



Bivalves for Clean Water

by Teri King and Janis McNeal

Bivalve Shellfish — Canaries in the Coal Mine, Grazers of the Sea.

Shellfish are a keystone species, studied by water quality investigators to determine the health of a water body. Clams, oysters, mussels and other bivalves filter seawater and, in the process, can accumulate environmental contaminants in their tissues. Polluted shellfish beds are often an early warning to a larger problem, upland in the watershed, that needs immediate attention. Marine water quality standards are more stringent for shellfish harvesting than for wading and swimming. Since shellfish are a food, the threshold for contamination is much lower than for external contact with marine waters.

Bivalve shellfish also play an important role in the food web. These grazers of the sea filter copious amounts of phytoplankton-rich water, converting it into a delectable dish — just as cows grazing in a pasture convert grass into steak. The role of shellfish in this transformative position within the marine ecosystem is essential in the cycling of nutrients in our marine waters. By converting phytoplankton into tissue and shell, the shellfish are able to improve light penetration in the water column, reducing overall turbidity and benefiting larger aquatic plants such as eelgrass. Bivalve shellfish can help control the overabundance of phytoplankton in parts of Hood Canal and South Puget Sound, where nitrogen from terrestrial sources has led to over-fertilization of marine waters. The best option for marine waters is to greatly reduce or eliminate the flow of nitrogen from land to sea. Failing that, bivalve shellfish introduced into nitrogen-rich marine waters can be an effective part

of a remediation plan. The animals consume and retain nitrogen. When they are harvested, the nitrogen they consumed is removed from the system.

It's the Water

Shellfish harvested in clean water are safe to eat; shellfish harvested in dirty water are not. Clams and oysters filter the water, picking out phytoplankton, bacteria and viruses to feed themselves. Shed by all warm-blooded animals, fecal coliform bacteria are food for bivalve shellfish and can cause illness in humans who eat shellfish tainted by the bacteria.

Information about water quality at or near your beach is available from the Washington State Department of Health's Office of Shellfish and Water Protection or local county health jurisdictions. Those agencies also provide water quality information about commercial and public recreation areas in watersheds.

Manila clams



The state and counties generally do not assess private tideland water quality. Shoreline property owners may be able to infer the water quality of their tidelands based on state assessments of a nearby commercial operation or public beach. Another approach would be to sample your beach's shellfish and submit them to a lab for analysis. One test, however, will only be a snapshot of the water quality conditions on your beach on that day. The state and counties perform sampling over time and review a full set of data to make an assessment. Contamination levels can change with property use, weather and season. Do not harvest and eat shellfish if there are any doubts about their safety.



Submitting shellfish samples for testing

What to Look For: Your Land Affects Your Water

Septic Systems

Standing on your beach looking up at the land, what do you see? A house, a dog, a nicely manicured lawn — and a bright green algae trail coming from a bulkhead weep?

Does your house have a septic system? If so, do you know where it is located? If it's exposed to tidal waters at certain times of the day, it could be easily flushed out onto your beach and shellfish. Inspections are really important to make sure that all of the components of your system are working properly and the septic tank doesn't need to be pumped. Routine septic system inspections will help catch problems before they give you a stomachache. Washington Sea Grant offers a host of publications, workshops and videos about septic system operation and maintenance. Check out the Resource Guide at the end of this document for titles and links.

Animal Waste

How you handle pet poop in your yard is important. Dogs, cats, chickens, birds, horses and other livestock all can contribute to fecal coliform pollution. Letting the rain wash away the poop in your yard is an easy way to make it disappear, but where does it go? Does it flow, with the water, down onto your shellfish? Remember, shellfish will be filtering those particles of poop as they pass by. When animals are allowed to make deposits on the beach, the feces liquefy and become shellfish and fish food. Yuck! Pick up your dog and cat waste, bag it, and put it into the trash, not into the septic system. For horses or other livestock, contact your local conservation district for manure management assistance. Horses for Clean Water also has an extensive Web site that can help you select the right kind of manure management system for your situation.



Scoop your pet poop

If you have a dock or a float that seals and birds like to visit, it is important to sweep the feces into a bag, not the water, and put the bag in the garbage. Even dry feces can contain active pathogens.



Yard and Garden Treatments

What products do you use on the lawn or in your garden to keep it growing and free of weeds and pests? Are those products being picked up by the rain or the water from your sprinkler and running off onto your beach? If they are, the shellfish are filtering it and perhaps concentrating those compounds in their bodies.



Select the right plants for your shoreline

You can use slower-release fertilizers that bind better to the soil and vegetation, slowly releasing nutrients needed by the plants throughout the growing season. If you use fertilizers, use only the recommended amount. You may even decide that you don't need a bright green lawn and the fertilizer applications that go with it. A simple way to see how far your fertilizer is running is to dye it with a food-grade dye — a blue dry drink mix will work. Fertilize with the dye-covered granules as usual, then water. If the dye is running into the water, you know the fertilizer is right there with it. Keeping fertilizer applications farther from the shoreline may help. Remember: fertilizers make sea plants, as well as land plants, grow. Washington Sea Grant offers a host of publications and workshops about Blue Thumb Gardening. Check out the Resource Guide at the end of this document for more information.

Nutrients

If you think nutrients may be running off your property into the water, look for green algae trails on your beach, leading from bulkhead weeps or freshwater seeps. Though they may not come from the fertilizer you use, green algae trails do indicate a presence of excessive nutrients running from the land into the sea. The trails could also originate from septic systems, pet waste or other sources and carry pathogens. Check out all green seeps and trace them back to their source.



A green algae seep full of nutrients

Help Your Land Filter Your Runoff

There are some simple things you can do to filter the water running off of your property and onto your shellfish. Plant and maintain shoreline vegetation. Trees, shrubs and small plants can all work together as a biological filter, taking up excess nutrients and water that would otherwise run onto the beach. The fibrous roots of trees and shrubs can also help to hold the soil on the bank and keep it from being washed down on top of your oysters or clams. Pacific oysters have an ability to clap their valves and uncover themselves — up to a point — but the smaller Olympia oysters can suffocate if buried under too much silt. Too much sediment running onto the beach can also bury clams deeper, smothering them if they cannot climb higher to expose their siphons to the water.

Trees suitable for marine shoreline plantings include: Big Leaf Maple, Douglas Fir, Pacific Madrone, Pacific Yew, Scouler's Willow, Shore Pine, Sitka Spruce, Western Red Cedar and Western White Pine. You can have your tree and a view, too! Interlimbing, windowing and skirting up are all techniques used by arborists to maintain the health of the tree and its positive impact on the ecosystem and also allow for a beautiful view out onto the bay.

These marine shoreline shrubs work in companion with trees to help bind the soil and capture rainwater: Bald Hip, Nootka and Clustered roses; Beaked Hazelnut; Ocean Spray; Pacific Ninebark; Red Twig Dogwood; Red Flowering Currant; Mock Orange; Serviceberry; Snowberry; and Vine Maple. These plants create thickets, can be pruned for more openness and are less likely to block views.



Trees and shrubs filter runoff.

Don't forget groundcovers that will also help filter out nutrients and water: Bunchberry, Deerfern, Kinnikinnik, Swordfern, Trailing Blackberry and Twinflower, to name a few. Groundcovers are easy to establish, have attractive flowers, attract pollinators, like hummingbirds, and provide habitat for small mammals and birds.

One of the greatest joys Puget Sound has to offer is the opportunity to dig clams and shuck oysters, creating a healthy, delightful meal out of a day's gathering. Even more special is the ability to step right outside your front door and harvest shellfish from your own tidelands. By taking care to limit the nutrients and pathogens running off of your property and into the Sound, and by maintaining a healthy population of shellfish on your beach, you will be helping to improve the water quality of Puget Sound — one bite at a time.

Resources

Shellfish Aquaculture

Small-Scale Clam Farming for Pleasure and Profit
<http://wsg.washington.edu/mas/pdfs/clamfarmlr.pdf>

Small-Scale Oyster Farming for Pleasure and Profit
<http://wsg.washington.edu/mas/pdfs/smallscaleoysterlr.pdf>

Reestablishing Olympia Oyster Populations in Puget Sound
<http://wsg.washington.edu/mas/pdfs/olyoysterlr.pdf>

**Gathering Safe Shellfish in Washington —
 Avoiding Paralytic Shellfish Poisoning**
<http://wsg.washington.edu/mas/pdfs/SafeShellfishBooklet.pdf>

The Nutritional Value of Shellfish
http://www.wsg.washington.edu/communications/online/shellfishnutrition_09.pdf

Septic Systems

**Septic Sense, Scents, Cents:
 Supreme Insights to the Fearless Flush**
<http://www.wsg.washington.edu/mas/pdfs/SepticSense.pdf>

Pumping Your Septic Tank
<http://wsg.washington.edu/mas/pdfs/pumpseptic.pdf>

Landscaping Your Septic System
<http://wsg.washington.edu/mas/pdfs/landscapesepic.pdf>

Homeowner's Manuals

Gravity System — <http://wsg.washington.edu/mas/pdfs/gravity.pdf>

Sand Filter — <http://wsg.washington.edu/mas/pdfs/sand.pdf>

Pressure Distribution System — <http://wsg.washington.edu/mas/pdfs/pressure.pdf>

Proprietary Device System — <http://wsg.washington.edu/mas/pdfs/proprietary.pdf>

Mound System — <http://wsg.washington.edu/mas/pdfs/mound.pdf>

Videos available from sgpubs@u.washington.edu

Animal Waste

Conservation Commission — www.scc.wa.gov

Horses for Clean Water — www.horsesforcleanwater.com

Snohomish County Pet Waste — www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Services/Water_Pollution/Pet_Waste.htm

Gardening

Blue Thumb Gardening brochure
<http://wsg.washington.edu/mas/pdfs/BlueThumb.pdf>



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