

SEPTEMBER 9, 2021

# Puget Sound Maritime Disaster Resilience Virtual Workshop



*Pacific NorthWest  
Economic Region*



# Welcome!

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## Agenda:

9:00 am

Welcome, Introductions, & Opening Remarks

9:15 am

Brief history of the project, overview of workshop objectives, and review of work accomplished to date

9:30 am

Panel & Interactive Discussion on Earthquake & Tsunami Risk and likely impacts to transportation systems and supply chains in the Puget Sound Region

10:15 am

Panel & Interactive Discussion on the potential opportunities for the maritime sector to assist in the response and recovery phases of a disaster

11:00 am

Regional leadership on why this work is so important and their perspectives on the unique roles for the maritime sector in disaster planning, response and recovery

11:45 am

Closing discussion and next steps in the project & workshop series



# Welcome!

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## Organizations represented on the call today:

Argosy Cruises  
American Red Cross  
U.S. Customs & Border Patrol  
Cities of Bainbridge Island, Des Moines, Lacey, Olympia, Seattle, and Tacoma  
Sheriff's Offices of Clallam, Pierce, Skagit, Thurston, & Whatcom counties  
CNA  
Crowley Alaska Tankers & Crowley Shipping  
DHS Cybersecurity & Infrastructure Security (CISA)  
Washington Department of Ecology  
U.S. Department of Justice  
Eastlake HUB  
Edmonds Community College, Skagit Valley College  
Everett Auxiliary Communication Service  
Expeditors  
Federal Emergency Management Agency (FEMA)  
ILWU Local 19  
King, Kitsap, Pierce, San Juan, Snohomish, Thurston,

King County Metro Transit  
Marine Exchange of Puget Sound  
National Oceanic & Atmospheric Administration  
The Northwest Seaport Alliance  
Pacific Northwest National Laboratory  
Pacific Partners  
Perteet  
Ports of Bellingham, Bremerton, Olympia, Seattle,  
Office of U.S. Representative Rick Larsen  
Seattle Emergency Communications Hub  
Thurston Regional Planning Council  
T-Mobile  
Tote Alaska & Tote Maritime  
Transportation Security Administration (TSA)  
Union Pacific Railroad  
U.S. Coast Guard  
Washington Departments of Ecology, Transportation, & Emergency Management  
Washington State Ferry System  
Washington State Legislature



# Opening Remarks



Jason Biermann  
*Director*  
Snohomish County Emergency  
Management

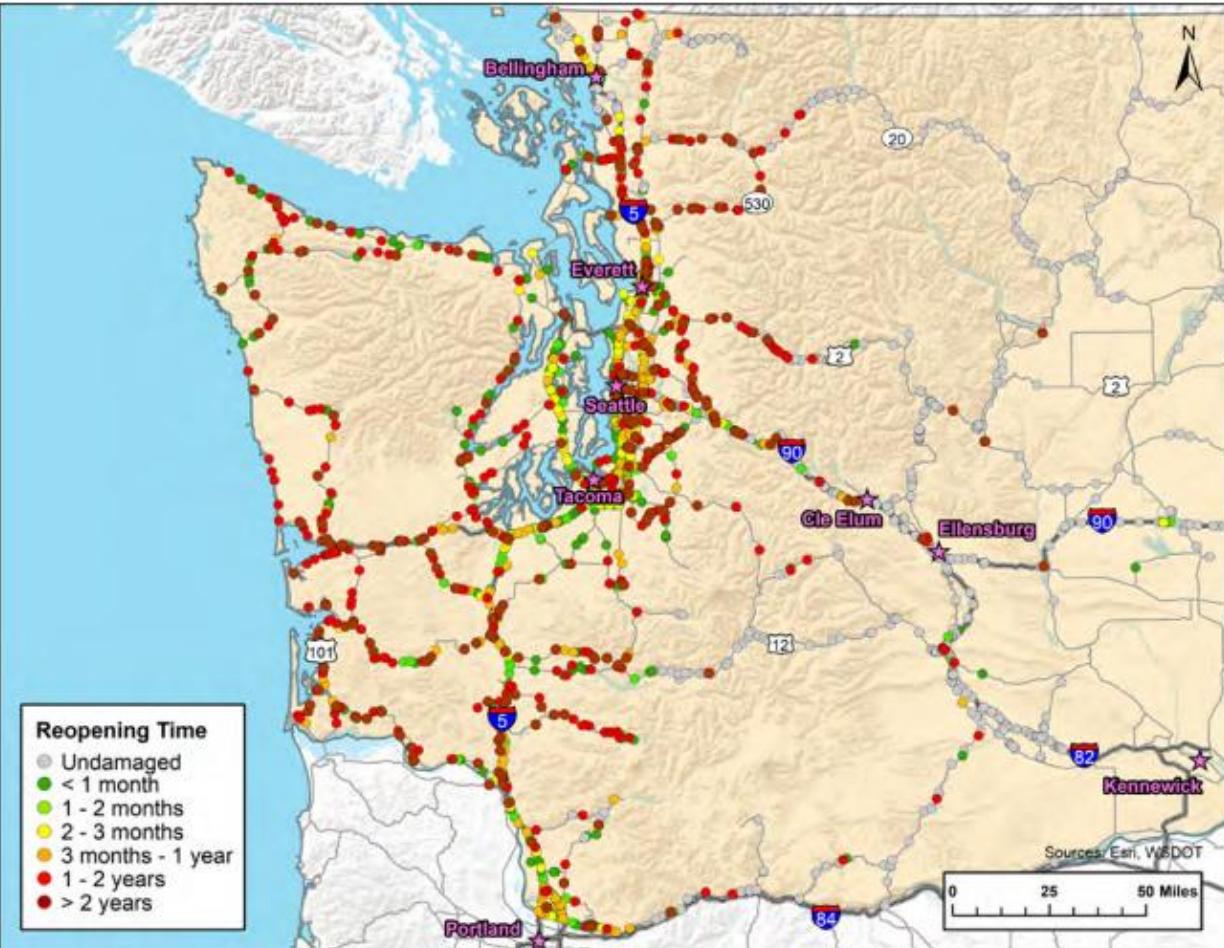


Brendan McCluskey  
*Director*  
King County Office of Emergency  
Management



# Project Purpose

The Federal Emergency Management Agency (FEMA) provided a Regional Catastrophic Preparedness Grant (RCPG) to Central Puget Sound partners to address the enormous risk the region faces from a catastrophic earthquake.



Bridge Seismic Screening Tool (BSST) Projected Reopening Times of Highway Bridges in Washington after the Cascadia Subduction Zone Scenario Earthquake

Purpose: Maximize the ability of the Maritime sector to assist in the disaster response and recovery from a catastrophic earthquake when road, rail, and air transportation may be disrupted for weeks, months, or perhaps, even years.

# Post-Earthquake Response Challenges

- Following a catastrophic earthquake, supplying the Puget Sound Region with life-sustaining commodities such as water and food will require a tremendous, coordinated effort.
- Current planning to supply Community Points of Distribution (CPODs) assumes that resupply will come via land routes over the Cascade Mountains from the east or by air.
- These delivery routes are not assured due to the significant potential for large landslides to block the few mountain passes, for bridges to collapse, for airfield runways and facilities to be significantly damaged, and for uncertain availability of aircraft.



In 2013, this span of Interstate 5 over the Skagit River in Mount Vernon, Washington collapsed after being struck by a semi truck. The long closure to freight resulted in far-reaching direct and indirect impacts to the Puget Sound Region.

Image courtesy U.S. Department of Transportation, Federal Highway Authority

# Maritime Resilience Opportunities

- One transportation asset that will remain functional is the Puget Sound's waterways.
- They provide a means to transport all manner of personnel, goods, and materiel that may be needed to respond to, recover from, and restore the region after a catastrophic earthquake.
- Planning assumes all land and air transportation infrastructure will be significantly damaged for months and possibly for years.



Boats that can be loaded and unloaded directly on shore may be useful for quickly resupplying communities across the Puget Sound.

Image courtesy Getty Images, Canva

# Project Deliverables

## Phase 1



Examine port area and regional capabilities, plans, and other resources that could be utilized during the response and recovery phases after a major catastrophic event.

## Phase 2



Utilize the data collected in Phase One to develop a regional Maritime Resilience Framework to coordinate efforts.



MARINE EXCHANGE



THURSTON COUNTY  
WASHINGTON  
SINCE 1852



Pacific Northwest  
Economic Region



# Initial Project Partners

The following organizations have committed to partnering on this project:

- Black Ball Ferry
- City of Seattle
- Island County
- King County
- Marine Exchange of Puget Sound
- NW Healthcare Response Network
- Pacific Merchant Shipping Assoc.
- Port of Anchorage
- Port of Everett
- Port of Tacoma
- Puget Sound Pilots
- Snohomish County
- Skagit County
- WA Emergency Management Div.

# Project Background

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Amy Lucas  
*Community Resilience Program Manager*  
Snohomish County Emergency  
Management



Angie De Groot  
*Senior Research Scientist*  
CNA

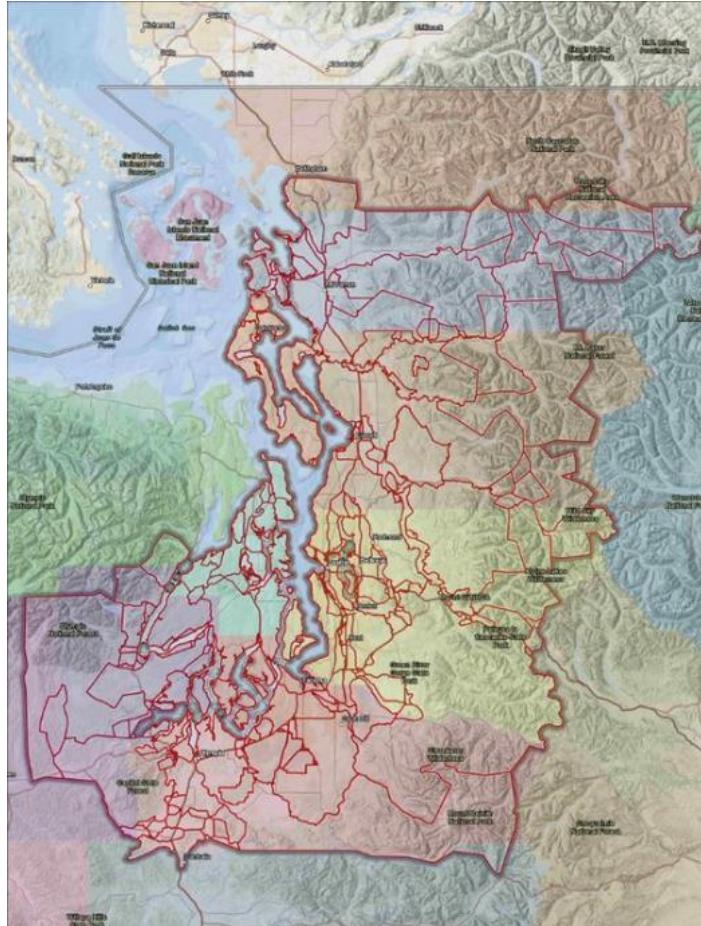


# Regional Catastrophic Preparedness Grant

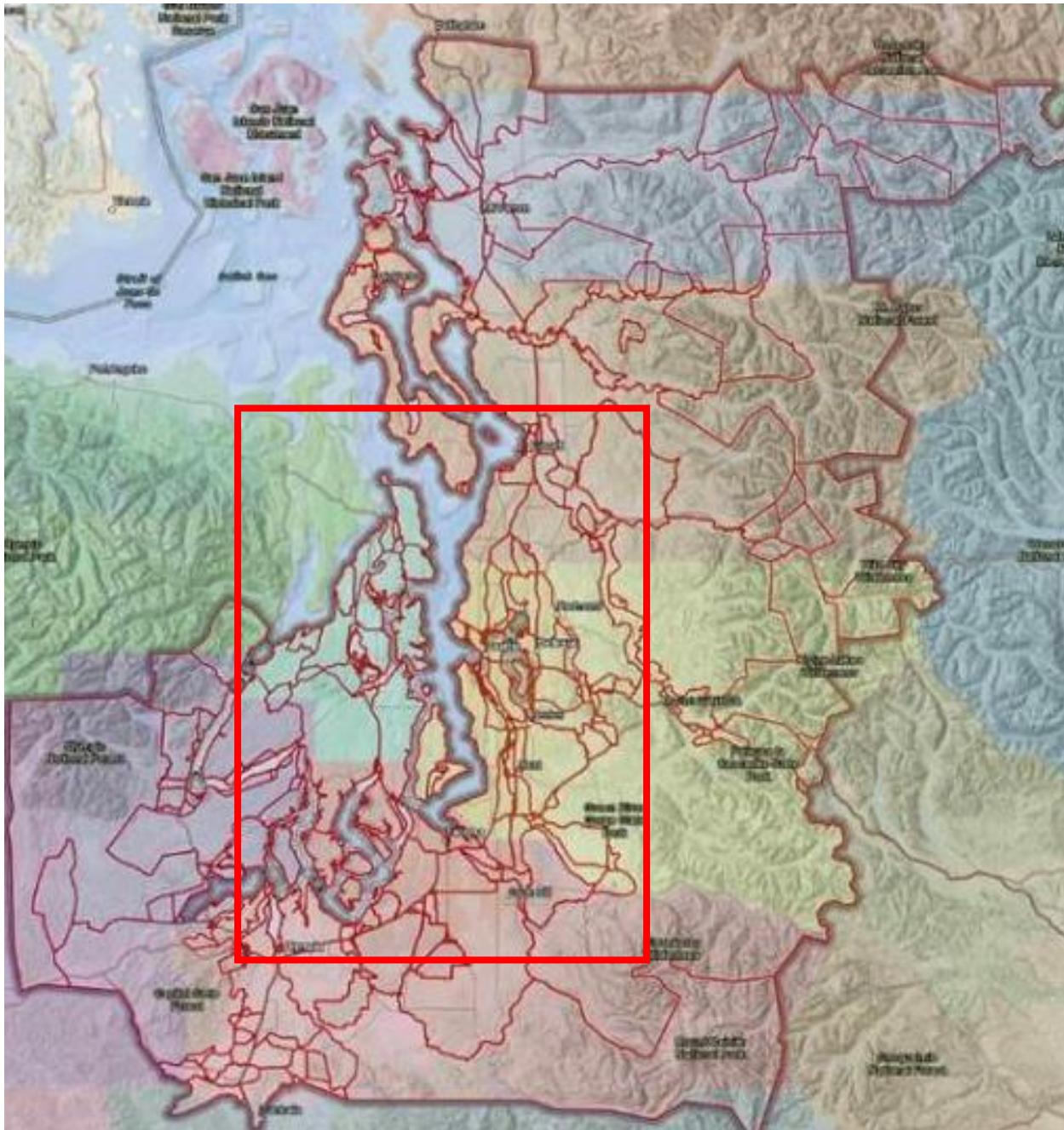
- RCPGP Grant program
  - Supports Communities and First Responders
  - Build, sustain and improve preparedness capability
    - Hazards
    - Threats
  - Implementation of the National Preparedness System
    - Supports core capabilities by providing resources to close known gaps
      - Housing and Logistics
      - Supply Chain Management
  - Encourages building on existing regional efforts to find innovative solutions

# RCPGP Hazard Scenario

- Increase capability level within the Food, Water, and Sheltering Community Lifeline



- Cascadia Subduction Zone M 9.0
- Worst Case Scenario
- Complete infrastructure damage
- Population islands



# FY 2019 RCPGP Outcome

- Increase capability level within the Food, Water, and Sheltering Community Lifeline



- Rapidly Assess Population mobility post event
- Evaluate needs for food and water distribution post earthquake
- Prioritize and activate viable Community Points of Distribution (CPOD) sites based on need and population locations

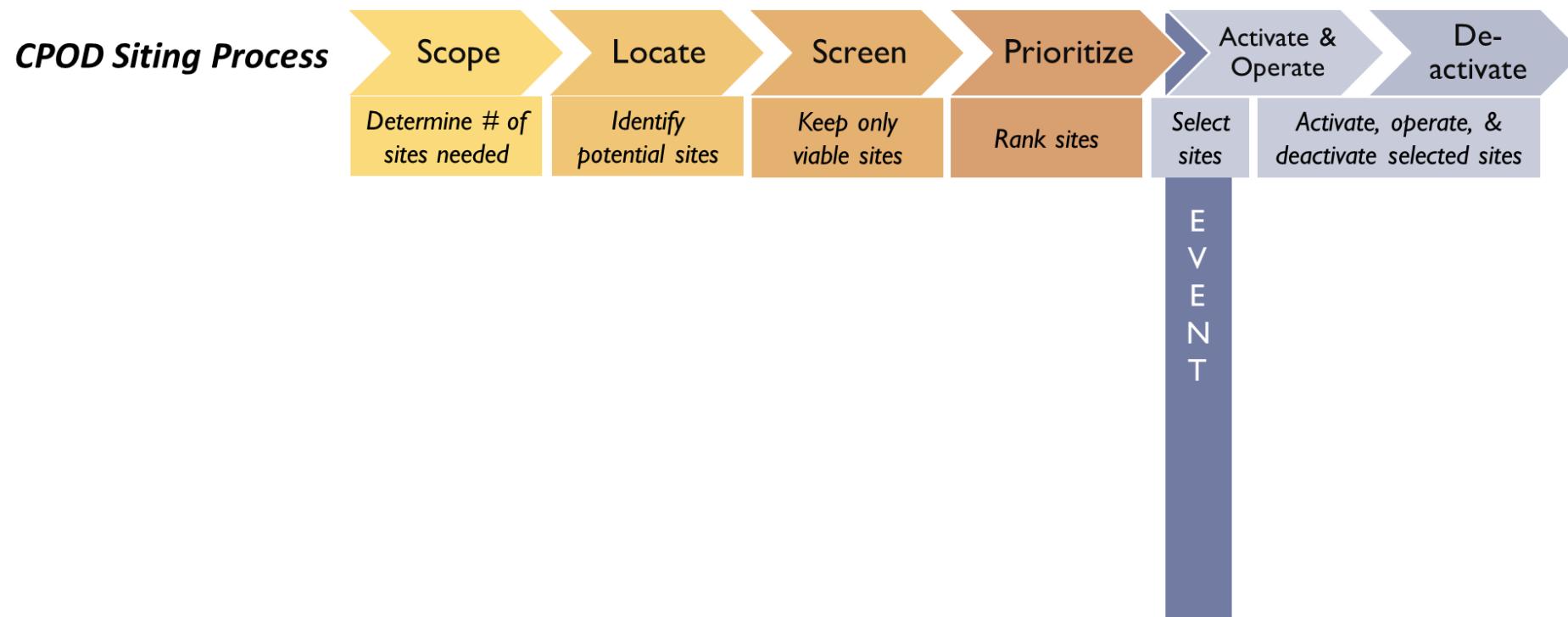


- Rapidly Assess Critical Infrastructure effects post catastrophic event
- Evaluate priority routes for debris clearing, quick repair and temporary connections
- Identify population islands that will need long term CPOD assistance

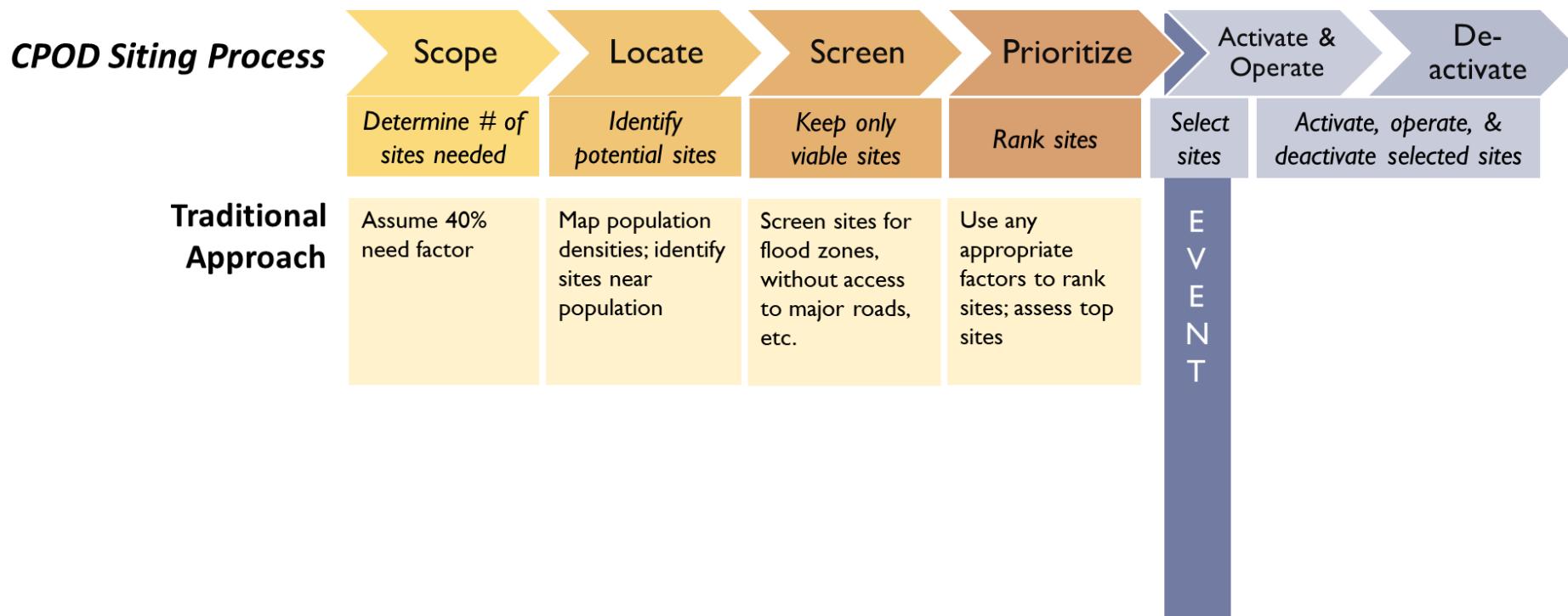


- Rapidly Assess Critical Transportation effects post catastrophic event
- Evaluate priority routes and temporary connections for resupply of CPOD sites and private sector retailers
- Reduce resource gaps for food and water by engaging in communication throughout regional public and private sector partnerships

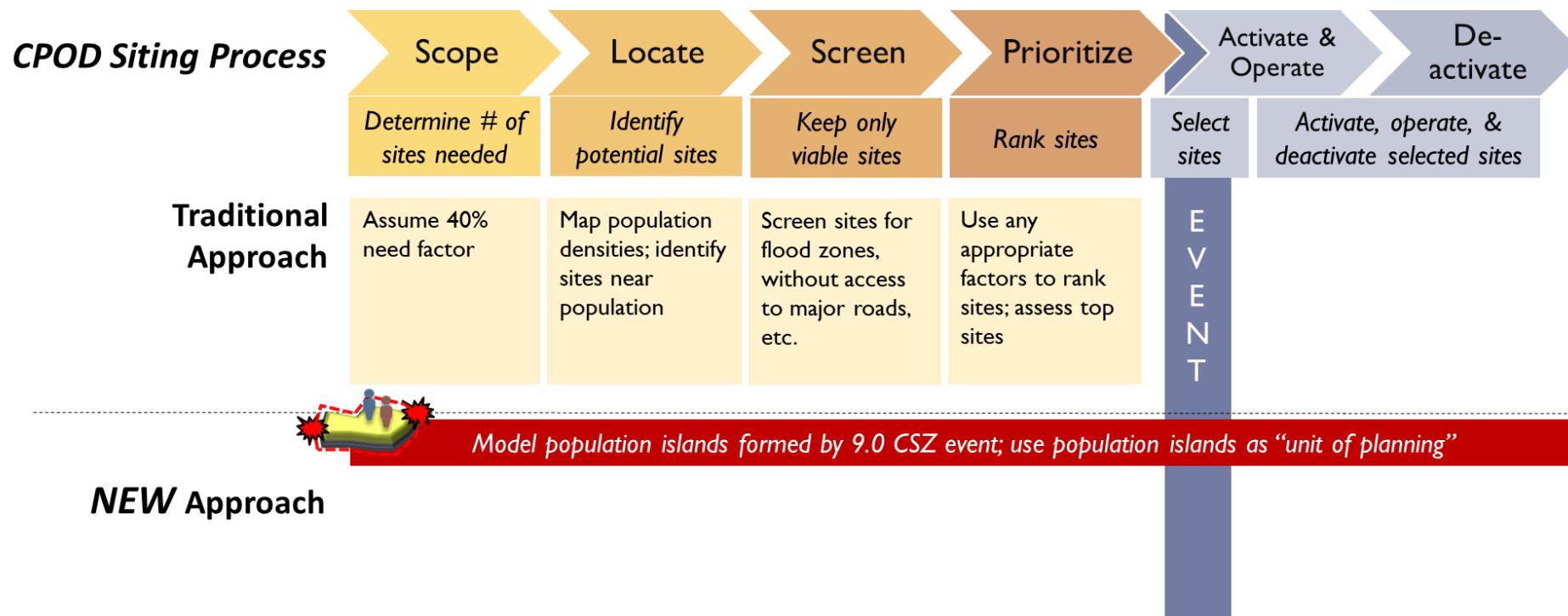
# CPOD Siting: Traditional vs. New Approach



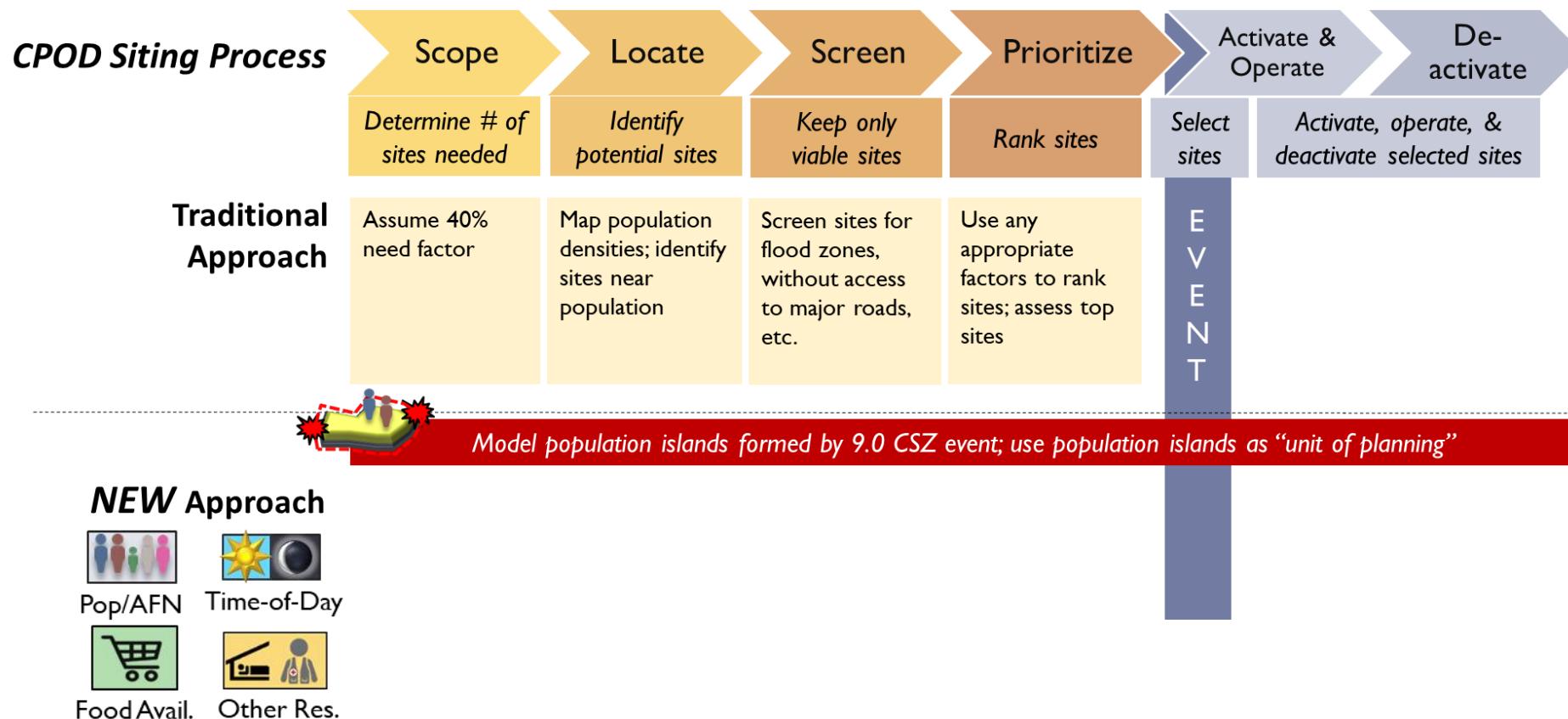
# CPOD Siting: Traditional vs. New Approach



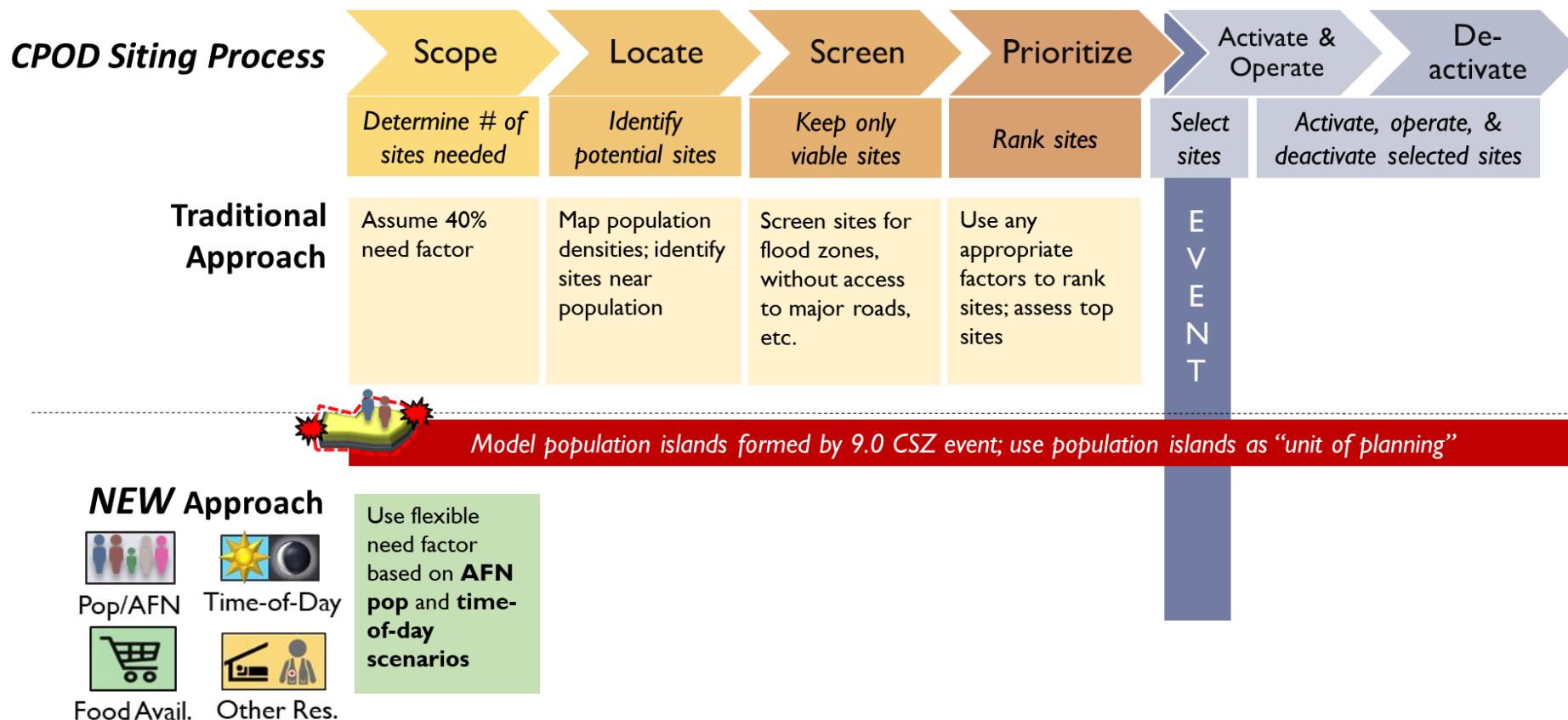
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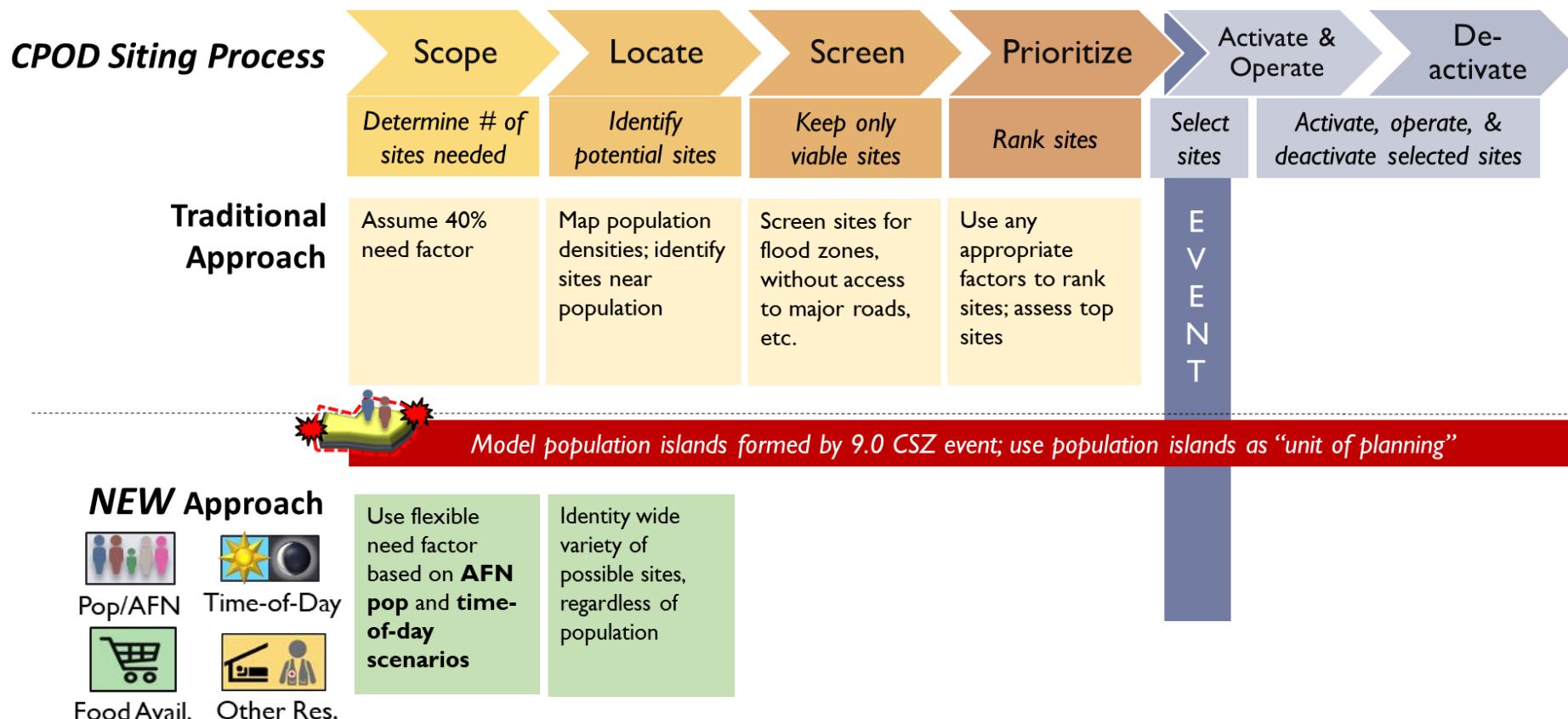
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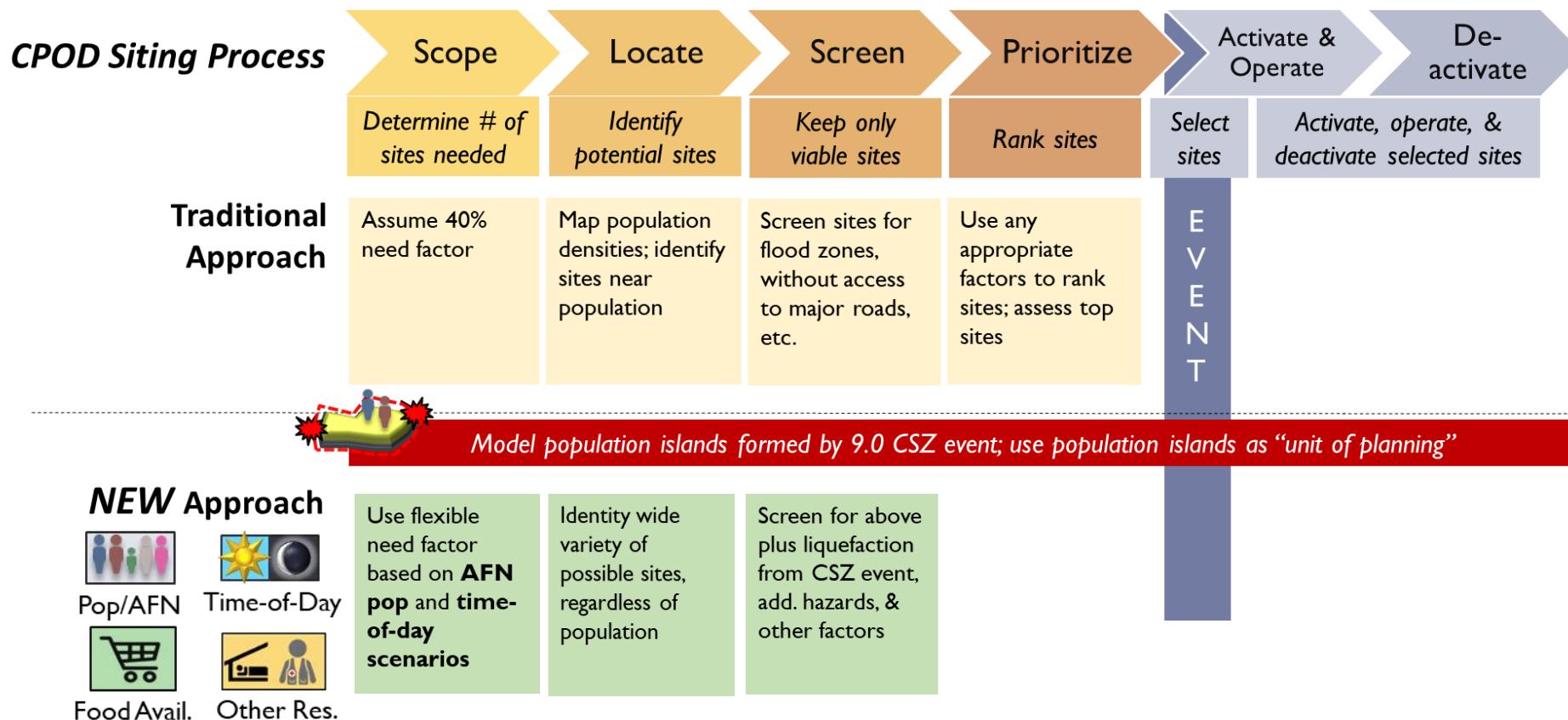
# CPOD Siting: Traditional vs. New Approach



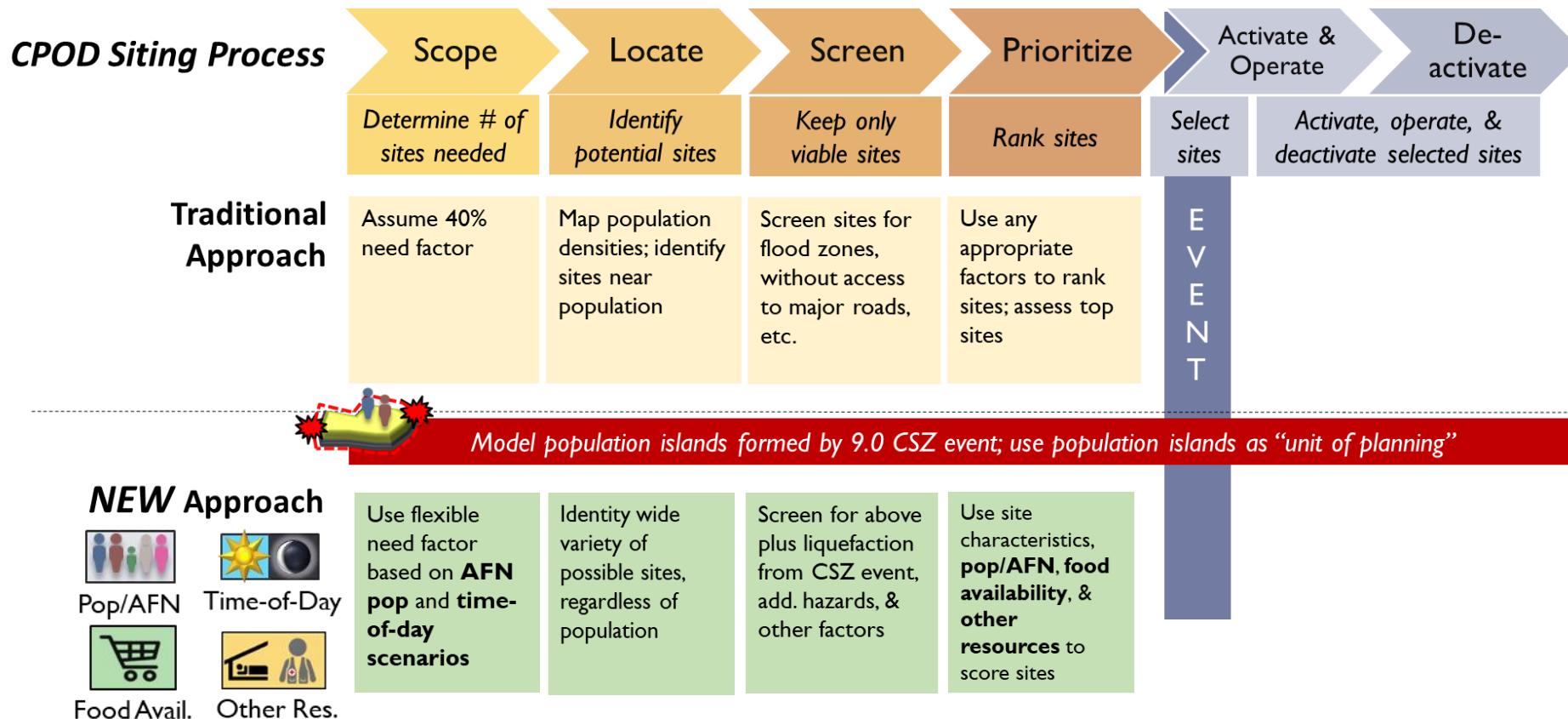
# CPOD Siting: Traditional vs. New Approach



# CPOD Siting: Traditional vs. New Approach



# CPOD Siting: Traditional vs. New Approach





Prioritize

SC	Site Characteristics
PA	Population/AFN
FA	Food Availability
OR	Other Resources

# Prioritization Indicators

ID	Name
SCI	Proximity to Major Transportation Routes
SC2	Usable Site Area
SC3	Site Ownership/Usage
SC4	Proximity to Public Transit
SC5	On-Site Storage
PA1	Total Social Vulnerability Index (SVI) Score
PA2	Population Within 2 Miles
PA3	SVI Household Composition Score
PA4	SVI Minority Status and Language Score
PA5	Population Without Vehicle Access
PA6	Population in Close Proximity

ID	Name
FA1	Grocery Stores in Neighborhood
FA2	Proximity to Emergency Water Distribution
FA3	Proximity to Community Food Aid
FA4	Food Insecure Population
FA5	Nearest Grocery Store
OR1	Proximity to Ad-Hoc Shelter Space
OR2	Nearest Air/Maritime Transportation
OR3	Proximity to Debris Clearing/Emergency Route
OR4	Proximity to Public Fleet Vehicle Locations
OR5	Proximity to Social Service and Other Resource Distribution Locations

# Panel: Earthquake & Tsunami Risk

Moderated by:



Maximilian Dixon  
*Hazards and Outreach  
Program Supervisor  
Washington Emergency  
Management Division*



Daniel Eungard  
*Subsurface Lead, Tsunami  
Hazards Geologist  
Washington Geological  
Survey*



Bill Steele  
*Director of Communications &  
Outreach  
Pacific Northwest Seismic  
Network*



# **CSZ Earthquake and**

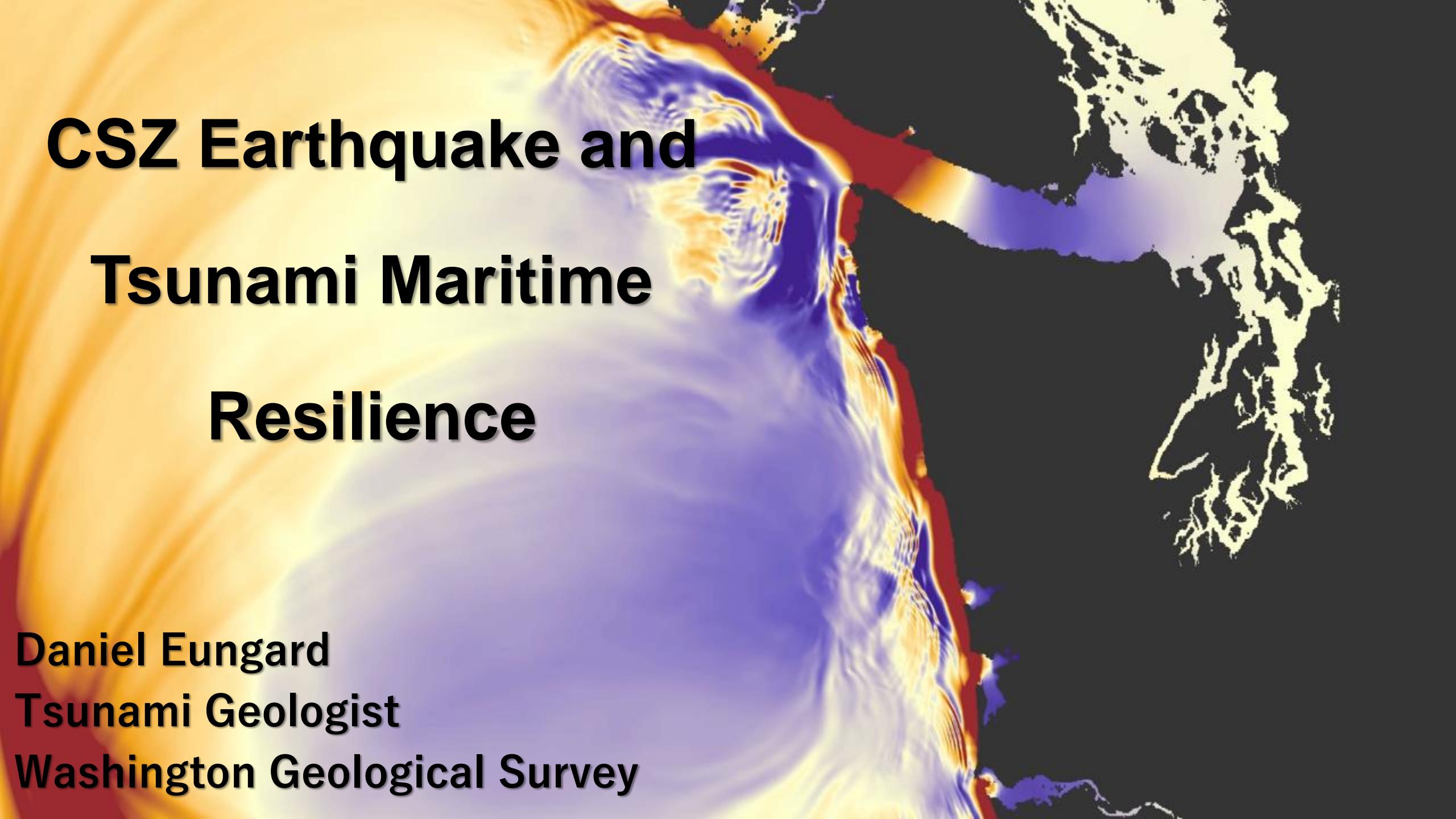
## **Tsunami Maritime**

### **Resilience**

**Daniel Eungard**

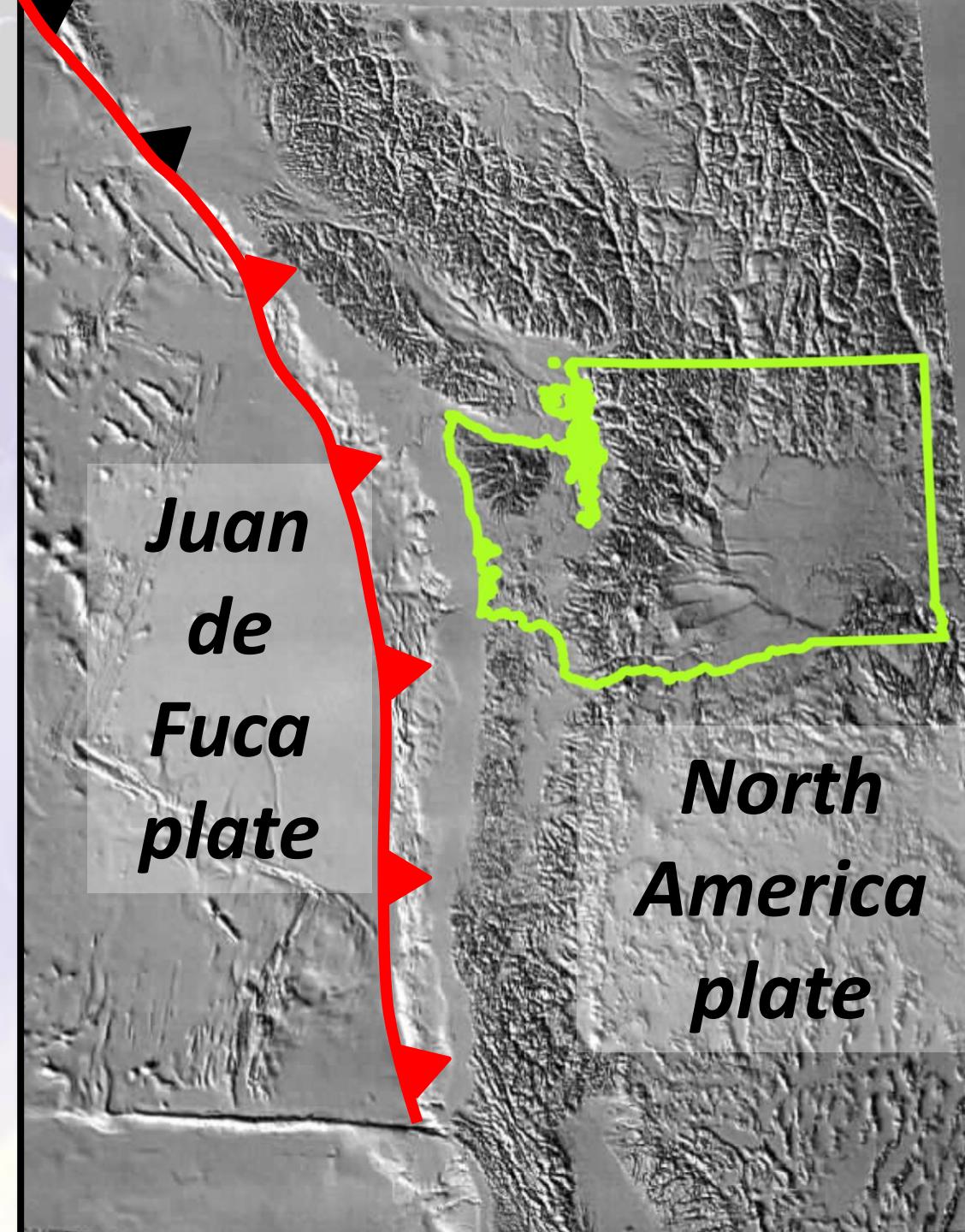
**Tsunami Geologist**

**Washington Geological Survey**



# Cascadia Subduction Zone

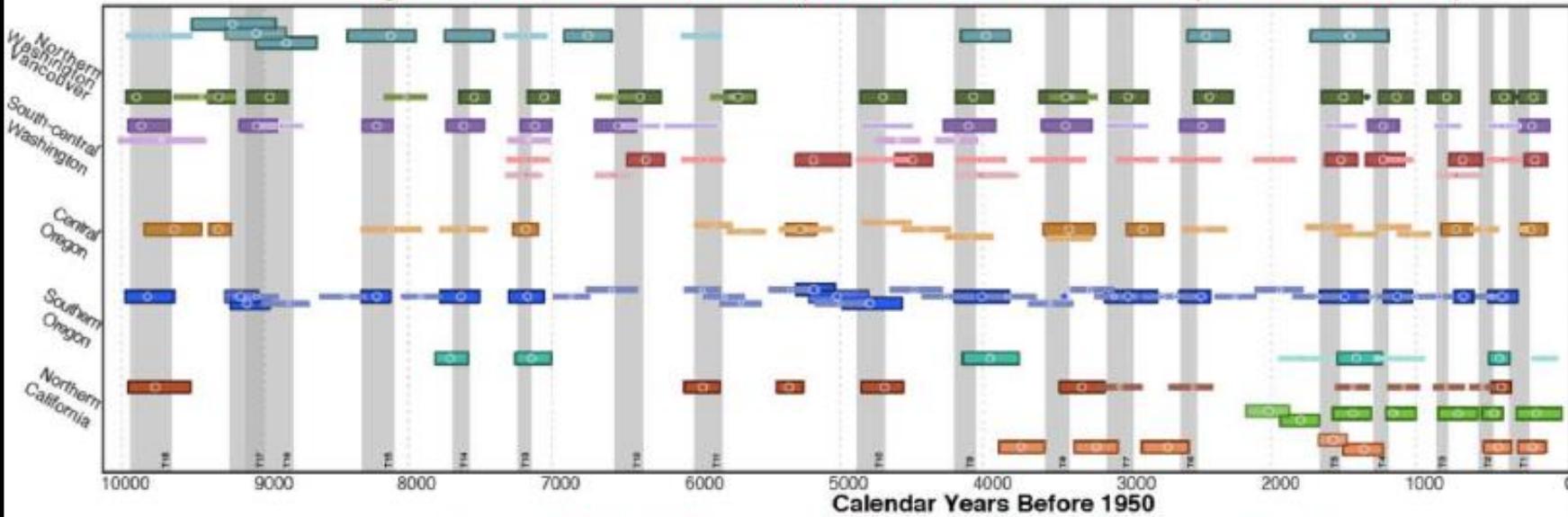
- 700 miles long (1,130 km)
- Breaks 300 – 600 years
- Last great rupture in 1700 (321 years ago)
- 15-25% chance within next 50 years
- Magnitude 8.0-9.0+
- Shaking felt for 3–6 minutes
- Earthquake followed by a **major tsunami hitting WA's coast in 10-250 min**
- Many large aftershocks will follow main quake and thousands of aftershocks for many years



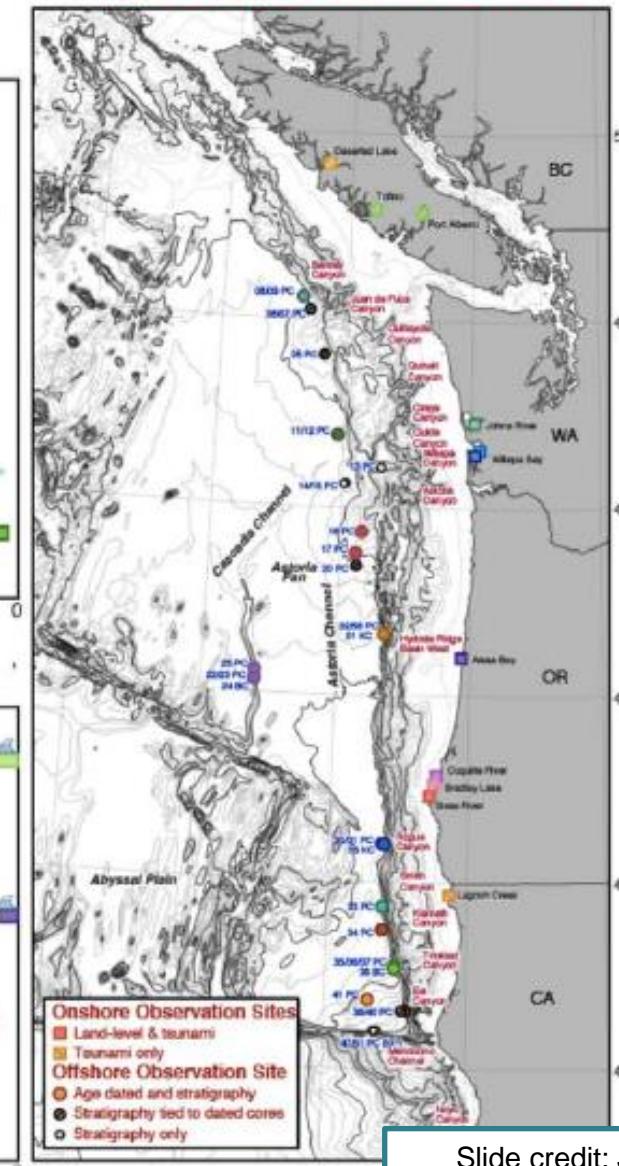
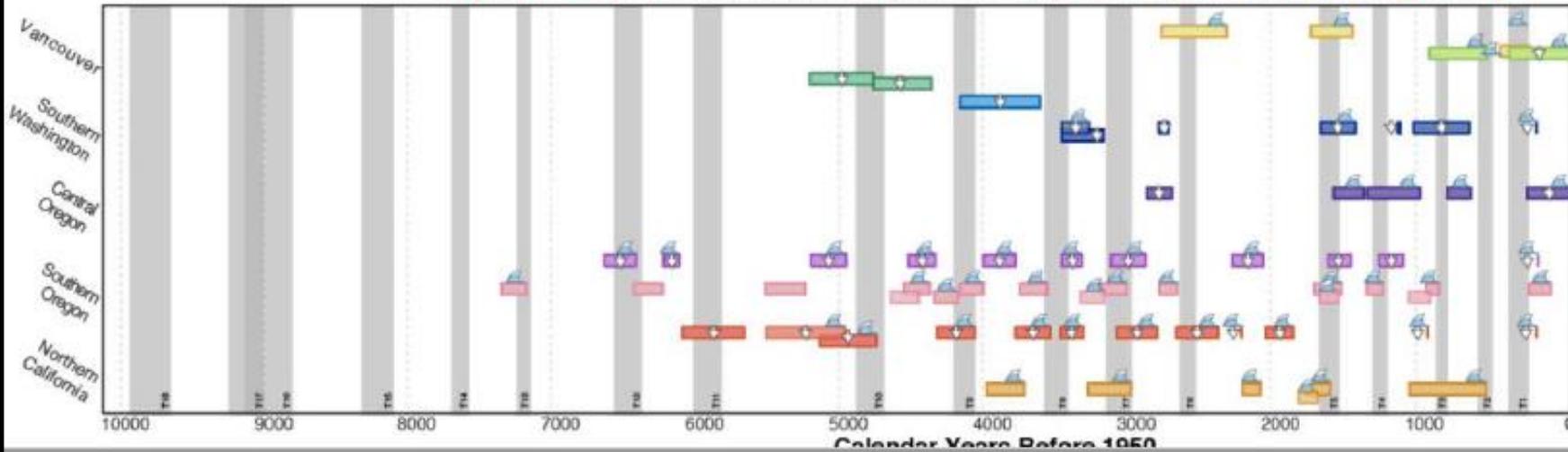
# CSZ: Geologic Records

## Geologic Study Sites

Ages of Offshore Observations (submarine landslide flow deposits = 'turbidites')



Ages of Onshore Observations (tsunami deposits ▲, land-level changes □)



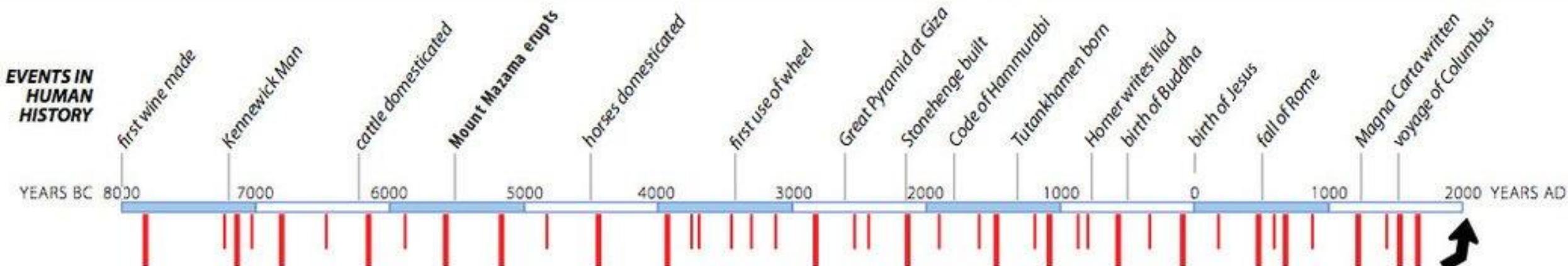
Slide credit: Joan Gomberg, USGS

# Cascadia Earthquakes

41 earthquakes in the last 10,000 years according to turbidite evidence.



## CASCADIA EARTHQUAKE TIME LINE



Earthquake of Magnitude 9+ (fault breaks along entire subduction zone)

Earthquake of Magnitude 8+ (fault breaks along southern half of subduction zone)

Goldfinger et al., 2012,  
2017



# Tsunami wave simulation

for Washington State  
from a hypothetical  
magnitude 9.0  
earthquake  
(L1) scenario  
on the Cascadia  
subduction zone



WASHINGTON STATE DEPT OF  
**NATURAL  
RESOURCES**  
WASHINGTON  
GEOLOGICAL SURVEY



National  
Tsunami  
Hazard  
Mitigation  
Program



# Learning From History

- 2011 Japan Earthquake (Magnitude 9.1) and tsunami (125 feet high in places)
- Approximately **20,000 casualties** and close to 500,000 people were forced to evacuate.
- The total economic cost could reach up to \$360 billion, making it the costliest natural disaster in world history.
- The 2004 magnitude 9.1 Banda Aceh earthquake and tsunami in Sumatra killed more than **227,000 people**



Photo credit unknown

# Impacts from Earthquakes

- Ground Shaking
  - Damage to infrastructure, chemical/biological spills
- Liquefaction
  - Most all ports are built on mud and fill
- Soil Settlement (unaffiliated with liquefaction)
  - Loss of pore water pressure in soils, compaction



*Ground Settlement at Port of Sendai*  
Photo Credit: ASCE



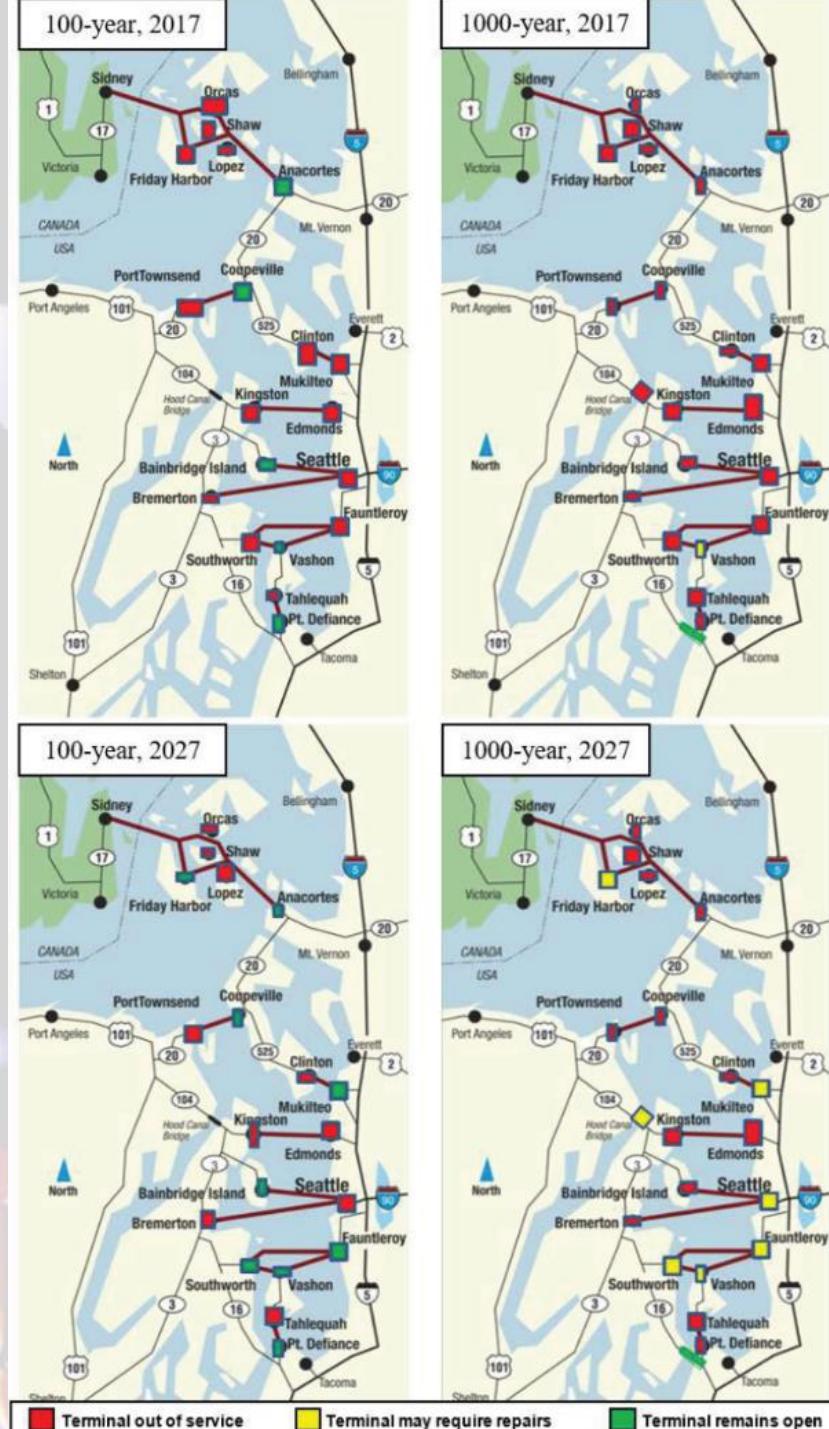
*Refinery Fire in Chiba Prefecture*  
Photo Credit: European Pressphoto Agency



*Tsunami shifted containers*  
Photo Credit: U.S. Marine Corps Photo  
by Cpl. Megan Angel/Released

# Overall Seismic Performance and Post-disaster Operability of Washington State Ferries (RRAP)

- 100 year and 1000 year earthquake events
- Present day versus planned seismic upgrades (expected completion in 2027)
- A 100-year earthquake can still cause extensive disruptions to ferry terminals
- For Cascadia, the 1000 year event is equivalent to the M1 scenario



# Maritime Tsunami Hazards

- **Strong and unpredictable currents**, especially where there are narrow entrances, narrow openings, and other narrow parts of harbor
- Sudden **water-level fluctuations** where docks and boats:
  - Hit bottom (grounded) as water level drops
  - Could overtop piles as water level rises
  - Buoyancy of large ships, pushed on top of docks
- **Eddies/whirlpools** causing boats to lose control
- **Tsunami bores and amplified waves** resulting in swamping of boats and damage to docks
- **Drag** on deep draught vessels causing damaging forces to the docks they are moored to
- **Debris in the water**; collision with boats, docks, and harbor buildings
- **Scour and sedimentation** can affect harbor protection measures and shipping channels, respectively
- **Dangerous tsunami conditions can last tens of hours** after first wave arrival, causing problems for inexperienced and unprepared boaters who take their boats offshore
- **Contaminated water/sediment and other environmental hazards** causing delays in recovery
- **Poor decision making** by boaters and/or port/harbor personnel

# Past Observations of Tsunami Scour Damage to Infrastructure

## Sumatra-Andaman 2004 Tsunami:

- Observed scour depths were **less than 2-3 meters**, located **within 200 meters** of the shoreline, and at **less than half the maximum inundation distance**.
  - Scour potential based on **runup height, inundation distance, and soil type**.
- Critical scour generally occurs during **drawdown flows**
- Pronounced scour damage in **areas of relief** near structures
  - Slopes, drainage structures, and abutments
- Increased scour resistance (if any from vegetative cover or soil type) was not apparent
- Several local piers and jetties were completely destroyed (combinations of ground shaking, scour, and subsidence)
- Foundation failures from runup heights as low as 2 meters** to many lightly reinforced pilings and pedestal foundations.
  - Elevated structures on well reinforced concrete pilings generally fared better than shallow footings.



Over 300 instances of scour were photographed in the Great Sumatra-Andaman event  
(Photo No. RS-3, EERI / FEMA 2006 Professional Fellowship Report)

# Tsunami Impact



## M9 Cascadia tsunami wave arrival

Abreviation	Location	Approximate First Wave Arrival	Approximate Maximum Offshore Amplitude (ft)
WAA	Waatch	15 min	29.5 prelim
NEA	Neah Bay	20 min	21 prelim
PGL	Port Angeles	1 hr	20
FHA	Friday Harbor	1 hr 35 min	8.5*
EAS	Eastsound	1 hr 55 min	17*
BLA	Blaine	2 hr 10 min	9.5
CPO	Cherry Point	2 hr	7
BLM	Bellingham	2 hr 15 min	13
ACT	Anacortes	1 hr 45 min	8.5
LCN	La Conner	2 hr 5 min	2
OAK	Oak Harbor	2 hr 45 min	6.5
WID	Whidbey Island	1 hr 30 min	16
STA	Stanwood	2 hr 30 min	5.5
PTW	Port Townsend	1 hr 30 min	18
EVT	Everett	1 hr 30 min	3
SEA	Seattle	2 hr 20 min	3.5
POT	Port of Tacoma	2 hr 35 min	9
GIG	Gig Harbor	2 hr 40 min	8
NSQ	Nisqually	3 hr 10 min	2
OLY	Olympia	4 hr 15 min	4.5
SLT	Shelton	4 hr 40 min	2.5
HOD	Hood Sport	2 hr 50 min	6
LYC	Lynch Cove	3 hr 5 min	12
BRE	Bremerton	2 hr 40 min	2.5
BNG	Bangor	2 hr 10 min	9
LPH	La Push	10 min	41 prelim
HOH	Hoh	20 min	71 prelim
QEE	Queets	20 min	40 prelim
TAH	Taholah	20 min	37.5 prelim
MCL	Moclips	20 min	44.5 prelim
ABD	Aberdeen	1 hr	3*
WPW	Westport	25 min	40*
TOK	Toke Point	30 min	5.5*
SBD	South Bend	55 min	7*
LBE	Long Beach	15 min	36.5*
SKW	Skamokawa	1 hr 30 min	5*
OWB	OR / WA border	15 min	16.5*

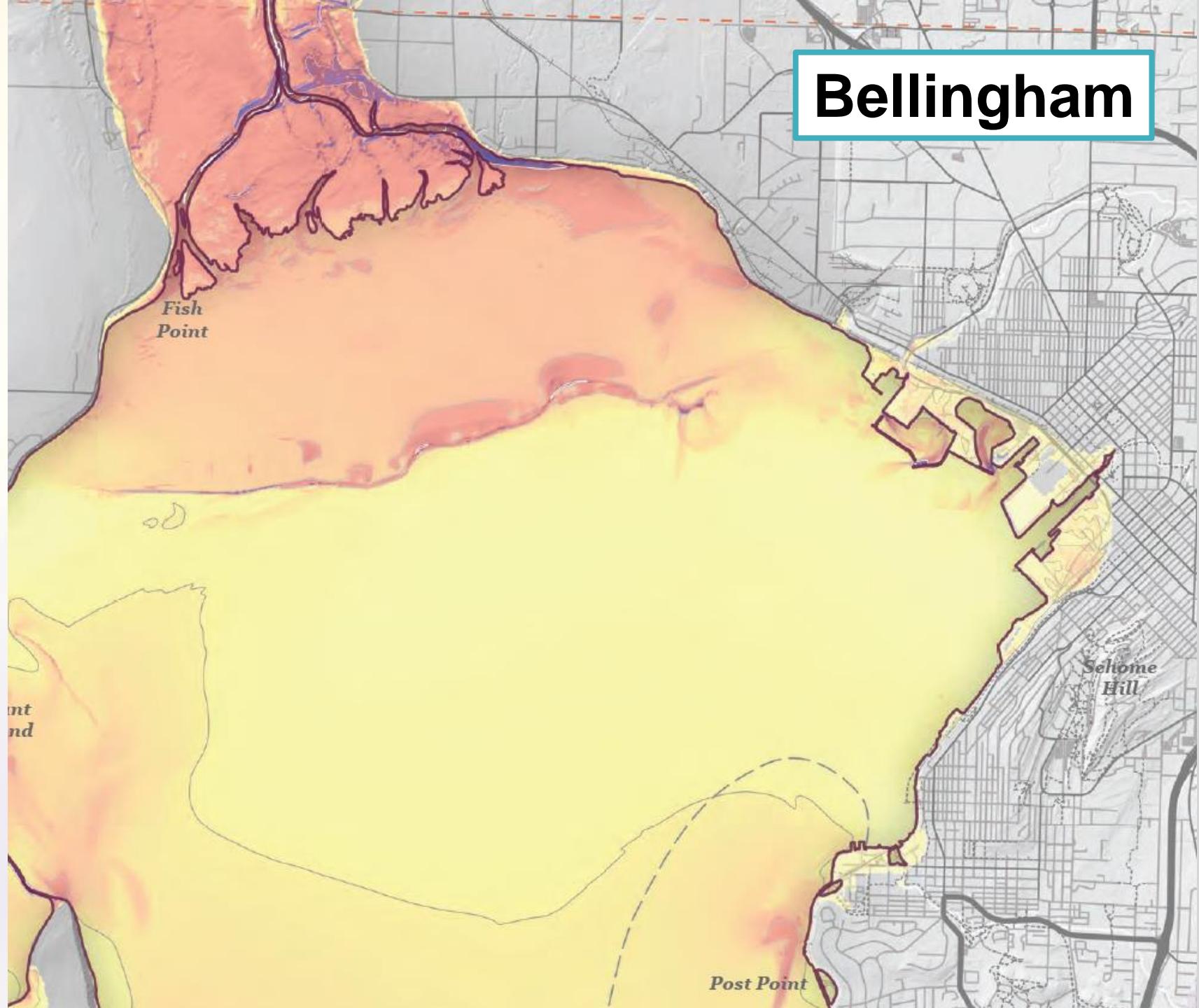
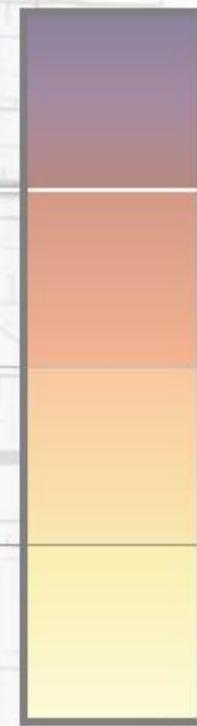
\* Modeled with the pre-modified L1 (not extended) scenario



# Bellingham

## MAP SYMBOLS

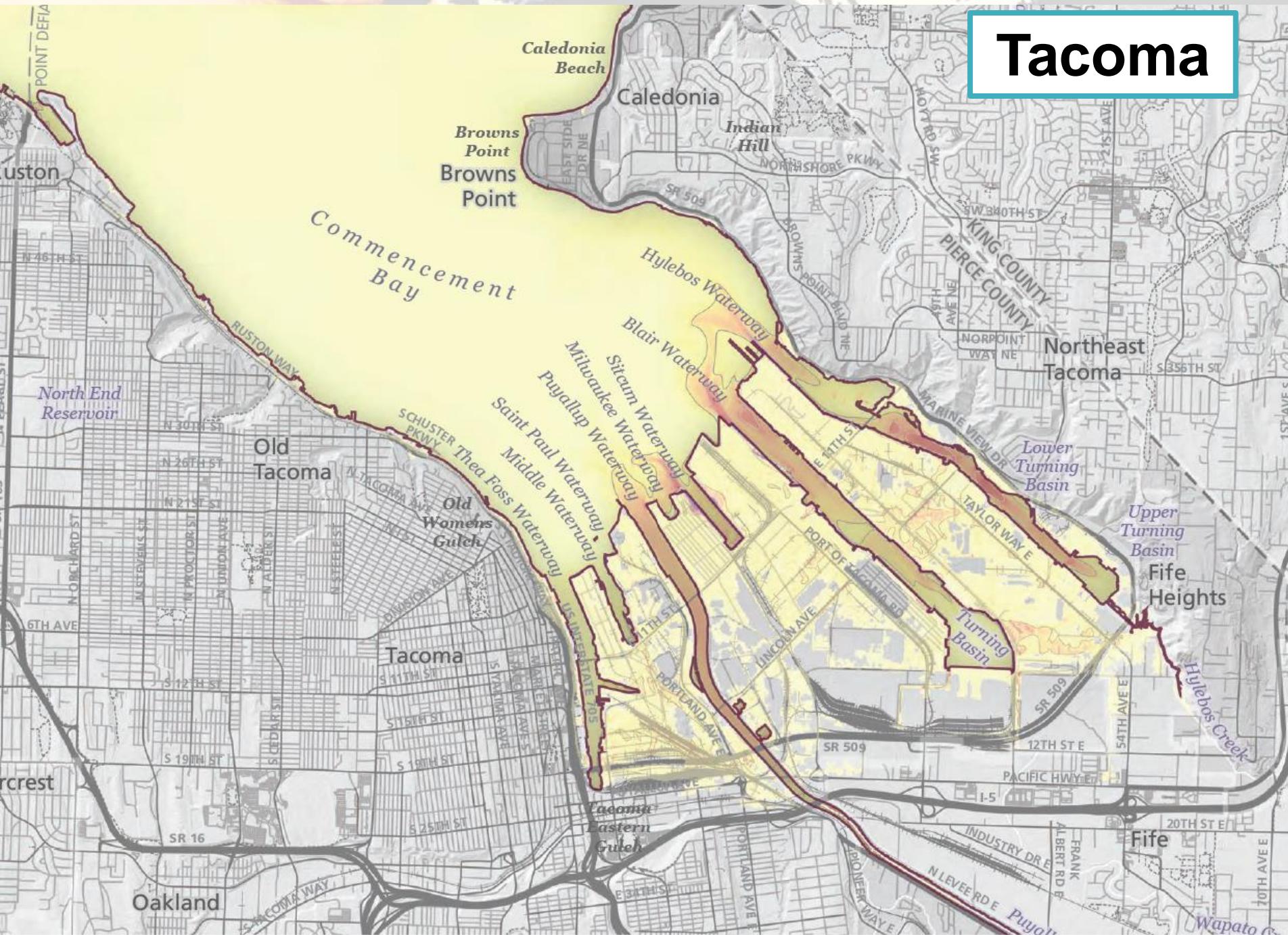
Modeled maximum current speed (knots)



# Tacoma

## MAP SYMBOLS

Modeled maximum current speed (knots)



# Tsunami Maritime Response and Mitigation Strategy

- High resolution models
- Maritime specific focus
- Additional products not found elsewhere

## Tsunami Maritime Response and Mitigation Strategy - Port of Bellingham

Bellingham, Washington



# Tsunami Maritime Response and Mitigation Strategy

- High resolution models
- Maritime specific focus
- Additional products not found elsewhere

Modeled Current Speeds for a CSZ Tsunami Event in Bellingham

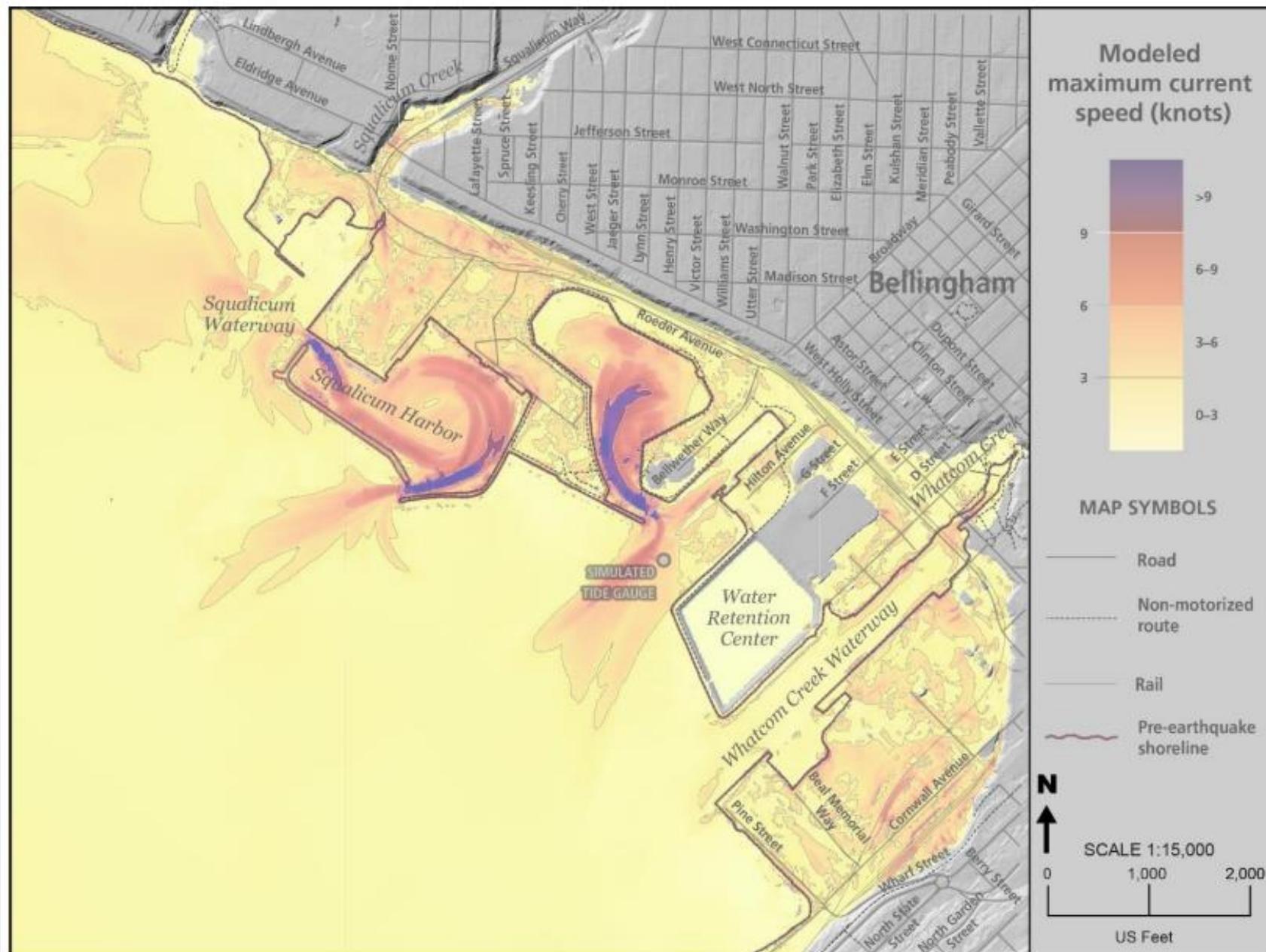


Figure 18: Modeled current velocity from a tsunami generated by the Cascadia Subduction Zone (CSZ) L1 scenario in Bellingham.

# Tsunami Maritime Response and Mitigation Strategy

- High resolution models
- Maritime specific focus
- Additional products not found elsewhere

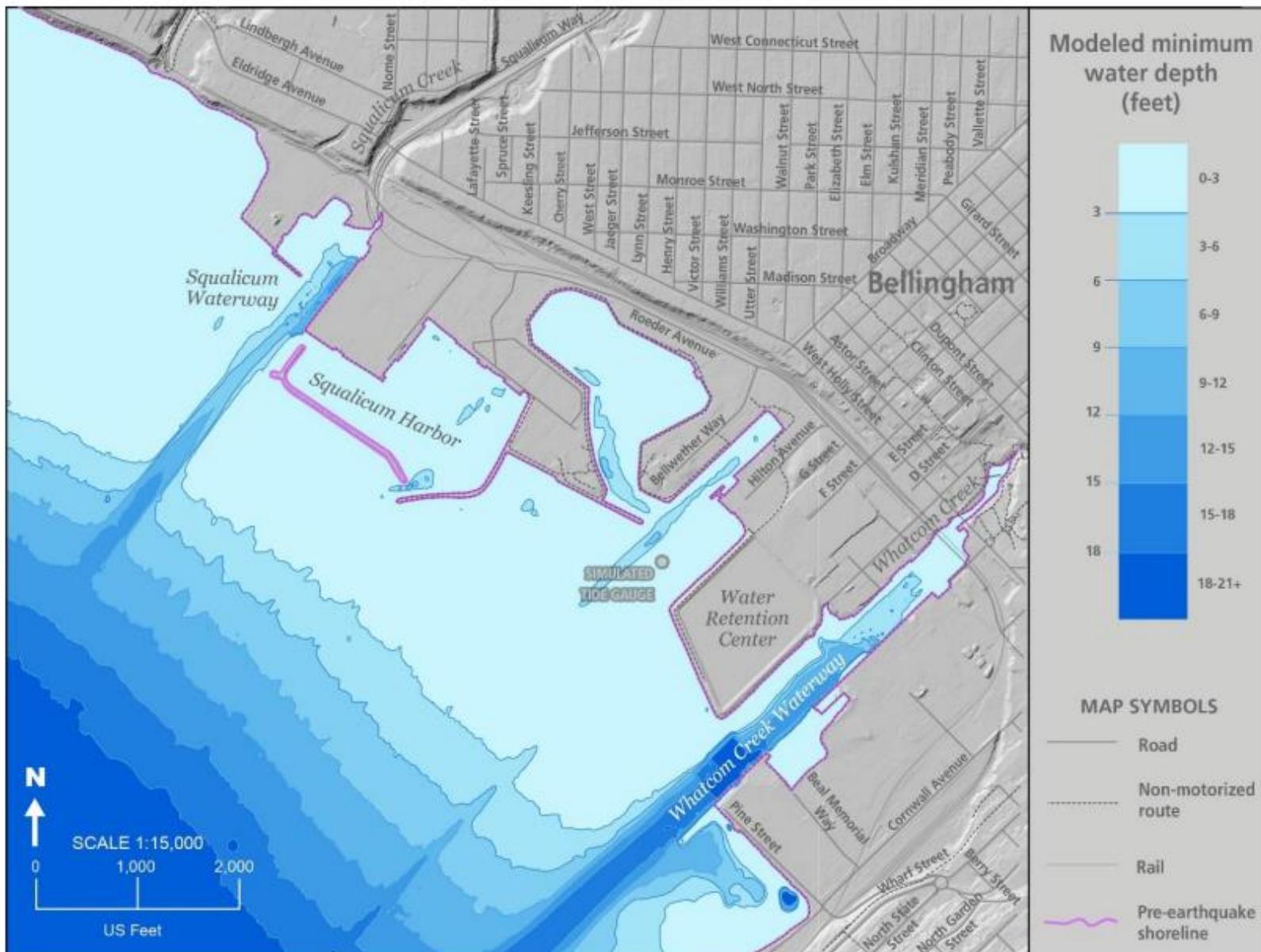


Figure 10: Modeled minimum water depth from a tsunami generated by the Cascadia subduction zone (CSZ) L1 scenario in Bellingham. Each colored zone has a 3-foot water depth interval. In the zone closest to land, water depth drops to 3 feet or less. Refer to the designated tide gauge plots to see the relative timing of each wave drawdown

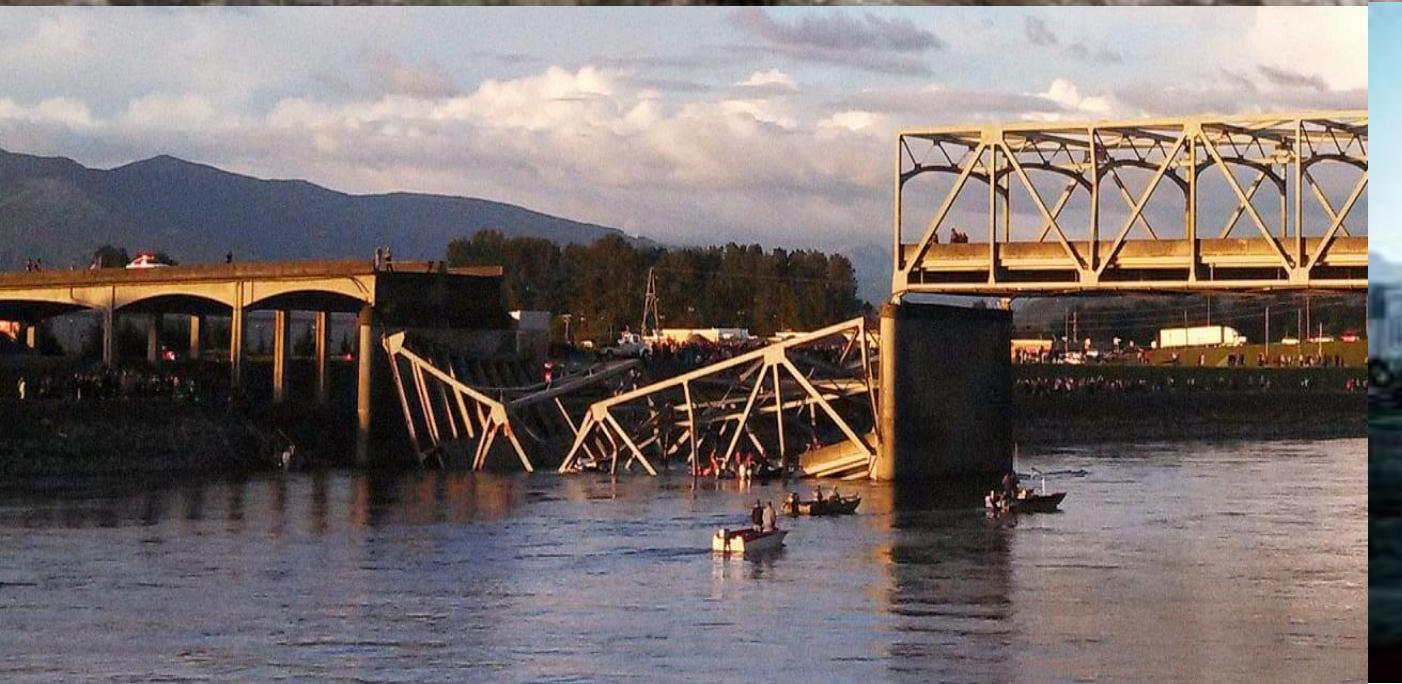
# Cascadia Subduction Zone Risk



Maximilian Dixon  
*Hazards and Outreach Program Supervisor*



# Effects - Shaking



# Earthquake Secondary Hazards



- Tsunamis
- Landslides (which can trigger tsunamis)
- Fires
- Infrastructure damage
- Liquefaction

Aftershocks can cause all of these to happen again!

# Liquefaction



Liquefaction can cause:

- Settling
- Slumping
- Sand blows
- Lateral Spreading
- Ground cracking
- Water infiltration

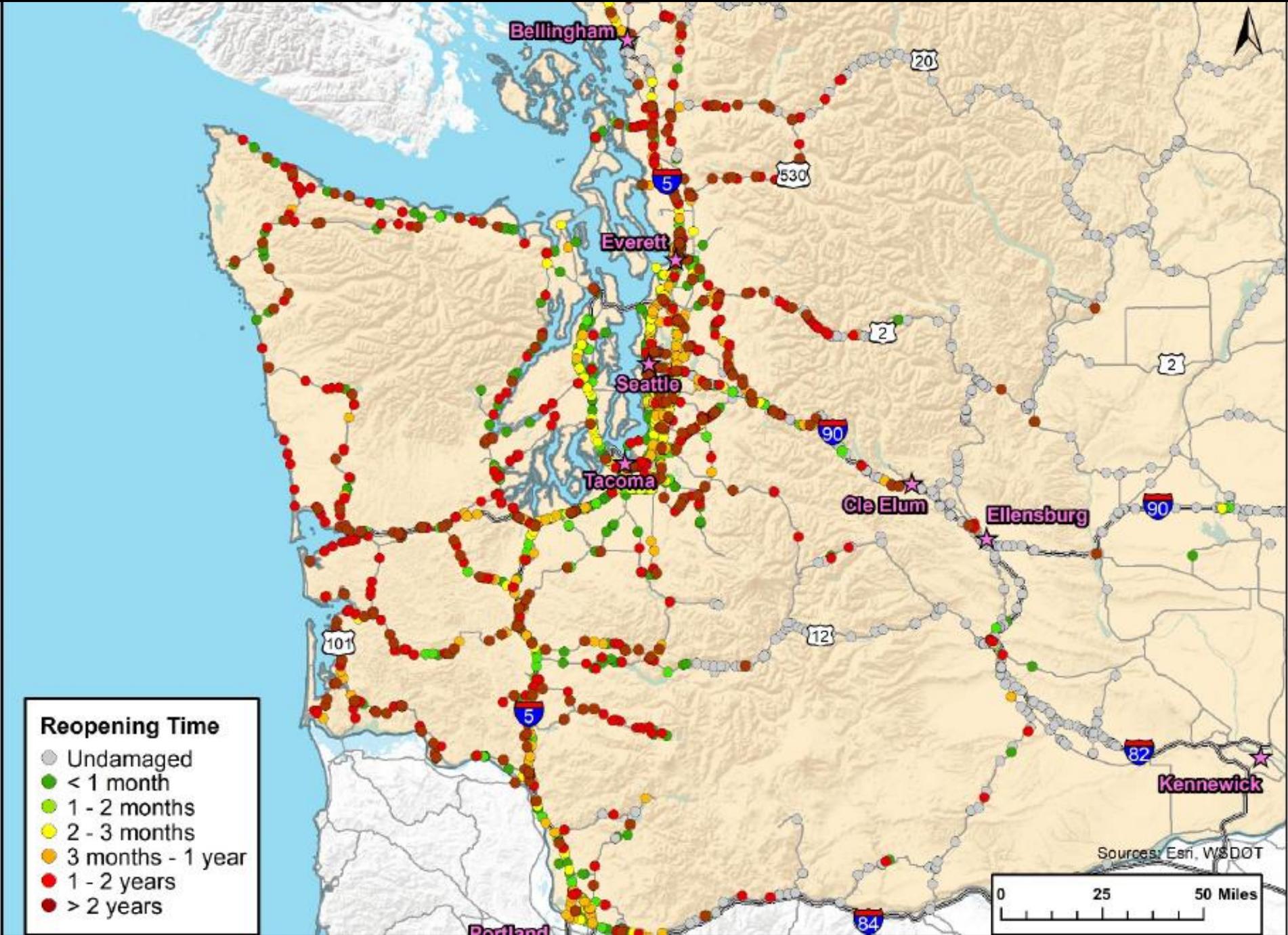


# Bridge Reopening Times

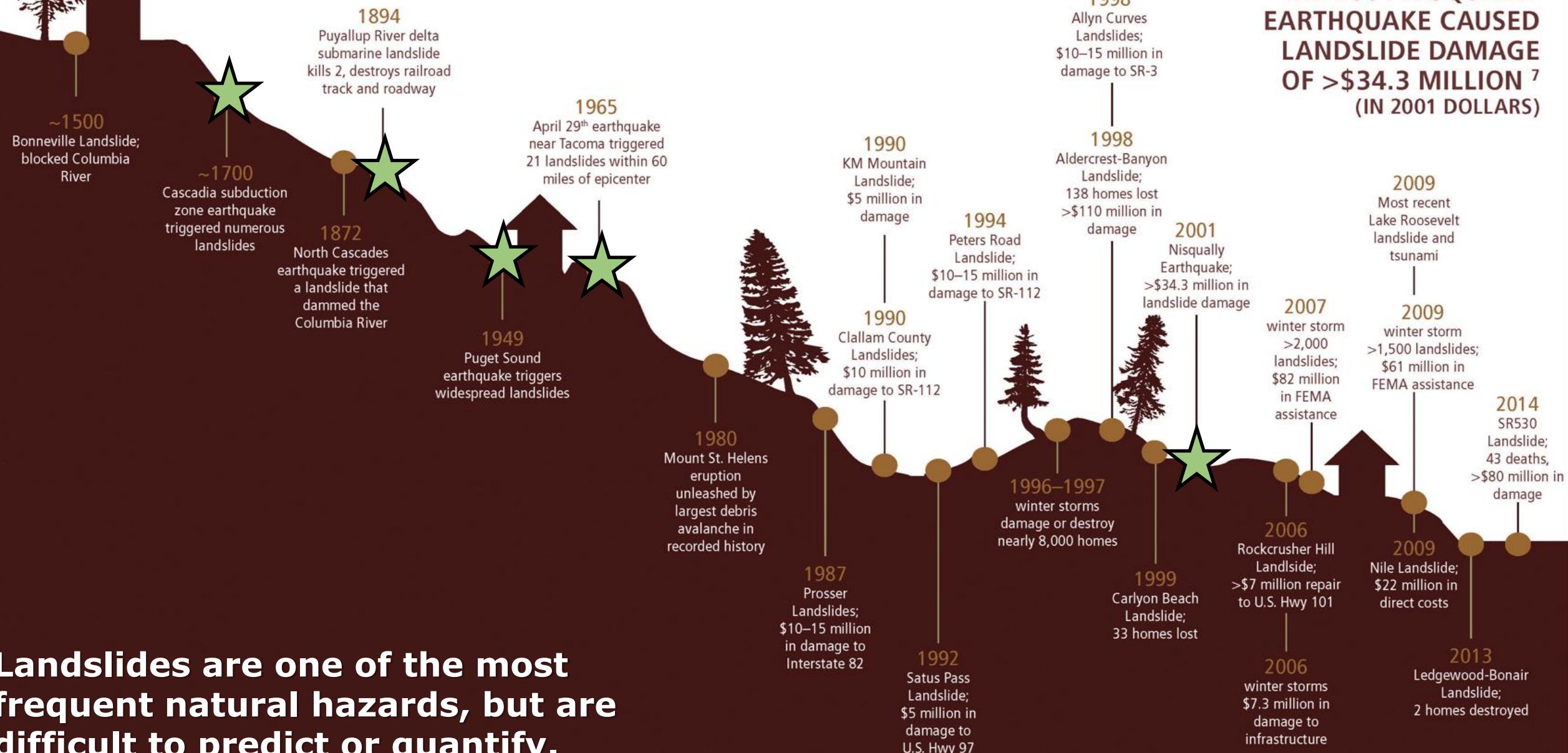
Reopening Time	Number of Bridges
<b>None</b>	621
<b>1–14 days</b>	317
<b>2–4 weeks</b>	46
<b>1–3 months</b>	627
<b>3–6 months</b>	165
<b>6–12 months</b>	159
<b>1–1.5 years</b>	304
<b>1.5–2 years</b>	120
<b>2–2.5 years</b>	352
<b>&gt; 2.5 years</b>	6



**CISA**  
CYBER+INFRASTRUCTURE



# THE 2001 NISQUALLY EARTHQUAKE CAUSED LANDSLIDE DAMAGE OF >\$34.3 MILLION<sup>7</sup> (IN 2001 DOLLARS)



Landslides are one of the most frequent natural hazards, but are difficult to predict or quantify. Landslides often happen during and after earthquakes.

# Unreinforced Masonry



# Aftershocks may be more hazardous than the mainshock!

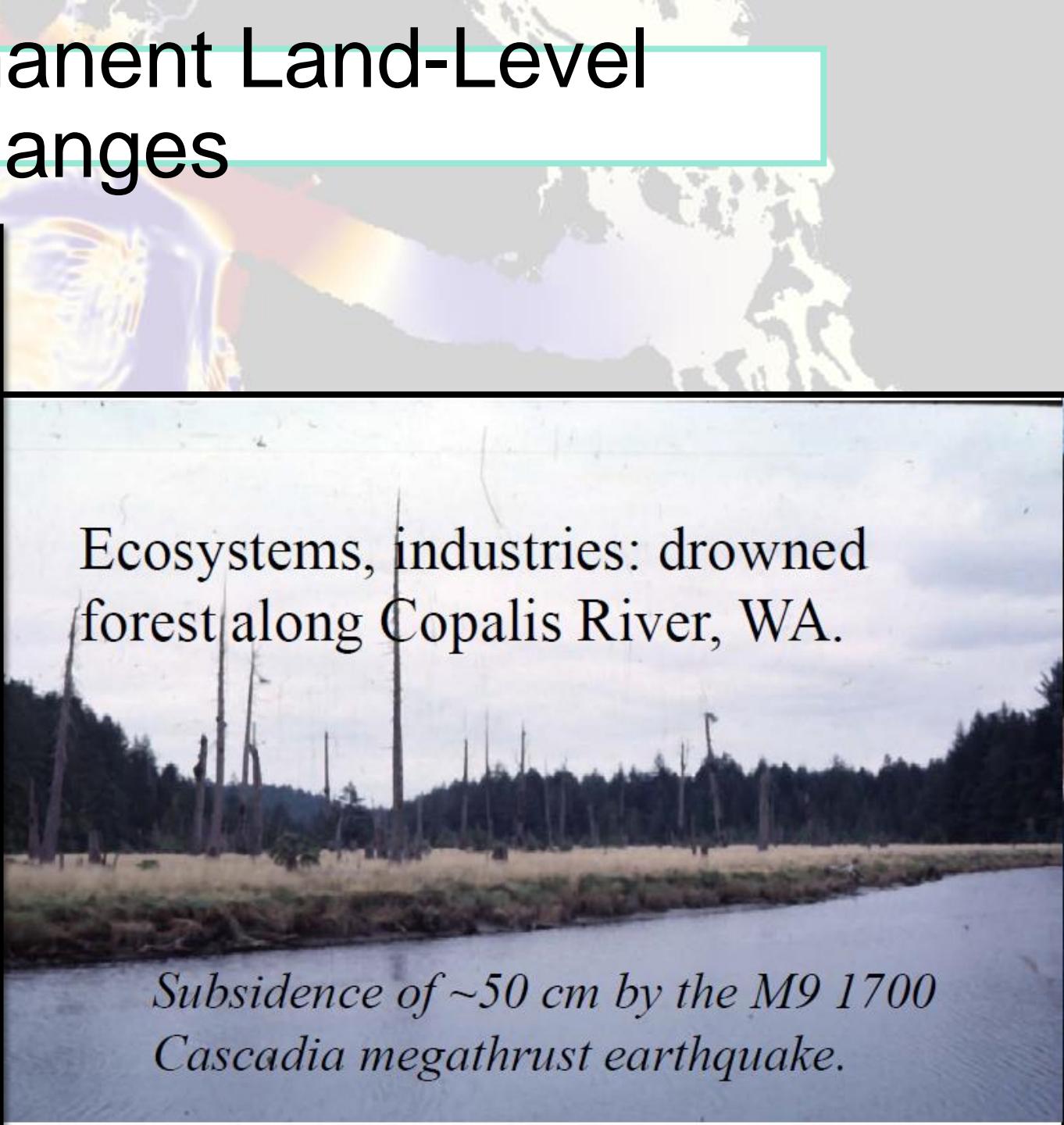


Slide credit: Joan Gomberg USGS

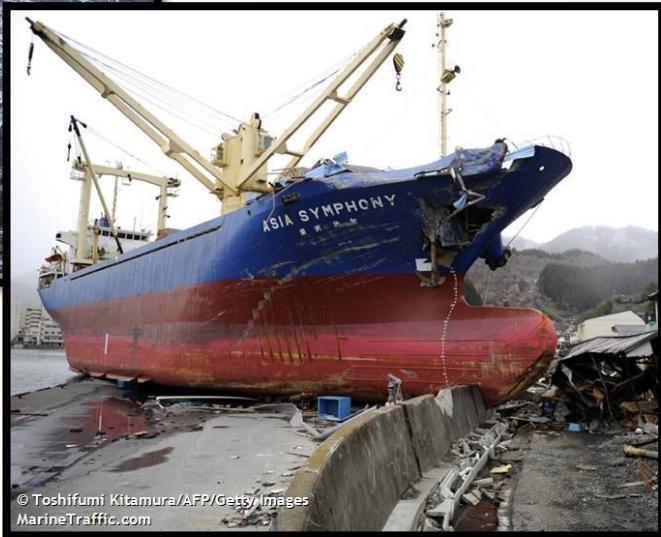
# Fires



# Effects - Permanent Land-Level Changes



# Maritime Impact in Tohoku (2011)



## Japan (local)

- 28,000+ ships & 319 ports destroyed
- Economic loss of \$3.9 Billion per day

## California (distant)

- \$100M in damage to 24+ harbors
- Some closed for 1+ years, some never recovered

# Maritime Risk

- Strong and unpredictable currents
- Sudden **water-level fluctuations** where docks and boats hit bottom, overtop piles, or are pushed on top of docks
- **Eddies/whirlpools**
- **Tsunami bores and amplified waves** swamping boats and damaging docks
- **Debris in the water**
- **Dangerous tsunami conditions can last 12-24+ hours** after first wave arrival, impacting boaters who take their boats offshore



# Maritime Risk



- Sediment will shift affecting shipping channels and ports
- Severe risk of damage to all maritime infrastructure
- Hazardous material in the water

An aerial photograph of a coastal town completely inundated by floodwaters. In the lower-left foreground, a large building is engulfed in intense orange and yellow flames, with a massive plume of black smoke billowing upwards. The town's infrastructure is severely damaged, with many houses reduced to rubble and debris scattered across the water. In the background, more buildings are visible, some partially submerged and others standing on higher ground. The overall scene conveys a sense of widespread destruction and emergency.

Plan to be on your own for a while

You CAN survive IF you get prepared!



[mil.wa.gov/alerts](http://mil.wa.gov/alerts)



[mil.wa.gov/tsunami](http://mil.wa.gov/tsunami)



[youtube.com/user/EMDprepare](https://youtube.com/user/EMDprepare)

DON'T WAIT.  
COMMUNICATE.  
MAKE YOUR  
EMERGENCY PLAN TODAY.

# Panel: Disaster Response Opportunities

.....

Moderated by:



Stephen Flynn  
*Director*  
Global Resilience Institute at  
Northeastern University



Mark Curtis  
*Director of Emergency  
Preparedness*  
Crowley Maritime



Eric Holdeman  
*Director*  
Center for Regional  
Disaster Resilience



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# “Lessons Learned on Leveraging the Maritime Sector in Disaster Response Since 9/11”

*A presentation to:*

## The Puget Sound Maritime Disaster Resilience

September 9, 2021

**Stephen E. Flynn, PhD**

Founding Director, Global Resilience Institute at Northeastern University

Professor of Political Science

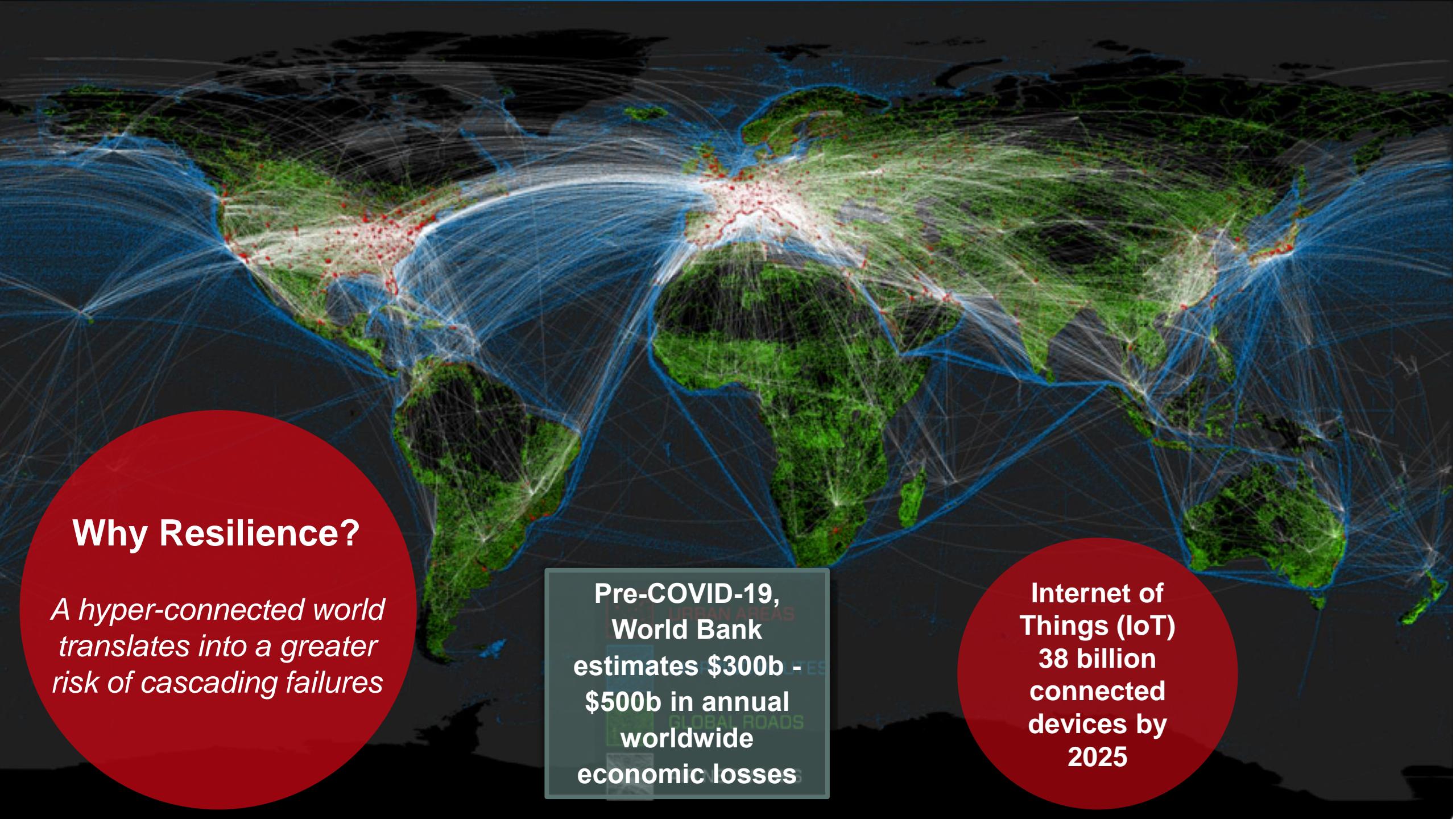
Professor of Civil and Environmental Engineering (affiliated)

[s.flynn@northeastern.edu](mailto:s.flynn@northeastern.edu)

**Global Resilience Institute**  
at Northeastern University

*Resilience is the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.*

— U.S. Presidential Policy Directive 21 (2013)



## Why Resilience?

*A hyper-connected world translates into a greater risk of cascading failures*

Pre-COVID-19,  
World Bank  
estimates \$300b -  
\$500b in annual  
worldwide  
economic losses

Internet of  
Things (IoT)  
38 billion  
connected  
devices by  
2025

# Boatlift: An Untold Story of 9/11 Resilience



<http://www.youtube.com/watch?v=18lsxFcDrjo>

# Hurricane Katrina – An overlooked opportunity to leverage the maritime transportation system

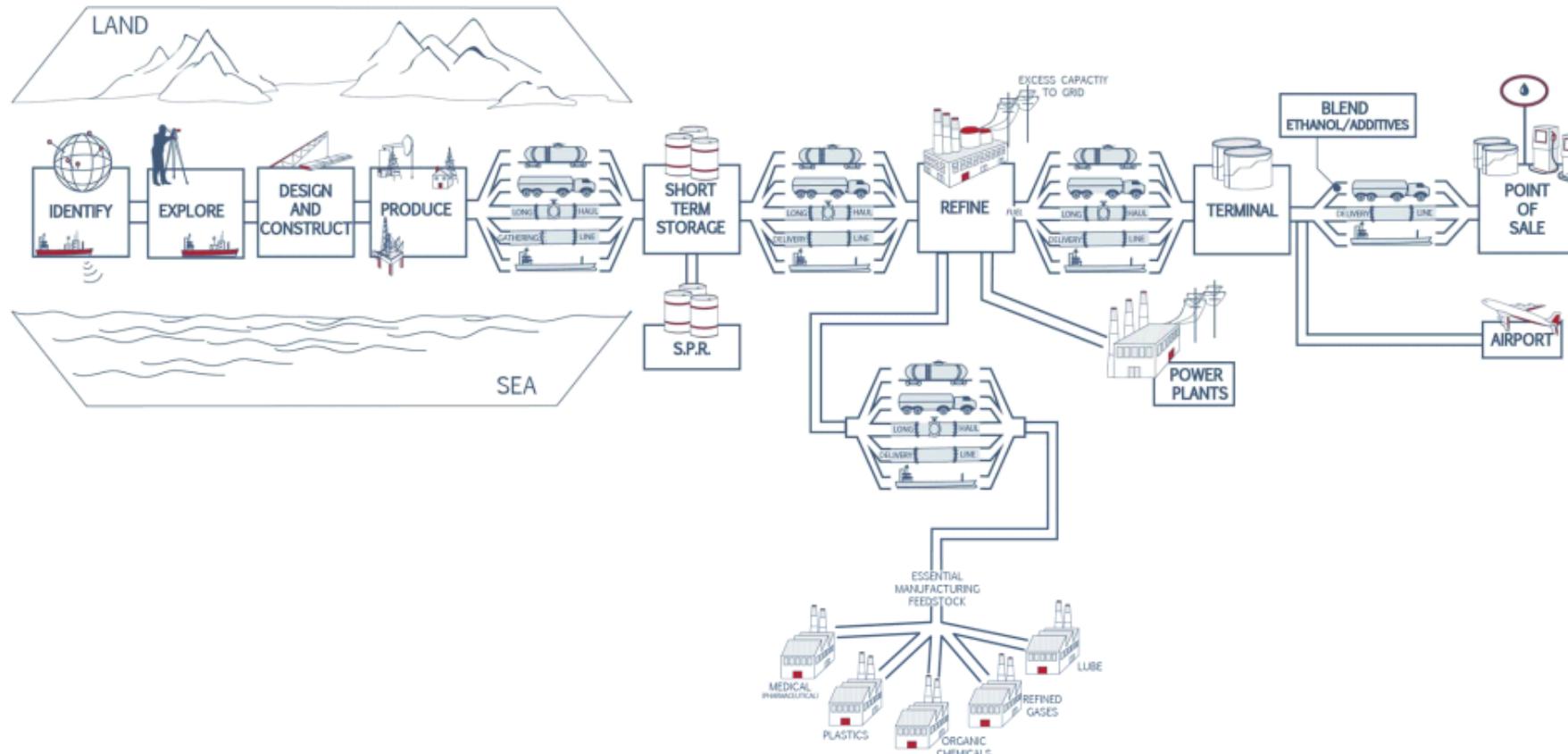


# Superstorm Sandy's Impact on Metro NY-NJ Liquid Fuels Distribution





## CRITICAL ELEMENTS OF THE OIL SUPPLY CHAIN



RESOURCES:

PEOPLE (HUMAN BEHAVIOR, SKILLED/TRAINED PERSONNEL)

POWER (ELECTRICITY)

WATER

IT (TELECOM, CYBER, ACCESS CONTROL)

# Superstorm Sandy's Impact on Metro NY/NJ Liquid Fuels Distribution

**SUPPLY** (42m gallons of petroleum products per day):



**Port closure** during and following the storm halted all maritime shipments (**60%**)



**Bayway Refinery** and **Hess Port Reading Refinery** disabled due to damage and power outages (**20%**)



**Colonial Pipeline** stopped deliveries to northern NJ due to damage and power outages, slowing entire pipeline back to Gulf Coast (**15%**)



Source: National Geographic, Nov. 2015

[http://www.eia.gov/special/disruptions/hurricane/sandy/petroleum\\_terminal\\_survey.cfm](http://www.eia.gov/special/disruptions/hurricane/sandy/petroleum_terminal_survey.cfm)

## **Goldman Sachs Headquarters**

**200 West St. New York, NY**



## **Citigroup Headquarters**

**388 Greenwich Street New York, NY**



**Case Study I: Private Sector  
Resilience: Oct 28, 2012**

# Goldman Sachs HQ:

200 West St. New York  
on Oct 29, 2012

“There is little value to  
being an island of  
resilience, if you are  
sitting in a sea of  
fragility.”  
– Stephen Flynn

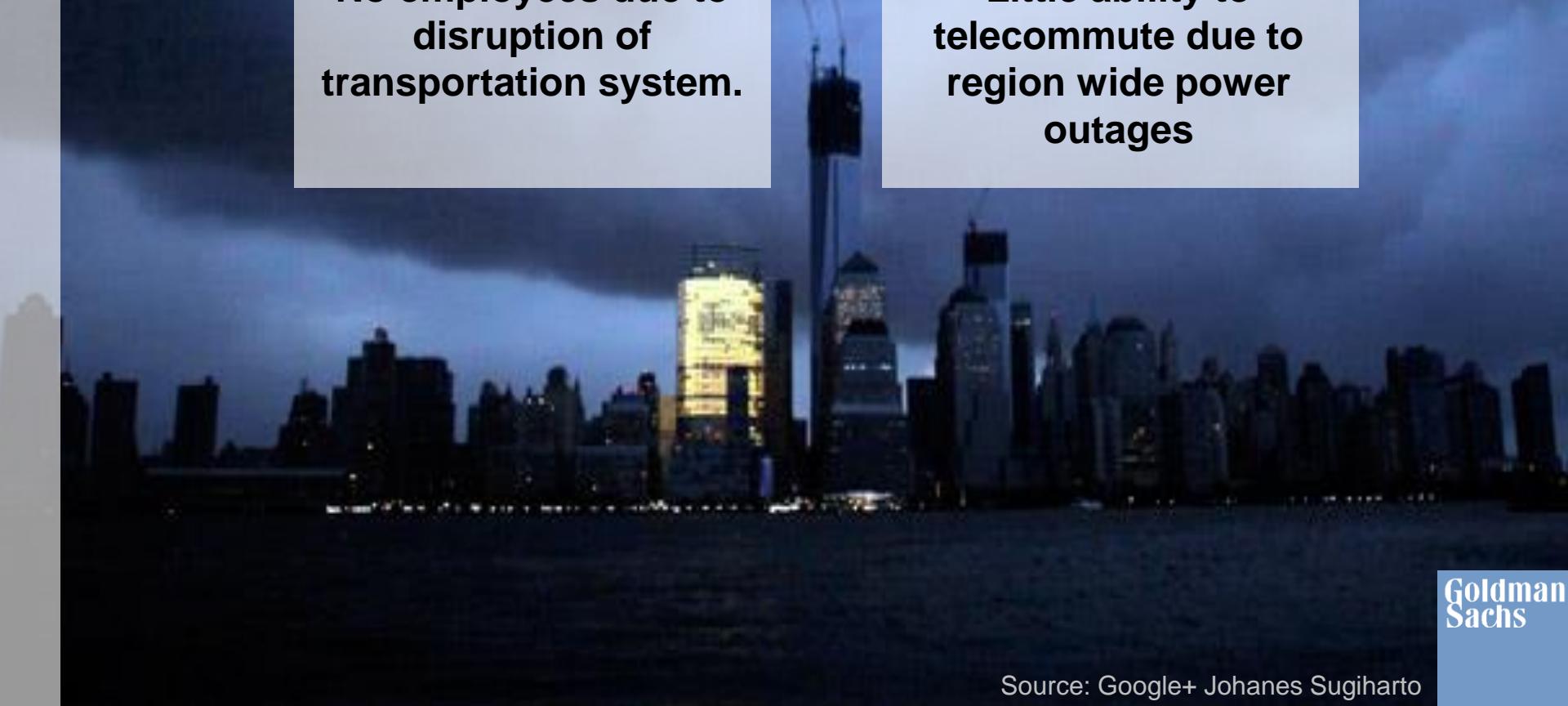
## HQ is dry and has electric power, but . . .



No employees due to  
disruption of  
transportation system.



Little ability to  
telecommute due to  
region wide power  
outages



Goldman  
Sachs

Source: Google+ Johanes Sugiharto

# The importance of harnessing the capabilities of civil society

*Oso, Washington Mudslide, March 22, 2014*



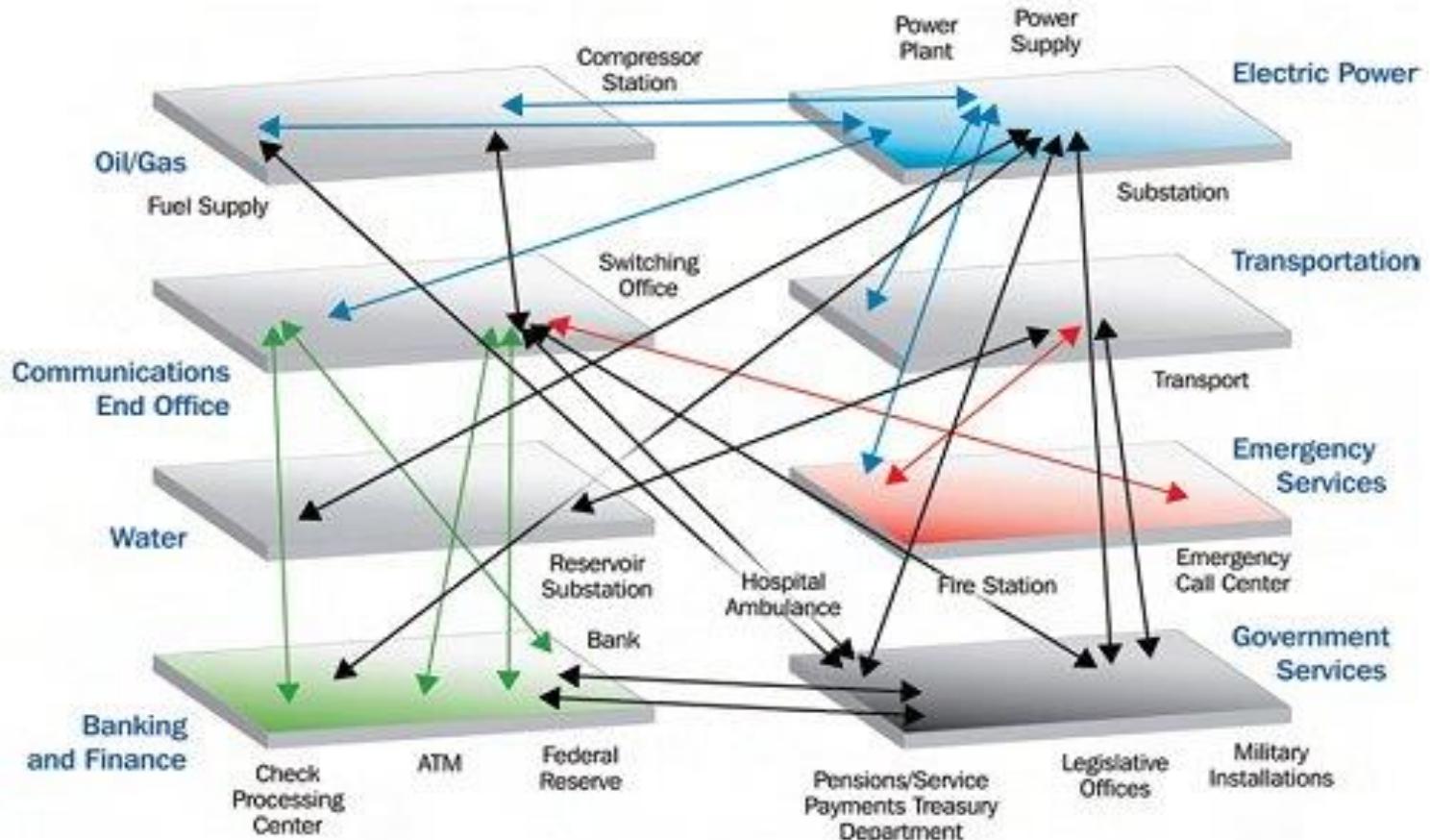
# The limits of the “Professional Protector” Approach



# Harnessing the capabilities of volunteers



# Understanding the Interdependency Challenge



National Aeronautics and Space Administration. NASA Science News. Severe Space Weather – Social and Economic Impacts. June 2009 at [http://science.nasa.gov/science-news/science-at-nasa/2009/21jan\\_severespaceweather/](http://science.nasa.gov/science-news/science-at-nasa/2009/21jan_severespaceweather/)

## TAKEAWAYS FROM HURRICANE SANDY THAT WILL APPLY TO ANY & ALL DISASTERS

- ❑ PREPARATION – first 48 – 96 hours, be prepared to be self-sufficient ...resources *take time to arrive* (emphasizing personal preparedness to the community is key critical).
- ❑ PLANNING - Pre-prepare FEMA Mission Assignments, create a *Dedicated and Coordinated Mutual Aid System*; conduct functional exercises to test local/regional plans.
- ❑ OUTREACH – No agency or entity can plan in a vacuum – know “who is who” – *invest in social capital* - knowing/trusting/expanding your network before an event can not be understated, *no one agency has all the resources*. It takes a community.
- ❑ & ACTION! In “the aftermath” take a holistic approach to port and regional recovery. Smart and creative commercial, NGO, government, community volunteers, etc...) will surface. *Leaders are going to lead*. Find ways to be connected, share ideas and resources – *foster the common goal to get to “yes.”*



# Maritime Resilience

Pacific Northwest  
September 9, 2021

**CROWLEY®**  
People Who Know®

**SUPPLY CHAIN MANAGEMENT**  
AIR FREIGHT **COLD STORAGE**  
**CUSTOMS** WAREHOUSING TRUCKING  
BROKERAGE **LOGISTICS** **FREIGHT**  
CARGO FORWARDING  
CONSOLIDATION **OCEAN**  
**DISTRIBUTION** TRANSPORTATION  
CARGO DECONSOLIDATION LCL/FCL

PROJECT MANAGEMENT  
GOVERNMENT SHIP MANAGEMENT  
**OFFSHORE ENGINEERING**  
**NAVAL** **SOLUTIONS** JENSEN  
ARCHITECTURE MARITIME  
GOVERNMENT SERVICES  
VESSEL CONSTRUCTION MANAGEMENT  
EXPEDITIONARY LOGISTICS

**VESSEL OWNERSHIP**  
COMMERCIAL VESSEL MANAGEMENT  
PETROLEUM TRANSPORTATION  
**ATBs** **SHIPPING** **TANKERS**  
**CONROs**  
TUGS AND BARGES **VESSEL**  
OPERATIONS  
SHIP ASSIST AND TANKER ESCORT  
**OFFSHORE SERVICES**

**CROWLEY**<sup>®</sup>

People Who Know<sup>®</sup>

SALES **AVIATION**  
HEATING OIL **FUEL**  
**FUEL TRANSPORTATION**  
**STORAGE** **FUELS** **ALASKA**  
PROPANE DIESEL GASOLINE  
CARIBBEAN **BASIN** **DISTRIBUTION**  
**ENGINEERING** LNG

# Crowley and the U.S. Jones Act (Merchant Marine Act of 1920)

## The Jones Act Supports American Jobs & Economy

- The Jones Act was an attempt to avoid repetition of the shipping shortages that occurred in World War One, when lack of access to foreign shippers left America's military without adequate means for moving men and materiel to the war zone.
- The Jones Act was supposed to ensure that the nation would in the future maintain a sizable fleet of U.S.-owned and crewed commercial vessels, available for military use in national emergencies.
- Setting aside domestic waterborne commerce for U.S. operators was deemed a better way of achieving that goal than providing federal subsidies to the industry.
- Things remain that way today: domestic carriers get no direct subsidies, but their routes between U.S. ports are protected from foreign competition.
- It requires movement of cargo between two U.S. locations be carried by U.S.-built, owned and operated vessels with US Crews
- 650,000 U.S. jobs and \$154.8 billion annual economic output



# U.S. Maritime Workforce

**Crowley employs more U.S. merchant mariners than any other company.**

**Provides 3,000 American officers and unlicensed crew who are union members operating 132 vessels**

- 41 domestic tank vessels
- 22 U.S. government
- 15 third-party commercial (domestic/international)
- 58 tugs/other (domestic/international)



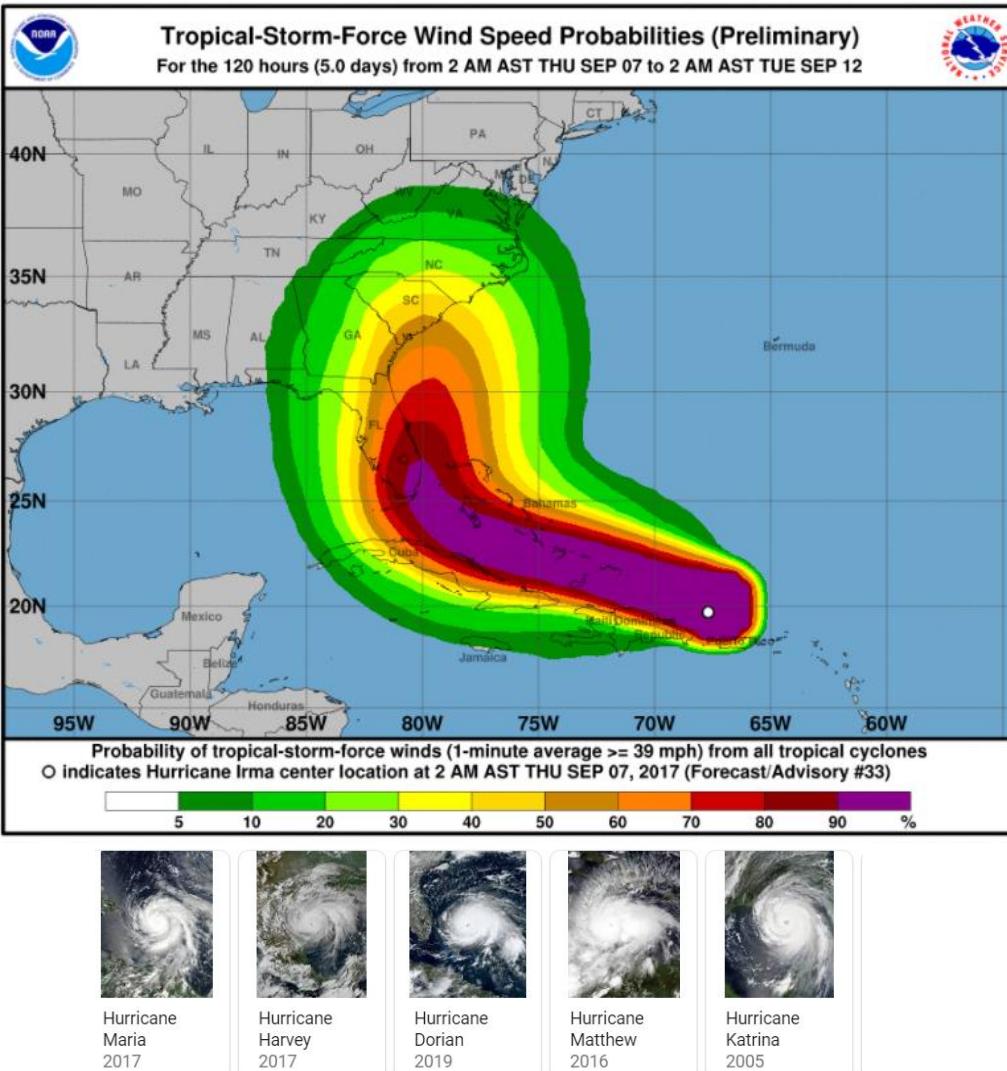
**Innovative workforce recruiting, education, safety training and development**

- World class safety performance
- Peer review and veteran recruiting



**Trusted industry advisor to government**

# Hurricane Irma Category 5 Storm



## Crowley Jones Act Vessels Loaded with Fuel for Hurricane Stricken Locales – Over 135 Million Gallons Ready for Discharge

September 14, 2017



[Crowley Maritime Corp.](#) announced today that it has dispatched 18 company owned and/or operated Jones Act petroleum vessels to discharge gasoline and diesel into Florida ports in the coming few days. This mobilization responds to fuel shortages caused by the unprecedented evacuation of millions of Floridians ahead of Hurricane Irma. The vessels include Crowley's *MT Ohio* and *MT Florida*, which were among the first tankers to bring fuel into the Port of Tampa on Tuesday along with *MT West Virginia* in Port Everglades.



"We are extremely grateful for our customers' response to this crisis, and for the dedication and sacrifice of the American men and women operating these vessels," said Rob Grune, Crowley's senior vice president and general manager, petroleum services. "Many of them live in Florida, and have put their own needs on hold while responding to the urgent needs of others."

Fuel is being discharged to all of the major terminals in Florida – Jacksonville, Port Canaveral and Ft. Lauderdale in addition to Tampa. The vessels will be bringing a combined volume 2.75 million barrels (115 million gallons) of gasoline and 500,000 barrels (21 million gallons) of diesel fuel within an eight-day period. This is enough to fill the tanks of more than seven million cars once distributed from the ports to service stations across the state.

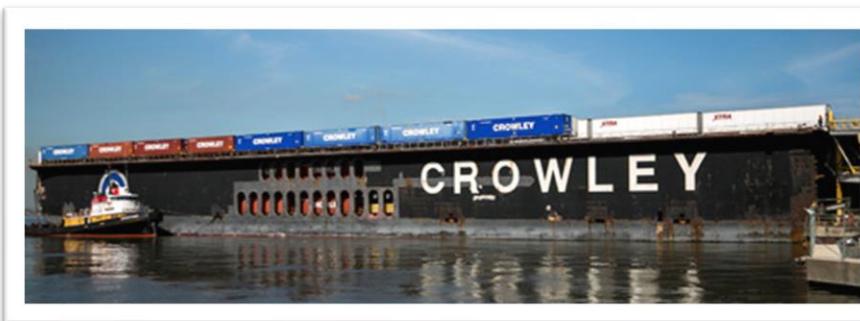
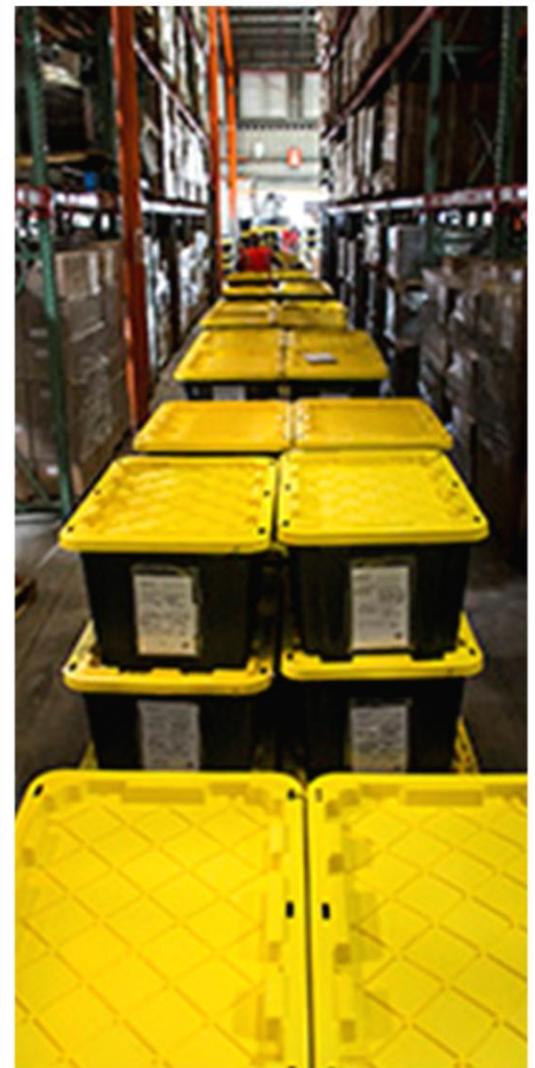
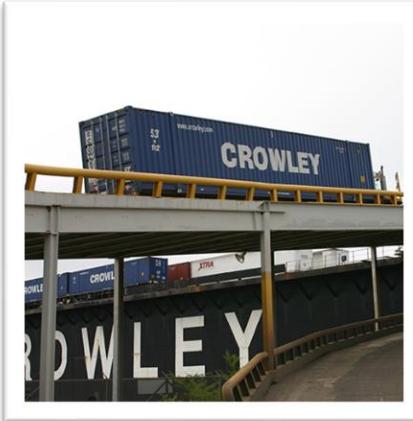
The vessels began discharging as soon as local fuel depot and port authorities gave the all clear to do so. Grune noted that berth availability is limited even when fully operational. "As a result, we expect that fully loaded vessels will experience significant delays waiting in line to discharge." He added that, "Crowley's vessels, and those of other American operators, are supplying as much fuel to Florida as the shoreside supply chain can accept and distribute."

The Merchant Marine Act of 1920, also known as the Jones Act, is a federal statute that requires that all goods transported by water in U.S. domestic commerce be carried on American vessels.

# Two Weeks Later



# Crowley Response to Hurricane Maria



# Crowley's Response to Aid Puerto Rico

## Crowley's relentless response to Hurricane Maria:

**Background:** Crowley has been a lead responder in several major, life-or-death emergencies including the 2010 earthquake in Haiti; Hurricanes Sandy, Matthew, Harvey, Irma and Maria; establishing Ebola treatment units in West Africa; and responding to oil spills in Alaska, the Persian Gulf and Puerto Rico.

### Ocean transportation

- San Juan terminal – key response infrastructure – was well-secured, undamaged
- First vessel worked there less than 2 hours after port reopened by USCG
- **67 percent** increase in vessel capacity to 16 tug and barge combinations
- Nearly **105,000** loads (TEUs) of relief and commercial cargo received in San Juan since the storm through 201 sailings into mid-February
- More **40,000** utility poles transported to restore power
- Delivered **7,000+** electrical transformers
- **10 Million** miles of wire and cable
- **3,500** breakbulk or equipment shipments: utility trucks, generators, bucket trucks and fuel trucks
- Due to the overwhelming demand for CDL/HAZMAT-certified fuel truck drivers in the area, six qualified fuel truck drivers from the company's Alaska operations were dispatched to the island where they performed a combined total of 2,200 hours distributing fuel to businesses and residents.

## Crowley employees gather 54,000 pounds of supplies to send to Puerto Rico

Island devastated by Hurricane Maria



JACKSONVILLE, Fla. – After Hurricane Maria, Puerto Rico is devastated, and the island needs to almost completely rebuild.

Immediate needs for people include such basic items as food and water. People also need toiletries and clothing.

Crowley Maritime is working with the Federal Emergency Management Agency to provide relief.

On Friday, Crowley employees jumped at the chance to help out. It's personal for a company with 300 workers in Puerto Rico, and it's emotional for employees who have family and friends there.

The call to action went out midweek, and by Friday afternoon, a room at Crowley's Regency headquarters was filled with employees doing something productive for the people of Puerto Rico.

"My family is still there," Wanda Gordon said. "Most of my friends are still there. You know, it's where I'm from, so it means everything to me."

Gordon and Freddy Fantauzzi are two of the Crowley employees who were helping load a container headed for their homeland.

# Crowley in Puerto Rico: Commitment



## The Commitment Class Projects

### **\$550 million investment innovating American maritime service**

- Faster, more efficient service
- Major private capital investment in Puerto Rico economy

### **Two new, LNG-powered combination Container/Roll-on Roll-Off ships set sail in 2018 to serve Jacksonville-to-San Juan trade**

- U.S. built in Mississippi – including Puerto Rican workers -- and both to be operated by American officers and crew

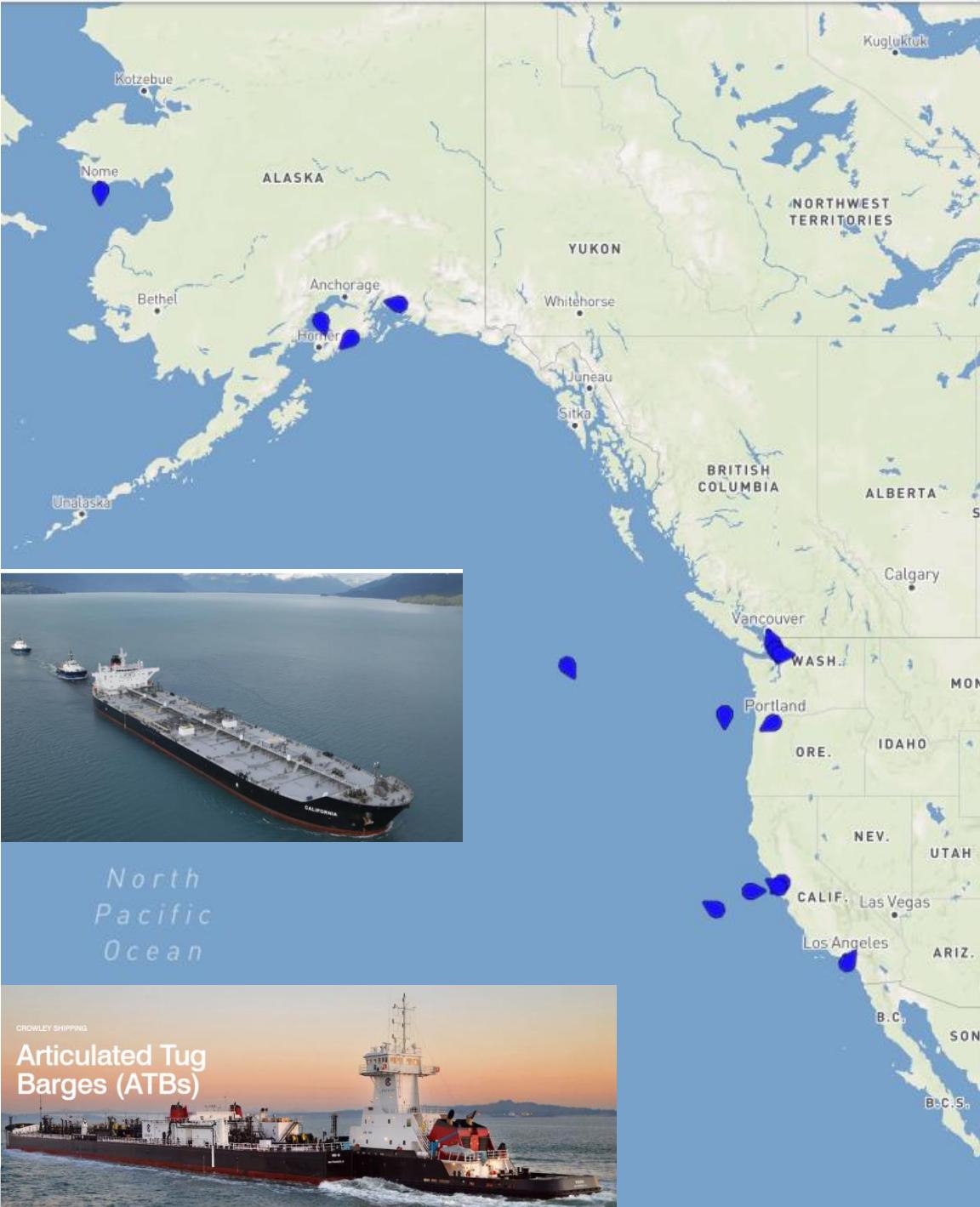
### **Enhanced Isla Grand Terminal in San Juan:**

- 3 new gantry cranes: the first of their kind in five decades in Puerto Rico
- New 900-foot pier
- Increased container and refrigerated cargo operations
- More efficient

### **New LNG Fuel Depot shoreside in Jacksonville, among the first of its kind in the U.S.**

# Crowley Pacific Coast Presence

- Crowley's maritime presence on the West Coast spans container vessels, oil tankers, ATBs, tug and barge towing/escorting/response.
- Offices currently include:
  - Pier 17 Seattle
  - Anacortes Warehouse
  - Bellingham Support Office
  - Valdez, AK – CAT
  - Anchorage, AK – Crowley Fuels



# Crowley Fuels

Crowley fuels life, business and growth in Alaska. Our quality fuels and service, provided by more than 350 Alaskans, can be found throughout this great state we call home.

We purchase, transport, store and distribute the fuels Alaskans need to heat their homes, schools and businesses, fly their planes, and drive their cars, trucks, boats, snow machines and construction equipment. We've been proud to serve our neighbors here since 1953

[www.CROWLEY.com](http://www.CROWLEY.com)



## Diesel Fuel

From large-scale commercial projects to marine operators to individual Alaskans, Crowley Fuels delivers the diesel fuel Alaskans need to keep their projects and passions moving.

[LEARN MORE](#)



## Gas Stations and Wholesale Fuel

Crowley Fuels keeps Alaskans on the road with our wholesale fuel distribution and network of retail gas stations across the state. Crowley owns and operates gas stations throughout Alaska, in Southcentral, Southeast, Western and Interior Alaska.

[STATIONS AND CARDLOCKS](#)



## Heating Alaska's Homes and Businesses

We deliver heating fuel to homes and businesses across the state, always with a focus on safety, quality and reliability.

[LEARN MORE](#)

## Aviation Fuel Services

Crowley's aviation fuel services in Alaska include convenient, 24-hour, self-service aviation fuel card lock stations, and we offer [aviation fueling services](#) at 21 public aviation airports throughout the state of Alaska, helping aviators get airborne safely and quickly.

[TAKE TO THE SKIES](#)

## Marine Fuels

With thousands of miles of coastline and rivers, travel by water is a way of life – as well as a necessity – for many Alaskans. From small fishing skiffs to ocean-going ferries, from Southeast Alaska to the Arctic, Crowley's marine fuel terminals throughout the state provide quality fuels that Alaska mariners can depend on.

[MORE ABOUT MARINE FUELS](#)



# Panel: Regional Leadership

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Captain Patrick Hilbert  
*Captain of the Port*  
U.S. Coast Guard Sector Puget Sound



Dick Marzano  
*Co-chair*  
The Northwest Seaport Alliance



John Veentjer  
*Executive Director*  
Marine Exchange Puget Sound

Moderated by:



Brandon Hardenbrook  
*COO*  
Pacific Northwest Economic Region



SEPTEMBER 9, 2021

# Thank you!

Mark your calendars for the next workshop on October 14 at 9 am



**Snohomish County**  
Emergency Management



*Pacific NorthWest  
Economic Region*

