

Sea level rise: an Introduction

What is sea level rise?

How may sea level rise affect me?

How much will sea levels rise, and when?

Why should I care now?

What can I do about it?

Where can I learn more about sea level rise in Washington?

Sea level rise will cause:

- Coastal flooding,
- Habitat loss,
- Salinity change in streams and groundwater, and
- Erosion or deposition of material in waterways.

Daily high tides will be higher, and so will water levels during storms.

We can see what normal tides may look like in the future by viewing King Tides and other extreme water levels today. There is no single number to accurately describe future sea level rise, but updated sea level rise projections were created for Washington State's shorelines in 2018.

Sea level rise, town planning, and building construction are all slow processes, so begin acting now. Prepare for sea level rise:

- Advocate for sea level rise language in local coastal planning efforts,
- Adapt your project to higher future water levels,
- Talk with your neighbors about higher future water levels.

What is sea level rise?

Sea level rise is an increase in ocean water levels over long time periods (decades to centuries). Large increases in sea level expected by the end of the century are caused by:

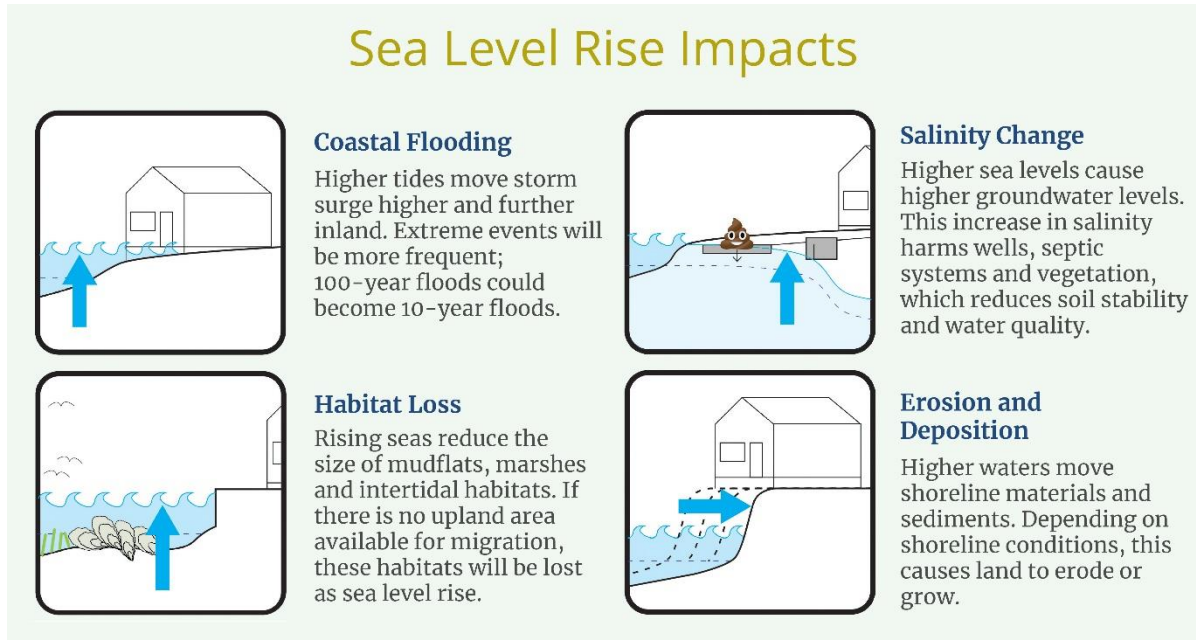
1. Thermal expansion – when sea water warms, it expands.
2. Melting of land ice – when glaciers, ice caps, and ice sheets melt, more water is added to the ocean, increasing its volume.

Both of these processes are due to global climate change. (<https://climate.nasa.gov/evidence/>) Local factors – such as tectonics and land subsidence – may cause local variations in water levels.



How may sea level rise affect me?

The diagrams below show how sea level rise could impact your home, business, or local shoreline.



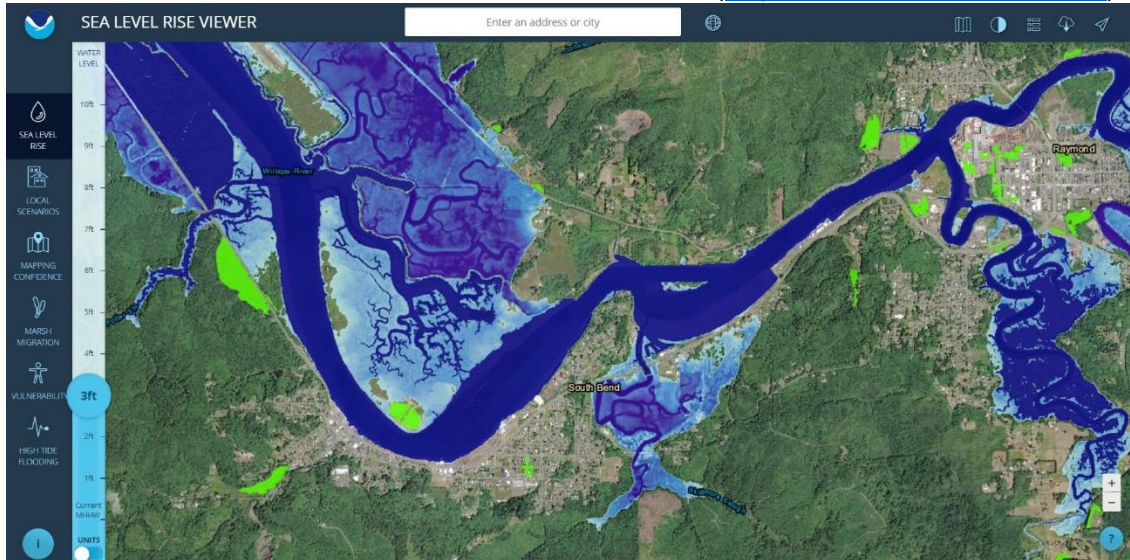
If coastal flooding is a problem now, it will get worse as sea level rises. Sea level rise will cause daily tides to be higher. When storms occur during these high tides, water levels will reach higher on the shoreline. For places where coastal flooding is rare today, it will occur more often. Higher water levels on the coast can damage existing infrastructure, impact coastal ecosystems, and increase impacts from other coastal hazards.

How much will sea levels rise, and when?

The most recent sea level rise projections for Washington State (<https://cig.uw.edu/resources/special-reports/sea-level-rise-in-washington-state-a-2018-assessment/>) were produced in 2018. These projections describe future changes in average sea levels for 150+ locations across Washington State’s coastline. They incorporate the latest science, account for our region’s active tectonics, and assign probabilities to different magnitudes of sea level rise. The table below shows a summary of this information for seven locations in Washington.

| Projected relative sea level change (in feet): continued emissions scenario (RCP 8.5) | | | | | |
|---|------|---|--------------------------------|-------------------------|--------------------------------|
| Location | Year | Current best estimate (50% probability of exceedance) | High end of likely range (17%) | Extreme - unlikely (1%) | Extreme - Very unlikely (0.1%) |
| Long Beach | 2060 | 0.4 | 0.8 | 1.5 | 2.5 |
| | 2100 | 1.3 | 2.1 | 4.1 | 7.8 |
| Aberdeen | 2060 | 0.6 | 1.0 | 1.6 | 2.6 |
| | 2100 | 1.6 | 2.4 | 4.4 | 7.9 |
| Neah Bay | 2060 | 0.2 | 0.6 | 1.2 | 2.3 |
| | 2100 | 1.0 | 1.7 | 3.8 | 7.4 |
| Sequim | 2060 | 0.9 | 1.1 | 1.8 | 2.8 |
| | 2100 | 2.0 | 2.7 | 4.8 | 8.3 |
| Olympia | 2060 | 1.1 | 1.4 | 2.0 | 3.0 |
| | 2100 | 2.3 | 3.1 | 5.1 | 8.5 |
| Seattle | 2060 | 1.1 | 1.4 | 2.0 | 3.1 |
| | 2100 | 2.3 | 3.1 | 5.1 | 8.6 |
| Bellingham | 2060 | 0.8 | 1.1 | 1.7 | 2.8 |
| | 2100 | 1.9 | 2.7 | 4.7 | 8.3 |

Sea level rise will impact each place differently. To see how sea level rise may impact your location, visit NOAA’s Sea Level Rise Viewer (<https://coast.noaa.gov/digitalcoast/tools/slr.html>) Using the numbers from the chart above (or the 2018 Washington Sea Level Rise Projections), move the viewer’s slider to show future water levels on the map.



NOAA's Sea Level Rise Viewer, showing average high tides in South Bend and Raymond, WA with 3 feet of sea level rise.

Why should I care now?

Sea level rise projections show future water levels, but we need to act now to ensure that tomorrow's shorelines and communities are resilient. Planning for sea level rise now can keep your community safe from hazards now and in the future. Adjusting the design of your project to accommodate higher waters can save money later, and can also preserve coastal habitat functions that assist social and ecological resilience to sea level rise.



Our highest annual tides are called king tides. They occur when one or more astronomical events happen at the same time. While King tides are not caused by sea level rise, they do give us a glimpse of the future: today's king tides are comparable to normal water levels in the future. For more information, see Washington Sea Grant's King Tides Program.

[\(http://wsg.washington.edu/community-outreach/hazard-resilience-and-climate-adaptation/king-tides/program/\)](http://wsg.washington.edu/community-outreach/hazard-resilience-and-climate-adaptation/king-tides/program/)

(source: King 5)

What can I do about it?

- Educate yourself:
 - Pay attention to high waters in your area, to see what normal water levels may look like in the future. For example, you can attend a local King Tides Viewing Party (<http://wsg.washington.edu/community-outreach/hazard-resilience-and-climate-adaptation/king-tides/program/>), sponsored by Washington Sea Grant.
 - Learn about the latest coastal hazards science and risks via the Washington Coastal Hazards Resilience Network (<https://wacoastalnetwork.com/>) (this website!).
 - Attend Shoreline and Coastal Planners Group (<https://www.coastalplanners.org/>) meetings or a Coastal Training Program course. (<http://www.coastaltraining-wa.org/>)
- Get involved in local coastal planning:
 - Contact local planners, planning commissions or Marine Resource Committees (Pacific Coast MRCs (<https://wacoasteconomist.com/blog/2019/9/26/north-pacific-coast-mrc-request-for-proposals>) or Straits and Sound MRCs (<https://www.nwstraits.org/get-involved/marine-resources-committees/>)) to share experiences, voice concerns, recommend that public projects account for sea level rise or attend a public planning meeting.
 - Engage with local Shoreline Master Program (<https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Master-Programs>) or Comprehensive Plan (Growth Management Act) (<https://www.commerce.wa.gov/serving-communities/growth-management/periodic-update/>) updates to encourage wise planning for the future.
 - Download the MyCoast app (<https://mycoast.org/wa>) to document storm surge, king tides, changes to your local shoreline, and more. This information is used to better understand coastal hazards and their impacts, while raising awareness among decision-makers and stakeholders.
- Adapt your project to sea level rise:
 - Consider sea level rise early in a project, when new permits are required, during renovations or during repairs.
 - Visit the Washington Coastal Hazards Adaptation Case Studies to see how other people in Washington have adapted to coastal hazards or connect to an expert via the Washington Coastal Hazards Resilience Network



Strategically-placed woody debris protects the drainage canal and Highway 105 in North Cove, WA from high waters (source: Molly Bogeberg, The Nature Conservancy)

This document was produced as part of the Washington Coastal Resilience Project, working to increase the state's capacity to prepare for coastal hazards related to sea level rise. The project was led by the Washington State Department of Ecology and Washington Sea Grant, with funding provided by NOAA Regional Coastal Resilience Grants Program (grant #NA16NOS4730015)