



Shore Stewards Guide for Shoreline Living



Funding Provided By Washington Department of Ecology

TABLE OF CONTENTS

Introduction.....	1
Guideline #1 - Use Water Wisely.....	2
Guideline #2 - Properly Care for your Septic System.....	5
Guideline #3 - Safe and Responsible Pest Control.....	9
Guideline #4 - Manage Water Runoff	12
Guideline #5 - Encourage Native Plants & Trees	18
Guideline #6 - Know the Permit Procedures for Shoreline Development.....	23
Guideline #7 - Develop on Bluffs with Care.....	25
Guideline #8 - Use Soft Armoring Techniques When Appropriate	28
Guideline #9 - Enjoy and Respect Intertidal Life While on the Beach and Boating	31
Guideline #10 - Preserve Eelgrass Beds and Forage Fish Spawning Habitats.....	34
Appendix A: Helpful Resources	39
Appendix B – Recommended Resources for Shoreline Landscaping	45
Bibliography.....	47

CONTENT AND EDITING

Jeff Adams—Washington Sea Grant

Mary DiMatteo – WSU Extension Mason County

Erica Guttman – WSU Extension Thurston County

Renee Johnson—WSU Extension Kitsap County

Kevin Long – North Olympic Salmon Coalition

Cammy Mills – WSU Extension Mason County

LaJane Schopfer – Mason County Department of Community Development

Hugh Shipman – Washington Department of Ecology

Bob Simmons – WSU Extension Mason County

Doris Small – Washington Department of Fish and Wildlife

Loretta Swanson – Mason County Public Works Department

Peg Tillery – WSU Extension Kitsap County

Special thanks to the following for the original Shore Stewards concept and booklet:

Don Meehan, WSU Extension Island County Director

Gary Wood, Island County Marine Resources Committee Director

Scott Chase, WSU Extension Island County Shore Stewards

Coordinator

Brittany Stromberg, WSU Extension Island County Shore Stewards

Coordinator (2001-2003)

Island County Shore Stewards website:

www.shorestewards.org

Introduction

The Puget Sound region is a unique and spectacular place to call home. It offers beautiful scenery, ample opportunity for recreation, and wonderful fish, shellfish, and wildlife. It is important to take care of the land and water to protect these qualities we appreciate and to provide crucial habitat for fish and wildlife.

Whether you live directly along the shoreline, or you live upland on property that drains to shoreline and nearby water bodies—if you love and want to protect our waters—this book is for you! Your actions can go a long way toward helping to protect and preserve our way of life here in the Puget Sound.

We hope that your commitment to living respectfully will include following the Shore Steward guidelines set forth in this booklet. Additional resources; including publications, phone numbers, websites, and blogs are located in the appendix to help you find additional information about topics of interest. Thank you for spending your time and energy to learn to become a better steward.



ILLUSTRATION: RESIDENTS OF NEIGHBORHOOD/MINI FOOD WEB Courtesy: Jan Holmes

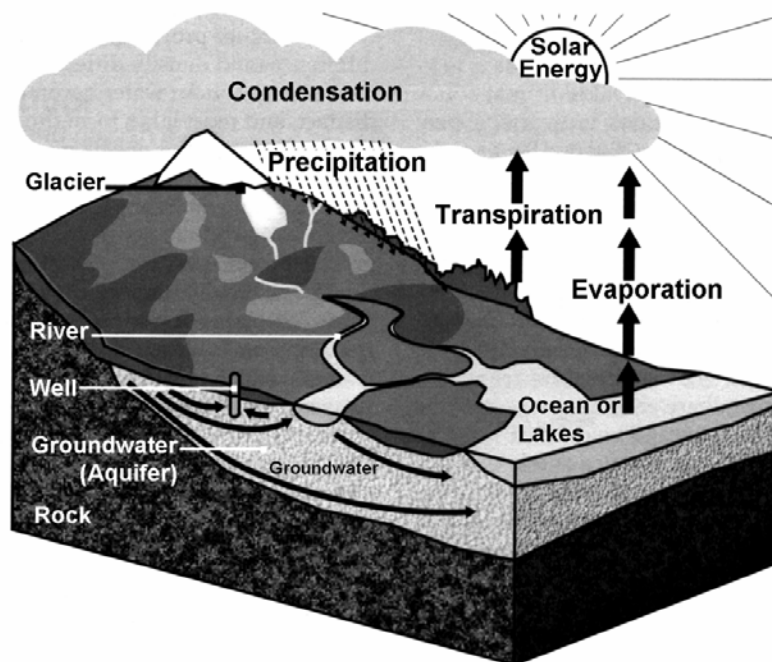
Guideline #1 - Use Water Wisely

Water is a Limited Resource

The water that we pump from wells is recharged (or refilled) solely by the rain or snow that falls on the soil and slowly works its way down into water-bearing zones. These zones are called aquifers. *For more information on the interaction between rainfall and our geology, refer to Guideline #4, Manage Your Groundwater.*

Conserving water is a good idea for several reasons. When you conserve water you ensure that as much water as possible can stay in the natural environment which keeps our streams flowing during dry periods and helps to keep stream temperatures cool. This benefits many organisms including salmon. Conserving water can also help keep a septic system functioning properly since too much water can overload the system. Using less water in your home can also equate to lower utility bills.

ILLUSTRATION: THE HYDROLOGIC CYCLE Source: Washington Lakes Protection Association



Ways to Conserve Water

There are many things you can do to conserve water, both inside and outside your home.

In Your Home:

- ◆ Use a high efficiency washer, which typically use 24 gallons of water per load, compared to the 40 gallons used by a standard machine.
- ◆ Use dishwashers and washing machines only with full loads.
- ◆ Check toilet for leaks by placing two or three drops of food coloring in the toilet reservoir and checking the bowl (without flushing) for the appearance of color.
- ◆ Install a low-flow or ultra-low flow toilet which use 1.6 gallons per flush, compared to 3.6 gallons per flush, saving 14,000 gallons per year for a family of four. Or place a half-gallon plastic bottle filled with pebbles in the tank. Be sure the bottle doesn't interfere with the flushing mechanism. Do not use a brick in the tank as bricks may break down and pieces can get caught in the mechanical parts of the toilet.
- ◆ Fix leaky faucets. Even a small drip can easily waste 20 gallons of water each day.
- ◆ Install a water-efficient showerhead and take shorter showers.
- ◆ Turn off the water while brushing your teeth.
- ◆ Use a broom to clean walks and driveways, not a hose.
- ◆ Install a water meter if you don't have one, and keep track of your water usage.

In Your Yard and Garden:

- ◆ Consider using Low Impact Development (LID) techniques that require little or no watering once plants are established; retain native soils and vegetation as much as possible; use native plants that typically require less care and water.
- ◆ Harvest rain water for your watering needs. Water in early morning or evening and avoid watering when it is windy to decrease water loss from evaporation.
- ◆ Use a soaker hose or drip irrigation system for garden beds.
- ◆ Water less frequently and for a longer duration. Light watering can encourage shallow root growth, making plants less drought tolerant.
- ◆ Lawns west of the Cascades only need about one inch of water per week during hot, dry weather. Apply no more than 1/2 inch of water per hour depending on type of soil and its absorption rate.
- ◆ Weekly watering should be sufficient for most plants during the summer.
- ◆ Place 2-4" inches of mulch around plants and trees to reduce evaporation and minimize watering requirements. Keep mulch away from stems and trunks.
- ◆ Monitor your watering to prevent runoff from occurring. Arrange sprinklers so that they don't water the street, the driveway or sidewalks.
- ◆ Use only hoses with a shutoff nozzle.

Typical Water Consumption

In this country, the in-home use of water averages about 70-100 gallons per day, per person. That's 29,000 to 36,000 gallons per year per person. This does not include lawn, garden and other outdoor uses of water. So where does all this water go?

Activity	Gallons Used
Flushing toilet (conventional) per flush	3.6
Showering per shower	17.2
Bathing per bath	24
Brushing teeth per person	1
Washing dishes (by hand) per load	30
Dishwasher per load	9.3
Washing machine per load	40
Cooking meal per person	3
Washing car per car	20
Watering lawn/garden for 30 min.	240

Did you know? A conventional toilet is perhaps the single biggest water guzzler, accounting for 27% of the water used in the average home.

Intrusion (Salt Water Intrusion)

As the population increases, the demands placed on our groundwater resources also increase. As a result, certain areas around Puget Sound (Jefferson County and areas of Kitsap County) have significant saltwater intrusion problems and other areas are at risk. Some wells are at risk of becoming unusable.

Seawater intrusion is the underground flow of salt water into wells and aquifers. It occurs near a coastline when fresh water is withdrawn faster than it is replenished. Seawater intrusion can increase the salt content of the well water to unsafe levels for human consumption.

Guideline #2 - Properly Care for your Septic System

How a Septic System Works

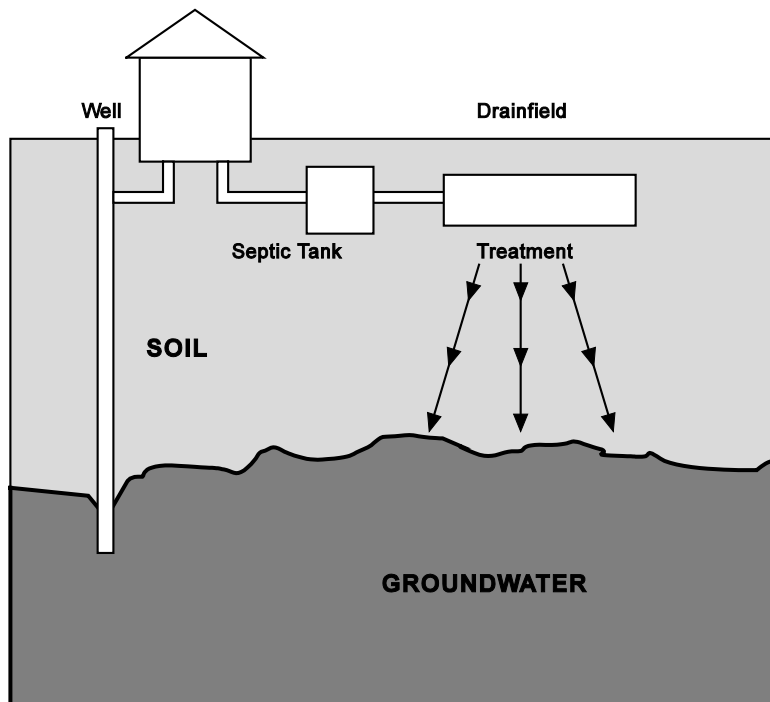
Household wastewater flows into the septic tank, where heavy solids settle to the bottom forming a *sludge layer*, while grease and lighter solids float to the top forming a *scum layer*. As additional wastewater enters the tank, the wastewater between the scum layer and sludge layer is pushed through other components of the tank and eventually flows or is pumped out to the drainfield for final treatment through the soil.

The scum and sludge layers accumulate and remain in the tank, where bacteria work to break them down to some degree. These solids cannot be fully digested so they will eventually fill up the tank and need to be pumped out so they don't get into the drainfield.

Maintenance and Repair Keeps us Healthy and Protects Our Waters

Poorly maintained or failing septic systems can lead to contamination of our beaches and waterways. Keeping your system in good repair not only saves you money in the long run, but prevents pollution that causes closure of shellfish beds and swimming beaches, an increase in aquatic lake plants, and other public health and environmental concerns.

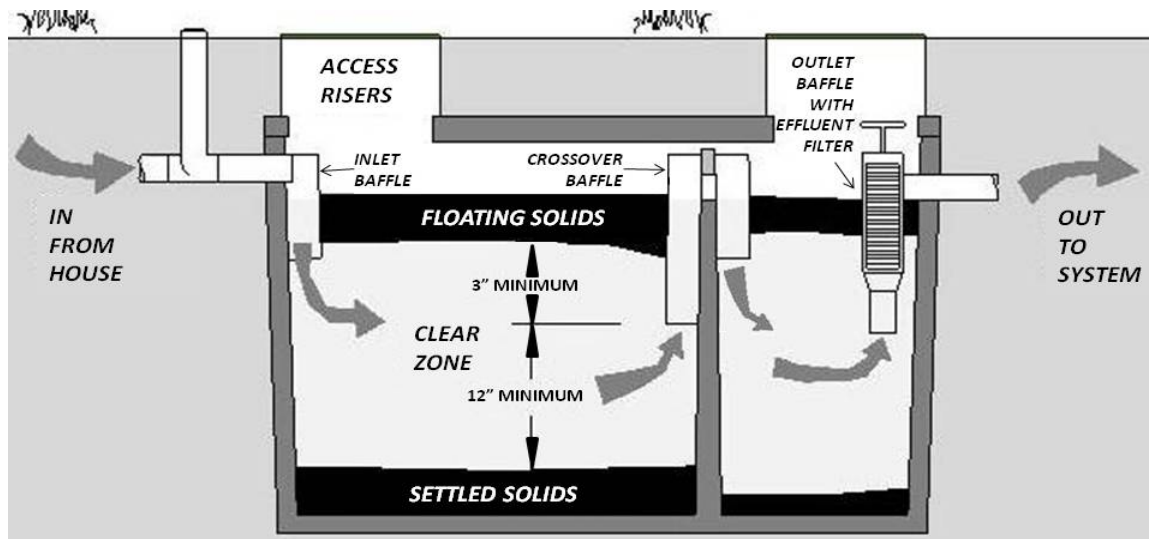
ILLUSTRATION: THE SEPTIC TANK AND DRAINFIELD Source: Island County Health Department



Maintaining Your Septic System

Inspect the scum and sludge layer levels inside the tank once a year to monitor when it should be pumped and to see if it is functioning properly. Pumping should be done whenever the bottom of the scum layer is within 3 inches of the bottom of the crossover baffle or the top of the sludge layer is within 12 inches of the bottom of the crossover baffle. Family size and use of the system may require the pumping frequency to be more or less often. Keep a schedule of tank maintenance and pumping.

ILLUSTRATION: A SEPTIC SYSTEM Source: Mason County Public Health



Tank and Drainfield Location

The location of your tank and drainfield are important. If you don't know where your septic system is, contact the county health department to request a copy of your records.

Water runoff from your roof gutters, downspouts, patios and driveways should be diverted away from your septic tank drainfield areas because excess water can flood the soil, reducing its ability to adequately remove contaminants from wastewater. If you have a water softening system, you should also avoid discharging water from the system into the septic tank or onto the drainfield area.

Drainfield and Reserve Area:

- ◆ Do not build any structures, such as sheds or greenhouses, over your drainfield.
- ◆ Do not pave on top of your drainfield or place non-permeable materials over it.
- ◆ Avoid driving over or parking on the drainfield and reserve drainfield areas; this can lead to broken pipes and compacted soils.

- ◆ Plant shallow-rooted native plants or drought-tolerant grasses over your drainfield, and do not water or fertilize in this area.
- ◆ Trees should not be planted any closer to the system than twice the branch reach of the mature tree. Roots can break the pipes and possibly enter the septic tank. Shrubs and hedges should be avoided for the same reason. Planting vegetables (especially root vegetables) over the septic tank and drainfield is not recommended.
- ◆ Do not burn brush piles on your drainfield.
- ◆ Do not locate a rain garden on or near your drainfield and reserve area. Contact your local jurisdiction for setback constraints.

Septic System Failure

So much of the septic system action takes place underground that it can be hard to tell if your system is doing its job. The following list contains some potential warning signs of a failing septic tank:

- ◆ Water pooling in your yard or accumulating elsewhere downhill from your septic tank or pump chamber.
- ◆ Moist or mushy areas in your drainfield area.
- ◆ Foul odors.
- ◆ Dark grey or black stains in soil of the drainfield or surroundings.
- ◆ Poorly flushing or backed-up toilets and sinks.
- ◆ Algae growth on subsurface drainage pipe outlet, bulkhead or as visible seeps on the beach.

Seek advice if you notice any of these warning signs. Help is available from your local health department. Your local conservation district may also be able to help you explore your options or know about special loan programs available for septic repairs in your area. Do not delay; repairs can be less costly than replacement, and human and environmental health are at stake.

A failed septic system along the shoreline can contaminate the intertidal area with bacteria (fecal coliform) and other pollutants. This can make shellfish from these sites inedible and nearby waters unhealthy for wading or swimming.

What Should Go into Your Septic System

Only three things should go into your septic system on a regular basis—human waste, toilet paper and water from everyday bathing and washing activities. Reading product labels is critical in knowing whether something can be safely flushed or washed down into your septic system.

Non-toxic household cleaners, dish washing products, laundry soaps, etc. are widely available and are not harmful to your system when used in moderation. Products with a “danger” warning should not be used. Instead try using different cleaning methods. For recipes for non-toxic household cleaners, see “Back to Basics” available for free download through the Washington State University website. Liquid laundry and dishwasher soaps should be used whenever possible to avoid clogging baffles and pipes.

TIP: If you are using your washing machine, try to do only one load of laundry per day. It’s wise to limit the amount of water put into a septic system and spread it out through the day and week. Typical water use is approximately 70-100 gallons per person per day. More than that can overload your system. *For more pointers on water conservation, refer to Guideline #1, Use Water Wisely.*

What Should NOT Go into Your Septic System

Some items do not break down easily in the septic tank. These items should be thrown into the garbage instead of flushed. If not disposed of properly, they can fill up the tank or harm the beneficial bacteria that keep your septic system functioning properly. Likewise, garbage disposals can also cause your tank to fill up more quickly and require more frequent pumping. Nutrients from the pulverized food can also contribute to dissolved oxygen problems in nearby water bodies. It is important to note that most septic systems do not remove nutrients very effectively.

Some common household products can also harm septic tanks. These include: disposable cleaning wipes (even those that say they are flushable), facial tissues, paper towels, disposable diapers, baby wipes, rags, cat litter (even the flushable kind), plastic, coffee grounds, grease, cooking oils, newspapers, cigarette butts, matches, sanitary napkins, tampons and/or applicators, dental floss, hair from hairbrushes, and water softener discharges.

In addition to these household items, dangerous chemical products can also harm the drainfield bacteria and septic tank. These include: gasoline, motor oil, paint (both latex and oil based), paint thinner, solvents, fertilizers, pesticides, pharmaceuticals, and lye-based drain openers.

If your pipes or toilet get clogged, do not use lye based drain openers. These kill the beneficial bacteria in your tank. Instead, try a solution of a half cup of vinegar mixed with a half cup of baking soda. Pour it down the drain, wait 20 minutes, and then rinse the mixture down the drain with boiling water. If this does not work, a “snake” is the

best way to clean your pipes. To prevent clogged drains, try adding a micromesh screen to your drains to eliminate much of the material going down the drain.

Additionally, do not clean paintbrushes in your sink. Thinners and solvents can be re-used and then recycled through your local solid waste or household hazardous waste facility. Paintbrushes may be wrapped in plastic and frozen in between uses. If you used latex paint, paintbrushes may be washed out over your lawn, but do this as far as possible from the shoreline and stormwater drains. If you have a large amount of paint to rinse out, rinse over a bucket and take the diluted paint to a hazardous waste facility.

Septic Tank Additives

Do not waste your money. There are chemical additives on the market that claim to improve the “health” of your system so you won’t need to pump as frequently. These chemicals are costly and unnecessary. Although they will probably not hurt your system, they will not help it. The enzymes and bacteria present in human waste are the only additives necessary to keep your system functioning properly.

Guideline #3 - Safe and Responsible Pest Control

Use Pesticides or Herbicides? Use Common Sense!

Most pesticides and herbicides are synthetic chemicals that may have harmful effects on non-target plants and animals, including pets, humans, and some beneficial insects that are desirable for pest control. Even some of the ‘safer’ alternatives can be harmful to the environment. Many are slow to break down and may end up contaminating our water supply. You can eliminate or reduce the use of dangerous chemicals and still control unwanted plants or pests by using the following methods.

Tips to Limit Pesticide Use:

- ◆ Incorporate northwest native plants into your landscape. Native plants create beautiful, beneficial & low maintenance gardens. They seldom need pesticide or fertilizer and many require little or no extra watering once established.
- ◆ Encourage habitat for beneficial organisms. Native plants create a welcoming environment to beneficial insects and animals. These insects provide pollen and nectar from a variety of plants throughout the growing season.
- ◆ Healthy soil, healthy garden. According to Washington State University, healthy plants that are attacked by pests produce chemicals that attract beneficial insects. Keep your plants healthy by giving them compost and mulch. Composts will boost soil health and microorganism populations which will help create a vibrant soil ecosystem and healthy plants in your garden.

- ◆ Try to tolerate some pests. Plants can bear some pest damage. Insecticides can often harm the soil microorganisms needed for healthy soils and the beneficial insects that are predators to garden pests. For almost every pest there is another organism that preys on it. By using some “broad spectrum” pesticides you may be killing the natural predators of the pest.
- ◆ Use safe and effective alternatives. Horticultural oils, insecticidal soaps and the bacteria *Bacillus thuringiensis* (Bt) are sometimes referred to as “soft pesticides.” They do less damage to beneficial insects.
- ◆ Always follow instructions. When using any pesticide product, follow the directions carefully and use them only when they are appropriate. Even then, use them sparingly.
- ◆ *For more information on the benefits of native plants, please refer to Guideline #5, Encourage Native Plants and Trees.*

Weed Control

- ◆ Mulch garden paths and flower beds. Mulch controls weeds, conserves water and adds organic material to the soil over time. Wood chip mulch and compost are a good combination,
- ◆ Hand-weed vegetable beds. A stirrup or scuffle hoe is an effective and efficient tool for weeding between vegetables. Remove all weeds before they go to seed.
- ◆ In areas that are vulnerable to weeds, out-compete the weeds by planting native trees, shrubs and groundcovers. You will eliminate the weeds and beautify your landscape. Contact the WSU Extension Office for a list of native plants. Do not expect to eradicate weeds completely. Do keep a watchful eye for noxious weeds such as knotweed. Knotweed can take over your shorelines. Contact WSU Extension for more information or if you think you may have knotweed on your property.

Slug Control

- ◆ Make your own slug trap by burying a bowl of beer so that the rim is level with the ground. Watch the slugs crawl right in!
- ◆ Hand-pick slugs at night when they are active.
- ◆ Keep the garden free of debris like leaves and grass clippings (home to slug eggs).
- ◆ Keep grass near and around the garden trimmed.
- ◆ Avoid heavy ground covers near susceptible plants.
- ◆ Use iron phosphate instead of metaldehyde, which is harmful to dogs and cats.

Disposing of Pesticides

When you switch to safer pesticide alternatives and discover unused pesticides around the house or garage, remember all pesticides are considered hazardous waste and must be disposed of at a hazardous waste site. In Washington it is illegal to dump them in the trash or down the drain. For more information on hazardous waste, contact your local county solid waste department.

Lawns

Many of us have a love affair with vast green lawns. But our lawns have become huge consumers of water, fertilizers and pesticides and a significant source of water pollution from runoff. One solution is to reduce the size of your lawn by replacing grass with native plants that require less water than lawns. It is especially beneficial to create a buffer of native plants along your shoreline, not only to reduce erosion but to reduce pollutant runoff as well.

There are a number of things you can do to minimize fertilizer and water use, thus reducing the cost and amount of labor involved maintaining your lawn. Healthy lawns start with healthy soils. Use a mulching mower, compost lightly once a year where needed, aerate soils, and leave grass clippings on the grass to build soil nutrient reserves and biodiversity.

Smart Fertilization

The methods above should go a long way in making your lawn beautiful. Apply organic or time-released fertilizer sparingly no more than twice per year. May and September are the recommended times. Avoid fertilizing more than 24 hours before forecasted rain. These measures ensure that fertilizers stay on your lawn instead of washing into the water. September is the best month to fertilize if you only choose a once a year fertilizing plan. Never use weed and feed type products on lawns.

Dangers of Over-fertilizing

Using too much fertilizer may pollute surface and groundwater, as rain or over-watering washes the soluble fertilizer off the lawn. Overuse of fertilizers causes thatch build-up (a naturally maintained lawn rarely has a thatch problem) and the reduction of earthworms and soil microorganisms. On the shoreline, over-fertilization may also contribute to algae blooms and adversely affects important nearshore plants such as eelgrass because it adds excess nutrients to the ecosystem. *For more information on the role of eelgrass in a healthy nearshore ecosystem, please refer to Guideline #10, Preserve Eelgrass Beds and Forage Fish Spawning Habitat.*

Did You Know? *Non-point pollution* comes from many small, widespread sources such as excess pesticides and fertilizers or failed septic systems. Nitrates from fertilizers, manures and some pesticides leach through the soil and may contaminate groundwater. *For more information on non-point pollution and water quality, please refer to Guideline #4, Manage Upland Water Runoff.*

Guideline #4 - Manage Water Runoff

Groundwater and Surface Water

Surface water is water that flows across or “ponds” on the ground’s surface. It can result from rainfall or irrigation practices. Groundwater is simply rainfall or surface water that has infiltrated, or soaked into, the soil.

Surface water volumes and flows can be large, especially after heavy rainfall. At such a time, you may have noticed a thin layer of water running over smooth areas such as parking lots, roofs, driveways and large expanses of lawn. This surface water runoff is known as stormwater. When groundwater and surface water are not properly managed, a number of problems can result including:

- ◆ The more hard surfaces we have (impervious areas), the more rainfall runs off our land instead of soaking in (infiltration). This can result in reduced drinking water supplies, smaller wetlands and increased runoff.
- ◆ Increased runoff means more stormwater leaves our property at a faster speed, and that can lead to flooding, erosion, excessive sediment deposits, property damage and habitat destruction.
- ◆ Stormwater can pick up pollutants as it runs across our lawns, driveways and other impervious areas. These pollutants can reduce and impair water quality in our lakes, streams, rivers, wetlands and marine waters.
- ◆ While infiltration is usually desirable, infiltrating in the wrong place can create on-site septic system problems, flooded crawlspaces, and unstable slopes.

The good news is there are many simple ways to properly manage water on your property to minimize water flooding and erosion problems. Be sure to check with your local Department of Community Development or Public Works to see what is required for new development, or for help with solving existing concerns. Other local resources for help with existing problems include the Conservation District and WSU Extension.

LOW IMPACT DEVELOPMENT

Low Impact Development (LID) is one approach to managing stormwater that can help efficiently and effectively manage stormwater and protect water resources. The goal is to mimic natural processes, thereby preserving or restoring the natural hydrology of watersheds. Key LID strategies include:

Conservation Measures

- Maximize retention of native forest cover, or revegetate if already cleared.
- Protect native soils that drain well, and restore the draining capacity of soils compacted during construction.
- Protect topographic site features that slow, store, and infiltrate stormwater.
- Protect natural drainage patterns and features.

Good Site Planning

Study your property before you build, watching how water flows under different rain events. Note where high water tables, springs, sloughing or erosion may exist.

- Place buildings and roads on well drained soils away from critical areas.
- Minimize impervious surfaces and completely disconnect them from the stormwater system (zero effective impervious surface area).

Use LID Practices, if Practicable

- Bioretention cells or swales (also known as rain gardens)
- Pervious pavement
- Amending soil with compost
- Vegetated roofs (also known as green roofs or eco-roofs)
- Minimal excavation foundations
- Rooftop rainwater harvesting
- Dispersion

Education and Maintenance

- Understand proper operation and maintenance
- Ensure that maintenance occurs

Low Impact Development Practices for Your Property

Low impact development can attractively and efficiently offset some of the problems of stormwater runoff. If you decide that you would like to implement low impact development on your property, be sure to first have your site assessed to see how stormwater is moving through the site, and have an evaluation of other site characteristics such as topography, soils, vegetation, and critical areas.

Contact the county public works or community development departments to determine if any county codes apply, and who may help you with a site assessment. Once a site assessment has been completed, the best LID practices for your site can be determined. Following is a list of common LID practices. Please note that not all practices are advised, or are practical, for every site.

Envision LID Practices on Your Property

- Conservation - Maybe your home has a smaller footprint, or shares a driveway with your neighbor, and much of the native vegetation has been preserved.
- Rain Gardens - Sometimes a LID technique can be as subtle as a swath of vegetation in a small depression that captures and filters stormwater runoff from your driveway or patio.
- Pervious Pavement - Perhaps your sidewalk doesn't look quite like a typical concrete sidewalk. Or you may park on a driveway that isn't asphalt. Instead of impervious materials, the surfaces are *permeable pavement*, which allows water to infiltrate to the ground beneath.
- Amending soil with compost - Soil amending is an important function of LID. You add compost to soils disturbed during construction to restore the soil's health and its ability to infiltrate rainwater. If you have poor soils at your existing home, be sure you've amended them to store and infiltrate water.
- Vegetated roofs (also known as green roofs or eco-roofs) - Your garden shed is designed with a green roof instead of shingles to help reduce pollutants and slow down roof runoff.
- Minimal excavation foundations - Another invisible LID technique uses *alternative building foundations* composed of driven piles and a connector at or above grade. This practice eliminates the need for extensive excavation and reduces soil compaction.
- Rooftop rainwater harvesting - Maybe you use a rain barrel next to your home acting as a *rooftop rainwater catchment system*. You use this water in your garden and are conserving water as well!
- Dispersion - You have taken care to not collect and concentrate stormwater, but manage it in small catchment areas where it can more readily infiltrate.

A word of caution: If you live on a shoreline bluff, great care should be taken when collecting and redirecting runoff. Saturation of soils can lead to landslides and slope failures. Seek professional advice regarding drainage methods. For more information on stormwater and bluffs, see the Department of Ecology's "Managing Drainage on a Bluff" website.

When to Avoid LID Practices

Low impact development practices that infiltrate surface water into the ground (rain gardens, and pervious pavement) are not advised in some situations, for example where soils have low permeability, or in close proximity to on-site septic systems.

Low impact development practices that infiltrate surface water into the ground (rain gardens, pervious pavement, and dispersion) are not recommended near bluffs, unstable or eroding slopes and shoreline areas. In these cases, remove the water by way of tightlines rather than infiltrating. A tightline is a continuous length of pipe used to transport water down a slope that is steep or susceptible to erosion. Tightlines are likely to require a permit and should not be used unless there is an existing or potential drainage-related problem on a slope. We highly advise that you seek professional advice to determine the need, as well as for design and construction.

Tightlines to the Beach

If your groundwater and/or surface waters are tightlined to your beach, it is very important that these lines are properly designed, constructed, and maintained. It is important to make sure that pollutants do not enter the tightline as they will be flushed directly into the water. The tightline pipe material has to be sufficiently strong to withstand the elements, anchored securely to the bluff, and not perforated. Water from a tightline should never be discharged at the top or middle of a slope as severe erosion can occur.

It is also very important to carefully consider the discharge point location. High tides can create pressure and delay the release of flow from a tightline if there is little difference in elevation (low-bank properties). A dispersion device or method should be used at the discharge point to reduce energy and prevent beach erosion. Finally, you should be able to inspect the line to ensure that it remains securely fastened and that there are no leaks. Perform maintenance immediately to ensure your bank stability is protected.

Again, consult the County regarding current regulations and resources that can help with site assessment, design and construction.

TIP: Inspect your tightline and its discharge frequently, especially after a major storm or earthquake. If there is a failure, severe erosion can occur over a very short period of time.

Non-Point Pollution and Water Quality

Stormwater can pick up a nasty assortment of pollutants as it flows across the land and into our lakes, streams, rivers, wetlands and marine waters. This is called non-point pollution. Stormwater transports a mixture of pollutants such as petroleum products, heavy metals, animal waste and sediments with the following results:

- ◆ Pollution carried by stormwater has harmed virtually all urban creeks, streams and rivers in Washington State. *This region has numerous locations where our lakes, streams, rivers and marine waters do not meet state water quality standards.*
- ◆ Stormwater is *the leading contributor to water quality pollution*. The primary pollutants of concern transported by stormwater are fecal coliform, nutrients, sediments, and in some locations heavy metals and petroleum products.
- ◆ Two species of salmon and bull trout are threatened with extinction under the federal Endangered Species Act. *Loss of habitat* due to development and concerns related to stormwater pollution are both contributing factors.
- ◆ Shellfish harvest at many beaches is restricted or prohibited due to pollution. Stormwater runoff can contribute to these closures.

We all play an important part in managing non-point pollution. Many of the LID approaches and techniques already listed help to prevent polluted runoff. Below are some other ways you can help.

Prevent Polluted Runoff:

- ◆ Maintain your car or truck. Never dump anything down a storm drain – it does not go to a treatment plant! Storm drains and ditches will eventually drain to a stream, wetland, beach or aquifer (your drinking water). Always recycle used oil, antifreeze, and other fluids. Fix oil leaks in your vehicles. Get vehicle emissions checked and repaired. Buy a low emission vehicle.
- ◆ Avoid storing machinery, equipment or substances outside or in areas where pollutants can leak into the ground and surface waters.
- ◆ If you wash your car or boat at home, wash it on your lawn using a mild, phosphate-free soap, (NOT over the septic system or drainfield and NOT on pavement or boat ramps). Or wash your car at a commercial car wash.
- ◆ Drive less. Leave your car at home at least one day each week and take a bus, carpool or bike to work. Combine errands when you drive. Fewer vehicles on the road mean less emissions and contaminants in runoff.
- ◆ Cut down on fertilizers, pesticides and herbicides. If you use these chemicals, follow directions and use them sparingly. Don't fertilize before a rainstorm. Consider using organic fertilizers. Reduce watering and let your lawn go dormant in the summer months; it will rebound in the fall with a little care. Compost or mulch lawn clippings. Preserve existing trees or plant new ones. Plants and trees can help manage stormwater.
- ◆ Remove part or all of your lawn. Lawns require a lot of watering, mowing and caring. Replace part of your lawn with native, drought-resistant plants. Add compost to

planting soil and dress it with mulch to improve plant growth and reduce stormwater runoff.

- ◆ If you are on a septic system, maintain the system. Septic systems require regular inspections, maintenance, and pumping, or they will fail, which can lead to costly repairs and pollution of nearby lakes and streams. Inspect your system regularly and have it pumped when needed.
- ◆ Pick up after your pets and keep animals out of streams. Pick up pet waste and properly dispose of it by putting it in the garbage. Also, make sure fences and other structures keep cows, horses and other animals out of streams. Compost manure in a designated area so that it does not wash off into nearby waterways.
- ◆ Reduce impervious surfaces at home and increase the vegetated land cover of your property. Impervious surfaces include your roof, driveway, patios and lawn. Reduce rooftop runoff by directing your downspouts to vegetated areas, and not to the storm drain on your street. For your driveway and patios, consider putting in permeable paving or patterns of cement and brick that allow water to filter through it.
- ◆ Support your local storm or surface water program. Programs to maintain a community's stormwater system, prevent flooding, and protect natural resources may cost money in the short run but save money for damages to public and private property and help protect water quality in the long term. Take advantage of opportunities to educate yourself and your family about your local watershed. Consider volunteering for stream restoration or other local volunteer projects.

Concerns about Excess Groundwater and Surface Water

Prevention or reduction of surface water runoff is often the least expensive approach to reducing drainage problems. However, it's important to remember that drainage issues are site specific. If you have concerns about excess groundwater or surface water on your property, contact your local planning department. *For more information on site drainage issues on a bluff, please refer to Guideline #7, Develop on Bluffs with Care.*

Landslides on Your Property

If your property is on a bluff, knowing the geology of the land is important to help you determine how best to manage the surface water and groundwater to prevent landslides. Vegetation is also a critical element that effects slope stability as fibrous roots can "knit" soils together at a bluff or on a bluff face. *For information on using native plants to control erosion on a bluff, please refer to Guideline #7, Develop on Bluffs with Care.*

With development, changes can occur in the volume and location of surface water runoff that can significantly change the potential for landslides. Our region's natural

geology makes some areas especially prone to landslides. The resulting combination of increased water runoff from development and naturally unstable soils can be disastrous.

The Puget Sound basin's geology has been heavily influenced by glaciation, which has left varying soil layers. These layers include a weathered zone (including topsoil), and thick deposits of sand, gravel, and glacial till, commonly called hardpan. In addition to flowing over land during heavy rains, rainfall and surface water infiltrate the soil, becoming groundwater, which often accumulates or "perches" above the glacial till or less permeable clay layers. Water that accumulates above the impermeable layer may then flow laterally (or in a side direction) until it "daylights" as seepage on the slope face. This water can act as a soil lubricant and can cause the upper layer to slide on top of the clay layer, resulting in landslides.

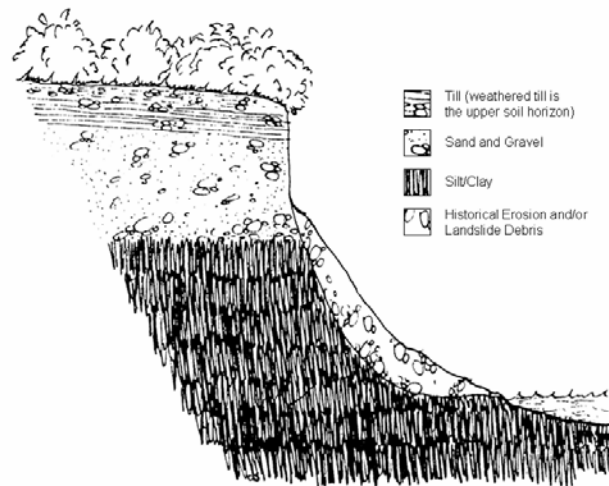


ILLUSTRATION: COMMON SOIL LAYER SEQUENCE ON COASTAL SLOPES Source: Department of Ecology, *Surface Water and Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners*

Guideline #5 - Encourage Native Plants & Trees

The Role of Native Plants

On shorelines, keeping one's property as "natural" as possible has many advantages. Maintaining trees, shrubs and groundcovers slows water runoff and traps pollutants. Plants capture large quantities of water during rainstorms, thereby helping reduce potentially damaging runoff and landslides. The root systems of plants, especially trees and shrubs, prevent erosion by binding layers of soil together. Mature vegetation provides shade to the beach below, enhancing habitat for salmon and other marine wildlife, and leaves and insects drop off trees into the water, providing food for young salmon. *For information on using native plants to control erosion on a bluff, please refer to Guideline #7, Develop on Bluffs with Care.*

Advantages of Using Native Plants in Your Landscape

- ⤴ Native plants are well adapted to our climate, insects, and diseases, so don't require much maintenance once established.
- ⤴ Native plants seldom require fertilizers or pesticides.
- ⤴ Once established, native plants properly sited generally require no watering.
- ⤴ Wildlife is adapted to native plants and depends on them for food, cover, and breeding places.

Overhanging and Fallen Trees

Trees that overhang the beach or have fallen downward onto the beach protect embankments from wave action and can help retain soils and provide vitally important shade, shelter, and insect food for fish and other marine life. Some downed nearshore trees may live for a number of years. Leave them if you can. Even dead trees are useful, serving as "sediment traps" to build beaches or provide more buffer at the water's edge. If you need to, prune fallen trees instead of removing them. *For more information on the importance of shade trees to forage fish, refer to Guideline #10, Preserve Eelgrass Beds and Forage Fish Spawning Habitat.*

Prune for Views

Trees are vital to the good health of shoreline properties and should be cut only when they are a hazard. To make the most of your waterfront panorama, frame views by selectively pruning your trees rather than cutting them down.

RECOMMENDED PRUNING STRATEGIES

ILLUSTRATION: WINDOWING, THINNING, LIMBING UP Source: Department of Ecology, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners*

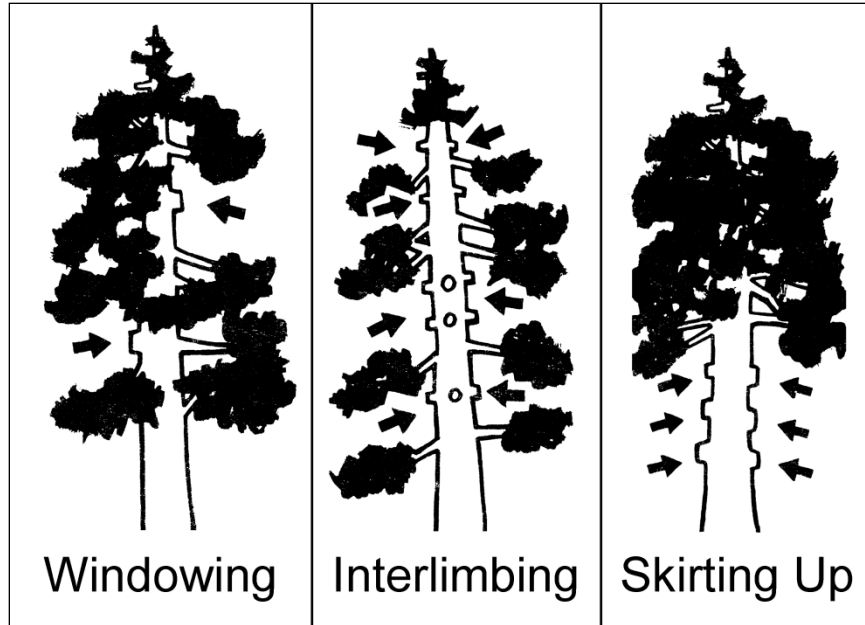
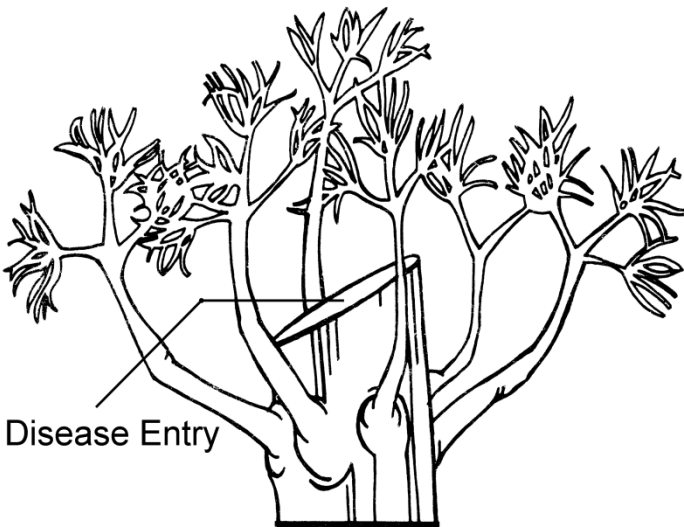


ILLUSTRATION: A “TOPPED” TREE Source: Department of Ecology, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners*



Never Top A Tree!

Topping can lead to disease and death of the tree. It may also lead to re-growth of weak upper limbs, which are more likely to break and be a danger in heavy winds.

Keep Yard Waste Off Bluffs And Beaches

Yard waste kills underlying vegetation, adds dead weight (usually wet and soggy) to the upper portion of a slope and can

easily slide, possibly precipitating a larger slide or doing down-slope damage. The discarded plant material may be washed away by tidal action. Although out of sight, the breakdown of plant material uses up oxygen as it decomposes which can cause problems for aquatic life. Dumping yard waste on the beach can also spread noxious weeds in our region!

By definition under statewide solid waste regulations, yard waste and grass clippings are considered solid waste and therefore must be handled and disposed of properly. It is unlawful to dispose of any type of solid waste by dumping it on the ground, into the water or burying it. Solid waste may be dumped and buried at a permitted landfill or, in some neighborhoods, collected by yard waste collection companies.

Two Alternatives to Dumping:

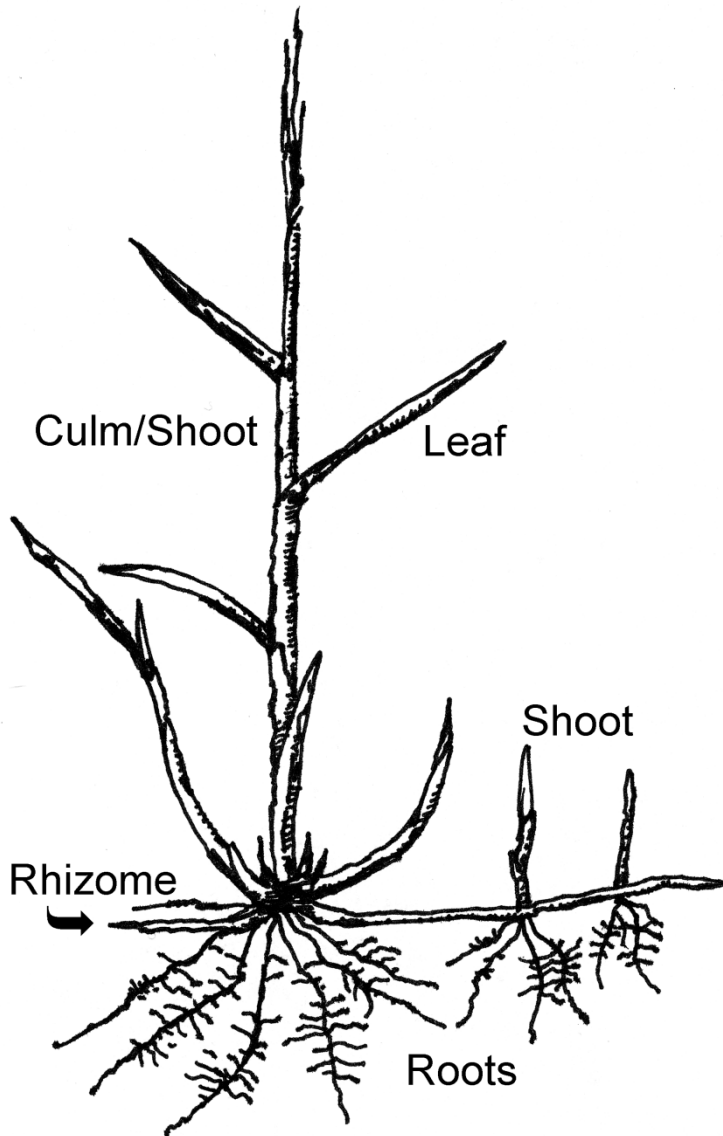
1. Compost yard waste. To prevent composted material from entering the water, use an above-ground composter if possible and position it well away from the water's edge. Composted material is beneficial to gardens because it increases soil fertility and microorganisms, makes clay soils more workable, and reduces irrigation needs.
2. Leave lawn clippings on the lawn. Grass clippings help keep your lawn green by recycling nitrogen.

***Spartina* is a Nasty Noxious Weed**

At first glance, *Spartina* appears to be just grass growing in or along the water. But look closer and you'll see that it severely disrupts the native saltwater ecosystem, alters fish, shellfish and bird habitat, and increases the threat of floods. *Spartina* colonizes in areas that would normally be mudflats, changing the natural regime of soil erosion and deposition by trapping soil with its roots. This is a non-native and invasive weed that can rapidly 'take over' whole beach areas just like weeds can take over our yards and gardens.

Early control of an infestation is essential. Care must be taken to remove not only the visible plant but all roots or rhizomes. Those removed must then be disposed of far from the shore, preferably in a landfill to prevent re-sprouting. Do not compost *Spartina*! When established, *Spartina* is far more difficult to eradicate. All *Spartina* invasions should be reported to the Noxious Weed Control Board or local noxious weed program staff person. Before pulling out a suspected bed of *Spartina*, carefully clip a couple of small stalks, placing them in a plastic bag as you collect them on the beach for identification by your local noxious weed staff person. There are many beach grasses that look alike.

ILLUSTRATION OF A SPARTINA PLANT



How to Identify *Spartina*

Spartina appears as individual plants, small clumps, or when established, as large circular masses of plants several feet tall in the intertidal zone. Its stems are round and hollow with leaves spreading out from the stem at nearly right angles. At the base of the leaves there is a row of fine hairs.

Sprouting in the spring, *Spartina* flowers and seeds from mid-summer to fall. The seed heads top the long stalks that grow straight up from the plant. *Spartina* turns brown in the fall and generally remains dormant until early spring.

Known *Spartina* Infestations in Puget Sound

The Washington Department of Agriculture (WSDA) estimates that in 2003, there were over 9,000 acres of *Spartina* in Washington State, mostly in

Willapa Bay. In 2010, WSDA estimates a total of 27 acres of *Spartina* in Washington. *Spartina* has been found in many Puget Sound counties including: Island, Snohomish and Skagit counties and smaller amounts in Clallam, Jefferson, Kitsap, King, San Juan, Pierce and Whatcom Counties. While significant progress has been made in eradicating *Spartina*, eradicating that last few acres will be the most challenging as it represents many individual plants and small clumps spread along thousands of miles of Washington's shoreline. You can help by watching for *Spartina* when you're at the beach and reporting sightings to your local noxious weed board.

Guideline #6 - Know the Permit Procedures for Shoreline Development

Why You Need a Permit to Develop Your Shoreline

Shoreline resources are finite and must be effectively managed if their many values are to be preserved. Planning under Washington State's Growth Management Act provides a unique opportunity to consider shorelines and their relationship to the community as a whole and its overall development strategy.

The Shoreline Management Act (SMA)

In 1971, the Washington State Legislature passed the Shoreline Management Act. This act was validated by voters in the November, 1972 election.

Objectives of SMA

- To protect and preserve shoreline resources.
- To provide for reasonable use of the state's shorelines.
- To preserve the public's right to access the shorelines.

The Shoreline Management Act covers more than 20,000 miles of Washington State saltwater, river and lake shorelines. This includes more than 2,600 miles of saltwater shoreline. Approximately one-third of Puget Sound's shoreline is currently lined by bulkheads or other hard structures.

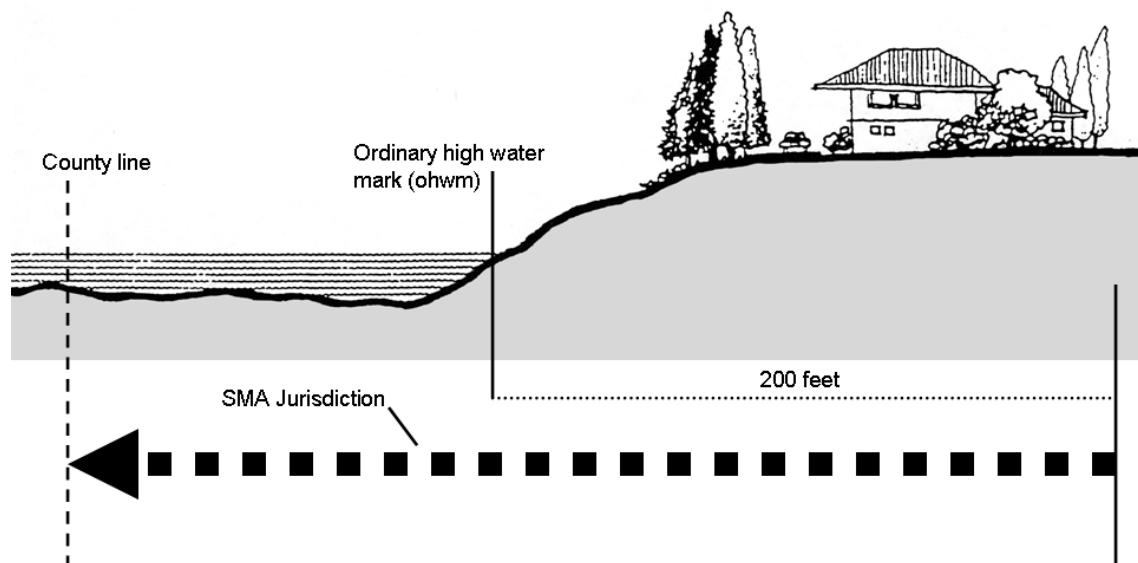


Illustration: The Shoreline Management Act along marine shorelines applies to the area from 200 feet landward of the "ordinary high water mark" extending offshore to the county line. Source: Department of Ecology, *Shoreline Master Program Handbook*

Did you know? Anchor buoys in the middle of a bay are covered by SMA permitting processes. Why? The SMA jurisdiction includes the water to the middle of the Puget Sound, Hood Canal, or wherever the county across the water intersects.

Shoreline Master Programs (SMP)

The provisions of the Shoreline Management Act established a planning and regulatory program, which is initiated at the local level under state guidance. This cooperative effort balances local and statewide interests in the management and development of shoreline areas by requiring local governments to plan (via Shoreline Master Programs, or SMPs) and regulate (via permits) shoreline development.

County planning departments are charged with ensuring compliance with the SMP. Each county works with Ecology to coordinate with the State Departments of Fish and Wildlife and Natural Resources and the US Army Corps of Engineers. The Department of Natural Resources may be a participant where state-owned tidelands and bedlands are involved.

The Shoreline Permit Process

All permits for development on your shoreline property originate at the local level. Substantial development permits for work such as clearing, grading, and construction are approved locally. Some conditional use permits and variances are locally approved and then sent to the Department of Ecology for their approval. Appeals to denied permits are made through the local hearing examiner and the state shorelines hearing board.

Some minor types of shoreline development may be “exempt” from permit requirements. They must still be reviewed by your local Planning Department for consistency with the Shoreline Master Program and the Shoreline Management Act.

Development Requiring a Permit

Major saltwater activities requiring a permit include:

Bulkheads	Dock floats
Filling	Marinas
Boat launches	Placement of utility lines
Piers	Pile driving
Dry docks	Dredging
Artificial reefs	Tree removal

The above are only examples of major types of activities. Any construction activity below the ordinary high water line requires a permit, even if the activity is outside the water at the time it is undertaken.

In some cases, a Department of Fish and Wildlife Area Habitat Biologist will visit the project site. They will work with you to help achieve your objective while protecting fish and shellfish and their habitat.

Compliance with Shoreline Regulations

You play a vital role in shoreline administration through peer education and bringing shoreline issues to the attention of state and local personnel. With ever-increasing workloads and reduced funding of staff positions, local and state agencies must rely more and more on citizen help in protecting and preserving our shoreline resources and letting local officials know how they feel about shoreline issues.

Guideline #7 - Develop on Bluffs with Care

The Importance of Bluffs

The coastal bluffs of our region result from thousands of years of erosion and are an important natural feature of the Puget Sound's shoreline.

Many of our local bluffs and beaches "feed" sediments to adjacent beaches and nearby "accretion" beaches, which are typically either low spits of land that jut into the intertidal zone or coves between headlands. When seawalls or bulkheads are placed on beaches with feeder bluffs, the natural process is halted. Without continual replenishment, beaches and accretion beaches erode, threatening homes and wildlife populations. Ironically, bulkheading of bluffs to protect property often leads to the loss of adjacent beaches and increased erosion of neighboring bluffs.

Did you know? Bluff erosion is often characterized by decades of gradual change, punctuated by sudden landslides. Slides can undermine structures at the top of the bluff or bury structures at the bottom.

ILLUSTRATION: ANATOMY OF A BLUFF Source: Department of Ecology, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners*

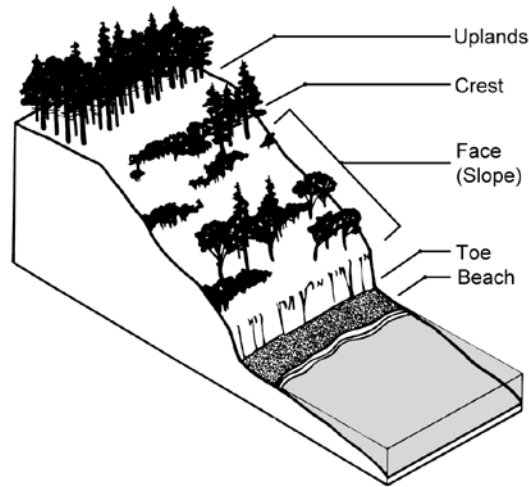
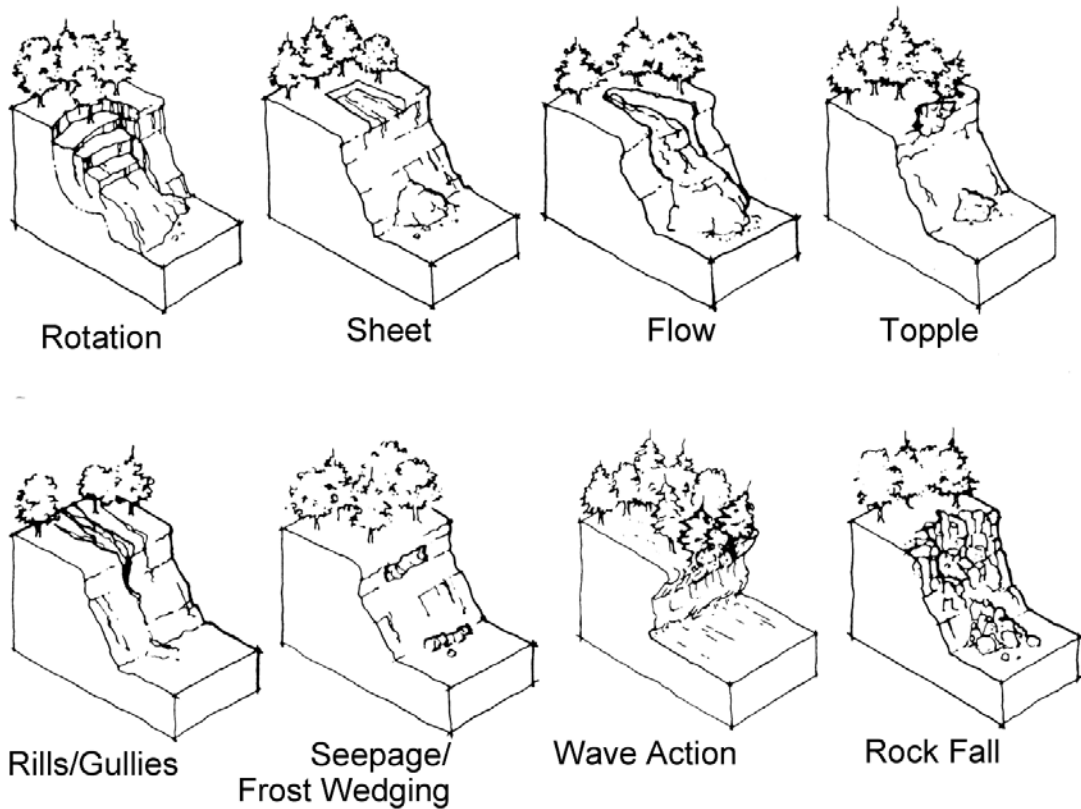


ILLUSTRATION: TYPES OF BLUFF EROSION Source: Department of Ecology, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners*



Leave Stumps in Place

Please keep in mind that it is best to save all stumps near a shoreline bluff or slope. Their roots alone will help stabilize soil. Likewise the removal of invasive plants such as Himalayan blackberry or Scotch broom from unstable shore property is unwise without an immediate revegetation plan.

Native Plants Help Control Erosion

Buffer zones with native plants can be a good option for helping control erosion. With excessive bluff erosion, particles can slip down into the water, covering and smothering many marine plants and animals. Proper plant selection and placement can help reduce erosion. If you choose to plant trees on a slope, then bareroot stock trees are a good option because soil disturbance is minimized during planting and bareroot stock will also be more successful long-term. A nice thick layer of mulch around the planting will help retain moisture and prevent erosion.

Did you know? English ivy is not a good erosion control option. It is invasive and will smother native plants. It is considered a noxious weed by the state and should not be planted. It is also not an effective soil holder and will just hide the signs of slope instability.

Good Choices for Stabilizing Soil and for Erosion Control:

Trees

Douglas fir
Bigleaf maple
Madrone
Red cedar
Willow

Shrubs

Ocean spray
Salal
Snowberry
Vine maple
Serviceberry

For more information on the role of native plants in shoreline landscapes, please refer to Guideline #5, Encourage Native Plants and Trees.

Ways to Limit Bluff Erosion

- View local setback requirements. For new construction, locate your home sufficiently far from the water or bluff so it is not susceptible to wave damage, erosion or landslides. Resist the urge to trade off safety for the sake of a slightly improved view. When developing your site, do so with a minimum of disturbance. Leave as much native vegetation as possible, including an undisturbed vegetation buffer along the top of the bluff.
- Where practical, replant bare areas. Use hardy, deep-rooted native species appropriate to the site. Avoid landscaping that requires watering, but remember

that plantings will need regular watering until they become established. Instead of removing or topping trees, selectively thin or window them to improve views. This action also promotes root vigor. *Refer to section #5, Encourage Native Plants and Trees, for an illustration of thinning and windowing trees.*

- Divert runoff away from the bluff face. Excessive groundwater and surface water runoff are leading causes of landslides and bluff erosion. Coordinate with neighbors to avoid concentrating runoff if possible. *For more information on this topic, please refer to section #4, Manage Your Upland Water Runoff.*
- Plan beach access carefully for minimal soil and vegetation disturbance. Where possible, consider sharing access with neighbors to minimize disturbance and costs. Consider building a “hybrid” system (a combination of trail, ladder, winding paths and stairs) to limit disturbance on the bluff.
- Avoid building bulkheads or other erosion control structures. Increased wave activity in front of and to the sides of a bulkhead encourage unnecessary erosion, often to your neighbor’s property. *For more information on the effects of bulkheading, please refer to section #8, Use Soft Armoring Techniques When Appropriate.*
- Do not dump yard waste over the edge of your bluff. It sets the stage for future erosion because these piles of green waste smother native plants holding fragile slopes in place. Even small heaps of grass clippings can take years to break down.

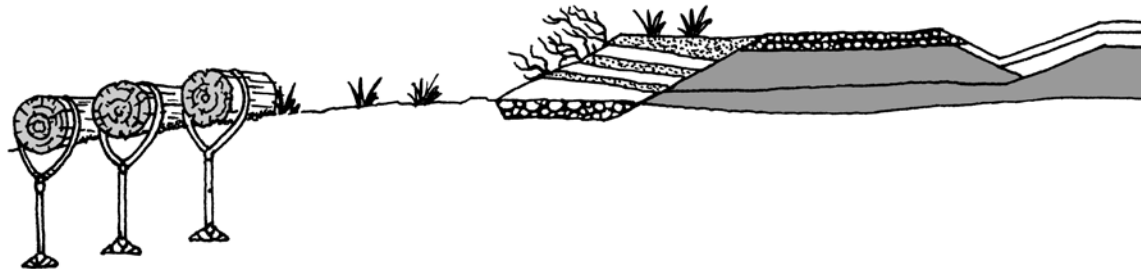
Guideline #8 - Use Soft Armoring Techniques When Appropriate

As discussed in *Guideline #7*, shoreline bluffs and beaches are dynamic environments where erosion and storms are the rule rather than the exception. It’s important to understand beach processes and to make environmentally sound choices about how we manage eroding shorelines. The shoreline actually depends on continuing erosion to maintain beaches and to support nearshore and intertidal habitats, yet we are often intolerant of even relatively gradual erosion. Some property owners go to great expense to engineer rock, wood and concrete structures to stabilize eroding property. This is called shoreline hardening, or bulkheading. Fortunately, for some properties, there are other ways to protect your land while allowing the necessary movement of beaches to occur.

Soft Erosion Control

Soft-shore protection projects rebuild the high-tide beach to provide protection of property and homes and while preserving natural beach functions. These approaches use indigenous materials such as gravel, sand, logs, and root masses to absorb wave energy and reduce erosion.

ILLUSTRATION: EXAMPLE OF A LOW-ENERGY ZONE, SOFT-SHORE PROTECTION PROJECT Anchoring logs on the beach helps dissipate wave energy and may help increase the deposition of sediment on the beach. Source: Department of Ecology, *Alternative Bank Protection Methods for Puget Sound Shorelines*



Below are some reasons to use soft erosion control to protect your property instead of hard armoring techniques.

The Impact of Bulkheads

Bulkheads cut off the sediments supplied to the beach by erosion. This leads to sediment-starved conditions that can actually increase erosion and alter beach composition. The cumulative effect of numerous bulkheads along a reach of shoreline may be the long-term, irreversible loss of habitat and increased erosion on the property of others.

Other Effects of Bulkheads:

- ⤴ Hard structures, especially when vertical, reflect wave energy back onto the beach, modifying the energy regime on the beach and sometimes undermining the bulkhead.
- ⤴ Increased wave energy and loss of sediment supplies can lead to coarsening of the beach as sand and small gravel are progressively winnowed from the beach. The result is a shift to coarser gravel and cobble beaches and more frequent exposure of underlying hardpan or bedrock.
- ⤴ Installation of bulkheads often requires that upland vegetation be removed and this can prevent mature native vegetation from becoming reestablished.
- ⤴ Bulkheads can decrease availability of spawning areas for forage fish.

Did you know? It is natural for our beaches to erode and long-term erosion rates are generally quite slow. The rates vary from one site to the next but an average range is one foot per decade (0.1 foot/year). This average often reflects the loss of several feet of bluff or bank in a landslide every twenty or thirty years.

What Can You Do?

There are a number of actions that you can take to help prevent erosion on your beach. Some actions require a minimum of money and effort while others may require more work and investment.

Have Your Site Professionally Assessed for Soft Armoring Suitability

Soft-shore protection designs are not suitable for all sites. The erosion rate, the type and causes of erosion and an evaluation of wave energy are critical for determining whether a soft-shore protection strategy will work on a particular beach. If you're interested, please contact your local Planning Department for a list of coastal geologists who design soft-shore protection systems.

Retain Driftwood and Native Vegetation

The presence of driftwood and other large woody debris helps to retain sediments and absorb wave energy; if you find them washed up on your beach, leave them in place. Also, intertidal plants, dune grass and other berm vegetation can greatly increase the resilience of beaches to storm waves. Native vegetation on shorelines and bluffs are your best first line of defense against erosion.

If You Must Replace or Build a Bulkhead

If it is necessary for you to have a bulkhead, build it to recognized standards. Construct it as far away from the water's edge as possible and build only as much structure as necessary. For example, a 200' bulkhead is not necessary to protect the base of a stairway. Consult the Planning department for assistance with design and permits. Plant a wide native plant buffer along your bulkhead to provide food and habitat for wildlife and increase erosion protection.

Guideline #9 - Enjoy and Respect Intertidal Life While on the Beach and Boating

Common Beach Sense

Beach etiquette is an important issue. Investigate, learn, have fun and leave the beach cleaner than you found it while respecting the intertidal species that make their homes on the beach and rocky shore.

A few things to keep in mind as you explore:

- ◆ Walk around tidepools and eelgrass beds.
- ◆ Tread lightly around barnacle covered rocks, protecting living barnacles as well as your shoes or bare feet.
- ◆ Unless you're harvesting, observe sea life where it lives or by handling them lightly with wet hands.
- ◆ Look carefully under rocks and seaweed and replace the rocks exactly the way you find them. As a general rule never lift a rock bigger than your head. Anything larger will damage sea life under it when being put back. Some organisms hide underneath rocks and seaweed to protect themselves from air, sun, and predators. Others are adapted to living on top of the rock. An overturned rock that is not replaced is doubly bad news for sea life.
- ◆ Refill any holes you dig in the sand. Leftover piles of sand may suffocate marine life.
- ◆ Give birds and mammals that you see on the beach plenty of room to go about their business. Mother seals will leave their young on the beach for periods of time while they forage. Other birds and animals are probably eating, and nobody wants to be disturbed at mealtime.
- ◆ Leave all vegetation where you find it. Plants prevent erosion, are food for animals and insects, and add variety and beauty to the beach.



Being a Great Boater

Boating in any type of craft should be done in a safe and conscientious manner. Using common sense will limit harm to shoreline habitats and the salmon, forage fish and other sea life that rely on them. *For more information on these habitats, please refer to Guideline #10, Preserve Eelgrass Beds and Forage Fish Spawning Habitats.*

Speed restrictions are in place for boaters for certain conditions and areas (there are signs posted) usually in bays and inside harbors. When passing near marinas, fishing or swimming areas or a vessel at anchor, boats should reduce their speed. Some local jurisdictions have ordinances prohibiting motor boating at a speed greater than 6 knots within 100 feet of shore, a dock, pier, float or anchored or moored vessel, unless taking off or landing a water skier.

Avoiding Damage to the Environment While Boating

- ◆ Slow down when close to the shoreline to reduce or eliminate your wake. This prevents excessive erosion and protects forage fish and salmon habitat. Some bigger power boats can produce wakes that will do much more damage to a shoreline than a speed boat, even if they are 500 feet off the beach. Likewise, a personal watercraft wake can cause as much damage as a regular speed boat. Use good judgment as to when to slow down.



- ◆ Inspect your boat's motor regularly and make sure that it isn't leaking fuel into the water. Consider purchasing a motor that meets or better EPA 2006 guidelines.
- ◆ When refueling, make sure hoses are tightly connected and that no gas spills into the water. Use an "oil absorb" pad to catch fueling drips and spills.
- ◆ For larger boats, do not pump any sewage or waste material into the water. Use only designated State pumpout locations.
- ◆ Avoid dragging your anchor. It may damage clam, oyster and eelgrass beds.
- ◆ Personal Watercrafts (PWC) disturb fragile intertidal areas when used irresponsibly. Their wakes can be as damaging to the shoreline as those of a speedboat. Do not operate PWCs in shallow water (less than 24 inches deep) and do not dock in reeds and grasses.
- ◆ Inspect, clean, and dry your boat or PWC and gear to prevent the spread of invasive species and to keep your boat running efficiently and safely.
- ◆ Avoid anchoring or mooring in eelgrass or microalgae beds. These provide important habitat for many species and can be damaged by anchor or mooring lines.
- ◆ Be a whale wise boater. As of May 16, 2011, new federal rules prohibit vessels from approaching any killer whale closer than 200 yards and forbid vessels from intercepting a whale or positioning their vessel in its path. The rules apply to all types of boats, including motorboats, sailboats and kayaks, in Washington.

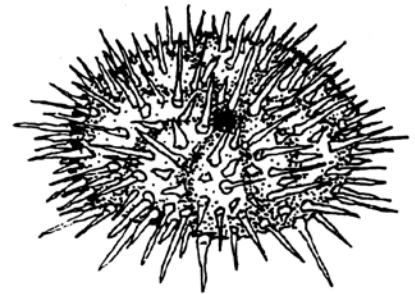
Fires on the Beach

Local regulations vary widely for beach fires, and there may be different restrictions depending upon whether you are on public or private property. Please check with your fire department or local jurisdiction on beach fire restrictions, permits and burn bans.

Beach fires can be a great part of going to the beach. However, fires could ignite tree roots and dry grasses, and driftwood fires are a genuine concern to firefighters and local residents on neighboring uplands. Because of these dangers, beach fires should only be built under strictly controlled circumstances. Bring your own wood and do not burn driftwood off the beach, as this is part of the habitat structure. Fires should be made above the high water mark in order to minimize the damage to organisms that make their home on the beach.

Good Campfire or Bonfire Practice Checklist:

- ◆ The fire is at least 50 feet from any structure.
- ◆ The fire is less than 3 feet in diameter and 2 feet high.
- ◆ You have a shovel nearby.
- ◆ There is always somebody present to tend the fire.
- ◆ The surrounding area is free of flammable materials.
- ◆ You douse a fire completely with water prior to leaving the site.



Marine Mammals on the Beach

Marine mammals may occasionally use the beach for various reasons. Adult seals and sea lions often rest on the shoreline or go there to avoid visiting Orcas, but they will eventually return to the water.

Mother seals may leave their pups on the shore while they go find food. If you see a seal pup alone, it may not necessarily be abandoned. Should you find a seal pup that appears to be in distress, contact the National Marine Fisheries Services immediately at 800-853-1964.

As great as it is to let Fido run free on the beach and frolic in the water, make sure to keep your dog in your sight and under your control. A wandering dog's interaction with a seal pup could be bad news for both.

If whales, dolphins or otters appear to be stranded on the beach, it's imperative that you report it to the Marine Mammal Stranding Network. Never attempt to touch a marine mammal, especially one that is stranded. Wild animals in a stressed condition bite, and they often carry diseases that are harmful to humans and dogs.

To Report a Stranding

1. Note the condition of the animal (without getting too close) and the location.
2. Do not touch, disturb, feed or pour water on the animal.
3. Contact National Marine Fisheries Services immediately at 206-526-6733.

Guideline #10 - Preserve Eelgrass Beds and Forage Fish Spawning Habitats**Eelgrass Provides a Diverse Habitat**

Eelgrass is a flowering, perennial grass that grows in nearshore marine waters with silty/sandy bottom, propagating both by vegetative growth and by seed germination. Just like other plants, eelgrass needs adequate sunlight to grow. In the Northwest, water clarity allows eelgrass to grow to depths of about 60 feet (-60' MLLW) in many locations. In other areas, turbidity or overwater structures restrict the amount of light reaching the substrate, limiting or eliminating eelgrass growth. The Washington Department of Ecology estimates that 33% of the eelgrass beds in Washington have been lost.

ILLUSTRATION: THE EELGRASS MEADOW Source: Reproduction of Port Townsend Marine Science Center's Eelgrass interpretive display



Eelgrass Facts:

- ◆ Softens the impact of waves and currents.
- ◆ Stabilizes the shoreline, providing a calm space where organic matter and sediments are deposited.
- ◆ Provides a diverse habitat for many species. Some animals and algae attach to the blades of eelgrass; others use the structure to hide or provide camouflage.
- ◆ Reduced currents, large surface area, abundant food and good hiding spots make Eelgrass beds excellent “nursery areas” for young fish (including salmon) and a variety of invertebrates.
- ◆ Shelters small animals and plants from extreme temperatures during low tides.
- ◆ Decomposes to form the base for an important food web for the nearshore marine and estuarine ecosystems.
- ◆ Grows in the spring and summer then decays in the fall and winter.
- ◆ Grows blades up to 3 feet in length.
- ◆ Is often used for shelter by Dungeness crabs in spring when molting and as juveniles.
- ◆ Is a substrate for herring eggs and a hiding place for juveniles.
- ◆ Is a resting and feeding place for juvenile salmon during outmigration.
- ◆ Eelgrass is not directly consumed by most of its inhabitants, but is an important feeding ground for many species that consume organisms attracted or attached to eelgrass.
- ◆ Brandt geese consume eelgrass as a nearly exclusive part of their diet and will also eat herring eggs on the eelgrass.

Forage Fish are Indicator Species

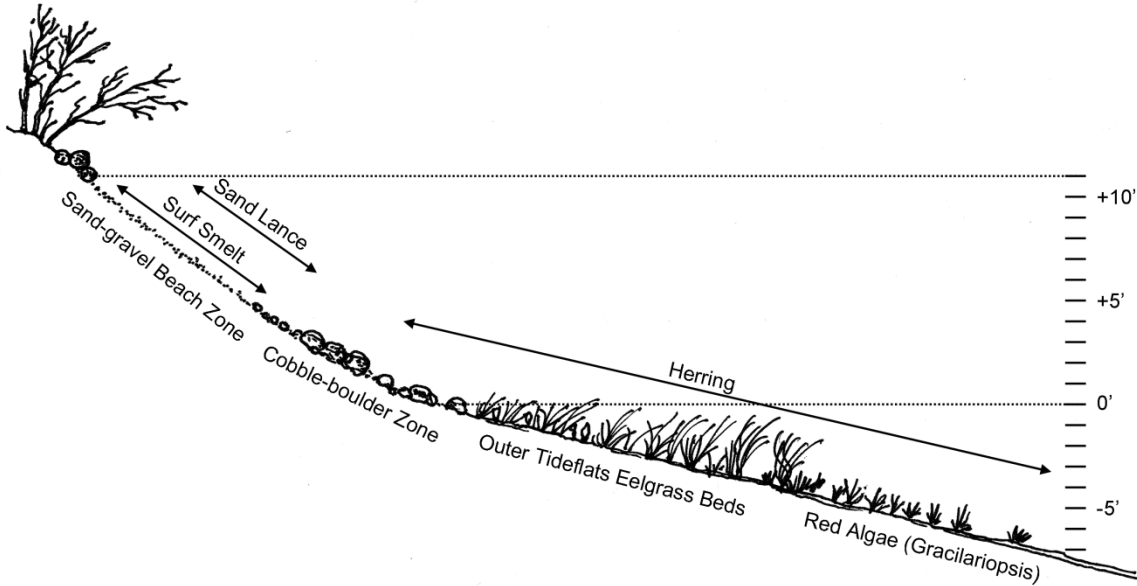
Puget Sound shoreline supports spawning beds for important forage fish, including Pacific herring, surf smelt and Pacific sand lance (also erroneously known as candle fish). As the name implies, the significance of forage fish is related to the critical role they play as a food source for a large variety of other marine organisms. Forage fish occur in large schools in our waters. Historically occurring in large numbers and being high in fat and protein these fish form a critical link in the Puget Sound food web between zooplankton and larger predators such as salmon, seabirds, crabs, seals and even whales rely on this food source for sustenance.

The spawning grounds of surf smelt and Pacific sand lance are along the shallow marine shoreline and therefore, vulnerable to shoreline development. Pacific Herring spawn on eelgrass, making protection of the beds critical to their survival.

The vitality of the total forage fish resources in Washington is a valuable indicator of the overall health and productivity of our marine environment.

ILLUSTRATION: FORAGE FISH SPAWNING HABITAT ZONE OF SARATOGA PASSAGE & PORT SUSAN

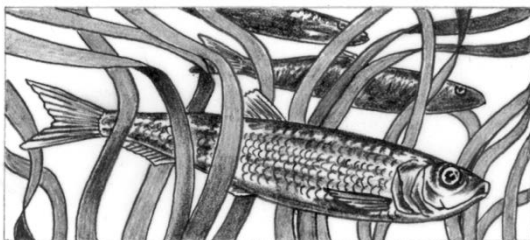
Source: Dan Penttila, Department of Fish & Wildlife



Pacific Herring Facts:

- Herring eggs may be deposited on eelgrass or seagrass between the upper limits of high tide to a depth of minus 40 feet, but most spawning takes place between 0 and minus 10 feet in tidal elevation.
- Herring spawn from late January through early April.
- Natural mortality for herring is quite high with approximately 50 to 70 percent of the adult herring from Washington falling to predation each year.
- Scoters (a marine duck) consume large amounts of herring eggs by stripping eelgrass of the attached eggs.

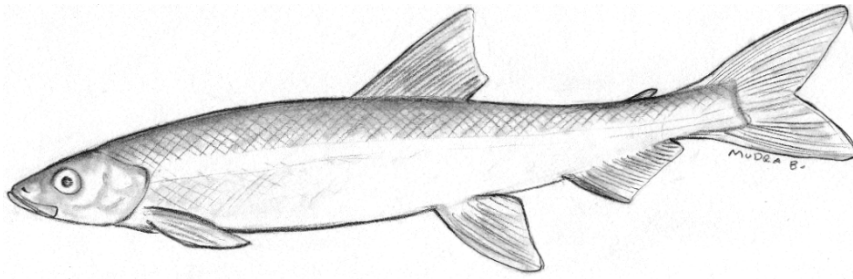
ILLUSTRATION: PACIFIC HERRING Courtesy: North Olympic Salmon Coalition and Deborah Cooper



Surf Smelt Facts:

- Surf smelt spawn on the upper beaches with coarse sand and pea gravel.
- Surf smelt eggs are deposited and fertilized near the water's edge around the time of high slack water at a tidal elevation between +7.0 and mean high-high water line during spawning events.

ILLUSTRATION: SURF SMELT Credit: North Olympic Salmon Coalition and Mudra Bergan.

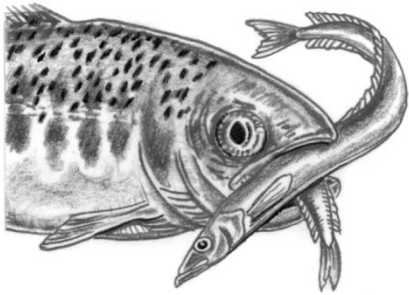


Did You Know? Overhanging shade trees along the beach are vital to the survival of surf smelt eggs during the summer months. To encourage surf smelt spawning it is wise to preserve existing trees and/or re-forest sections of the shoreline where the marine forest has been removed during the course of development.

Pacific Sand Lance Facts:

- ◆ Up to 60% of a juvenile Chinook salmon's diet is sand lance.
- ◆ Sand lance deposit eggs on a rather broad range of beach substrates, from fine sand beaches to gravel beaches up to 3cm in diameter, but most frequently, they spawn on sandy beaches.
- ◆ Sand lance spawning occurs at tidal elevations ranging from +5 feet to about mean higher high water line.
- ◆ Sand lance feed in open water during the day and burrow into the sand at night to avoid predation.

ILLUSTRATION: SALMON SMOLT EATING SAND LANCE Credit: North Olympic Salmon Coalition and Deborah Cooper



Conclusion

The Puget Sound region is a unique and spectacular place to call home. By following the guidelines set forth in this booklet, you can help to protect and improve quality of life in the Puget Sound region for yourself and others. We all have a responsibility to help keep the Puget Sound healthy for generations to come, so please do your part!

Whether or not you live directly along shoreline, your actions make a difference. Please consider taking the pledge to practice the Shore Stewards guidelines in this booklet and commit to honor and respect the amazing place in which we live, work, and play.

We hope that this resource has helped to educate and inspire you towards action. When you are ready, please refer to the additional resources we have provided in the Appendix. If you want more information about stewardship and volunteer opportunities in your area, please contact your local WSU Extension.

Appendix A: Helpful Resources

Guideline 1- Helpful Resources for Using Water Wisely:

Water Conservation

- H₂OUSE – Water Saver Home – www.H2Ouse.org
- Ecology – Be Water Smart, Not Water Short - www.ecy.wa.gov/programs/wr/ws/wtrcnsv.html
- Tacoma Public Utilities - www.mytpu.org/tacomawater/water-conservation/water-smart/Default.htm
- WSU Extension Drought Alert website – www.drought.wsu.edu
- Rainwater Collection at www.ecy.wa.gov/programs/wr/hq/rwh.html

Water Availability

- WRIA 15 – Kitsap Watershed
fortress.wa.gov/ecy/publications/publications/1111020.pdf

Guideline 2- Helpful Resources for Septic System Care and Maintenance:

- Contact your local health department website and office:
 - Tacoma-Pierce County Health Department – www.tpchd.org/environment/septic-systems
 - Kitsap Public Health District - www.kitsapcountyhealth.com/environment/septic_systems.php
- WA State Department of Health Wastewater Forms & Publications: www.doh.wa.gov/CommunityandEnvironment/WastewaterManagement/FormsPublications.aspx
- Washington Sea Grant Program Septic Sense website at: www.wsg.washington.edu/mas/pdfs/SepticSense.pdf
- WSU Extension Publication *Creative Cleaning: Back to Basics*: cru.cahe.wsu.edu/CEPublications/EB1758/eb1758.html

Guideline 3- Helpful Resources for Reducing the Use of Pesticides and Herbicides:

- Tacoma-Pierce County Health Department *Natural Yard Care Program* - www.tpchd.org/environment/healthy-environment/natural-yard-care/
- Washington Toxics Coalition - watoxics.org/healthy-living/healthy-homes-gardens-1
- *Grow Smart, Grow Safe Guide* - www.growsmartgrowsafe.org/
- Washington State University Extension Hortsense: pep.wsu.edu/hortsense/ (a searchable database of local plants and pests)
- National Pesticide Information Network at: 1-800-858-7378 or www.npic.orst.edu
- Washington State Noxious Weed Control Board online: www.nwcb.wa.gov

- Contact your county solid waste division for information about safe disposal of pesticides and herbicides

Guideline 4- Helpful Resources for Managing Groundwater and Surface Water

- Puget Sound Starts Here: pugetsoundstartshere.org/
- For information on Stormwater, Low Impact Development, and Rain Gardens:
 - Puget Sound Partnership - www.psp.wa.gov/stormwater.php
 - Washington Stormwater Center at: www.wastormwatercenter.org/low-impact/
- For information on rain gardens:
 - [Stewardship Partners and WSU 12,000 Rain Gardens - www.12000raingardens.org/index.phtml](http://www.12000raingardens.org/index.phtml)
 - Kitsap County Surface & Stormwater Management - www.kitsapgov.com/sswm/rain_gardens.htm
- The Washington Lake Book: www.ecy.wa.gov/programs/wq/plants/lakes/BookContents.html
- Marine shorelines: Department of Ecology's booklet *Managing Drainage on a Coastal Bluff* - www.ecy.wa.gov/programs/sea/pubs/95-107/intro.html

Guideline 5- Helpful Resources for Encouraging Native Plants and Trees

Gardening with Native Plants:

- WSU Master Gardener Stewardship Gardening: gardening.wsu.edu/nwnative/
- Kitsap County Master Gardener Program: county.wsu.edu/kitsap/gardening/Pages/ClinicsGardensandResources.aspx
- *Blueprint for Lake Friendly Landscape*: www.ecy.wa.gov/programs/wq/plants/lakes/landscaping.html
- *Grow Your Own Native Landscape: A Guide to Identifying, Propagating & Landscaping with Western Washington Native Plants*. WSU Publication Misc 0273. Order a copy at pubs.wsu.edu/ItemDetail.aspx?ProductID=15561

Native Plant Sales:

- Pierce Conservation District: www.piercecountycd.org/treesale.html
- Kitsap Conservation District: www.kitsapcd.org/programs/tree-sale
- Washington Native Plant Society: www.wnps.org
- Find a local nursery that carries native plants at: www.tardigrade.org/natives/nurseries.html
- Contact the Native Plant Salvage Alliance for opportunities to rescue native plants from sites slated for development at www.ssstewardship.org/

- Woodbrook Native Plant Nursery, 5919 78th Avenue NW, Gig Harbor, grows native plants specifically for the Key and Gig Harbor Peninsulas. Visit www.woodbrooknativeplantnursery.com or call 253-857-6808

To Dispose of Yard Waste:

- Both Pierce and Kitsap Counties offer alternatives to burning or trashing yard waste. Many areas have facilities that accept yard waste at no cost, or for a reduced fee. In Kitsap County, information is available at www.kitsapgov.com/sw/burning.htm
- In Pierce County, information is available at www.piercecountywa.org/index.aspx?nid=1525
- Also, check with your solid waste service provider for information about curbside yard waste collection.

To Report Illegal Dumping:

- In Pierce County, contact Pierce County Responds at 253-798-4636.
- In Kitsap County, call 360-337-5777.

To Report *Spartina* Invasions and Other Noxious Weeds:

- Visit the Washington State Noxious Weed Control Board website for links to your county noxious weed program at: www.nwcb.wa.gov
- If you are not sure what *Spartina* looks like, you can find identification information at: www.spartina.org/species.htm

Related Links:

- *Managing Vegetation on Coastal Slopes*, Department of Ecology. Vegetation management during site development to reduce the hazard of erosion and landslides. www.ecy.wa.gov/programs/sea/pubs/93-31/intro.html
- *Slope Stabilization and Erosion Control Using Vegetation*, Department of Ecology. An online guide to controlling erosion on slopes and bluffs using vegetation at: www.ecy.wa.gov/programs/sea/pubs/93-30/index.html

Guideline 6- Helpful Resources for Understanding the Permit Procedures for Shoreline Development

- Contact your local county or city planning department. Pierce County's can be reached at 253-798-3739 and Kitsap County's at 360-337-5777.
- Review local shoreline codes, Pierce County's Shoreline Management Use Regulations can be found at www.piercecountywa.org/DocumentCenter/View/1172
- Kitsap County has recently adopted an updated Shoreline Master Program. Information can be found at www.kitsapshoreline.org.

- Contact the Department of Ecology. Ecology maintains oversight of the Shoreline Master Programs and the shoreline permit processes. They also maintain a large and informative website at www.ecy.wa.gov/programs/sea/pugetsound
- See the Citizen Guide: Shoreline Master Program Updates at: www.ecy.wa.gov/programs/sea/shorelines/smp/citizen.html
- Contact the Permit Assistance Center at: www.ecy.wa.gov/permit.html
 - Or 360-407-7037

Guideline 7- Helpful Resources for Developing on Bluffs with Care

- Contact your local city or county planning department. Pierce County's can be reached at 253-798-3739 and Kitsap County's at 360-337-5777.
- For information on landslides: www.ecy.wa.gov/programs/sea/landslides
- See Guideline 5 *Helpful Resources for Encouraging Native Plants and Trees*
- See the Native Plant Salvage Project Guide at: gardening.wsu.edu/text/nvsalvag.htm
- The Seattle Chapter of the Geo-Institute maintains a list of local Geotechnical Engineering Firms at <http://www.seattlegeotech.org/firms.html>

Guideline 8- Helpful Resources for Minimizing Bulkheads

- Contact your local city or county planning department. Pierce County's can be reached at 253-798-3739 and Kitsap County's at 360-337-5777.
- See Ecology's report comparing local soft armoring projects, "Alternative Bank Protection Methods for Puget Sound Shorelines", at fortress.wa.gov/ecy/publications/publications/0006012a.pdf
- See the Washington Department of Fish and Wildlife, *White Paper – Overwater Structures: Marine Issues* at: www.wdfw.wa.gov/publications/00051/

Guideline 9- Helpful Resources for Respecting Intertidal Life

- See shoreline aerial photos at: fortress.wa.gov/ecy/coastalatlantools/ShorePhotos.aspx
- For Clean Boating tips, see www.ecy.wa.gov/programs/spills/BoatingTips/BoatingTips.html
- For a free clean boating kit and information, contact Citizens for a Healthy Bay, Bay Patrol Director at 253-255-3895
- To find Pump out locations contact the State Parks Commission at: 360-902-8500 or www.parks.wa.gov/boating/pumpout/
- NOAA Fisheries Northwest Regional Office and the Northwest Fisheries Science Center have a lot of information about Puget Sound species. Visit their website at: www.nwr.noaa.gov/index.html

- Contact the Washington Department of Fish and Wildlife for permitting and enforcement issues at: <http://wdfw.wa.gov> or call 1-877-933-9847. To report poaching in progress, call 911.
- Check for swimming beach information at: <http://www.ecy.wa.gov/programs/eap/beach/>
- To check for beach closure information for either swimming or shellfish harvesting, visit: <http://www.doh.wa.gov/CommunityandEnvironment/Shellfish/BeachClosures.aspx>

Sea Life and Shoreline Books, Cards, Blogs and Links

- *At the Sea's Edge: An Introduction to Coastal Oceanography for the Amateur Naturalist*, William T. Fox, Prentice Hall
- *The Beachcomber's Guide to Seashore Life in the Pacific Northwest (Revised Edition)*, J. Duane Sept, Harbour Publishing
- WSU Beach Watchers, EZ-ID laminated cards http://beachwatchers.wsu.edu/ezidweb/ezid_cards
- *Marine Life of the Pacific Northwest: A Photographic Encyclopedia of Invertebrates, Seaweeds And Selected Fishes*, Andy Lamb (Author), Bernard Hanby (Author, Photographer), Harbour Publishing
- *The Natural History of Puget Sound Country*, Arthur Kruckeberg, University of Washington Press
- *The Naturalist's Path: Beginning the Study of Nature*, Cathy Johnson, Walker and Company
- *Puget Sound Sea Life*, David Jamison, www.pugetsoundsealife.com
- *PUGET SOUND'S Wildside, A Natural History of Puget Sound's Marine Environment*, Katrina Mikitik & Corey Watson (Authors), Ram Papish (Illustrations), <http://www.harborwildwatch.org>
- *Sea-life*, Jeff Adams, www.pugetsoundblogs.com/sea-life
- *Seashore Life of the Northern Pacific Coast*, Eugene N. Kozloff, University of Washington Press
- *Seashore of the Pacific Northwest*, Ian Sheldon, Lone Pine Publishing

Guideline 10- Helpful Resources for Preserving Eelgrass Beds and Forage Fish Spawning Habitats

- See the Puget Sound Nearshore Ecosystem Restoration Project – Marine Forage Fishes in Puget Sound Technical Report at: www.pugetsoundnearshore.org/technical_papers/marine_fish.pdf
- See the Washington Department of Ecology Eelgrass webpage at: www.ecy.wa.gov/programs/sea/pugetsound/species/eelgrass.html

- See the Washington Department of Natural Resources Eelgrass Monitoring webpage at:
www.dnr.wa.gov/ResearchScience/Topics/AquaticHabitats/Pages/aqr_nrsh_eelgrass_monitoring.aspx
- For forage fish spawning habitat, please contact the WSU Beach Watchers at www.beachwatchers.wsu.edu or visit Washington Department of Fish and Wildlife Salmonscape mapping website at www.wdfw.wa.gov/mapping/salmonscape/index.html
- See Washington Department of Fish and Wildlife, *Protecting Nearshore Habitat and Functions in Puget Sound: June 2010 Revised Edition* at:
www.wdfw.wa.gov/publications/00047/

Appendix B – Recommended Resources for Shoreline Landscaping

Check out these resources from horticulture expert and garden columnist, Peg Tillery:

MISC0274 “Winter in the Woods: A Winter Guide to Deciduous Native Plants in Western Washington” gives tips on identifying bare plants by their twigs, texture and features such as leaf scars and fruits and seeds. The guide includes a glossary of scientific terms to aid in identification, plus notes on commonly confused plants. This guide is helpful when trying to figure out what vegetation to cut back or remove when establishing a garden on a new piece of property or expanding an existing garden. You do not want to remove a great native plant by accident. The cost for this publication is \$6 plus shipping and handling.

Another extremely valuable publication is MISC0273 “Grow Your Own Native Landscape: A Guide to Identifying, Propagating and Landscaping in Western Washington with Native Plants.” Once you see this publication, you’ll want it. This particular document is no longer in print, however you can download the entire publication for free at <https://pubs.wsu.edu/ListItems.aspx?Keyword=MISC0273>

Washington State University Extension has a great website on native plants. Go to <http://gardening.wsu.edu/nwnative>. The photos and plant recommendations for a wide variety of situations and growing conditions are a good place to start and even finish on your quest to explore the attributes of using and/or incorporating native plants into an existing or new landscape.

Plants of the Pacific Northwest Coast by Pojar and MacKinnon – this paperback publication is divided into color coded sections to aid in choosing a plant or looking up a plant that has piqued your interest. The definition of natives includes plants found in Washington, Oregon, Alaska and British Columbia. Pojar and MacKinnon also list the ways in which the plants were used for food, clothing and/or shelter by natives and early settlers and often still persist in use to this day.

Gardening with Native Plants of the Pacific Northwest by Arthur R. Kruckeberg is also in a sturdy paperback format. Color photos are included in the center of the book, but nearly every page includes pen and ink line drawings of the particular plant being described. Many northwest gardeners call this the native plant bible for gardeners.

Landscaping for Wildlife in the Pacific Northwest by Russell Link, also a sturdy paperback version, includes how to design a landscape or explore and/or edit an

existing landscape and includes abundant lists of plants and landscaping ideas. The underlying theme is how to attract wildlife to our gardens, how to discourage them if one has too many pesky critters, and in doing so helps us to understand how the landscapes, human beings and wildlife are interconnected. The plant listings include sizes of plants, various planting zones and climates and features tons of useful appendices with abundant information and cross references. Even though there are no photos or color prints, if you can only purchase one book, this one is the book for learning about and actually incorporating native plants into our gardens.

Living with Wildlife in the Pacific Northwest by Russell Link is the follow up book to *Landscaping for Wildlife* listed above. It too is crammed full of abundant information about the critters who share our neighborhoods and surrounding natural areas. Its main purpose is to give us an appreciation of the creatures living in our own backyards and byways, but it helps us cope with them when they can become pesky or a hazard. It doesn't educate us about the native plants, but does educate us about why native plants are a very good thing and how all the creatures that were here before us depended on these plants. We really can live peaceably with the wild critters in our region.

DVDs Available through WSU Kitsap Extension

The Kitsap Gardener series on Bremerton Kitsap Access Television includes 4 videos featuring information on native plants. If you'd like to purchase any of these videos for \$5 a copy please contact the WSU Kitsap Extension at 360-337-7224.

The videos are on:

- Landscaping for Septic Systems using Native Plants and Related Plants
- Incorporating Native Plants into an Existing Landscape
- Landscaping with Native Plants
- Native Plants for Shade

Bibliography

1 – Use Water Wisely

Water Conservation: Guidelines to Being Waterwise, available from Washington State Department of Health at 800-525-0127

California Urban Water Conservation Council: *H2Ouse.org*

2 – Know and Practice All the Elements of Septic Maintenance

Septic System Users Manual: Care and Feeding of your Onsite Sewage System.

Mason County Public Health. Accessed at

www.co.mason.wa.us/forms/Env_Health/septic_user_manual.pdf

3 – Control Pests Safely

Washington State University Extension: *Hortsense* pep.wsu.edu/hortsense/

National Pesticide Information Network 1-800-858-7378 npic.orst.edu

Grow Smart, Grow Safe Guide. Accessed at www.lhwmp.org/home/gsgs/

4 – Manage Water Runoff

Department of Ecology: Shorelands and Environmental Assistance. Access publications

At Home with Wetlands – A Landowners Guide; Slope Stabilization and Erosion Control

Using Vegetation; Managing Drainage on Coastal Bluffs; Managing Vegetation on

Coastal Slopes at <http://www.ecy.wa.gov/programs/sea/publications.htm>

5 – Encourage Native Plants and Trees

Gardening with Native Plants of the Pacific Northwest, Arthur Kruckeberg, University of Washington Press

Native Plants in the Coastal Garden, April Pettinger, Whitecap Books

Plants of the Pacific Northwest Coast, Jim Pojar and Andy McKinnon, Lone Pine Publishing

Landscaping for Wildlife in the Pacific Northwest, Russell Link, University of Washington Press

Spartina Eradication Program 2010 Progress Report, Washington State Department of Agriculture available at:
agr.wa.gov/PlantsInsects/Weeds/Spartina/docs/SpartinaReport2010.pdf

Managing Vegetation on Coastal Slopes, Department of Ecology. Vegetation management during site development to reduce the hazard of erosion and landslides.
www.ecy.wa.gov/programs/sea/pubs/93-31/intro.html

6 – Know the Permit Procedures for Shoreline Development

Puget Sound Shoreline Armoring: State of the Science Workshop – available at:
pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_intro.pdf

Below are valuable publications available to you from the Department of Ecology with their publication numbers. You may request copies online or by mail or phone.

Department of Ecology
Publication Distribution Center
360-407-7472
<https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx>

Washington State Office of Regulatory Assistance, Environmental Permitting Services, #00-06-041

Frequently Asked Questions: Shoreline Master Programs, #09-06-029

Citizen Guide: Shoreline Master Programs, #12-06-003

7 – Develop on Bluffs with Care

Living with the Shore of Puget Sound and the Georgia Straight, Thomas A. Terich, Duke University Press

The Coast of Puget Sound—Its Processes and Development, John Downing, University of Washington Press

Below are valuable publications available to you from the Department of Ecology with their publication numbers. You may request copies online or by mail or phone.

Department of Ecology
 Publication Distribution Center
 360-407-7472
<https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx>

Bluff Erosion Monitoring on Puget Sound: A Guide for Volunteers, #98-122

Department of Ecology – Shorelands and Environmental Assistance
 360-407-7472
www.ecy.wa.gov/programs/sea/shorelan.html - Click on “Publications” at the left of page to access the following publications:

- *Slope Stabilization and Erosion Control Using Vegetation*
- *Managing Drainage on Coastal Bluffs*
- *Managing Vegetation on Coastal Slopes*

8 – Use Soft Armoring Techniques when Appropriate

Below is a DOE publication available to you with its publication number. You may request a copy online or by mail or phone.

Department of Ecology
 Publication Distribution Center
 360-407-7472
<https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx>

Alternative Bank Protection Methods for Puget Sound Shorelines, #00-06-012

9 – Respect Intertidal Life While on the Beach and Boating

At the Sea’s Edge: An Introduction to Coastal Oceanography for the Amateur Naturalist, William T. Fox, Prentice Hall

The Naturalist’s Path: Beginning the Study of Nature, Cathy Johnson, Walker and Company

Seashore Life of the Northern Pacific Coast, Eugene N. Kozloff, University of Washington Press

The Natural History of Puget Sound Country, Arthur Kruckeberg, University of Washington Press

10 – Preserve Eelgrass Beds and Forage Fish Spawning Habitat

Puget Sound Nearshore Ecosystem Restoration Restoration Project – Marine Forage Fishes in Puget Sound Technical Report.

www.pugetsoundnearshore.org/technical_papers/marine_fish.pdf

Washington Department of Ecology Eelgrass webpage

www.ecy.wa.gov/programs/sea/pugetsound/species/eelgrass.html

Washington Department of Natural Resources Eelgrass Monitoring webpage

www.dnr.wa.gov/ResearchScience/Topics/AquaticHabitats/Pages/aqr_nrsh_eelgrass_monitoring.aspx

Washington Department of Fish and Wildlife, *Protecting Nearshore Habitat and Functions in Puget Sound: June 2010 Revised Edition*

wdfw.wa.gov/publications/00047/

Inside Back Cover

Regional adaptation, updating, and printing of this booklet was funded by a Centennial Clean Water Fund grant from the Washington State Department of Ecology.

For additional information on the Shore Stewards program, to get more booklets, or to request a Shore Stewards presentation be made at an upcoming community event, please contact your local WSU Extension office. To find your local Extension office, visit <http://ext.wsu.edu/> and search under “locations.”

Issued by Washington State University Extension and the U.S. Department of Agriculture in furtherance of the Acts of May 8 and June 30, 1914. WSU Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, sex, religion, age, color, creed, national or ethnic origin; physical, mental or sensory disability; marital status, sexual orientation, and status as a Vietnam-era or disabled veteran. Evidence of noncompliance may be reported through your local WSU Extension office. Trade names have been used to simplify information; no endorsement is intended. Published February 2013.



