Similar to Katrina
- Spillway possibly overtopped into canal
- South egress compromised
- Coastal communities flooded





Interstate 10

Jourdan River Basin

Pearl River Basin



Category 5
(Katrina Path)

Test Complex

Building 1100
You Are Here

HPGF

Rolls Royce

Now & Future Scenario

Hurricane Hudson

- Same Katrina path
- Intensity increased to Category 5

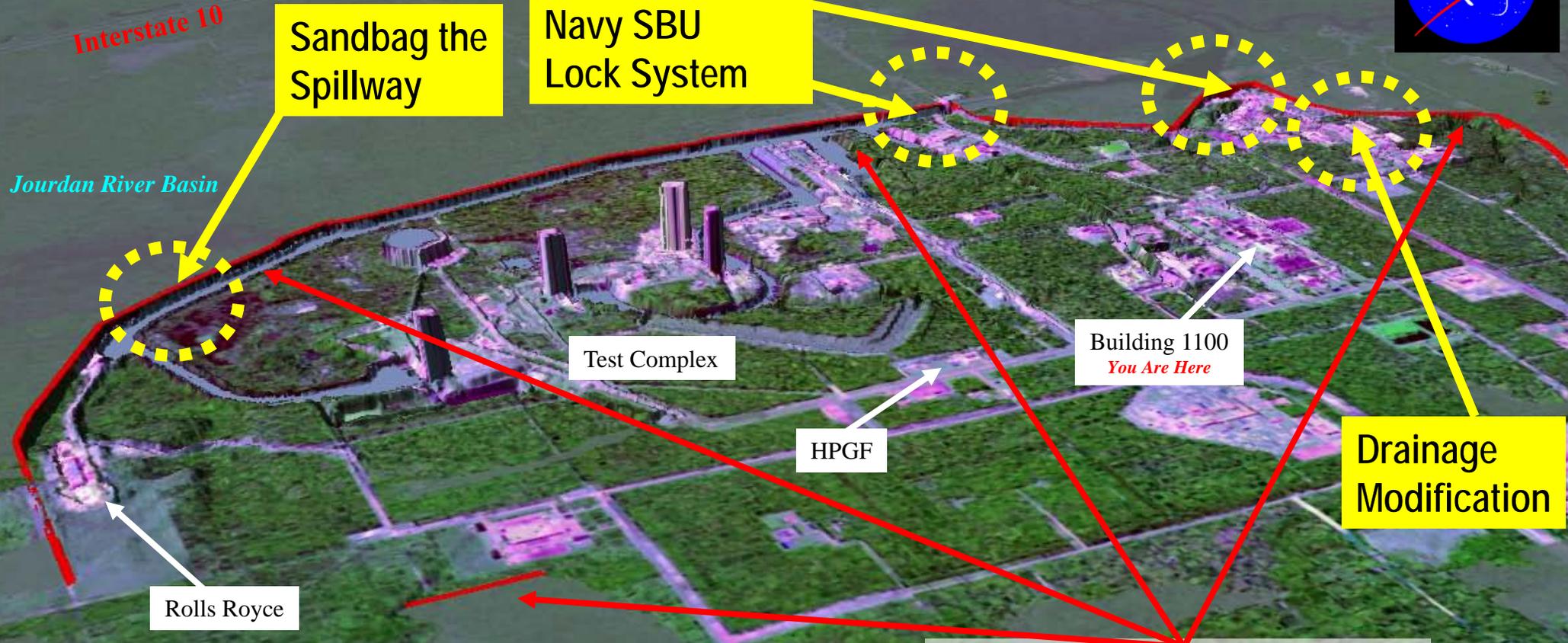
Impacts

- Coastal communities flooded
- Fee Area 50% flooded
- Built systems ... ?
- Resources ... ?
- PEOPLE ... ?





One solution: **The Great Wall of Stennis**



Now Scenario
Hurricane Gotwals

- Katrina is as Katrina was
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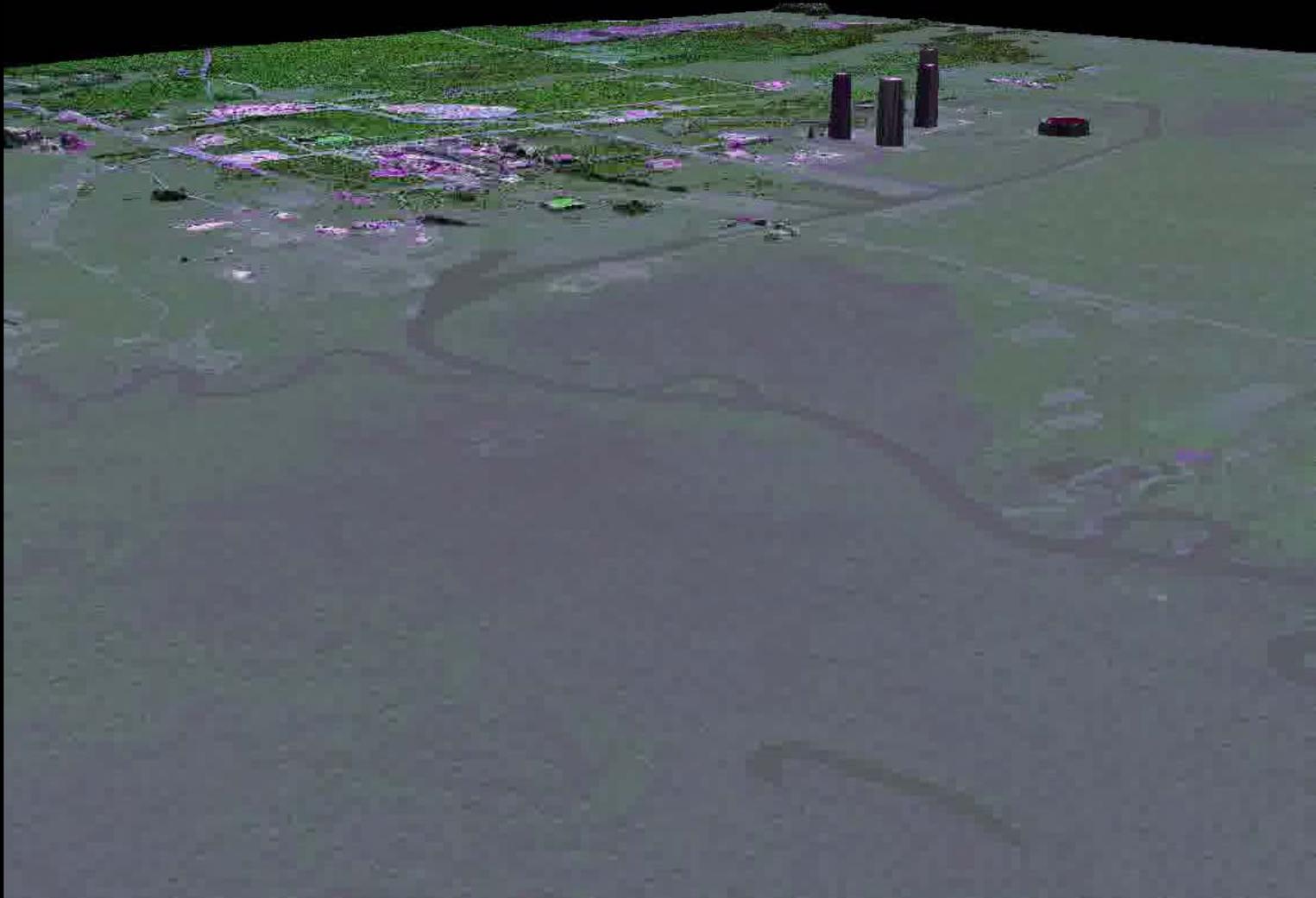
Impacts

- Spillway overtopped into canal
- Ingress/Egress compromised
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Adding a protective levee using existing road or railroad grade where possible

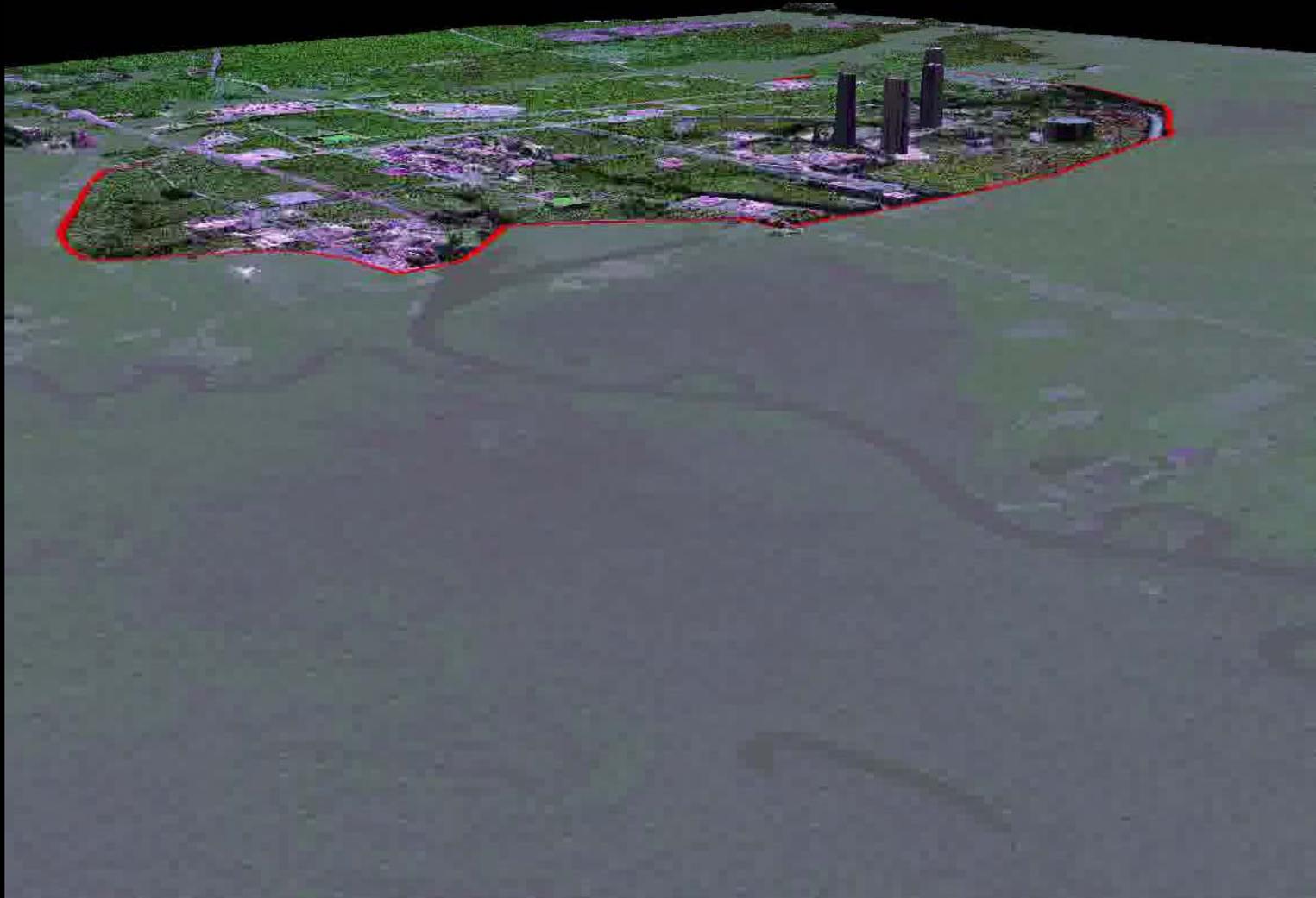


**Synthesized fly-by of SSC inundated by a Katrina-class hurricane
land-falling 4 miles west of Katrina's actual path**



Great Wall of Stennis

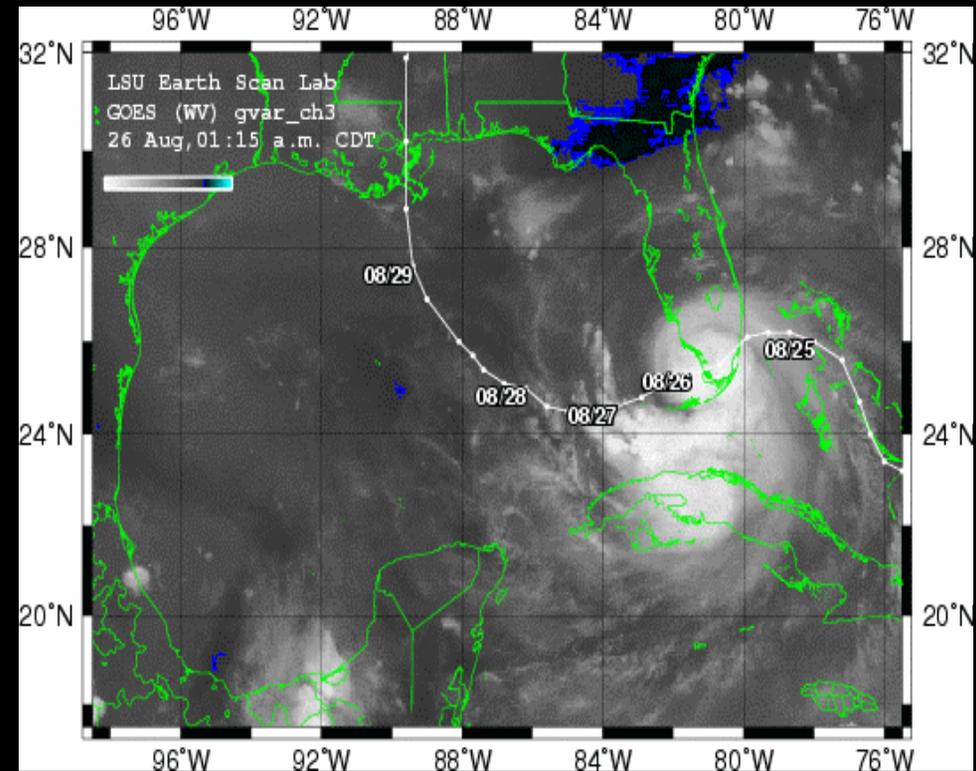
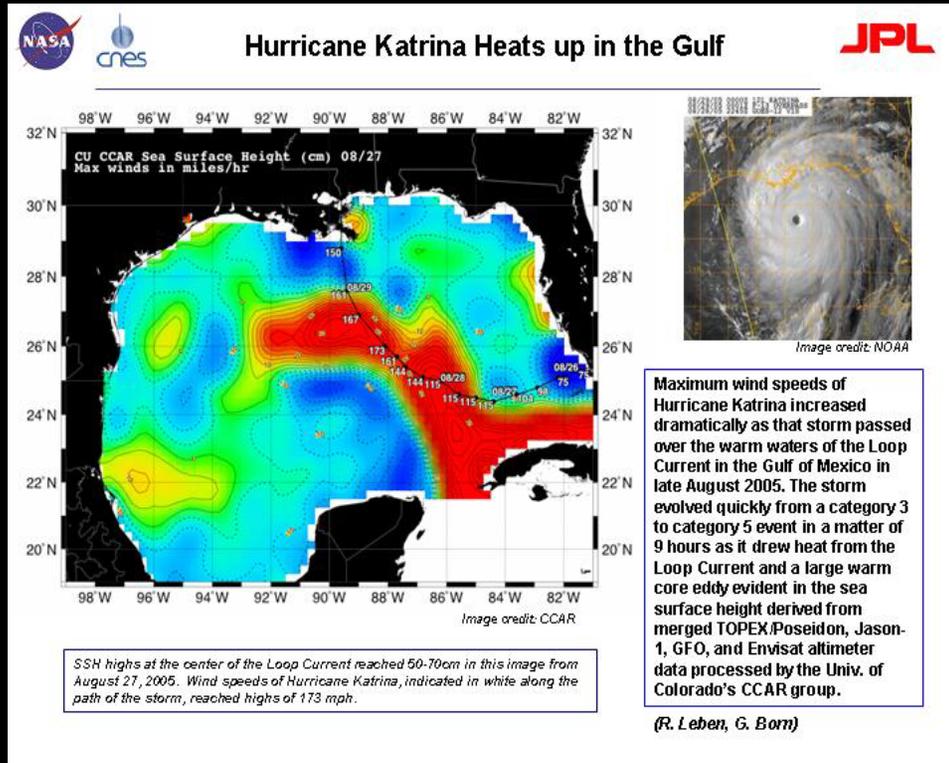
(A solution, not the solution)





What made Katrina, Katrina?

- SE blocking high pressure system
- Warm ... HOT ... Gulf Loop Current



How will climate change affect the Loop Current?



What's next for CASI at SSC?

Hurricane Impacts (*Built Systems, People*)

- NE trending storms
- Impacting Jourdan River
- Each scenario coupled with SLR

Terrestrial Influences (*People, Natural Resources*)

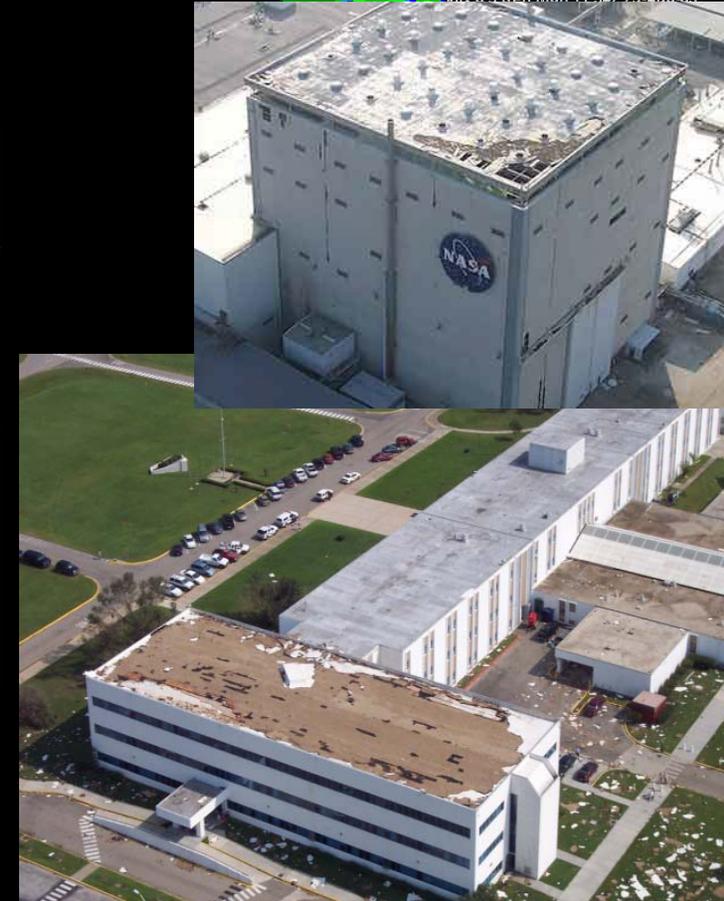
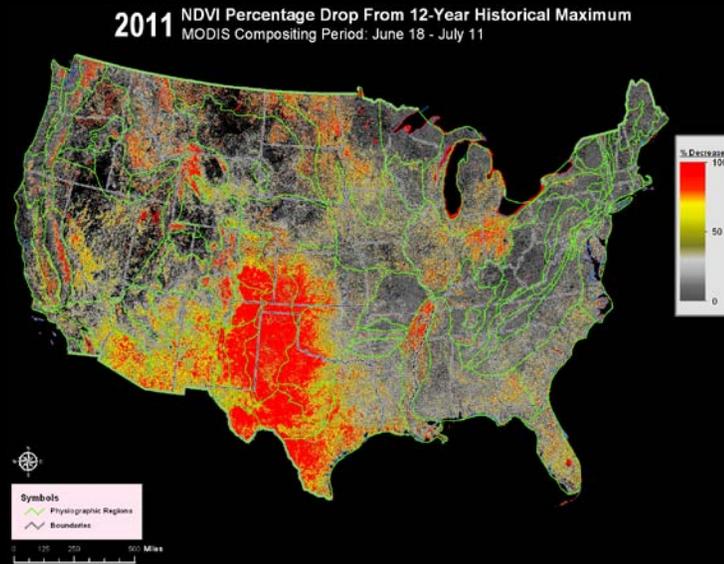
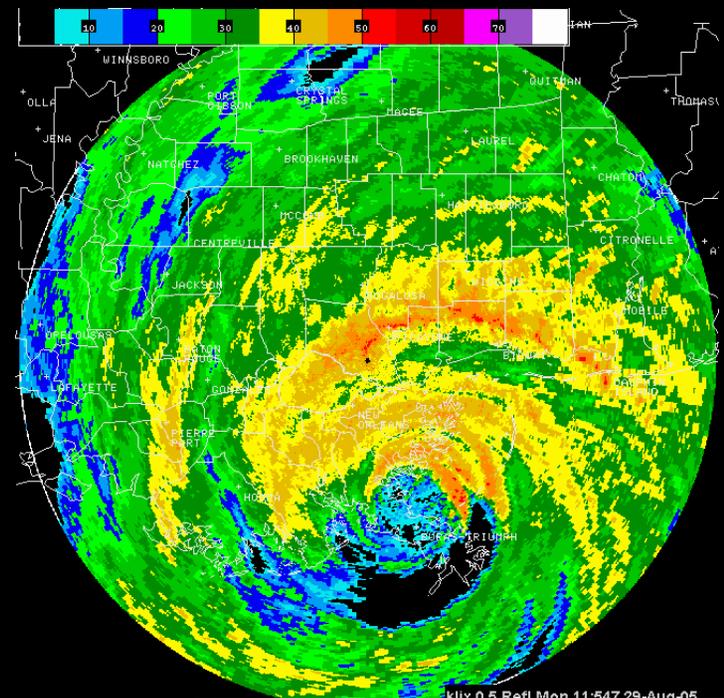
- Floods (e.g., Isaac)
- Drought
- Fire & Smoke

Climate Science

- Sea surface temperature
- Loop current

Adaptation Strategy

- Flood protection
- Building orientation





QUESTIONS ?

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