

GAM Programs and Transportation Resilience

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Landslide Technology

GAM and Resilience

- Transportation Asset Management (TAM)

“Strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle”

- Transportation Resilience

“Resilience is generally defined as the ability to anticipate and prepare for, respond to, and recover rapidly from disruptions.”



U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

Audit Highlights

FHWA Lacks Detailed Guidance on Infrastructure Resilience for
Emergency Relief Projects and a Process To Track Related
Improvements

Self-initiated

Federal Highway Administration | ST2018014 | January 10, 2018

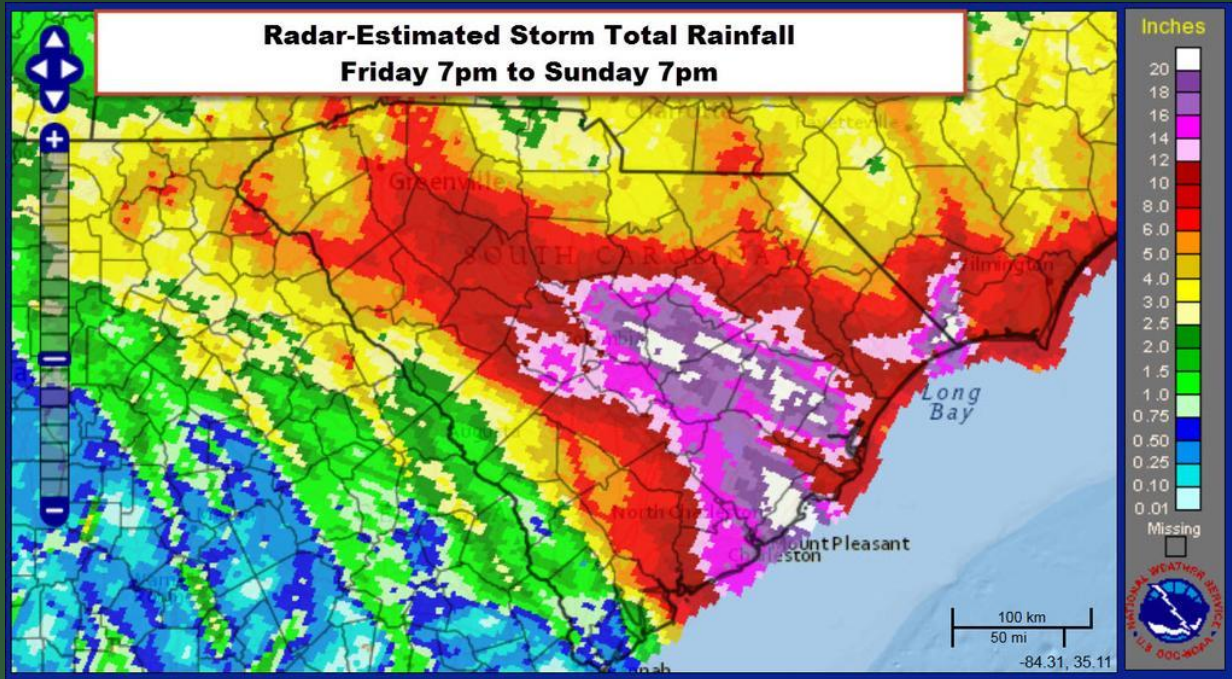
GAM and Resilience

- Fundamental Data from GAM
 - Inventory (What do I have?)
 - Condition (Are they teetering on the brink of failure?)
 - **GOOD** -> Higher chance of network resilience
 - **POOR** -> Lower chance of network resilience
 - Illustrate where a cascade of events or severe event threatens functionality

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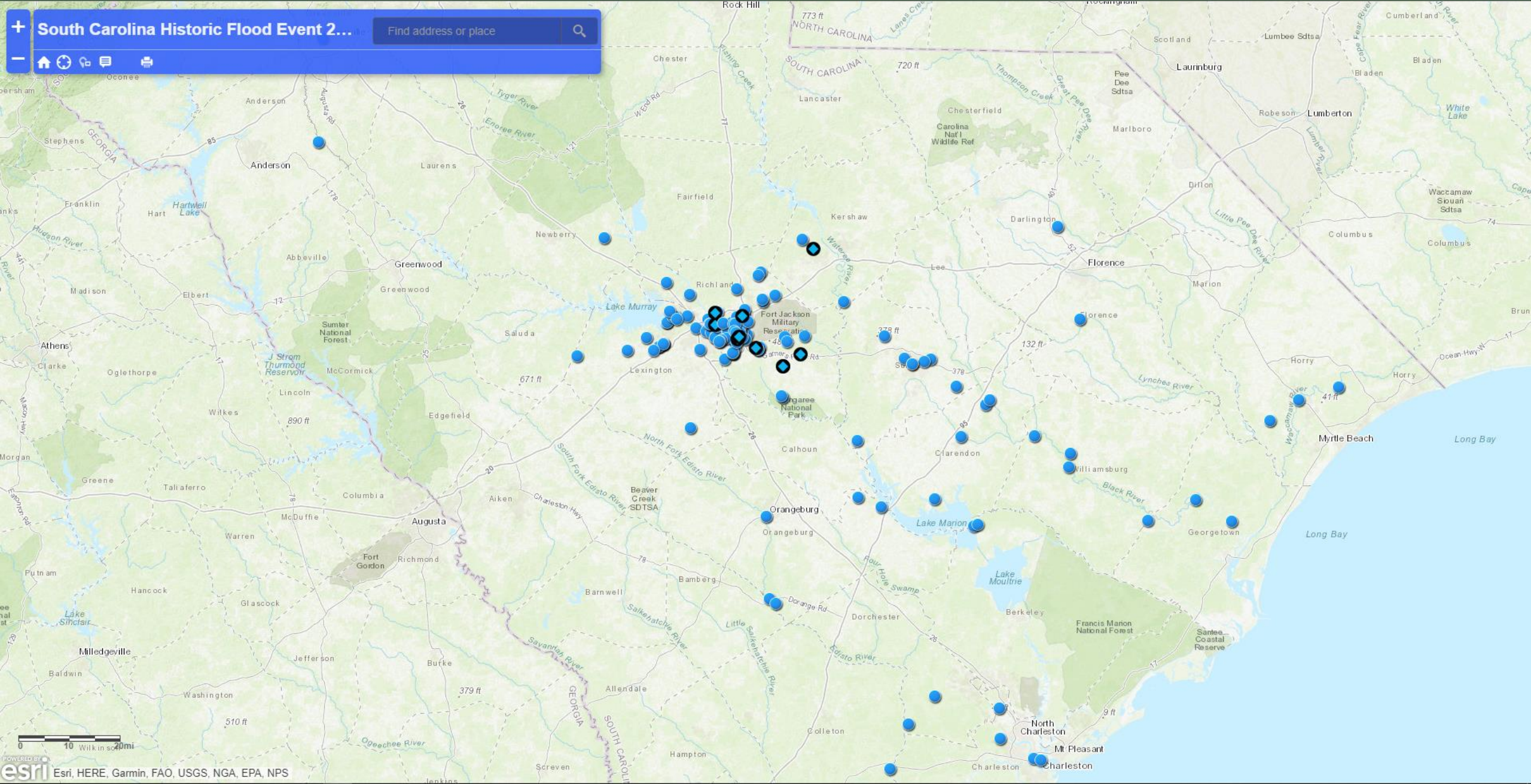
South Carolina, 2015 – Hurricane Joaquin



- 20 inches of rainfall
- 410 roads and bridges closed for up to a week
- 36 dam failures
- 19 fatalities
- \$1.5 billion damage losses

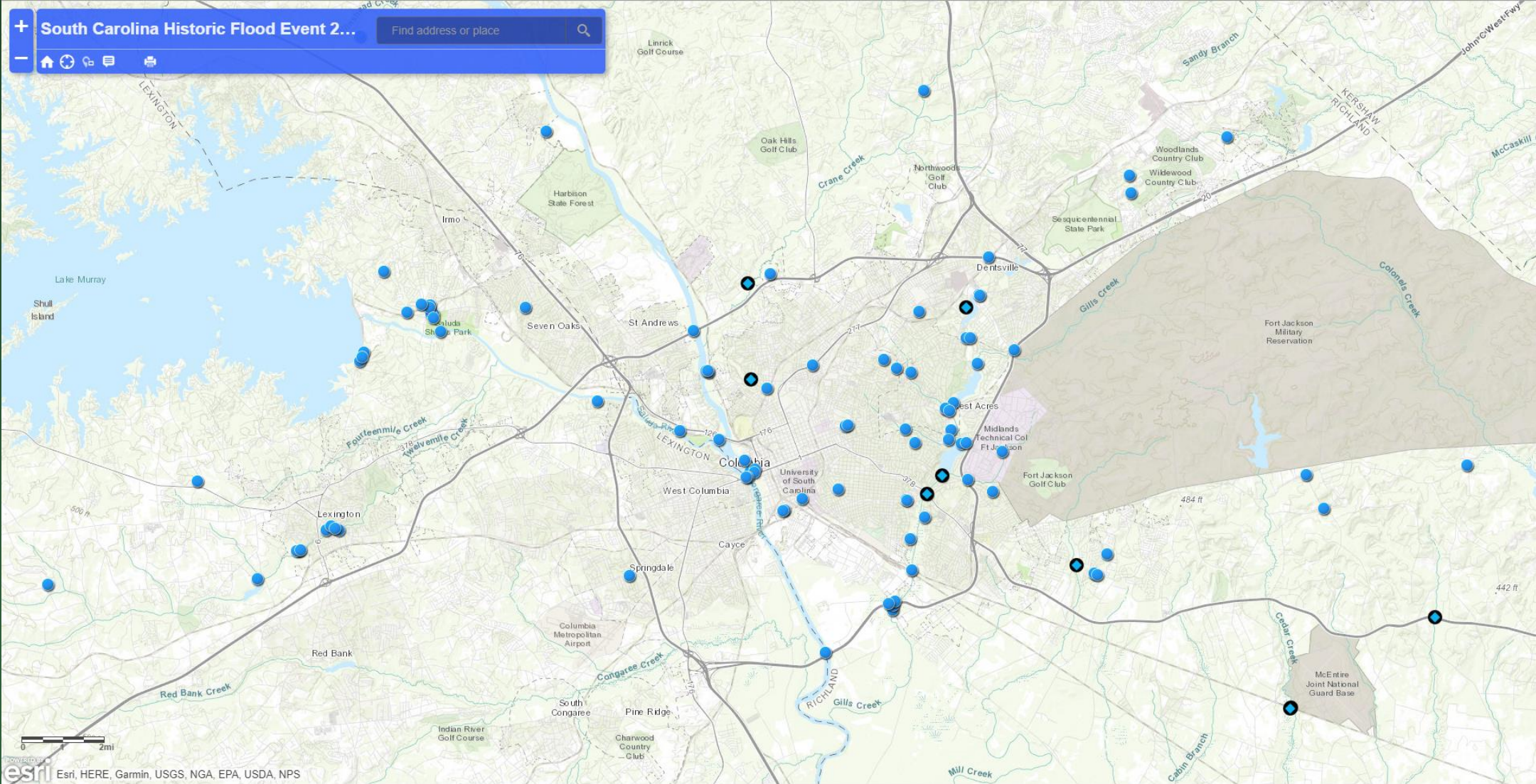
South Carolina Historic Flood Event 2... Find address or place

Home, Refresh, Layers, Share, Print icons

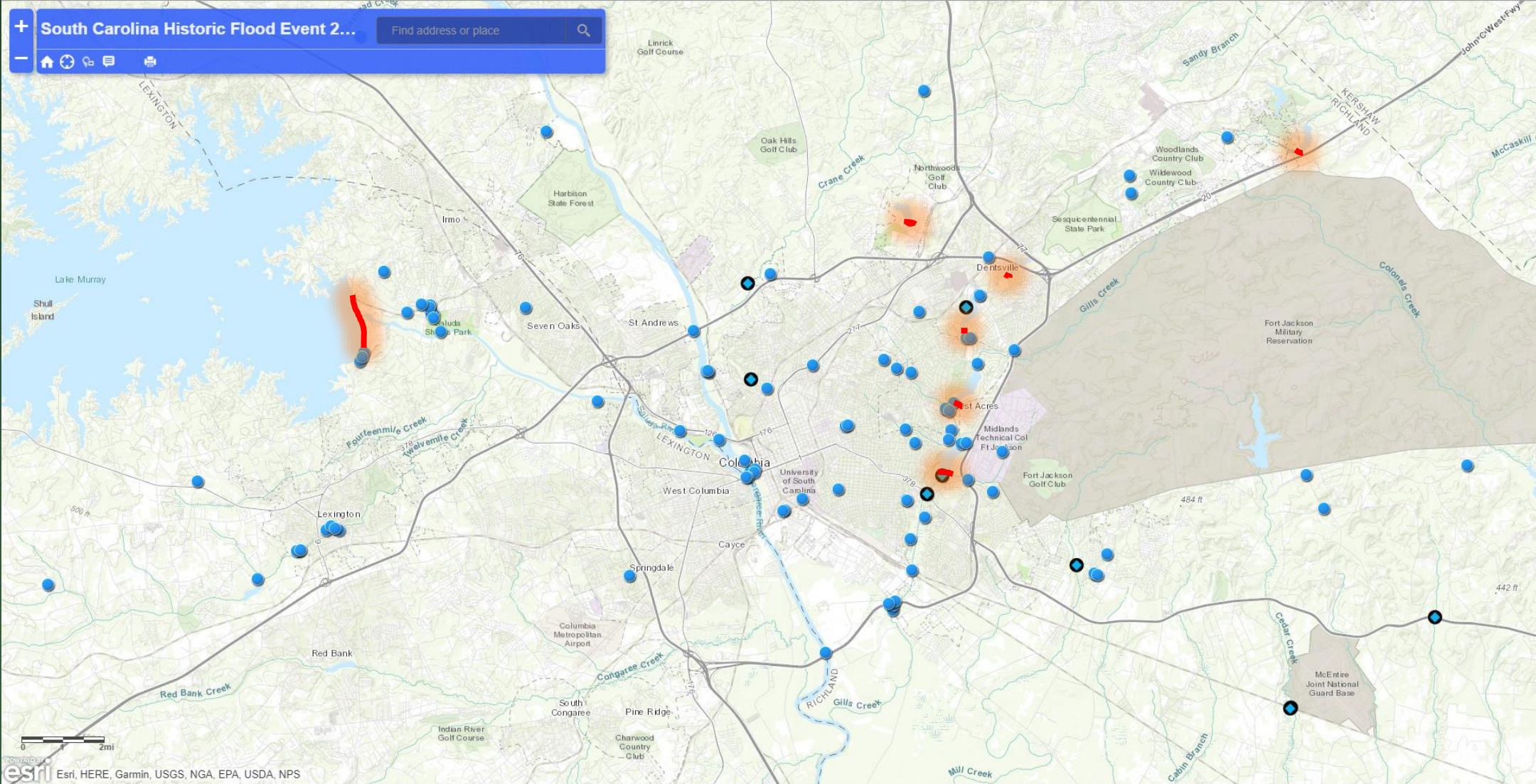




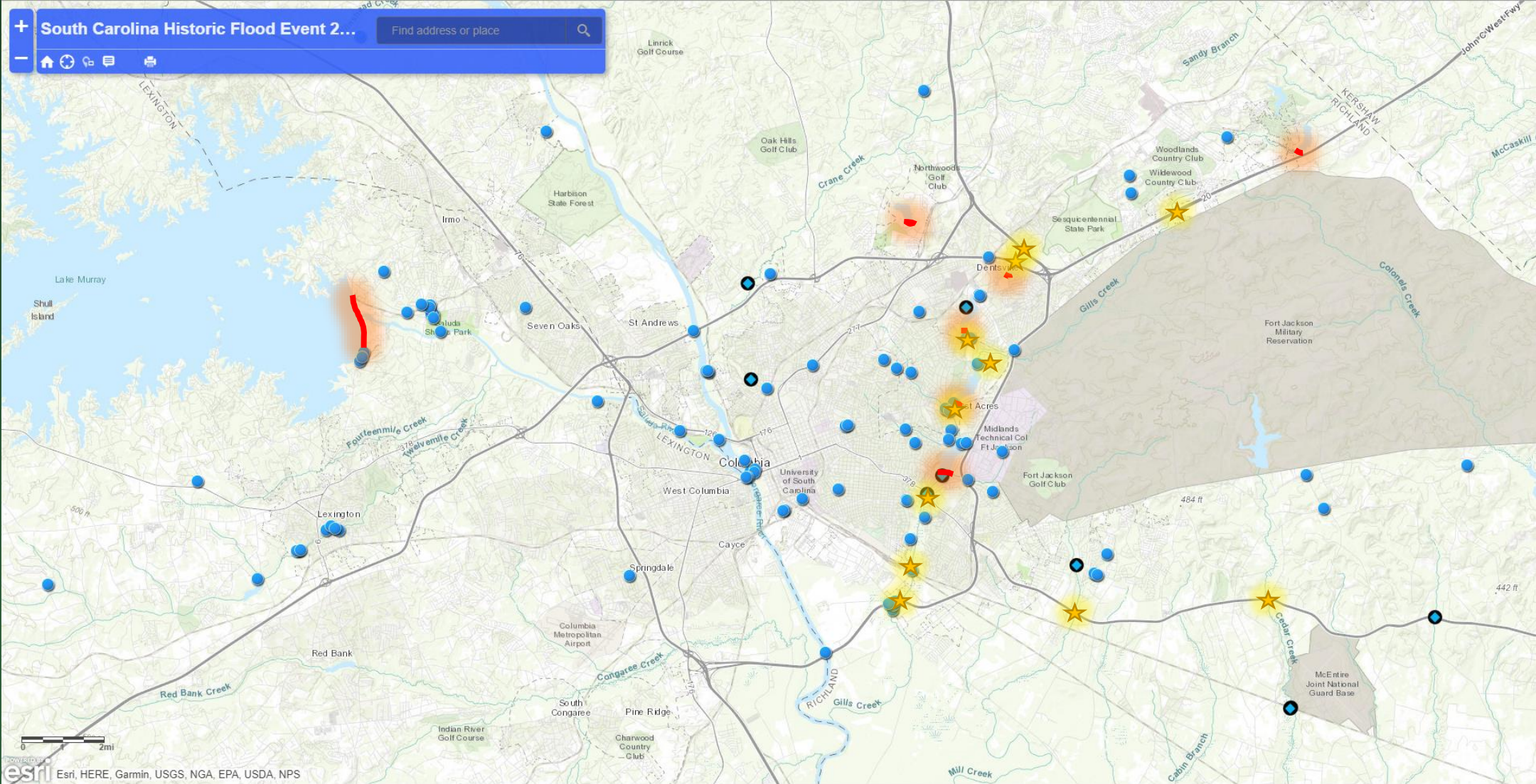
Better Understanding



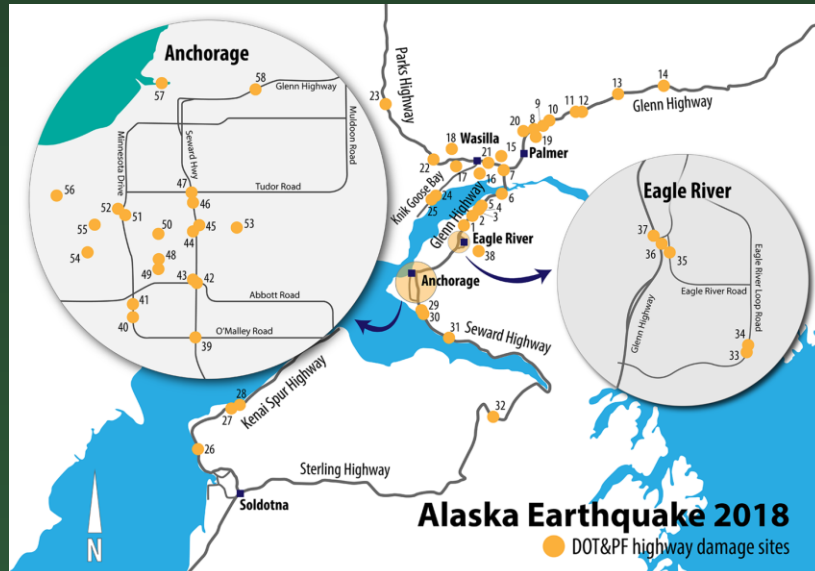
Better Understanding



Better Understanding



Alaska, 2018 – Anchorage Earthquake



Damage Locations by Highway and Community

| Glenn Highway | Parks Highway | Anchorage |
|---|--|--|
| 1 Old Glenn Highway, north of Fire Lake, southbound | 21 Seward Meridian Bridge Abutment | 39 O'Malley Bridge Abutment |
| 2 North Peters Creek Off-Ramp, southbound | 22 Milepost 52.4 | 40 Minnesota Drive, 100th Bridge Abutment |
| 3 Mirror Lake On-Ramp, southbound | 23 Willow-Fishhook Road, Milepost 44 | 41 Humphrey Road (Frontage Road), 100th to Dimond |
| 4 Mirror Lake between ramps, southbound | | 42 Dimond Bridge Abutment |
| 5 Mirror Lake Off-Ramp, southbound | Knik Goose Bay Road | 43 Seward Highway, Off-Ramp at Dimond, southbound |
| 6 Milepost 29.2 | 24 Milepost 14.7 | 44 Seward Highway, Dowling On-Ramp, southwest quadrant |
| 7 Glenn / Parks Interchange | 25 Milepost 15.2 | 45 Seward Highway, Dowling On-Ramp, northeast quadrant |
| 8 Moose River Bridge Abutment | Kenai Spur Road | 46 Seward Highway, Tudor to 36th |
| 9 Milepost 55 - 58 | 26 Milepost 19 | 47 Tudor Bridge Abutment at Seward Highway |
| 10 Milepost 58.7 | 27 Milepost 35.1 | 48 C Street north of Campbell Creek, east lane, northbound |
| 11 Kings River Bridge Abutment | 28 Milepost 35.7 | 49 C Street Bridge Undercrossing at Campbell Creek |
| 12 Milepost 68.5, northbound | Seward Highway | 50 C Street at Dowling, southbound |
| 13 Chickaloon Bridge Abutment | 29 Rabbit Creek Bridge Abutment | 51 Minnesota Drive and International, On-Ramp, northbound |
| 14 Puninton Creek Bridge Abutment | 30 Rabbit Creek Off-Ramp, southbound | 52 Minnesota Drive and International, On- and Off-Ramp, southbound |
| | 31 Milepost 104-116 | 53 Dowling Road, Elmora to Lake Otis, westbound (MOA-maintained) |
| Wasilla | 32 Six Mile Creek Bridge Abutment | 54 Jewel Lake Road, south of Raspberry Road |
| 15 Palmer-Wasilla Highway east of Shesandoah | Eagle River | 55 Jewel Lake Road, east of airport runway |
| 16 Fairview Road at Jack Fish | 33 Briggs Bridge (Eagle River Bridge) Abutment | 56 Aircraft Drive and Vought Circle (runway) |
| 17 Vine at Milepost 2.5 (Mat-Su Borough-maintained) | 34 Eagle River Loop Pedestrian Undercrossing | 57 Anchorage Port Access Bridge Abutment |
| 18 Pittman Road Milepost 0.7 | 35 VFW Road | 58 Bragaw Bridge Abutment |
| Palmer | 36 Eagle River Bridge Abutment, southbound | |
| 19 Clark-Wolverine Road Milepost 5.5 | 37 Eagle River Bridge Abutment, northbound | |
| 20 Buffalo Mine Road | 38 Eagle River Road near Prudhoe Bay Road | |



- November 30, 2018
- 7.0 Magnitude
- 0 fatalities
- Damage: 35% chance between \$100M and \$1B
- AKDOT&PF ER response and repair: \$25M
- 58 damaged AKDOT&PF sites

<http://dot.alaska.gov/earthquake2018/>









Trucker Craig Maddex is now ... 'the Rock Maddex'



AKDOT&PF's Geotechnical Asset Management Program



- Overview Map
- Unstable Rock Slopes
- Unstable Soil Slopes
- Retaining Wall Assets
- Material Site Assets

Please click on the appropriate tab for detailed information in the asset-specific maps.

Rock Slopes

- GOOD
- FAIR
- POOR

Number of features

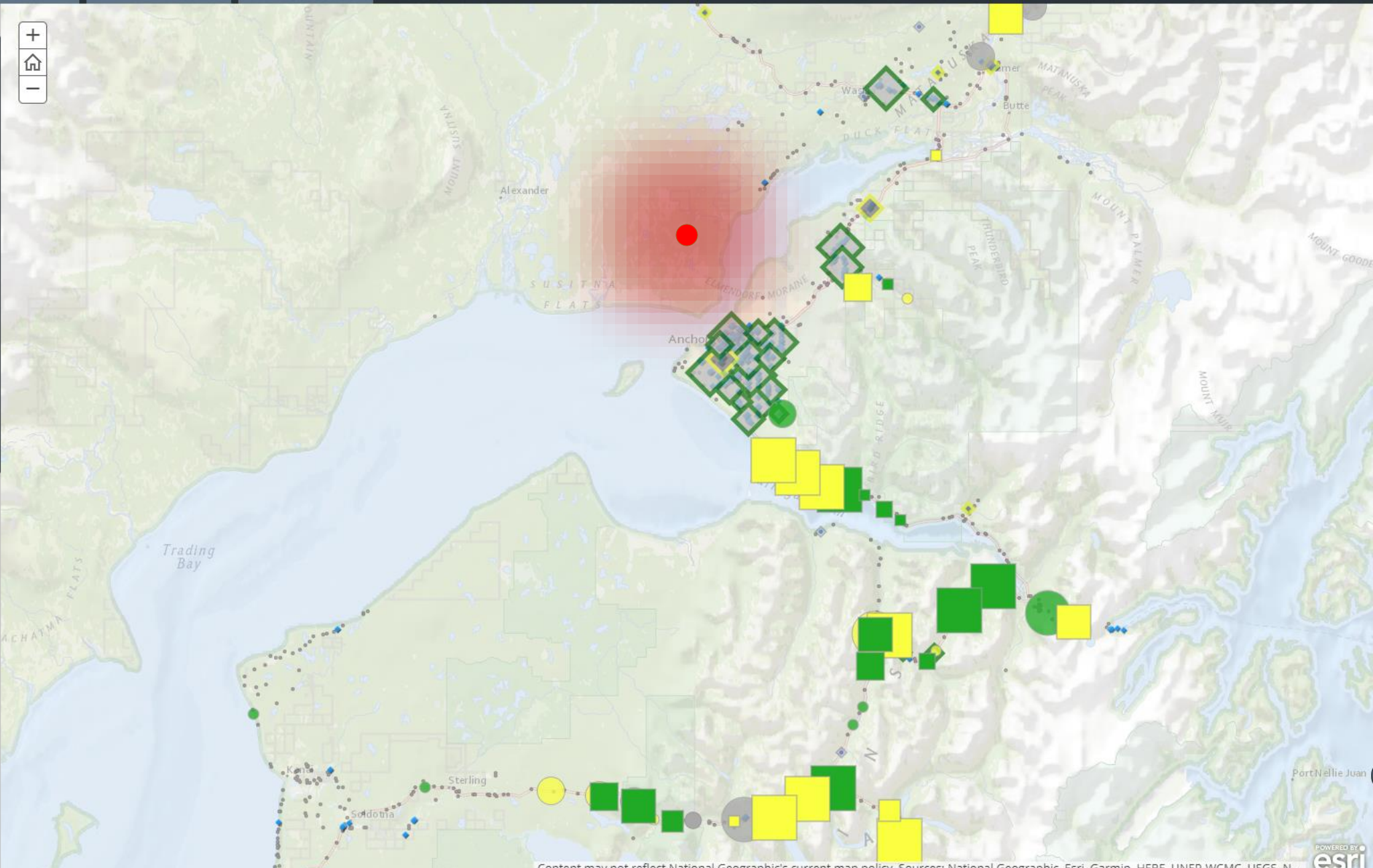
- > 7
- 5.5
- 4
- 2.5
- 1

Unstable Soil Slopes and Embankments

- GOOD
- FAIR
- POOR

Number of features

- > 3
- 2.5
- 2
- 1.5
- 1



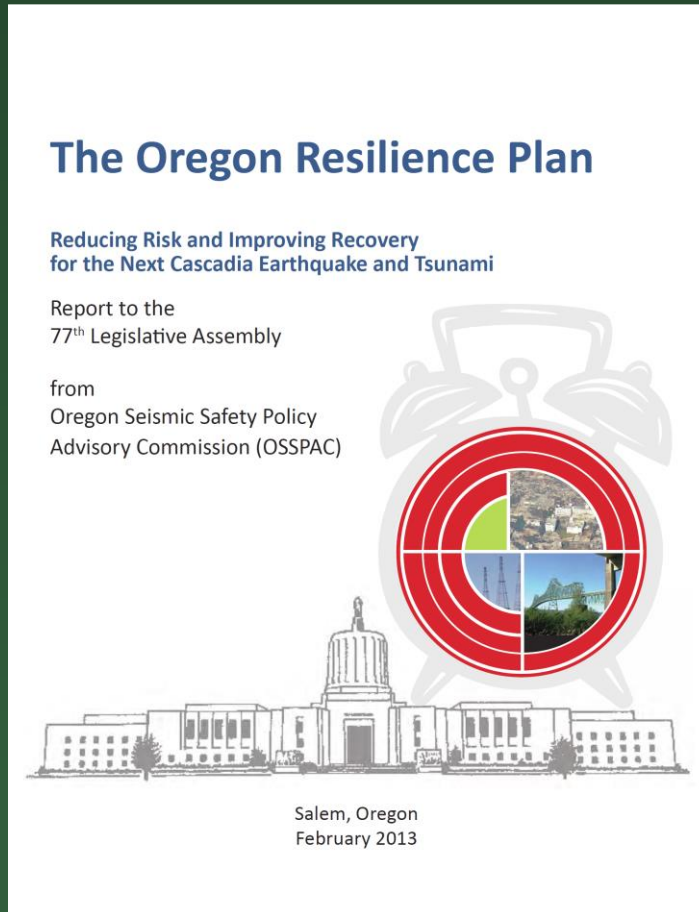
Geotechnical Assets within 100 miles

- 472 inventoried retaining walls
- 287 assessed retaining walls (quantify & understand damage)
- 285 assessed rock slopes
- 64 known unstable soil slopes
- 832 geotechnical related events in Maintenance Management System since 2005

5 DAYS TO RECOVER

ERFO funding for damaged assets with prior data?

Oregon Resilience Plan



- ODOT's Unstable Slope Program permitted quantification of Oregon's Resilience
 - 1,700 known unstable slopes on highway system between Willamette Valley and Oregon coast
- Loss Of Mobility After A Major Seismic Event: Landslides & Rockfalls

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- Kenneth Murphy, director FEMA Region X

Plan ID's following landslide issues

- Immediate injury or loss of life during the seismic event
- Immediate damage to the transportation infrastructure (resulting from numerous small to average-sized landslides and very large landslides)
- Hindrance to intermediate and long-term economic recovery
- Long-term highway closures due to landslides
- Utilities disruption
- Time-consuming mitigation of very large landslides that will impede repairs to bridges and other facilities

Take-aways

- Major climate and geologic events severely impact geotechnical assets...how will the highway system perform?
- Good condition assets generally expected to be more resilient
- Cannot plan for what hasn't been counted and assessed
- Prepare fully to avoid falling flat, know what you are getting into