

# Office of Cyber and Infrastructure Analysis

## National Protection and Programs Directorate

### ***Infrastructure Modeling: Crawl, Walk, Run***

#### ***Briefing for the GUIRR***

**February 24, 2016**



Homeland  
Security

## OCIA Vision

**Strengthen the security and resilience of the Nation's critical infrastructure through innovative cyber and physical analysis**

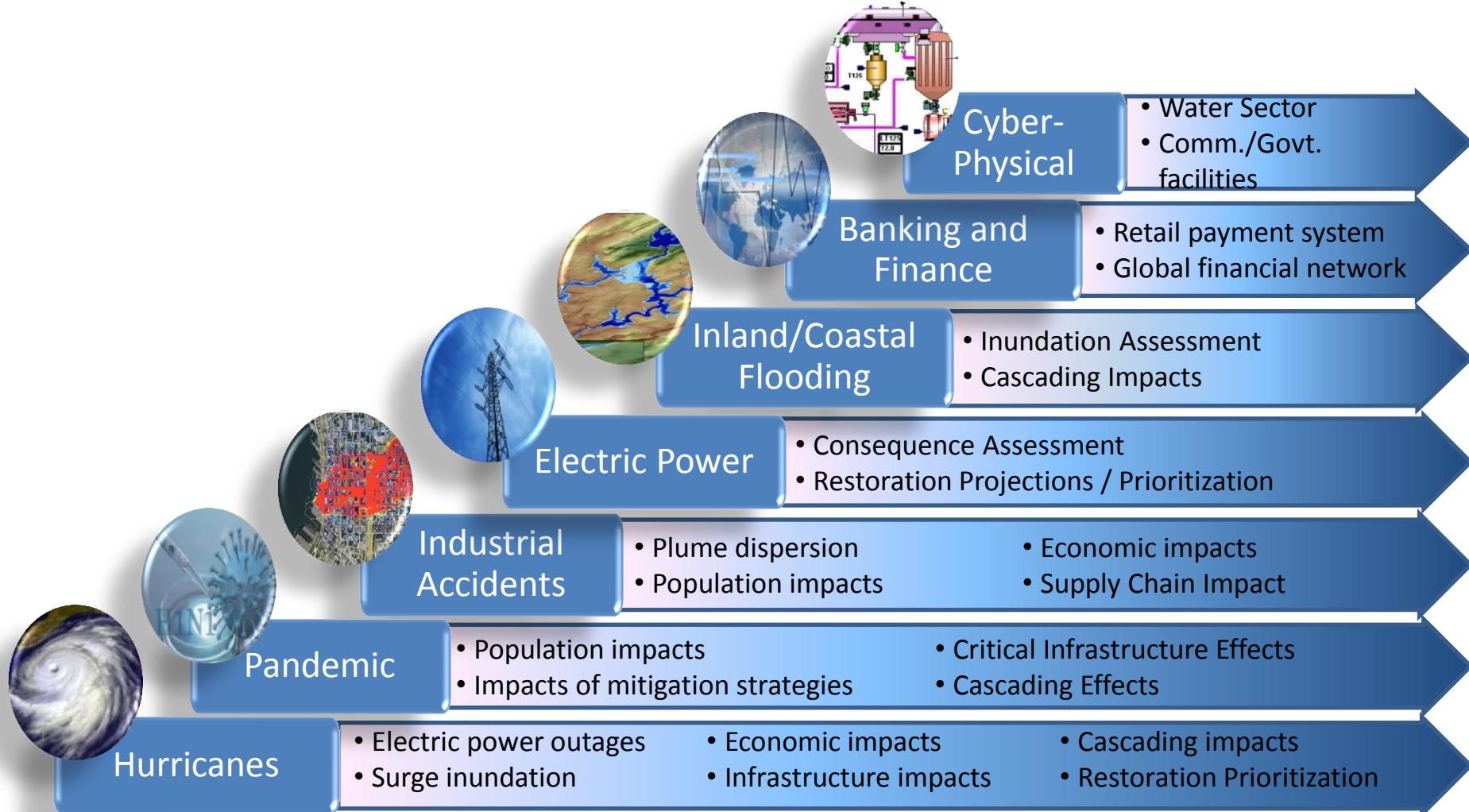
## OCIA Mission

**Inform the decisions that protect the Nation's critical infrastructure**



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# OCIA Analytic Evolution

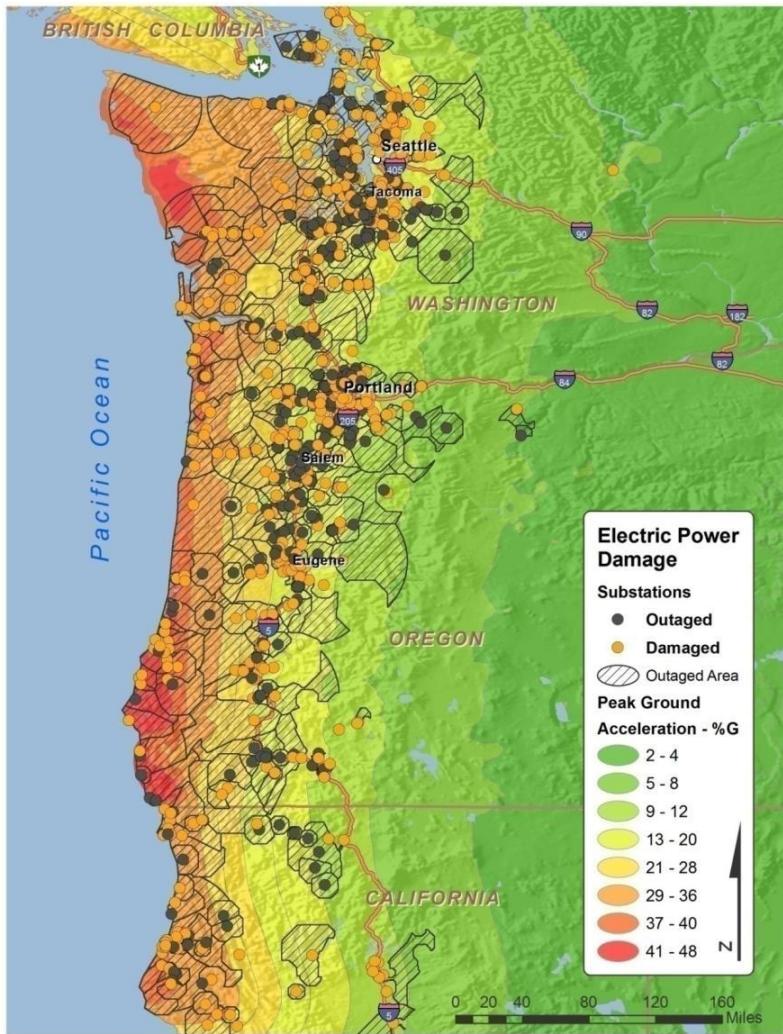


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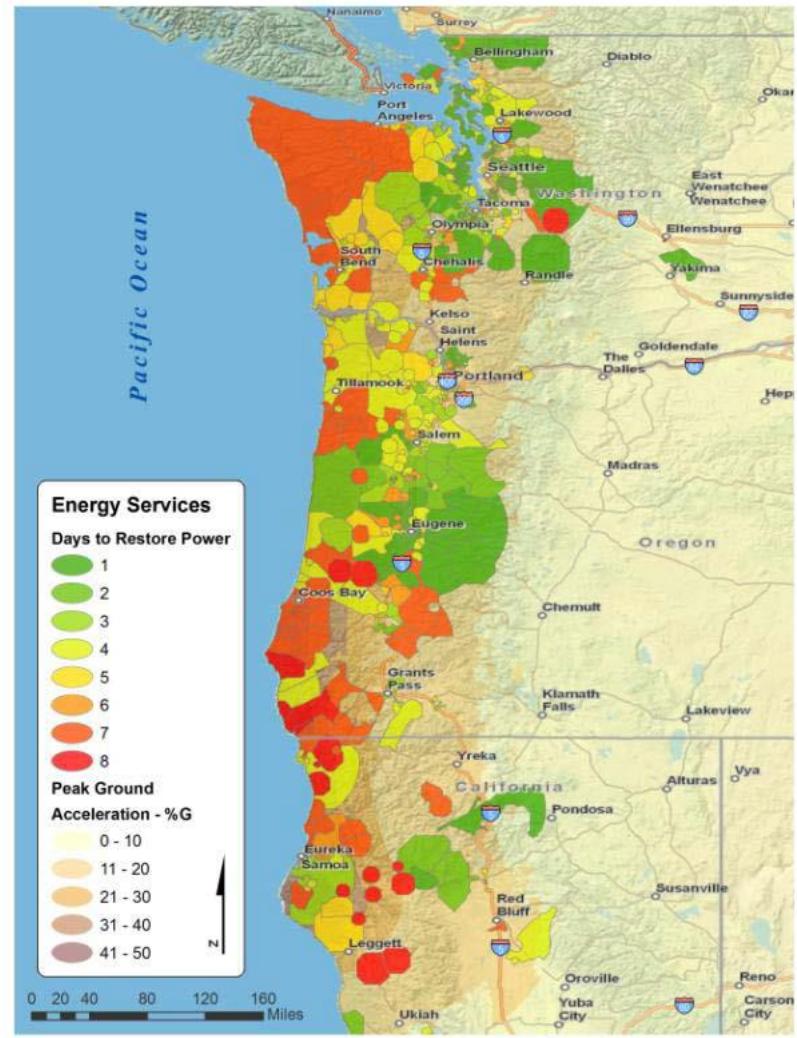
# I. Planning for Infrastructure Disruptions



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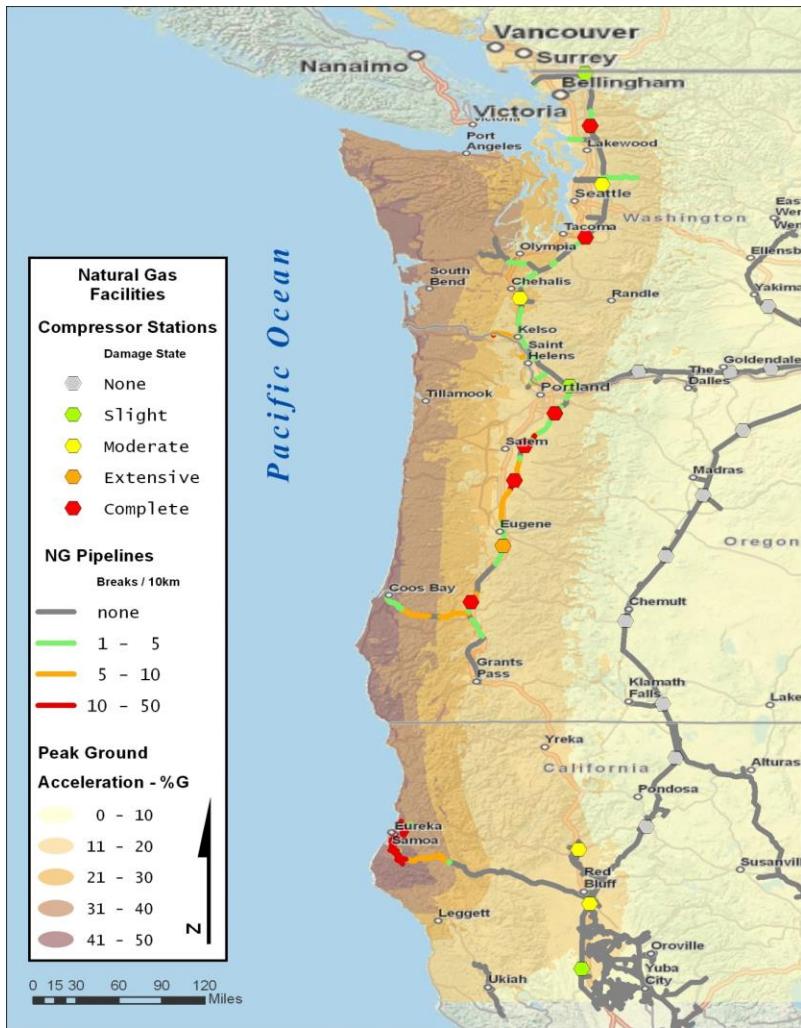
**Electric power infrastructure damaged and outaged**



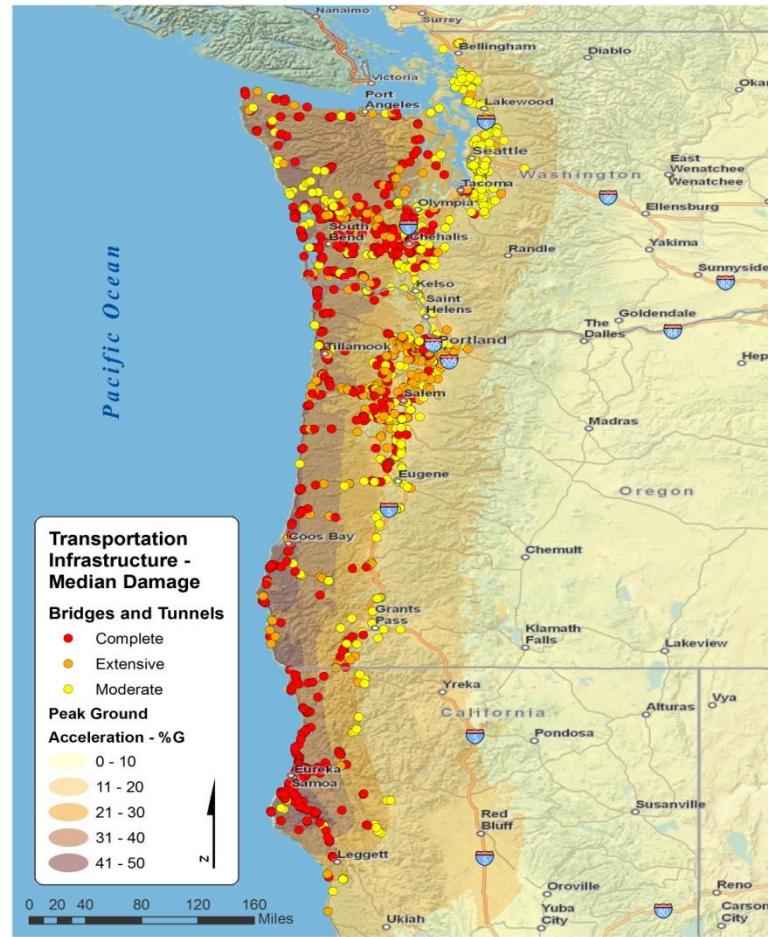
**Estimated restoration times for damaged and outaged substations**



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**Estimated damage to natural gas pipelines and compressor stations**

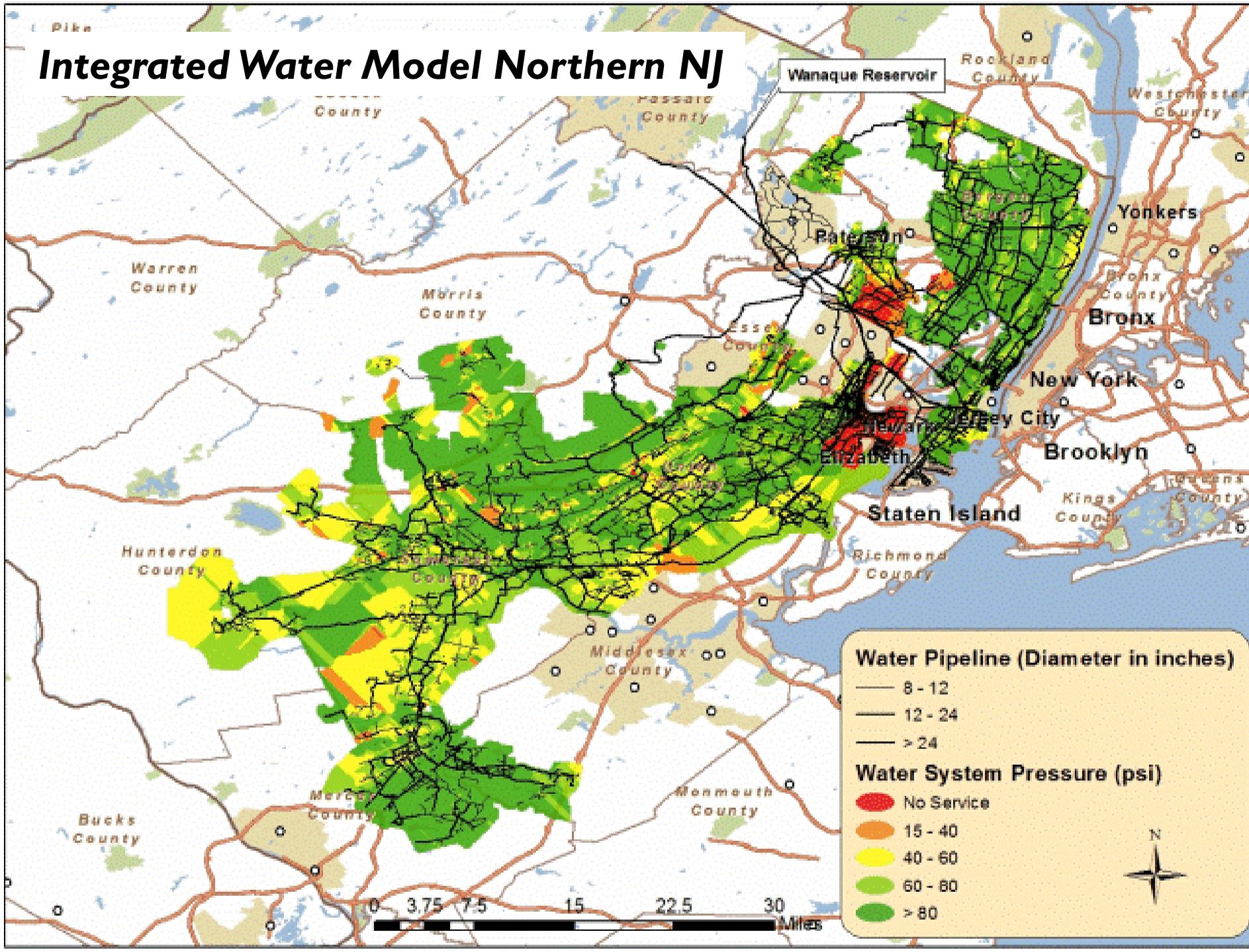


**Expected damage to highway bridges and tunnels in the Cascadia region**



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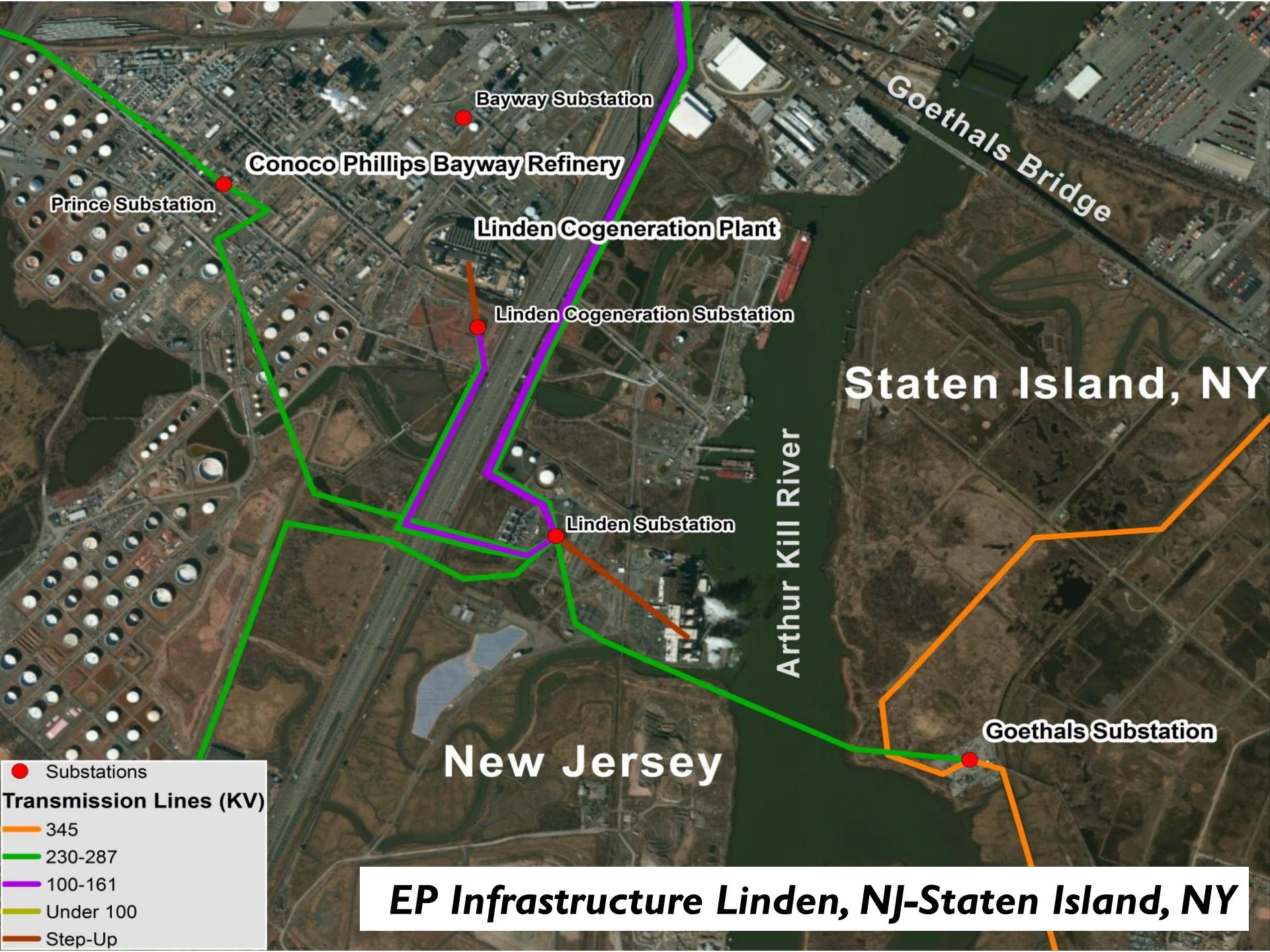
# Integrated Water Model Northern NJ



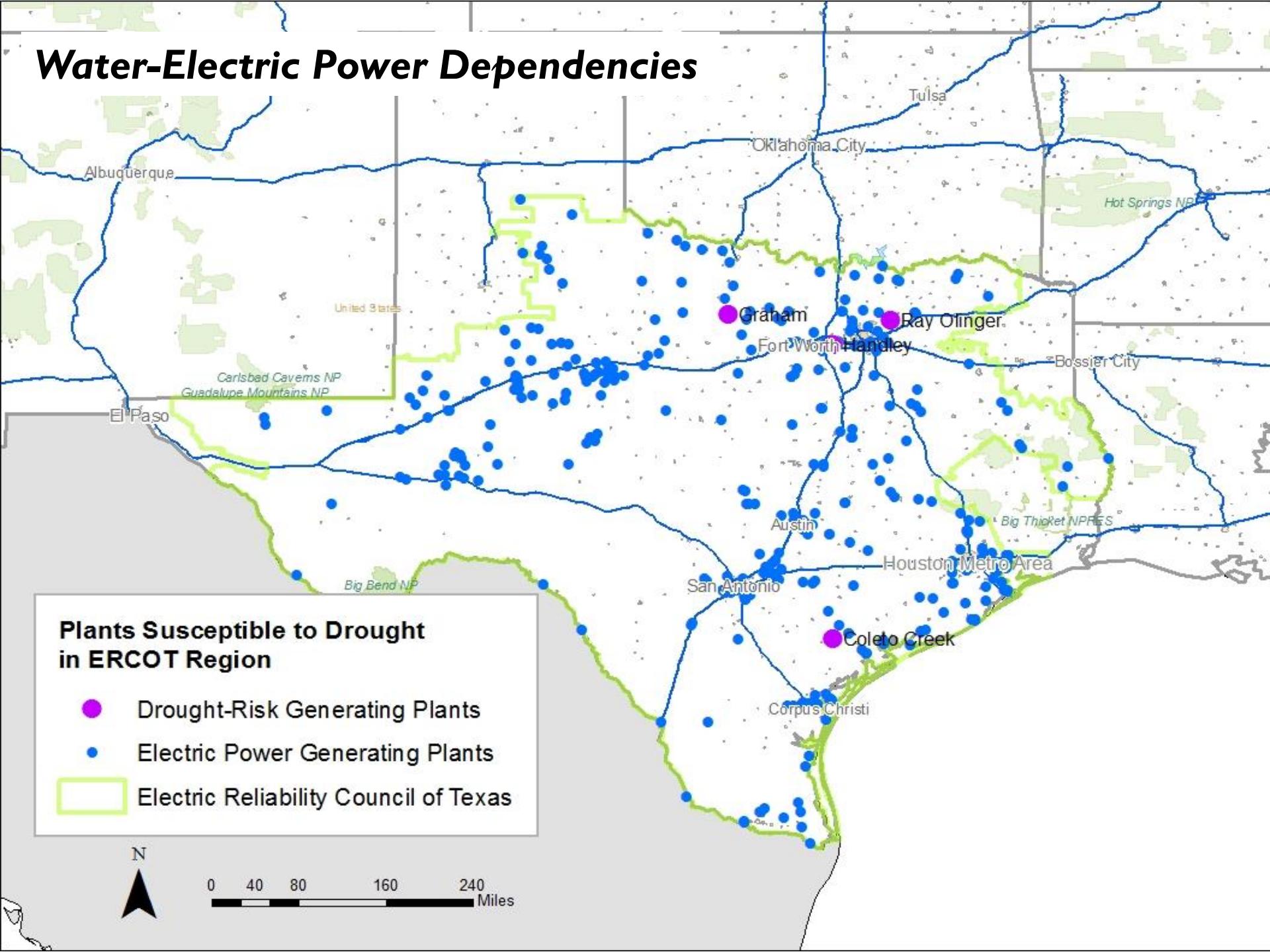
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## II. Understanding Infrastructure Dependencies





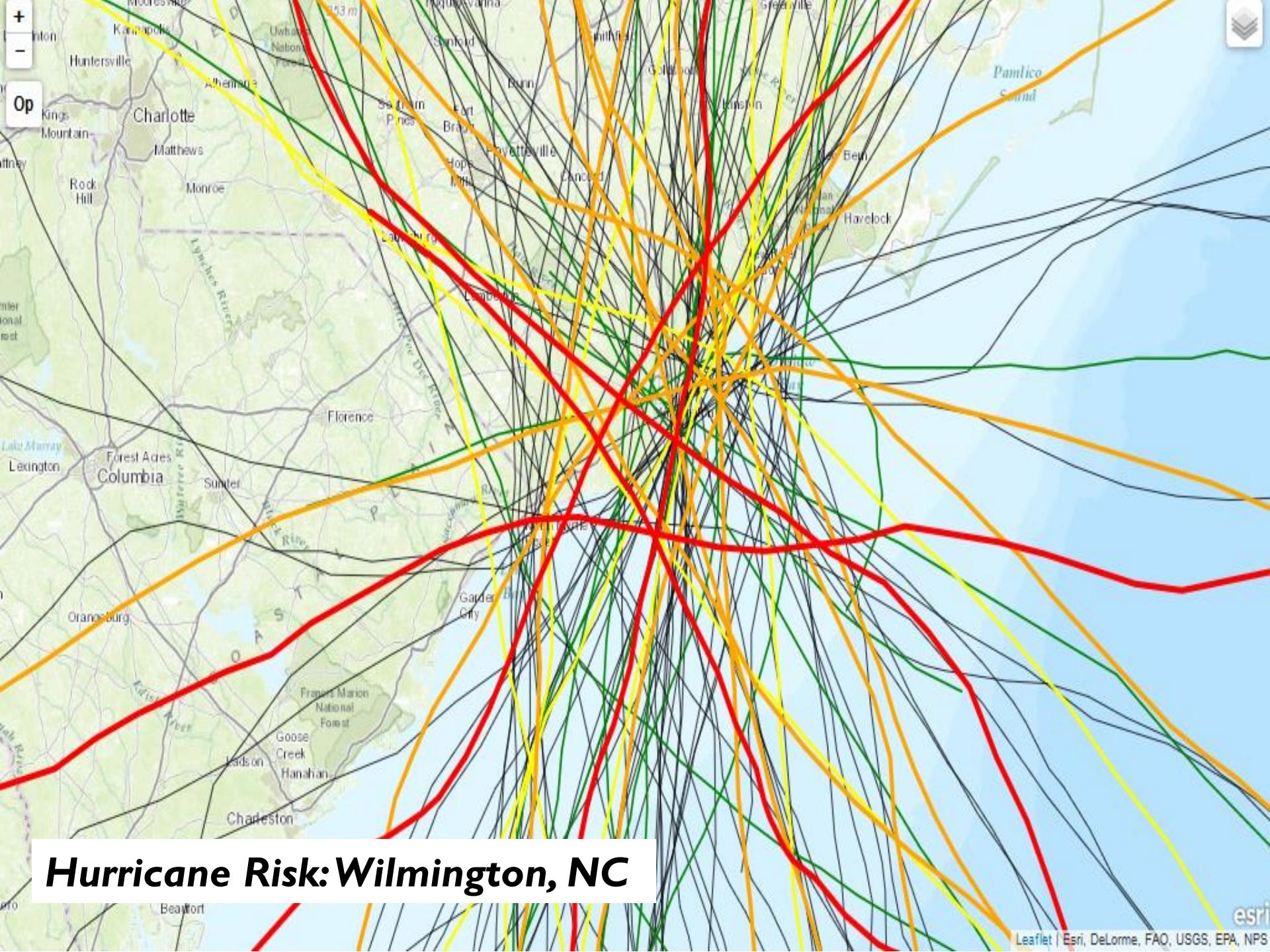
# Water-Electric Power Dependencies



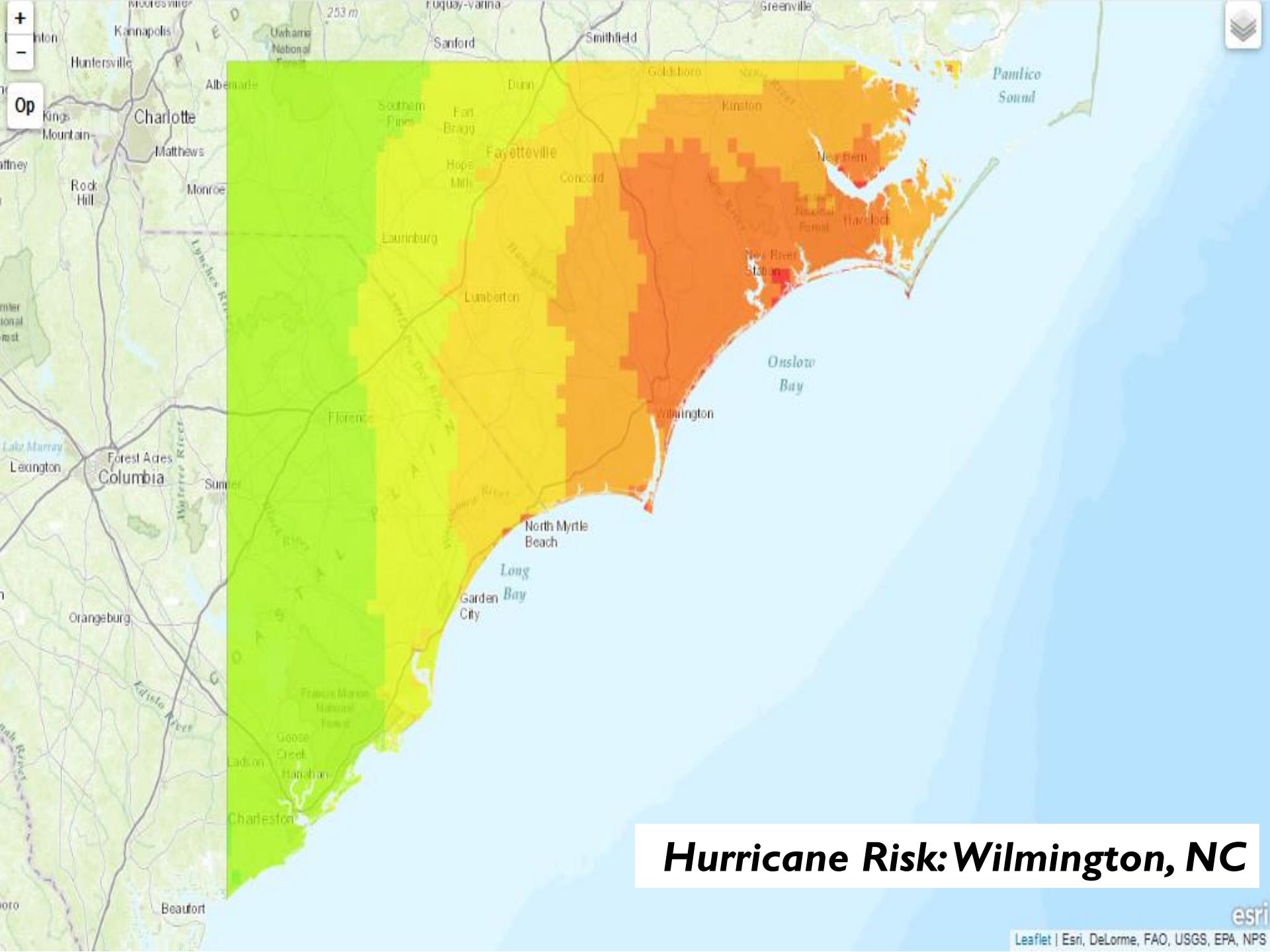
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## III. Modeling Uncertainty





## Hurricane Risk: Wilmington, NC



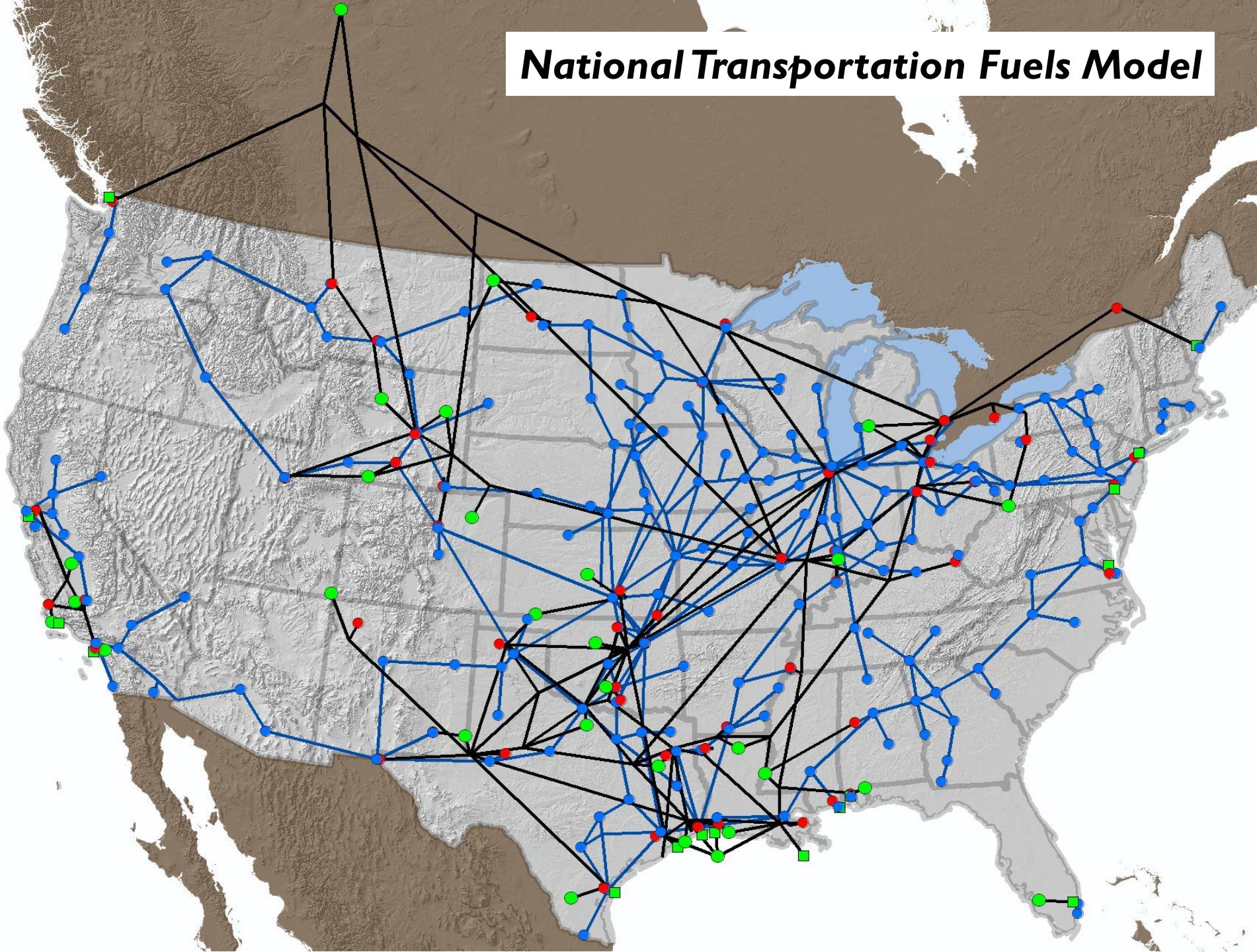
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## IV. Modeling Supply Chains



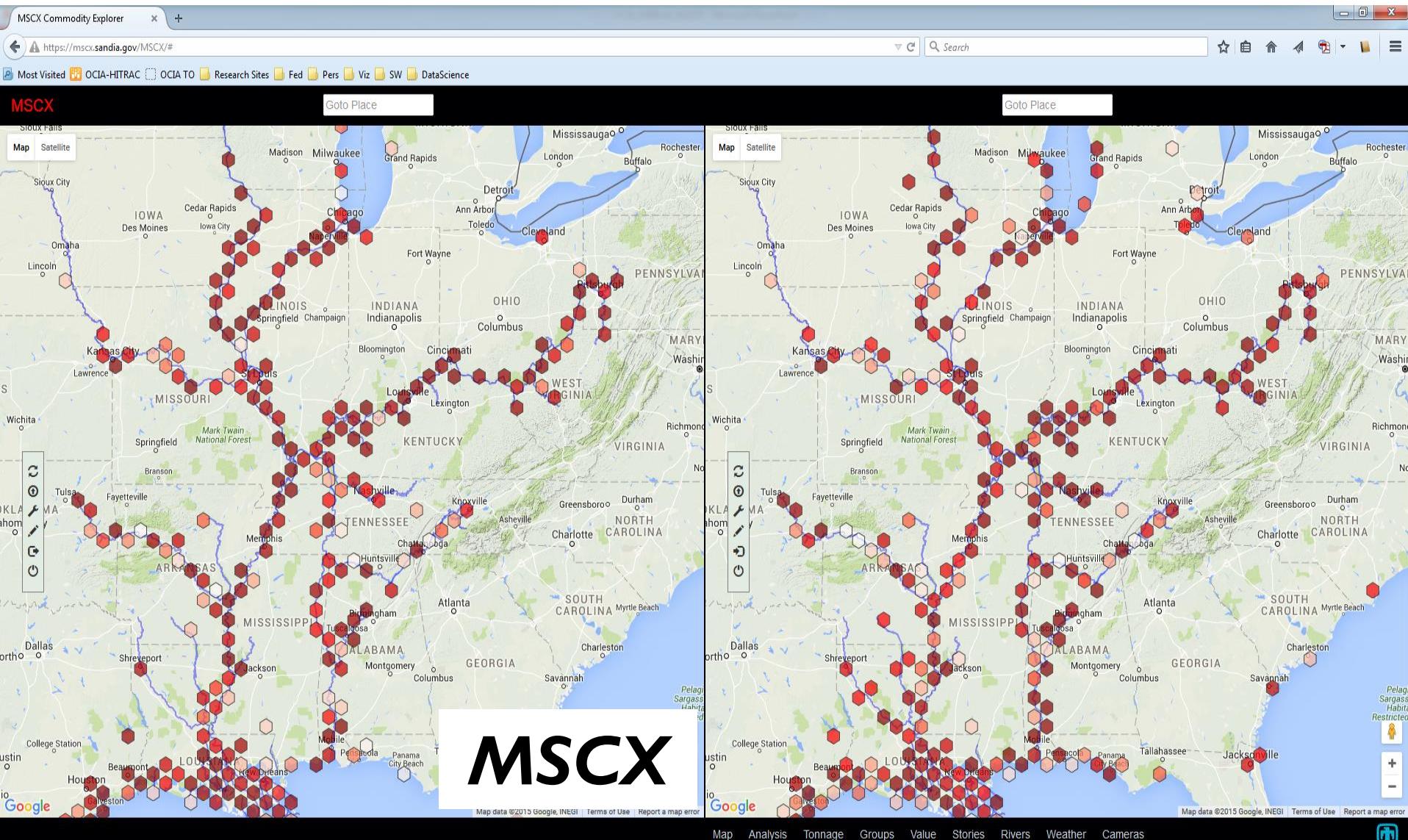
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# *National Transportation Fuels Model*

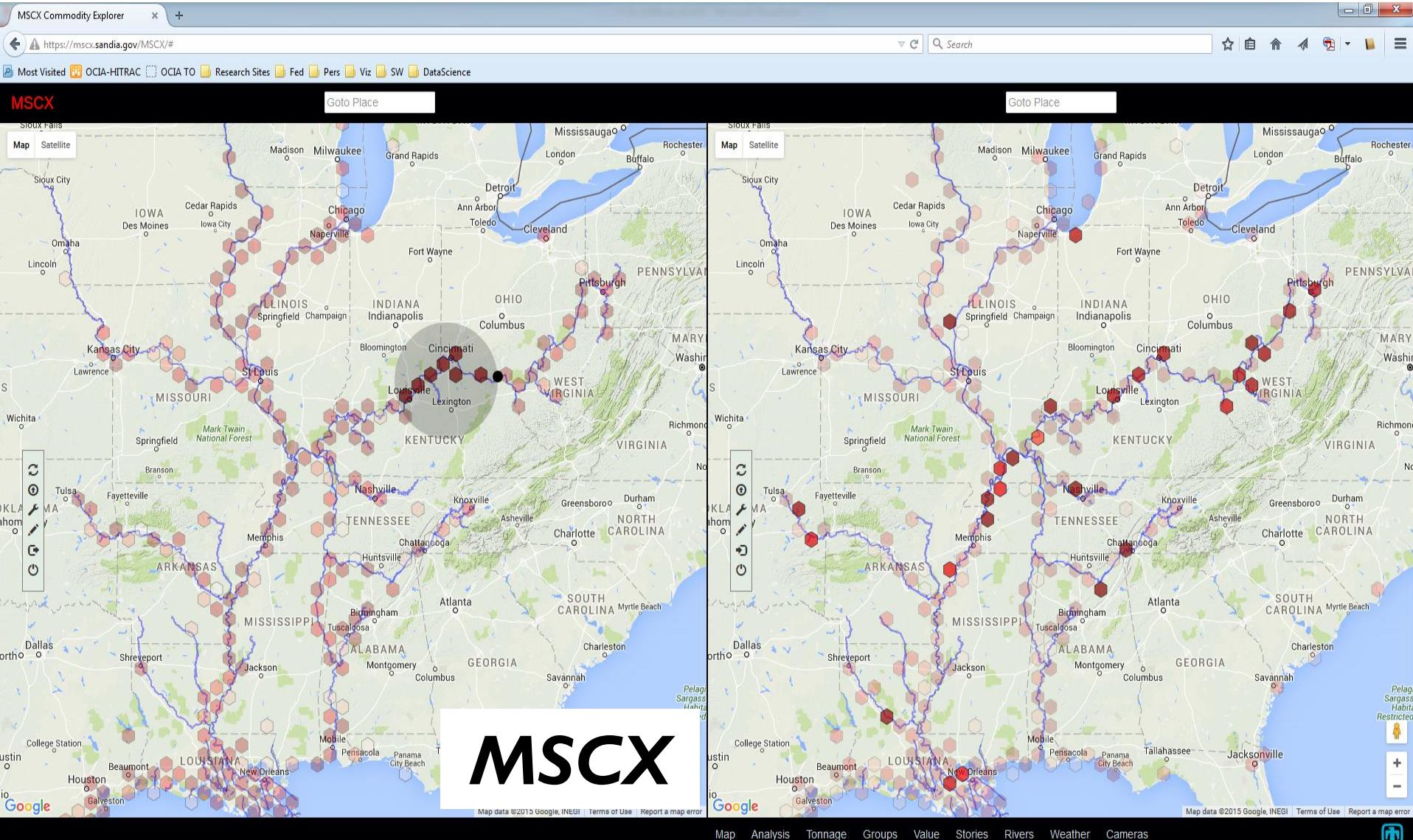


# **Iron Ore-Steel Supply Chain**

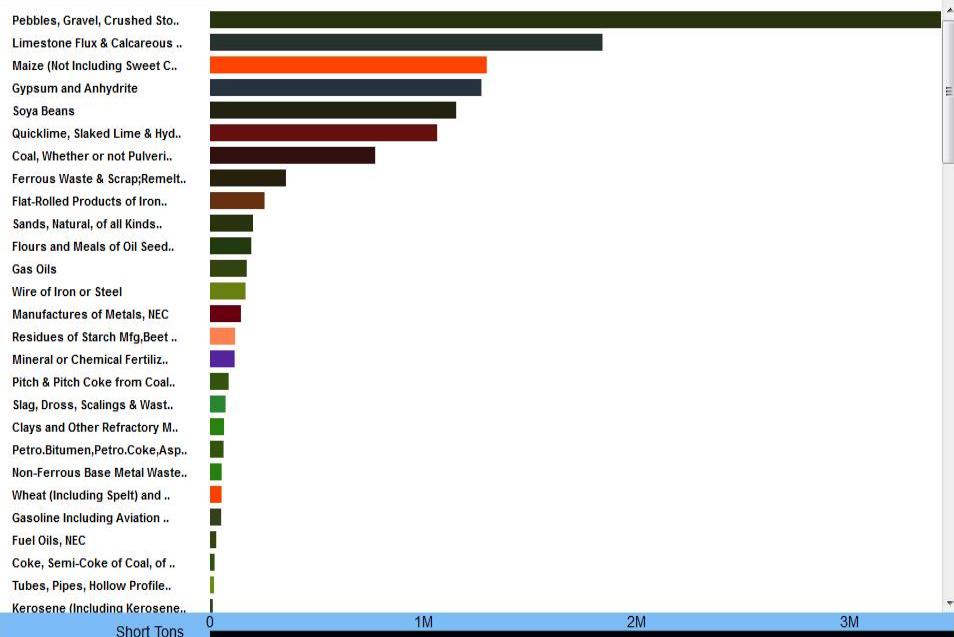
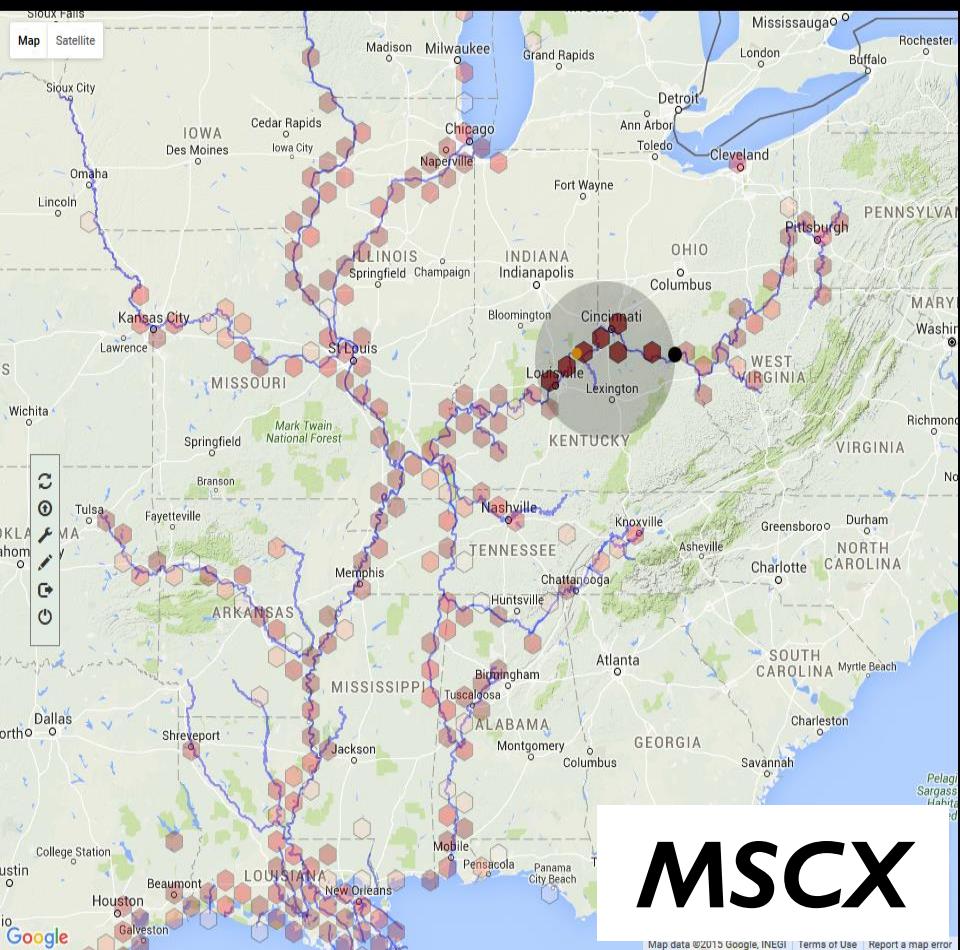




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## Send Port

CARMEUSE LIME, MAYSVILLE OPERATION	1695097
HILLTOP BASIC RESOURCES, INC. PATRIOT	1370219
MILE 577 OHIO RIVER	1258374
CARMEUSE LIME & STONE, BLACK RIVER OPERATION	1052279
CINCINNATI BULK TERM DIV OF HATFIELD TERM	1033988
TRANSCONTINENTAL TERMINALS INC	714060
MARTIN MARIETTA CORP/LANE QUARRY	681185
CONSOLIDATED GRAIN & BARGE	590501
CARGILL INC	575670
CINCINNATI GAS & ELEC CO	499920
GALLATIN TRANSIT	421858
MULZER CRUSHED STONE	375643
THE DAYTON POWER & LIGHT CO	320290
KINDER MORGAN ENERGY PARTNERS	311989
NUGENT SAND CO	270194

## Recv Port

NUGENT SAND CO.	1476046
ZEN-NOH GRAIN CORP WHARF.	1101632
LAFARGE GYPSUM	761077
HILLTOP BASIC RESOURCES, INC. EAST CINCINNA..	580103
OHIO POWER CO., GENERAL JAMES M. GAVIN PLAN..	561528
FIRST ENERGY, PENN POWER CO., BRUCE MANSFIE..	509173
CARGILL, INC. - NAGOG, RESERVE ELEVATOR WHARF	477040
HILLTOP BASIC RESOURCES, INC. RIVER TERMINAL	446658
THE DAYTON POWER & LIGHT CO	400024
UNITED STATES GYPSUM CO., ALIQUIPPY PLANT D..	399557
CARGILL INC WESTWEGO ELEVATOR WHARF	307557
OHIO POWER CO., KAMMER POWER PLANT, COAL UN..	251682
KENTUCKY UTILITIES CO., INC	248761
PRICE ISLAND TERMINAL, BELPRE & PORTERFIELD..	222388
ALLEGHENY ENERGY SUPPLY PLEASANTS/MILLOW IS..	210904

Map Analysis Tonnage Groups Value Stories Rivers Weather Cameras



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## V. Modeling Democratization



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## LANL Agave



Clip Area

Print Map

Wind Damage Forecasts

Wind Damage 1-3 Day CONUS (1 Hour) ▾

Reference Time 09/21/2015 02:00:00 UTC

NOAA Forecast projections included in set

All forecast times are UTC

09/21/2015 03:00:00

09/21/2015 04:00:00

09/21/2015 05:00:00

09/21/2015 06:00:00

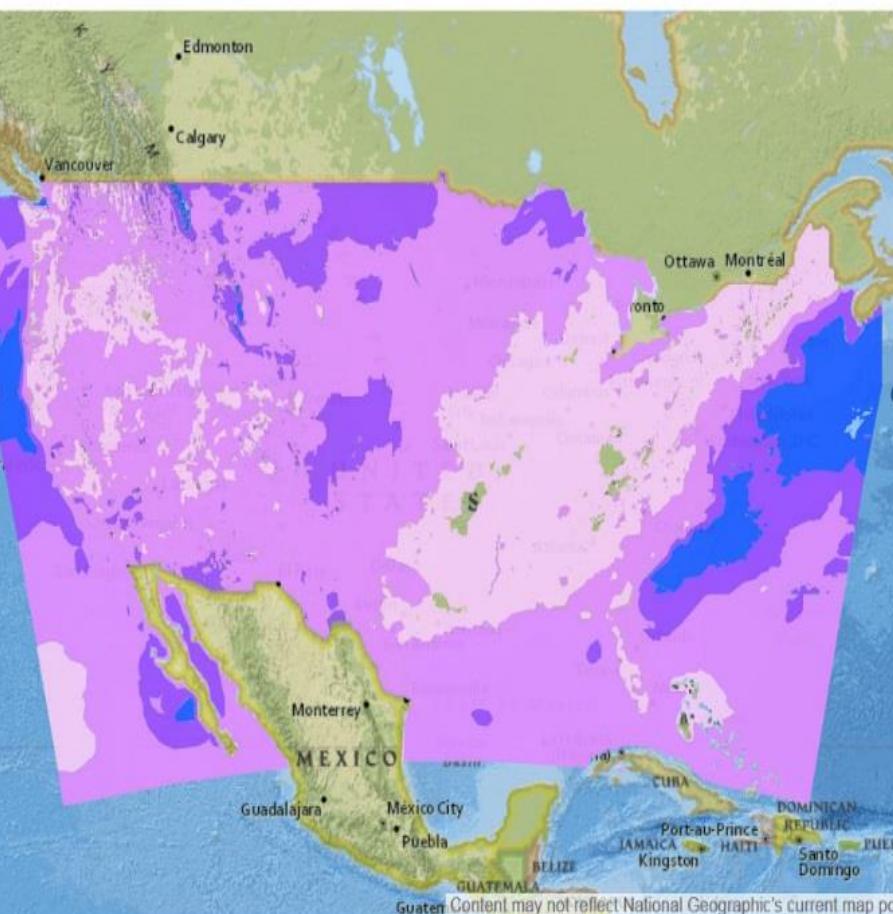
09/21/2015 07:00:00

09/21/2015 08:00:00

09/21/2015 09:00:00

B a s i n  
TROPIC OF CANCER

# AGAVE



Map Layers



EP Damage (1-3 Day) CONUS (1 Hour)

EP Damage (4-7 Day) CONUS (3 Hour)

NOAA 1-3 Day Max Winds CONUS (1 Hour)

MPH

< 5

5 - 10

11 - 20

21 - 30

31 - 40

41 - 50

51 - 60

61 - 70

71 - 80



Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, H...



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## Charleston

## Clip Area

Print Map

## Precipitation Forecasts

## Infrastructure Assessment

## Wind Forecasts

Pop/Econ Assessment

Calculation Name

### Hazard Area ▾

Bin Field ▾

## Demographic Fields ▾

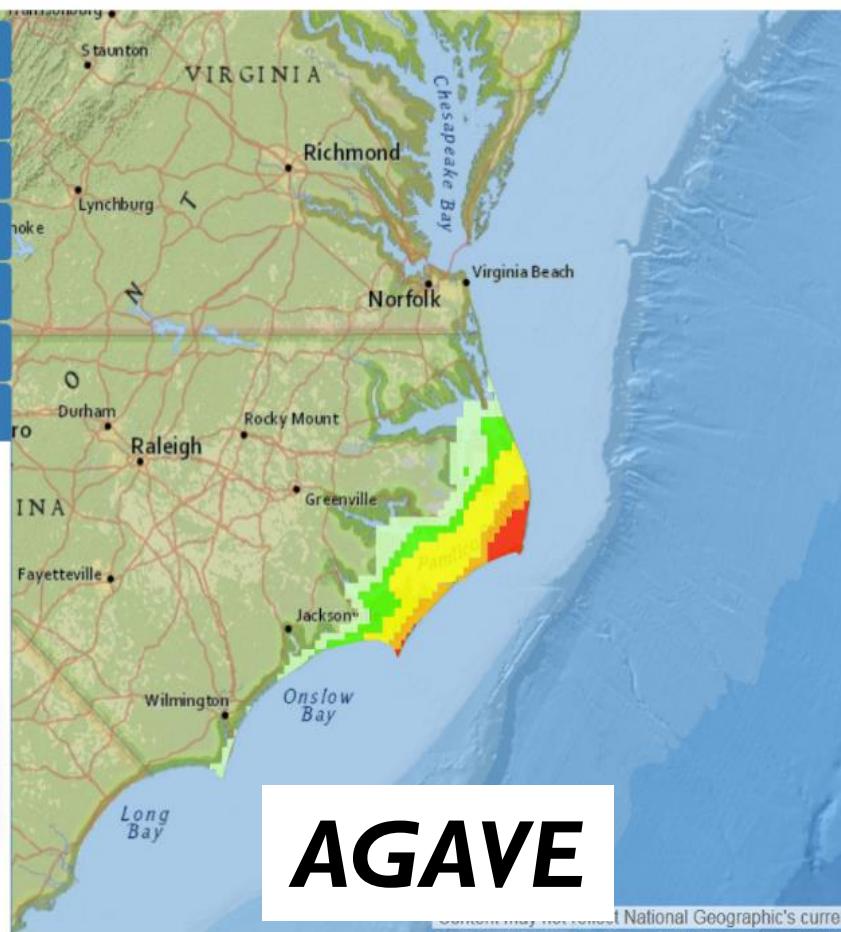
Total Population

Male Pop by Age

Female Pop b

javascript:void(0); Fields ▾

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at National Geographic's current map policy. Sources: National Geographic, Esri, Del.

POWERED BY  
**esri**

22

## LANL Agave



Clip Area

Print Map

Precipitation Forecasts

Show Layer

Layer:

Raw Values      Return Period

Percentile of non-exceedence:

5 10 25 50 75 90 95

Date:

2015-09-20T12:00:00.000Z

Rainfall (inches/6 hours)

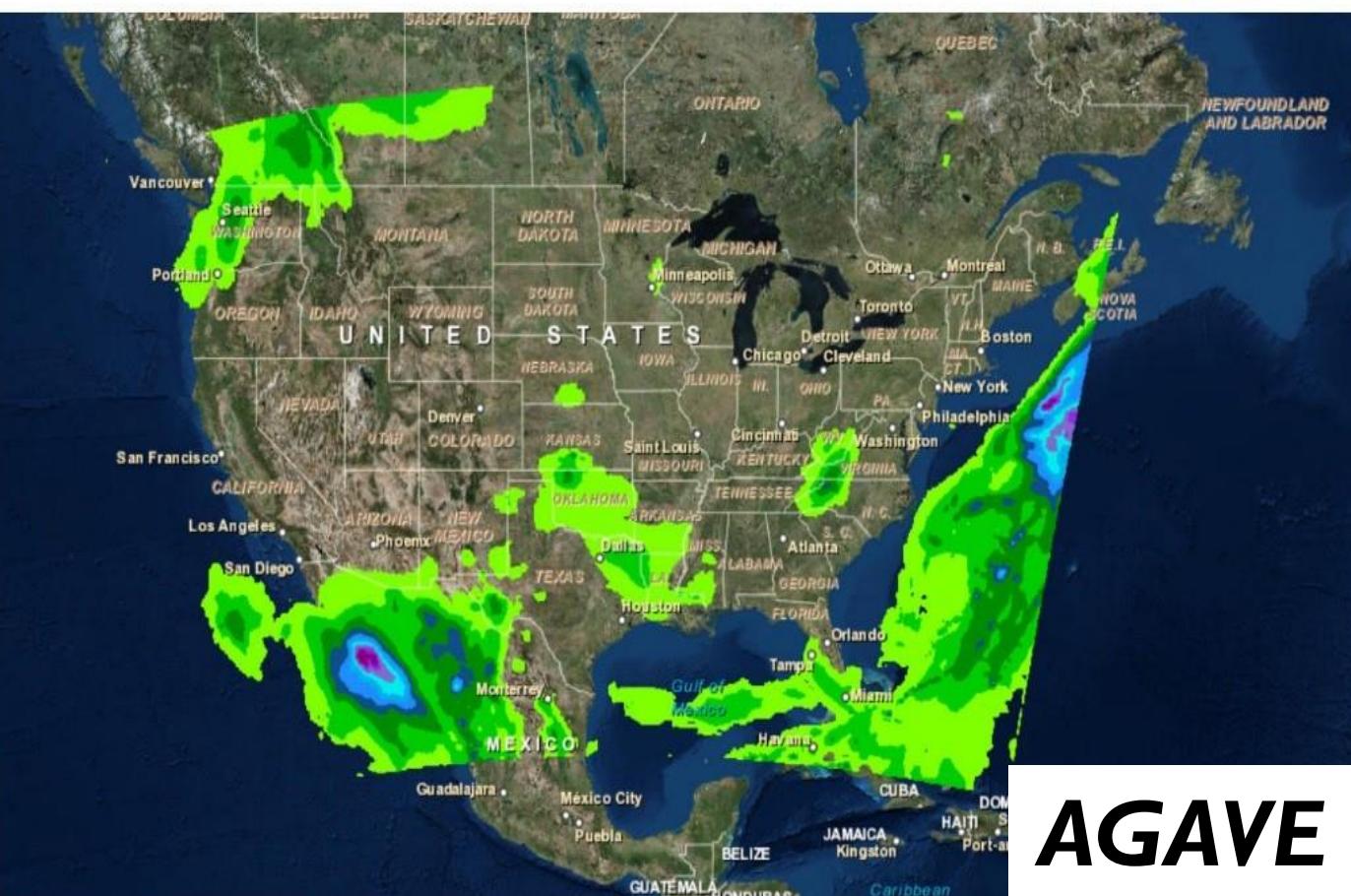
0.01 0.10 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.50 3.00 4.00 5.00 7.00 10.0 15.0

Opacity:



Surge Forecasts

Wind Damage Forecasts



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Clip Area

Print Map

Precipitation Forecasts

Surge Forecasts

Show Layer

Storm:

Tropical Storm Bill (2015)

Percentile of non-exceedence:

50 60 70 80 90

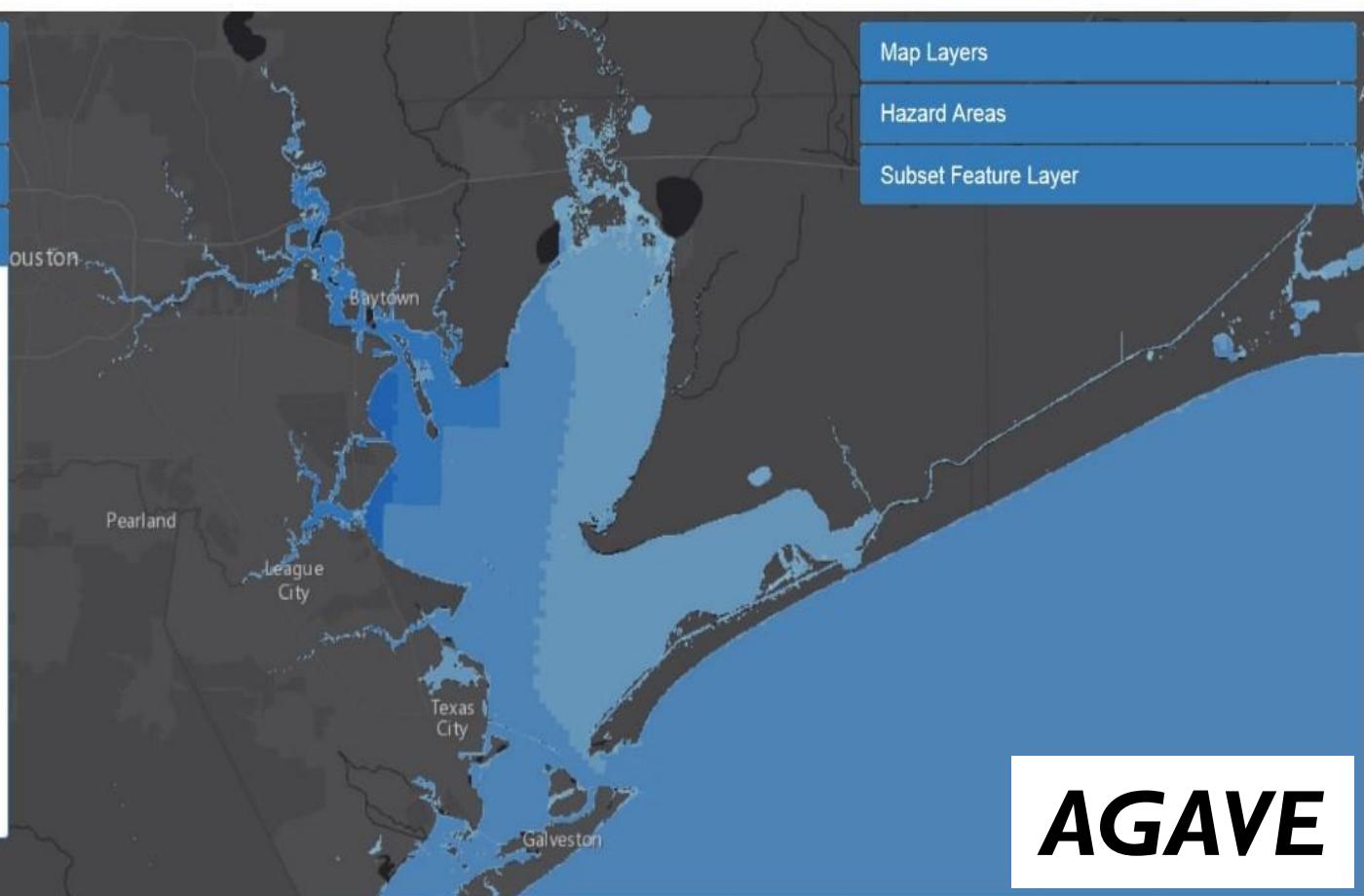
Date:

2015-06-16T00:00:00.000Z

Surge Depth (feet)

0.5 1 2 3 4 6 8 10 12

Opacity:



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# Humility

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## Analytic Success in a Dynamic Environment



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For more information visit:

[www.dhs.gov/office-cyber-infrastructure-analysis](http://www.dhs.gov/office-cyber-infrastructure-analysis)

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