

# Sea level rise along Washington's shores

Jackson Blalock

March 22, 2019

The Nature  
Conservancy



Sea Grant  
Washington

- How can sea level rise impact your project?
- How much and when?
- What can you do about it?

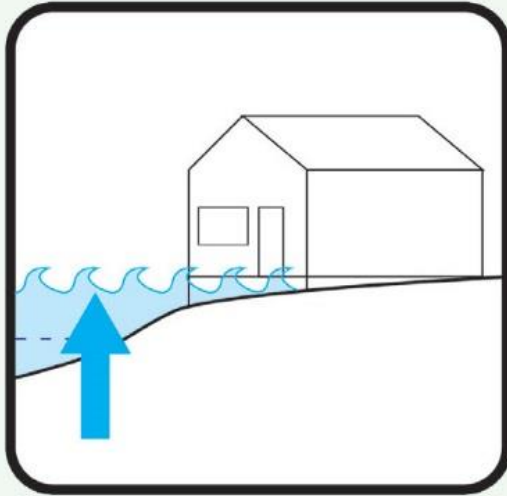


# How can sea level rise impact your project?



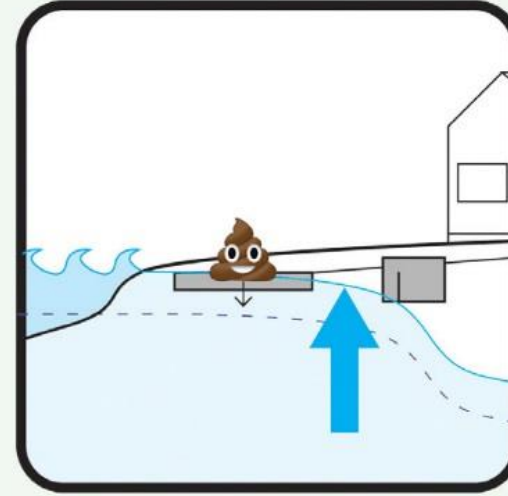
North Cove, WA  
via Pinterest

# Sea Level Rise Impacts



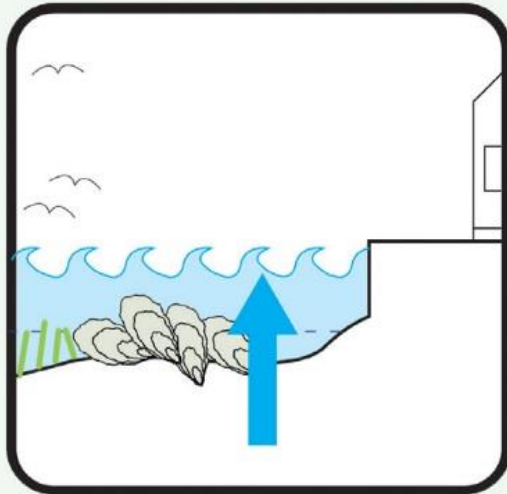
## INUNDATION

Higher tides move storm surge higher and further inland. Extreme events will be more frequent; 100-year floods could become 10-year floods.



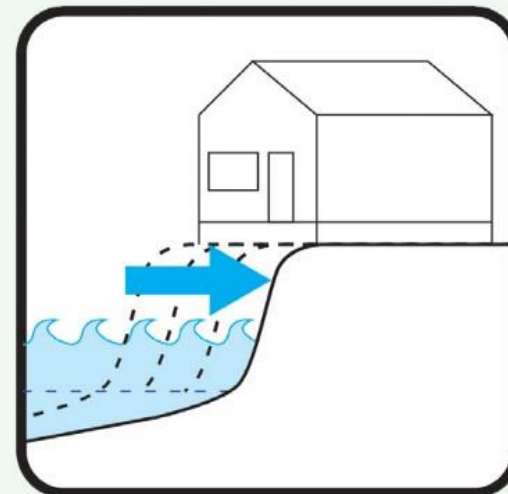
## SALINITY

Sea level rise raises groundwater, increasing salinity. This harms wells, septic systems and vegetation, which reduces soil stability and water quality.



## HABITAT LOSS

Rising seas reduce the size of mudflats, marshes and intertidal habitats. If upland area is available, habitats may be able to adapt to “coastal squeeze.”



## LANDFORM CHANGE

Higher waters move sediments in new ways, causing some areas to erode more quickly, while others may grow.

Diagram: Jackson Blalock

# Sea level rise + existing erosion



# Sea level rise + filled tidelands





# ***NEW NORMAL?***







How much?

When?

# The Washington Coastal Resilience Project

*Goal: Increase regional capacity to build resilience to changes in relative sea level.*

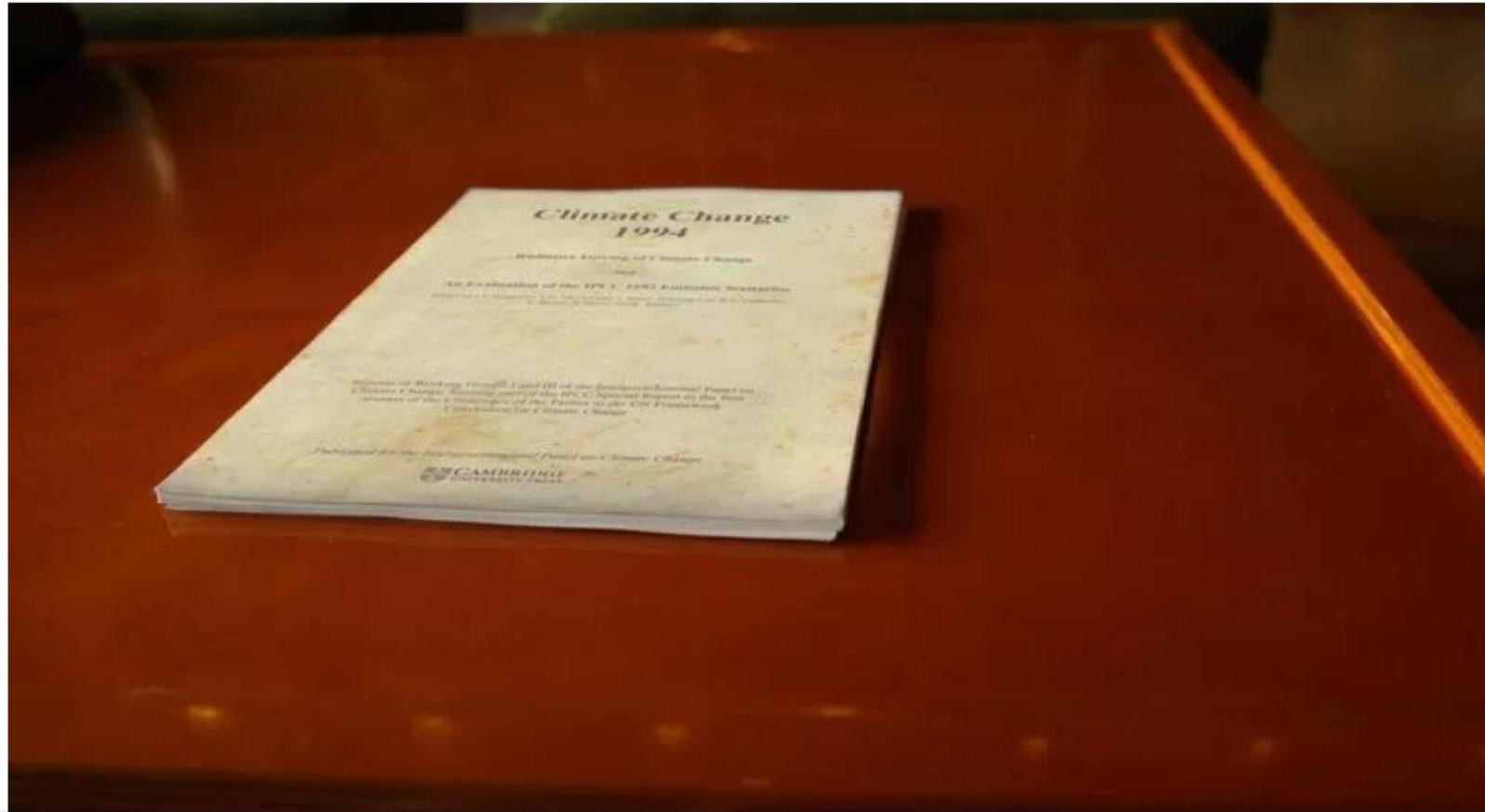


# The Washington Coastal Resilience Project

*Goal: Increase regional capacity to build resilience to changes in relative sea level.*

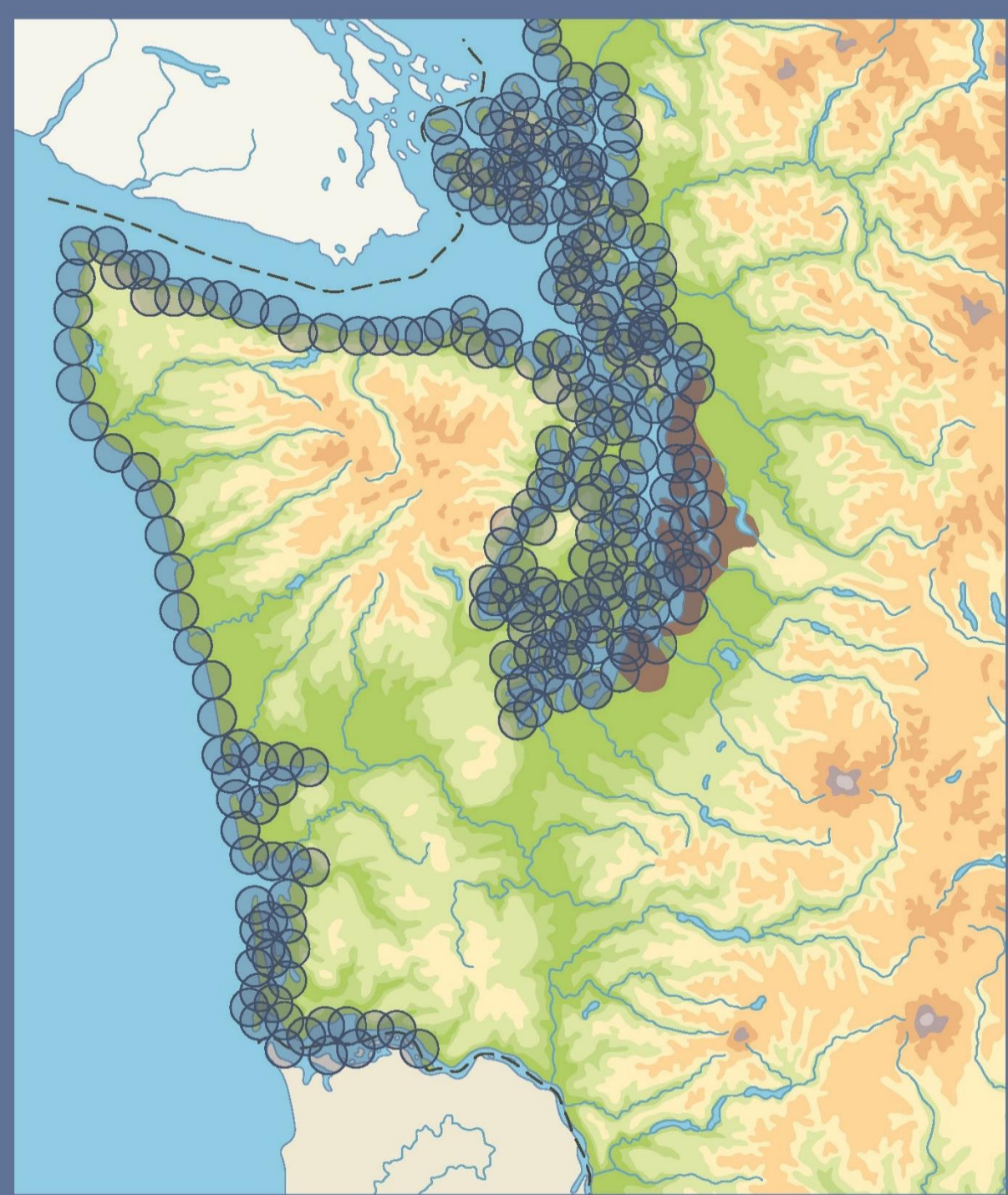


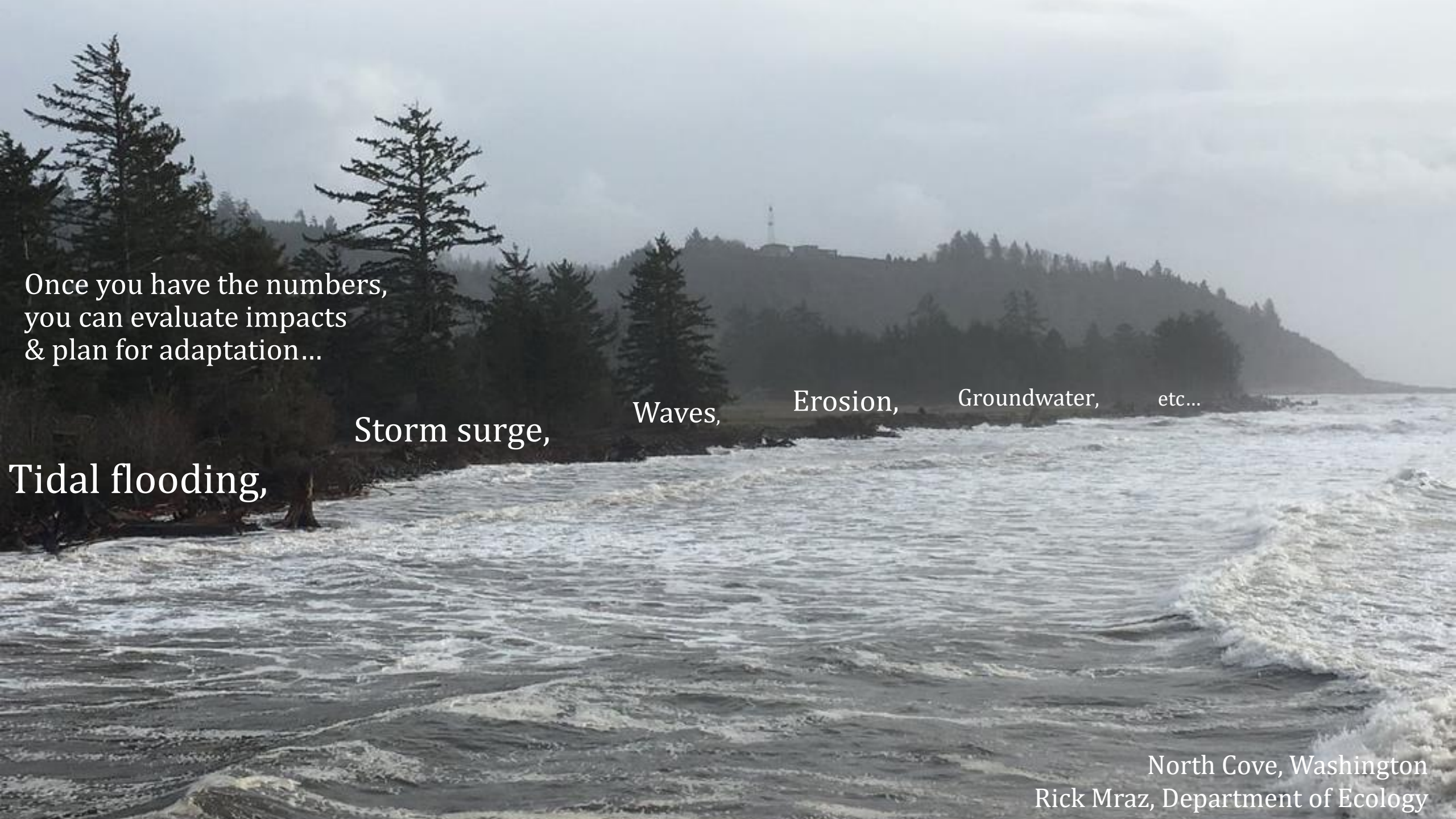
# 'The Time To Act Is Now,' Says Yellowing Climate Change Report Sitting In University Archive



## Sea level rise projections: go local!

- Future high tides at 150+ sites
- Vertical land movement
- Probabilistic: investments + livelihoods
- Extreme events additive
- Applicable to planning or projects





Once you have the numbers,  
you can evaluate impacts  
& plan for adaptation...

Tidal flooding,

Storm surge,

Waves,

Erosion,

Groundwater,

etc...



*So where are the numbers?!*

North Cove, Washington  
Rick Mraz, Department of Ecology

**Strengthening the resilience of Washington's coastal communities to natural hazards impacts through collaboration, education, and resource exchange.**

[PROJECTED SEA LEVEL RISE FOR WASHINGTON STATE - A 2018 ASSESSMENT](#)

[BLOG: MEMBER UPDATES](#)



**[www.WAcoastalnetwork.com](http://www.WAcoastalnetwork.com)**



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[WCRP](#)

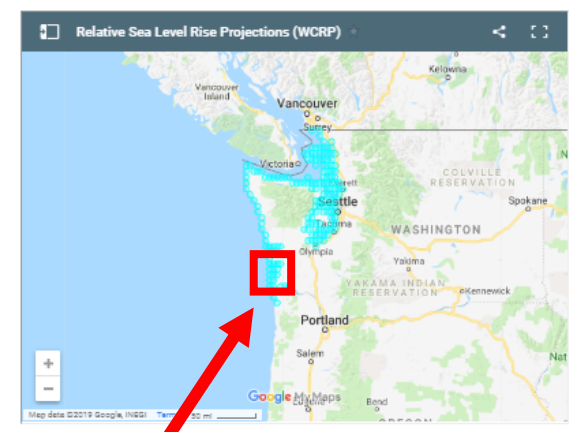
- [What's at Stake](#)
- [Partners](#)
- [Relevant Blogs](#)
- Data and Resources

**Data and Resources**

**Sea Level Rise Projections**  
This project provides an updated set of sea level rise projections that incorporates the latest science, provides community-scale projections, and is designed for direct application to risk management and planning.

Our new projections reflect the latest science on sea level rise and are an improvement over previous assessments. We recommend using these new projections for coastal impacts assessments within the state of Washington.

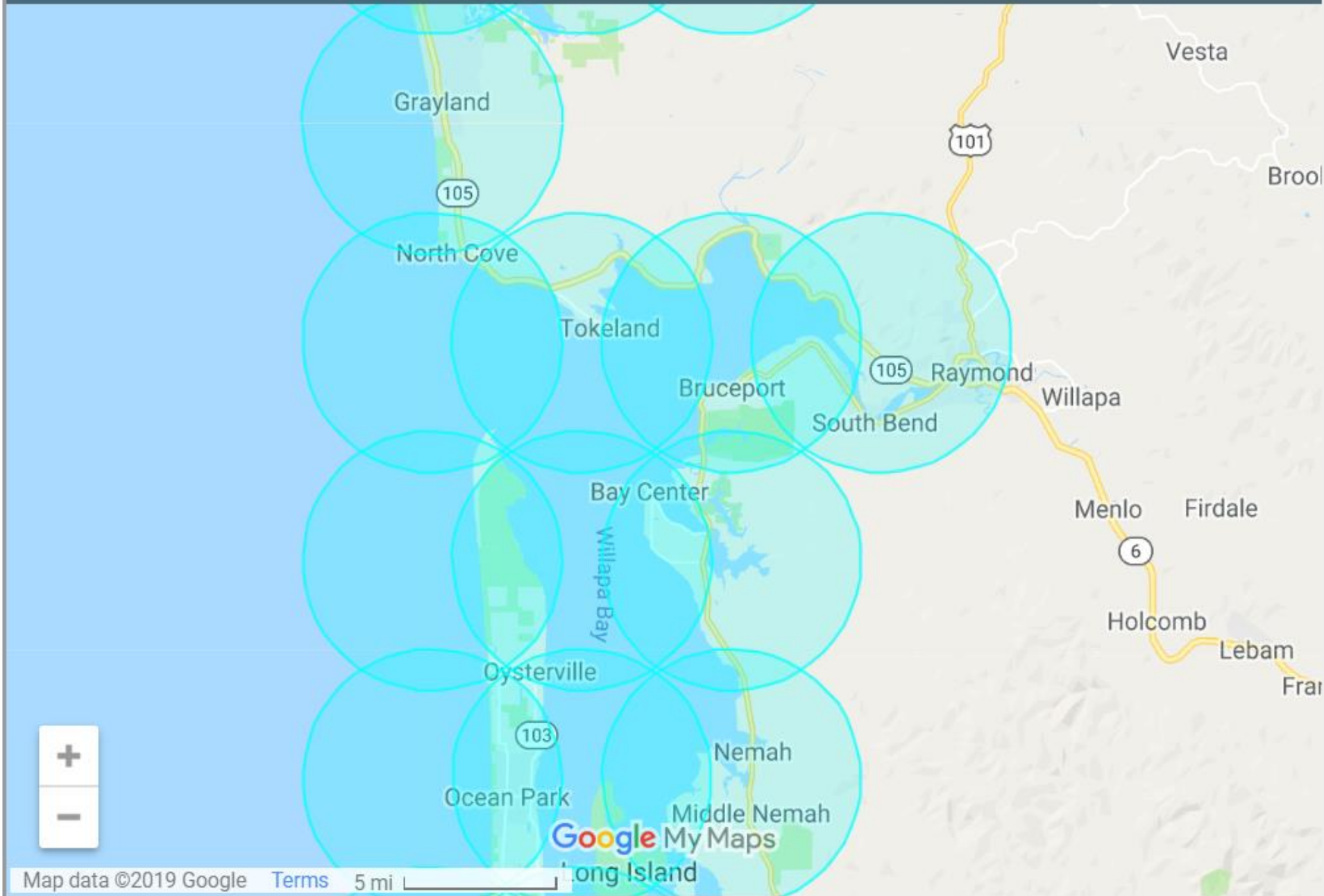
How is relative sea level rise projected to change along Washington's coastlines?  
The map below links to relative sea level rise (RSLR) projections for 171 sites along Washington's coast. The projections for each site are provided as a downloadable excel spreadsheet which contains three worksheets: (1) an overview, (2) RSLR projections for a low greenhouse gas scenario (RCP 4.5), and (3) RSLR projections for a high greenhouse gas scenario (RCP 8.5).



***map with 150+ local SLR projections***



# Relative Sea Level Rise Projections (WCRP) ★



name

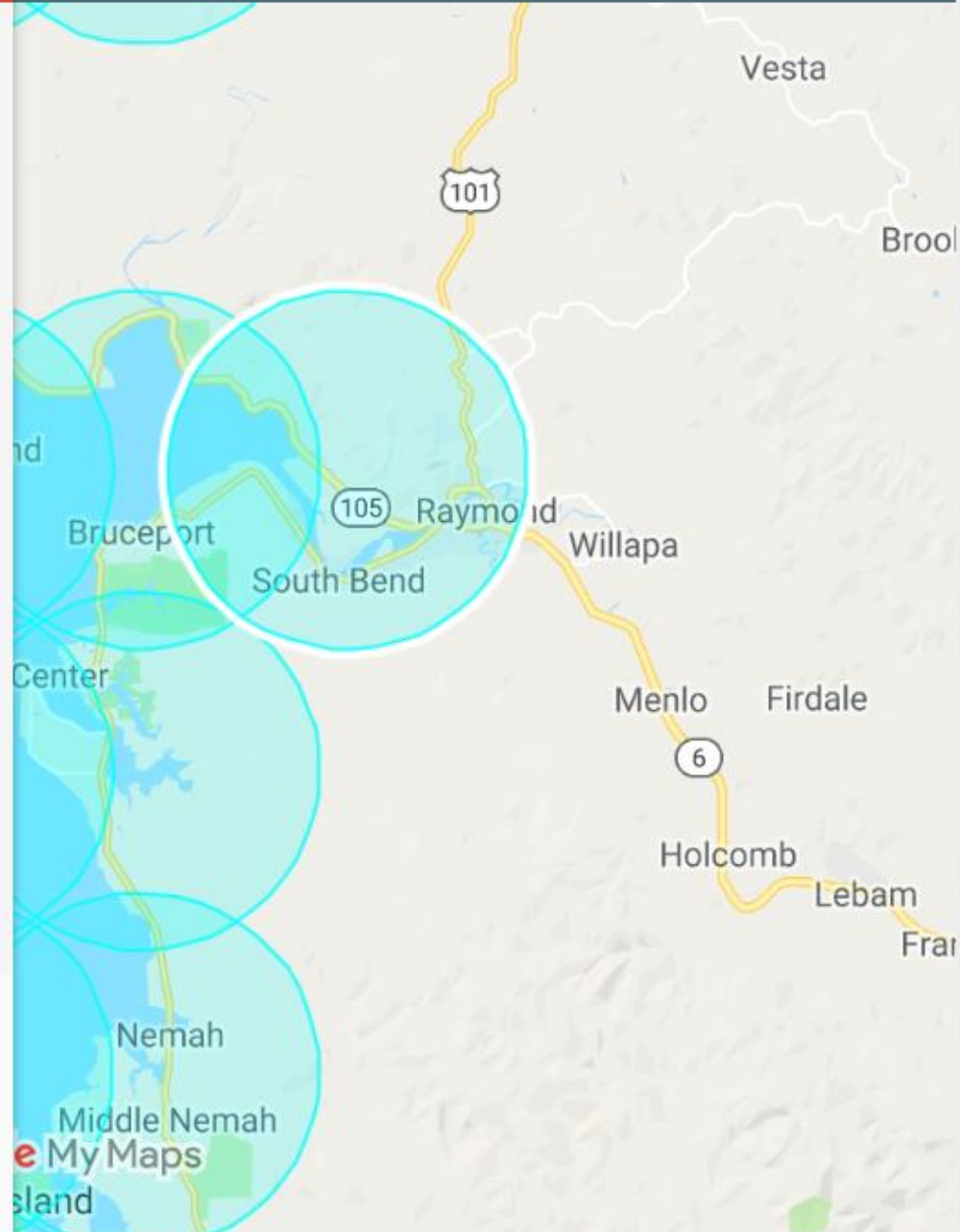
see spreadsheet  
RSLProjections\_forLat46.7Long-123.8.xlsx

description

Developed as part of the Washington Coastal Resilience Project, the excel sheet referenced with this polygon summarizes a current assessment of sea level projections for this area

Data Download:

[http://www.wacoastalnetwork.com/files/theme/wcrp/mapdata/RSLProjections\\_Lat46.7N\\_Long123.8W.xlsx](http://www.wacoastalnetwork.com/files/theme/wcrp/mapdata/RSLProjections_Lat46.7N_Long123.8W.xlsx)



# Projections: spreadsheets

19 year period center	Assessed Probability of Exceedance:										
	99	95	90	83	50	17	10	5	1	0.1	
2010	-0.1	-0.1	0	0	0	0.1	0.1	0.1	0.2	0.2	
2020	-0.1	-0.1	0	0	0.1	0.2	0.2	0.3	0.3	0.4	
2030	-0.1	0	0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	
2040	-0.1	0	0.1	0.1	0.3	0.5	0.6	0.6	0.8	1.1	
2050	-0.1	0	0.1	0.2	0.5	0.7	0.8	0.9	1.2	1.8	
2060	-0.1	0.1	0.2	0.3	0.6	1	1.1	1.2	1.6	2.6	
2070	0	0.2	0.4	0.5	0.9	1.3	1.4	1.6	2.2	3.6	
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2150	0.2	0.9	1.3	1.6	2.8	4.4	5	6	9.4	17.6	

← Probability of Exceedance (risk tolerance)

Timeline →

SLR Magnitude

# Choose your risk tolerance...

	← Less risk averse      Likely range      More risk averse →									
19 year period center	99	95	90	83	50	17	10	5	1	0.1
2010	-0.1	-0.1	0	0	0	0.1	0.1	0.1	0.2	0.2
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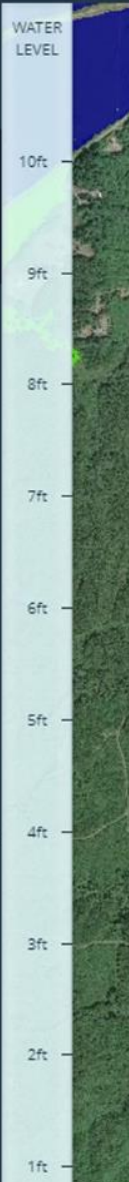


← Less risk averse      Likely range      More risk averse →

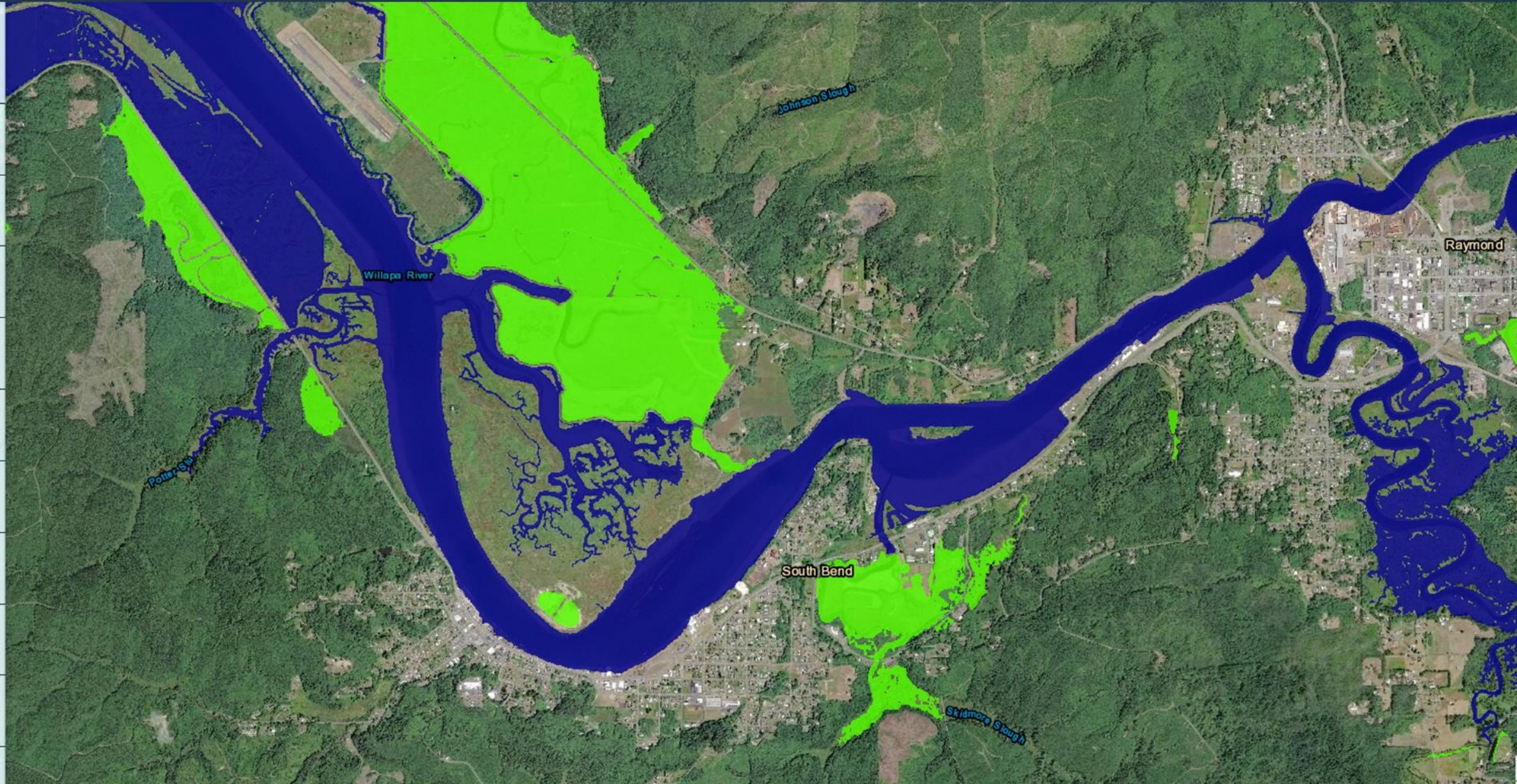
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# Now you have your number...

	← Less risk averse						Likely range	More risk averse→			
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- SEA LEVEL RISE
- LOCAL SCENARIOS
- MAPPING CONFIDENCE
- MARSH MIGRATION
- VULNERABILITY
- HIGH TIDE FLOODING



*Today's high tide: NOAA SLR Viewer*





SEA LEVEL RISE



LOCAL SCENARIOS



MAPPING CONFIDENCE



MARSH MIGRATION



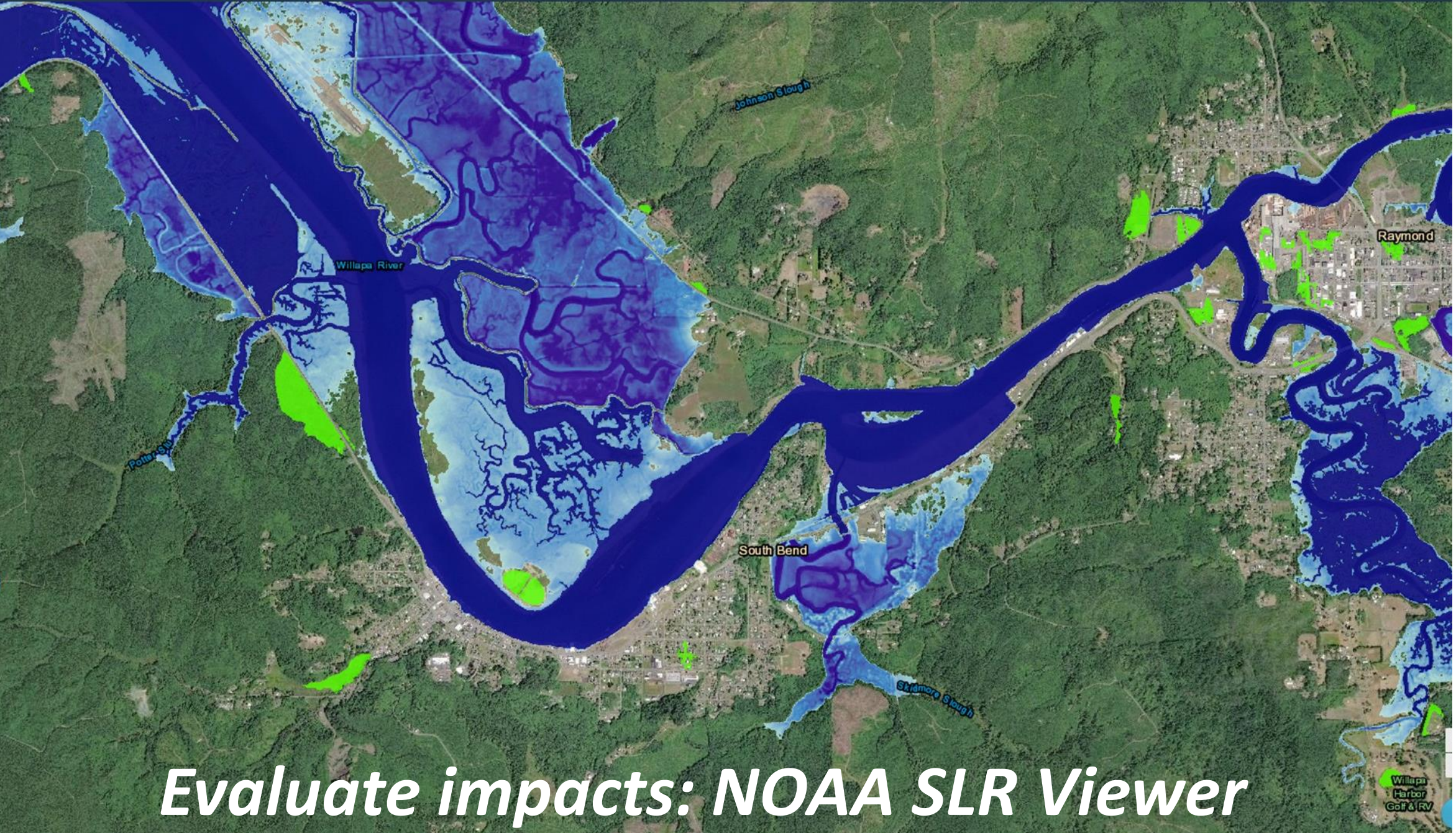
VULNERABILITY



HIGH TIDE FLOODING



UNITS



*Evaluate impacts: NOAA SLR Viewer*



SEA LEVEL RISE



LOCAL SCENARIOS



MAPPING CONFIDENCE



MARSH MIGRATION



VULNERABILITY



HIGH TIDE FLOODING



UNITS

WATER LEVEL

10ft

9ft

8ft

7ft

6ft

5ft

4ft

3ft

2ft

1ft

Current MHHW

UNITS



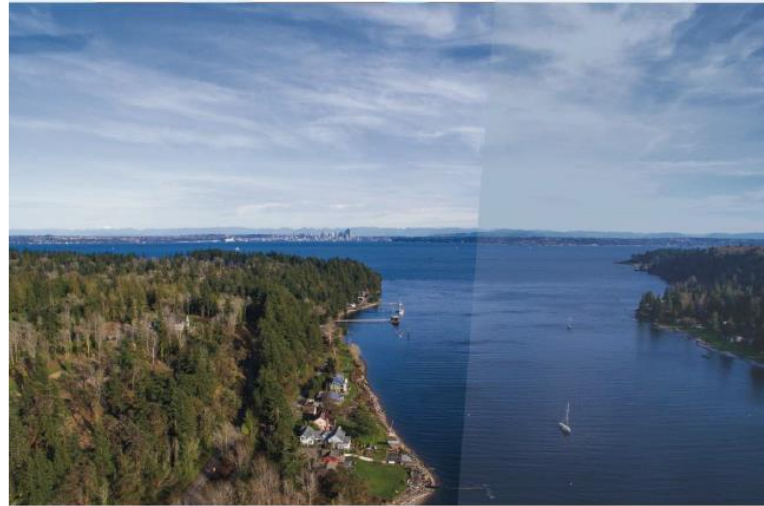
*Consider extreme events*

PROJECTED  
SEA LEVEL RISE  
*for* WASHINGTON STATE



A 2018  
ASSESSMENT

GUIDELINES FOR  
MAPPING  
SEA LEVEL RISE  
INUNDATION  
*for* WASHINGTON STATE



SEA LEVEL RISE  
CONSIDERATIONS  
*for* NEARSHORE RESTORATION  
PROJECTS *in* PUGET SOUND





# Coastal Training Program *Washington*

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## Working to Protect Puget Sound and Washington's Shorelines

The Coastal Training Program provides practical, science-based training to professionals who make decisions about shoreline management in Western and Eastern Washington.



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*Padilla Bay*  
National Estuarine  
Research Reserve

# What can you do about it?



Chinook, WA shore stabilization  
Pacific Conservation District

Interested in submitting a new project example? Take our Natural Hazards Mitigation and Risk Reduction Project survey here:  
<https://www.surveymonkey.com/r/CoastalNaturalHazards>



All Projects

Beach

Bluff

Estuary / Marsh

Policy-Based

Emergency Mgmt

Coming Soon



**1** North Cove Dynamic Revetment



**2** Chinook Beach Erosion Reduction



**3** Westport Dune Nourishment & Sand...



**4** Lower Elwa House Set-Back



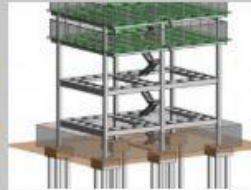
**5** WSDOT Dynamic Revetment



**6** Ediz Hook Beach Nourishment



**7** Elevation of Historic Net Sheds



**8** Tsunami Vertical Evacuation Tower



**9** Coastal Bluff Home Retreat / Set-Back



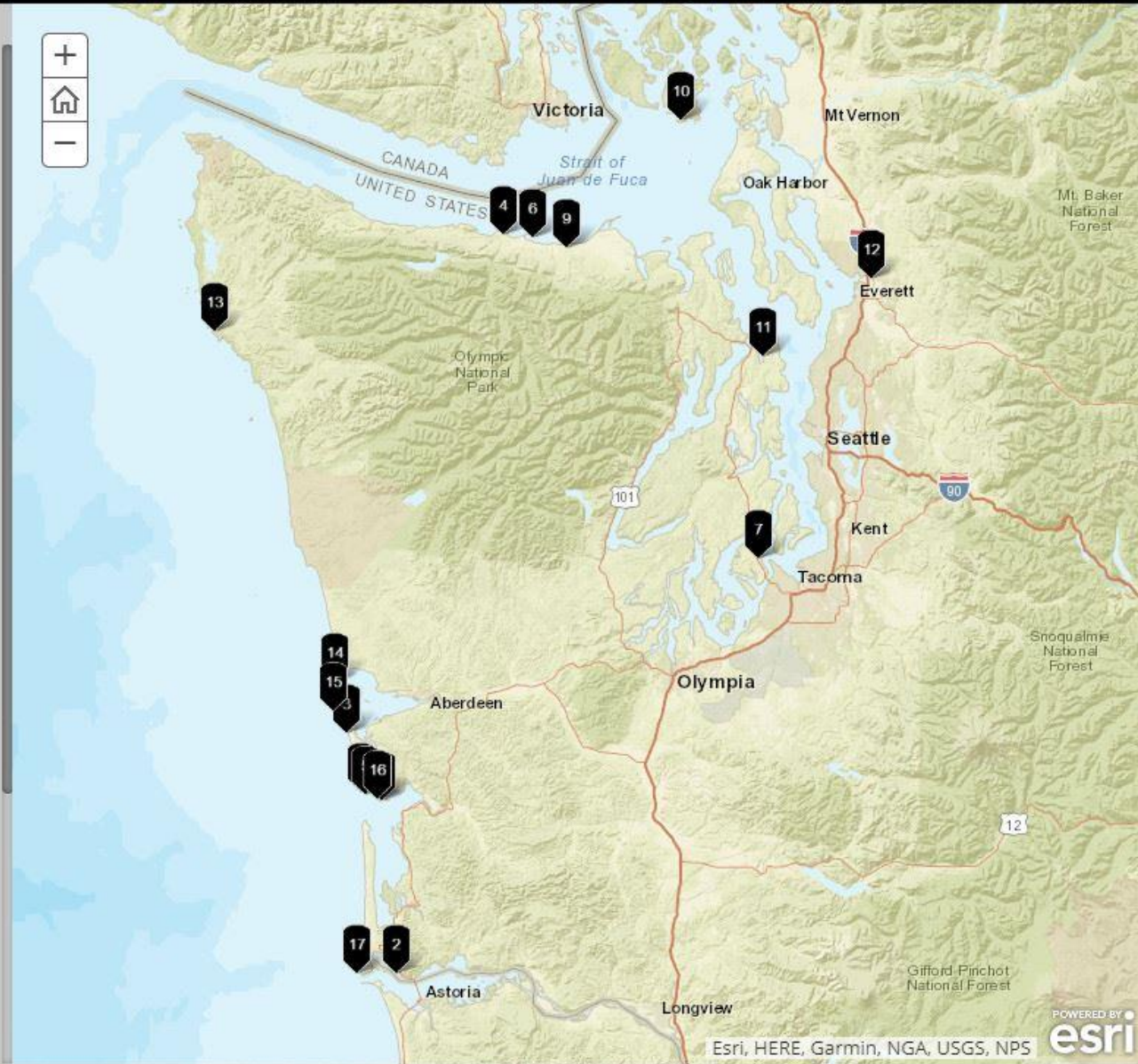
**10** Agate Beach Road Relocation



**11** Native Vegetation Erosion Management



**12** Qwuloolt Estuary Floodplain Restoration



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## 2 Chinook Beach Erosion Reduction



Private landowners in Chinook WA had been losing shoreline forest and beach to wind driven waves for a number of years. The District installed 450ft of rootwad logs in a pile anchored matrix to knock down wave energy and reduce shoreline erosion rates.

Location: Chinook, WA

Year Built: 2017

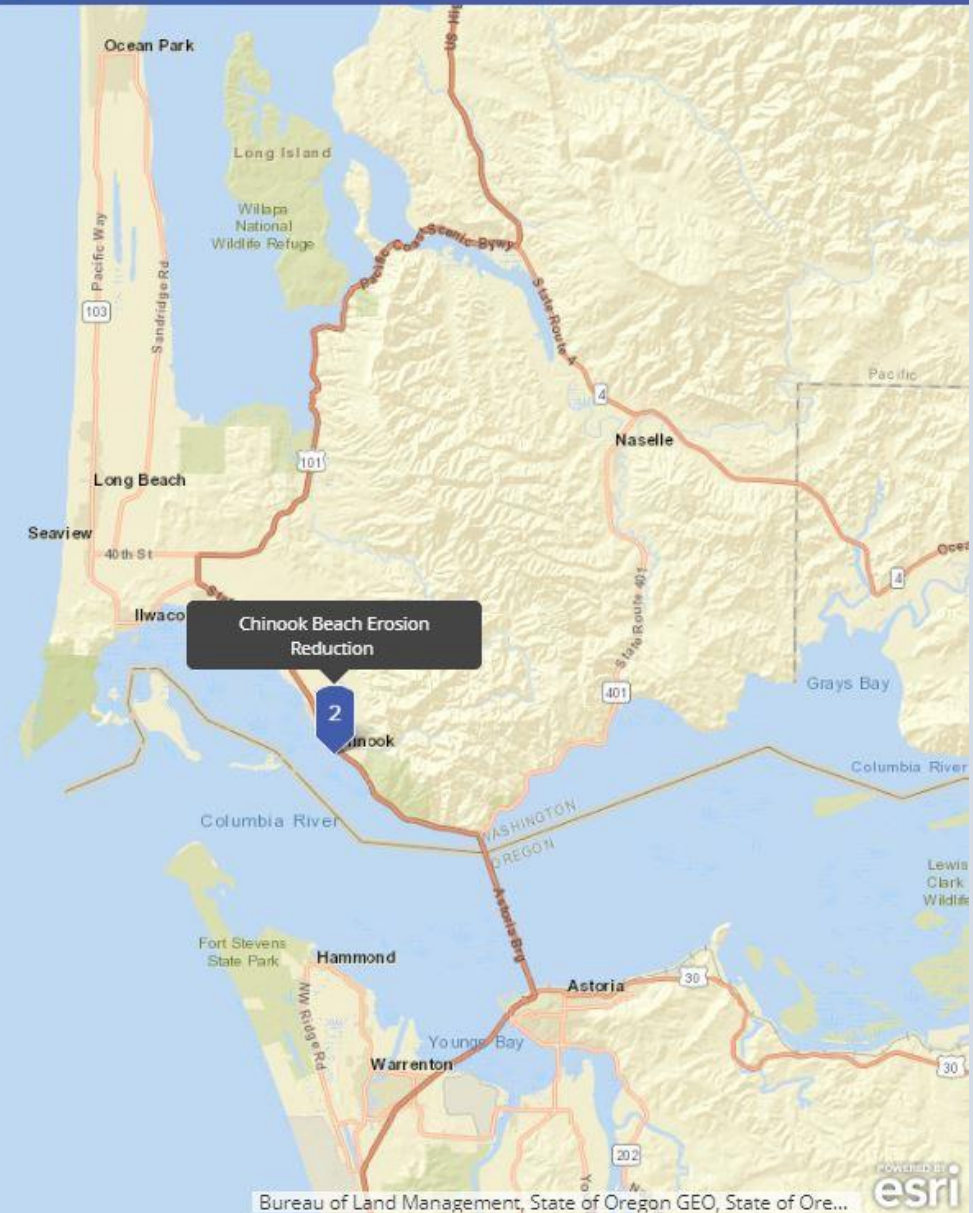
Shoreline Type: Beach

Primary Hazard: Erosion

Mitigation Strategy: Structural

Action Employed: Wood-Based Wave Erosion Reduction

[Click here to learn more!](#)





The stuff  
Shore →

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