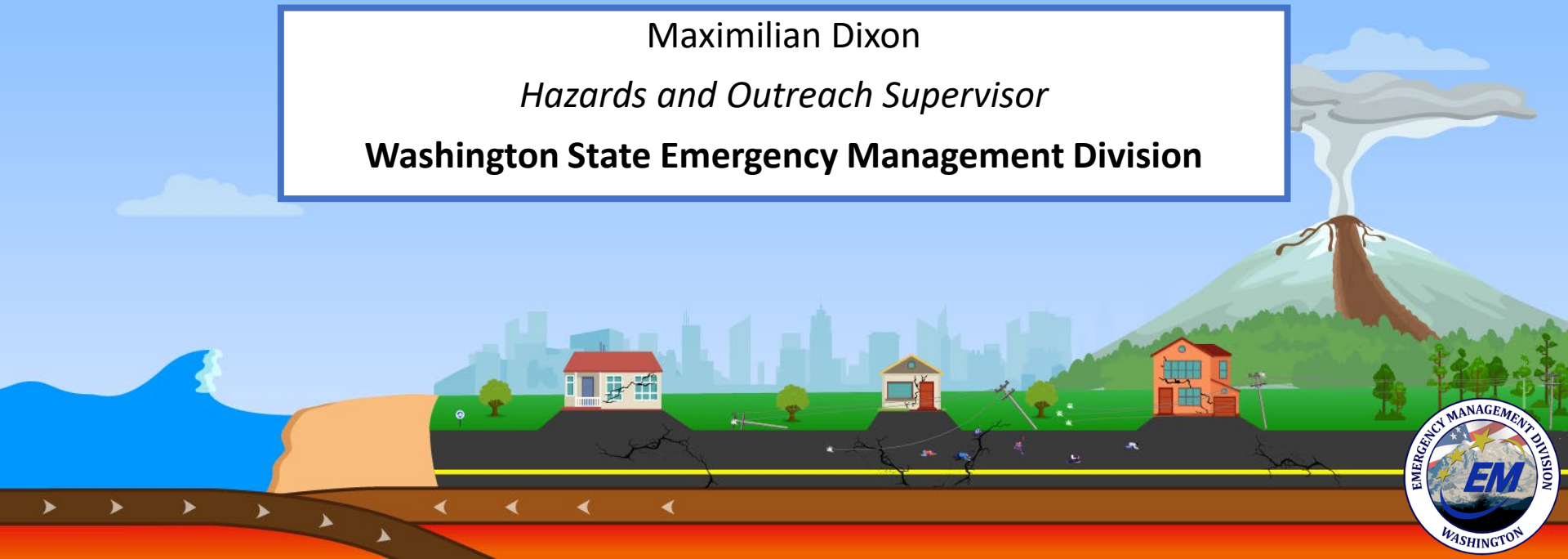


# Vertical Evacuation on the outer coast of Washington

Maximilian Dixon

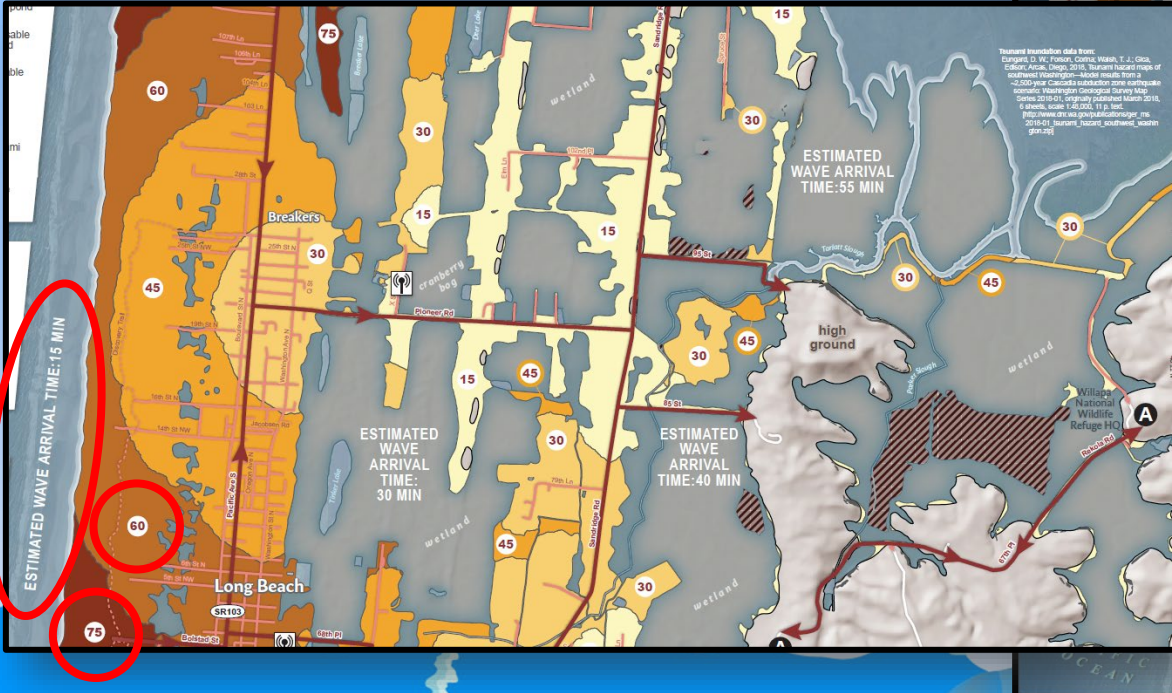
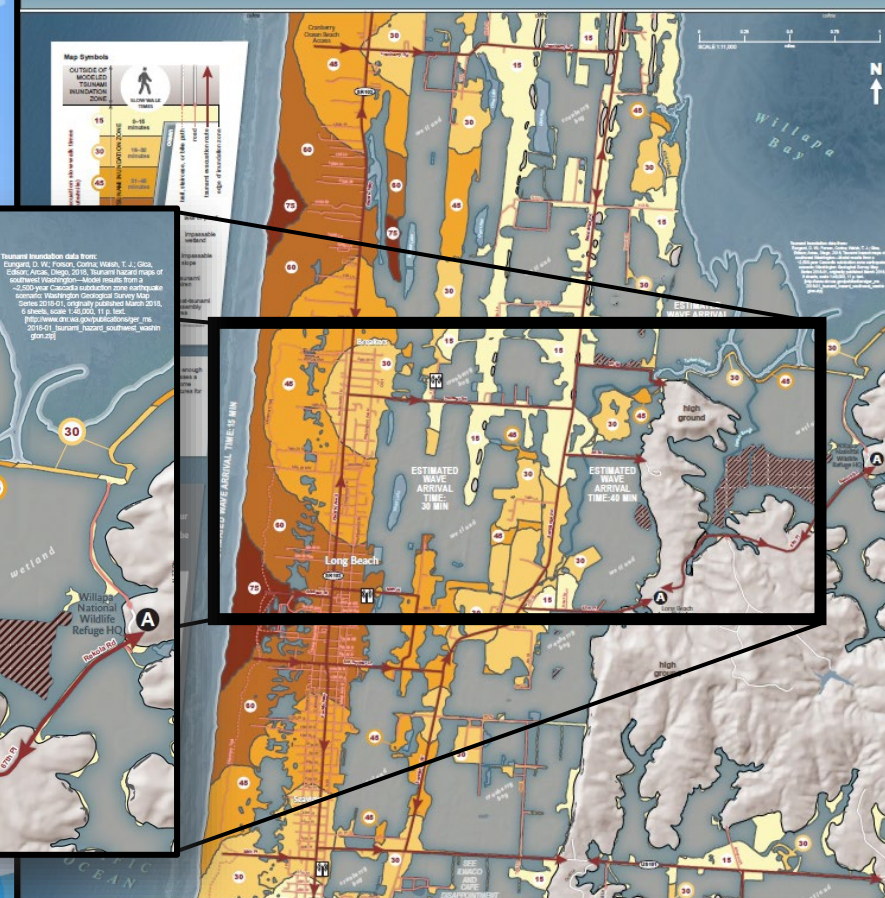
*Hazards and Outreach Supervisor*

**Washington State Emergency Management Division**



# Vertical evacuation is vital in many outer coast communities

## Long Beach and Seaview Tsunami Evacuation Walk Times



ESTIMATED WAVE ARRIVAL TIME: 15 MIN

ESTIMATED WAVE ARRIVAL TIME: 55 MIN

ESTIMATED WAVE ARRIVAL TIME: 30 MIN

ESTIMATED WAVE ARRIVAL TIME: 40 MIN

ESTIMATED WAVE ARRIVAL TIME: 15 MIN

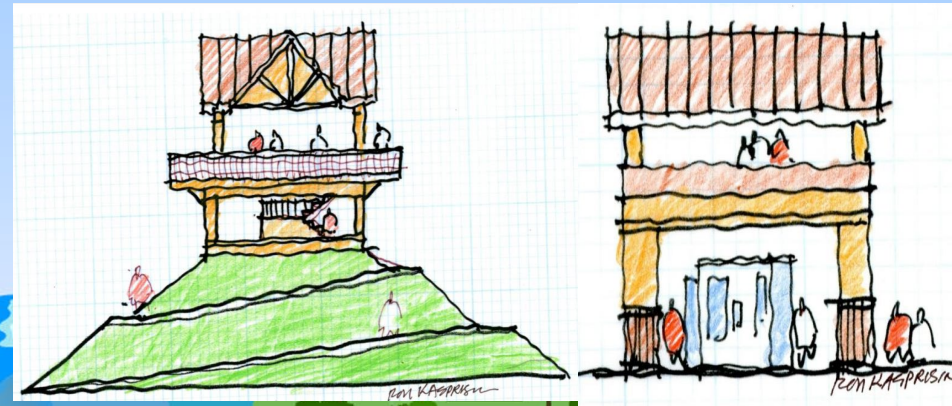
ESTIMATED WAVE ARRIVAL TIME: 30 MIN

ESTIMATED WAVE ARRIVAL TIME: 40 MIN

ESTIMATED WAVE ARRIVAL TIME: 45 MIN

# Project Safe Haven - Vertical Evacuation Structures

- **2010 - 12:** Pacific County, Grays Harbor County, Clallam County Community Planning + Visioning Process
- **2013 - 15:** Worked with FEMA to make VES eligible for HMA funding
- **2013 - Today:** Supporting communities with their VES needs, including funding
- **2016:** VES Cost Estimate Report
- **2018:** Vertical Evacuation Manual for Communities
- **2020 - 21:** Site Verification and Assessment of Vertical Evacuation Options



# Resulted in the funding of VES's

- Ocosta Elementary School
  - 1<sup>st</sup> VES in North America
- Shoalwater Bay Tribe
  - 1<sup>st</sup> standalone tower
- Ocean Shores VES
  - Under Way
- Westport VES
  - Funding pending



# Tsunami Vertical Evacuation Needs Assessment

- **Conducted by the Institute for Hazards Mitigation Planning and Research** at the University of Washington
- Built off work begun in 2010 by Project Safe Haven
- Project determined **how many vertical evacuation structures (VES) needed in each county** and potential locations
- **Study areas:** Pacific, Grays Harbor, and Clallam Counties
- **Several high-risk communities or “study areas” were assessed:**
  - **Pacific County:** Ilwaco, Seaview, Long Beach South, Long Beach North, Ocean Park, Oysterville, Leadbetter, Tokeland, and North Cove
  - **Grays Harbor County:** Grayland, Westport, Ocean Shores West, Ocean Shores East, Taholah
  - **Clallam County:** La Push and Neah Bay



# VES Options Proposed

- **Option #1: No Vertical Evacuation:** Assumes no new or future vertical evacuation structures will be built.
- **Option #2: Community-Derived Vertical Evacuation:** Includes VES locations proposed through Project Safe Haven.
- **Option #3: Broad Spatial Coverage:** Attempts broad spatial coverage in each study area. “Cadillac” option.
- **Option #4: Efficient/Lean:** Attempts balance between cost and coverage (the “biggest bang for the buck”). Some locations were moved or removed to develop an option that is both strong (in terms of coverage, # of people in walking distance) and realistic (in terms of cost).



### Ocean Shores - West: Context Map

- Community Study Area
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassable)
- Evacuation Zone

0.75 0.375 0.75 1.5 Miles

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### Ocean Shores - West: Option #1 (no VES)

- Community Study Area
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassable)

#### *(Slow Walk) Walk Speed to High Ground*

- <15 Minutes
- 15-25 Minutes
- 25+ Minutes

0.75 0.375 0.75 1.5 Miles

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# Ocean Shores - West: Comparison of All Options (1-4)

# of proposed VES = 0



7.8%

% of people within 15 minutes of high ground



8.8%

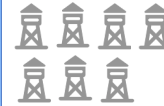
% of people within 25 minutes of high ground

N/A

\*Minimum VES Capacity (# of People)

Option #1

# of proposed VES = 11



4,633

\*Minimum VES Capacity (# of People)



76.9%

% of people within 15 minutes of high ground or vertical evacuation

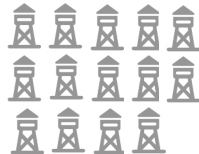


99.4%

% of people within 25 minutes of high ground or vertical evacuation

Option #2

# of proposed VES = 14



5,027

\*Minimum VES Capacity (# of People)



82.7%

% of people within 15 minutes of high ground or vertical evacuation

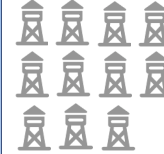


99.6%

% of people within 25 minutes of high ground or vertical evacuation

Option #3

# of proposed VES = 11



4,860

\*Minimum VES Capacity (# of People)



80.2%

% of people within 15 minutes of high ground or vertical evacuation



99.5%

% of people within 25 minutes of high ground or vertical evacuation

Option #4



# Summary Tables: Total estimated population in tsunami zone = ~71,186

## OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	54.9%	39,115	45.1%	32,073	66.4%	47,282

## OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
58	16,302	77.9%	55,420	22.1%	15,766	95.4%	67,907

## OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
82	22,804	87.0%	61,959	13.0%	9,227	99.2%	70,603

## OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
58	21,049	86.3%	61,441	13.7%	9,747	98.4%	70,013

# Questions?

Learn about how to get  
prepared for tsunamis:  
[mil.wa.gov/tsunami](http://mil.wa.gov/tsunami)



Learn about how to get  
alerts:  
[mil.wa.gov/alerts](http://mil.wa.gov/alerts)



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