Walking to Mordor:

A Case Study for Conducting Evacuation Route Assessments

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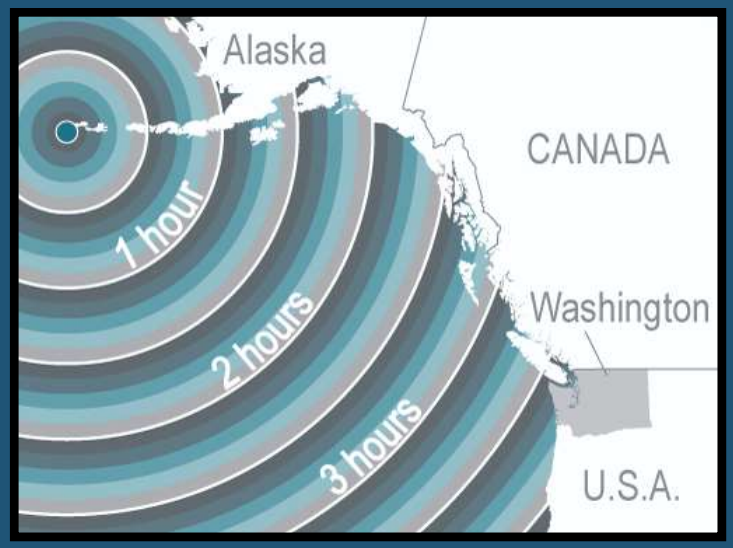
Washington Emergency Management Division

Agenda

1. Tsunami evacuation in Washington
2. Washington State tsunami wayfinding project
3. Wayfinding lessons learned and best practices

Washington is Tsunami Country



Local Tsunamis

- Shaking is primary warning
- < 3 hours until first wave arrives
- More inundation/currents
- Biggest local threat: Cascadia
- Evacuation: pedestrian

Distant Tsunamis

- Alerts are primary warning
- > 3 hours until first wave arrives
- Less inundation/currents
- Biggest distant threat: Alaska
- Evacuation: pedestrian

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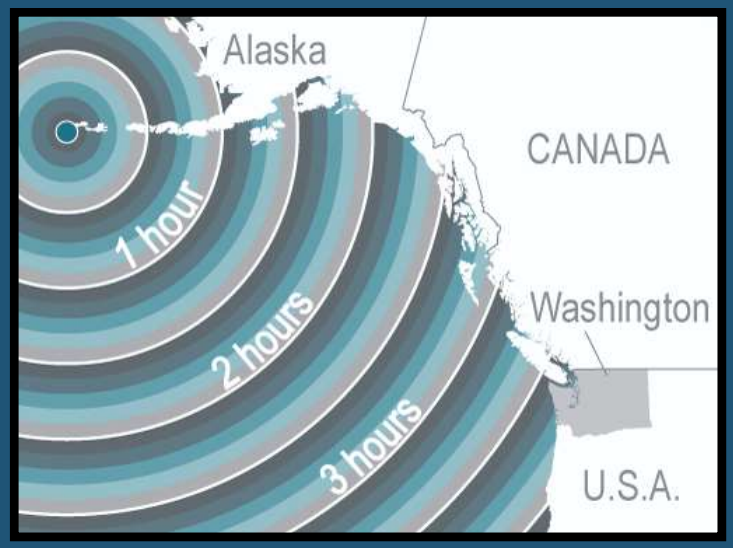

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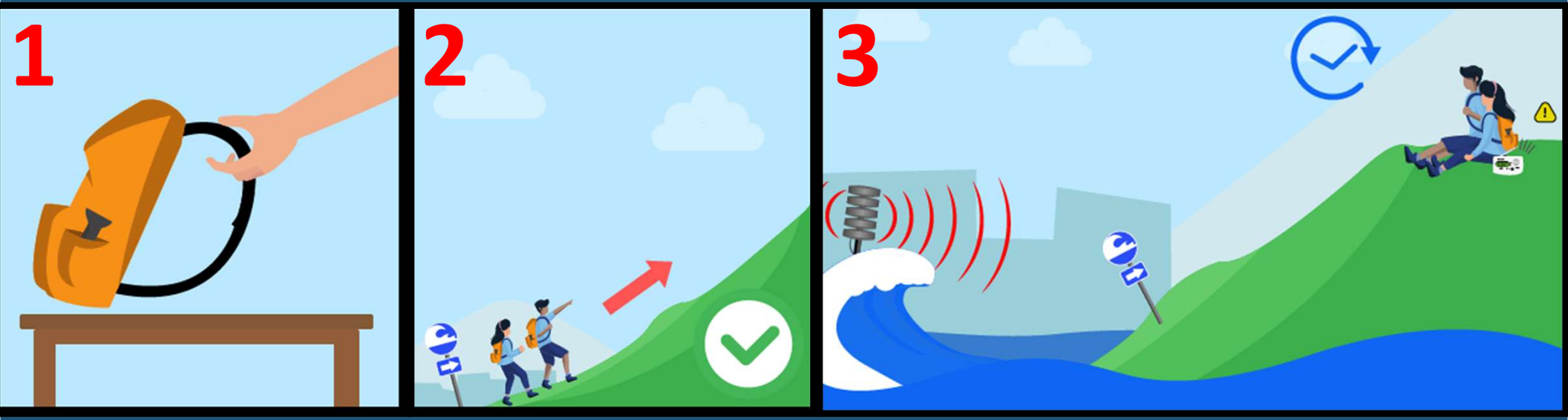
Tsunami Signage in Washington

If you're on the coast and feel shaking/get an alert…



Don't plan on evacuating by car, roads may be impassable due to ground shaking or packed with traffic!

Let’s test that…

Imagine you’re walking a trail on Washington’s outer coast on a sunny day when the ground begins to shake for what feels like minutes.

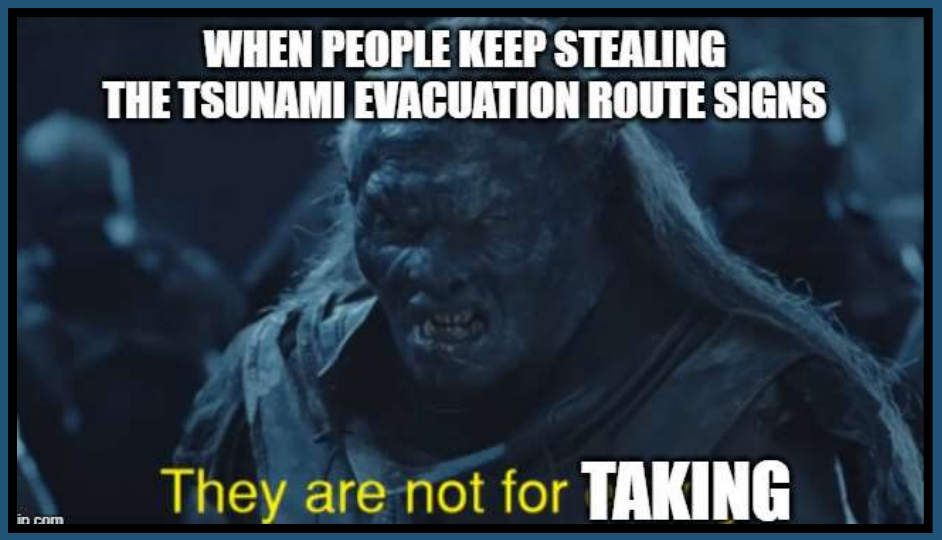
You drop, cover, and hold on where you are to protect yourself. When the shaking stops, you stand and survey your surroundings. You know you need to reach high ground quickly in case a tsunami is on the way.

This is what you see.

Easier said than done!

Tsunami Signage in WA (as of 2022)

- **Current tsunami signs ineffective** – installed decades ago based on outdated mapping and with vehicular evacuation in mind
- **Lacking signage off main roads** – state parks, beaches, private roads, logging/forestry roads, paths/trails need coverage
- **Many routes haven't been walked** – route conditions and overall accessibility unknown
- **Sign locations and conditions unknown** – many are damaged or "walk away" with visitors



Local jurisdictions lack capacity to conduct wayfinding assessments.

Tsunami Wayfinding Project

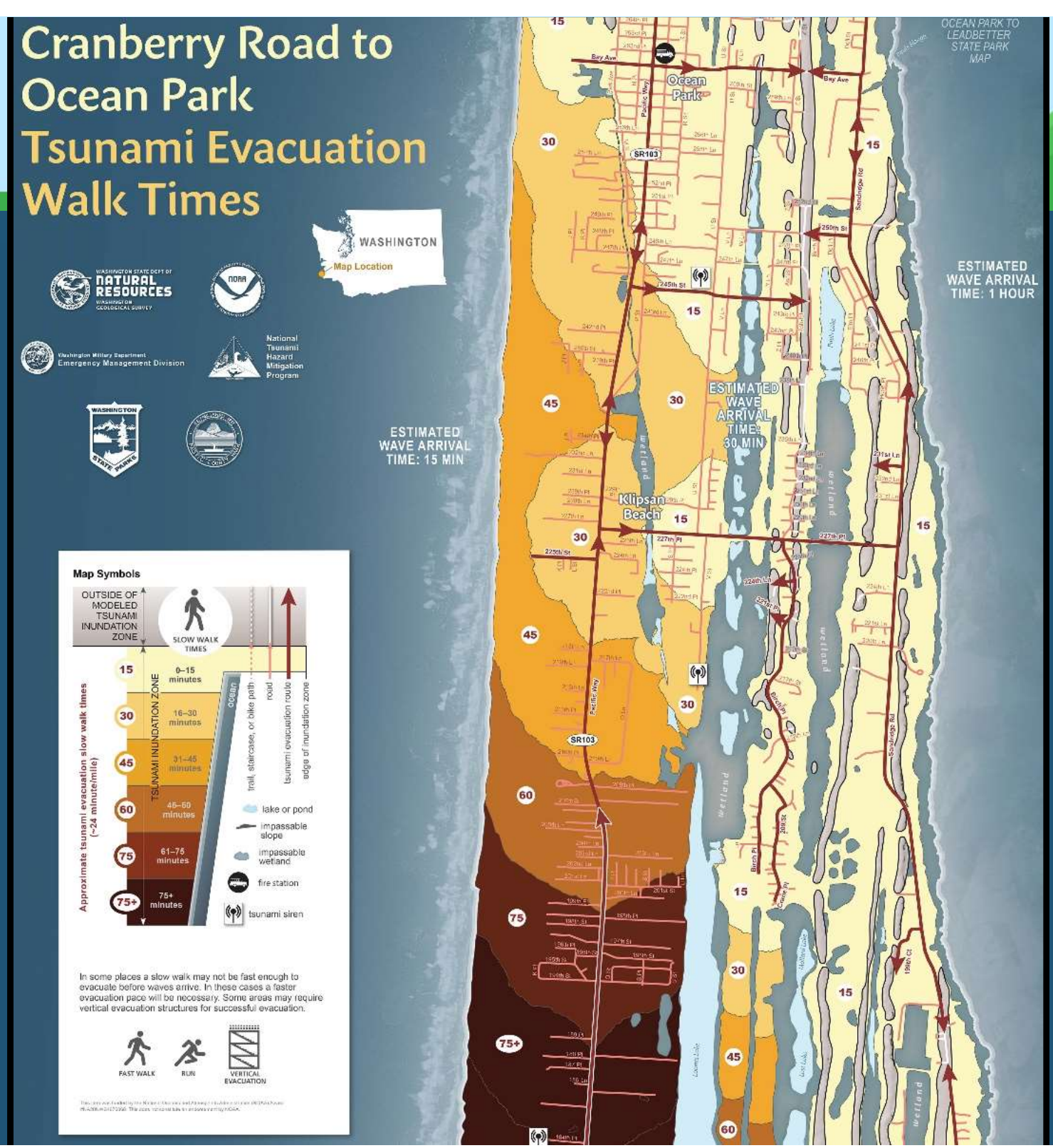
WA EMD teamed up with University of Washington to assess tsunami evacuation routes.

- 28 communities and 1,055+ miles of evacuation routes total (just ~660 miles shy of Mordor!)
- Study targeted locations with tsunami pedestrian evacuation walk maps
- Students captured location data, took pictures, and documented condition of any signs, paths, or other issues.

Tsunami Wayfinding Project

- **Where we recommended new signs** –
  - Anywhere line of sight from the last sign was broken due to distance, a rise or fall in the route, or a turn in the route
  - Trail heads, public parking lots, and other places where routes begin and/or where people may congregate
  - Anywhere the next direction is unclear (intersections, etc)
  - Assembly areas currently lacking signs
  - Convenient locations like informational kiosks
  - Heavily trafficked locations where an “entering” or “leaving” hazard zone sign would be good to have

Cranberry Road to Ocean Park Tsunami Evacuation Walk Times



Map Symbols

In some places a slow walk may not be fast enough to evacuate before waves arrive. In these cases a faster evacuation pace will be necessary. Some areas may require vertical evacuation structures for successful evacuation.


242nd Pl
240th St
239th Pl
J Pl
L Ln
45
30
242nd Pl
Z Pl
240th Pl
238th Ln
Pauls Lake
241st Pl
240th Pl
Hope Pl
ESTIMATED
WAVE
ARRIVAL
WHEN YOU CAN'T FIND THE NEXT TSUNAMI EVACUATION ROUTE SIGN
We're going in circles
45
218th Ln
217th Ln
216th Ln
215th Ln
213th Pl
Pacific Way
30
219th St
217th St
Birch Pl
wetland
221st Ln
220th Ln

Wayfinding Project Findings - Signage

Damaged

Confusing

Incomplete

Inaccurate

Wayfinding Project Findings - Signage

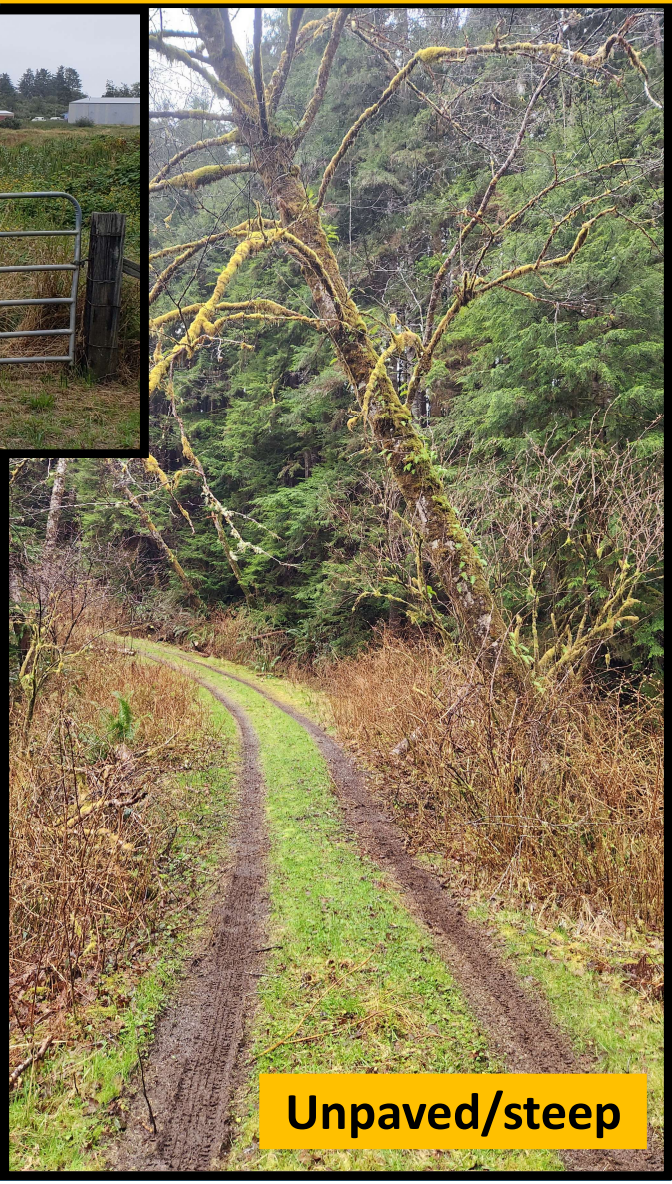
- **Currently existing signs** (in good condition/location) – ~170
- **New signs needed** – 1,700+

Wayfinding Project Findings - Routes

Washed out

Locked barrier

Private property



Unpaved/steep

Data Consolidation - Google MyMaps

An online, collaborative mapping platform built on top of Google Maps.

Waterfront Blues Festival | See it in My Maps

Draw

Add points or draw shapes anywhere.

Search

Find places and save them to your map.

Import

Instantly make maps from spreadsheets.

Personalize

Show your style with icons and colors.
Add photos and videos to any place.

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Get the word out

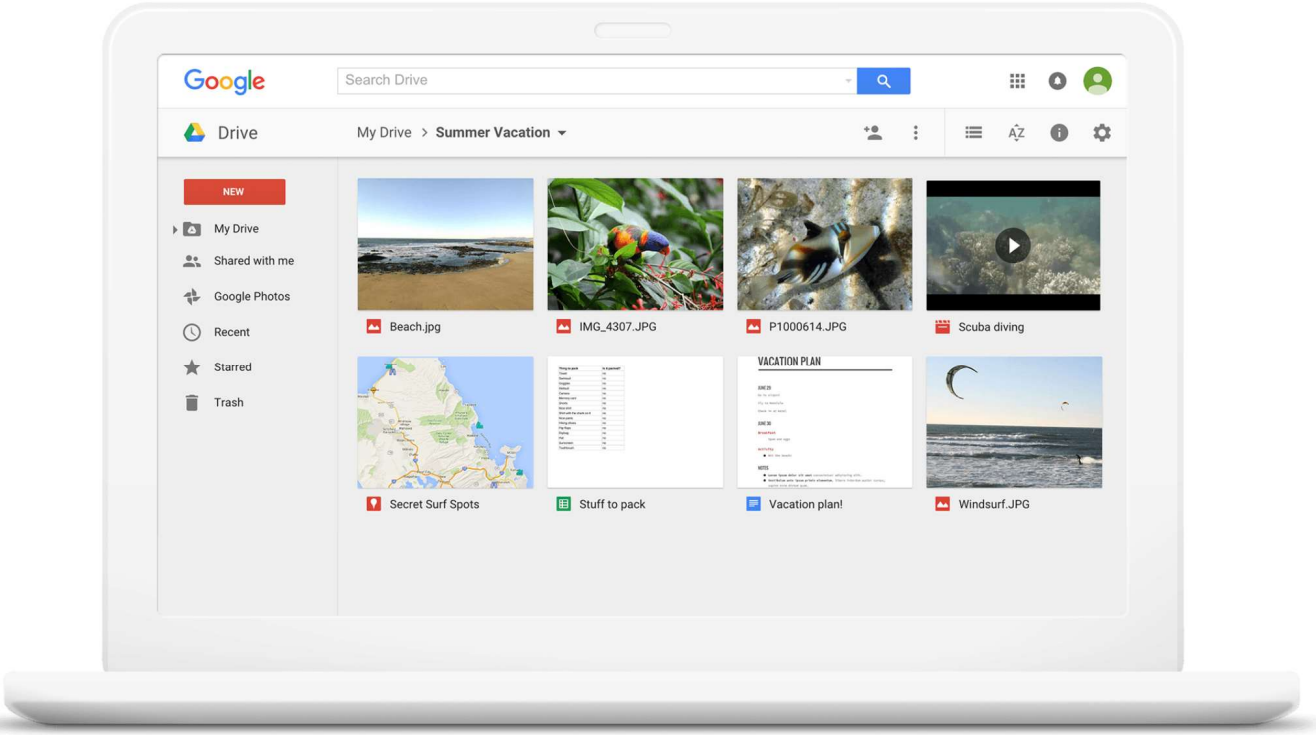
Embed maps in your website or blog.

Make maps together

Work together on building your map, just like Google Docs.

Works with Drive

Easily organize all your maps alongside your other documents in Google Drive.



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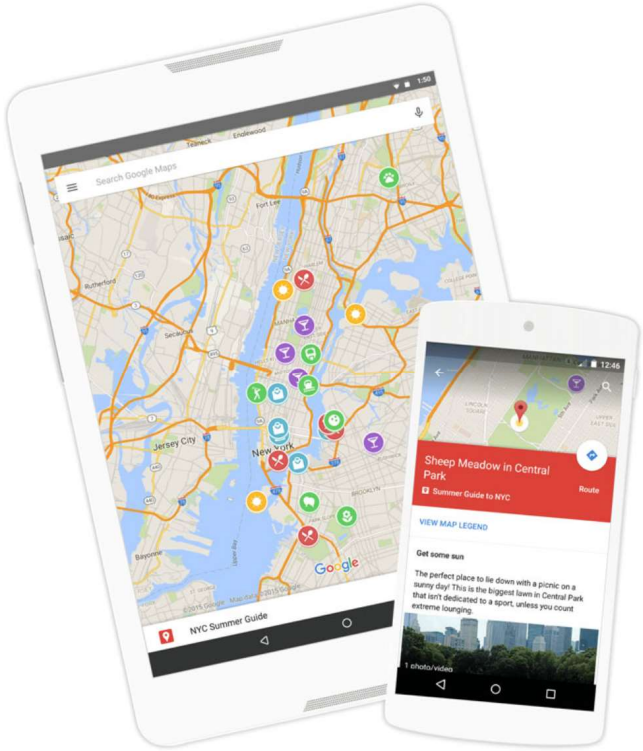


Maps when you need them

Find all your maps in the Your Places menu on Google Maps.

Your world, your maps

Chart your favorite places or explore a new city.

Discover new destinations

Save maps you find on the web and use them on-the-go.

Google MyMaps Tiers and Icons

- **Existing Signs:** good condition, correct location
- **Tier 1 (highest priority):** starting/ending points along mapped routes; incorrect/damaged signs; areas where line of sight is lost along routes
- **Tier 2 (mid-priority):** all other points along mapped routes; alternative sign location options
- Tier 3 (lowest priority): signs not along main routes or that aren't needed solely for line of sight

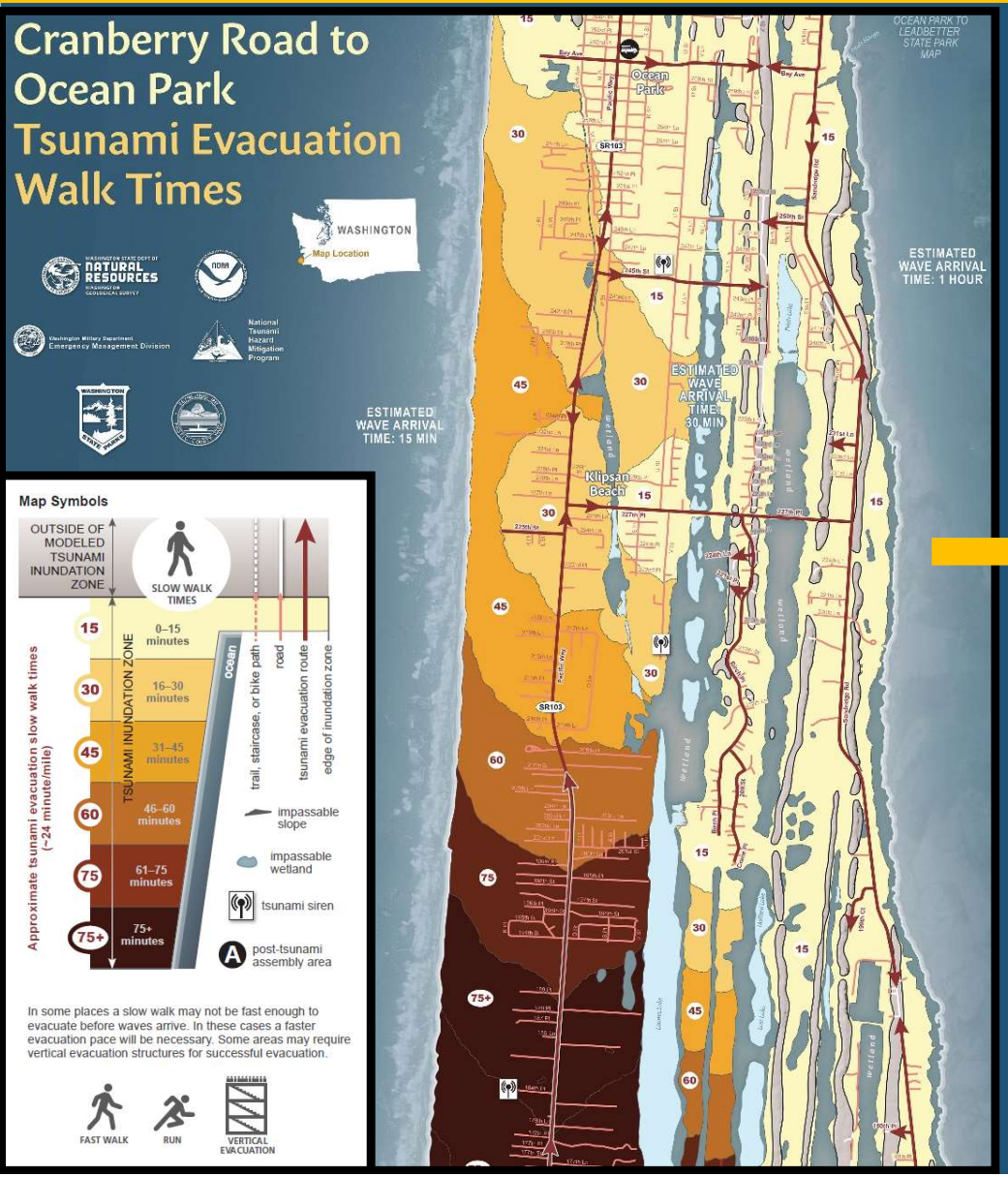
Evacuation Route

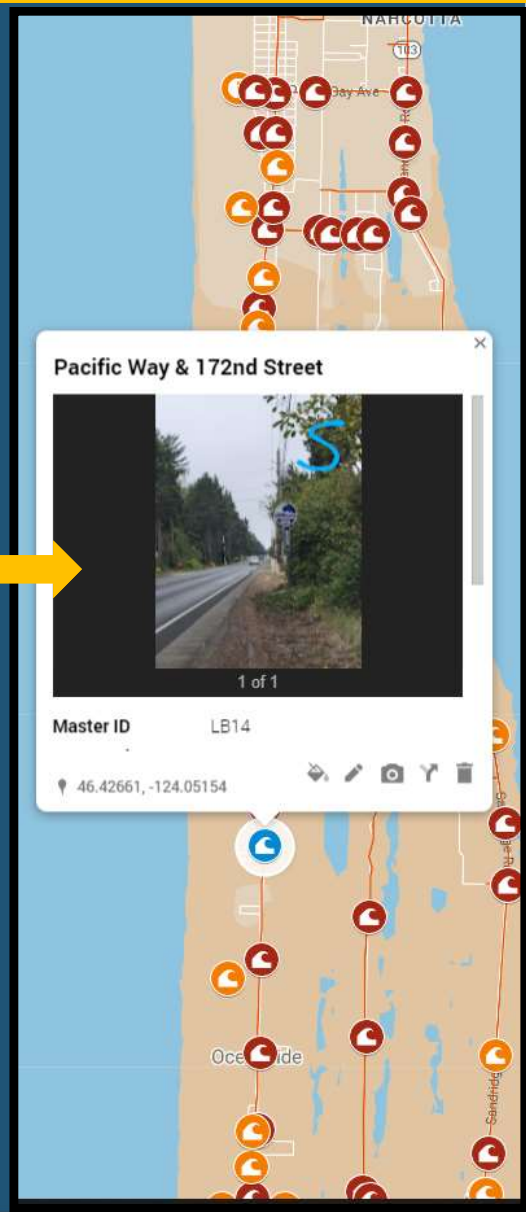
Entering/Leaving; Tsunami Hazard Zone

Assembly Area

Kiosk Location

Example – Long Beach, WA





Final Deliverables

- **Meetings with each community to discuss findings** – Included key partners such as tribal, county, and city emergency management, public works, public safety, elected officials, state parks, etc
- **Email with link to all Google MyMaps pages** – Editable links so jurisdictions can update or change maps to suit their needs (NOT shared with public by WA EMD)
- **Zip file with copies of all associated documents for each location** – Included PowerPoint presentation with methodology and findings, Excel spreadsheet of all data, .kmz backup files of Google MyMaps pages

Next Steps

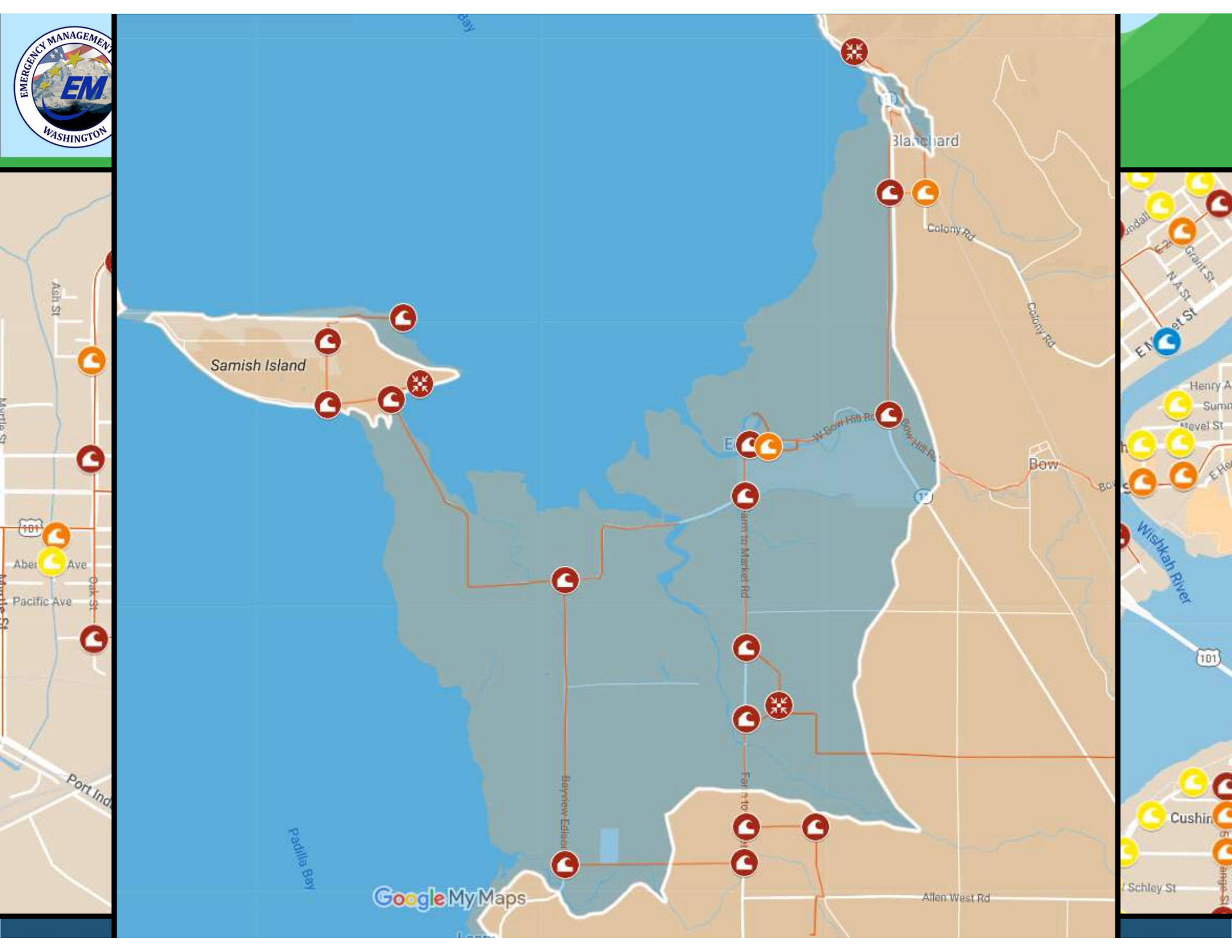
- **Washington State Tsunami Wayfinding guide** – Guidance document for tsunami wayfinding in Washington State
  - Includes checklist for conducting wayfinding assessments based on mapped evacuation routes or if starting from “scratch” (no map)
  - Based on lessons learned from this project and other wayfinding best practices in other states, like Oregon
- **Tsunami sign order** – WA EMD will provide tsunami signs free to local jurisdictions as long as grant funding allows; next order July 2024
- **Tsunami sign installations** – WA EMD will assist with sign installation costs on WSDOT-owned roads as long as grant funding allows

Lessons Learned/Best Practices - Fieldwork

- **Working with communities**
  - Discuss details of project in advance so everyone is aware
  - Obtain any necessary permits or passes in advance
  - Define “no-go” areas like private property, gated communities, etc
- **Use of volunteers**
  - Group field training is vital
  - Require high visibility gear
  - Accompany groups if possible
  - Provide business cards or other info to hand out if they get questions

Lessons Learned/Best Practices – Data

- **Getting into the mindset: what if someone…**
  - Has never been to the community before?
  - Is unfamiliar with the hazard?
  - Is directionally challenged?
- **Collecting data**
  - Utilize a standardized methodology, including GPS devices/apps
  - Be exhaustingly thorough


Samish Island
Blanchard
Colony Rd
Bow
Bow Hill Rd
W Bow Hill Rd
Farm to Market Rd
Bayview Edison Rd
Padilla Bay
Allen West Rd
Ash St
Pacific Ave
Oak St
Port Ind
Wiskah River
Grant St
Schley St
Google My Maps

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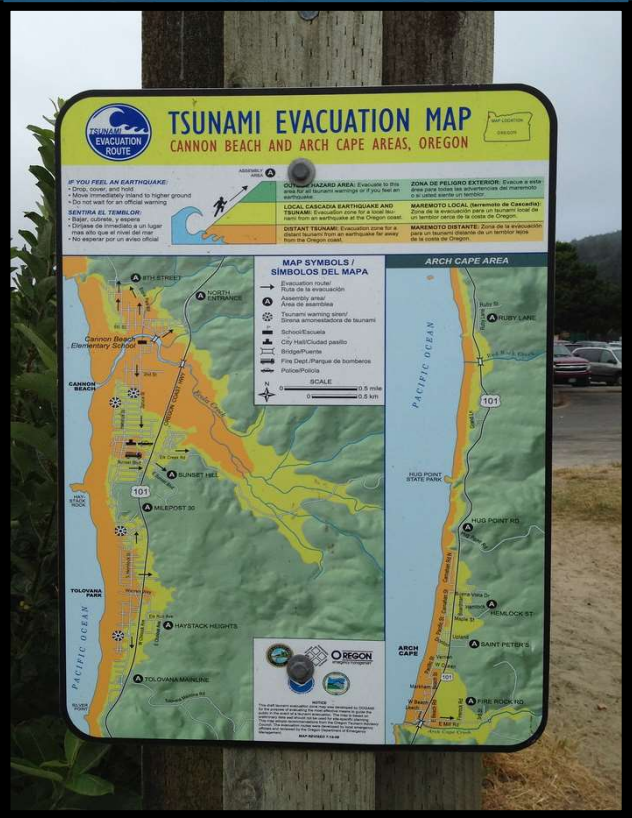
  - Be exhaustingly thorough
- **Compiling and tracking data**
  - What does your agency use to manage locational data?
  - Keep your records updated as you replace/install signs

Lessons Learned/Best Practices – Routes and Signage

- **Route accessibility and maintenance**
  - You may have requirements to make routes accessible to mobility devices
  - Routes degrade over time, especially if unpaved and/or in rural areas
  - Long-term projects: harden routes, install lighting, establish more accessible paths
  - Routes along/onto private property may require access agreements with owners
- **Route signage**
  - Line of sight requires a LOT of signs…
    as does ensuring general awareness in the inundation zone!

So let’s get creative!



Thank you!

Institute for Hazard Mitigation Planning and Research
Resilient and Safe Communities

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Communities Included in Project

Aberdeen
Anacortes
Bellingham
Cosmopolis
Grayland
Hoh
Hoquiam
Ilwaco
La Push
Leadbetter Park
Long Beach
Neah Bay
Ocean City/Copalis Beach/
Seabrook/ Pacific Beach/Moclips
Ocean Park
Ocean Shores (north)
Ocean Shores (south)
Port Angeles
Port Townsend
Queets
Quinault
Seaview
Taholah
Tokeland/North Cove
Westport