

State of Oregon
Oregon Department of Geology and Mineral Industries
Brad Avy, State Geologist

OPEN-FILE REPORT O-19-01

**SUMMARY REPORT ON THE OREGON COASTAL HOSPITAL
SPECIAL LEADERSHIP EVENT**

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2019

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Oregon Department of Geology and Mineral Industries Open-File Report O-19-01
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TABLE OF CONTENTS

1.0 Introduction	4
2.0 Flipchart Notes	12
3.0 Leadership Event Photographs	14
4.0 Cascadia Region Earthquake Workgroup (CREW) Fact Sheets.....	17
5.0 Presentations	18
5.1 Welcome by Mike Harryman, State Resilience Officer, Office of the Governor	19
5.2 Coastal hospital project results summary, Yumei Wang, DOGAMI.....	22
5.3 Tsunami planning, Daniel Cox, Oregon State University	35
5.4 Disaster power planning, Yumei Wang, DOGAMI	51
5.5 State of Oregon fuel action plan, Deanna Henry, Oregon Department of Energy	55
5.6 Disaster water planning, Yumei Wang, DOGAMI	63
5.7 Federal response to disasters, John Smart, U.S. Health and Human Services	75
6.0 Completed Feedback Forms	82
7.0 Follow-up Correspondence.....	113
8.0 DOGAMI Resilience Planning Maps	115
8.1 Introduction	115
8.2 Tsunami information on maps	116
8.3 Evacuation information on maps	117
8.4 Facilities located on maps	117
8.5 Local fuel supply resources located on maps.....	117
8.6 Water system facilities located on maps	118
8.7 Bridges located on maps	118
8.8 Community Points of Distribution located on maps	118
8.9 General information on maps	118
8.10 Additional information on maps	118
9.0 Acknowledgments	119

LIST OF FIGURES

Figure 1. Invitation letter.....	6
Figure 2. Event agenda	7
Figure 3. Participant list.....	11
Figure 4. Site resilience planning map and regional resilience planning map for the Tillamook Regional Medical Center	116

LIST OF SITE AND REGIONAL RESILIENCE PLANNING MAPS

Maps are oversize PDFs. See digital folder for map files.

Columbia Memorial Hospital, Astoria regional map

Columbia Memorial Hospital, Astoria site map

Seaside Providence Hospital, Seaside regional map

Seaside Providence Hospital, Seaside site map

Tillamook Regional Medical Center, Tillamook regional map

Tillamook Regional Medical Center, Tillamook site map

1.0 INTRODUCTION

The Oregon Health Authority (OHA) hosted the Coastal Hospital Special Leadership Event on March 20 and 21, 2018, in Newport, Oregon. This leadership event was organized by OHA, Healthcare Preparedness Liaisons from Regions 1, 2, and 3, and the Oregon Department of Geology and Mineral Industries (DOGAMI) and was co-sponsored by the Cascadia Region Earthquake Workgroup (CREW.org).

This by-invitation-only event was the first time that coastal hospital executives and their partners from Regions 1, 2, and 3 have been brought together. Invitations (**Figure 1**) were extended to persons representing:

- Hospitals
- Healthcare partners
- Public health partners
- County emergency managers
- Elected officials
- Subject matter experts

The event agenda is shown in **Figure 2**. The purpose of the event was to:

- Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami
- Encourage progressive ways to prepare to be able to serve coastal community post-disaster
- Explore launching a coastal hospital-driven collaborative network

The event was attended by hospital executives from the 11 hospitals along the coast. Hospital emergency managers and facility managers also participated. All but one coastal county emergency manager participated, which is important because they and hospitals have a partnership role in planning for Cascadia disasters. Other key partners attending included the Governor's state resilience officer, a state legislator, the chair of the Oregon Seismic Safety Policy Advisory Commission (OSSPAC), a federal emergency manager from the U.S. Department of Health and Human Services, an emergency manager from the Oregon Department of Energy, and researchers from Oregon State University. A full participant list is shown in **Figure 3**.

At the event, information published by DOGAMI about the science and impacts of Cascadia earthquakes and tsunamis was distributed. CREW fact sheets on how to prepare employees, how to prepare for non-structural damage, how to prepare for business continuity, and lessons to businesses from past earthquakes were shared. A resource table had information on preparing hospitals for earthquakes, including structural and non-structural components, as well as planning for emergency water and emergency power supplies. Resilience planning maps prepared by DOGAMI for three hospitals were displayed. These maps, which can be used by the hospitals to develop resilience action plans, are:

- Regional resilience planning map for Columbia Memorial Hospital, Astoria
- Site resilience planning map for Columbia Memorial Hospital, Astoria
- Regional resilience planning map for Seaside Providence Hospital, Seaside
- Site resilience planning map for Seaside Providence Hospital, Seaside
- Regional resilience planning map for Tillamook Regional Medical Center, Tillamook
- Site resilience planning map for Tillamook Regional Medical Center, Tillamook

The program struck a balance between sharing information and engaging the participants. Speakers provided information on why coastal hospitals should accelerate Cascadia preparedness and how a

coastwide collaborative learning network could help. Hospital executives and partners, including the Oregon Association of Hospitals and Healthcare Systems (OAHHHS), agreed to accelerate resilience activities and form a network. Based on the discussions during this event, it is likely that in the future, all coastal hospitals will be better prepared for a Cascadia earthquake and tsunami. Based on feedback from this event, the event achieved its intended purpose and was considered to be a success.

This report provides a record of the event and includes:

- Introduction
- Example of invitation letter
- Agenda
- Participant list
- Flipchart notes
- Leadership event photographs
- Links to Cascadia Region Earthquake Workgroup (CREW) fact sheets
 - Employee preparedness
 - Non-structural damage
 - Emergency and continuity planning
 - Learning from experience
- Presentations
 - Welcome, Mike Harryman, State Resilience Officer, Office of Governor Kate Brown
 - Coastal hospital projects summary, Yumei Wang, DOGAMI
 - Tsunami planning, Dan Cox, Oregon State University
 - Disaster power planning, Yumei Wang
 - State of Oregon fuel action plan, Deanna Henry, Oregon Department of Energy
 - Disaster water planning, Yumei Wang
 - Federal response to disasters, John Smart, U.S. Health and Human Services
- Feedback forms
- Follow-up correspondence
- Example of resilience planning maps and description of content

Figure 1. Invitation letter.

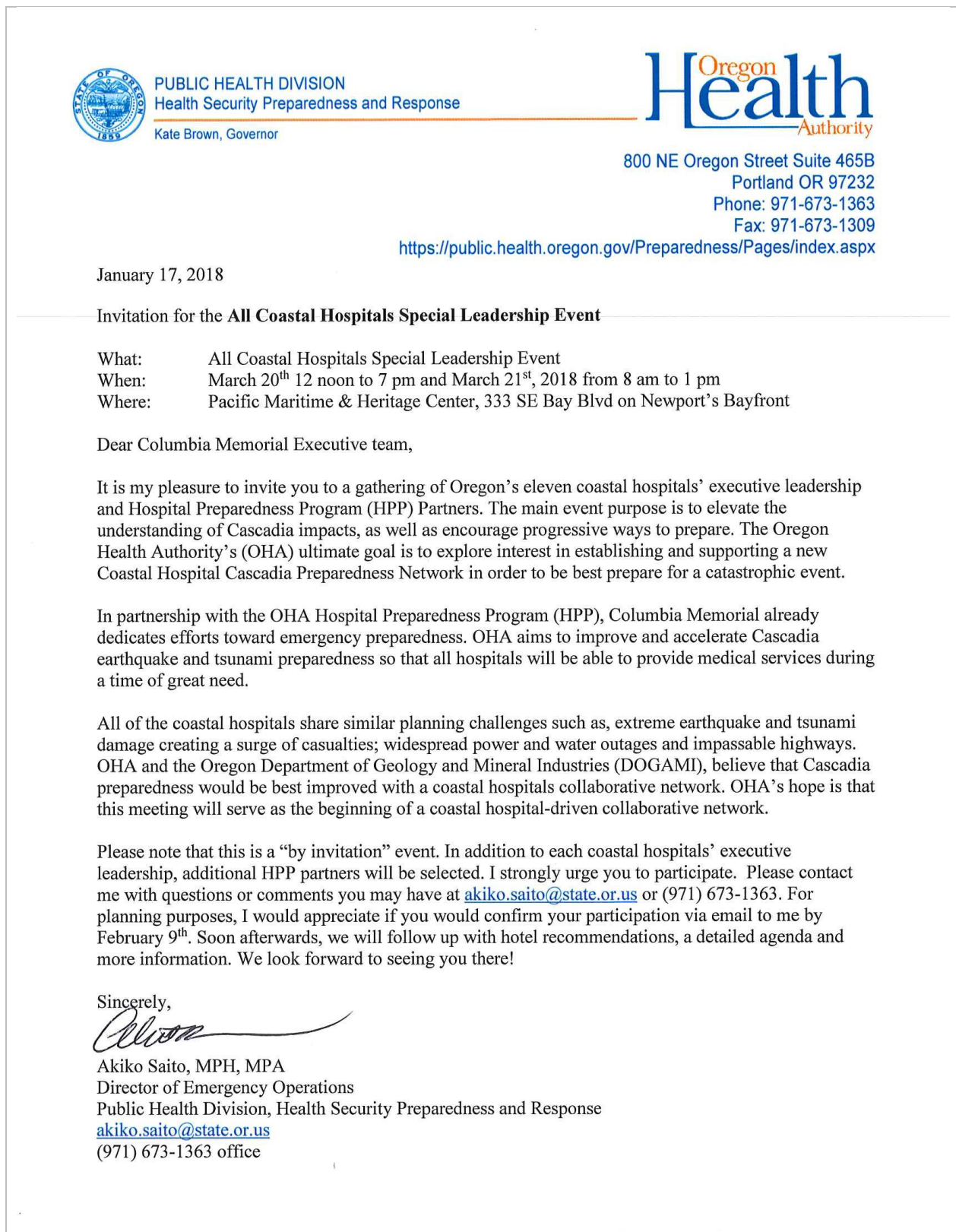


Figure 2. Event agenda (continued on next page).





Coastal Hospitals Special Leadership Event

Pacific Maritime Heritage Center

333 SE Bay Boulevard

Newport, OR 97365

Tuesday, March 20, 2018

12:00-5:00pm

5:00-7:00pm Get Ready for Cascadia Networking

Overall Event Purpose:

- Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami.
- Encourage progressive ways to prepare to be able to serve coastal communities post-disaster.
- Explore launching a coastal hospital-driven collaborative network.

Quick Glance Agenda:

Lunch Meet & Greet	12:00-1:00pm	Hospital Technical Assistance Results	3:00-3:45pm
Welcome & Agenda Review	1:00-1:45pm	Coastal Hospital Learning Network	3:45-4:30pm
Introductions	1:45-2:10pm	New Innovations for Tsunami Safety	4:30-4:50pm
Coastal Hospital Project Results	2:10-2:40pm	Meeting Close	4:50-5:00pm
Break	2:40-3:00pm	Get Ready for Cascadia Networking	5:00-7:00pm

Full Participant Agenda			
Topic	Desired Outcome	Lead	Time
Lunch Meet & Greet	<ul style="list-style-type: none"> Provide a welcoming environment for participant connection and nourishment 	ALL	12:00-1:00pm
Welcome, Event Purpose, Agenda Review	<ul style="list-style-type: none"> Welcome participants and acknowledge their time commitment to the event Understand the purpose of the Coastal Hospitals Special Leadership Event Knowledge of the importance of coastal resilience 	Akiko Saito, Director of Emergency Operations Oregon Health Authority/ Public Health Division/ Health, Security, Preparedness & Response Program	1:00-1:15pm
		Andy Van Pelt, Executive Vice President, Oregon Association of Hospitals & Health Systems	1:15-1:30pm
		Mike Harryman, State Resilience Officer, Governor's Office	1:30-1:45pm
Introductions	<ul style="list-style-type: none"> Build group familiarity to contribute to working relationships 	Kathryn Richer, (Moderator) Region 1 Hospital Preparedness Program Liaison	1:45-2:10pm
Coastal Hospital Project Results	<ul style="list-style-type: none"> Understand DOGAMI's learnings from working directly with hospitals 	Yumei Wang, Geotechnical Engineer, Oregon Department of Geology and Mineral Industries (DOGAMI)	2:10-2:40pm

Event agenda (continued)

Full Participant Agenda			
Topic	Desired Outcome	Lead	Time
Break	♦ Refresh, renew, mingle	ALL	2:40-3:00pm
Hospital Technical Assistance Results	♦ Awareness of progress made in understanding Cascadia Subduction Zone/Tsunami preparedness, and current concerns <ul style="list-style-type: none"> • What are hospitals' greatest strengths/ best practices in preparing for a CSZ Earthquake and Tsunami? (e.g. seismic strength of building including non-structural components; seismically-certified emergency power system; water plans for sheltering and post-earthquake operations; business continuity plans during surge, other plans) • How could a Coastal Hospital Learning Network support you in reaching your CSZ Earthquake/Tsunami preparedness goals? • What impacts have DOGAMI and Oregon Department of Energy's work had on your hospital's planning? <ul style="list-style-type: none"> ◦ What have been the most eye-opening learnings from their data and advice? 	Beth DePew, (Moderator) Region 3 Hospital Preparedness Program Liaison Hospital Emergency Management Personnel	3:00-3:45

Full Participant Agenda			
Topic	Desired Outcome	Lead	Time
Coastal Hospital Learning Network	♦ Explore the need/desire of Hospital Leadership for establishing a Coastal Hospital Learning Network <ul style="list-style-type: none"> • Identify benefits • Identify top preparedness concerns to address 	Akiko Saito (Moderator) Hospital Leadership	3:45-4:30pm
New Innovations for Tsunami Safety	♦ Awareness of innovative actions that can be taken by communities, including hospitals, to prepare for Tsunamis ♦ Learn about Oregon State University's Hatfield Tsunami Vertical Evacuation building plans ♦ Knowledge of OSU's conducting research with utilities on Cascadia resilience	Yumei Wang (Moderator) Dr. Dan Cox , Director, O.H. Hinsdale Wave Research Laboratory, Oregon State University	4:30-4:50pm
Remarks on Day 1 Sessions	♦ Acknowledge accomplishments of Day 1 ♦ Understand goals of Day 2 ♦ Awareness of "Get Ready for Cascadia Networking" for North, Central, and South coast discussions on a new Coastal Hospital Learning Network	Akiko Saito	4:50-5:00pm

Get Ready for Cascadia Networking (snacks and no host bar available)

5:00-7:00pm

Event agenda (continued)



Coastal Hospitals Special Leadership Event

Pacific Maritime Heritage Center

333 SE Bay Boulevard

Newport, OR 97365

Wednesday, March 21, 2018

8:00am-1:00pm

Overall Event Purpose:

- ♦ Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami.
- ♦ Encourage progressive ways to prepare to be able to serve coastal communities post-disaster.
- ♦ Explore launching a coastal hospital-driven collaborative network.

Quick Glance Agenda:

Welcome & Today's Goals	8:00-8:15am	Region 2 Hospital CSZ/Tsunami Preparedness Activities	10:00-10:30am
Cascadia Subduction Zone: Impacts and Mass Care Policies	8:15-8:40am	Recent Hurricane Hospital Impacts	10:30-11:00am
Cascadia Emergency Power Planning	8:40-9:10am	Coastal Hospital Learning Network	11:00am-12:00pm
Cascadia Emergency Water Planning	9:10-9:40am	Closing Comments & Working Lunch	12:00-1:00pm
Break	9:40-10:00am		

Full Participant Agenda

Topic	Desired Outcome	Lead	Time
Welcome & Today's Goals	♦ Refresh understanding of the overarching event purpose	Yumei Wang, Oregon Department of Geology and Mineral Industries	8:00-8:15am
Cascadia Subduction Zone: Impacts and Mass Care Policies	♦ Knowledge of Cascadia Subduction Zone impacts to coastal communities and the importance of medical services provision ♦ Awareness of OSSPAC's efforts to develop mass care policies as part of 2017 Senate Bill 850	Yumei Wang (Moderator) Jay Raskin, Oregon Seismic Safety Policy Advisory Commission (OSSPAC), Chair	8:15-8:40am
Cascadia Emergency Power Planning	♦ Understand the Oregon Department of Energy's fuel allocation planning ♦ Understand county emergency managers' and hospitals' need to plan together to obtain fuel ♦ Understand hospitals' need to have robust emergency power systems and 3 weeks of locally available fuel	Yumei Wang (Moderator) Deanna Henry, Emergency Preparedness Manager, Oregon Department of Energy (ODOE)	8:40-9:10am
Cascadia Emergency Water Planning	♦ Understand hospitals' need to have robust water systems and 3 weeks locally available water ♦ Understand water system vulnerabilities and ways for hospitals to improve emergency water planning ♦ Understand the need for water districts, county emergency management, and hospitals to plan together	Yumei Wang	9:10-9:40am

Event agenda (continued)

Full Participant Agenda			
Topic	Desired Outcome	Lead	Time
Break	♦ Refresh, renew, mingle	ALL	9:40-10:00am
Region 2 Hospital Cascadia Subduction Zone/Tsunami Preparedness Activities	♦ Knowledge of local preparedness activities to date <ul style="list-style-type: none"> • Ericka Mason, Emergency Management Coordinator, Samaritan North Lincoln and Samaritan Pacific Communities, Newport 	Sue Lamb, (Moderator) Region 2 Hospital Preparedness Program Liaison	10:00-10:30am
Recent Hurricane Hospital Impacts	♦ Knowledge of how recent hurricanes impacted hospitals ♦ Awareness of lessons learned; implications for Cascadia earthquakes and coastal hospitals	U.S. Health & Human Services, Regional Emergency Coordinator	10:30-11:00am
Coastal Hospital Learning Network	♦ Hear input from all participants on the need/desire of Hospital Leadership and partners for establishing a Coastal Hospital Learning Network <ul style="list-style-type: none"> • Public Health • County Emergency Management • Elected Officials • Other Hospital Representatives ♦ Agree if there is consensus ♦ Determine next steps	Akiko Saito, (Moderator) Director of Emergency Operations, Oregon Health Authority/Public Health Division/Health, Security, Preparedness & Response Program	11:00am -12:00pm
Closing Comments	♦ Closing remarks	Akiko Saito and Yumei Wang	12:00-12:15pm
Working Lunch	♦ Encourage informal discussions on how to launch a successful Network ♦ Identify collective actions that can be taken to improve hospitals' and coastal communities' resiliency for a CSZ event.	ALL	12:15-1:00pm
Adjourn			

Figure 3. Participant list.

Coastal Hospital Resiliency Workshop - Newport, OR - 3/20/2018 - 3/21/2018		
Last Name	First Name	Organization
Aikman	Valarie	Bay Area Hospital
Allan	Jon	DOGAMI
Alvarez-Rojas	Wayne	Tillamook Regional Medical Center
Austen	Rebecca	Lincoln County
Barbosa	Andre	Oregon State University
Brown	Tiffany	Clatsop County
Bruce	Rob	Tillamook Health Department
Buckley	Samantha	Coos Health and Wellness
Butler	David	Tillamook Regional Hospital
Cox	Dan	Oregon State University
Demaris	Jenny	Lincoln County
Depew	Beth	HSPR
Dumire	Jeremy	Curry County
Escobar-Sinn	Maria	HSPR
Files	Bill	Bay Area Hospital
Goettl	Micah	Samaritan (all)
Gomberg	David	Oregon House of Representatives
Grigoraitis	Billie	Providence Seaside Hospital
Hansen	Kris	HSPR
Harris	Katie	OAHHS
Harryman	Mike	Governors Office
Hatcher	Dewayne	HSPR
Heath	Luke	PCS Structural Solutions
Heiberg	Holly	OSPHD
Henry	Deanna	Oregon Department of Energy
Jurgenson	Edie	So. Coos Hospital
Jurgenson	Dennis	So. Coos Hospital
Kamofski	Jarrod	Columbia Memorial
Kaup	Doug	Columbia Memorial
Kirby	Pat	Peace Harbor Hospital
Lamb	Sue	HSPR
Lang	Jeff	Coquille Valley
Leslie	Haleigh	HSPR
Lindstrom	Matthew	Columbia Memorial
Marr	Donald	Lower Umpqua Hospital
Mason	Ericka	Samaritan Pacific & Samaritan North Lincoln
McCraw	Gordon	Tillamook County
Miller	Karla	Curry General Hospital
Murphy	Mike	Coos County
Mutschler	Teresa	Douglas Public Health Network
Ogden	Lesley	Samaritan North Lincoln Hospital & Samaritan Pacific Communities Hospital
Phair	Brian	PCS Structural Solutions
Raskin	Jay	OSSPAC
Richer	Kathryn	Multnomah County
Rifle	Virginia	Samaritan North Lincoln Hospital
Saito	Akiko	HSPR
Sanford	David	Curry General Hospital
Smart	John	ASPR
Stinson	Wayne	Douglas County
Swanson	Eric	Tillamook Regional Medical Center
Thorsen	Erik	Columbia Memorial
Tittle	JoDee	Southern Coos Hospital and Health Center
Van Pelt	Andy	OAHHA
Wang	Yumei	Oregon Department of Geology and Mineral Industries
Ward	Sherri	Curry County
Williams	Nicole	Columbia Memorial
Zauner	Janiece	Providence Seaside

2.0 FLIPCHART NOTES

**Coastal Hospitals Special Leadership Event
Pacific Maritime Heritage Center
March 20-21, 2018
Discussion Notes**

STRENGTHS/WHAT WORKS

- Administration support of preparedness and allocation of resources to promote planning
- Resources gained through collaboration, far and wide ***and*** in your area.
- Cross-bracing
- Where and how structures are built
- Emergency Preparedness Committee identified specialty skills
- ICS training to support response roles
- SBAR for decision making/reporting (Situation, Background, Assessment Recommendation technique)

OPPORTUNITIES CASCADIA SUBDUCTION ZONE PLANNING PROVIDES

- Strengthening locally while also convening entire coast (e.g. mass care needs assessments and associated resources)
- Engagement with CMS EP Rule-impacted, healthcare facilities (LTCFs, SNFs, etc.); especially re employee preparedness

BARRIERS

- Community partners' level of preparedness

DOGAMI – EYE OPENERS

- Mapping – S, M, L, XL impacts and associated timing
- Knowledge of little things that are do-able
- Cardlock fuel systems in Tsunami Zone
- Water system vulnerability
- The need for partnering with water providers

CONCERNS/WHAT WOULD BE HELPFUL

- Water
- Transport and accessibility
- Power/Fuel/ for the long-term
- Staffing
- Communications: Hospital to Hospital; Hospital to County
- Create catastrophic medical services plan (with a whole community approach)
- Determine how to promote/grow MRCs and SERV-OR, and offer ICS training to these groups
- Know where we stand in priority re receipt of assets
- Share Exercise/Drill approaches
- Resiliency Planning
- Strategize how hospitals can self-support
- Knowing communities' capabilities to communicate
- Develop strategies for funding CSZ planning

COASTAL HOSPITAL NETWORK: LEADERSHIP INPUT

- We can get everything right if we get Cascadia Subduction Zone planning right
- A network is critical
- A network helps to get us out of our geographical boundaries

WHAT WOULD A NETWORK LOOK LIKE?

- Retreats
- Hospital leadership meet regularly
- Utilize existing conferences to merge healthcare and emergency management
- OR Prepared – A Friday healthcare focus
- Utilize gatherings and organizations e.g., OAHHS and Office of Rural Health

WHAT ARE PRIORITY TOPICS FOR THE NETWORK? (Day Two)

HOSPITAL INFRASTRUCTURE

- Water
- Power
- Transportation
- Communications

OTHER

- Community Collaboration
- Policy/funding opportunities to build coastal resiliency
- How can we impact regulatory authorities' requirements?

3.0 LEADERSHIP EVENT PHOTOGRAPHS

All photographs were taken by Sue Lamb, OHA, unless otherwise indicated.



(above photo by Yumei Wang, DOGAMI)





4.0 CASCADIA REGION EARTHQUAKE WORKGROUP (CREW) FACT SHEETS

The following CREW fact sheets were provided to each participant:



Doing Business in Earthquake Country:
Employee Preparedness



Doing Business in Earthquake Country:
Nonstructural Damage



Doing Business in Earthquake Country:
Emergency and Continuity Planning



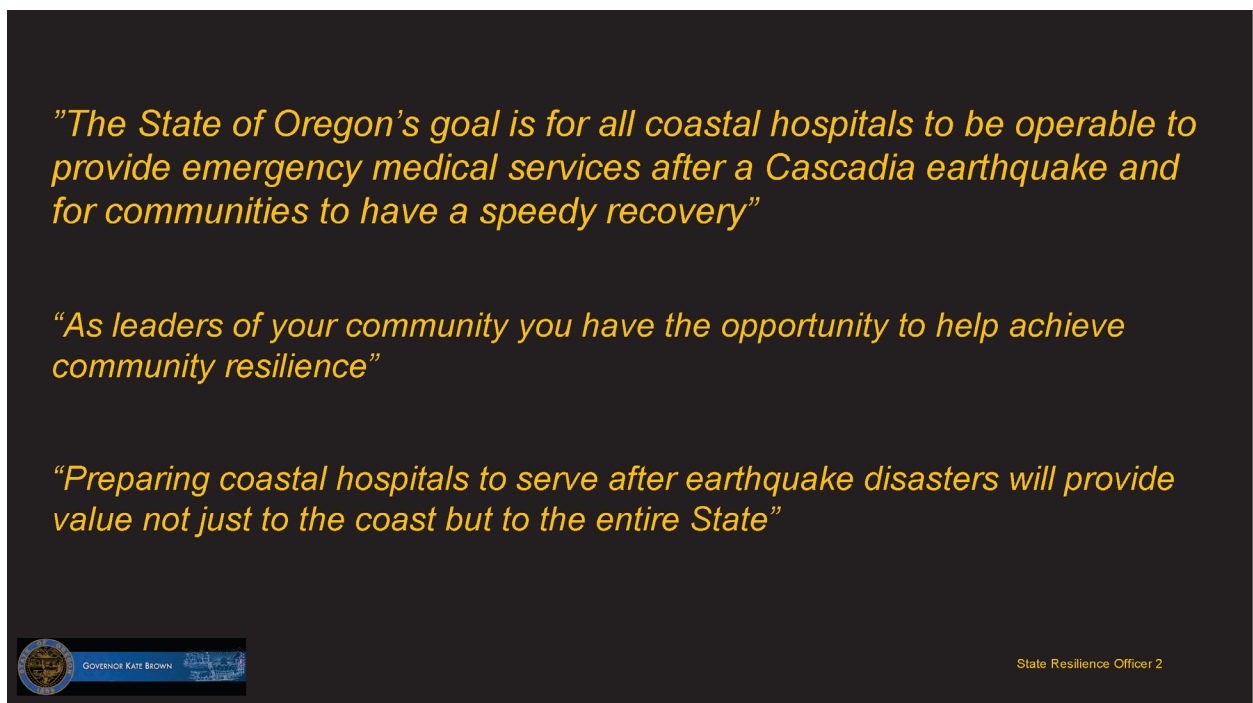
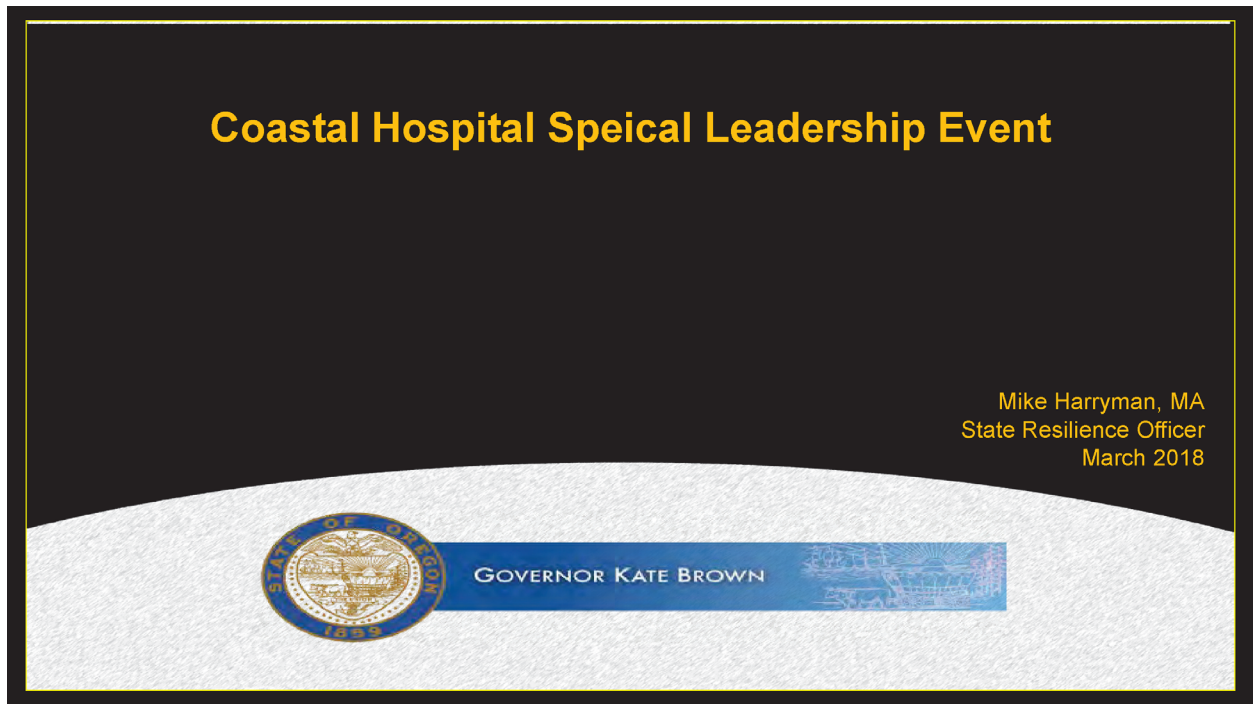
Doing Business in Earthquake Country:
Learning from Experience

5.0 PRESENTATIONS

Presentation slides are provided “as-is” in the order presentations occurred, as follows:

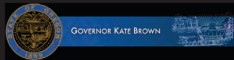
1. Welcome by State Resilience Officer, Mike Harryman, Office of Governor Kate Brown
2. Coastal hospital projects summary, Yumei Wang, DOGAMI
3. Tsunami planning, Dan Cox, Oregon State University
4. Disaster power planning, Yumei Wang
5. State of Oregon fuel action plan, Deanna Henry, Oregon Dept of Energy
6. Disaster water planning, Yumei Wang
7. Federal response to disasters, John Smart, U.S. Health and Human Services

5.1 Welcome by Mike Harryman, State Resilience Officer, Office of the Governor



Leadership – leading from the front...

- *Make preparing for the Cascadia Subduction Zone a priority*
- *Dedicate more resources to hospital preparedness, get the right person(s) who has the drive to lead from the front*
- *Have your executive team (COO/CFO) help each of the sections on preparedness: facilities, finance, safety, operations*



State Resilience Officer 3

Collaborate with critical systems/community organizations

Energy Providers

Public Works

Public Health (Pharmacy MOU)

County Emergency Management

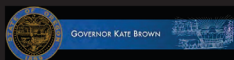
Water Provider

Port Authorities

First Responders

Elected Officials

Collaborate with each other organizations



State Resilience Officer 4

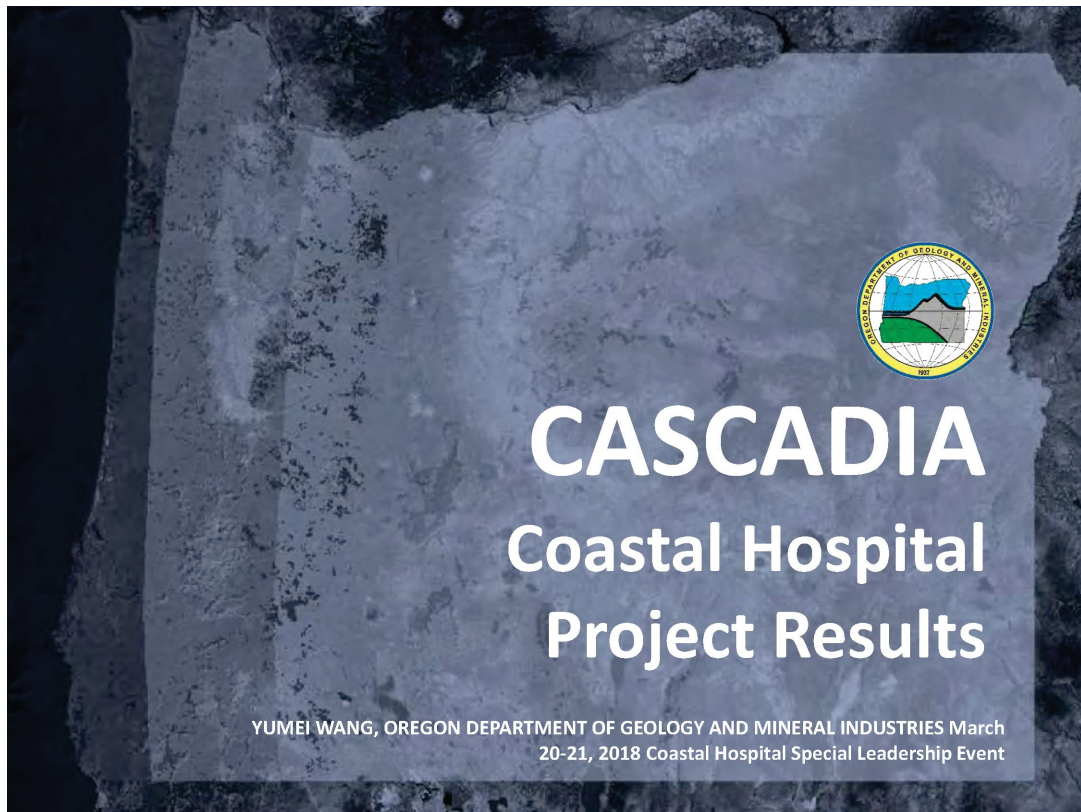
Questions and Contact information –

Mike Harryman, M.A.
Office of Governor Kate Brown
State Resilience Officer
mike.k.harryman@oregon.gov
503.975.1911 (M)
971-673-1541 (O)

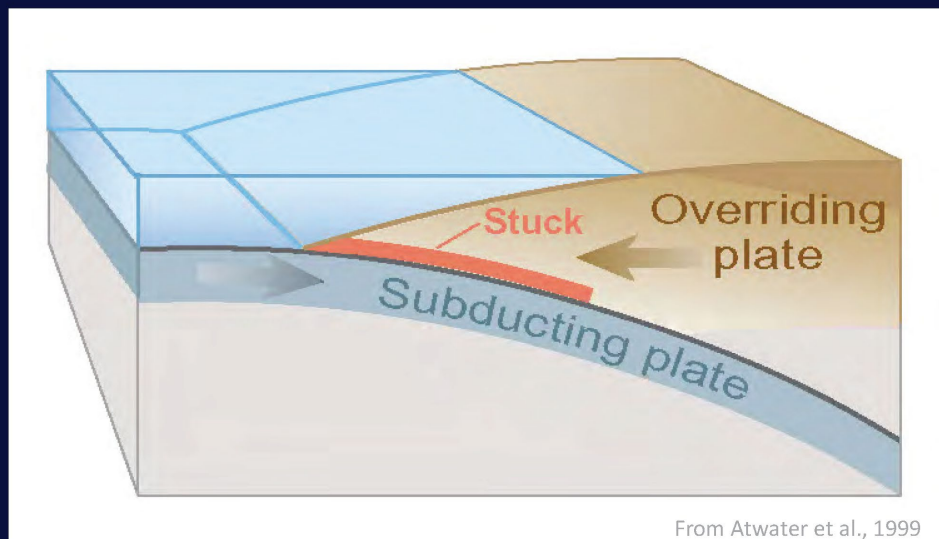


State Resilience Officer 5

5.2 Coastal hospital project results summary, Yumei Wang, DOGAMI



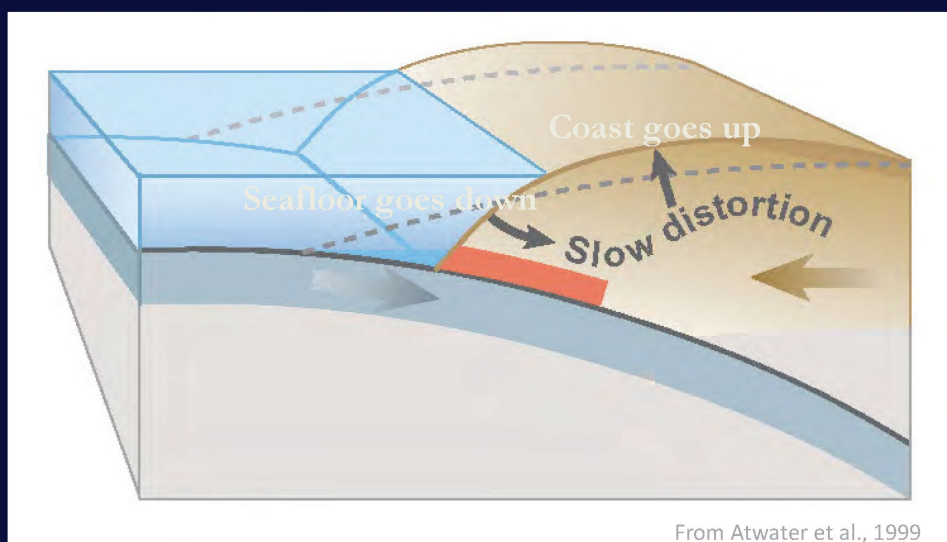
Vertical Slice through Cascadia Fault



Y Wang, DOGAMI, 2018



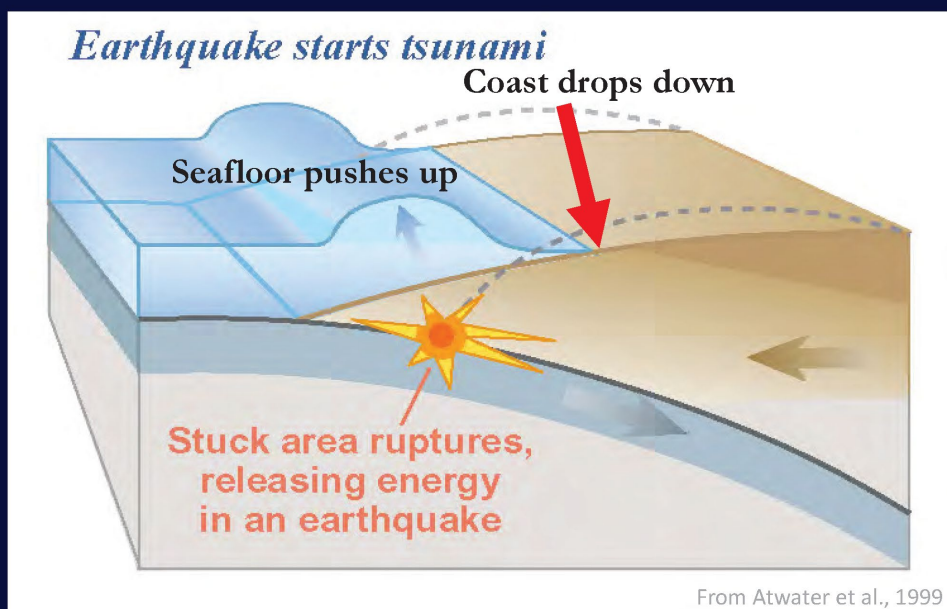
Between Earthquakes



Y Wang, DOGAMI, 2018



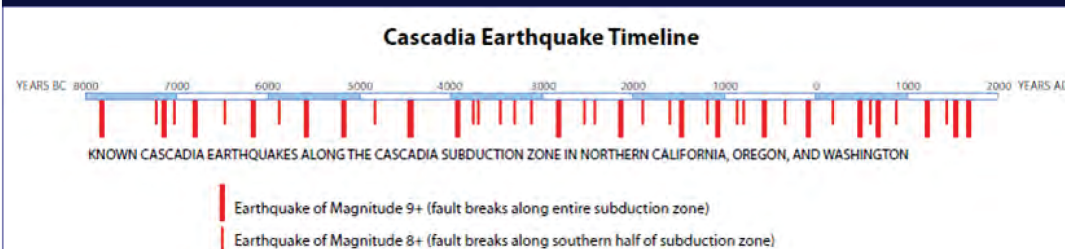
During an Earthquake



Y Wang, DOGAMI, 2018



When, Where, How Big? 100%, but don't know exactly when...



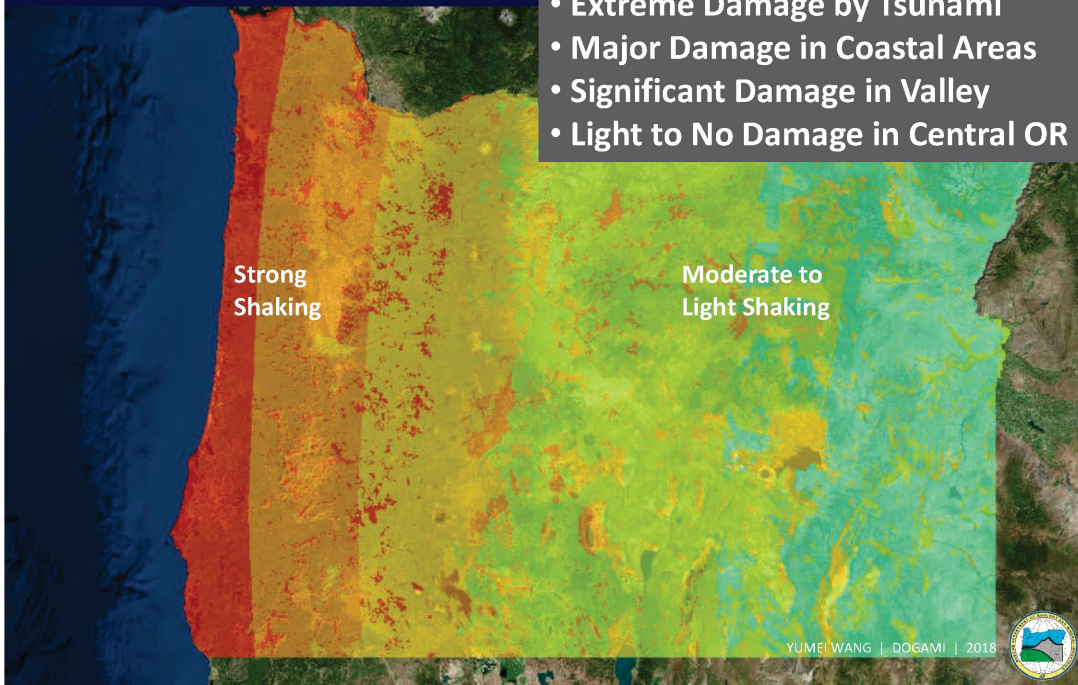
(Goldfinger et al, 2012; Image: DOGAMI Cascadia, 2010)

- Magnitude 9 on Jan 26, 1700 (318 yrs ago)
- ~45 > magnitude 8 in 10,000 year record

Y Wang, DOGAMI, 2018



Shaking (~5 min) & Tsunami (~15 min)



“A Cascadia Subduction Zone (CSZ) event will have farther reaching impacts than that of Katrina and Sandy combined”

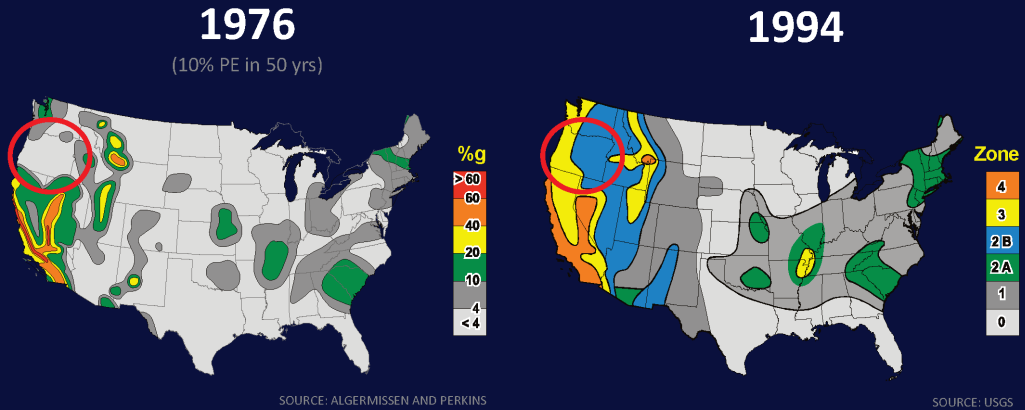
- KEN MURPHY, FORMER FEMA REGION X ADMINISTRATOR

	Cascadia	Japan Tsunami	Sandy	Katrina	Cascadia multiplier (of Sandy + Katrina)
Fatalities	12,000+	16,000	162	1,833	6x
People Needing Short-term Shelter	933,000	470,000	174,000	273,000	2x
Housing Units Damaged	961,000	>1,000,000	305,000	215,000	2x

SOURCE: KEN MURPHY

YUMEI WANG | DOGAMI | 2018

Oregon's Seismic Building Code Gap (until mid-1990s)



Also, we build in the tsunami zone without protecting ourselves

YUMEI WANG | DOGAMI | 2018



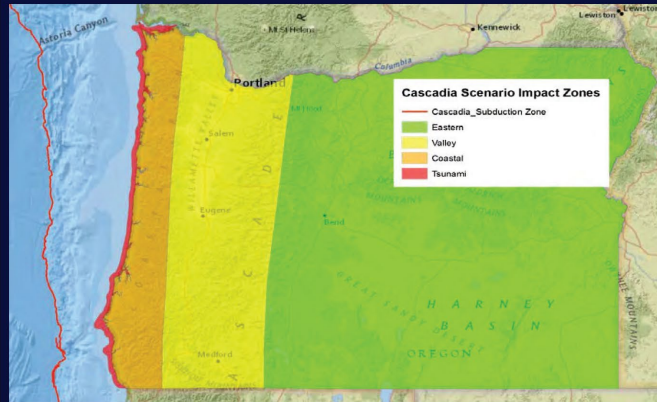
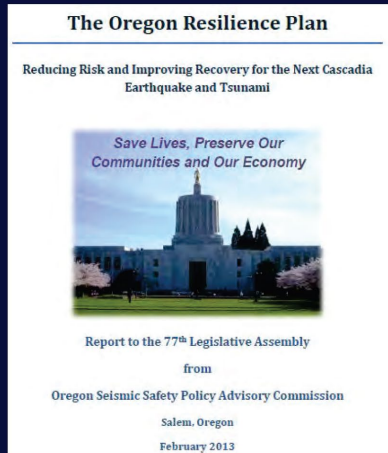
Earthquake Shaking Building Performance *Newer Wood versus Older Brick*



YUMEI WANG | DOGAMI | 2018



2013 Oregon Resilience Plan



3/21/2018

Y. Wang



Three OHA-DOGAMI Projects

1. **2014 Pilot Study: 2 hospitals -- Coast and Valley** (*online report O-17-1*)
2. **2017 Coastal Hospitals Technical Assistance Project**
 - Exchanged info on Cascadia Earthquake and Tsunami (EQT)
 - Ready for storms; Not Ready for Cascadia EQT
 - 4 recommendations in DOGAMI report (*online report O-18-3*)
3. **2018 Coastal Hospitals Resilience Project (*in progress*)**
 - ✓ Ask coastal hospitals to create a collaborative **network**
 - Guidance on emergency power and water
 - Conduct on-site consultative visits

3/21/2018

Y. Wang



2014 Pilot Study

➤ Key Conclusion: Coastal Hospitals Isolated

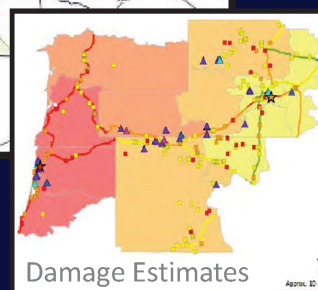
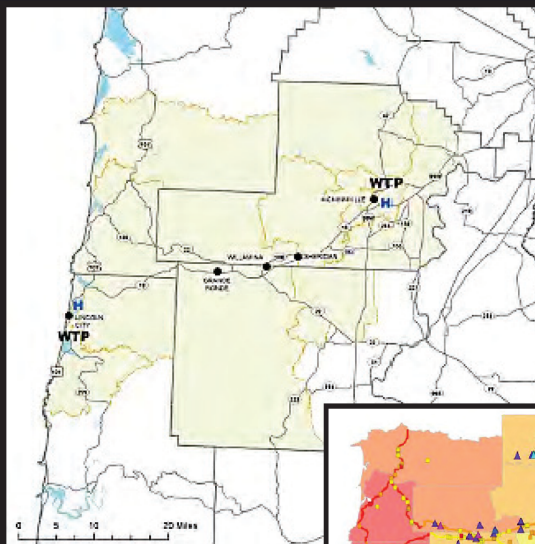
- Coast to Valley
Lincoln City to McMinnville
- 2 hospitals
- 2 water districts
- Connecting highways

DOGAMI report O-17-01
www.oregongeology.org/pubs/ofr/O-17-01.pdf



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Connecting Highways: Hwy 101 and Hwy 18

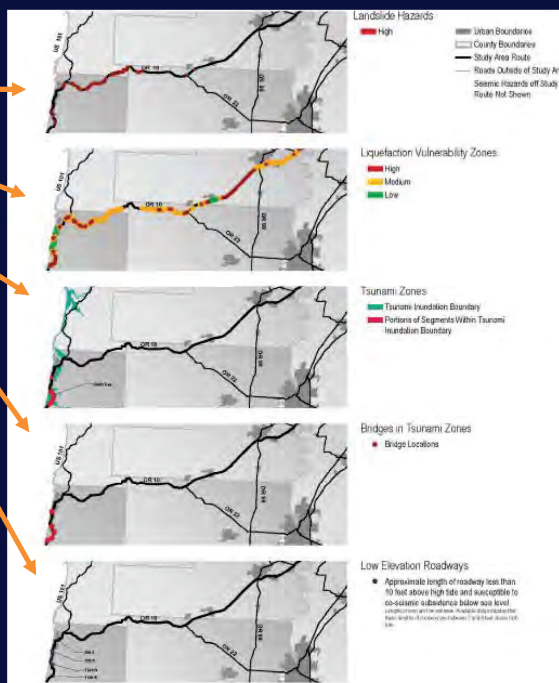
Geologic Hazards

1. Landslides
2. Liquefaction
3. Tsunami
4. Bridges/Tsunamis
5. Roads/Tsunamis

*Analyzed bridges
and highways for
earthquake shaking,
liquefaction, and
landslides*



Y. Wang, DOGAMI, 2018



2017 Coastal Hospitals Technical Assistance Project

- Exchanged Information on Cascadia Preparedness
- Hospital Self-Assessments of Expected Performance

	Number of Hospitals by Expected Performance Level				
	Very Low	Low	Moderate	High	Very High
Building Structure	0	4	5	0	1
Non-Structural Components	0	5	4	1	0
Generator(s)	1	3	2	4	0
Emergency Fuel	1	3	3	3	0
Water for Sheltering	4	3	1	2	0
Water for Hospital Functions	4	5	0	1	0

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2017 Technical Assistance Project Conclusions and Recommendations

- Ready for Winter Storms
 - Not Ready for Cascadia Earthquakes
1. Create *Coastal Hospital Resilience Network* to Accelerate Cascadia Preparedness
 2. Conduct On-Site Consultative Visits
 3. Clarify and Improve Existing Hospital Requirements on Earthquake Preparedness
 4. Encourage Emergency Fuel and Water Planning

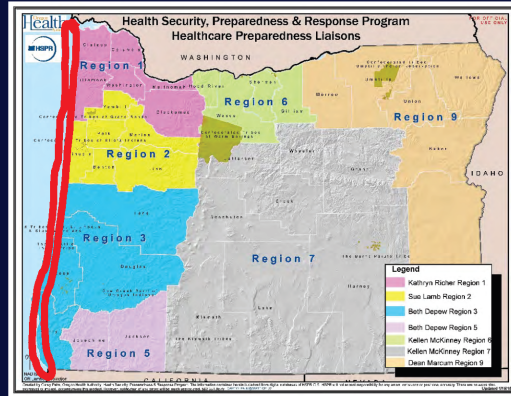
Y Wang, DOGAMI, 2018



2018 Coastal Hospitals Resilience Project

Rec #1: Create Coastal Hospital Resilience Network

- Coastal hospitals are separated across 3 Regions
- Connect Regions 1, 2 & 3 to focus on coastal challenges
 - Strongest shaking
 - Tsunami casualties
 - Geographic isolated
 - Longest response times



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Why a Resilience Network?

- **Network would accelerate Cascadia preparedness**
- **Coastwide “learning community”**
 - Training opportunities
 - Share best practices
- **Collaboration: good ROI**
 - Cost effective, high efficiency
 - Leverage investments
 - Planning and prioritization
- **Discussions can stretch our minds**
 - Clarity on shared goals and values
 - Can inspire an alternative future
 - Set a new direction for transformation
- **Collectively, A Stronger Voice**




Source: en.wikipedia.org/wiki/Mesh_networking#/media/File:NetworkTopology-Mesh.svg



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Oregon Coastal Bridges
SEISMIC VULNERABILITY

- Vulnerable
- Potentially Vulnerable
- Not Vulnerable
- HOSPITALS

Source: DOGAMI

Options for a Resilience Network

Bi-Annual Retreats

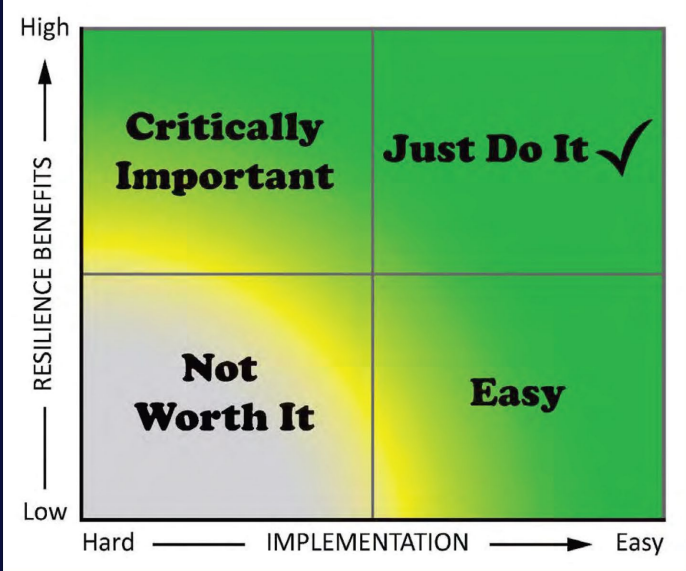
- Alternate hospital host
- Updates from Leaders
- Recognition Awards
- Focus topics
 - Mitigation grants, water planning, etc

- ❖ Columbia Memorial, Astoria (**Tsunami XL**)
- ❖ Providence Seaside, Seaside (**Tsunami M**)
- ❖ Tillamook Regional, Tillamook (**Tsunami L**)
- ❖ Samaritan North Lincoln, Lincoln City
- ❖ Samaritan Pacific Communities, Newport
- ❖ PeaceHealth Peace Harbor, Florence
- ❖ Lower Umpqua Hospital, Reedsport
- ❖ Bay Area Hospital, Coos Bay
- ❖ Coquille Valley, Coquille
- ❖ Southern Coos Hospital and Health Center, Bandon
- ❖ Curry General, Gold Beach (**Tsunami L**)

Y.Wang, DOGAMI, 2018

Resilience Action Plans

Strategic – Prioritize – Incremental



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Photo taken 12/9/2015
Permission from: Jordan Phillips



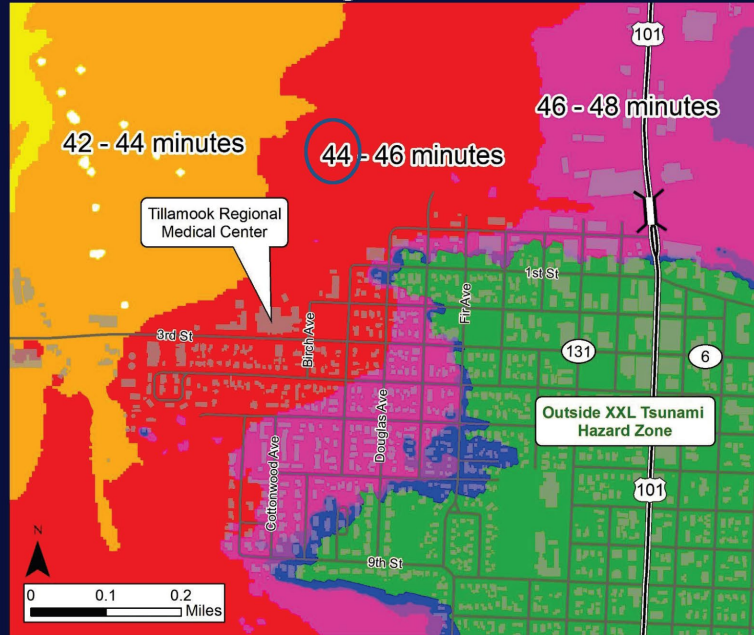
The map illustrates the Tsunami Evacuation Route in Tillamook, Oregon. The route is marked with a red line and arrows, starting from the Tillamook Regional Medical Center and heading south along the coast. The map also shows the Tillamook River, Hoquarton Slough, and various buildings including the Health Care Services, Waud's Funeral Home, Fibre Federal Credit Union, and Tillamook County Library. A scale bar and north arrow are included in the bottom right corner.

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Tillamook Regional XXL Tsunami Arrival Time

44 minutes starting from onset of shaking

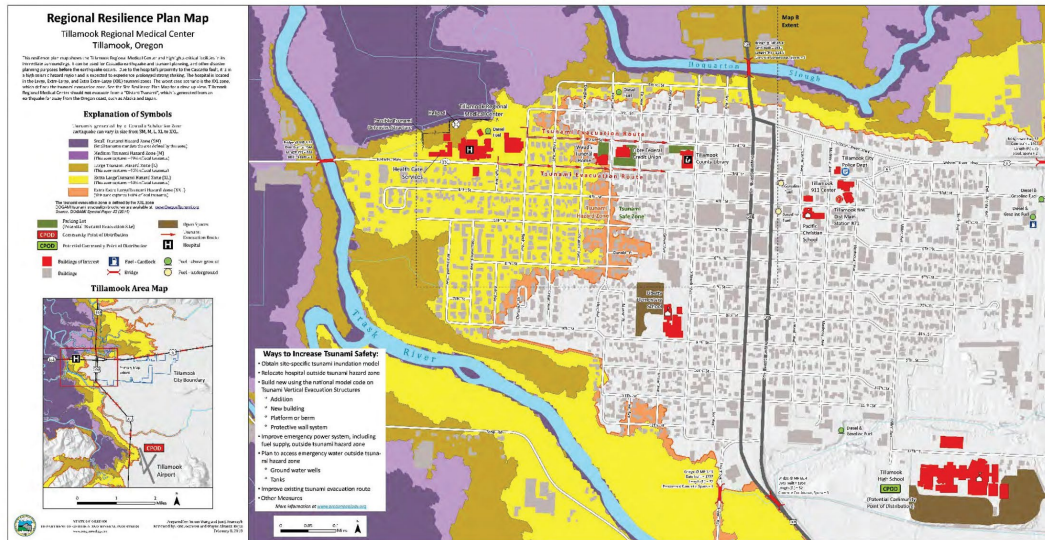


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Regional Resilience Plan Map



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Questions?

www.oregongeology.org



Y Wang, DOGAMI, 2018

Oshiokuri Hato Tsusen no Zu (Fast Cargo Boat Battling The Waves) 1805
<http://thesoundsinsidemyhead.blogspot.com/2008/05/hokusais-great-wave.html>



5.3 Tsunami planning, Daniel Cox, Oregon State University

COLLEGE OF ENGINEERING

Oregon State University

Preparing for the “Really Big One”: Resilient Hospitals in Coastal Oregon

Daniel Cox

*Professor, Coastal Engineering
Oregon State University*

- Member, Am. Soc. Civil Engineers, Tsunami Codes and Standards subcommittee
- Assoc. Director, NIST Center of Excellence for Risk-Based Community Resilience Planning
- Director, Cascadia Lifelines Program
- Lead, 2011 Tohoku Tsunami Disaster Investigations

Collaborators: Shafiq Alam, Andre Barbosa, Lori Cramer, John van de Lindt (CSU), Alireza Mostafizi, Hyongsu Park, Haizhong Wang

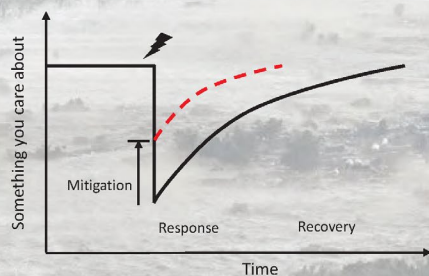
COLLEGE OF ENGINEERING

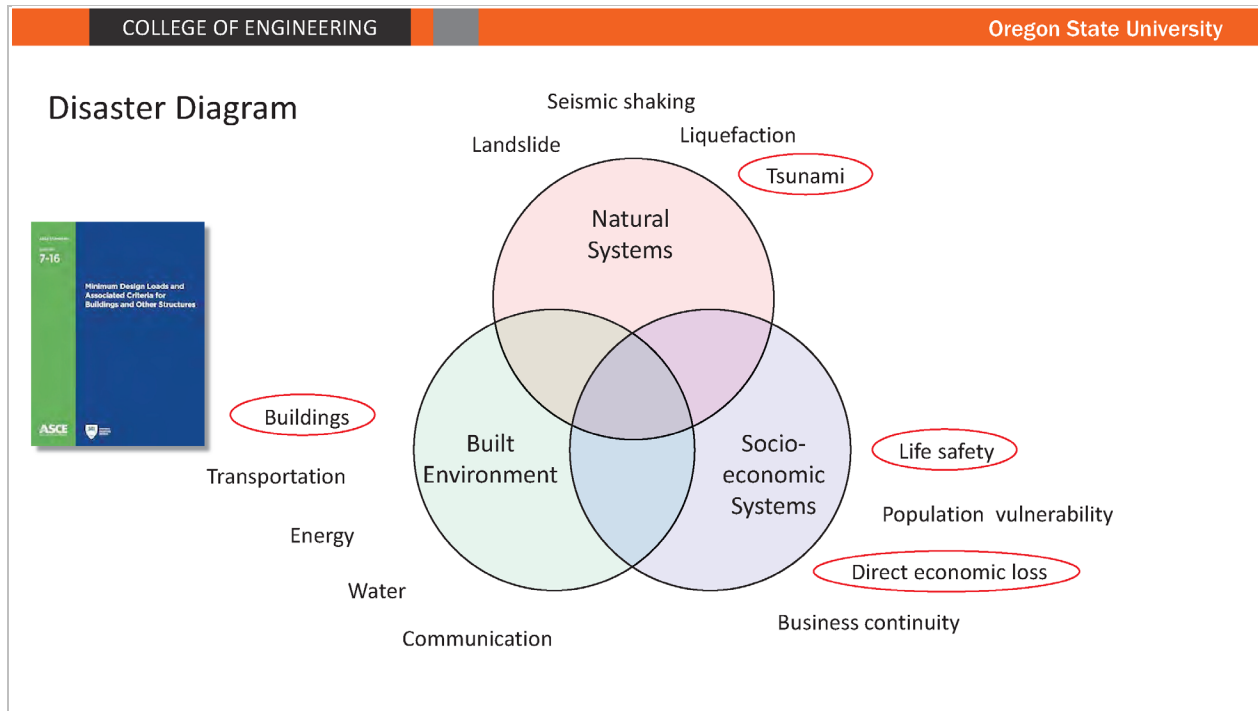
Oregon State University



Resilience


“Ability to resist, absorb and recover from a sudden stress”



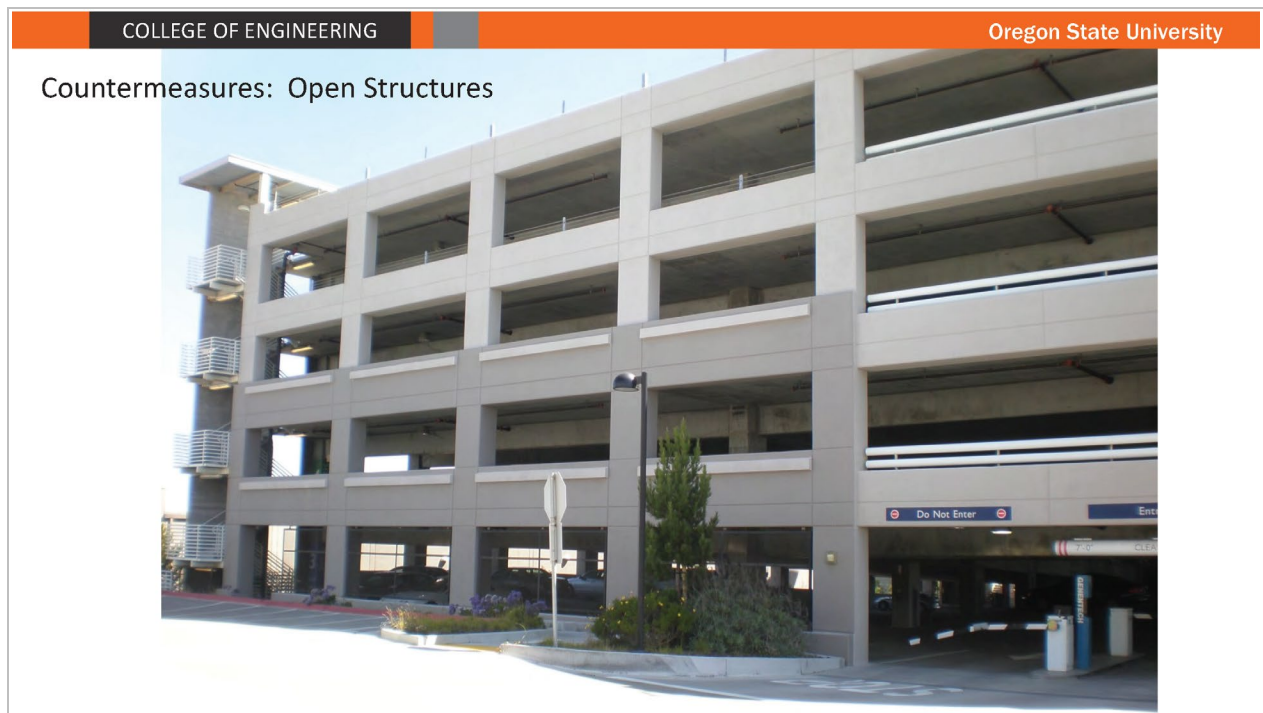


COLLEGE OF ENGINEERING Oregon State University

What does ASCE 7-16 provide to engineers and designers for tsunami?



- Site-specific Probabilistic Tsunami Hazard Analysis (PTHA)
- Consistent Design Procedures (seismic, wind, snow/ice)
- Hydrostatic and hydrodynamic load procedures (water forces)
- Debris Impact Loads (cars, logs, boats, containers)
- Foundation Designs (erosion, scour)
- Structural Countermeasures
 - ✓ Open Structures (circled in red)
 - ✓ Tsunami Barriers
- Vertical Evacuation Structures



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Oregon State University

Countermeasures: Open Structures

Proposal for new city hall,
Cannon Beach OR

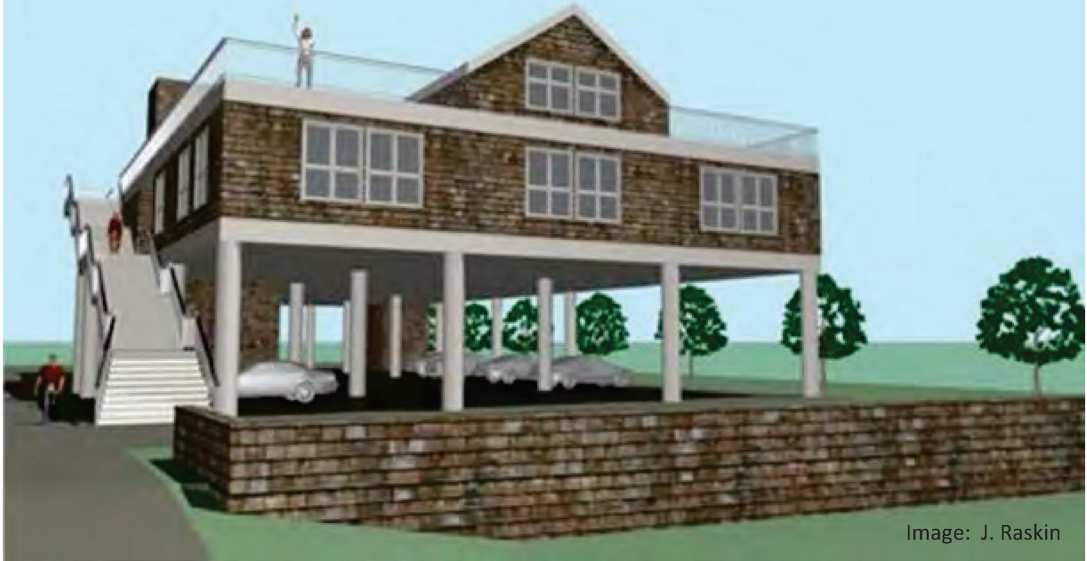
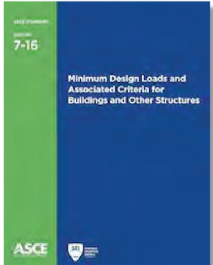


Image: J. Raskin

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Oregon State University



What does ASCE 7-16 provide to engineers and designers for tsunami?

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Examples of testing the effectiveness of tsunami walls

This is one of the first works to study the possible protection afforded by low-lying seawalls from tsunami attack. New hydraulic model experiments were conducted in the NEES Tsunami Facility. The bathymetry had a mild slope constant in the cross-shore direction and was followed by a flat section raised above the mean water level. The tsunami forces, pressure, and run-up were measured on an instrumented specimen located on the flat section, and a seawall was placed between the specimen and the shoreline. The incident wave conditions, seawall positions, and seawall heights were varied systematically to quantify the reduction of the maximum and average forces relative to the baseline conditions without a seawall. In total, 121 trials were conducted with seawalls, and 81 trials in the absence of seawalls (baseline conditions). Two simple empirical formulas were derived to predict the reduction factors for the maximum and average forces using inputs of the incident (unbroken) tsunami height, the bore height at the seawall (in the absence of the wall), the seawall height, and the position of the seawall relative to the shoreline and design structure. The equations were used to predict two other laboratory data sets: one conducted in the same facility under

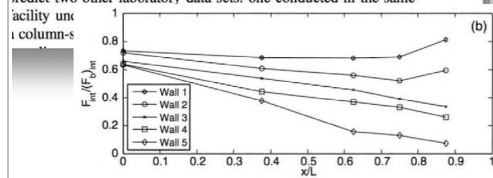
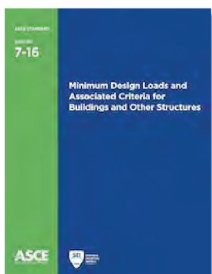


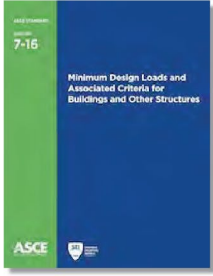
Fig. 10. Measured reduction factor for (a) maximum and (b) average force relative to baseline condition using $ERF = 7$ s as input



What does ASCE 7-16 provide to engineers and designers for tsunami?

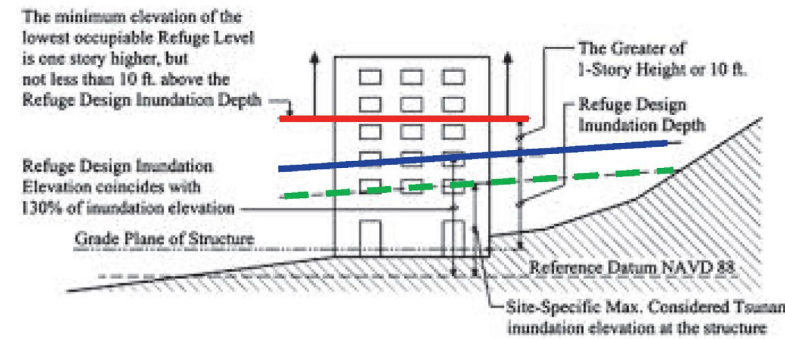
- Site-specific Probabilistic Tsunami Hazard Analysis (PTHA)
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- Foundation Designs (erosion, scour)
- Structural Countermeasures
 - ✓ Open Structures
 - ✓ Tsunami Barriers
- Vertical Evacuation Structures

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Standards for Tsunami Vertical Evacuation Structures


Including vertical evacuation structures





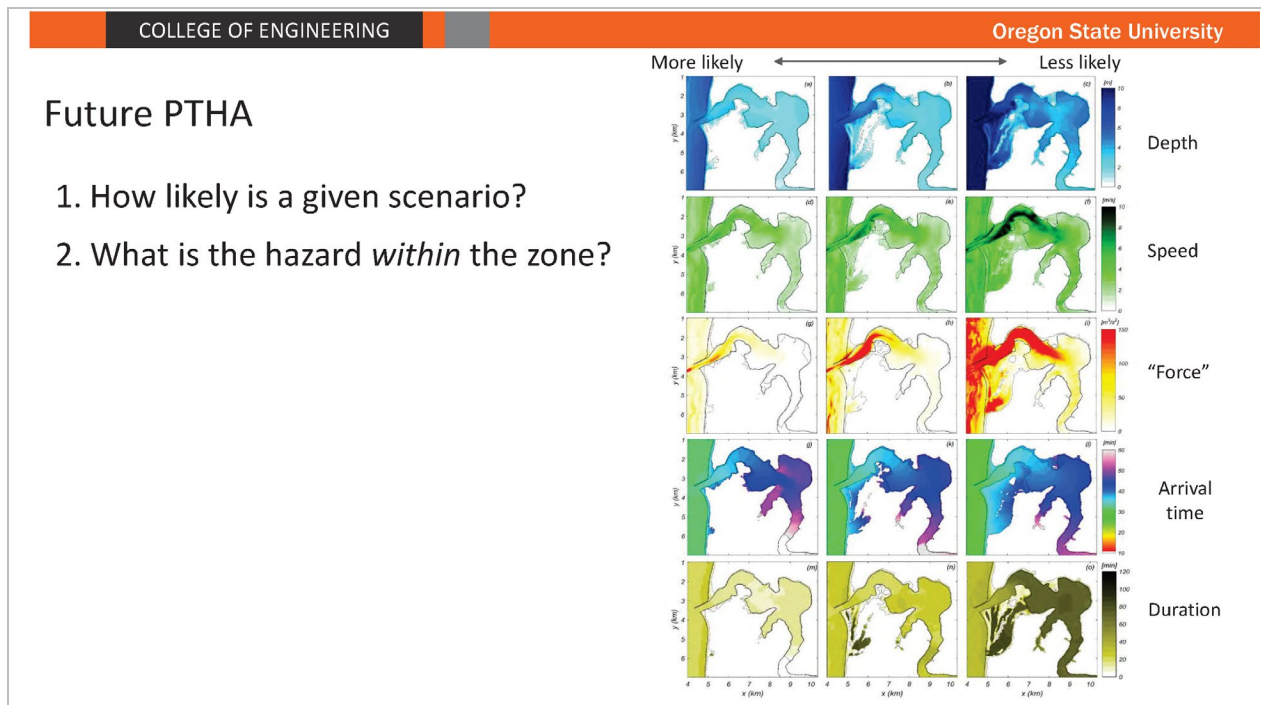
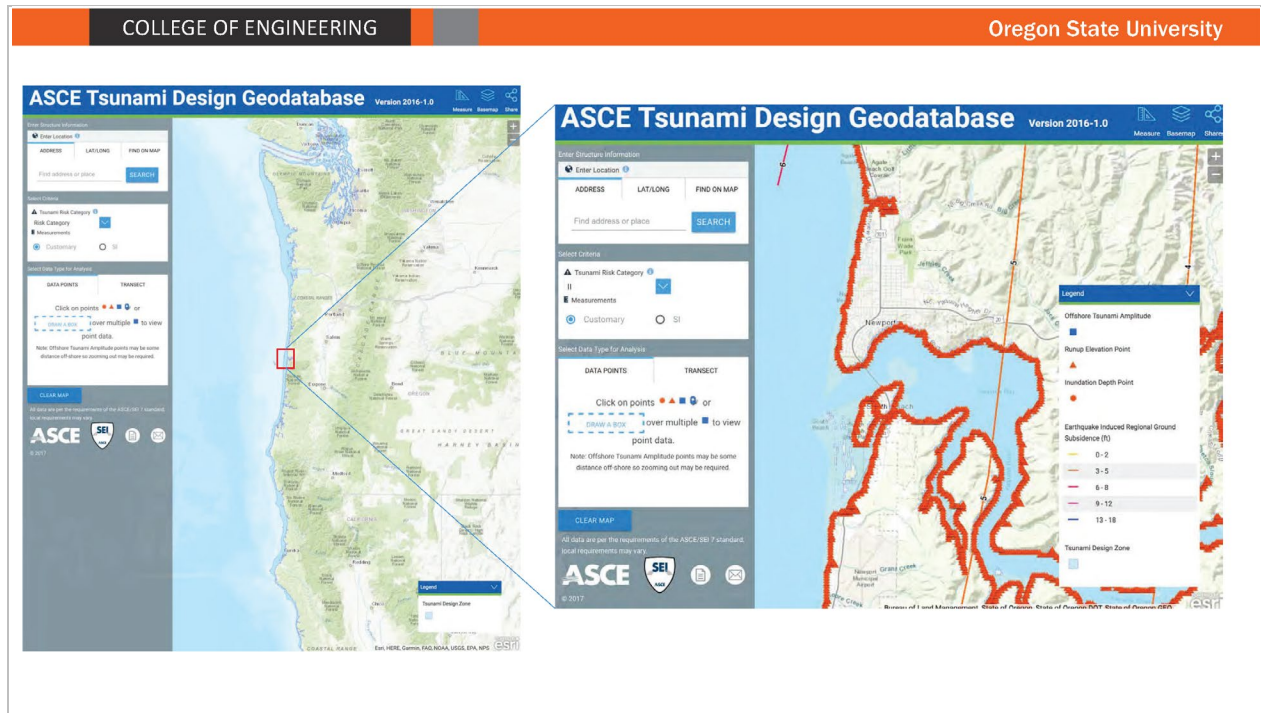


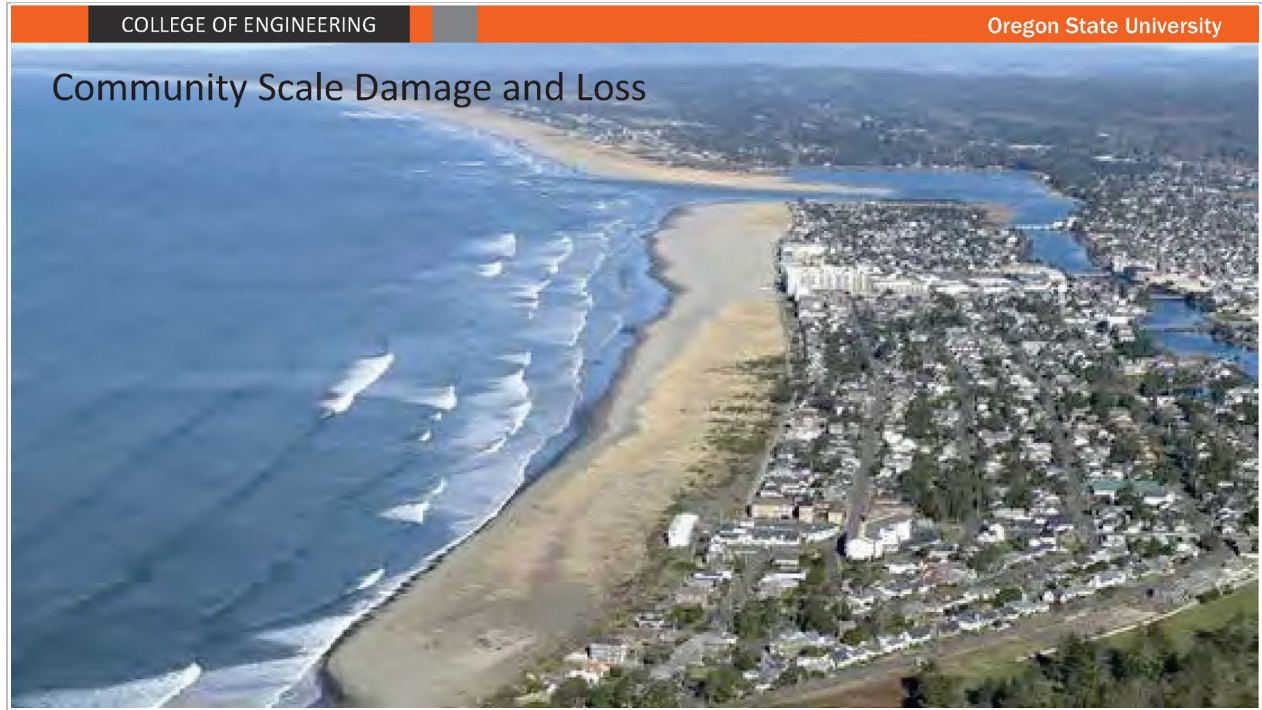
COLLEGE OF ENGINEERING
Oregon State University

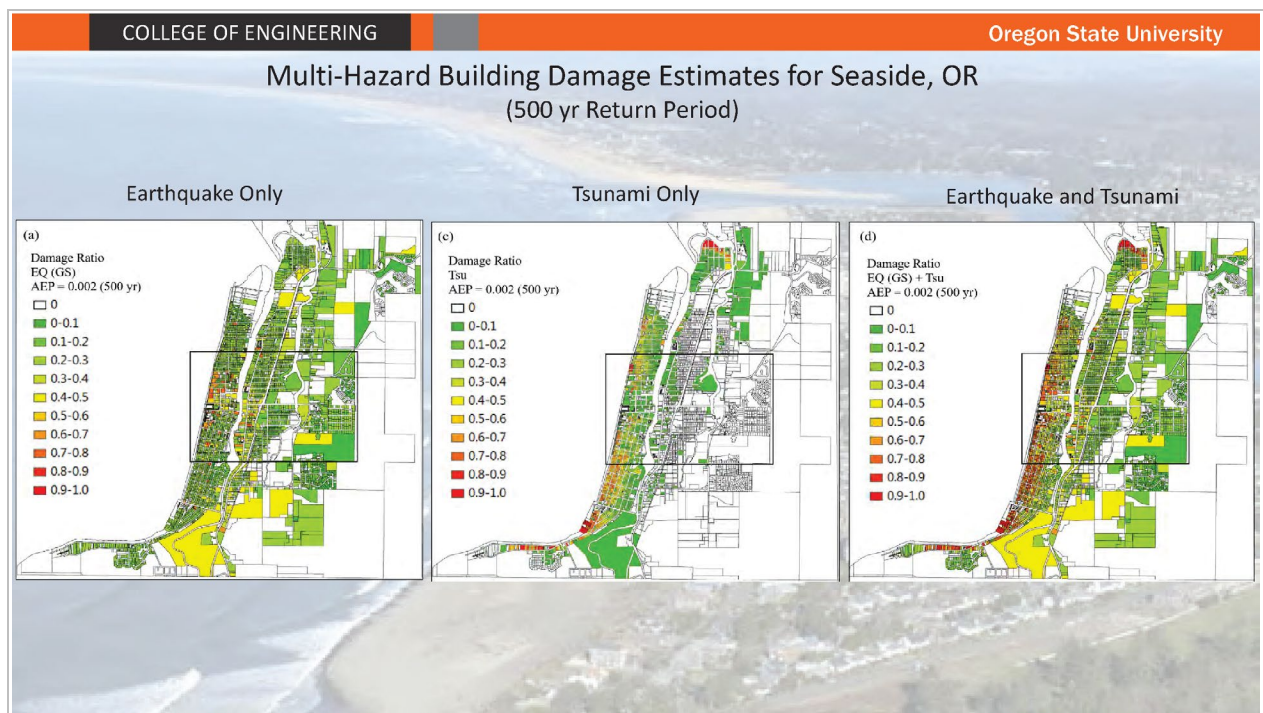


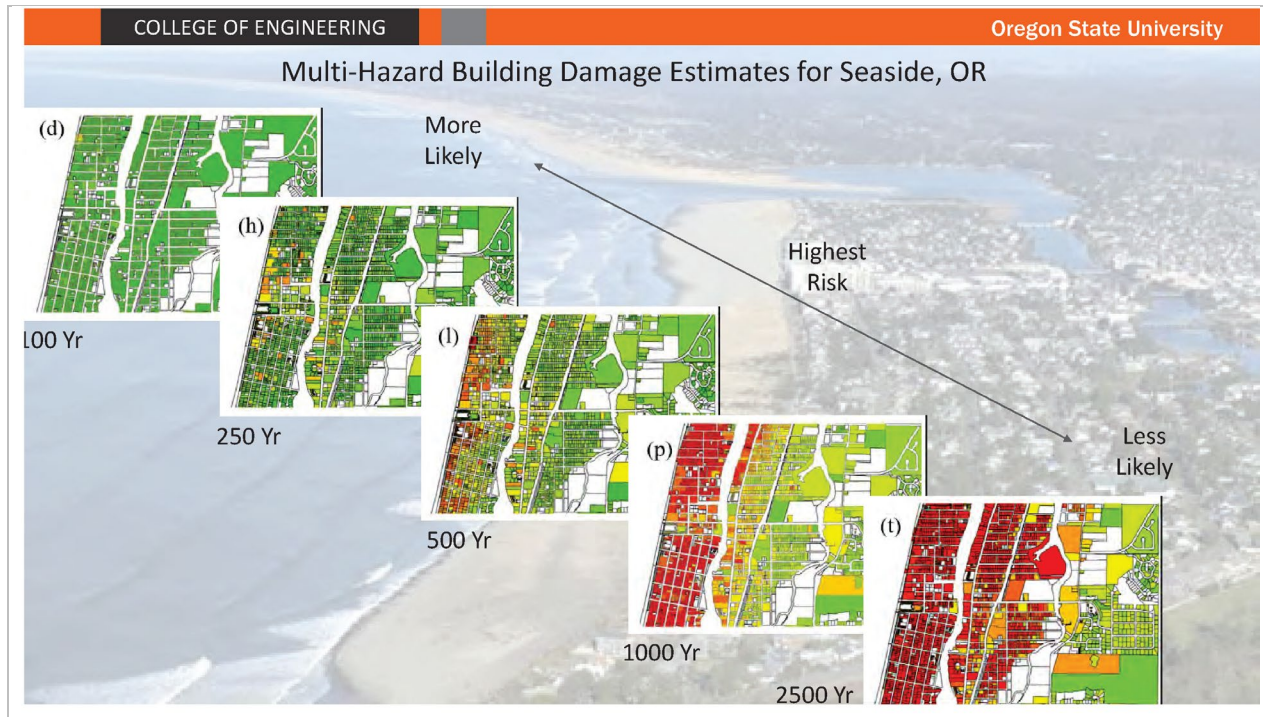
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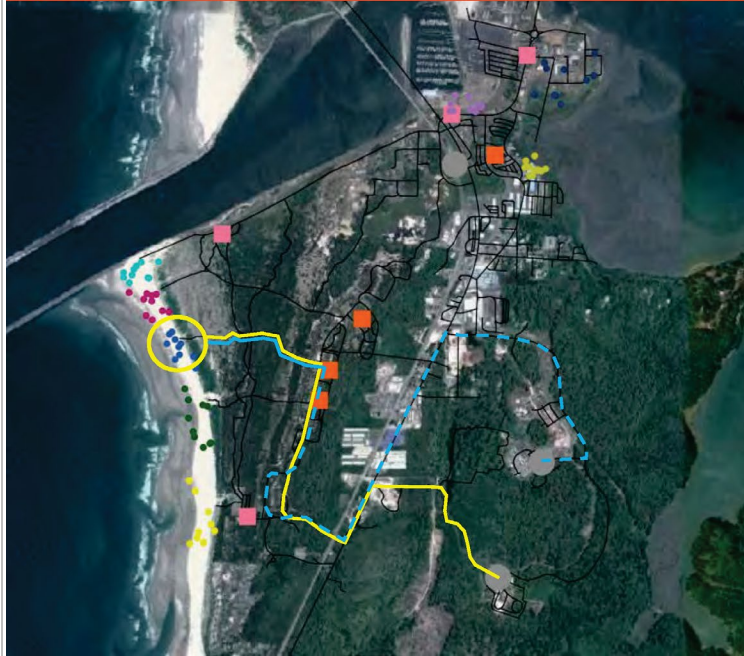




[The following slide contained an Adobe Flash based animation showing a modeled simulation of people evacuating Seaside.]





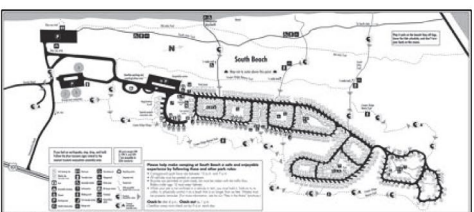



What are my best options?

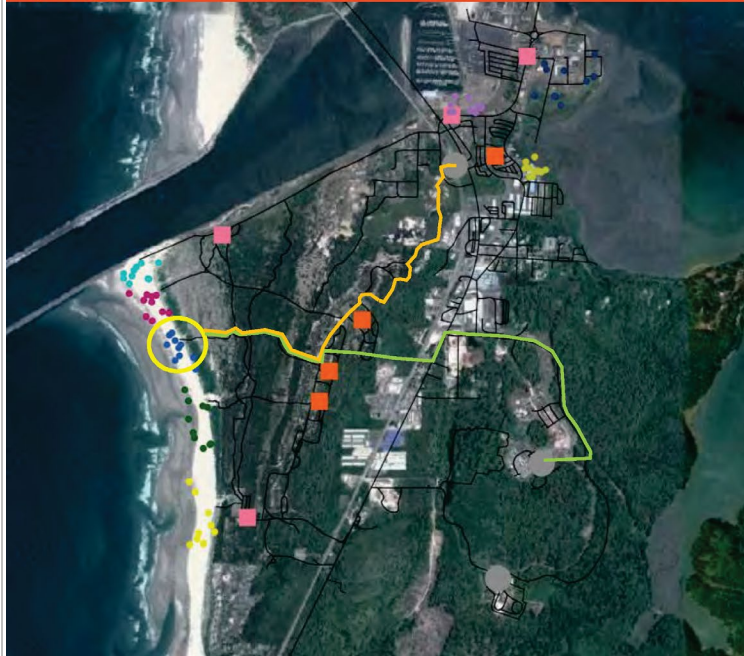
- Which route is the best?
- Which mode is the best (foot, car)?
- How long do I have?

Group 1: Only on foot, goes out the park entrance (yellow line)

Group 2: Start on foot, goes to car, then out the park entrance (blue line)





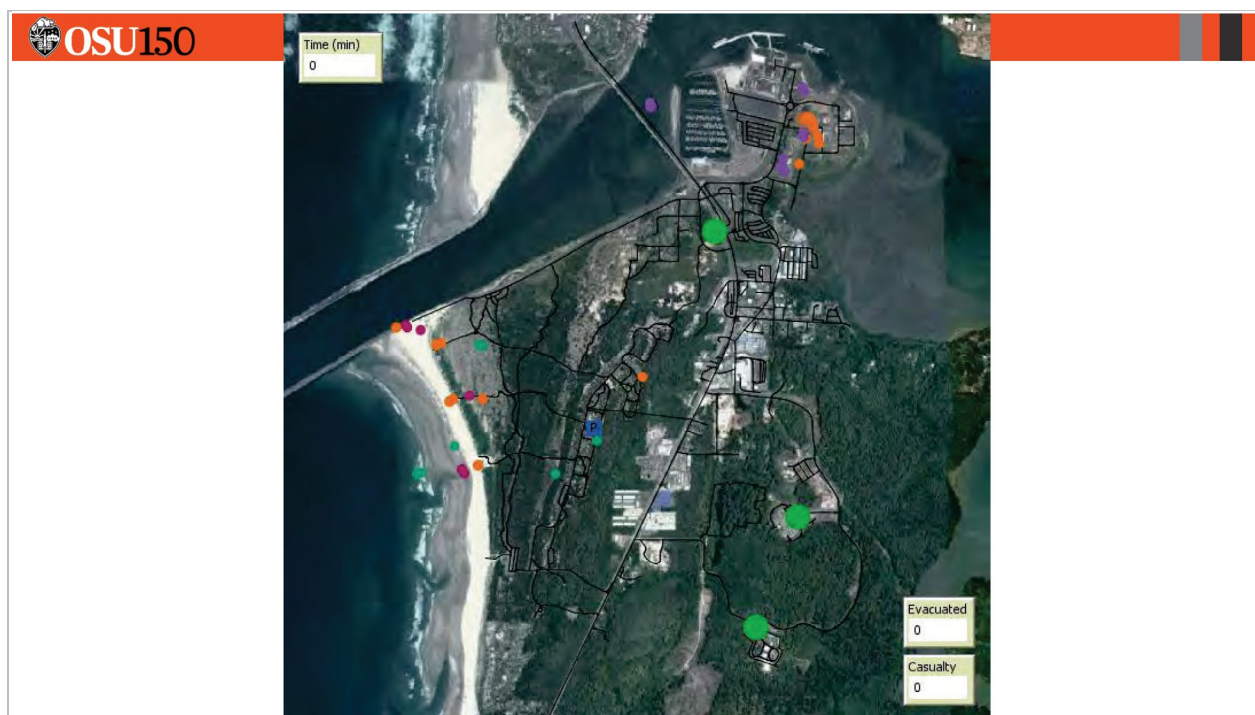


What are my best options?

- Which route is the best?
- Which mode is the best (foot, car)?
- How long do I have?

Group 3: New destination (OCCC), and new trail (green)


Group 4: New destination (SHH), and new trail (orange)

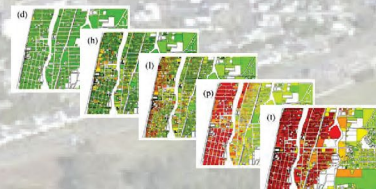


Summary of 2017 evacuation drills in south Newport area

Date	N	Who	Purpose
2.18.17	13	OSU grad students	Pilot test, logistics of working remotely
5.11.17	52	OSU, Oregon Parks, Teen CERT, HMSC, volunteers	Collect travel trajectory, user surveys, debrief
6.16.17	11	HMSC employees and students	Add OCCC destination
6.29.17	28	OSU undergrads (SURF)	Add scenario, role playing. No maps or cell phone.
7.13.17	19	HMSC REU students	Night drill (HMSC-SHH)
8.10.17	50	HMSC REU, OMSI camp	Night drill, role playing
Total	173		

Summary

- Disaster Resilience → Hazard Science + Engineering + Socio-economic science 
- New ASCE Tsunami Codes
 - ✓ Consistent with other hazards
 - ✓ Extensive peer review
 - ✓ Structural Countermeasures
 - ✓ Tsunami Vertical Evacuation
- Risk-informed Decision Making
 - ✓ Probabilistic Tsunami Hazard Analysis
 - ✓ Community Scale Damage and Loss Assessment
 - ✓ Interconnected Lifelines → Building functionality,



Thank you!

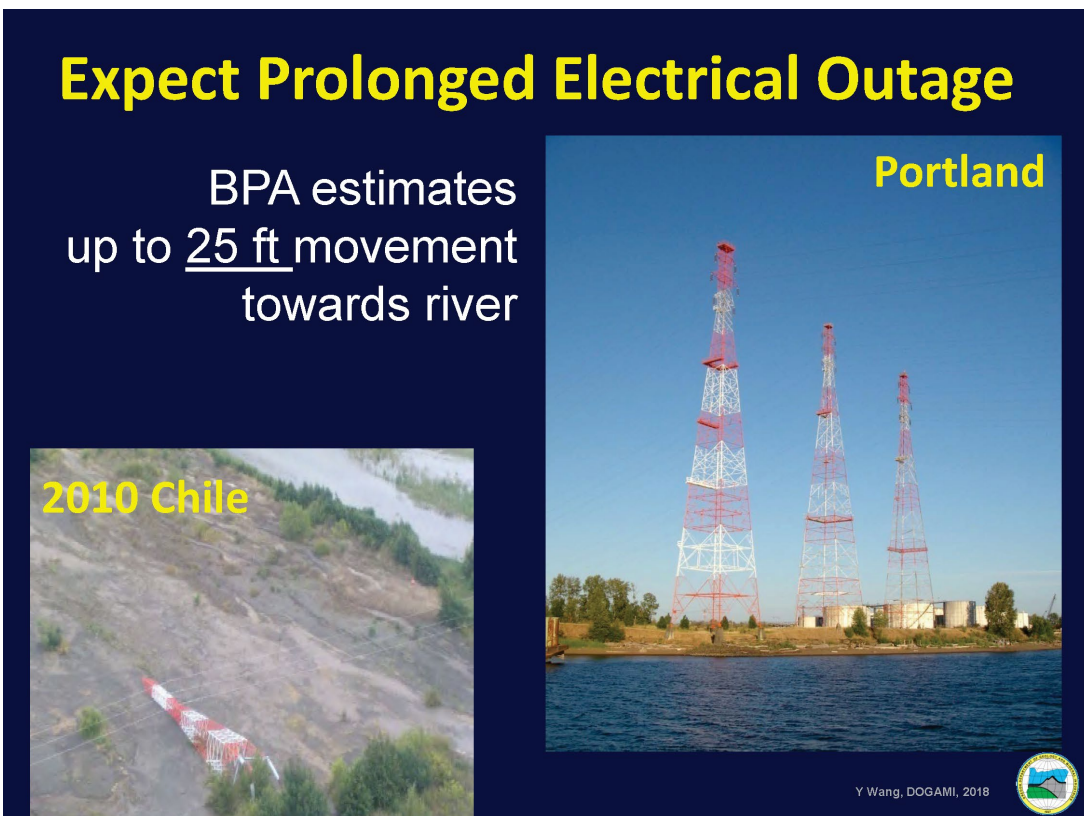
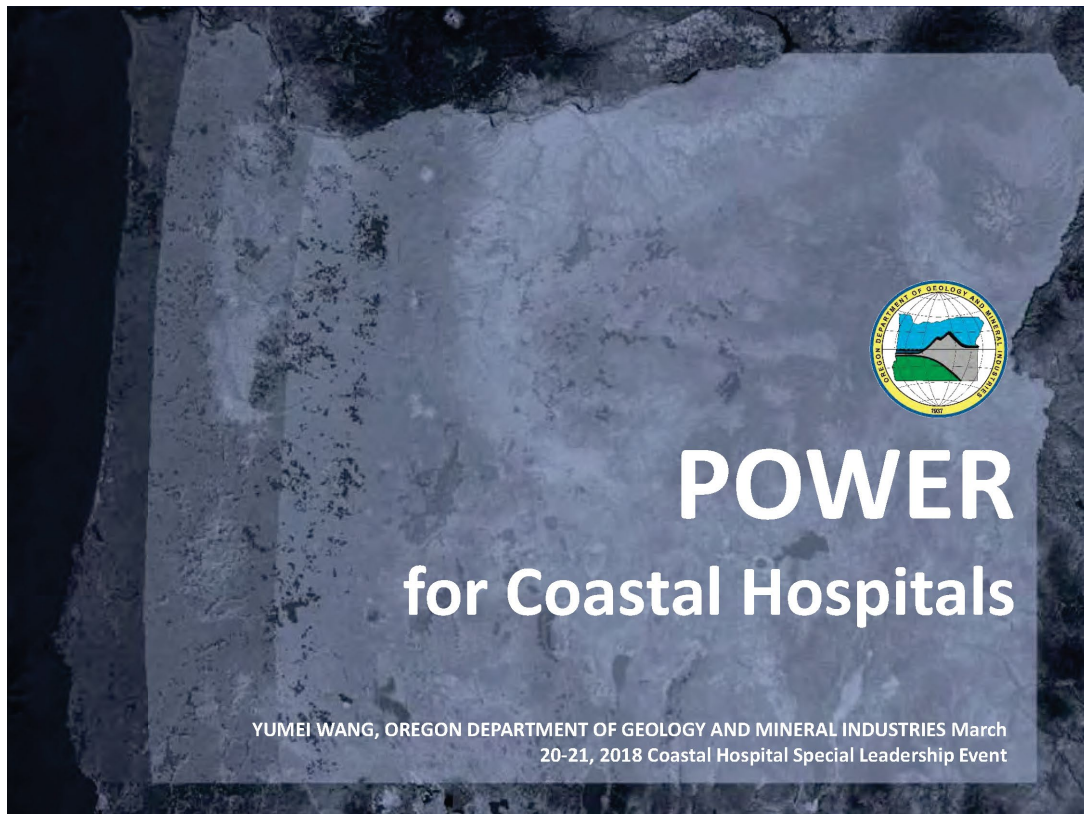
Dan Cox

dan.cox@oregonstate.edu



Oregon State
University

5.4 Disaster power planning, Yumei Wang, DOGAMI



3 Stages of Fuel Disaster Planning

Stage 1: On-Site

- **Seismically certified generator/emergency power systems**
 - Fuel supply
 - *FEMA 1019 reference (display copy)*

Stage 2: Local supplies

- Hospitals work with local supplier/distributor and County
- Non-retail “card lock” facilities, gas stations, other
- Viable transportation route for delivery

Stage 3: **3 weeks** until State’s post-disaster delivery

- Hospitals work w/ County
- County work w/ State

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Need Uninterrupted Fuel Supply

CSZ
EQT

Stage 1: On-Site Fuel



Source: DOGAMI

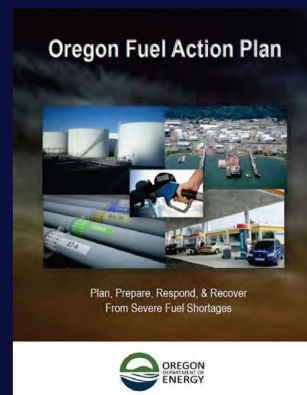
Stage 2: Local Fuel Options (e.g., Card Lock Facility)



Source: DOGAMI

3 weeks

Stage 3: State Delivers to County

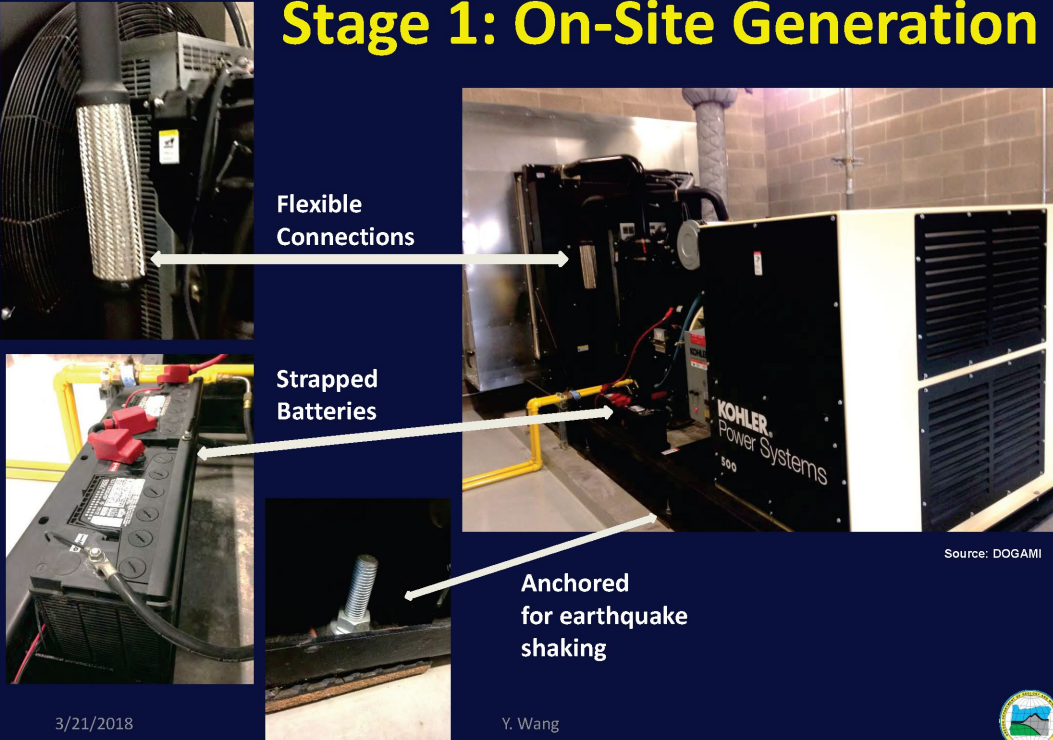


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Stage 1: On-Site Generation



Flexible Connections


Strapped Batteries

Anchored for earthquake shaking


Source: DOGAMI

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Seismically Certified Generator!



KOHLER Power Systems

Seismic Certification Label
International Building Code

Reference Certificate of Compliance
VMA - 45451 - 01C

Model Number: 500RE02J

Type: Generator


Equipment Serial Number:
SGM328T6N

Reference corresponding labels on all non-factory components to verify system compliance

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Source: DOGAMI



On-Site Fuel Tank (5,000 gal)



Source: DOGAMI

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Source: DOGAMI



Fuel Disaster Planning

Stage 1: On-Site emergency power system

Stage 2: Local fuel supply

Stage 3: Post-disaster delivery by State in 3 weeks

➤ ***Future Stage: Resilient local power source & microgrid***

- ***Operating hospitals with generators is challenging***
- ***Initial discussions with Tillamook PUD***
- ***ODOE is co-developing local energy resilience guidance***

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5.5 State of Oregon fuel action plan, Deanna Henry, Oregon Department of Energy

Oregon Fuel Action Plan

Presentation to Coastal
Hospitals' Leadership

Deanna Henry
Emergency Preparedness
Manager

March 21, 2018





Emergency Powers: Fuel

State Declared Emergency – Management of Resources (ORS 401.188)

- ✓ Control, restrict, and regulate the use of food, feed, **fuel**, clothing, and other commodities, materials, goods, and services

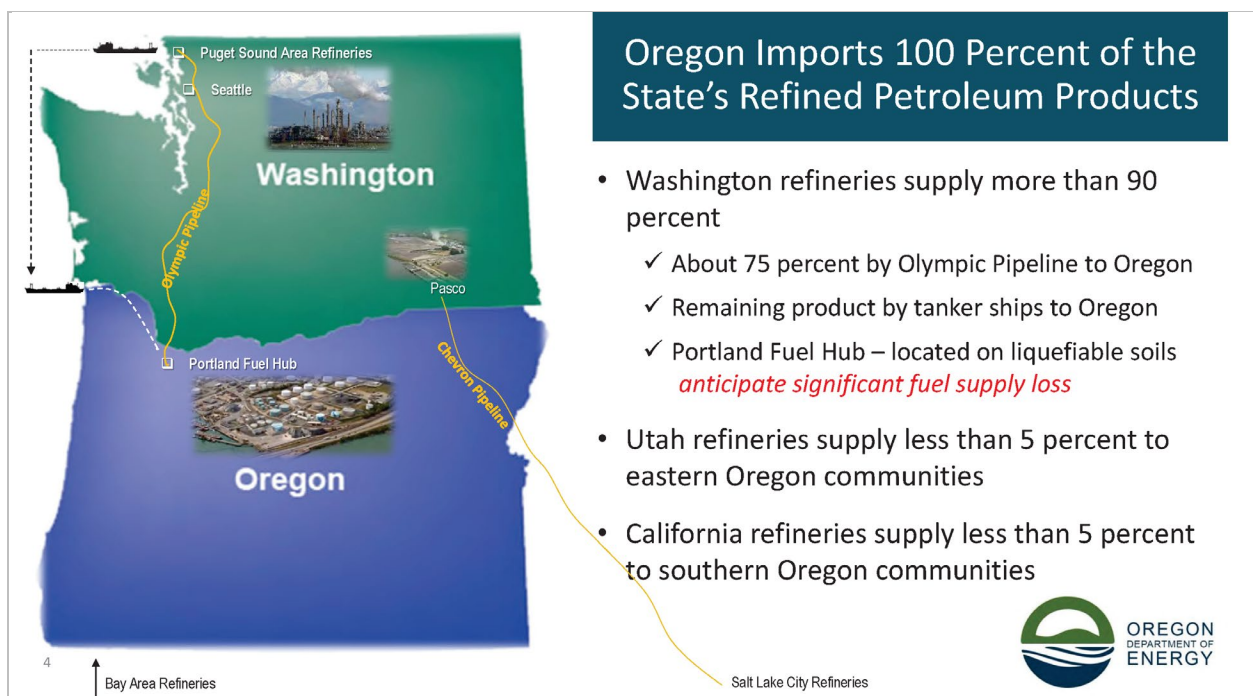
Oregon Department of Energy (ODOE) Authority – (ORS 176.750-785)

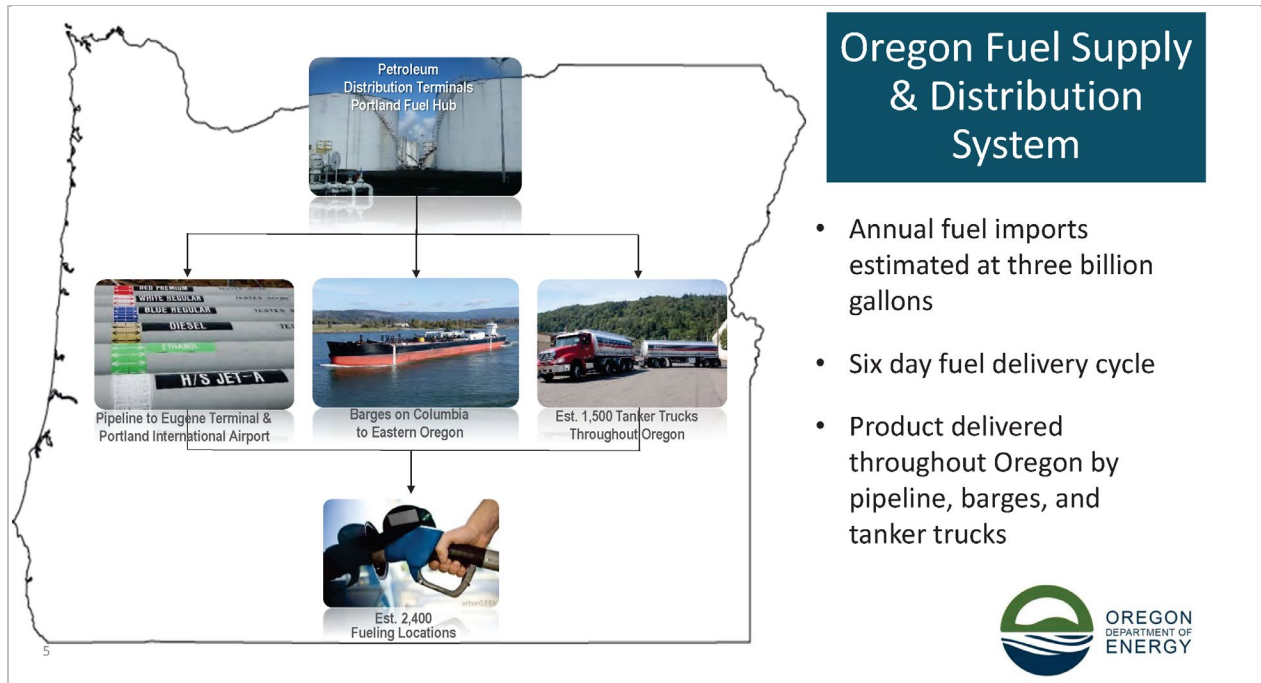
- ✓ Develop and maintain a statewide contingency plan in response to petroleum shortages that impact Oregon
- ✓ Provide adequate fuel supplies to maintain emergency services, transportation, and the operation of the economy to ensure the health, safety, and welfare of the residents of the State of Oregon while an emergency exists

Fuel Executive Order

- ✓ Authorizes ODOE to implement the strategies in the Oregon Fuel Action Plan in response to a Cascadia Subduction Zone Earthquake and Tsunami

Federal State Structure	EMERGENCY SUPPORT FUNCTIONS (ESFs)		
	ESF	SECTOR	PRIMARY STATE AGENCY
<ul style="list-style-type: none"> Designated lead state and federal agency for each ESF sector ESF 12 federal lead is U.S. Department of Energy Structure for states to request and receive federal and military resources in response to emergencies 	1	Transportation	Oregon Department of Transportation
	2	Communications	Oregon Public Utility Commission Oregon Department of Administrative Services
	3	Public Works	Oregon Department of Transportation
	4	Firefighting	Oregon State Fire Marshal Oregon Department of Forestry
	5	Information and Planning	Oregon Emergency Management
	6	Mass Care	Oregon Department of Human Services
	7	Resource Support	Oregon Department of Administrative Services
	8	Health and Medical	Oregon Health Authority
	9	Search and Rescue	Oregon Emergency Management Oregon State Fire Marshal
	10	Hazardous Materials	Oregon State Fire Marshal Oregon Department of Environmental Quality
	11	Food and Water	Oregon Department of Human Services
	12	Energy	Oregon Department of Energy (nuclear-petroleum-LNG) Oregon Public Utility Commission (electricity-natural gas)
	13	Military Support	Oregon Military Department
	14	Public Information	Oregon Emergency Management
	15	Volunteers and Donations	Oregon Emergency Management
	16	Law Enforcement	Oregon State Police
	17	Agriculture and Animal Protection	Oregon Department of Agriculture
	18	Business and Industry	Oregon Emergency Management





Oregon Fuel Action Plan

OREGON DEPARTMENT OF ENERGY

OREGON FUEL ACTION PLAN

Plan, Prepare, Respond, & Recover Severe Fuel Shortages

- Identifies ODOE authority and responsibilities to control and direct the state's overall response to petroleum emergencies
- Provides structure for federal, state, county, tribal, and industry coordination
- Provides structure for fuel allocation that identifies pre-approved priority users of fuel and user responsibilities
- Identifies state and county priority lifeline routes to support fuel deliveries
- Pre-designates Fuel Points of Distribution (FPOD) for receiving emergency fuel

6

Oregon Fuel Action Plan: 9 Priority Actions



Action 1	Action 2	Action 3	Action 4	Action 5	Action 6	Action 7	Action 8	Action 9
Notification Activation and Authorities	Public Information	Damage Assessment	Assess Fuel Needs & Determine Priorities	Outside Assistance: Fuel Supply	Fuel Conservation Measures	Temporary Waivers	Fuel Allocation	Recovery
<ul style="list-style-type: none"> - Initial Notifications - Activate ODOE AOC - Succession & Authorities 	<ul style="list-style-type: none"> - ODOE Fuel Emergency Outlook Web Page - Public Information Campaign – social media - News conferences - Telephone Information Center 	<ul style="list-style-type: none"> - Assess impacts to petroleum infrastructure - Estimate timeline for repairs - Provide fuel sector info & status updates 	<ul style="list-style-type: none"> - Assess fuel availability in Oregon - Assess 18 state ESFs, counties, and tribal fuel needs - Determine state & regional fuel priorities - Governor's Disaster Cabinet 	<ul style="list-style-type: none"> - Identify & obtain fuel source - Identify viable fuel delivery options into Oregon - Identify viable options for dispensing fuel 	<ul style="list-style-type: none"> - Issue voluntary fuel conservation measures - Issue mandatory fuel conservation measures 	<ul style="list-style-type: none"> - Obtain temporary environmental, operational, and safety waivers as needed to ensure the timely delivery of fuel 	<ul style="list-style-type: none"> - Review & approve/deny fuel requests (ESF Primary State Agencies, counties & tribes) - Allocate fuel to approved state agencies, counties & tribes - Odd/Even Fuel Allocation - Fuel Request Form Provided 	<ul style="list-style-type: none"> - Allocate fuel to support recovery activities - State Recovery Coordinating Team - SRF 6 - Governor's Recovery Cabinet - Terminate fuel recovery activities as appropriate

Fuel Allocation: Saving Lives, Restoring Critical Lifelines & Services



Challenge – Allocating fuel to emergency and essential service providers in the state involves 120 state agencies, 36 counties, 240 cities, and 9 federally-recognized tribes

Standardized Structure – Identifies three categories of priority fuel users:

- 18 ESF Primary State Agencies
- 36 Counties
- 9 Federally-Recognized Tribes



Priority Fuel Users: Responsibilities



County	City	Name	Address	State	Zip	Capacity (gallons)	Fuel Type	Above Below	Backup Power	Longitude	Latitude
Wheeler	Fossil	Faa	Kinzua Rd	OR	97830	1,000-4,999	Diesel	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fill-Up, Llc	609 W Main St	OR	97830	2000	Gasoline	Underground		-120.2138429	44.9991949
Wheeler	Fossil	Fossil Fill-Up, Llc	609 W Main St	OR	97830	2000	Diesel	Underground		-120.2138429	44.9991949
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	10,000-49,999	Petroleum Distillates	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	5,000-9,999	Petroleum Distillates	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	10,000-49,999	Petroleum Distillates	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	5,000-9,999	Diesel Fuel High Sulfur	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	10,000-49,999	Diesel Fuel Low Sulfur	Above		0.000000	0.000000
Wheeler	Fossil	Fossil Fuel Inc	750 6th St	OR	97830	10,000-49,999	Gasoline Unleaded	Above		0.000000	0.000000
Wheeler	Fossil	Wheeler County	115 1st St	OR	97830	500-999	Gasoline	Above		-120.2188156	44.9998682
Wheeler	Fossil	Wheeler County	115 1st St	OR	97830	500-999	Diesel Fuel	Above		-120.2188156	44.9998682
Wheeler	Kimberly	Faa	Se 1/4 Section 3	OR	97848	1,000-4,999	Diesel	Above		0.000000	0.000000
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Petroleum Distillates	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Petroleum Distillates	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Petroleum Distillates	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Diesel Fuel Low Sulfur	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Gasoline Unleaded	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Fossil Fuel Inc	101 Main St	OR	97750	1,000-4,999	Diesel Fuel High Sulfur	Above		-120.1543244	44.5667935
Wheeler	Mitchell	Wheeler County	500 1st St	OR	97750	500-999	Gasoline	Above		-120.1593730	44.5685329
Wheeler	Mitchell	Wheeler County	500 1st St	OR	97750	500-999	Diesel Fuel	Above		-120.1593730	44.5685329
Wheeler	Spray	Lazy Wolf Ranch	Willow Hwy 19	OR	97874	10,000-49,999	Gasoline Unleaded	Above		-119.7936725	44.8331353
Wheeler	Spray	Lazy Wolf Ranch	607 Willow Hwy 19	OR	97874	1,000-4,999	Diesel Fuel Low Sulfur	Above		-119.7936725	44.8331353
Wheeler	Spray	Long Elk Market Llc	800 Willow St	OR	97874	1000	Gasoline	Underground		-119.7941967	44.8349497
Wheeler	Spray	Lone Elk Market Llc	800 Willow St	OR	97874	1000	Diesel	Underground		-119.7941967	44.8349497
Wheeler	Spray	Spray School District 1	E Pine & Hwy 19	OR	97874	500-999	Diesel	Above		0.000000	0.000000
Wheeler	Spray	Wheeler County	917 Willow St	OR	97874	500-999	Gasoline	Above		-119.7950611	44.8368651
Wheeler	Spray	Wheeler County	917 Willow St	OR	97874	500-999	Diesel Fuel	Above		-119.7950611	44.8368651

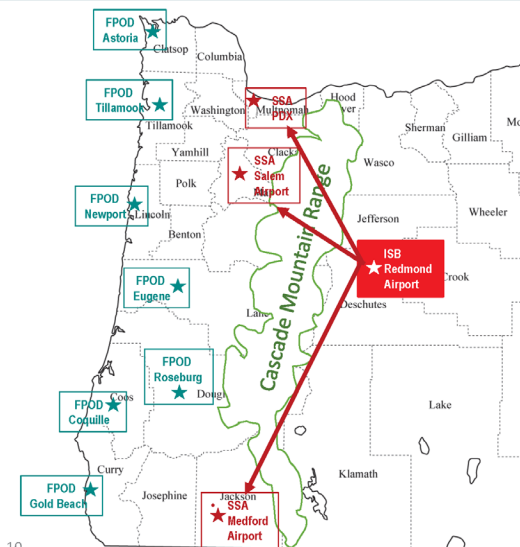
ODOE Fuel Database

Prior to an Emergency

- Identify and assess fuel needs for critical missions for sector or jurisdiction of responsibility
- Identify all fueling locations in the county – Initial fuel source for life safety missions
- Estimated 3 weeks** before bulk fuel supplies can be brought into some communities

9

Fuel Strategy: Air Response



10

INITIAL AIR RESPONSE ACTIVITIES

Required Support: Federal, Military, and Industry

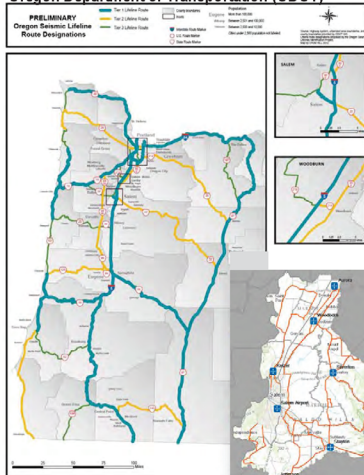
Bulk Fuel Source – Outside Region

- Bulk fuel “pushed” into the federal Incident Support Base - Redmond Municipal Airport
- Initial daily bulk fuel push
 - Unleaded gasoline – est. 75,000 gallons
 - Diesel – est. 400,000 gallons
- ODOE directs movement of bulk fuel from federal ISB to State Staging Areas and to the pre-designated fuel points in the impacted communities

Fuel Strategy: State & Local Lifeline Routes



Oregon Department of Transportation (ODOT)



- **State Lifeline Routes** – Guide initial repairs on the transportation, power, and communication systems to support the delivery of fuel to the impacted communities
- **County Lifeline Routes** – Counties to identify local priority routes that connect to state lifeline routes
- **Fuel Points of Distribution (FPOD)** – Pre-designate FPODs to receive emergency fuel supplies

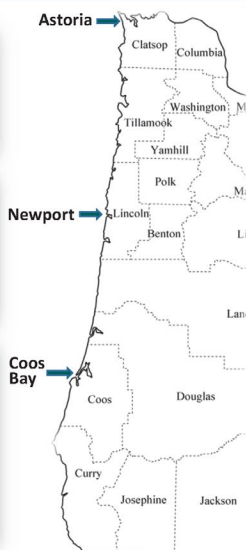
Marion County Example:

- Identified Tier 1 priority routes connecting to state lifeline routes
- Pre-designated 9 FPODs to receive emergency bulk fuel supplies

ODOE has fuel data from 24 of 36 counties

11

Fuel Strategy: Oregon Coast



U.S. MARITIME ADMINISTRATION (MARAD) ASSETS

Fuel Source: Outside Region

Maritime Assets – Deliver bulk fuel and operate portable fueling points along the Oregon Coast

- Ready Reserve Force ships out 7 – 10 days of notification
- Larger MARAD vessels ship out within 30 days of notification

Foreign Vessels – Lift Jones Act to allow foreign vessels to deliver bulk fuel to Oregon ports

- Superstorm Sandy – Foreign vessels shipped 115 million gallons of fuel to ports in New York and New Jersey

15

Fuel Strategy: Central & Eastern Oregon



VIABLE CRITICAL INFRASTRUCTURE

Working Transportation, Power & Communications Systems

Fuel Source: Pasco Distribution Terminal-Petroleum Industry

- Reliant on petroleum industry to meet fuel demands
- Implement voluntary & mandatory fuel conservation measures if needed
- Implement Odd/Even Fuel Allocation Program if needed
- Implement Public Information Campaign to reduce fuel consumption



16

Oregon Fuel Action Plan: Next Steps



11 Coastal Hospitals – Ensure properly installed seismically certified generators with adequate fuel stored onsite

Emergency Managers – Ensure county fuel distribution plans include method to deliver fuel to coastal hospitals:

Clatsop: Tiffany Brown

Lane: Linda Cook

Curry: Jeremy Dumire

Tillamook: Gordan McCraw

Douglas: Wayne Stinson

Lincoln: Jenny Demaris

Coos: Mike Murphy

Coast Fuel Exercise – Work with Lincoln County to conduct an exercise to test federal, military, state, and local plans for implementing a fuel management system for coastal communities

Partnerships

20

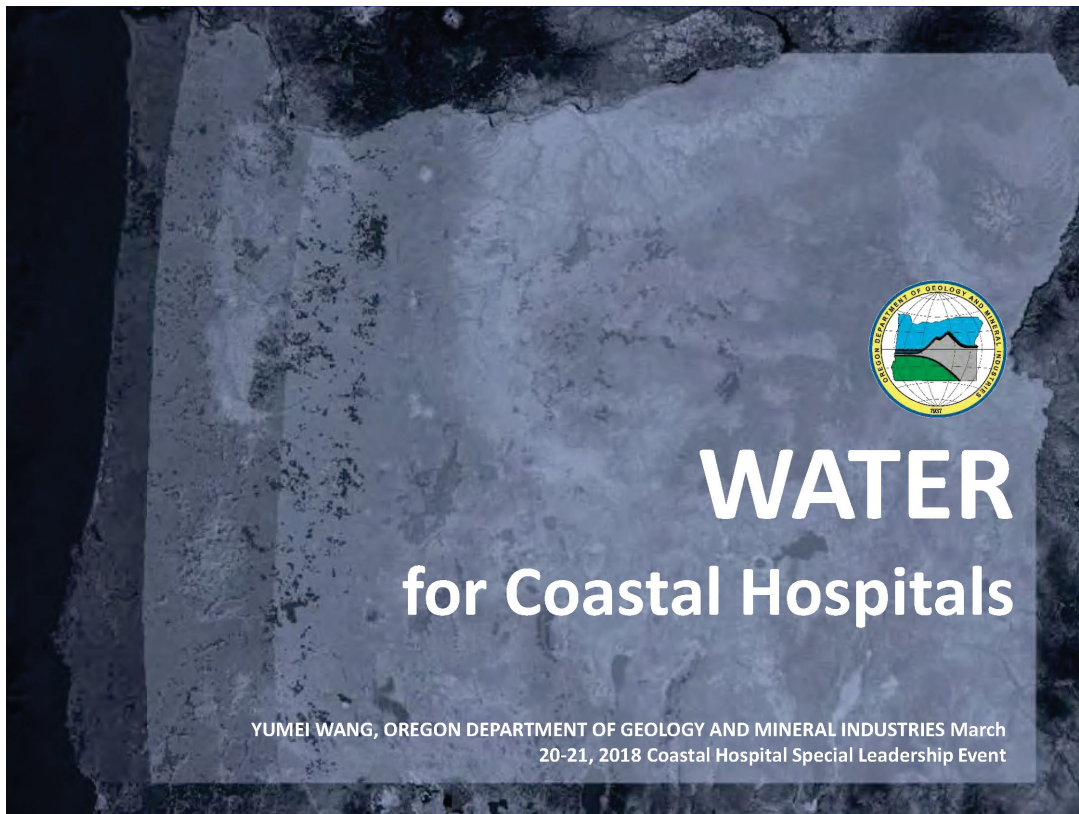
Oregon Fuel Action Plan

Deanna Henry

Emergency Preparedness
Manager
503-932-4428 Mobile
deanna.henry@oregon.gov



5.6 Disaster water planning, Yumei Wang, DOGAMI



Hospitals Use a Lot of Water!

- ✓ Operating water system equipment
- ✓ Uninterrupted water supply

- Hospital Lifeline System Dependencies
- Water System Vulnerabilities
- Hospital Water Disaster Planning

3/21/2018

Y. Wang



Hospital Lifeline System Dependencies *Normal Conditions*

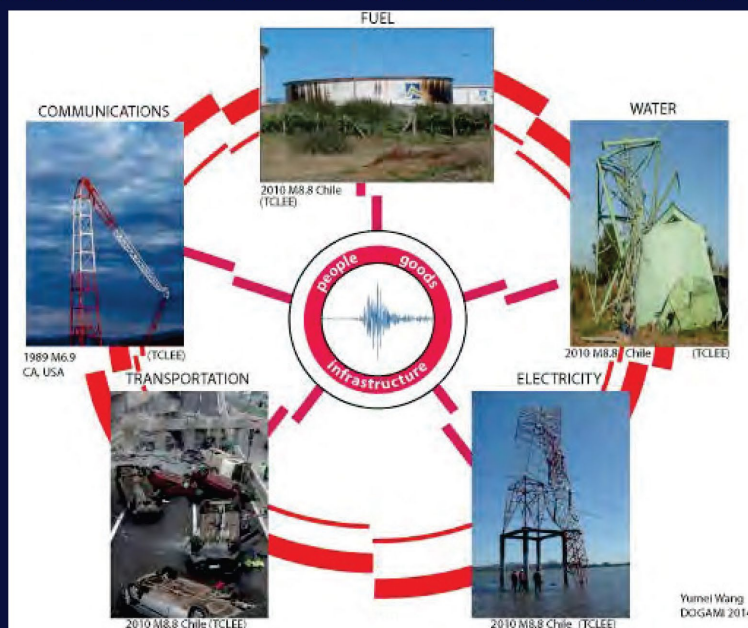


3/21/2018

Y. Wang



Hospital Lifeline System Dependencies ***EARTHQUAKE** Disaster Conditions*



3/21/2018

Y. Wang



Hospital Lifeline System Dependencies Emergency Operations

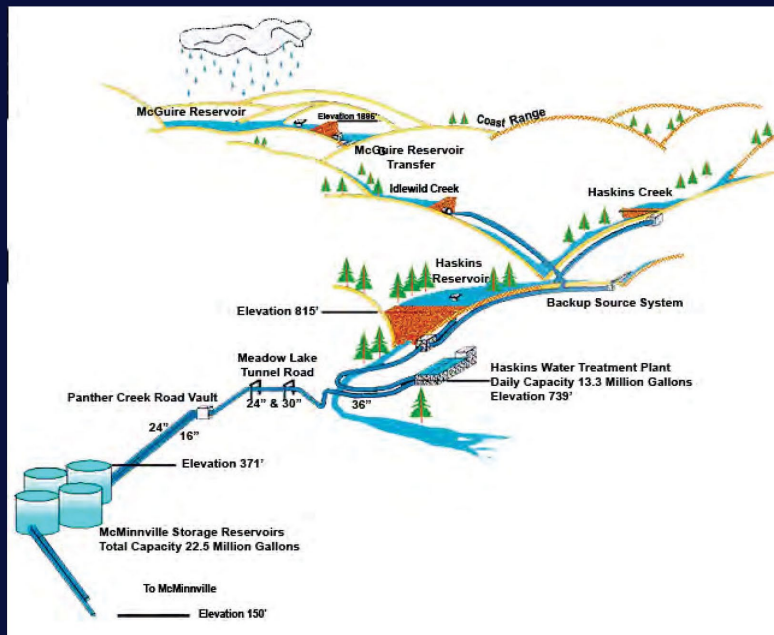


3/21/2018

Y. Wang



Typical Features of Water Systems



Y. Wang, DOGAMI, 2018



Liquefaction & Landslide Hazards



8/07 Japan quake



8/07 Japan quake

Y. Wang, DOGAMI, 2018



Liquefaction: Water Bodies & Floodplains



Source: TCLEE member



Source: TCLEE member

3/21/2018 Yumei Wang, DOGAMI

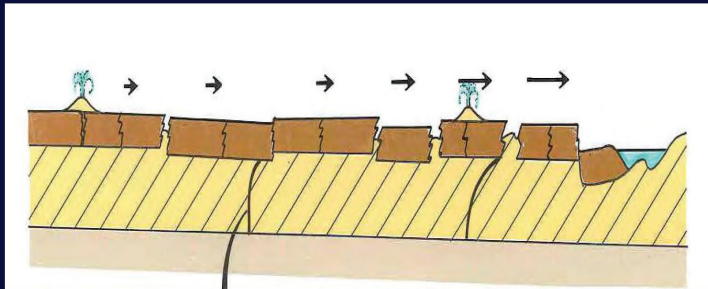


Earthquakes and Water Systems

- Damage is commonplace
- Entire water systems can drain
- Protect available supply



Source: TCLEE member



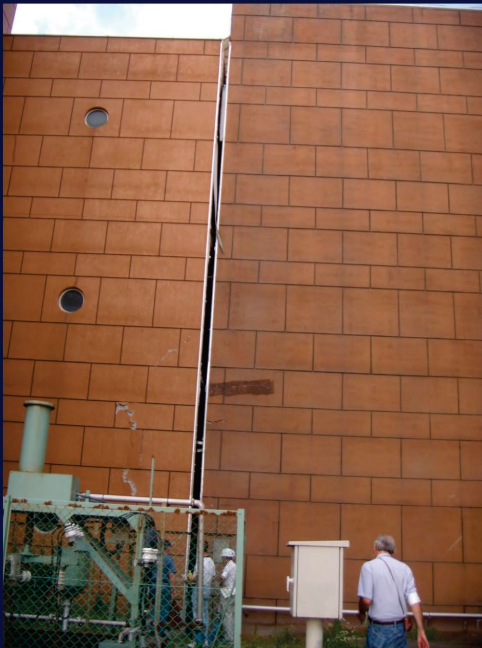
3/21/2018

Y. Wang

Source: USGS



Water Treatment Plant & Equipment



Source: Yumei Wang



Source: Yumei Wang



Source: Yumei Wang

Y. Wang, DOGAMI, 2018



Water Pipelines Can Fail



Y. Wang, DOGAMI, 2018



Water Tanks Can Fail



Source: TCLEE member



Source: TCLEE member

Y. Wang, DOGAMI, 2018



Why Hospitals Should Work with Water Districts?

*Reedsport bridge links Downtown to Uptown
carries water transmission main that supplies hospital*



Source: City of Reedsport

3/21/2018

Y. Wang



Hospital Water Disaster Planning

- Purposes: Sheltering and **Operational Capabilities**
- Stage 1: On-site
 - Building system, storage, emergency water purification
- Stage 2: Local supplies
 - **Hospitals plan with water district, city and county**
 - Water stub out
 - Agreements with others (e.g., farm with well water)
- Stage 3: Assistance from the State via County

3/21/2018

Y. Wang



On-Site: Increase Capabilities *e.g., Water Storage and Purification*



Source: DOGAMI



Source: DOGAMI

3/21/2018

Y. Wang



On-Site: Strengthen Building Systems *California Hospital Components with "Special Seismic Certification"*

- Emergency generator systems
- Components w/ hazardous contents
- Elevator equipment
- Smoke control fans
- Exhaust fans
- Switchgear
- Motor control centers
- X-ray machines in fluoroscopy
- CT Scanners
- **Chillers**
- **Cooling towers**
- Transformers
- Electrical substations
- UPS and ACUs
- Distribution panels
- Control panels

Yumei Wang, 2018



Hospitals Plan with Local Water District!

e.g., Emergency Distribution



Source: TCLEE team
3/21/2018



Source: DOGAMI

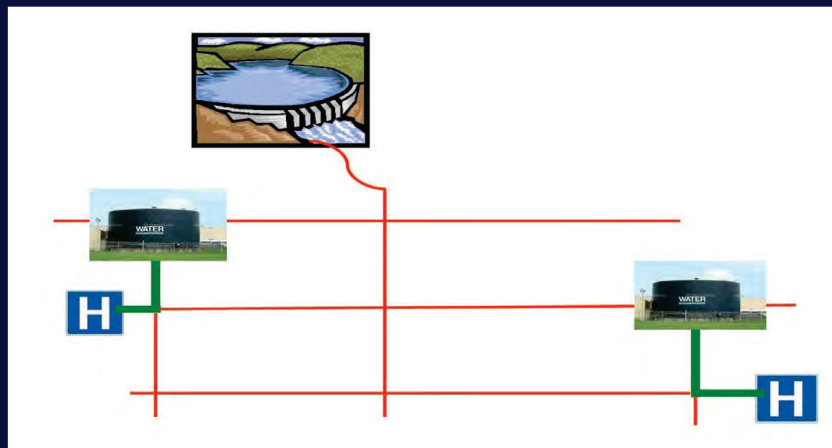


Y. Wang

Hospitals Plan with Local Water District!

Prioritize Hospitals for Seismic Mitigation of Water System

- Strengthen Portion of the Water System: closest Water Tank and Piping to Hospital
- **NEW:** OHA Drinking Water Program requires seismic plans from water districts



Source: Y. Wang, DOGAMI

3/21/2018

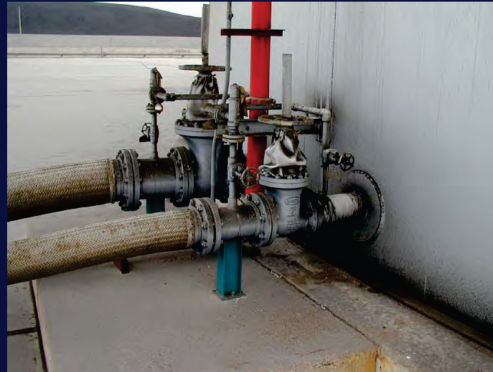
Y. Wang



Seismic Design for Entire Pathway

- Seismically Designed Tank (*AWWA D100*)
- Seismic Shut Off Valve
- Flexible Connection to Tank
- Ductile Water Pipe for Entire Path (esp river crossings)
- (plus a Hospital Stub Out)

Flexible
Connections to
Tank



3/21/2018

Source: FEMA 74

Y. Wang



Portland Water Bureau



50 MG Powell Butte Reservoir
City of Portland



YWang, DOGAMI, 2018



Ground-to-Tank Piping Connections

- Replace rigid connections with flexible
- Install seismic shut off valves

Vulnerable



3/21/2018

Source: Portland Water Bureau

Earthquake Damage



Source: TCLEE member

Y. Wang



Hospitals Plan with Local Water District and Local Emergency Managers

“Like most hospitals in the Pacific Northwest Salem Hospital has been systematically mitigating the many impacts of a major earthquake since the true earthquake threat was identified just a few decades ago. Today, the **loss of the city’s water supply is the hospital’s single greatest vulnerability to a catastrophic earthquake**, which is why the hospital’s emergency water supply planning team is working with community partners to design a robust, reliable emergency water supply.”

Wayne McFarlin

Salem Health Emergency Preparedness Administrator



Emergency Water Supply Planning Guide for Hospitals and Healthcare Facilities

CDC and American Water Works Association (2012)

www.cdc.gov/healthywater/pdf/emergency/emergency-water-supply-planning-guide.pdf

3/21/2018

Y. Wang



Questions?

www.oregongeology.org



Y Wang, DOGAMI, 2018

Oshiokuri Hato Tsusen no Zu (Fast Cargo Boat Battling The Waves) 1805
<http://thesoundsinsidemyhead.blogspot.com/2008/05/hokusais-great-wave.html>



5.7 Federal response to disasters, John Smart, U.S. Health and Human Services



United States Department of
Health & Human Services
Office of the Assistant Secretary for Preparedness and Response



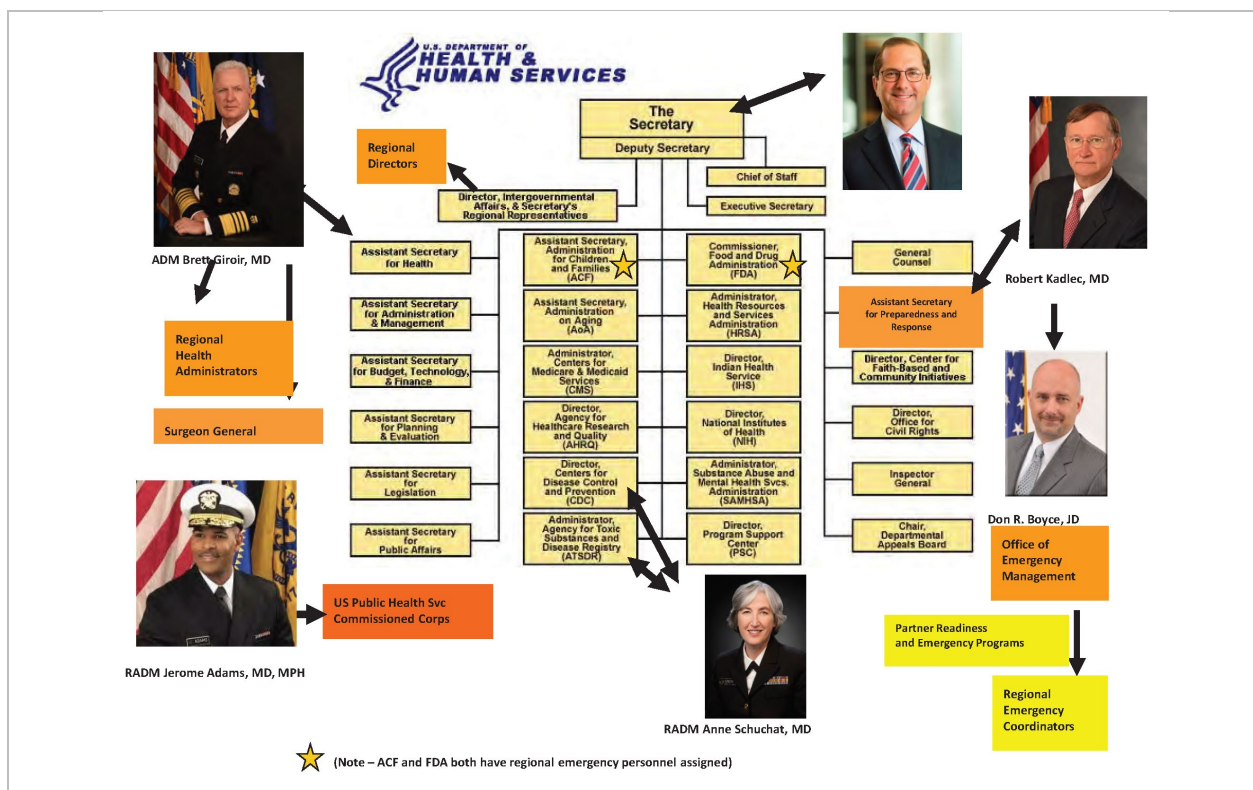
Overview of Catastrophic Response

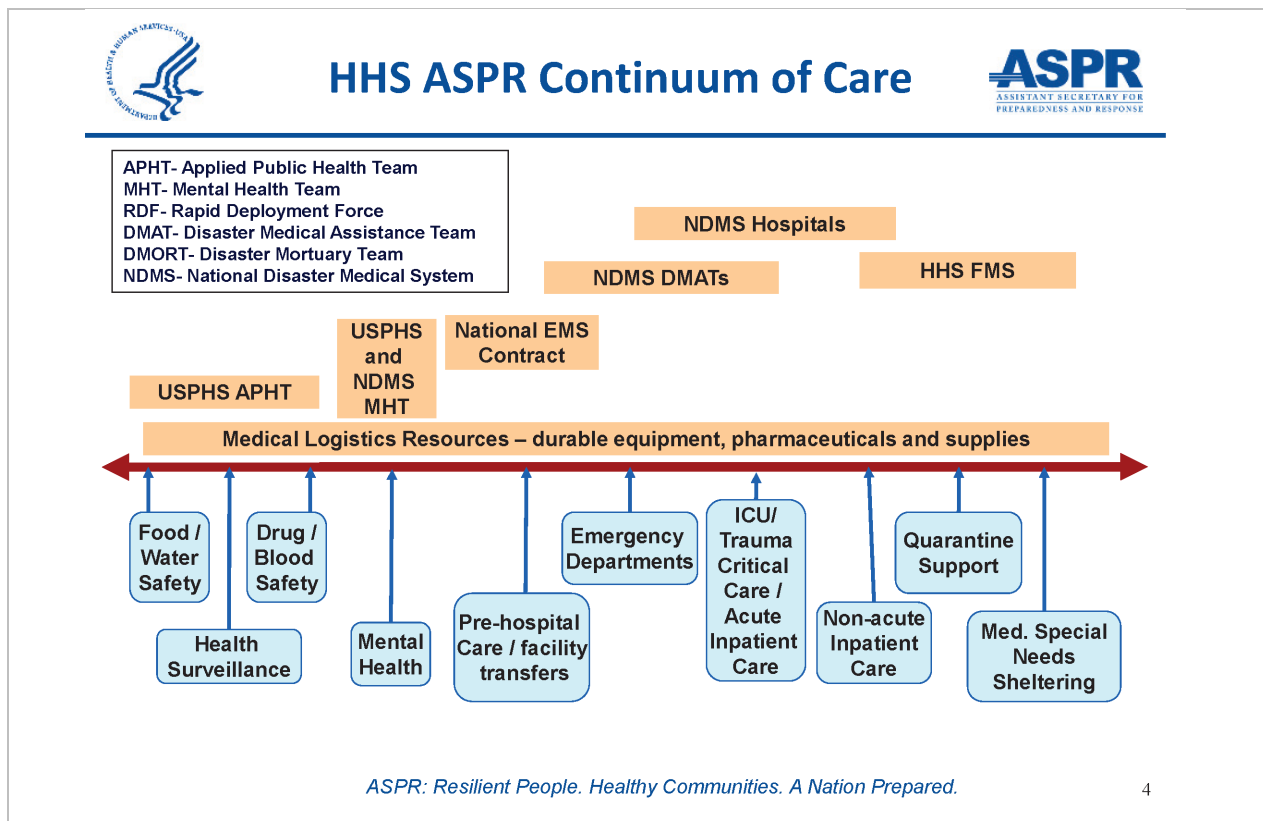
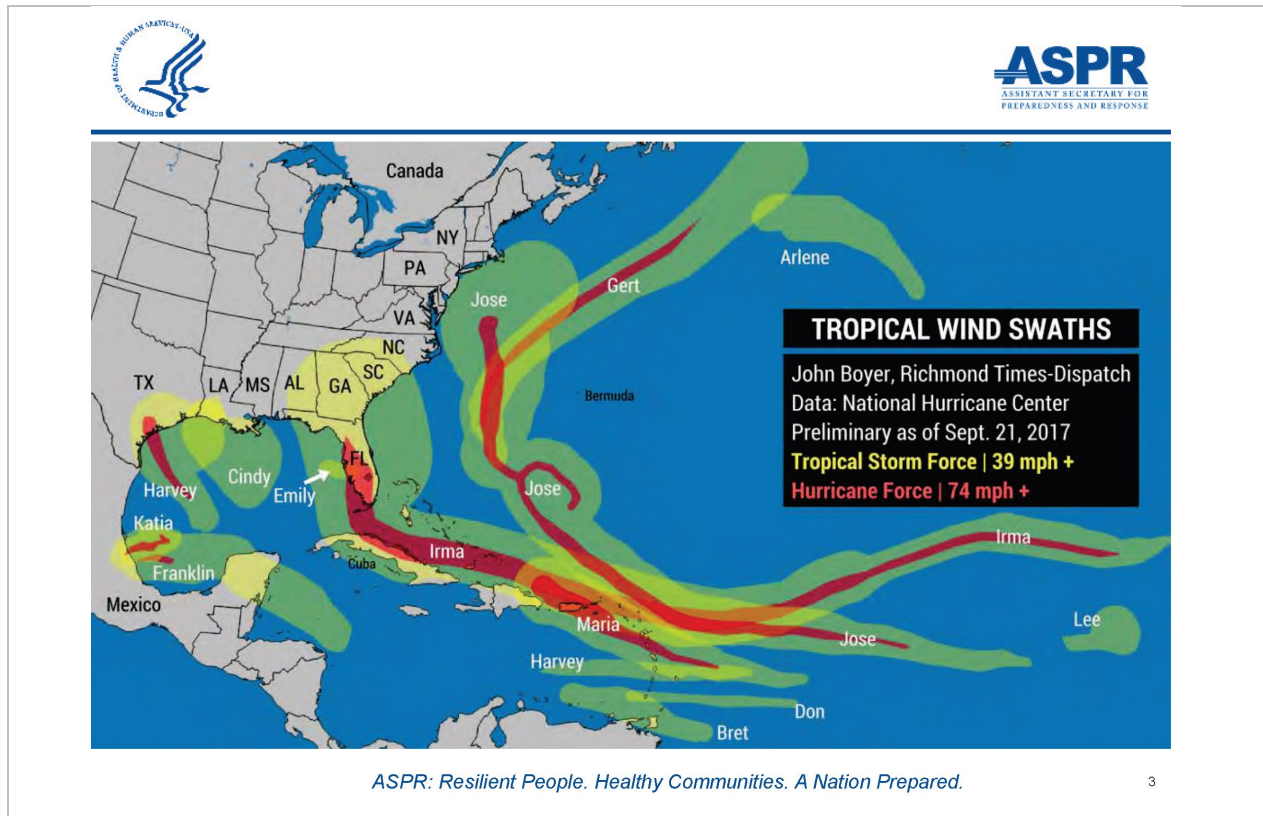
Oregon Coastal Hospital Special Leadership Conference 2018



**HHS Region 10
Regional Emergency Coordinator Program**

Content developed by Rick Buell and CAPT John Smart, RECs, HHS Region 10







HHS ASPR OEM Resource Availability Summary



Medical Surge

- DMAT
- Types I, II, III
- MSURT
- RDF
- MHT
- FMS staffed or cache

Fatality Management

- DMORT
- DMORT Assessment

Operational Coordination and Support

- IRCT/LRAT
- RIST
- NIST

Public Health Support

- APHT

Veterinary Support

- NVRT
- NVRT Assessment

Patient Movement

- MAC-T
- SAT
- JPAT

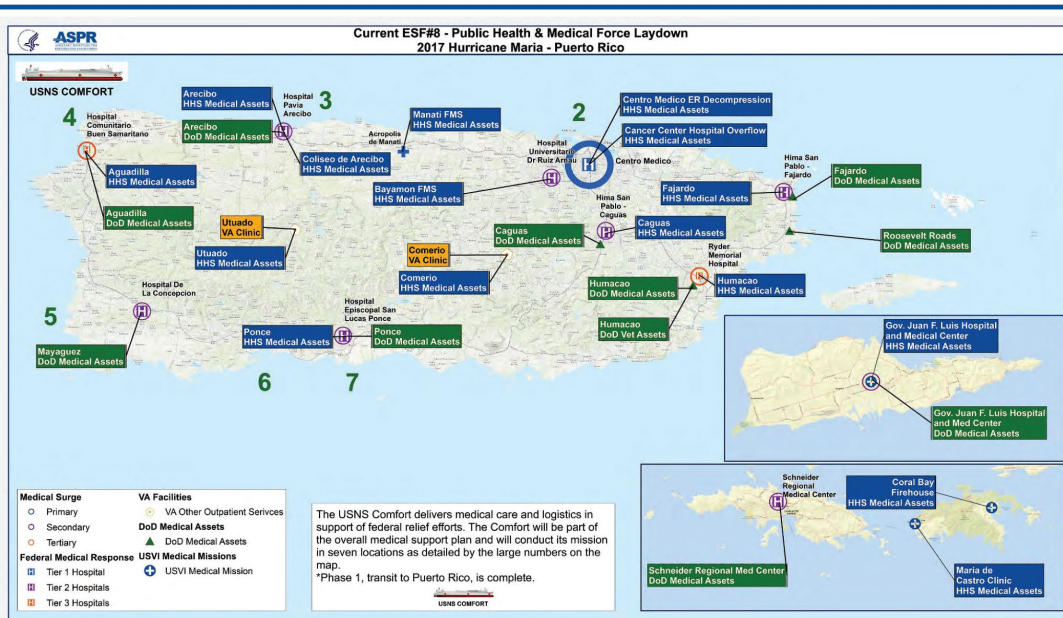


ASPR: Resilient People. Healthy Communities. A Nation Prepared.

5



HHS Response



ASPR: Resilient People. Healthy Communities. A Nation Prepared.

6



HHS Response



Response and Recovery

from Hurricanes Harvey, Nate Irma and Maria



4,674

Personnel deployed

36,370

Patients assisted

782

Patients evacuated

944

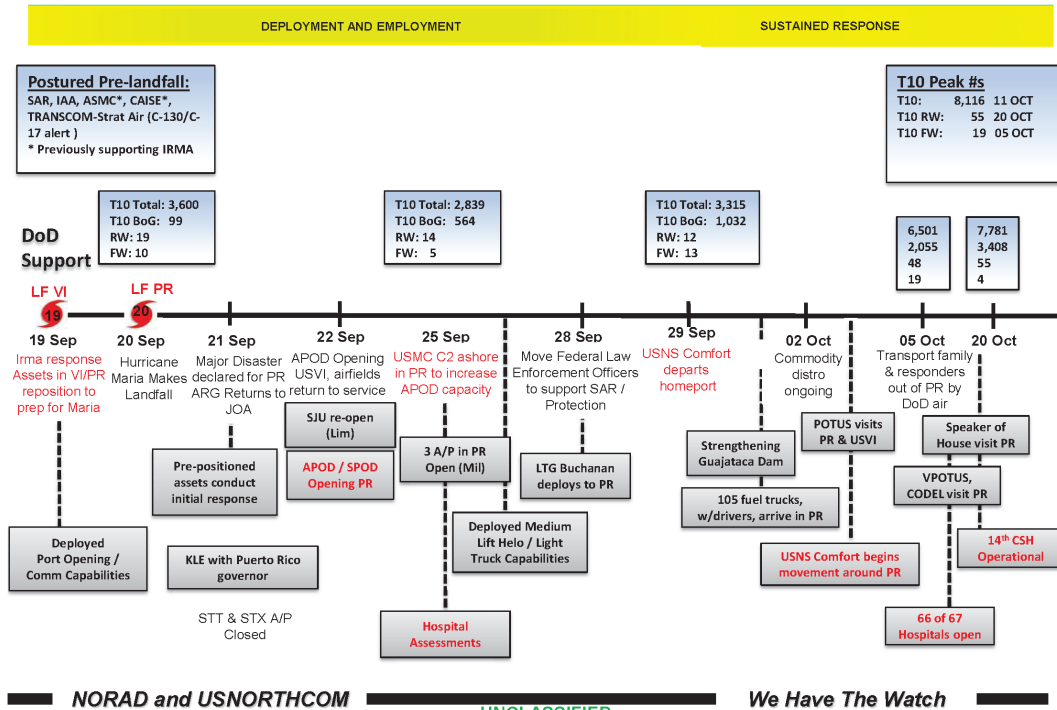
Tons of medical caches moved

ASPR: Resilient People. Healthy Communities. A Nation Prepared.



UNCLASSIFIED

DoD HURRICANE MARIA RESPONSE TIMELINE





UNCLASSIFIED

DoD Hurricane Maria Response

- DSCA from the sea in VIPR + HA/DR
- Overcoming distance & damaged infrastructure
- Transition of lead FCCs
- C2 and liaison structures in PR
- Route clearance and commodity distribution
- HHS and the medical CONOPS for VIPR
- Other Contingencies
- Strategic messaging
- Disaster Area Circulation
- Drawing down the mission



NORAD and USNORTHCOM

UNCLASSIFIED

We Have The Watch

9



Lessons Observed

ASPR
ASSISTANT SECRETARY FOR
PREPAREDNESS AND RESPONSE

- Communications, Assessment, Situational Awareness



ASPR: Resilient People. Healthy Communities. A Nation Prepared.



Lessons Observed



- Transportation, Medical Logistics, EMS



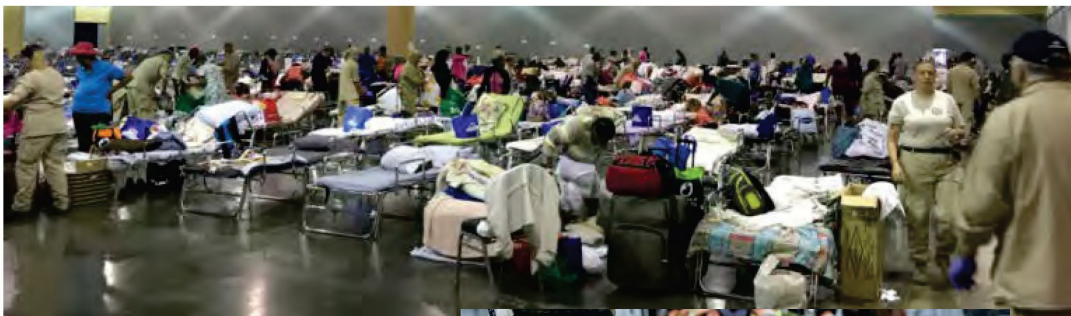
s. A Nation Prepared.



Lessons Observed



- Support “wrap around” services, Pt. movement





Lessons Observed



- Business continuity
- Recovery – temp medical facilities
- EMAC – Emergency Management Assistance Compacts

ASPR: Resilient People. Healthy Communities. A Nation Prepared.

6.0 COMPLETED FEEDBACK FORMS

Feedback Form

Coastal Hospital Special Leadership Event

Held on March 20-21, 2018 in Newport, Oregon

Overall Event purposes:

- Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami
- Encourage progressive ways to prepare to be able to serve coastal communities post disaster
- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Jerrod Karnotski
 Organization: Columbia Memorial Hospital
 Email: jkarnotski@columbiamemorial.org
 Phone: 503-338-4519

1. What is your primary profession?

- ☒ Hospital executive
- ☐ Hospital emergency planner or coordinator
- ☐ Medical clinician
- ☐ Hospital facilities
- ☐ Public health
- ☐ Elected official
- ☐ Local government
- ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☐ Met my expectations
- ☒ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☒ Yes
- ☐ No
- ☐ Some

Comment: Briefly describe your new understanding of the impact

We are working hard to prepare, but we need renewed focus + resources.

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☒ Yes
- ☐ No
- ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network
~~we~~ we need to work collaboratively. Many of our organizations' buildings will not exist.

6. Did you learn anything new that is especially helpful? If yes, what?

we are not prepared to have our generator + fuel tank ready for an earthquake.

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Emergency management from Providence Seaside, Tillamook General, & Curry General.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

Investigate water preparedness + fuel availability + onsite storage of both. More drills are needed + more training for staff.

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

I liked the multiple disciplines at one event.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

I thought introductions could be several minutes shorter + save more time for presentations. Maybe have bios in the packet so we can just read through it?

11. Do you have any other comments?

☐ If you would like someone to follow up with you on any of the survey questions, please check the box and fill in your contact info on page 1 (name, phone and email address)

For questions, contact Akiko Saito, Oregon Health Authority (OHA), at Akiko.Saito@state.or.us

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Dan Cox
 Organization: Oregon State University
 Email: dan.cox@oregonstate.edu
 Phone: 541 737 3831

1. What is your primary profession?

- ☐ Hospital executive
- ☐ Hospital emergency planner or coordinator
- ☐ Medical clinician
- ☐ Hospital facilities
- ☐ Public health
- ☐ Elected official
- ☐ Local government

☒ Other (fill in) Academic/researcher-education

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☐ Met my expectations
- ☒ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☒ Yes
- ☐ No
- ☐ Some

Comment: Briefly describe your new understanding of the impact

How CSZ impacts hospitals, coastal Oregon, Emergency management

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☒ Yes
- ☐ No
- ☐ Some

Comments: Briefly describe in what ways you feel encouraged

Good network of people. CEO's gave strong support of the mission

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes
☐ No
☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

Looking at critical life lines water, fuel, power

6. Did you learn anything new that is especially helpful? If yes, what?

What hospitals + communities are already doing

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Everyone was great

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

Personally, no. I'm already prepared - lot

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

*• venue - excellent. "informal" setting, promotes discussion
 • knowledge - people in the room had a lot of understanding of CSZ + preparedness + what the needs are
 • format - generated a lot of discussion*

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

Will a participant list be made available?

11. Do you have any other comments?

Great meeting! Thank you for organizing it

☐ If you would like someone to follow up with you on any of the survey questions, please check the box and fill in your contact info on page 1 (name, phone and email address)

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Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: _____
 Organization: _____
 Email: _____
 Phone: _____

1. What is your primary profession?
 - ☐ Hospital executive
 - ☐ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
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 - ☐ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

A straw proposal for what this might look like and for people to react to, would have made this more productive

6. Did you learn anything new that is especially helpful? If yes, what?

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Yes.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

At times, especially on the first day, most things were too general

11. Do you have any other comments?

☐ If you would like someone to follow up with you on any of the survey questions, please check the box and fill in your contact info on page 1 (name, phone and email address)

For questions, contact Akiko Saito, Oregon Health Authority (OHA), at Akiko.Saito@state.or.us

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: MICAH T GOETR
 Organization: SHS
 Email: mgoetth@sanhealth.org
 Phone: 541-905-2924

1. What is your primary profession?

- ☐ Hospital executive
- ☒ Hospital emergency planner or coordinator
- ☐ Medical clinician
- ☐ Hospital facilities
- ☐ Public health
- ☐ Elected official
- ☐ Local government
- ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☐ Met my expectations
- ☒ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☐ Yes
- ☐ No
- ☒ Some

Comment: Briefly describe your new understanding of the impact

**BETTER UNDERSTANDING
of STATE LEVEL PLANS**

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☒ Yes
- ☐ No
- ☐ Some

Comments: Briefly describe in what ways you feel encouraged

**NO ONE IS UNDER ANY
ILLUSIONS OF WHAT WE
ARE UP AGAINST**

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☐ Yes

☐ No

☒ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

TO BE USEFUL THERE NEEDS TO BE A TANGIBLE OUTCOME

6. Did you learn anything new that is especially helpful? If yes, what?

YES, SOME NEW IDEAS FROM OTHERS

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

YES, JOHN SMART, ASPR

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

MEETING W/ WATER DISTRICTS

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

HOSPITAL CEO'S PRESENCE. WE NEED THAT BUY-IN

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

FACILITIES WERE SEGREGATED BY TYPE/LOCATION. BREAK UP THE GROUPS FOR STIMULATING CONVERSATION.

11. Do you have any other comments?

I WOULD BE INTERESTED IN ANY PLANNING MEETINGS AT STATE LEVEL WHERE HOSPITAL INPUT IS DESIRED.

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For questions, contact Akiko Saito, Oregon Health Authority (OHA), at Akiko.Saito@state.or.us

Feedback Form

Coastal Hospital Special Leadership Event

Held on March 20-21, 2018 in Newport, Oregon

Overall Event purposes:

- Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami
- Encourage progressive ways to prepare to be able to serve coastal communities post disaster
- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Ericka Mason
 Organization: Sumneritan Health Services
 Email: Emason@Sumhealth.org
 Phone: 503.971.8199

1. What is your primary profession?
 - ☐ Hospital executive
 - ☒ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☒ Met my expectations
 - ☐ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☐ Yes
 - ☐ No
 - ☒ Some

Comments: Briefly describe in what ways you feel encouraged

looking for more of the "How to" for issues.

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes
☐ No
☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

Yes!

6. Did you learn anything new that is especially helpful? If yes, what? ASPR presentation was excellent as it discussed real world issues. Also OSU tsunami simulation was incredible to watch and learn from

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Yes. Networking opportunities w/many.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

Fatality Planning, Seismic grants (smaller than rehabilitation sizes)

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

I am interested in work groups that want to focus on common issues and finding solutions to them. Water, fatality plans, training etc.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

11. Do you have any other comments?

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Valerie Arkman, RN, BSN
 Organization: Bay Area Hospital
 Email: Personal contact
 Phone: information redacted

*please put me
on contact list
(VA)*

1. What is your primary profession?
☒ Hospital executive *Leader, Trauma Program Manager*
☐ Hospital emergency planner or coordinator
☐ Medical clinician
☐ Hospital facilities
☐ Public health
☐ Elected official
☐ Local government
☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
☐ Did not meet my expectations
☐ Met my expectations
☒ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
☒ Yes
☐ No
☐ Some
 Comment: Briefly describe your new understanding of the impact
Excellent work!
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
☒ Yes
☐ No
☐ Some
 Comments: Briefly describe in what ways you feel encouraged

I redact personal contact information.

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes
☐ No
☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

Even @ the Grass roots level.

6. Did you learn anything new that is especially helpful? If yes, what?

How much planning? work that has been done all ready. BAA just needs to be @ that table; to benefit from everything done so far & go forward.

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Oh yes David Sanford, Bill Hiles, Beth DePen, Yumei Wang, Akiko Saito, Erica, Micah, Dewayne, Mike Murphy AND more. Deanna Henry!

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

Tell this info in a presentation format to our 'C' Suite; Quality, Facilities Leadership

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

These wonderful people in the room.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

I can't think of a thing.

11. Do you have any other comments?

Excellent venue; very easy to learn; listen in this beautiful environment.
 loved the timing & organization of the event.

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Michael Murphy
 Organization: Coos County Emergency Management
 Email: M.Murphy@CO.COOS.OR.US
 Phone: 541-396-7790

1. What is your primary profession?

- ☐ Hospital executive
- ☐ Hospital emergency planner or coordinator
- ☐ Medical clinician
- ☐ Hospital facilities
- ☐ Public health
- ☐ Elected official
- ☐ Local government
- ☒ Other (fill in) COUNTY E.M.

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☒ Met my expectations
- ☐ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☒ Yes
- ☐ No
- ☐ Some

Comment: Briefly describe your new understanding of the impact From Hospital Perspective

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☒ Yes
- ☐ No
- ☐ Some

Comments: Briefly describe in what ways you feel encouraged
opened channels for dialog

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

I Hope it works & actually happens

6. Did you learn anything new that is especially helpful? If yes, what?

REINFORCED PRIOR KNOWLEDGE OF COVID-19

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

I AM willing to participate with hospital collaborative group

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

11. Do you have any other comments?

Avoid the coast during tourist season April - October

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Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: _____
Organization: _____
Email: _____
Phone: _____

1. What is your primary profession?

- ☐ Hospital executive
- ☐ Hospital emergency planner or coordinator
- ☐ Medical clinician
- ☐ Hospital facilities
- ☒ Public health
- ☐ Elected official
- ☐ Local government
- ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☐ Met my expectations
- ☐ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☒ Yes
- ☐ No
- ☐ Some

Comment: Briefly describe your new understanding of the impact

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☒ Yes
- ☐ No
- ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

11. Do you have any other comments?

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Edie Turcanson
 Organization: Southern Coast Hospital
 Email: edieturcanson@southerncoast.org
 Phone: 541 252-1989

1. What is your primary profession?
 - ☐ Hospital executive
 - ☒ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
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 - ☐ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

Secondary water source

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Beth, Mike Yumei, Akiko

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

Practice Hospital wide evaluation

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

DAN Cox exhibit

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

11. Do you have any other comments?

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Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: GORDON McCRAW
 Organization: TILLAMOOK CO. EMERGENCY MGMT.
 Email: gmcraw@co.tillamook.or.us
 Phone: 503 842 3412

1. What is your primary profession?
 - ☐ Hospital executive
 - ☐ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☒ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
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 - ☐ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

BETTER UNDERSTANDING OF STATE FUEL SUPPLY

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

KNEW A LOT OF FOLKS ATTENDING ALREADY.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

ALREADY IN THE WORKS BECAUSE OF RECENT VISIT BY EYUMGI

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

GOOD TO GET LIKE DISCIPLINES TOGETHER.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

IT WAS ALL GOOD

11. Do you have any other comments?

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Wayne Alvarez-Rojas
 Organization: AHJM / Tillamook Regional Medical Center
 Email: Wayne.alvarez-rojas@ah.org
 Phone: 503-303-3373

1. What is your primary profession?
 - ☐ Hospital executive
 - ☐ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☒ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☒ Met my expectations
 - ☐ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☐ Yes
 - ☐ No
 - ☒ Some

Comments: Briefly describe in what ways you feel encouraged

ways to prepare were only lightly covered compared to painting a very grim picture of what it will look like.

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

As a facilities person I would have liked to meet more w/ just facilities.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

• Review generator seismic certified.

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

The Captain's presentation was probably the most important for me.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

The venue has great view but too crowded/small.

11. Do you have any other comments?

More breaks even if shorter.

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: ERIC SWANSON
 Organization: TRMC
 Email: ERIC.SWANSON@TRM.ORG
 Phone: 503.815.2106

1. What is your primary profession?

- ☒ Hospital executive
- ☒ Hospital emergency planner or coordinator
- ☒ Medical clinician
- ☐ Hospital facilities
- ☐ Public health
- ☒ Elected official
- ☐ Local government
- ☐ Other (fill in) _____

2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?

- ☐ Did not meet my expectations
- ☒ Met my expectations
- ☐ Exceeded my expectations

3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)

- ☐ Yes
- ☐ No
- ☒ Some

Comment: Briefly describe your new understanding of the impact

4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)

- ☐ Yes
- ☐ No
- ☒ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

—

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

—

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

—

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

The PH LIAISON program is non-existent in my community and is frankly over-rated.

11. Do you have any other comments?

We will not rely on that program in an emergency and the assumption that it will be of any benefit in an event is questionable at best.

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Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: DAVID SANFORD
 Organization: CHN
 Email: DAVID.SANFORD@CURNYHEALTH.ORG
 Phone: 541-373-3084

1. What is your primary profession?
 - ☒ Hospital executive
 - ☐ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☐ Met my expectations
 - ☒ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes
☐ No
☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

6. Did you learn anything new that is especially helpful? If yes, what?

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

SESSIONS WE WILL HAVE A LOT OF TAKE AWAYS.

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

Great Presentation.

11. Do you have any other comments?

WELL DONE.....

☐ If you would like someone to follow up with you on any of the survey questions, please check the box and fill in your contact info on page 1 (name, phone and email address)

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Karla Miller
 Organization: Curry Health Network
 Email: Karla.miller@curryhealth.org
 Phone: 541-999-7274

1. What is your primary profession?
 - ☐ Hospital executive
 - ☒ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☒ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☐ Met my expectations
 - ☒ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
Resources available & encouraged
Governmental assistance availability
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged
Exploring resources to determine existing ideas & methods
both successful & unsuccessful.

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes
☐ No
☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

Learning & development. Determining additional assistance available.

6. Did you learn anything new that is especially helpful? If yes, what?

How much information is available from government agencies

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

Jeremy Dumire ESC, Curry County
Daniel Cox OSU, Coastal & Ocean Engineering

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

More community networking & (hopefully) planning
Enhanced community, Board of Directors, Admin
Education & participation

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

All of it → content, information, format informality,
positive reinforcement.

Terrific group of people!

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

Space was a little tight for movement, but great for conversing

11. Do you have any other comments?

Thank you!

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- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Pat Kirby
 Organization: Peace Harbor Medical Center
 Email: PKirby@PeaceHealth.org
 Phone: 541-902-6710

1. What is your primary profession?
 - ☐ Hospital executive
 - ☒ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☒ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☐ Other (fill in) _____
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☒ Met my expectations
 - ☐ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
I was pretty elevated to CS event. Always to hear it again elevates the concern.
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged
Thanks for invited CEO + Board members. Although our CEO was not here, the encouragement that was spoken to them was great.

5. Did this Event help explore launching a coastal hospital-driven collaborative network? (Event Purpose #3)

☒ Yes

☐ No

☐ Some

Comments: Briefly describe if you would like to participate in a hospital-driven collaborative network

The on going efforts for fuel, water, supplies.

6. Did you learn anything new that is especially helpful? If yes, what?

MASS Displacement Negotiation to the State of Oregon.

7. Meeting others with shared concerns was one of the informal objectives of this event. Did you meet anyone that was especially helpful to meet? If yes, who and why?

yes, but can't remember names.

8. Are there any earthquake preparedness actions you plan to take as a result of this Event? If yes, what?

work harder on fuel + water

9. What did you especially like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

The pull to bring the hospitals together

10. What did you not like about the Event? (goals, sessions, speakers, participant input, etc.). Why?

A little bigger room

11. Do you have any other comments?

Thank you very much!

☐ If you would like someone to follow up with you on any of the survey questions, please check the box and fill in your contact info on page 1 (name, phone and email address)

For questions, contact Akiko Saito, Oregon Health Authority (OHA), at Akiko.Saito@state.or.us

Feedback Form

**Coastal Hospital Special Leadership Event
Held on March 20-21, 2018 in Newport, Oregon**

Overall Event purposes:

- Elevate understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami
- Encourage progressive ways to prepare to be able to serve coastal communities post disaster
- Explore launching a coastal hospital-driven collaborative network

Please submit your completed form before you leave the Event.

Contact Information (optional):

Name: Jay Raskin
 Organization: OSHPA
 Email: jay@jayraskinarchitect.com
 Phone: 503-440-0436

1. What is your primary profession?
 - ☐ Hospital executive
 - ☐ Hospital emergency planner or coordinator
 - ☐ Medical clinician
 - ☐ Hospital facilities
 - ☐ Public health
 - ☐ Elected official
 - ☐ Local government
 - ☒ Other (fill in) Chair of State Commission
2. At what level did the Coastal Hospital Special Leadership Event meet your expectations?
 - ☐ Did not meet my expectations
 - ☐ Met my expectations
 - ☒ Exceeded my expectations
3. Did this Event elevate your understanding of the impact of a Cascadia Subduction Zone Earthquake and Tsunami? (Event Purpose #1)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comment: Briefly describe your new understanding of the impact
4. Did this Event encourage progressive ways for you to prepare to be able to serve coastal communities post disaster? (Event Purpose #2)
 - ☒ Yes
 - ☐ No
 - ☐ Some

Comments: Briefly describe in what ways you feel encouraged

7.0 FOLLOW-UP CORRESPONDENCE

Follow up Correspondence

Good afternoon,

On behalf of OHA, a hearty thanks to you for amazing collaborating on Cascadia earthquake and tsunami preparedness over the past two days! Our conversations about all coastal hospitals being prepared were robust and meaningful due to the enthusiasm and knowledge the group brought together.

Some highlights and identified priorities include:

100% of 11 coastal hospital executive level representation both days

- Rep. David Gomberg, a representative of the Coastal Caucus, joined us for the kick off lunch, and other key partners participated
- Welcome from Mike Harryman (Governor's Office) and V.P. Andy Van Pelt from Oregon Association of Hospitals and Health Systems
- Excellent presentations from OSSPAC (Chair), US Health and Human Services, local hospitals, DOGAMI, Dept of Energy, OSU, that spurred productive discussions
- Goal was met to get agreement from hospital executives to build a coastal hospital learning network/ collaborative, and OAHHS agreed to support hospitals
- Priorities were identified: hospital infrastructure (water, power, transportation and communication), community collaboration and policy/ funding opportunities to build coastal resiliency.
- Participant comments such as "this was the most productive meeting" or "this was the best meeting" were made

Below is a list of resources that were discussed and list of attendees is attached. Further contact information can be obtained through your local liaison. A second email containing presentation slides will follow shortly.

We look forward to the formation of a coastal hospital resilience network, and continued collaborations on building Cascadia resilience!

[OHA Health Security, Preparedness & Response Resources for Partners](#)
[Oregon Coastal Hospital Preparing for Cascadia \(DOGAMI technical assistance project report\)](#). Appendix D include options for a Collaborative Network
[CDC Emergency Water Supply Planning Guide](#)
[FEMA 1019 emergency power guide](#)
[Pharmacy Memorandum of Understanding \(MOU\)](#)
[OMA Crisis Care Guidance](#)
[Oregon Region 1 Trauma Surge Plan](#)
[Oregon Seismic Safety Policy Advisory Commission \(OSSPAC\) main page](#)
[OSSPAC SB 850](#)
[Oregon Resiliency Plan](#)
[DOGAMI pilot study on hospitals, water systems, transportation and interdependencies](#)
[Oregon Fuel Action Plan](#)

[Johns Hopkins A Framework for Healthcare Disaster Resilience: A View to the Future](#) includes 4 groupings of public health disasters, with Cascadia earthquakes in catastrophic group
[Oregon Emergency Management Association](#)

Best regards,

Akiko, Kathryn, Sue, Beth and Yumei

(sent to all participants on 3/22/18 via email from Maria Escobar-Sinn, OHA Administrative Coordinator)

8.0 DOGAMI RESILIENCE PLANNING MAPS

8.1 Introduction

DOGAMI created resilience planning maps with tsunami hazards for three hospitals. DOGAMI identified hazards, assets, and features that are aimed to be helpful in disaster resilience planning and included them on each map. These maps were displayed at the leadership event. This section describes the information, the way it is displayed on the maps, and how it can be useful to hospitals and hospital partners. The main purpose of these maps is to help with planning *before* the Cascadia earthquake and resulting tsunami occurs.

These maps are useful because they:

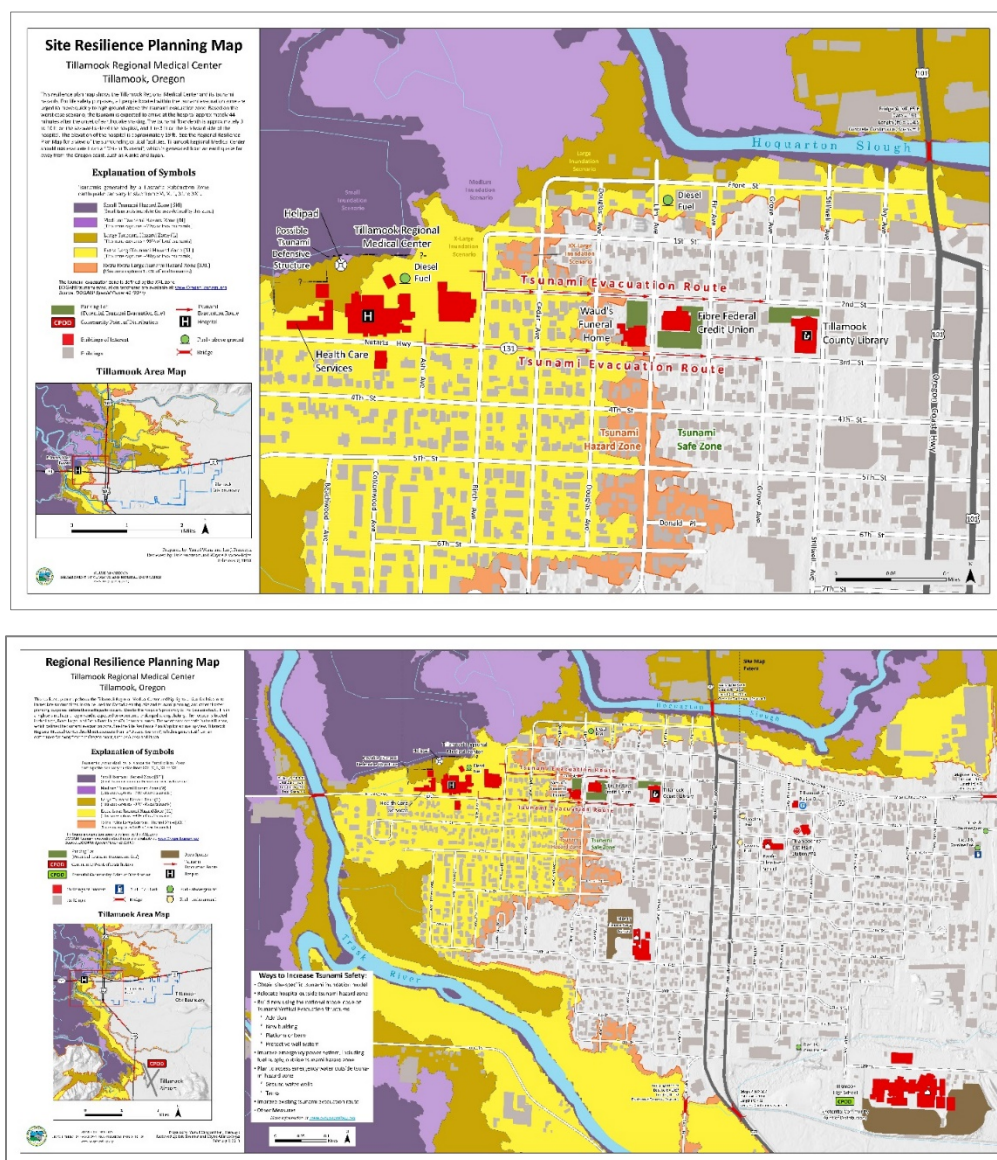
- Assist hospitals in developing a Cascadia earthquake resilience plans
- Assist hospitals in examining and improving their tsunami safety plans by characterizing how the hospitals could be impacted by potential tsunami events of increasing sizes
- Provide helpful presentation material for internal and community resilience planning by visualizing the geographic locations of important facilities to the hospital

Please note that tsunami resilience planning maps are *not* tsunami evacuation maps. Tsunami evacuation maps are designed to be simple, clear, and instructive and to show routes to be used during a disaster, whereas resilience planning maps are intended to assist in planning before a disaster.

Text included on each site resilience planning map describes general tsunami information unique to the specific hospital. Similarly, each regional resilience planning map offers potential tsunami safety improvement measures that could be employed by the hospital. Where applicable, possible tsunami defensive structures and possible sites for constructing tsunami vertical evacuation structures are also suggested. The DOGAMI tsunami evacuation brochure website address is included on each map.

Below are images of the site resilience planning map and the regional resilience planning map for the Tillamook Regional Medical Center. Full-size maps for all three hospitals are provided with this report.

Figure 4. Site resilience planning map and regional resilience planning map for the Tillamook Regional Medical Center.



8.2 Tsunami information on maps

Scenarios for tsunami inundation after a Cascadia subduction zone earthquake vary in size from small (SM), to medium (M), large (L), extra large (XL), and extra extra large (XXL). Each resilience map includes these five tsunami hazard zones. Additionally, tsunami hazard zone and tsunami safe zone labels clearly identify the boundary between the unsafe and safe areas. The boundary is defined by a red line.

On the Seaside map only, a “landscape friction XXL line” has been included from unpublished site-specific tsunami simulation data (Y. Joseph Zhang, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Va., unpublished report to Seaside School District, Feb. 2017, Site specific simulation for Seaside, OR). This line represents the maximum extent of inundation from an XXL tsunami scenario with the added consideration of friction. Friction was not incorporated for DOGAMI’s five scenarios (SM through XXL), so these maps represent a more conservative (higher) estimate of inundation.

Tsunami information shown on resilience maps:

- o Tsunami hazard zones (SM, M, L, XL, XXL)
- o Landscape friction XXL line (Seaside maps only)

8.3 Evacuation information on maps

In the event of a tsunami, hospitals may need to quickly evacuate patients and employees out of the tsunami hazard zones using the most efficient routes available. To help hospitals prepare, each resilience map includes recommended existing evacuation routes (shown with red arrows) and/or potential evacuation routes (shown with green arrows). Established and potential post-tsunami areas of assembly are also identified on each map. These include parking lots and open areas that could be considered for potential tsunami evacuation sites.

Evacuation information:

- o Recommended evacuation routes (red arrows)
- o Possible evacuation routes (green arrows)
- o Possible areas of assembly – parking lots
- o Possible areas of assembly – open areas

8.4 Facilities located on maps

Each map includes the names and locations of buildings and facilities of special interest, shown in red.

Buildings and facilities of special interest:

- o Hospital
- o Hospital helipad
- o Hospital expansion areas (if applicable)
- o Other health care services in the area
- o City fire and rescue
- o City police department
- o Schools

8.5 Local fuel supply resources located on maps

Each hospital has its own fuel tank on site, and this location is shown on each map. In addition, each map shows locations of fuel tanks near the hospital, as well as whether they are constructed above or below ground. Each regional resilience plan map shows locations of local cardlock facilities, which are fueling sites that are restricted by requiring an issued access card to obtain fuel.

Included fuel supplies:

- o Fuel – cardlock facility
- o Fuel – above-ground tank
- o Fuel – underground tank

8.6 Water system facilities located on maps

Water system facilities are located on the Columbia Memorial Hospital (Astoria) regional map, where two reservoirs are located south and southeast of the hospital. Water system facilities are not shown on the Seaside and Tillamook maps because the facilities are located off the map extents.

8.7 Bridges located on maps

Bridge locations are included on both the regional and site maps. Next to each bridge symbol there are important details about the bridge's construction material, number of spans, length, date built, and mile post number. This allows planners to have access to information about bridges that are situated along potential evacuation routes as well as routes to critical facilities, such as fuel supplies. Some bridges may have been retrofitted and/or are being replaced.

Bridge information includes the following where available:

- o Mile post number
- o Construction material
- o Number of spans
- o Date built
- o Bridge length

8.8 Community Points of Distribution located on maps

A designated location where the public can pick up emergency supplies following a disaster is called a Community Point of Distribution (CPOD). Typically, local CPODs are determined by the county emergency manager. Each regional resilience plan map includes the location of the designated CPOD for that area. If within the map extent, the recommended route to the CPOD is also defined. A potential new CPOD location is suggested on maps where the hospital might benefit from a closer point of distribution.

8.9 General information on maps

Each of these maps provide general geographical information. Topography around the hospitals is represented and contours are shown in regions that exhibit variable elevations. The regional transportation network, including all local roads, highways, and interstates is displayed, along with the regional hydrology network, including rivers and streams and the ocean, where applicable. Each map also includes building footprints and the location of the regional airport.

List of general base map information:

- o Transportation network (interstate highways, state highways, local roads)
- o Hydrology network (ocean, rivers, streams)
- o Building footprints
- o Surrounding topography with contour lines
- o Airport location

8.10 Additional information on maps

Because each hospital has its own unique circumstances, additional helpful information may be included on the regional and site maps. For example, the location of a possible future tsunami defensive structure was included for one hospital (Tillamook). As another example, DOGAMI included some landslide hazard

areas, which may overlap with evacuation routes (Astoria). In the event of an earthquake, these landslides may reactivate, and evacuation routes could potentially be blocked. For Seaside, the school relocation and future water reservoir (tank) areas are included.

Additional helpful information that may be included:

- o Possible tsunami defensive structure (Tillamook only)
- o Landslide hazard areas (Astoria only)
- o Areas of future school relocation (Seaside only)
- o Areas of future water storage reservoir locations (Seaside only)

9.0 ACKNOWLEDGMENTS

This leadership event was organized by OHA, Healthcare Preparedness Liaisons from Regions 1, 2, and 3, and the Oregon Department of Geology and Mineral Industries (DOGAMI) and was co-sponsored by the Cascadia Region Earthquake Workgroup (CREW.org). Funding for this project was made possible by the Centers for Disease Control and Prevention via a federal grant to OHA (number 1 NU90TP921916-01), which passed funds through OHA-DOGAMI agreement number 157707-0, DOGAMI contract number 632171924. The views expressed in written materials or publications and by speakers or moderators do not necessarily reflect the official policies of the Department of Health and Human Services, nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government. This project was funded with 100% federal funds.