



## **Lessons Learned from Local Governments Incorporating Sea Level Rise in Shoreline Master Programs**

**A compilation of success strategies,  
challenges, needs, and opportunities**

By the

**Shorelands and Environmental Assistance Program**

Washington State Department of Ecology

Olympia, Washington

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<sup>1</sup> <https://ecology.wa.gov/About-us/Get-to-know-us/Contact-us>

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## Funding and Project Information

The Washington Coastal Resilience Project (WCRP) was a three-year effort to rapidly increase the state's capacity to prepare for coastal hazards, such as flooding and erosion, that are related to sea level rise. The project improved risk projections, provided better guidance for land use planners, and strengthened capital investment programs for coastal restoration and infrastructure. Partners included:

Washington Sea Grant  
Washington Department of Ecology  
Island County  
King County  
NOAA Office for Coastal Management  
Padilla Bay National Estuary Research Reserve  
The City of Tacoma  
The Nature Conservancy  
U.S. Geological Survey  
University of Oregon  
University of Washington Climate Impacts Group  
University of Washington Department of Earth and Space Sciences  
Washington Department of Fish and Wildlife  
Pacific Northwest National Laboratory

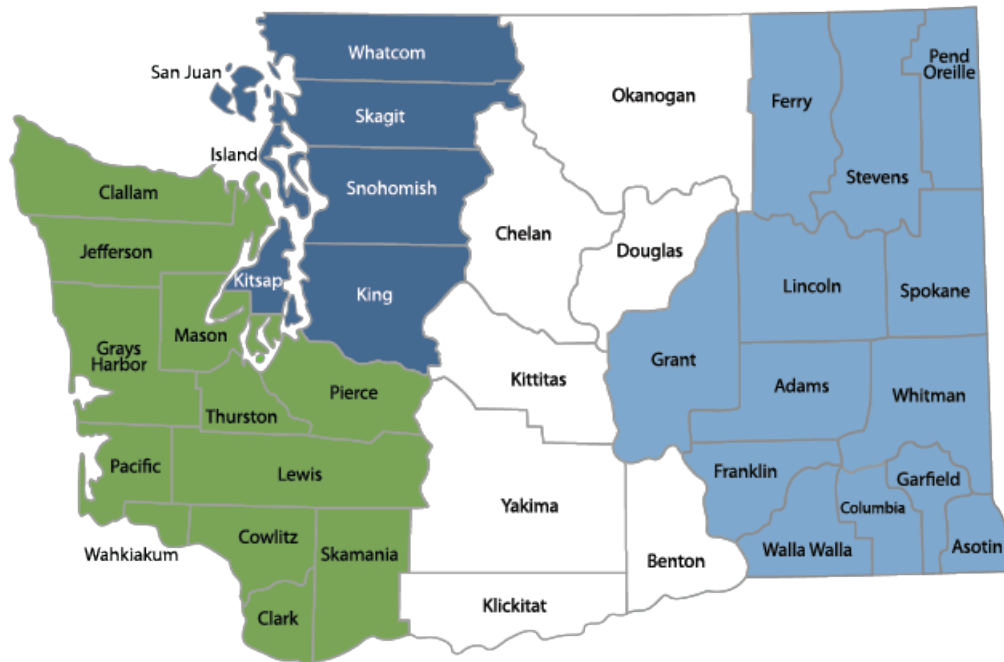
The primary source of funding for the Washington Coastal Resilience Project (WCRP) was a NOAA Coastal Resilience grant from the NOAA Office of Coastal Management (grant #NA16NOS4730015).

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Washington's federal management responsibilities come from the Coastal Zone Management Act, passed in 1972. The act creates a voluntary state-federal partnership between states and NOAA's Office for Coastal Management. The program is administered by the Department of Ecology's Shorelands and Environmental Assistance (SEA) Program.

# Department of Ecology's Regional Offices

## Map of Counties Served



**Southwest Region**  
360-407-6300

**Northwest Region**  
425-649-7000

**Central Region**  
509-575-2490

**Eastern Region**  
509-329-3400

Region	Counties served	Mailing Address	Phone
<b>Southwest</b>	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
<b>Northwest</b>	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	3190 160th Ave SE Bellevue, WA 98008	425-649-7000
<b>Central</b>	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
<b>Eastern</b>	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
<b>Headquarters</b>	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

# Lessons Learned from Local Governments Incorporating Sea Level Rise in Shoreline Master Programs

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DEPARTMENT OF  
**ECOLOGY**  
State of Washington

# Table of Contents

<b>List of Figures.....</b>	<b>6</b>
<b>Acknowledgements.....</b>	<b>7</b>
<b>Purpose .....</b>	<b>8</b>
<b>Introduction .....</b>	<b>9</b>
<b>Methods.....</b>	<b>11</b>
Key word search.....	11
Interviews and engagement with local governments .....	12
<b>Key Findings.....</b>	<b>13</b>
Sea level rise planning case studies .....	13
Changes to enabling conditions.....	14
Success strategies .....	15
Challenges .....	19
Needs.....	24
Opportunities for local governments.....	27
<b>Appendix A. Washington Jurisdictions with Marine Waters.....</b>	<b>30</b>
<b>Appendix B. Sea Level Rise Policies and Regulations Included in Shoreline Master Programs .....</b>	<b>31</b>
<b>Appendix C. Interview Questions.....</b>	<b>45</b>

# List of Figures

<b>Figure 1.</b> High tides cause flooding at the Port of Ilwaco during a King Tide event on October 15, 2015. ....	8
<b>Figure 2.</b> The Port of Ilwaco experienced high water levels during a King Tide event on October 21, 2015. ....	9
<b>Figure 3.</b> Number of jurisdictions with marine waters that had completed comprehensive SMP updates and had included sea level rise key words in the SMP, in 2017 and through June 2021. ....	11
<b>Figure 4.</b> Participants in the "Adaptation Planning for Coastal Communities" course discuss climate change impacts on Island County's shorelines. ....	12
<b>Figure 5.</b> The Coastal Hazards Risk Reduction Project Mapper. ....	13
<b>Figure 6.</b> High water levels impact a road in Freeland, WA. ....	14
<b>Figure 7.</b> The City of Olympia recognizes that many local planning tools can be used to address sea level rise, as indicated by this table in their SMP. ....	15
<b>Figure 8.</b> Staff from Island County and Washington Coastal Resilience Project partner organizations gathered for a workshop to learn about sea level rise and discuss potential impacts on the County. ....	16
<b>Figure 9.</b> The Port and City of Bellingham are engaged in the long-term process of redeveloping 237 acres of the Bellingham waterfront over the course of 50 years. ....	18
<b>Figure 10.</b> A pier in Mukilteo is nearly overtopped during a King Tide in January 2010. ....	19
<b>Figure 11.</b> Staff from the Department of Ecology guide local planners through a sea level rise planning exercise at a workshop hosted by the Shoreline and Coastal Planners Group in Aberdeen, WA. ....	22
<b>Figure 12.</b> Conceptual design for renovations to Owen Beach at Point Defiance Park in Tacoma. ....	23
<b>Figure 13.</b> Outreach staff engage with community members about sea level rise projections at a 2019 King Tides Viewing Party in Raymond, WA. ....	25
<b>Figure 14.</b> Managing Washington's marine shorelines in the face of sea level rise will continue to be an important subject of local planning for years to come. ....	26
<b>Figure 15.</b> Washingtonians are no strangers to changing water levels. Percival Landing Park in Olympia experiences extreme water level fluctuations. ....	28

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- Bellingham
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- Langley
- Olympia
- Shoreline
- Woodway

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## Purpose

The purpose of this study is to foster knowledge sharing between local jurisdictions and highlight case studies from communities in Washington that have taken steps to include sea level rise considerations in Shoreline Master Programs (SMPs). This document is not Ecology guidance on sea level rise planning and does not replace [Appendix A of the Shoreline Master Programs Handbook](#).<sup>3</sup>

There is a growing interest among coastal communities to address this climate hazard, and the lessons shared by communities that have already begun doing so can assist other Washington jurisdictions looking to include sea level rise in their SMPs and other planning documents. They also reveal difficulties that will likely require additional support to overcome. This study identifies success strategies, challenges, needs, and opportunities for local governments.

As more communities incorporate sea level rise in SMPs and other local plans, new examples and lessons learned will emerge. At the time of this report's publication in July 2021, many jurisdictions were preparing SMP amendments related to sea level rise. We anticipate that this document will be updated at periodic intervals to represent future local efforts as jurisdictions continue to advance sea level rise planning.



Figure 1. High tides cause flooding at the Port of Ilwaco during a King Tide event on October 15, 2015. Photo by Guy Glenn Jr, 2015.

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<sup>3</sup> <https://apps.ecology.wa.gov/publications/parts/1106010part19.pdf>. Appendix A of the Shoreline Master Programs Handbook is the Department of Ecology's current guidance on sea level rise planning in SMPs.

## Introduction

Washington's local governments are primarily responsible for addressing management challenges along the state's marine shorelines, such as development in flood-prone areas, construction of shoreline armoring, protection of beaches and salt marshes, and siting a variety of shoreline uses. Sea level rise will intensify these challenges by exacerbating existing coastal hazards and changing the very shape of the coastline. In the absence of advance planning, human reaction to sea level rise will likely be driven by incremental responses to damage caused by storms and floods, not by our desire to reduce the long-term impacts of a gradually rising sea on our communities, economy, and environment.



Figure 2. The Port of Ilwaco experienced high water levels during a King Tide event on October 21, 2015. Photo by Guy Glenn Jr, 2015.

Local [Shoreline Master Programs \(SMPs\)](#)<sup>4</sup> implement the state's [Shoreline Management Act \(SMA\)](#)<sup>5</sup> and play a primary role in managing the use and development of Washington's shorelines for current and future generations. Since 2004, the Washington State Department of Ecology (Ecology) has been working with local governments on comprehensive updates of their SMPs. 53 of 56 jurisdictions with marine waters (Appendix A) have completed their comprehensive SMP updates at the time of this publication. More recently, local governments have been making changes to their SMPs as part of their periodic review, which is required every eight years.

The SMA does not include explicit direction on how to incorporate future conditions brought by climate change into planning and implementation. However, SMP jurisdiction is measured from the [Ordinary High Water Mark \(OHWM\)](#),<sup>6</sup> which reflects the conditions in place at the time that development or use proposals are authorized in the shoreline jurisdiction. As a result of sea level rise, shoreline jurisdiction will therefore move landward as OHWM moves. Shoreline buffers and setbacks based on OHWM will also reflect changes in sea level. As sea level rise manifests, existing structures that have not adequately accounted for higher water levels will

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<sup>4</sup> <https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Master-Programs>

<sup>5</sup> <https://apps.leg.wa.gov/rcw/default.aspx?cite=90.58>

<sup>6</sup> <https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Management-Act-SMA/Shoreline-Management-Act-jurisdiction/Ordinary-high-water-mark>

be at risk. This highlights the importance of planning for sea level rise to avoid or minimize these risks.

In [WAC 173-26-090\(1\)](#),<sup>7</sup> Ecology encourages jurisdictions to consider new information and consult Ecology guidance on emerging topics such as sea level rise:

Each local government should review its shoreline master program and make amendments deemed necessary to reflect changing local circumstances, new information or improved data. Local governments are encouraged to consult department guidance for applicable new information on emerging topics such as sea level rise.

Ecology published [Appendix A \(2010; revised in 2017\) of the Shoreline Master Programs Handbook](#)<sup>8</sup> to guide planners to relevant information and suggestions on incorporating sea level rise into the SMP. Many communities used the comprehensive update to insert sea level rise language into local SMPs. Local governments have also used the periodic review as an opportunity to add or strengthen sea level rise language in SMPs. The [Washington Coastal Resilience Project](#),<sup>9</sup> conducted from 2016-2020, significantly improved sea level rise projections for the state and developed guides and tools to help local planners understand and plan for sea level rise impacts. This information can now be leveraged to incorporate sea level rise into future periodic reviews and updates.

Ecology and local governments recognize that the SMP is one of many planning measures that can be used to evaluate and minimize the risks from hazards such as sea level rise. Shoreline jurisdiction is generally limited to 200 feet from the OHWM and in many areas this is too narrow to incorporate a comprehensive approach to managing natural hazards in coastal areas. Jurisdictions address natural hazards in local comprehensive plans, flood ordinances, hazard mitigation plans, stormwater management plans, infrastructure planning, evaluations of utility and service capacity, and through other activities.

This report focuses on the sea level rise planning process in the context of SMPs. Yet throughout the course of this study, local governments discussed many instances of using other planning tools and working across departments and planning authorities to address sea level rise. This demonstrates the value of working comprehensively to tackle this complex issue, and the lessons drawn from these experiences are relevant to many local planning processes, including SMPs. These examples are highlighted throughout this report.

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<sup>7</sup> <https://apps.leg.wa.gov/wac/default.aspx?cite=173-26&full=true#173-26-090>

<sup>8</sup> <https://apps.ecology.wa.gov/publications/parts/1106010part19.pdf>

<sup>9</sup> <https://wacoastalnetwork.com/washington-coastal-resilience-project/>

## Methods

### Key word search

In Washington, there are 56 jurisdictions with marine waters (Appendix A). This includes jurisdictions on the Pacific coast, the Strait of Juan de Fuca, and Puget Sound. In 2017, Ecology conducted a key word search of the SMPs for the 40 jurisdictions with marine waters that had completed their comprehensive SMP updates. We searched for the inclusion of the following terms: sea level, sea level rise, sea-level rise, and climate change. We identified 17 jurisdictions that had included this language in their SMPs in 2017.

Since this initial word search was conducted, 53 of 56 jurisdictions have completed their comprehensive updates, and many jurisdictions have also completed periodic reviews. In preparation for this publication, we updated the key word search in June 2021 to identify sea level rise language from all approved comprehensive updates and periodic reviews. We identified 24 jurisdictions that had included language about sea level rise in their SMPs. A full list of this language is located in Appendix B.

This research project focused on use of these specific terms as an indicator of how SMPs address sea level rise. However, SMP provisions can protect habitat, avoid flood threats, and prepare communities for threats exacerbated by climate change without using these specific terms. Ecology recognizes that some communities choose to incorporate consideration of future conditions using more general language. This report may therefore underrepresent the number of SMPs that are addressing sea level rise or incorporating adaptation planning approaches.

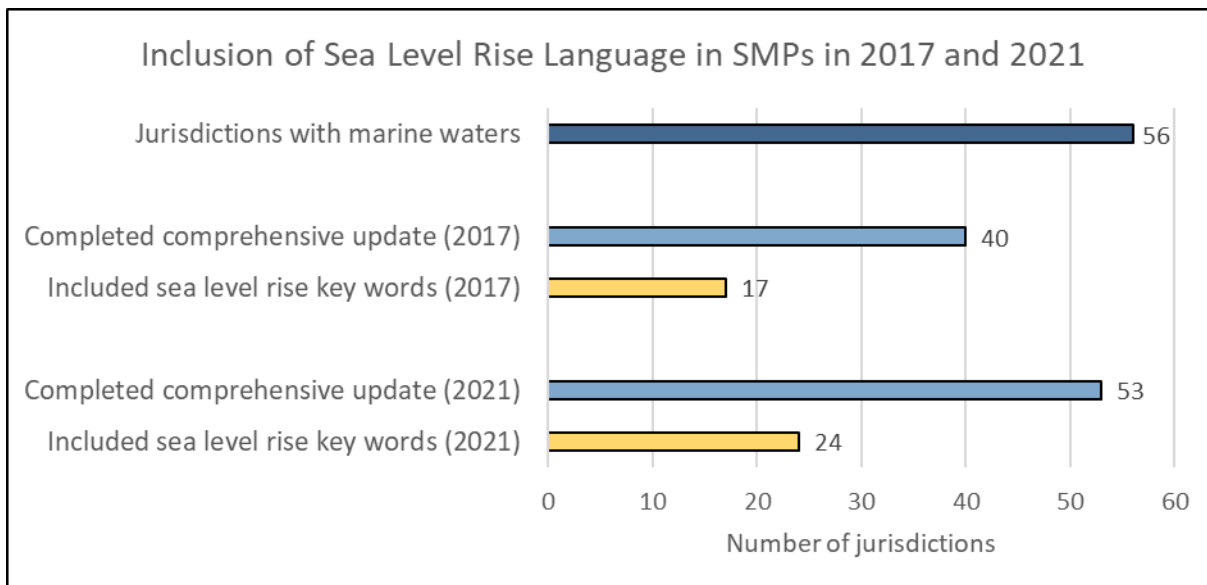


Figure 3. Number of jurisdictions with marine waters that had completed comprehensive SMP updates and had included sea level rise key words in the SMP, in 2017 and through June 2021.



## Interviews and engagement with local governments

The results of the 2017 key word search informed the planning of in-person interviews. In order to share lessons learned from local governments' sea level rise planning efforts, we conducted interviews with staff from eight jurisdictions that had included sea level rise considerations in their SMPs. These jurisdictions were Bainbridge Island, Bellingham, Gig Harbor, King County, Langley, Olympia, Shoreline, and Woodway. These interviews do not represent all jurisdictions involved in sea level rise planning efforts, nor do they include jurisdictions that have not incorporated sea level rise considerations within SMPs or other plans.

The interviews were conducted in 2018. A consistent set of open-ended interview questions was used for all interviews (Appendix C). We conducted 8 interviews involving 11 participants. These interviews covered a range of topics aimed at understanding how and why the jurisdictions incorporated sea level rise policy and regulatory language in their SMPs, as well as challenges and additional needs the jurisdictions encountered while working through these processes. The interviews also sought to capture recommendations and identify future opportunities based upon the experiences of these local governments. We then prepared an initial summary assessment of the interview results. Although the interview questions were focused on SMPs, local jurisdictions shared their experiences using other local plans to address sea level rise. These comments were also captured in the summary of interview results.

Ecology has continued to support Washington's coastal communities as they work to include sea level rise language and considerations in SMP updates and other planning processes. Recent efforts included a new series of [climate adaptation trainings](https://coastaltraining-wa.org/Climate-Training-Courses)<sup>10</sup> through the Washington Coastal Training Program and a [planners' workshop](https://www.pugetsoundclimate.org/past-event-addressing-sea-level-rise-in-shoreline-master-programs-workshop/)<sup>11</sup> in partnership with the [Puget Sound Climate Preparedness Collaborative](https://www.pugetsoundclimate.org/)<sup>12</sup> and the [Shoreline & Coastal Planners Group](https://www.coastalplanners.org/).<sup>13</sup> These conversations and



Figure 4. Participants in the "Adaptation Planning for Coastal Communities" course discuss climate change impacts on Island County's shorelines. Photo by Bobbak Talebi/WA Dept. of Ecology, 2017.

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<sup>10</sup> <https://coastaltraining-wa.org/Climate-Training-Courses>

<sup>11</sup> <https://www.pugetsoundclimate.org/past-event-addressing-sea-level-rise-in-shoreline-master-programs-workshop/>

<sup>12</sup> <https://www.pugetsoundclimate.org/>

<sup>13</sup> <https://www.coastalplanners.org/>

interactions extensively informed the development of this report and ensured that all lessons learned, examples, and case studies shared here are relevant as of this report's publication date. Finally, local government staff reviewed the report prior to publication to ensure their jurisdictions' experiences were accurately reflected.

## Key Findings

The following section summarizes the lessons learned from our interviews and other interactions with local governments. The findings are separated into five categories that represent the common themes that were shared across local governments: changes to enabling conditions, success strategies, challenges, needs, and opportunities for local governments.

### Sea level rise planning case studies

#### The [Washington Coastal Hazards Resilience Network](https://wacoastalnetwork.com)<sup>14</sup>

serves as a hub for information and outreach materials related to coastal hazards resilience in the state. The network has collected examples of how Washington's communities are incorporating sea level rise considerations into local planning, infrastructure improvements, and

redevelopment plans for waterfront spaces. To view case studies of these projects, visit the [Coastal Hazards Risk Reduction Project Mapper](https://wacoe.maps.arcgis.com/apps/MapSeries/index.html?appid=cb81314d6fb44e0187e7980a1f0cd32b)<sup>15</sup> and navigate to the 'Sea Level Rise' tab. New case studies are added to the Project Mapper on a regular basis. Current featured case studies include the Sea Level Rise Risk Area for Vashon-Maury Island in King County, the redesign of Owen Beach in Tacoma's Point Defiance Park, and Olympia's Sea Level Rise Response Plan, among others. Many of these case studies are mentioned throughout the key findings of this report and are indicated by a green arrow on the right-hand margin that links to the Project Mapper projects page. To view text of all current SMPs that have goals, policies, or regulations addressing sea level rise, see Appendix B.

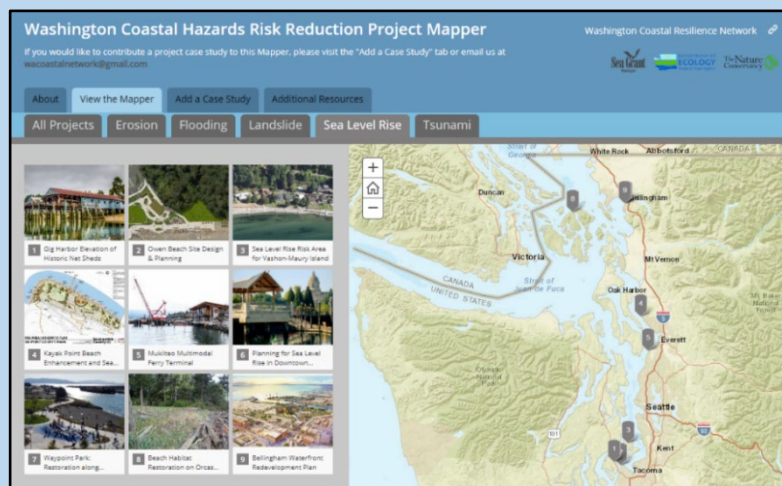


Figure 5. The Coastal Hazards Risk Reduction Project Mapper.

Read the case studies

<sup>14</sup> <https://wacoastalnetwork.com>

<sup>15</sup> <https://wacoe.maps.arcgis.com/apps/MapSeries/index.html?appid=cb81314d6fb44e0187e7980a1f0cd32b>

## Changes to enabling conditions

Enabling conditions are the factors in a community that support the adoption of policies and management approaches. They are wide-ranging and can include social or cultural beliefs, availability of information, and economic conditions. Local governments highlighted the broader influence of these conditions on their ability to consider sea level rise as part of the SMP.

- *Public support for climate and sea level rise planning continues to increase.* Across nearly all jurisdictions, there is broader acceptance and understanding among residents that sea level rise is an issue that should be addressed at the planning and policy levels. Residents do have questions and concerns related to specific actions that could be taken or regulations that may be adopted, but climate change denial is less of an obstacle that has to be overcome in many communities. This has helped ease the process of adopting climate change and sea level rise language into comprehensive plans and built broad support for general climate action plans.
- *Improvements to science, communication, and planning resources are providing better support for communities.* The last two decades have produced a significant increase in Washington-specific sea level rise information and resources available to local governments. Jurisdictions often mentioned the UW Climate Impacts Group as a widely trusted, reliable, and uncontroversial source for the best available climate change and sea level rise information for the state. Additionally, the [Miller et al. 2018 sea level rise projections](#)<sup>16</sup> and other resources developed as part of the [Washington Coastal Resilience Project](#)<sup>17</sup> provide valuable data to support sea level rise planning. Many jurisdictions also explained that they relied upon [Appendix A of Ecology's SMP Guidance](#)<sup>18</sup> to incorporate sea level rise language in their SMP updates, and expressed considerable interest in and desire for additional guidance, recommendations, and best practices.



Figure 6. High water levels impact a road in Freeland, WA. Photo by Hugh Shipman/WA Dept. of Ecology, 2012.

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<sup>16</sup> <https://wacoastalnetwork.com/chnr/research/slr-projections/>

<sup>17</sup> <https://wacoastalnetwork.com/washington-coastal-resilience-project/>

<sup>18</sup> <https://apps.ecology.wa.gov/publications/parts/1106010part19.pdf>

## Success strategies

These findings summarize actions and approaches that local governments indicated were helpful in supporting the inclusion of sea level rise considerations in SMPs and other local plans.

- Leveraging planning tools to understand and plan for sea level rise.** Recognizing that SMPs are only one potential method of planning for sea level rise, local governments are using a variety of planning tools and processes to consider the implications of sea level rise for their communities. These include sea level rise considerations within critical areas ordinances, hazard mitigation plans, subarea plans, building and zoning codes, local flood ordinances, stormwater management plans, the State Environmental Policy Act (SEPA) process, and other activities. Some jurisdictions have also begun to address the need for sea level rise planning within their comprehensive plans. For example, King County recently adopted a Sea Level Rise Risk Area for Vashon-Maury Island, while the City of Olympia initially used SEPA authority to begin planning for sea level rise in the historic downtown area. Olympia has since expanded the breadth of tools they use to plan for sea level rise, as shown in Figure 7.

Read the case studies

Summary of Regulatory and Policy Tools that Impact Development Along the Shoreline and Throughout the City										
Issue	SMP	Comp Plan	Zoning Code	EDDS	Storm Water Manual	CAO	Flood Plain	SEPA	CFP	Bldg. Codes
Shoreline Uses	X	X	X			X <sup>1</sup>				
Setbacks	X		X							
Heights	X	X	X							
View Protection	X	X	X					X		
Sea Level Rise	X	X	X	X			X	X	X	
No Net Loss	X	X			X	X		X		
Vegetation Preservation	X	X	X <sup>2</sup>			X				
Liquefaction										X
Development Review Process	X		X					X		
Nonconformities	X		X							
Vision	X	X								
Public Access	X	X	X					X		
Trails	X	X	X	X						
SMP = Shoreline Master Program EDDS = Engineering Development & Design Standards CAO = Critical Areas Ordinance SEPA = State Environmental Policy Act CFP = City's Capital Facilities Plan X = Primary Function										

Figure 7. The City of Olympia recognizes that many local planning tools can be used to address sea level rise, as indicated by this table in their SMP, effective June 29, 2021. The red box was added by the authors for emphasis. Image via the City of Olympia.



- *Employing existing climate change initiatives as a vehicle for specific sea level rise actions.* Some local governments have adopted climate action plans to support and coordinate climate action initiatives across local offices and planning bodies. While these plans often address CO<sub>2</sub> emission reductions or other climate mitigation measures, they also provide a natural forum for conversation and strategic leadership on sea level rise adaptation action. One example is [Bainbridge Island's Climate Change Advisory Committee](https://www.bainbridgewa.gov/922/Climate-Change-Advisory-Committee),<sup>19</sup> which consists of a wide variety of area experts and works on how climate change issues affect local plans. This committee provides guidance to the city on the inclusion of sea level rise information within their SMP.
- *Fostering interdepartmental communication and collaboration on the topic of sea level rise.* Formal and informal conversations, meetings, and workshops between departments and agencies have been instrumental in raising questions about sea level rise and helping jurisdictions begin to plan for its impacts. For example, the Island County planning department sponsored and coordinated a [joint learning workshop](https://drive.google.com/file/d/1lIDWEZCc23XO6f5wGJQS_1svU654VddS/view)<sup>20</sup> in 2019 that focused on developing a common understanding of terms and concepts about sea level rise across County departments. Participants also engaged in a high-level assessment of vulnerabilities throughout the county, explored efforts taken by other local governments to address sea level rise, and discussed what might be applicable to Island County. In other jurisdictions, initial sea level rise planning considerations were sparked by informal questions and conversations between members of the planning and public works departments.




Figure 8. Staff from Island County and Washington Coastal Resilience Project partner organizations gathered for a workshop to learn about sea level rise and discuss potential impacts on the County. Photo by WA Department of Ecology, 2019.

- *Early outreach and engagement with the public on sea level rise planning.* Local governments that took the initiative to engage the public in early, robust, and transparent conversations around sea level rise planning found this to be very useful in moving their efforts forward. They found that this helps educate the public about the issue and build

<sup>19</sup> <https://www.bainbridgewa.gov/922/Climate-Change-Advisory-Committee>


<sup>20</sup> [https://drive.google.com/file/d/1lIDWEZCc23XO6f5wGJQS\\_1svU654VddS/view](https://drive.google.com/file/d/1lIDWEZCc23XO6f5wGJQS_1svU654VddS/view)

consensus around the need to take action. It also assists local governments in understanding and incorporating the concerns and questions of private landowners. In Island County, the Marine Resources Committee helped sponsor [several community workshops on sea level rise](#)<sup>21</sup> to inform the County's planning efforts and to answer community members' questions. A different jurisdiction that did not engage early enough with the public on their sea level rise planning efforts noted that they felt this was a missed opportunity and recommended that other jurisdictions not repeat their mistake.



Read the case studies

- *Using local projects and public infrastructure as action drivers.* Local governments can initially focus sea level rise planning on publicly owned assets such as infrastructure, parks, public access, utilities, and other key investments. These projects help to jump-start sea level rise planning conversations within local governments and provide important learning opportunities. Examples of these actions include:
  - Metro Parks Tacoma received a grant to renovate and replace facilities and infrastructure at [Owen Beach in Point Defiance Park](#).<sup>22</sup> To ensure the park's longevity, the design team consulted the latest sea level rise projections and data on expected storm surge. The new designs incorporated an expected three to six feet of sea level rise by the end of the century while avoiding increased construction costs.
  - Bellingham's extensive [Waterfront District Redevelopment Plan](#)<sup>23</sup> initiated significant discussion about sea level rise and ultimately resulted in the addition of specific development standards to the Waterfront Sub-Area Plan to account for sea level rise (see Figure 9 for more information).
  - The redevelopment of Gig Harbor's Skansie Brothers Park created an opportunity for the local public works department to incorporate sea level rise projections into their plans, resulting in the elevation of vulnerable sewer infrastructure as well as the city's historic net sheds.
  - The locations of water treatment facilities or potentially hazardous sites have led local governments to conduct vulnerability assessments or otherwise gain a better understanding of future sea level rise implications. See the next success strategy for more information on jurisdictions that have conducted vulnerability assessments.



Read the case studies

These projects are a vehicle to initially understand and test how to incorporate sea level rise considerations into planning, siting, design, and implementation. This process can foster cross-departmental collaboration and reveal important lessons that can inform future sea level rise strategies and regulations.

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<sup>21</sup> <https://www.islandcountymrc.org/projects/sea-level-rise-workshop/>

<sup>22</sup> <https://www.metroparkstacoma.org/project/owen-beach-improvements/>

<sup>23</sup> <https://www.portofbelllingham.com/DocumentCenter/View/9149/2019-Waterfront-District-Sub-Area-Plan>, see page 23.

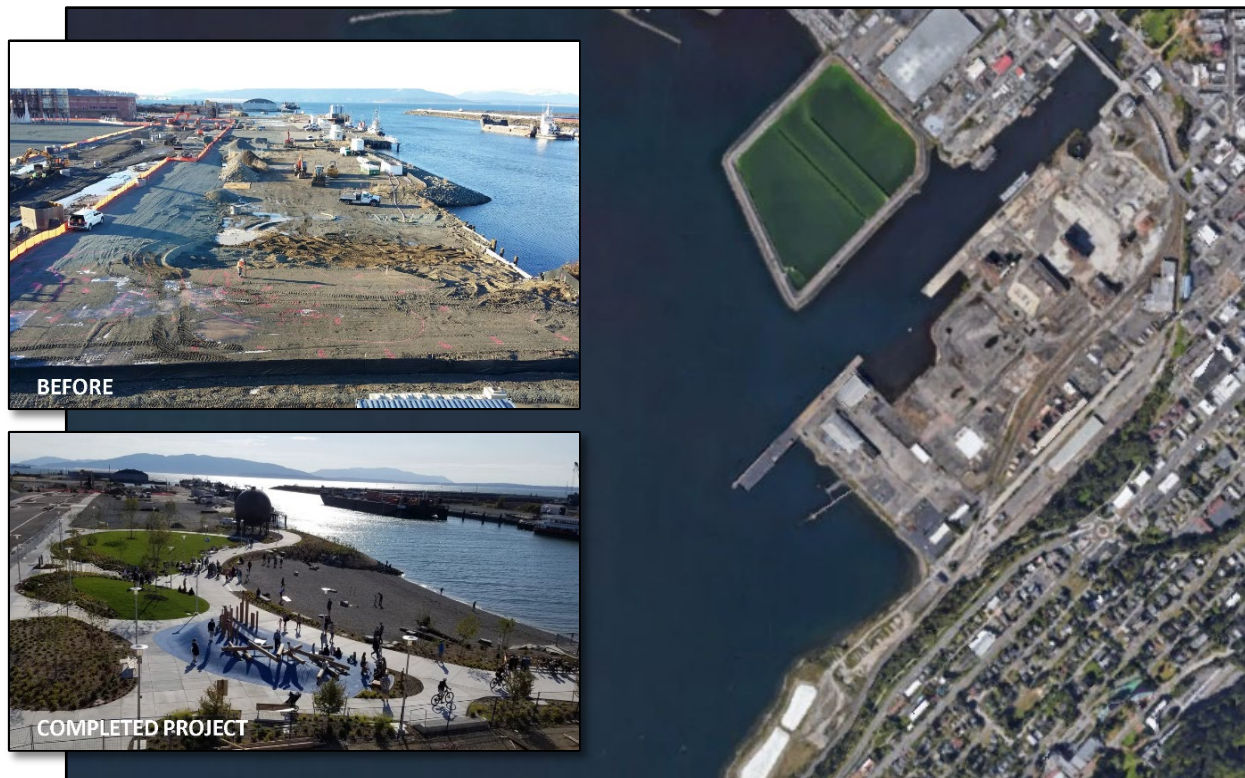


Figure 9. The Port and City of Bellingham are engaged in the long-term process of redeveloping 237 acres of the Bellingham waterfront over the course of 50 years. In 2018, Waypoint Park beach (inset) was restored to provide public access to the downtown waterfront for the first time in over 100 years. The Park's design accounts for 2.4 feet of sea level rise, while The Waterfront District Sub-Area plan and the accompanying planned action ordinance require the City to apply 50 inches of projected sea level rise during the preliminary design and review of shoreline permit development project applications. The Sub-Area plan also provides specific examples of ways to accommodate rising waters. Satellite image via Google Earth, 2021. Inset photos by Jim Johannessen, 2018.

- Conducting sea level rise vulnerability assessments.** Completing sea level rise vulnerability assessments have helped jurisdictions better understand the extent and timing of sea level rise impacts. This then assists jurisdictions with prioritizing actions that can reduce sea level rise-related vulnerability. Vulnerability assessments can be relatively comprehensive studies of a jurisdiction's shoreline and public infrastructure to identify, quantify, and prioritize vulnerabilities and determine the level of risk. The City of Olympia took this approach in its [2017-2018 vulnerability and risk assessment](http://olympiawa.gov/~media/Files/PublicWorks/Water-Resources/Olympia%20SLR%20Vulnerability%20and%20Risk%20Assessment%20March%202018_combined.pdf?la=en).<sup>24</sup> Vulnerability assessments can also be more narrowly focused and consider specific sites or facilities. For example, in 2008, [King County conducted an analysis](https://your.kingcounty.gov/dnrp/library/archive-documents/wtd/csi/csi-docs/0807_SLR_VF_TM.pdf)<sup>25</sup> to identify if their wastewater treatment facilities might be at risk to future sea level rise, storm surge, and

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<sup>24</sup> [http://olympiawa.gov/~media/Files/PublicWorks/Water-Resources/Olympia%20SLR%20Vulnerability%20and%20Risk%20Assessment%20March%202018\\_combined.pdf?la=en](http://olympiawa.gov/~media/Files/PublicWorks/Water-Resources/Olympia%20SLR%20Vulnerability%20and%20Risk%20Assessment%20March%202018_combined.pdf?la=en)

<sup>25</sup> [https://your.kingcounty.gov/dnrp/library/archive-documents/wtd/csi/csi-docs/0807\\_SLR\\_VF\\_TM.pdf](https://your.kingcounty.gov/dnrp/library/archive-documents/wtd/csi/csi-docs/0807_SLR_VF_TM.pdf)



associated flooding. Other jurisdictions have recognized that future impacts from sea level rise to private septic systems and public wastewater systems are relatively unknown, and that vulnerability assessments should be carried out to better understand the threat to these systems.

- *Ensuring new sea level rise science is incorporated into plan updates.* Some jurisdictions have included inward-facing policy direction on sea level rise in their SMPs, which helps define their responsibilities and guide their processes and procedures. These policies provide direction on examining new science and information, re-evaluating risk scenarios and mapping, and updating their SMPs accordingly. Jurisdictions that have done so include Bremerton, Edmonds, Everett, and Olympia (see Appendix B).

## Challenges

Interviewees reported facing the following challenges within their local jurisdictions. Challenges are organized into larger themes reflecting the potential hurdles faced when incorporating sea level rise into the local SMP.

### Shoreline development

- *Pressure for residential development in areas vulnerable to sea level rise.* Waterfront properties that are most vulnerable to sea level rise are often among the most valuable real estate assets in a jurisdiction. These may be in urban areas experiencing revitalization on the waterfront, or in low-density residential areas that are desirable for larger permanent residential developments. Efforts to regulate development in these areas are therefore often met with considerable resistance. Given the high value of shoreline property and the importance of waterfront development to a variety of community interests, jurisdictions may allow or even encourage investments in areas that face vulnerability to sea level rise.
- *Existing development in vulnerable areas.* Many sections of Washington's marine waterfront are already developed with a mix of public and private infrastructure. Interviewees noted the range of existing development they manage, such as Olympia's downtown core, King County's residential development on Vashon and Maury islands, wastewater treatment facilities, and the BNSF railway along the shoreline of many communities north of Seattle. Some of this development cannot be moved




Figure 10. A pier in Mukilteo is nearly overtopped during a King Tide in January 2010. Photo by Hugh Shipman/WA Dept. of Ecology, 2010.

out of harm's way, and may require sea level rise adaptation strategies (such as bulkheads and seawalls) that could raise additional regulatory or environmental concerns. Jurisdictions are still uncertain of how to handle the regulation and permitting of proposed modifications to existing development in the future.

- *Concerns over regulations affecting private property.* Tensions over sea level rise regulations were most pronounced in the context of regulations that affect private property, such as restrictions on shoreline stabilization. Two jurisdictions with active residential shoreline communities shared that they altered their proposed sea level rise language due to pushback from private property interests. In other jurisdictions, discussions around identifying areas at risk from sea level rise raised concerns that this would lead to future restrictions in these areas. This highlights a key conflict that local governments face: despite constituents' general support for climate action and concerns regarding damages to property, specific regulations—especially those that restrict actions on private property or may lower property values—are not always well received.

## Inherent aspects of the planning process

- *Policy statements on sea level rise are an important first step, but can have limitations.* At the time of this publication in July 2021, 24 of 56 jurisdictions with marine shoreline had incorporated sea level rise into their SMPs in some form (see Appendix B). However, sea level rise was most often included in SMP goals and policies sections, rather than in regulations. The 2017 key word search identified five jurisdictions that included sea level rise considerations in regulatory sections of their SMPs. This number had increased to nine jurisdictions by the time this report was published. Local governments noted that the inclusion of sea level rise in the goals and policies sections can be a feasible and important first step. SMP policies may be cited when reviewing shoreline permits, can provide internal direction to staff, and can act as a stepping stone for the inclusion of regulations at a later date as more information becomes available and jurisdictions are able to conduct sufficient public engagement on the topic. However, jurisdictions also expressed that the general nature of goals and policies provide minimal guidance for implementing sea level rise considerations when reviewing and approving shoreline proposals.
- *Planning is a slow process.* Planners are well aware of the time and steps required to develop a plan. All planning processes include time-intensive steps such as procuring long-term funding, securing commitments from elected officials, and maintaining meaningful engagement with the community. The existing timelines are further complicated when addressing sea level rise due to the potentially controversial nature of the topic, the evolving state of the science, and the growing understanding of impacts to communities. Bellingham planners shared that the jurisdiction's Waterfront District Redevelopment Plan has been twenty years in the making, and Olympia planners noted that the city has been working on sea level rise planning since 1990. These extended timelines raise other challenges such as resource limitations, staff capacity, and shifting priorities.



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## Resources and capacity

- *Staff capacity to take on sea level rise planning work.* Local governments face a variety of urgent planning challenges and must meet deadlines for mandated planning work. Planners may be supporting several efforts at a time, especially in smaller jurisdictions with limited staff. One jurisdiction shared that their planning department struggles to complete everything that they are currently supposed to do and any added tasks (such as sea level rise planning) without additional funding would be difficult to complete. Without a statewide mandate to plan for sea level rise, some jurisdictions are unable to justify devoting staff time to the issue.
- *Insufficient resources allocated for development and implementation of sea level rise language.* Sea level rise planning can add additional layers of complexity to a project or planning process, and may call for hiring outside expertise, commissioning vulnerability studies, or extending staff commitment to a planning task. Several interviewees faced resource limitations when incorporating sea level rise goals, policies, or regulations into their SMPs. Resources were not directly allocated for sea level rise language development and implementation, or were minimally allocated at an insufficient level. However, jurisdictions that were able to dedicate resources to sea level rise work showed that this investment can lead to substantial progress in addressing the issue. For example, King County planners received significant resources and staff capacity to work on sea level rise, which was critical in their recent efforts to integrate sea level rise and climate change throughout County plans.
- *Staff turnover and loss of institutional knowledge.* Political and institutional turnover are common in local governments. In fact, most of the local government staff interviewed in 2018 as part of this project did not work on their comprehensive SMP update. Background knowledge, relationships, and other important elements of institutional knowledge are often lost with staffing changes. Notably, one jurisdiction cited its lack of staff turnover and resulting continuity as a specific strength of their sea level rise efforts.
- *Disconnect between long-range planning and day-to-day SMP implementation.* The long-range planners who develop an SMP are not necessarily the same staff who administer shoreline permits. The implementation of sea level rise language can be hampered when knowledge and decision support information are not transferred between staff. Interviewees pointed to the importance of communication between long-range planners and permit implementation staff throughout the planning process—from initial discussions to final approval—so staff across the department can lend their expertise to language development and are fully aware of any sea level rise requirements during permit review and SMP implementation.



Figure 11. Staff from the Department of Ecology guide local planners through a sea level rise planning exercise at a workshop hosted by the Shoreline and Coastal Planners Group in Aberdeen, WA. Photo by Jackson Blalock/WA Sea Grant, 2019.

- Uncertainty regarding legal liabilities stemming from action—or inaction—on sea level rise.*  
 A jurisdiction’s liability for the planning action it takes (or fails to take) in response to climate hazards is an emerging legal question. Jurisdictions already face legal challenges related to regulating private property and restricting development. Limiting development in areas vulnerable to future hazards provides an additional subject for legal disputes. Conversely, jurisdictions may also face potential liability for failing to act on sea level rise, given the growing body of science and widespread consensus on the existence of the threat. This is an emerging issue and local legal counsel is the best resource for exploring these concerns.
- Potential legal risks and liability when sharing sea level rise data and information.*  
 Jurisdictions expressed a concern that providing sea level rise resources (e.g., geospatial data, inundation maps) could create liability issues. For example, depicting or delineating at-risk areas on maps may generate complaints and legal action from residents who interpret the data to imply that new regulations are now in place or may be forthcoming. Local government officials should consult with their attorneys regarding liability concerns.



- Uncertainty around future conditions.* As conversations about sea level rise planning have become more pronounced in Washington, a consistent local concern has been the uncertainty of how much sea level rise we will experience. During much of the time when jurisdictions were doing their comprehensive SMP updates, Washington did not have localized sea level rise projections. This posed a challenge for local governments wanting to “pick a number” for their plans. However, the products of the [Washington Coastal Resilience Project \(WCRP\)](#)<sup>26</sup> have significantly advanced our understanding of sea level rise science. The localized, probabilistic sea level projections provide communities much more detail about the hazard, and the [“How to Choose” guide](#)<sup>27</sup> can help local governments make the choices necessary to select and use sea level rise projections for their particular context. This decision-ready information is now being incorporated into local planning and the design of public infrastructure. [The City of Bainbridge Island used this information to evaluate the vulnerability of City assets](#)<sup>28</sup> and other infrastructure to the impacts of sea level rise, while the [City of Langley developed a strategy document](#)<sup>29</sup> for using SMPs and other plans to adapt to sea level rise. WCRP sea level rise information also informed the design of Owen Beach at Point Defiance Park in Tacoma and Kayak Point Regional Park in Snohomish County.

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Figure 12. Conceptual design for renovations to Owen Beach at Point Defiance Park in Tacoma. The new design incorporates sea level projections developed by the Washington Coastal Resilience Project. At inset, construction crews conduct renovations on the beach in Tacoma. Conceptual design provided by Metro Parks Tacoma. Photo by Henry Bell, 2021.

<sup>26</sup> <https://wacoastalnetwork.com/washington-coastal-resilience-project/>

<sup>27</sup> <https://cig.uw.edu/publications/how-to-choose-a-primer-for-selecting-sea-level-rise-projections-for-washington-state/>

<sup>28</sup> [https://www.bainbridgewa.gov/DocumentCenter/View/12893/Sea-Level-Rise-Assessment-October-24-2019#:~:text=Central%20\(%E2%80%9Cmost%20likely%E2%80%9D\),\(see%20yellow%20box%20below\)](https://www.bainbridgewa.gov/DocumentCenter/View/12893/Sea-Level-Rise-Assessment-October-24-2019#:~:text=Central%20(%E2%80%9Cmost%20likely%E2%80%9D),(see%20yellow%20box%20below))

<sup>29</sup> <https://www.langleywa.org/2020-12-11%20SLR%20Strategy%20document.pdf>



## Needs

Consensus arose around the needs and external assistance that local governments indicated would support their efforts to plan for sea level rise.

- *Multi-organizational technical assistance.* Since 2017, shoreline planners at the Department of Ecology have fielded an increasing volume of calls, questions, and requests for assistance with incorporating sea level rise information within SMPs and navigating the complex shoreline regulatory environment. The University of Washington Climate Impacts Group and Washington Sea Grant have also experienced a large uptick in inquiries from local governments. However, state agencies and area experts are limited in their staffing to deliver the breadth of assistance required to support locally driven efforts that are tailored to each community's goals and objectives. As noted in the William D. Ruckelshaus Center's [2017 Washington State Coast Resilience Assessment](https://s3.wp.wsu.edu/uploads/sites/2180/2013/06/Washington-Coast-Resilience-Assessment-Report_Final_5.1.17.pdf),<sup>30</sup> there is a well-recognized need to establish an integrated technical assistance program that can provide backbone services to support resilience initiatives undertaken by local governments along the coast. The proposed "Coastal Hazards Organizational Resilience Team" (COHORT), further detailed in a [2019 report also conducted by the Ruckelshaus Center](https://s3.wp.wsu.edu/uploads/sites/2180/2021/02/Options-and-Considerations-for-Implementing-the-COHORT_final_6.28.19.pdf),<sup>31</sup> provides one such model for how coordinated multi-organizational assistance could be delivered to support localized planning efforts for addressing sea level rise and other hazards.
- *Additional data and information for understanding sea level rise impacts.* Local governments continue to identify additional data and information that could help them understand the impacts of sea level rise in their communities. Interviewees mentioned the following needs:
  - Monitoring and analysis of changes in physical conditions of shorelines and nearshore areas over time to assess vulnerability to sea level rise, erosion, and flooding. This information could then be integrated into SMPs, Hazard Mitigation Plans, Comprehensive Plans, or others to set the stage for community-led adaptation actions and increase the likelihood of communities receiving state or federal competitive grant funds to address these coastal hazards
  - Research and corresponding outreach to landowners about the effects of sea level rise on all shoreforms, including impacts on slope stability.
  - Additional mapping and visualization of future storm surge levels and wave impacts associated with higher sea levels.<sup>32</sup>

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<sup>30</sup> [https://s3.wp.wsu.edu/uploads/sites/2180/2013/06/Washington-Coast-Resilience-Assessment-Report\\_Final\\_5.1.17.pdf](https://s3.wp.wsu.edu/uploads/sites/2180/2013/06/Washington-Coast-Resilience-Assessment-Report_Final_5.1.17.pdf)

<sup>31</sup> [https://s3.wp.wsu.edu/uploads/sites/2180/2021/02/Options-and-Considerations-for-Implementing-the-COHORT\\_final\\_6.28.19.pdf](https://s3.wp.wsu.edu/uploads/sites/2180/2021/02/Options-and-Considerations-for-Implementing-the-COHORT_final_6.28.19.pdf)

<sup>32</sup> The USGS Coastal Storm Modeling System (CoSMoS), which provides detailed predictions of coastal flooding due to future sea-level rise, storms, and river flooding driven by climate change, is in the process of being expanded to include the Puget Sound region as of the time of this publication: [https://www.usgs.gov/centers/pcmsc/science/ps-cosmos-puget-sound-coastal-storm-modeling-system?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pcmsc/science/ps-cosmos-puget-sound-coastal-storm-modeling-system?qt-science_center_objects=0#qt-science_center_objects)

- Research into impending flood risks to assets that are located outside of current FEMA flood zones.

Although science and information addressing some of these needs are being developed for Washington State and are available online in places such as the [University of Washington Climate Impacts Group](https://cig.uw.edu/)<sup>33</sup> and [Coastal Hazards Resilience Network](https://wacoastalnetwork.com/)<sup>34</sup> websites, further resources and investment would help build capacity to collect and disseminate information on sea level rise and its associated impacts at local and site-specific scales.

- *Outreach materials for educating the public on sea level rise.* Nearly all jurisdictions interviewed expressed that it would be very useful to have easy-to-understand graphics and outreach materials for educating homeowners, shoreline permit applicants, and other members of the public on sea level rise issues. Although awareness of sea level rise is generally high, jurisdictions voiced that many of their constituents do not fully understand what the impacts will be and when they will occur. Specifically, jurisdictions explained they are lacking local or site-specific materials, maps, or figures, backed by defensible data, that depict expected sea level rise and include storm surge height. They also indicated that it would be best if these materials were produced or approved by Ecology or a non-jurisdictional source such as the UW Climate Impacts Group.



Figure 13. Outreach staff engage with community members about sea level rise projections at a 2019 King Tides Viewing Party in Raymond, WA. Photo by The Nature Conservancy, 2019.

- *Guidance from the state on planning for sea level rise.* Additional guidance or best management practices around sea level rise planning would assist coastal jurisdictions in developing sea level rise adaptation strategies. Although there is no specific directive from the legislature for local governments to develop sea level rise adaptation strategies at this time, all jurisdictions interviewed for this study conveyed that further guidance would help them take additional actions. Local planning staff reach out to Ecology's shoreline planners on a regular basis to request additional information, example language, or suggested practices for incorporating sea level rise considerations within their SMP or other local

<sup>33</sup> <https://cig.uw.edu/>

<sup>34</sup> <https://wacoastalnetwork.com/>

plans. Clarity from the legislature on sea level rise planning requirements would also help local governments avoid legal challenges regarding the inclusion or omission of sea level rise language in local shoreline regulations.

- *Funding allocated to support local sea level rise planning efforts.* There are very few funding opportunities available to local communities that can be used to support sea level rise planning activities. Although funding options do exist for the implementation of specific projects and mitigation actions, jurisdictions struggle to reach this phase if they cannot fund necessary planning efforts, such as vulnerability and risk assessments, community workshops, and project scoping endeavors. This issue is compounded by limited planning staff capacity and minimal available resources, particularly in rural and less populous jurisdictions. To begin addressing this need, Ecology is launching a new Shoreline Master Program Competitive Grant Pilot Program in September 2021.<sup>35</sup> This grant will support sea level rise planning efforts by local jurisdictions, including initial project scoping, vulnerability assessments, and considerations of SMP amendments. An additional method for the state to address this need would be to broaden eligible activities under existing capital grant programs to include additional preparation, planning, and capacity-building activities for evaluating risk and addressing sea level rise impacts. This is discussed further in Ecology's [Sea Level Rise Considerations in Washington State Capital Grant Programs report](#).<sup>36</sup>



Figure 14. Managing Washington's marine shorelines in the face of sea level rise will continue to be an important subject of local planning for years to come. Photo of Ebey's Landing in Island County, WA by Sydney Fishman/WA Dept. of Ecology, 2018.

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<sup>35</sup> At the time of publication, a webpage for the SMP Competitive Grant Pilot Program was still in development. A link to the webpage will be located within Ecology's Shoreline Planners' Toolbox: <https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-planners-toolbox>

<sup>36</sup> <https://apps.ecology.wa.gov/publications/documents/2006015.pdf>

## Opportunities for local governments

Interviewees offered the following ideas and suggestions for advancing sea level rise planning efforts through the SMP and other local planning tools.

- *Use goal-setting and SMP policies to lay the groundwork for future sea level rise action.* SMA and SMP guidelines do not require the inclusion of goal statements in an SMP. However, many local communities find value in setting goals. Goal-setting can focus the community on mutually desired outcomes before beginning the potentially more contentious process of deciding how best to achieve those outcomes through regulations. Furthermore, by including goals and policies about sea level rise in SMPs, jurisdictions are provided with new authority to work on the issue. Local governments that have formally adopted sea level rise language in goals and policies point out that it offers many benefits, including:
  - Raising internal and external awareness of sea level rise issues.
  - Engaging the public in creating a common vision for adapting to sea level rise.
  - Establishing a pathway for writing future policies and regulations based on the common vision.
  - Enabling departments and staff to appropriately prioritize and dedicate resources toward understanding and addressing sea level rise issues.
  - Enhancing cross-departmental coordination on sea level rise and clarifying expectations.
  - Aligning incremental and short-term decision-making with long-term goals.
  - Improving a jurisdiction's eligibility or competitiveness for funding programs that support the implementation of projects that address sea level rise.
- *Take advantage of existing strategies and regulatory tools to reduce risk from sea level rise.* Zoning overlays, flood hazard policies, design standards, and buffers are all examples of existing management approaches that can help avoid, minimize, and protect from the impacts of sea level rise. For example, King County applied known flood risk reduction strategies within a newly created Sea Level Rise Risk Area in their 2020 Comprehensive Plan update. New homes built in this area, which extends inland from the edge of the existing 100-year floodplain, are required to be built three feet above the 100-year base flood elevation and comply with a number of other floodplain construction regulations in order to account for future flood risks. Even if jurisdictions do not adopt new construction regulations, local planners can still recommend risk reduction measures used today in flood-prone areas. These may include home elevation, flood-proofing of existing structures, and managed realignment to remove or avoid development in hazardous areas. Examples of beach restoration and upland relocation strategies include the restoration of natural beach habitat for a residential property on Orcas Island and the relocation of a private home near the mouth of the Lower Elwha River.



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- *Deliver sea level rise information early in project design, when it is actionable.* Many local staff mentioned that property owners express concern about sea level rise. However, project design often does not account for sea level rise, and opportunities to explore alternatives are limited after a project is designed and the permit is submitted. Pre-application meetings are already required for certain types of development and offered on an optional basis to other interested parties in many jurisdictions. These consultations are a prime opportunity to educate property owners about sea level rise risks and code language, and to connect them with resources early in the pre-design stages of their projects when design alterations are actionable. Outreach materials, hazard maps, and easily digestible sea level rise data would be key in supporting these conversations.
- *Develop a strategy for implementing sea level rise regulations.* As one jurisdiction acknowledged, writing regulatory language to address sea level rise is easier than implementing that language. Once enforceable regulations are in place in an SMP, local government staff need to be trained and prepared to implement them. This may include educating permit review staff on sea level rise concepts, providing staff access to project-scale sea level rise data, or preparing public-facing educational materials to inform applicants of sea level rise regulations. These steps require time and resources, as well as in-house sea level rise expertise or consultation with external support.
- *Create feedback loops for adaptively managing sea level rise policies and regulations.* Sea level rise planning cannot be a static process. Policies and regulations will need to be adjusted as new science becomes available, impacts are felt, and community needs shift. By creating feedback loops in the planning process to evaluate new data and learn from projects and people subject to sea level rise provisions, local jurisdictions can make



Figure 15. Washingtonians are no strangers to changing water levels. Percival Landing Park in Olympia experiences extreme water level fluctuations, which range from -4.1ft MLLW (May 28, 2021; above) to +16.9ft MLLW (January 23, 2019; below). High water events, such as the 2019 King Tide pictured, demonstrate potential impacts from future sea level rise. Photos by Sydney Fishman/WA Dept. of Ecology.

adjustments to (i.e., adaptively manage) the code to suit the community's needs. Strong feedback loops also reduce the risk of maladaptation, defined as "actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future."<sup>37</sup> Undesirable planning and policy outcomes can be recognized and corrected in a timely manner to minimize impacts to individual projects and larger community adaptation goals. In addition to completing a [Sea Level Rise Strategy Study](#)<sup>38</sup> to identify best practices for sea level rise adaptation in their communities, Island County is currently developing a monitoring program to track sea level data and inform future planning decisions.



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- *Model the local planning office as a partner and resource to the community.* As evidenced by the number of SMPs with sea level rise language, local planning departments are taking a lead role in addressing this hazard in their communities. Yet citizens may hold negative views of the planning department as a regulator, or may not know that their local government is working to address sea level rise. Planners in one jurisdiction shared the desire for their office to be viewed as a positive partner to the community. They noted that this partnership could help residents develop and maintain their properties while being resilient to hazards and protective of the environment. Emerging threats from sea level rise will only increase the need for resources and local support to citizens, and planning departments can begin working to position themselves to meet these needs.
- *Foster inter-jurisdictional communication and planning.* Jurisdictions expressed a desire to coordinate sea level rise planning efforts with other entities in their areas. Several interviewees specifically expressed interest in additional coordination and collaboration with the BNSF Railway Company (whose infrastructure borders the shoreline of many jurisdictions in Puget Sound), other local jurisdictions, and state, federal, and tribal governments. There are opportunities for state agencies, academic institutions, non-governmental organizations, or others working in the region to facilitate this communication through workshops and outreach, the Coastal Hazards Resilience Network, and the proposed Coastal Hazards Organizational Resilience Team (COHORT).

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<sup>37</sup> Noble, I.R., S. Huq, Y.A. Anokhin, J. Carmin, D. Goudou, F.P. Lansigan, F.P. et al. 2014. Adaptation needs options. In Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.R. et al. (eds.) Cambridge, UK: Cambridge University Press. 833-868. [https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap14\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap14_FINAL.pdf)

<sup>38</sup> <https://wacoastalnetwork.com/wp-content/uploads/2021/02/IC-SLR-Strategy-Study.pdf>

## Appendix A. Washington Jurisdictions with Marine Waters

Aberdeen  
Anacortes  
Bainbridge Island  
Bellingham  
Blaine  
Bremerton  
Burien  
Clallam County  
Coupeville  
Des Moines  
DuPont  
Edmonds  
Everett  
Federal Way  
Friday Harbor  
Gig Harbor  
Grays Harbor County  
Hoquiam  
Ilwaco  
Island County  
Jefferson County  
King County  
Kitsap County  
La Conner  
Lacey  
Langley  
Long Beach  
Lynnwood

Mason County  
Mukilteo  
Normandy Park  
Oak Harbor  
Ocean Shores  
Olympia  
Pacific County  
Pierce County  
Port Angeles  
Port Orchard  
Port Townsend  
Poulsbo  
Ruston  
San Juan County  
Seattle  
Sequim  
Shelton  
Shoreline  
Skagit County  
Snohomish County  
South Bend  
Steilacoom  
Tacoma  
Thurston County  
University Place  
Westport  
Whatcom County  
Woodway

## Appendix B. Sea Level Rise Policies and Regulations Included in Shoreline Master Programs

Below are examples of goals, policies, and regulations addressing sea level rise in SMPs, through June 2021. The jurisdiction, the language of each goal, policy, or regulation, and the year in which the updated SMP took effect are listed.

The following terms were used in the key word search to identify this language: sea level, sea level rise, sea-level rise, and climate change. The search was conducted on [state-approved SMPs](#)<sup>39</sup> posted on the Department of Ecology's website.

### Bainbridge Island (2014)

SMP > Critical Areas Regulations > Frequently Flooded Areas:

Applicants for development in low lying shoreline areas and other areas where flood elevation is controlled by tide level shall be provided with information on **sea level rise** (Ord. 2005-03 § 2, 2005).

### Bellingham (2013)

SMP > Shoreline Goals and Policies > Shoreline Goals > Flood Damage Minimization > Objective: B: New scientific studies/information on tsunamis and **sea level rise** should be used to guide shoreline development as it becomes available and accepted as scientifically valid.

### Bremerton (2017)

SMP > Goals > General Goals > Conservation and Restoration Goal:

7: Recognize and monitor the potential effects of **sea level rise** as additional scientific information becomes available. At the next major update of the Shoreline Master Program consider additional specific policies and regulations based on additional scientific projections.

### Burien (2019)

SMP > General Goals and Policies > Flood Prevention and Minimization Element > Policy:

4: Monitor **sea level rise** and accordingly adjust development standards and building setbacks to minimize flooding potential.

### Edmonds (2017)

SMP > Master Program Elements: Goals and Policies for the Edmonds Shoreline Master Program > Shoreline Use Element > Shoreline Use Policies:

10: Develop adaptive management strategies to increase capacity to respond to future possible impacts on the Edmonds shoreline from **climate change** in the Puget Sound region.

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<sup>39</sup> <https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/State-approved-Shoreline-Master-Programs>



11: The City of Edmonds shall stay abreast of scientific information regarding **climate change** and **sea level rise** and reevaluate the Shoreline Master Program development standards as soon as adequate scientific information is available.

12: The Edmonds Marsh study identified in the City of Edmonds Capital Improvement Plan is an important study for determining the potential impacts of **climate change** and **sea level rise** on the City of Edmonds and should be considered a high priority for completion.

### **Everett (2019)**

SMP > General Shoreline Requirements > Shoreline Master Program Elements > Flood Hazard Reduction Element > Policies:

4: Map the potential impacts of **sea level rise** in Everett. Evaluate a range of **sea level rise** scenarios from 1 foot to at least 3 feet by the end of the century. Continue to monitor the latest information on **sea level rise** to adjust scenarios.

5: Evaluate public and private levees/dikes and facilities that may be impacted by **sea level rise** and plan for appropriate responses, such as modifications to structures, elevations, or operations; replacements; or relocations.

SMP > General Shoreline Requirements > Shoreline Master Program Elements > Conservation Element > Policies:

13: Evaluate the effect of soil subsidence on **sea level rise** in Everett.

14: Evaluate the risk to valuable environmental resources from **sea level rise**, such as loss of beach and marsh habitats and inundation of Jetty Island, and evaluate options to compensate for impacts to these resources.

15: Require evaluation of the impacts of **sea level rise** for proposed developments and wetland restoration projects near Port Gardner Bay and the Snohomish River estuary and require appropriate mitigation.

### **Gig Harbor (2013)**

SMP > General Goals, Policies, and Regulations > Restoration and Remediation > Policy:

F: **Climate Change**: Consideration should be made for potential adverse effects of global **climate change** and **sea level rise** when designing restoration and remediation projects.

### **Island County (2016)**

SMP > Shoreline Goals and Policies > Shoreline Use Element > Policy:

6: **Sea level rise** and increased frequency and magnitude of extreme storm events as a result of **climate change** should be taken into account when considering and evaluating shoreline uses.

SMP > Shoreline Goals and Policies > Conservation Element > Policy:

10: Island County shall establish a program to monitor the effects of ongoing **climate change** on the marine environment by annually measuring **sea level** and marine water pH at a minimum of five established sites spread throughout Island County.

SMP > Shoreline General Policies > Flood Hazard Reduction > Policy:

6: When reviewing projects that could be affected by **sea level rise** adjust development standards such as building setbacks or elevation as necessary to minimize potential damage from flooding.

### **Jefferson County (2014)**

SMP > Master Program Goals > Shoreline Use > Goal:

10: Encourage all use and development to address potential adverse effects of global **climate change** and **sea level rise**.

SMP > General Policies and Regulations > Shoreline Setbacks and Height > Policy:

2: Proponents of a development on no-bank or low bank marine shorelines are encouraged to locate the bottom of a structure's foundation higher than the level of expected future **sea-level rise**.

### **King County (2020)**

SMP/Comprehensive Plan > Environment Protection Policies > Preparing for **Climate Change**:

S-650: King County shall ensure that new projects for and major maintenance or replacement of utilities, roads, and other public infrastructure consider the impacts of **sea-level rise** in the location, design, and operation of the projects.

S-651: Habitat protection and restoration projects in the shoreline jurisdiction shall consider implications of **sea-level rise** and other **climate change** impacts to promote resiliency of habitats and species.

SMP/Comprehensive Plan > Shoreline Use & Shoreline Modification > Shoreline Modifications > Shoreline Stabilization:

S-778: King County should notify all prospective developers of new development along Vashon and Maury Islands that their development may be impacted by **sea-level rise** and should encourage all such new development to be set back a sufficient distance to avoid the need for shoreline protection during the expected life of the development.

S-785: King County should encourage replaced structural shoreline stabilization located on Vashon-Maury Island to be relocated outside of the 100-year floodplain whenever possible. The edge of the 100-year floodplain is consistent with a two-foot **sea-level rise**.

SMP > Shorelines Code/Regulations > Shoreline Stabilization:

M: The department shall provide a notice to an applicant for new development or redevelopment located within the shoreline jurisdiction on Vashon and Maury Island that the development may be impacted by **sea level rise** and recommend that the applicant voluntarily consider setting the development back further than required by this title to allow for future **sea level rise**.

## **Langley (2013)**

SMP > General Policies and Regulations > Flood Hazard Management > Policies:

6: When reviewing projects that could be affected by **sea level rise** adjust development standards such as building setbacks or elevation as necessary to minimize potential damage from flooding.

## **Mason County (2017)**

SMP > Shoreline Stabilization > Shoreline Stabilization – Regulations:

1: New development shall be located and designed to avoid the need for future shoreline stabilization to the extent feasible. Subdivision of land must be regulated to assure that the lots created will not require shoreline stabilization in order for reasonable development to occur using geotechnical analysis of the site and shoreline characteristics.

a. When a Geotechnical Report or Geological Assessment is required for primary structures and appurtenances per the Landslide Hazard, Erosion Hazard, or Seismic Hazard Chapters of the Resource Ordinance, in addition to the requirements in 8.52.140, they shall consider **sea level rise**, if applicable, and include the following:

i. A site plan, drawn to scale and stamped/signed by the author of the report or assessment, that shows the ordinary high water mark (OHWM), the crest of the bluff or shoreline bank (if applicable), the development envelope (including proposed or recent clearing and grading), and the proposed structures.

ii. The geotechnical report shall assert that proposed development or uses are set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure. In addition, buffer widths for marine bluffs shall be equal to or greater than a distance from the OHWM landward at a slope of 2:1 (horizontal to vertical) that intersects with the existing topography of the site.

2: New structural stabilization measures shall not be allowed except as follows:

a. To protect existing primary structures:

i. New or enlarged structural shoreline stabilization measures for an existing primary structure, including residences, shall not be allowed unless there is conclusive evidence documented by a Shoreline Geotechnical Assessment that the structure is in danger from shoreline erosion caused by tidal action, currents, waves, or **sea level rise**. Normal sloughing, erosion of steep bluffs, or shoreline erosion itself, without a scientific or geotechnical analysis, is not demonstration of need. The geotechnical assessment shall evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization.

## **Ocean Shores (2018)**

SMP > Specific Shoreline Use Policies & Regulations > Residential Development > Policies:

B: Set back residential development and accessory structures and uses from steep slopes and shorelines vulnerable to erosion so that structural improvements are not required to protect such structures for the expected life of the structure and considering **sea level rise**, increased storm intensity, and changes to coastal erosion and sediment supply

## Olympia (2021)

SMP > Goals and Policies > Shoreline Master Program Goals and Policies:

H. The policies and regulations of Olympia's Shoreline Program should provide resilience for shoreline ecosystems, functions, and developments in response to **sea level rise**.

SMP > Goals and Policies > Shoreline Use and Development Policies:

D. The City should continue to develop information about the impacts of **sea level rise** on the shoreline and other affected properties; the City should develop plans to address the impacts of **sea level rise** in collaboration with impacted property owners, the community and the Department of Ecology. These plans should include at minimum flood prevention approaches, shoreline environment impact considerations and financing approaches. The City should amend the Shoreline Master Program and other policy and regulatory tools in the future as necessary to implement these plans.

E. The City should consider the impacts of **sea level rise** as it plans for the rebuild of Percival Landing and other shoreline improvements and it should be designed to provide for a reasonable amount of **sea level rise** consistent with the best available science and the life cycle of the improvements.

F. The City should collaborate with private property owners, business owners and citizens in the implementation of the Shoreline Master Program to explore creative ways to reduce ecological impacts and mitigate for impacts from **sea level rise** when new development or redevelopment is proposed. This objective may best be accomplished by developing flexible approaches to shoreline development where the total environmental benefit is enhanced through such measures. Opportunities for collaboration may include:

1. Provision of advanced stormwater management and treatment within the shoreline.
2. The restoration, repair and replacement of Percival Landing where appropriate.
3. Provision of direct physical access to the water where appropriate.
4. Provision of a shoreline trail where feasible and consistent with applicable laws.
5. Provision of native vegetation preservation and restoration where appropriate.
6. Bulkhead removal and replacement of hardened shoreline with soft structural stabilization measures water-ward of Ordinary High Water Mark (OHWM) where appropriate.
7. Provision of water related recreation, active playgrounds, and significant art installations, performance space, or interpretive features where appropriate.

SMP > Goals and Policies > Marine Recreation Environment Management Policies:

G. The City recognizes that the Marine Recreation shoreline (Reach 5C) and the adjoining Urban Conservancy/Urban Intensity shoreline in Reach 6A provide a variety of benefits to the community including boat moorage, utility transmission, transportation, public access, water enjoyment, recreation, wildlife habitat and opportunities for economic development. These benefits are put at risk by continued shoreline erosion. The City recognizes that there exists a need to develop a detailed plan for shoreline restoration and stabilization for Reaches 5C and 6A and encourages the Port to partner in this effort.

1. This plan may include:

- a. Measures to enhance shoreline stabilization through the introduction of bioengineered solutions.
- b. Measures to incorporate habitat restoration water-ward of the OHWM.
- c. Measures to incorporate public access and use through trails, public art, parks and other pedestrian amenities.
- d. Measures to incorporate **sea level rise** protection.
- e. Setbacks, building heights and building design considerations.

SMP > Goals and Policies > Urban Intensity Environment Management Policies:

B. Olympia's shoreline is characterized by a wide variety of "urban" uses and activities, including commercial, industrial, marine, residential, and recreational uses. Together, these uses and activities create a vibrant shoreline that is a key component of Olympia's character and quality of life. These types of uses should be allowed within the *Urban Intensity* environment, with preference given to Water-Dependent and Water-Enjoyment uses. Shorelines in this Shoreline Environment Designation (SED) are highly altered and restoration opportunities are limited. The City's own Percival Landing is a good example of how the immediate shoreline in the Urban Intensity SED should be redeveloped with a focus on public access and enjoyment, **sea level rise** protection and restoration of shoreline environmental function where feasible.

E. Support the restoration, repair and replacement of Percival Landing including consideration of **sea level rise** protection.

SMP > Goals and Policies > Scientific and Educational Activity Policies:

A. Encourage scientific and educational activities related to shoreline ecological functions and processes, including **sea level rise** resilience.

SMP > Goals and Policies > Residential Policies:

C. Residential development, including the division of land and the construction of residential units, should be designed and located with consideration of **sea level rise** projections and so that shoreline armoring and flood hazard measures will not be necessary to protect land or structures.

SMP > Goals and Policies > Transportation Policies:

A. New roads and railroads, and expansions thereof should not be built within the shoreline jurisdiction. Where this is not feasible, such improvements should be located and designed to have the least possible adverse effect on the shoreline, account for **sea level rise** projections, not result in a net loss of shoreline ecological functions, or adversely impact existing or planned water-oriented uses, public access, and habitat restoration and enhancement projects.

SMP > Goals and Policies > Utility Policies:

A. Utility facilities should be designed, located and maintained to minimize harm to shoreline ecological functions, account for **sea level rise** projections, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth.

SMP > Goals and Policies > Fill Policies:

C. Fill should be allowed to accommodate berms or other structures to prevent flooding caused by **sea level rise**, when consistent with the Olympia **Sea Level Rise** Response Plan and the flood hazard reduction provisions in this Shoreline Program. Any such fill should include mitigation assuring no net loss of ecological functions and system-wide processes.

SMP > Goals and Policies > Shoreline Stabilization Policies:

B. New development requiring structural shoreline armoring should not be allowed. Shoreline use and development should be located and designed in a manner so that structural stabilization measures are not likely to become necessary in the future, including a consideration of **sea level rise**.

E. Encourage the removal of bulkheads and other hard armoring and restore the shoreline to a more natural condition. Where stabilization is necessary for the protection of private or public property or to increase **sea level rise** resilience, alternative measures that are less harmful to shoreline ecological functions should be employed. An example of such an approach is included in the West Bay Environmental Restoration Assessment report for some shoreline reaches.

SMP > Regulations > Shoreland Fill:

L. Fill within the shoreline jurisdiction shall be allowed in response to increases in **sea level** subject to all other provisions of this Master Program and the mitigation sequencing process.

SMP > Regulations > Fill Water-ward of Ordinary High Water Mark:

A. Fill water-ward of the Ordinary High Water Mark shall be permitted for the following purposes only, with due consideration given to specific site conditions and only as part of an approved use or development:

1. Port development for water dependent uses where other upland alternatives or structural solutions, including pile or pier supports is infeasible;
2. Expansion or alteration of transportation facilities where there are no feasible upland alternatives;
3. Ecological restoration or enhancement such as beach nourishment, habitat creation, or mitigation when consistent with an approved restoration or mitigation plan;
4. Disposal of dredge material in accordance with the Dredge Material Management Program (DMMP) of the Department of Natural Resources;
5. Construction of protective berms or other structures to prevent the inundation of water resulting from **sea level rise** shall be allowed subject to all other provisions of this Master Program and the mitigation sequencing process when there are no other feasible options to protect existing development;
6. Public access; or
7. Cleanup of contaminated sites.

SMP > Regulations > Design of Shoreline Stabilization Measures:

B. The size of shoreline stabilization structures shall be the minimum necessary to protect the primary use or structure.

1. Within the project area of the Olympia **Sea Level Rise** Response Plan (2019), consideration of

**sea level rise** projections may be used to determine the minimum necessary size of shoreline stabilization structures in accordance with the plan.

SMP > Regulations > Alteration of Nonconforming Structures in Shoreline Jurisdiction:

A. Shoreline Structures – The following regulations apply to nonconforming structures located in shoreline jurisdiction. Alterations pursuant to this section shall not result in a net loss of shoreline ecological functions and processes. The applicant shall obtain all required permits or approvals prior to construction. All alterations shall comply with applicable development regulations.

1. Structures within Shoreline Setbacks - Alteration of structures located landward of the Ordinary High Water Mark within a required shoreline setback is limited to:

a. For structures located partially within the shoreline setback, alterations shall be limited to the addition of height and expansion into areas outside the shoreline setback.

b. For structures located entirely within the shoreline setbacks, alterations shall be allowed for the addition of height, or expansion on the upland side of the structure, or both.

c. Interior and exterior remodels and the addition of upper stories are permitted. Except as provided above, such additions shall not extend beyond the existing or approved building footprint. Any expansion of nonconforming structures that further encroach on the Ordinary High Water Mark setback by decreasing the distance between the structure and the Ordinary High Water mark shall require a shoreline variance.

2. Overwater Structures – Alteration of structures located water-ward of the Ordinary High Water Mark is prohibited except: a. Alterations to the footprint or building envelope may be permitted when required by Washington State Department of Natural Resources for light penetration;

b. Alterations that do not increase or expand the building footprint nor increase the height are permitted; and

c. Existing covered moorage may be maintained, repaired, or replaced pursuant to WAC 173-27-040.

3. Structures within Vegetation Conservation Areas. Alteration of structures located landward of the Ordinary High Water within a required Vegetation Conservation Area (VCA) that include expansion of the building footprint is prohibited. Only interior and exterior remodels and the addition of upper stories are permitted.

4. Structurally raising the floor elevation of an existing legally established nonconforming structure, which is necessary to protect the structure from flooding due to **sea level rise**, shall be allowed in accordance with the height limits set forth in Table 6.2. Raising the floor elevation is not allowed for legally established nonconforming overwater structures.

## Pacific County (2018)

SMP > General Policies and Regulations > Flood Hazard Management > Policies:

2: Encourage enhanced construction standards in areas that are vulnerable to flooding both now and in the future based on historical flooding events and future flooding predictions. The County should facilitate sharing of information related to coastal vulnerability to **sea level rise** with developers and residents.

SMP > General Policies and Regulations > Flood Hazard Management > Regulations:

4: In determining the appropriateness of any proposed use in a flood hazard area, the following shall be considered:

- a. The danger to life and property due to increase [sic] flood heights or velocities caused by encroachments.
- b. The danger that materials may be swept on to other lands or downstream to the injury of others.
- c. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination and unsanitary conditions.
- d. The susceptibility of the proposed use and its contents to flood damage and the effect of such damage on the individual owner.
- e. The importance of the services provided by the proposed use to the community.
- f. The requirements of the use for a waterfront location.
- g. The availability of alternative locations not subject to flooding for the proposed use.
- h. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
- i. The safety of access to the property in times of flood for ordinary and emergency vehicles.
- j. The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters expected at the site, including those associated with **climate change** and **sea level rise**.
- k. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities such as sewer, gas, electrical and water systems, and streets and bridges.
- l. Such other factors which are relevant to the policy of this Master Program.

SMP > Shoreline Uses, Development and Modifications > General Development Standards:

C: Shoreline Buffers. Buffer widths for shoreline waterbodies are included in the Development Standards Table listed below (Table 5-2). For non-shoreline streams and other critical areas in shoreline jurisdiction, see the Critical Areas and Resource Lands Ordinance (Ordinance No. 180) for applicable buffers. In addition to required buffers, applicants are advised to consider potential vulnerability to **sea level rise** and coastal inundation.

SMP > Shoreline Uses, Development and Modifications > Residential Development > Policies:

8: Limit residential development within identified Channel Migration Zones, FEMA Floodways, frequently flooded areas, areas flooded by storm surge, and areas vulnerable to inundation under projected **sea level rise** in the foreseeable future.



SMP > Shoreline Uses, Development and Modifications > Transportation and Parking > Policies:  
3: Locate roads to fit the topographical characteristics of the shoreline such that minimum alteration of natural conditions results. New transportation facilities should be located and designed to minimize the need for shoreline stabilization and flood protection measures and to minimize the need to modify the natural drainage systems. New transportation facilities should be located outside of the floodplain and areas vulnerable to inundation as a result of **sea level rise**. The number of waterway crossings should be limited.

Shoreline Uses, Development and Modifications > Utilities > Regulations:

9: Any oil and gas facilities, including pipelines shall be located, designed, constructed, and maintained to ensure adequate protection from geological hazards such as liquefaction, hazardous slopes, erosional shorelines, earthquakes, tsunamis, areas subject to storm surge or subsidence, areas projected to be inundated by **sea level rise**, physical oceanographic processes, and natural disasters.

### **Pierce County (2018)**

SMP > Recognition of Legally Established Development > Residential Structures:

3: Structurally raising the floor elevation of an existing legally established single-family residence, which is necessary to protect the structure from flooding due to **sea level rise**, shall be allowed in accordance with the height limits set forth in PCC 18S.30.060, Scenic Protection and Compatibility.

SMP > Recognition of Legally Established Development > Nonconforming Structures:

4: Structurally raising the floor elevation of an existing legally established nonconforming structure, which is necessary to protect the structure from flooding due to **sea level rise**, shall be allowed in accordance with the height limits set forth in PCC 18S.30.060, Scenic Protection and Compatibility.

### **Port Angeles (2014)**

SMP > General Policies and Regulations > Critical Areas (Geologically Hazardous Areas) > Regulations:

2: Proposals requiring a variance for development within 65 feet of the top of a marine bluff as outlined above shall be required to submit a geotechnical engineering report, prepared in accordance with the requirements of this SMP and Title 15, PAMC.

The geotechnical engineering report shall:

- be prepared by a Washington State licensed professional civil engineer with a specialty in geotechnical engineering or an engineering geologist with a Washington specialty license in engineering geology as specified in RCW 18.220,
- be professionally stamped,
- be based upon the best available science,
- consider existing and proposed uses,
- include risks of slope failure,
- include coastal erosion rates over at least 75 years, based in part on anticipated **sea level rise** and storm frequency,

- Document how, and include a certification that the proposed structure will not be in danger from erosion for at least 75 years,
- Include vegetation enhancement and low impact development measures that might be used as a means of reducing undesirable erosion.
- address the requirements outlined in PAMC 15.20.060 (C), and
- outline how the proposal meets all of the variance criteria in chapter 7 of this SMP.

### **San Juan County (2021)**

SMP > General Regulations > General environmental protection:

D: On all nonbedrock shorelines all new structures are subject to coastal geologic buffers consistent with SJCC 18.50.130.

In addition to the requirements of SJCC 18.35.070 and 18.35.130, Figure 3.1, the required technical report must:

1. Evaluate the potential impacts on water circulation, sand and gravel movement, erosion and accretion;
2. Evaluate the potential impacts of **sea level rise** over the life of the structure (75 years); and
3. Demonstrate that the proposed buffer will be sufficient to avoid the need for new protective structural shoreline stabilization and flood protection measures for the life of the structure (75 years).

### **Seattle (2015)**

SMP/Comprehensive Plan > Land Use Element > Shorelines > Shoreline Protection and Restoration:

LUG52: Address and minimize the impacts of **sea level rise** on the shoreline environment with strategies that also protect shoreline ecological functions, allow water-dependent uses and provide public access.

### **Shelton (2017)**

SMP > Shoreline Master Program Goals and Policies > Flood Hazard Reduction Goals and Policies:

SMP 6.1c: Floodplain management planning should consider implications of **sea-level rise** and other **climate change** impacts.

SMP > Shoreline Master Program Goals and Policies > Restoration Goals and Policies:

10.2: Restoration projects should be designed in a manner that complements adjacent natural resources, incorporates maintenance-free designs, minimizes in-water work, considers **sea-level rise**, and includes adaptive management techniques.

10.2d: Habitat protection and restoration projects should consider implications of **sea-level rise** and other **climate change** impacts to promote resiliency of habitats and species.

SMP > Shoreline Master Program Goals and Policies > Shoreline Use and Development Goals and Policies:

SMP 12.1m: Consider implications of **sea-level rise** and other **climate change** impacts as part of capital facilities and infrastructure projects.

### **Shoreline (2013)**

SMP > Goals and Objectives > Flood Hazard Management:

Goal: Protect the City of Shoreline and other property owners from losses and damage created by flooding along the coast and **sea-level rise**.

Objective: Develop a plan to mitigate and adapt to potentially altered environmental conditions along the coastline resulting from **climate change**.

### **South Bend (2017)**

SMP > Shoreline Modifications > Shoreline Stabilization > Regulation for Shoreline Stabilization:

B: New structural shoreline stabilization measures shall not be allowed except when necessity is demonstrated in the following manner:

i. To protect existing primary structures:

a. There is conclusive evidence, documented by a geotechnical analysis that the structure is in danger from shoreline erosion caused by tidal action, currents, waves, or **sea level rise**. Normal sloughing, erosion of steep bluffs, or shoreline erosion itself, without a scientific or geotechnical analysis, is not demonstrated need. The geotechnical analysis should evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization; and

b. The erosion control structure will not result in a net loss of shoreline ecological functions.

ii. In support of new nonwater-dependent development, including single-family residences, when all of the following conditions apply:

a) The erosion is not the result of upland conditions, such as the loss of vegetation and drainage;

b) Nonstructural measures, such as placing the development further from the shoreline, planting vegetation, or installing on-site drainage improvements, are not feasible or insufficient;

c) A geotechnical report demonstrates the need to protect primary structures from damage due to erosion. The damage must be the result of natural aquatic processes, such as tidal action, currents, waves, and **sea level rise**; and

d) The erosion control structure will not result in a net loss of shoreline ecological functions

iii. In support of water-dependent development when all of the following conditions below apply:

a) The erosion is not the result of upland conditions, such as the loss of vegetation and drainage;

b) Nonstructural measures, planting vegetation, or installing on-site drainage improvements, are not feasible or not sufficient;

c) A geotechnical report demonstrates the need to protect primary structures from damage due

to erosion. The damage must be the result of natural aquatic processes, such as tidal action, currents, waves, and **sea level rise**; and

d) The erosion control structure will not result in a net loss of shoreline ecological functions.

v. A property owner may replace an existing shoreline stabilization structure with a similar structure if there is a demonstrated need to protect primary uses or structures from erosion caused by currents, tidal action, waves, or **sea level rise**. Replacement may occur in accordance with the following provisions:

a) The design, location, size, and construction of the replacement structure results in no net loss of shoreline ecological functions;

b) Replacement walls or bulkheads do not encroach waterward of the ordinary high-water mark or existing structure unless the residence was occupied before January 1, 1992 and there is significant safety or environmental concern. In such cases, the replacement structure shall abut the existing shoreline stabilization structure;

c) Where a net loss of shoreline ecological functions associated with critical saltwater habitats would occur by leaving the existing structure, remove it as part of the replacement measure; and

d) Replacement of structural stabilization measures with nonstructural ones that restore shoreline ecological functions may locate waterward of the ordinary high-water mark.

## **University Place (2016)**

SMP > Shoreline Modifications > Fill > Policies:

3: Fill should be allowed to accommodate berms or other structures to prevent flooding caused by **sea level rise** when other flood prevention methods or alternatives are not feasible and in accordance with UPMC 18.25.030.

SMP > Shoreline Modifications > Fill > Regulations – Fill Waterward of Ordinary High Water Mark:

1: Fill waterward of the ordinary high water mark shall be authorized for the following purposes only, with due consideration given to specific site conditions and only as part of an approved use or development:

a. Water-dependent uses where other upland alternatives or structural solutions, including pile or pier supports, are infeasible;

b. Expansion or alteration of transportation facilities of Statewide significance where there are no feasible upland alternatives; bridging is the preferred alternative to fill;

c. Ecological restoration or enhancement such as beach nourishment, habitat creation, or bank restoration when consistent with approved restoration or mitigation plan;

d. Construction of protective berms or other structures to prevent the inundation of water resulting from **sea level rise** when consistent with the flood hazard reduction provisions in UPMC 18.25.030;

e. Public access and water-dependent recreational uses;

f. Cleanup and disposal of contaminated sediments as part of an interagency environmental cleanup plan;

g. Disposal of dredged material in accordance with DNR Dredged Material Management

Program; or

h. Maintenance of lawfully established development, if all other alternatives are infeasible.

### **Woodway (2013)**

SMP > General Use Policies and Regulations > Restoration and Enhancement > Policies:

5: Consideration should be made for potential adverse effects of global **climate change** and **sea level rise** when designing restoration and remediation projects.

## Appendix C. Interview Questions

These are the questions and related purposes used for the in-person interviews conducted in 2018. These questions were provided to each jurisdiction one week before the interview.

1. Why did inserting sea level rise policy and regulatory language (SLR language) in your community's Shoreline Master Program (SMP) become a priority and how much time and how many resources were dedicated to this work?

*Purpose: Understand what motivated your community to include SLR language in your SMP and what level of effort was needed to accomplish this task. This information will provide other planners with possible strategies for making the inclusion of SLR language a future priority for their SMP.*

2. How much and what scale of information did your community collect before including the SLR language in the SMP?

*Purpose: Understand the information that was important to consider before including SLR language in your SMP. We have learned that there are many ways to evaluate and minimize the risks from sea level rise, and that different types of analyses and actions will be appropriate, depending on the level of the planning effort and availability of information and data. Sharing insight into the amount and details of this information will be valuable for other planners engaging in this work.*

3. Was the SMP the only planning/management tool considered for addressing sea level rise?

*Purpose: We have heard from local governments that there are many ways to implement adaptation responses to sea level rise, including local comprehensive plans, hazard mitigation plans, flood ordinances, stormwater management, infrastructure planning, evaluations of utility and service capacity, and other activities. Each planning/management tool has advantages and disadvantages, and local governments are in the best position to determine how to incorporate these planning resources into their overall sea level rise response strategy. Insight from your community's discussion around this topic will help others understand the different options available for sea level rise planning/management.*

4. How did you decide on what SLR language to use in your SMP?

*Purpose: Understand the factors (origin, word choice, section of the SMP) that were important to the development of the SLR language. For instance, did the SLR language come from other SMPs, different planning documents, or another source? What considerations were made regarding how the SLR language would be implemented and the resulting outcome?*

5. How do you plan to implement the SLR language in your SMP, or what have you learned if you have already implemented the SLR language?

*Purpose: Understand what approaches have been considered for implementation, and how the SLR language has performed in meeting your intended goals and objectives.*

6. What resources (technical assistance, guidance, information, etc.) would have aided and supported this process? What resources would aid and support your current or future efforts?

*Purpose: Agencies are investing in efforts to provide additional resources and guidance to communities. This information will further improve the sea level rise guidance and resources provided to planners.*

7. Based on your experiences, what three recommendations would you give a community interested in undertaking a similar effort?

*Purpose: Collect a range of recommendations for Washington planners who intent to add SLR language to their jurisdiction's SMP.*