



## Puget Sound Waterfront Homeowner Checklist

### Monitoring Tips for Living in a Dynamic Marine Environment

*Living on the waterfront offers many benefits - and some challenges as well. The marine shoreline is a naturally dynamic place where change is to be expected. Understanding typical coastal processes is an important part of being a waterfront property owner. Knowing what to expect will help you to address issues that might merit further investigation or action. This guide offers an overview of shoreline processes and tips for regular monitoring that will help you to manage your property with confidence.*

### BECOME FAMILIAR WITH YOUR WATERFRONT AND NATURAL COASTAL PROCESSES

Taking time to make regular waterfront observations is the easiest way to become familiar with your stretch of the waterfront. This can be as simple as taking photos from the same spot throughout the year, and possibly over many years. It is a simple way to identify and track changes through time. Not only will this clarify what to expect, but you may notice situations that influence changes in how you manage your waterfront.

For example, erosion is a common concern for many waterfront homeowners. Erosion is a typical shoreline process, both at the toe of the slope and higher on a bluff. Erosion may be caused by single or recurring storm events with large waves, or by smaller, more frequent agents of weathering like rainfall impacts and surface run-off. Walk your waterfront several times a year, in different seasons and weather conditions if possible, to observe the different processes and rates of change. You may observe seasonal vegetation or beach surface changes, and occasional landslides that deposit sediment, trees or other vegetation on the beach. These natural processes provide the material that builds and maintains beaches around Puget Sound. Unless a home is at risk or there is a sudden change to the shoreline with rapid, severe erosion or serious drainage problems, these gradual changes are typical and should not be cause for worry.

Give yourself the tools to best manage your marine waterfront property for the long term. The next pages include tips to guide you as you observe and manage your property to manage your shoreline through time.



Image: Mason CD

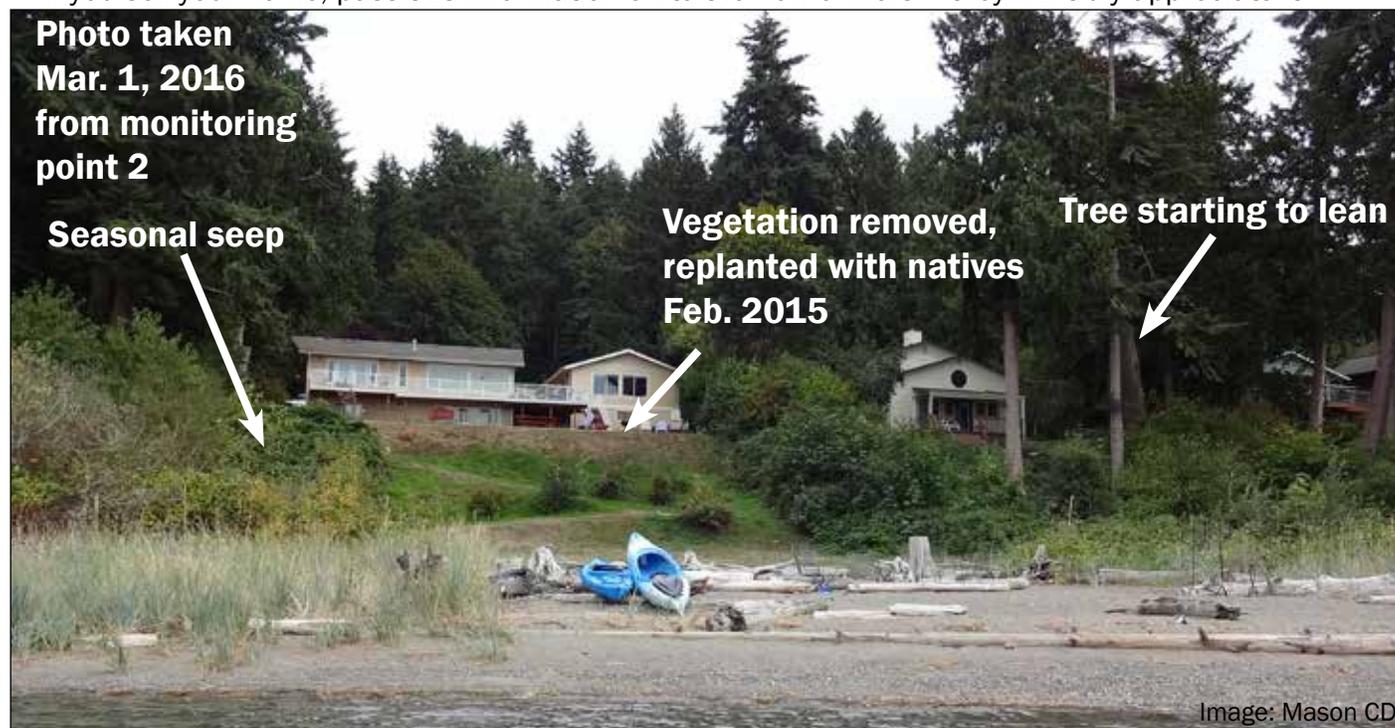
A bulkhead at the toe (bottom) of a bluff won't stop erosion caused by conditions above.



## SECTION 1: CREATE A RECORD FOR YOUR PROPERTY

### TIP #1. KEEP A MONITORING NOTEBOOK OR FILE

- Use a dedicated notebook to record observations about your property's natural and constructed features.
- Keep notes on maintenance and on any major changes you make to your property, including: tree or vegetation removal or plantings, any new construction, and even minor activities such as when gutters were last cleaned, drain lines flushed and checked for leaks, septic maintenance etc.
- Request and keep "as-built" documentation (on-site changes to the original construction) for all projects completed by contractors. This record will be valuable for future reference. Take photos before and after repairs.
- If you receive professional reports from engineers or geotechnical specialists, be sure to keep them with the notebook.
- Create a property management calendar so you will know when it is time for maintenance again.
- Choose a few "photo-monitoring" points, at least one of which is on the beach looking toward the land. Choose stable locations that are easy to find again, so that you can return each year to take pictures. Pick several times each year when you will photograph your property during different seasons. It is also very helpful to take pictures after any major weather or erosion events. Annotate photos with dates and important features.
- If you sell your home, pass this information on to the new owners – they will truly appreciate it.



**Sample Monitoring Photo** Monitoring photos similar to this will help a landowner observe shoreline changes over time. Note the two different approaches to landscape management on these neighboring properties. The property on the left has removed all native plants and replaced them with grass. The property on the right has limbed up the large trees to allow for views of the water while maintaining the native vegetation. Erosion and stability problems are much more likely on the cleared property.



## TIP #2. MAKE A SIMPLE DIGITAL OR HAND-DRAWN MAP OF YOUR PROPERTY

Keep your map simple but useful. Include the information you would want to know if you were just purchasing this property, and wanted to understand the “lay of the land.” Consider aspects of your property that you want to keep an eye on, as well as what resources or investments have already been made on the property. You can either hand-draw to scale or use a digital image and digital drawing tools to capture the various features of your property.

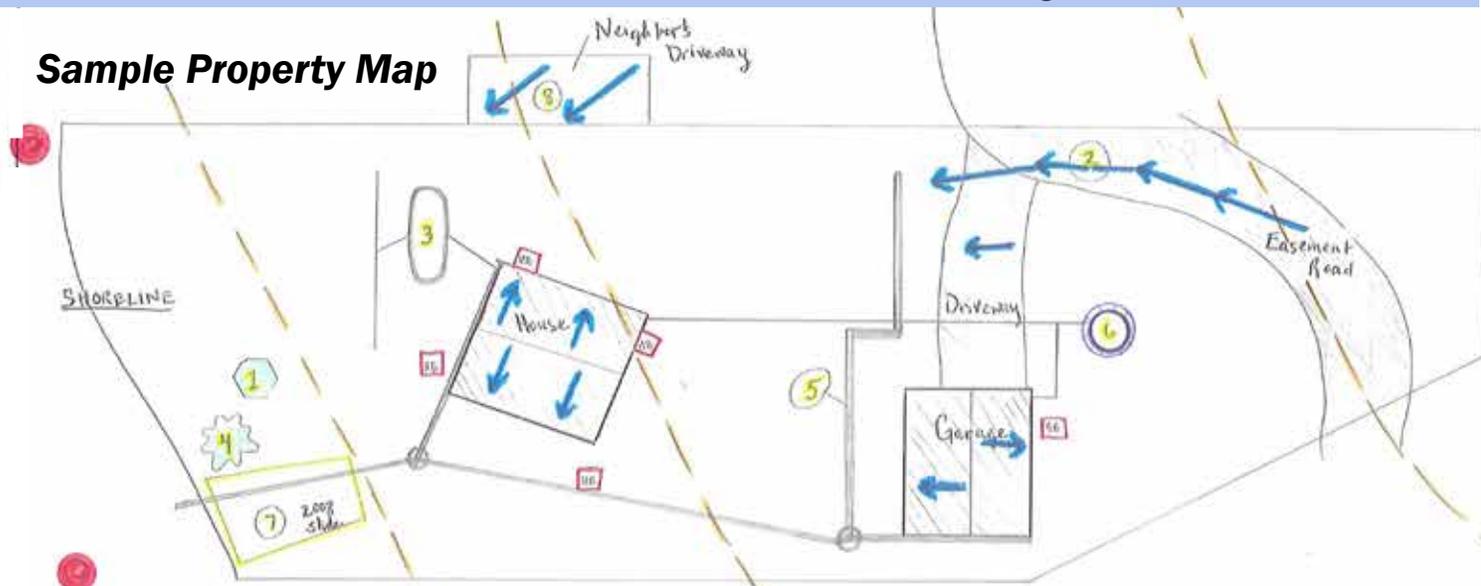
### INCLUDE BUILT FEATURES

- Note the location of hard (impermeable) surfaces that generate stormwater runoff during rainfall (buildings, paved areas, driveways, sidewalks and patios, etc.)
- Identify where the water from these hard surfaces drains and/or collects.
- Include drainage infrastructure such as catch basins, pipes or French drains, downspouts, connections between pipes, outlets, etc. Note depths and types of pipe (solid pvc; perforated pipe, corrugated pipe, etc.).
- Note the location of your septic tank, drainfield, and any connecting pipes.
- Note the location of your well or water service connection and related waterlines.
- Indicate the location(s) of all your hose bibs.
- Indicate the location of any irrigation system lines.
- Mark chosen “photo-monitoring” points so that you can return each year to take a picture.

### INCLUDE NATURAL FEATURES

- Note the location and drainage route of any natural springs, creeks, or seasonal seeps on, adjacent to, or impacting your property.
- Note the height of bluffs and the location and slopes of land leading down to the water. Note the crest and toe of the bluff. Do the same for all slopes on your property.
- Indicate locations of any past landslides or erosion. Add dates associated with specific events.
- If stormwater drains onto your property from beyond your property lines (natural runoff or other), note where this happens, and the route the water takes through your property.
- Choose 2-3 fixed points midway between your home and the top of your bluff/bank for monitoring land erosion (“retreat”). Some homeowners install t-posts, rebar stakes, or other easily-identifiable markers to use as monitoring points. Once a year, measure the distance from these points to the top edge of the bluff. Record changes over time.

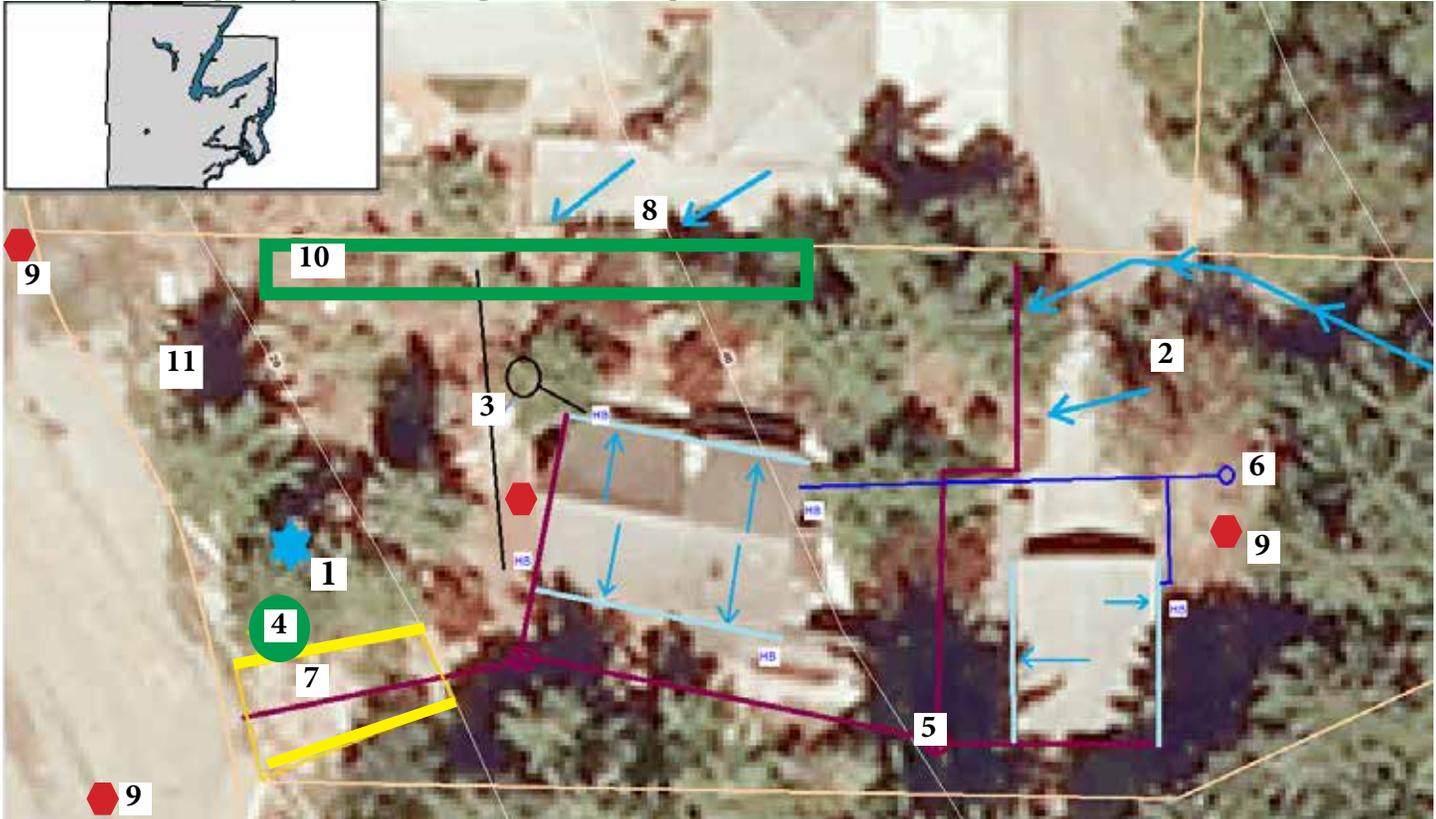
### Sample Property Map



This landowner used numbers and arrows to link to additional information in their shoreline monitoring notebook, elements like where water drains, and where the septic system is located, etc. This is a hand-drawn version of the digital map on the following page.



## Sample Property Map - Digital Example



This example map was created using the County's GIS GeoData, which is available on the County website. To create a similar map, zoom in on your property then select (1) an aerial photo in the legend, (2) 20 ft contours, and (3) the parcels layers. You can also use Google earth to print an aerial image of your property, and then draw on top of that.

### SAMPLE MAP NOTES

1. Seasonal Seep. Area on bank wet from October through early July 2008.
2. Storm water runoff flows down driveway and across property during large rain events. Installed French Drain on downslope side of driveway when it was paved in 1990.
3. Septic tank and system located to west of house. Installed in 1980.
4. Green circle indicates large Douglas fir that tilted out during the winter of 2008.
5. French drain and subsurface drainage used to collect driveway runoff and roof runoff from downspouts on garage and house. Catch basins were installed when French Drain and garage were built. Stormwater is piped to beach in 4" corrugated drainage pipe. Pipe joints are sealed with fiberglass tape. Pipes are checked in October, February and April.
6. Well head and buried waterline. Well was drilled in 1980. 70 feet deep.
7. Yellow line indicates boundaries of the slide that occurred in 2008. Distance from SW corner of house to top of slide was 45 feet after the slide.
8. Runoff from neighbor's property increased when they built their house and paved the driveway in 2008.
9. Red dots indicate points where photos are taken yearly to monitor changes in slope and property.
10. Hose bibs are indicated by HB
11. New area planted with native plants (2010)



## SECTION 2: MONITOR YOUR SHORELINE

Once you have established your notebook or record file, all that remains is periodic monitoring along your waterfront. This section covers what to look for and what to do if you see something worrisome.

### WHAT TO LOOK FOR:

- Possible changes in slope stability.
  - Newly tilting fences, decks, power poles, or trees
  - The sudden appearance of cracks, depressions, or unusual bulges in the lawn or soil landward of a bluff
  - Slumping or settling of soil near a slope/bluff
  - New cracks in concrete building foundations, poured concrete pads/slabs, patios, or in house walls. If outside walls, walkways or stairs begin pulling away from the building, investigate the cause.
  - The stability issues above may occur slowly over time, but if you observe sudden changes immediately contact a licensed geologist or civil (geotechnical) engineer for a site assessment. A broad sweep in the tree trunk suggests slow on-going movement. A kink at the base with a straight upper trunk is more suggestive of movement when the tree was younger.
- New areas of erosion, cracks, or slumps.
  - Note signs of erosion such as bare earth with rills and channels cut into the slope or slumping soil
  - Check if the erosion is caused by leaks or drainage issues. If you can link the erosion to drainage management or plant removal, immediately address these issues. If you cannot identify the cause of erosion, consult a licensed engineering geologist or civil (geotechnical) engineer (experienced in drainage design) to determine the cause and options to address erosion.
- Watch for seeps and springs in your bank during all seasons.
  - Take special note of NEW seeps, springs or saturated ground in areas that have not typically been wet before. Determine if the seeps or leaks are related to drainage system(s) or land use.
  - Instability and landslides tend to take place where certain combinations of sediments occur, usually where layers of sand and gravel overlie less permeable silt and clay layers, stopping groundwater from soaking deeper into the ground. Water collects above the low-permeable sediments, creating weak zones that can erode or slump. While you can't change the geology of your property, you can limit your contributions to shallow groundwater by carefully maintaining drainage collection and conveyance systems.



Image: Mason CD

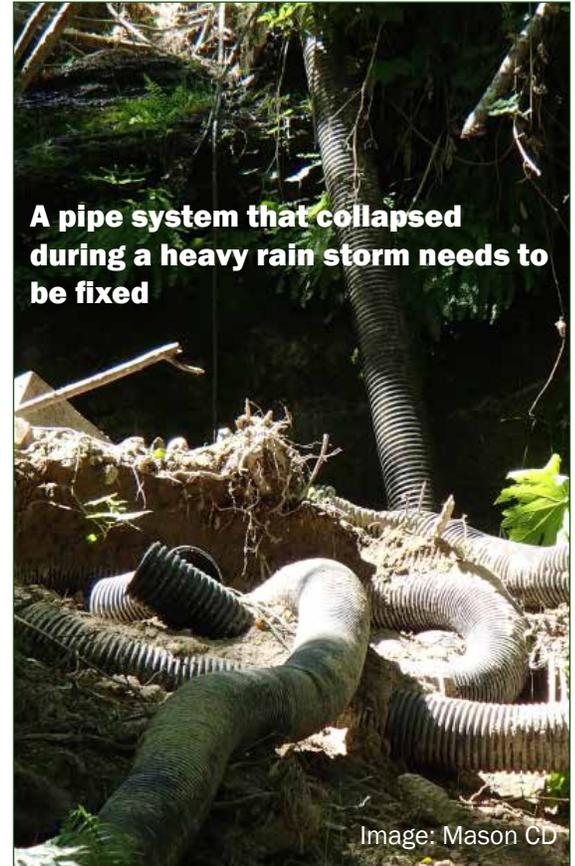


Image: Ohio Dept. Natl. Resources



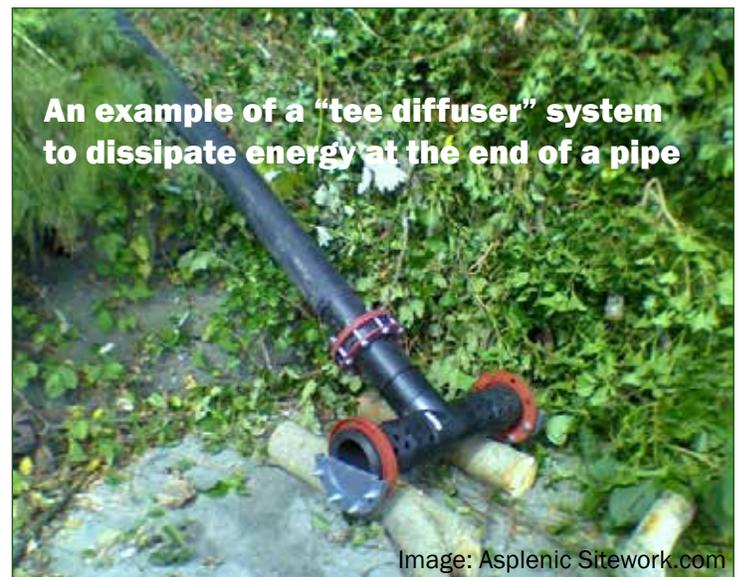
## WHAT TO DO:

- Check drainage systems several times a year. Make sure that all pipe connections are sealed, with no leaks or breaks. Be sure that water collected in drainage systems is piped properly to an outlet near the beach, with an erosion deterrent (energy dispersant) at the outlet (see picture below). Never release piped water at the top or on the face of a bank, slope, or bluff. You can check your drainage system by running water through the system during the dry season, but it is also useful to monitor during heavy rain. Confirm that the amount of water going in equals the amount coming out. Check corrugated pipe even more frequently, as it is prone to failures and cracks as it ages. Check your hose bibs regularly for leaks. Fix any drainage issues immediately.
- Check natural stormwater pathways for sudden changes in the volume of water. These are also places to check for new signs of erosion issues. Respond quickly to stop erosion from becoming a concern.
- Hire professionals to develop drainage plans.
- Check for water level changes in swimming pools, water features, and drinking water wells. Keep an eye on water depth in your well (measure this at the same time each year to check for sudden, unexplained changes in water level). When working with your drinking water well, be sure to follow all protocols provided by the WA State Department of Health - Drinking Water (publication No. 331-428), to protect your water.
- Check and maintain your septic system regularly. The septic tank liquid level should be near the top unless you have had it pumped. Low levels in your tank may indicate that your tank is cracked or leaking into the soil. Be sure your drainfield is functioning properly; wet areas during dry periods could indicate problems that need to be addressed immediately.



**A pipe system that collapsed during a heavy rain storm needs to be fixed**

Image: Mason CD



**An example of a "tee diffuser" system to dissipate energy at the end of a pipe**

Image: Asplenic Sitework.com

*This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement PC-01J223-01 Contract #16-05251 through the Washington Department of Fish and Wildlife. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the Washington Department of Fish and Wildlife, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.*



## SECTION 3: OTHER TIPS AND RESOURCES

- Landslides tend to occur where they occurred previously. Slope features, slope stability maps, local knowledge, and geotechnical site assessments can inform you about the history of landslide activity along your reach of shoreline. Slopes that are steep, lack vegetation, have younger deciduous vegetation (for example, clusters of young Red alder), have drainage problems, or have “benches” (level areas stepping down on otherwise steep slopes) can indicate past instability or potential for future instability.
- Make sure your insurance policy is updated. Some home insurance policies include coverage for risks such as landslides or debris flows, or you can buy additional insurance for this purpose. Call your agent to discuss options such as the National Flood Insurance Program. Adding a policy to a home located above or below a steep slope is one of the best ways to reduce financial risk. Read the fine print to ensure that you are properly covered.
- Keep emergency supplies on-hand and develop a family evacuation plan in the event of a landslide, earthquake, or other emergency.
- Unusual Sounds. If you hear loud or unusual sounds such as low rumbling, groaning, grinding, or cracking sounds, they may indicate landslide movement and or distress to your house or other structures. Quickly evacuate to a safe location; contact emergency management services for assistance.
- Choose professionals experienced in working on shorelines and bluffs. Contact professionals specifically experienced in working with steep slopes and marine shorelines. These complex, dynamic landscapes need to be treated with care. Designing ponds, water features, drainage systems, etc. should be done with the utmost care - or should be avoided altogether.



Image: Mason CD



Image: Mason CD

### ONLINE RESOURCES FOR MORE INFORMATION

- **Managing Drainage on Coastal Bluffs** - [www.ecy.wa.gov/programs/sea/pubs/95-107/intro.html](http://www.ecy.wa.gov/programs/sea/pubs/95-107/intro.html)
- **Shoreline Slope Stability Maps** - [www.ecy.wa.gov/programs/sea/landslides/maps/maps.html](http://www.ecy.wa.gov/programs/sea/landslides/maps/maps.html)
- **Department of Ecology's Landslide Page** - [www.ecy.wa.gov/programs/sea/landslides/index.html](http://www.ecy.wa.gov/programs/sea/landslides/index.html)
- **Shallow Landslide Hazard Forecast System (Department of Natural Resources Landslide Page)** - [www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides](http://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/landslides)
- **Emergency Management, Thurston County** - (360) 867-2800
- **Federal Emergency Management Agency** - [www.fema.org](http://www.fema.org)
- **US Geological Survey Landslide Hazards Program** - [www.landslides.usgs.gov](http://www.landslides.usgs.gov)
- **US Department of Homeland Security** - [www.Ready.gov](http://www.Ready.gov)