

BEYOND BULKHEADS



Washington Sea Grant completes what may be the largest residential de-armoring ever undertaken on Puget Sound, restoring a Bainbridge Island estate's natural shoreline and setting an example for waterfront owners everywhere.



The Bainbridge Island Land Trust asked WSG's Jim Brennan to advise as to whether de-armoring would be feasible, and whether it would be worth it.

By Eric Scigliano

Puget Sound has more armor than a medieval arsenal — 600-plus miles of concrete, rock and timbers, enclosing 26 percent of its shoreline. Quantified local data on shoreline armoring's biological effects are in short supply (see next page for one Washington Sea Grant scientist's efforts to obtain these). But armoring has been widely observed to block natural beach replenishment, contribute to scouring, and choke off intertidal habitats that are essential nurseries and feeding grounds for salmon and many other fish species.

And the armoring continues: A little over a mile of it still gets laid along Puget Sound's shores each year, 76 percent of it beside single-family residences, according to data collected by the Washington Department of Fish and Wildlife. This trend may accelerate as climate change progresses and sea level rises, colliding with development near and on top of intertidal areas. "It's really death by a thousand cuts," says Randy Carman, DFW's near shore section manager.

This unwelcome trend briefly reversed last autumn, when the bulkheads came down along 1,544 feet of placid Port Madison at the northeast corner of Bainbridge Island. The Powel Shoreline Restoration Project, as it's called, marked the culmination of three years' painstaking work by Jim Brennan, Washington Sea Grant's Bainbridge-based marine habitat specialist, in close collaboration with Brenda Padgham, the stewardship director of the Bainbridge Island Land Trust (which sponsored the project), the Powel Family, and other stakeholders.

The Powel estate presented both a rare opportunity and some special challenges. The Powels held an unusually long stretch of shoreline, about 1,800 feet, and were sympathetic to shoreline restoration. They had already granted a conservation easement to the Land Trust, and Padgham had maintained a close relationship with them. And, as their 40-to-80-year-old bulkheads started to fail, they faced a potential half-million-dollar replacement bill — a strong inducement to consider alternatives.

Nevertheless, the project was challenging on both the technical and human levels. The shore was lined with a complex mix of stone and concrete walls, concrete fill, riprap, and creosoted wood. One of the property's two homes was only about 30 feet from shore, and the family wanted to preserve the intervening lawn and riprap and be assured that removing the armoring on either side would not undermine them. And how could so much rock, timber, and concrete be removed without damaging either the grounds above or the tidelands below?

Padgham had the diplomatic skills to mediate the intrafamilial issues that inevitably arose; Brennan and family members alike marveled at her tact and patience. But the Land Trust lacked experience at large-scale shoreline restoration. And so it turned to Sea Grant.

The Land Trust initially asked Brennan and other resource managers to evaluate the feasibility and conservation value of de-armoring the property — the sort of technical assistance he's provided on a wide range of shoreline projects. Feasibility: check. Conservation value: check — this could be a prime feeding ground and refuge for young salmonids. But who could manage it?

The Land Trust hired Brennan to manage first the design and then the execution. He helped the Trust secure \$400,000 in grants from the Puget Sound Acquisition and Restoration Fund (the Powels put up matching funds) and steered the project through a multi-agency labyrinth of permits and soil, drainage, vegetation, and archaeological assessments. Getting the last done early, rather than waiting to discover old artifacts, avoided later delays.

Brennan found contractors who could bring the necessary finesse and enthusiasm to the job. Chris Kachman, a backhoe maestro from Tacoma's Sound Bulkhead, managed to demolish the bulkheads and deposit the rubble on barges while sparing the salt-marsh vegetation below.



PENETRATING THE SECRETS OF BEACH ARMORING

For all the concerns about armoring's impacts, precious little local study has been done to quantify them. Megan Dethier is trying to change that.

Armoring is widespread on local shores, as are observations of its physical and biological impacts. But hard data are harder to come by.

Those impacts have been studied and confirmed in Europe, New England, and Hawaii. "But as naysayers are quick to point out, conditions are very different here," says Megan Dethier, a Washington Sea Grant-supported biologist based at UW's Friday Harbor Marine Labs. And there have been "surprisingly few" studies documenting impacts in this region.

Dethier has set out to change that, though she acknowledges it's a forbidding research subject: "It's trying to look at a process that takes decades. Funding organizations don't tend to provide money for a study taking longer than two or three years."

Above the waterline, crews removed vinca, sweet peas, and other invasive plants from nearly 33,000 square feet of grounds and planted 2,650 native trees and other plants. They left more grass lawn than set-back models might normally call for — but again, conservation had to be balanced against human use. They let stay several large conifers growing dramatically out over the water; their roots actually run far back from the bank, Brennan explains, anchoring them securely, and they provide valuable shade for salmon and other fish.

The team refrained from excavating and reshaping the banks or "enriching" the beach with added sand. "I tend to take a minimalist approach," Brennan explains. "You remove the obstacles, then get out of the way and let nature do the rest." Nature is already obliging; much of the backfill behind the bulkheads proved to be barnacled rocks and other old beach material. "It's dropped back down on the beach and taken its own shape," says Brennan. Pickleweed and other intertidal plants have already begun to emerge.

A third-mile of restored shoreline may seem like small change against the 600-plus miles of local armoring. But the Powel project is nevertheless a signal achievement — what appears to be the largest residential shoreline restoration ever undertaken on Puget Sound, surpassing all the residential armoring removed Sound-wide in the six recent years tallied by the Department of Natural Resources. (Most de-armoring occurs on public lands, though these contain just 14 percent of local armoring.) It stands as a model, a challenge, and an invitation to other waterfront owners — a proof of possibilities beyond the familiar riprap and bulkheads. "The idea is to have this be a demonstration project, and allow other people to see alternatives to armoring," says Padgham.

By undertaking this demonstration on Bainbridge Island, the Land Trust and Sea Grant have taken the message to ground zero in the debate over shoreline

Elsewhere, an accumulation of studies over many years has documented those impacts. Dethier decided to beat that clock by comparing conditions at 31 pairs of neighboring beaches, 25 on Central Puget Sound and six on the South Sound. One in each pair was armored, the other not.

For three years, she and her colleagues have surveyed the beaches' topography and overhanging vegetation, measured their sediment grains, and deployed wave gauges. They've tallied washed-up logs and wrack, the insects, crustaceans, and worms dwelling amid them, and the abundance and types of juvenile clams in the low shore. To unravel what this means for the food web, graduate student Sarah Heerhartz snorkeled the Central Sound sites, counting juvenile salmon and recording their behavior. She's also developed studies (still underway) to quantify beach use by land birds.

Dethier and her team are still analyzing their data and preparing them for publication, which should commence this summer. They haven't found differences in grain size or clam abundance at the mid-shore, though she cautions that impacts may yet occur in the longer term. Further up, they found slightly steeper foreshores and coarser sediments on armored beaches — a concern for surf smelt and other forage fish that spawn there. The armored beaches also had less riparian vegetation and substantially fewer logs (important as wave buffers and habitat) and less wrack, which feeds and shelters the invertebrates on which birds, juvenile salmon, and other fish feed. Preliminary data suggest the armored beaches have fewer insects; the salmon counts may determine whether this affects the fish that feed on these insects.

Amidst all the challenges of documenting so many phenomena at so many sites, Dethier faced a special hurdle: getting landowners' permission to study their beaches. "People with armoring are very beleaguered," she says. "I was regarded as the enemy. I can't blame them. If I had a million-dollar house and people kept telling me I should take out my armoring, I would be wary."

Nevertheless, she recalls "the exceptions — people who came down and brought us coffee and cookies when we were working in front of their seawalls. Other people threatened to call the sheriff."

What impressed Dethier most, however, was the number of beach walkers who stopped to ask about the processes she was studying — and how much they had to share on the subject. "It was neat to hear them tell stories about how things were 20 years ago — 'The beach used to come down to here...'" Somebody should be collecting this sort of mental baseline. It would be very appropriate for studying large areas of Puget Sound. It's anecdotal, but if you get enough anecdotal evidence it can be useful."

Indeed, it might provide the sort of history gained from accumulated studies elsewhere. "But it needs a sociologist," Dethier sighs. "That's not me." — E.S.

Dethier's colleagues in this project include Jason Toft, Jeff Cordell and Sarah Heerhartz at the UW School of Aquatic and Fishery Sciences, Andrea Ogston at the School of Oceanography (for beach topography and wave-gauge work), and Helen Berry at the Washington Department of Natural Resources.

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armoring. Nearly two-thirds of the island's shores have been clad in concrete, stone, and timbers. Kitsap and nearby Mason and Island Counties together account for more than half the new armoring in all 12 Salish Sea counties. And Bainbridge has been home to some particularly vehement defenders of armoring, including a now-retired bulkhead builder renowned for monumental projects using what DFW's Randy Carman calls "rocks the size of Volkswagens."

So far the Powells' example hasn't induced any other waterfront dwellers to rip out their riprap. But skeptical neighbors have been won over, says Padgham, and "a couple people are interested in pursuing their own de-armoring." And the example has resonated further afield. In March, Padgham, Brennan, and Babe Kehers, a Powel family member who played a key role in seeing the restoration through, spoke about the project at the annual conference of the Oregon and Washington land trusts.

Kehers says family members are delighted with the outcome, and even one brother who doubted the project now grudgingly concedes its success. Carman publicly touts it as "a great example of complexity and collaboration." Following its completion, "I gave a presentation to our habitat program quarterly meeting in Olympia. I used the Powel project as a positive example of what we can do — after all the dire reports, here's a good one!"



With the Powells' bulkheads gone, native forest plants take root above and pickleweed and other intertidal plants emerge below.

ELWHA UNCHAINED,

Even before the last Elwha River dam sections come down, Sea Grant researchers are finding dramatic changes in the beaches downstream and a whole new world for fish blocked by the dams.

by Jocelyn Robinson, WSG Science Writing Fellow

The Elwha River is starting to flow free once again. The last pieces of the Elwha Dam, which blocked the river's course for nearly a century, came down last year, and the upstream Glines Canyon Dam was supposed to be gone by autumn 2013 (though downstream issues now delay completion).

The river has already changed: Fish that were blocked by the dams have begun to recolonize the river's upper reaches, mixing with populations that were trapped above them. Newly released water and sediments are transforming the riverbed and downstream beaches. This is a lab experiment on steroids, a large-scale test of adaptation and evolution. Washington Sea Grant-funded researchers are taking advantage of this unique opportunity to learn how a river returns to a natural state.

Thomas Quinn, a professor in UW's School of Aquatics and Fishery Science and a lead researcher on the Elwha project, is studying the changing life histories of the Elwha's anadromous and resident fish populations. The river is home to all five native salmon species — Chinook, coho, sockeye, chum and pink — as well as Dolly Varden, steelhead, rainbow, bull, cutthroat, and nonnative brook trout. Before the dams, the Elwha's salmon runs were among the biggest in the state; now only a few thousand fish return each year. But the river is primed for recolonization; 87 percent of its watershed lies within Olympic National Park, whose mossy trees and fog-shrouded hills are shielded from logging and mining. Quinn and other researchers hope to see dormant life cycles resume with the opening of the salmon's ancestral habitat.

Just as the Chinook can now reach upstream habitat, Lake Sutherland's formerly landlocked kokanee (freshwater sockeye) can now move downriver. Quinn wants to know if they were a pre-dam freshwater population or anadromous fish that got trapped behind the dams. To find out, he and his colleagues are measuring eggs and body shapes, sampling tissue isotopes, and removing otoliths ("ear stones" that show annual rings), all of which differ in anadromous and freshwater populations.

These questions aren't just matters of curiosity, Quinn notes. They affect a population's resilience and ability to adapt to changing conditions. If the ocean-going steelhead are flourishing while river-bound rainbows (freshwater versions of the same species) struggle, or vice versa, might one population stabilize the other?

This isn't the first time Quinn has investigated salmon recolonization. When barriers to fish passage at the

FISH IN FLUX

Landsburg Dam on the Cedar River came down in 2003, Quinn and other scientists measured and sampled the first salmon to venture upstream. But the Cedar pales in complexity; the Elwha is a much bigger river with many more species, and the dams' removal will trigger a multitude of physical and biological changes. "On the Cedar, we essentially opened the door and kept count," says Quinn. "On the Elwha, we kind of blew up the door... The removal of the huge dams will not leave convenient sites for counting fish, so keeping track of the recolonization will require many different kinds of studies."

Historically the Elwha was home to stream-type Chinook, which are typically found in colder, larger and more stable river systems. Because of the low temperatures, stream-type Chinook are slow-growing and linger in freshwater for a year before migrating to sea. In contrast, ocean-type Chinook migrate after only a few months in freshwater. The Elwha's headwaters were ideal for stream-type Chinook, but the dams blocked their way. Now these kings are returning and spawning — in very small numbers, NOAA fisheries biologist George Pess says, "but we're starting to see it."

The researchers are using a number of tools: sonar, which helps track fish in sediment-laden water; physical sampling to determine genetics, body morphology, and sex ratios; tagging to determine where the fish are spawning; and on-foot and snorkel surveys of juvenile fish.

Quinn is collaborating with researchers from a host of federal, state, and tribal entities, including NOAA, the U.S. Geological Survey, the Fish and Wildlife and National Parks Services, the Washington Department of Fish and Wildlife and the Lower Elwha Klallam Tribe. Collaboration is central to the project, he says, and necessary to avoid costly duplication. For example, Quinn asked tribal biologists, who were already measuring water quality and temperature on Lake Sutherland, to begin sampling zooplankton in the lake to determine whether returning salmon would have enough food. The tribe agreed, saving Quinn money and gaining information it could also use.

Student contributions are key to Sea Grant projects, and Emily Thornton, a fisheries graduate student at UW, has assisted with everything from sampling kokanee and zooplankton to snorkel surveys and invasive plant removal. She's now trying to determine how long it takes steelhead fry to lose the saltwater isotopes transferred from their parents, to help identify fresh and saltwater fish in the Elwha. Lab fry will be fed ocean or freshwater food and the subsequent

decline in nitrogen isotopes measured. "It's trying to find the little ways the world works that haven't been discovered before," says Thornton. She's also assessing how brook trout introduced after the dams' construction will affect coho recolonization.

The dams' removal has physical as well as biological implications. Preliminary estimates by the USGS suggest that the river has already flushed out nearly 1.2 million cubic meters of sediments. Sea Grant coastal hazards specialist Ian Miller is monitoring these sediments' effects on the eroded beaches at the river's mouth. Twice a month, Miller measures grain size and beach shape at three sites east of the mouth and one to the west. He uses kinematic differential GPS — basically the same system surveyors use — to compare today's beach with measurements taken as far back as 2001. And he uses a USGS system called Cobble Cam to measure sand grain size from digital photos.

The changes are striking: The rocks of a year ago have been replaced by sand — a phenomenal amount, "unlike anything we've ever seen," says Miller — and the once-eroding beach just east of the mouth has grown by nearly 100 meters.

Deciphering the Elwha's changes requires both rapid response and long-term commitment. The Lower Elwha Klallam Tribe expects full restoration to take 20 to 30 years. That will consummate decades of work by the tribe, which helped win passage of the federal Elwha River Restoration Act in 1992.

"Getting the river restored has been one of the tribe's top priorities ever since I can remember," says Robert Eloffson, who directs the tribe's Elwha restoration projects. "When we started, just about our only allies were the environmental groups." Eventually the federal agencies came on board, as the cost-benefit ratio for dam removal improved. Now the river itself, in its free-flowing natural state, is their ally.



UW fisheries professor Tom Quinn has documented the salmon's return to the Cedar and now the Elwha River.



WSG's Ian Miller marvels at a beach recovery "unlike anything we've ever seen."



FIELD NOTES

Washington Sea Grant has placed a record five **Marc Hershman Marine Policy Fellows** for 2012—13, who are working on coastal hazards, harmful algal blooms, marine spatial planning, pathogen reduction, and marine protection and restoration strategies in Puget Sound. Congratulations to UW Marine and Environmental Affairs graduates **Kara Cardinal** (working at the Nature Conservancy), **Gretchen Glaub** (at the Washington Department of Ecology), Constance Sullivan (Puget Sound Partnership), Libby Whiting (Department of Natural Resources), and Laura Wigand (Department of Health).



Marc Hershman, 1942-2008, former professor and director of the University of Washington School of Marine Affairs and member of the U.S. Commission on Ocean Policy.

In 2012 WSG also launched a partnership with the Washington NASA Space Grant Consortium to offer undergraduate scholarships and summer research opportunities to students pursuing degrees in the marine sciences. Space Grant/Sea Grant Scholars **Eryca Benson** (2012) and **Michael Barsamian** (2013) and 2012 Summer Undergraduate Research Program recipients **Philippe Enos**, **Neil Gompertz**, **Marisa Karpack**, **Danielle Lemmon**, and **Daniel Noteboom** are cleared for take-off.



On April 2, ocean acidification specialist **Meg Chadsey** shared the speaker's table with Taylor Shellfish's Bill Dewey and Café Campagne owner Gordon Daisley at "Changing Tides," a forum on acidification's causes, effects, and potential cures hosted by the Seattle Chefs Collaborative and Ocean Conservancy. Afterward the 100 taste-setters in attendance dined, of course — on underappreciated local marine delicacies such as herring, smelt, and gooseneck barnacles.

Speaking of acidification, WSG-supported researcher **Carolyn Friedman's** investigations of ocean acidification's effects on Olympia oysters are highlighted in a feature article, "Pacific Oysters Serving as Ocean Acidification Sentinels," in the year's first issue of *Fish Farming News*, at fish-news.com/ffn/pacific-oysters-serving-as-ocean-acidification-sentinels.



Boating program specialist **Aaron Barnett** will soon embark on another two-year Boat Pumpout contract with Washington State Parks, sharing the pump-don't-dump gospel and free pumpout adapter kits with Puget Sound, Columbia River, and Eastern Washington boaters. In August Aaron and fellow-paddler volunteers will take the message to the water, loading their kayaks with pumpout kits for distribution around the San Juan Islands.



Marine spatial planning specialist **Bridget Trostin** and field agent **Steve Harbell** conducted three spring workshops on marine spatial planning at Aberdeen's picturesque Rotary Log Pavilion, with help from Hershman Fellows **Libby Whiting** and **Kara Cardinal** and Ecology's Jennifer Hennessey. (March 29, April 26, May 3). Representatives from various federal, state, and local agencies, coastal tribes, and the Washington Coast Marine Advisory Council have joined in to define goals and objectives for a coastal marine spatial plan.

Marine habitat specialist **Jim Brennan** is finally getting the chance to work on a project he first proposed even before the state transferred Fay Bainbridge State Park to the City of Bainbridge Island in 2010: a boardwalk system that will help visitors see more of the shore while protecting plants and wildlife from trampling and erosion. In March Jim and Capstone student **Mariah Vane**, working with Bainbridge Parks, rolled out a draft plan, alignment, signage, and budget for the project, together with a public survey that Mariah is now analyzing.

Marine advisory services leader **Pete Granger** and continuing education coordinator **Sarah Fiskén** attended a national Sea Grant Fisheries Extension Network training conference in late April in San Diego. Pete spoke about direct marketing for fishermen.



Above: WSG's Pete Granger and Sarah Fiskén. Right: Ada Millicent with her big sister Kendall.



Coastal management specialist **Nicole Faghin** brought a very big project to a close in March: hosting the third National Working Waterfronts and Waterways Symposium, in Tacoma. The symposium attracted nearly 300 attendees from four countries and 24 states; 130 speakers from industry, government, and academia at 36 sessions; and Senator Patty Murray, as keynote speaker.

In April, our man on the Olympic Peninsula, geologist and coastal hazards specialist **Ian Miller**, crossed over to Whidbey Island to provide technical assistance to homeowners and agencies dealing with the effects of the massive Coupeville landslide.



On April 3, citizen science specialist **Kate Little** brought a new citizen, and perhaps future scientist, Ada Millicent, into the world.

MEET & GREET

WSG welcomes five new Sea Granters



Public information specialist **Allegra Abramo** grew up amid the rolling hills of northwest New Jersey, but after nearly 14 years on the West Coast can't imagine living far from real mountains. She holds a BA in English from Columbia University and an MPA and an MS in natural resources management from the University of Washington. Before coming to WSG, she managed water conservation programs at Seattle Public Utilities and worked for several environmental and public interest nonprofits. She splits her time here between press releases, impact statements and other communications duties and assisting **Aaron Barnett** in the boat pumpout campaign, *pumpoutwashington.org*. Outside WSG, she takes on freelance writing, research, and communications projects and volunteers as a foster "parent" for the Seattle Animal Shelter. *Allegra Abramo: 206.685.8191, aabramo@uw.edu.*

Ocean acidification specialist **Meg Chadsey** set out to be a marine biologist, but got sidetracked by a PhD in microbial genetics at UW. "Halfway through my postdoc I found myself drifting back to the sea, skipping pathology seminars to audit classes at the School of Marine and Environmental Affairs." She did a stint at the Marine Stewardship Council, a project on



Pseudo-nitzschia impacts, and many years on the board of the Seattle Chefs Collaborative, promoting sustainable seafood, "It gave me the chutzpah to waltz into WSG and pitch the idea of coordinating an ocean acidification symposium," she says.

That event prompted Governor Chris Gregoire to convene the Washington State Blue Ribbon Panel on Ocean Acidification. WSG brought Chadsey on to coordinate the panel and oversee the preparation of its scientific summary, then hired her as its first OA specialist, advancing a wide range of acidification-related projects. She also serves as WSG's liaison on acidification to NOAA's Pacific Marine Environmental Laboratory. *Meg Chadsey: 206.669.1637, wsgoa@uw.edu.*

Nicole Faghin brings a wealth of study and experience to her work as WSG's coastal management specialist. With a law degree from the Northeastern University School of Law and an MA in city planning from MIT, she worked for three years as an attorney and for 22 as an urban planner specializing in coastal zone management and waterfront planning. She has taught in the University of Washington's Urban Planning Program (in Seattle) and Urban Studies Program (in Tacoma) and been a guest lecturer in its School of Marine and Environmental Affairs and at the Department of Ecology's Coastal Training Program. She now works out



of both Sea Grant's Seattle office and the Center for Urban Waters in Tacoma on shoreline-friendly projects such as Green Shores for Homes and the National Working Waterfronts and Waterways Network. *Nicole Faghin: 425.327.1036, faghin@uw.edu.*



Science writer and *Sea Star* editor **Eric Scigliano** came to Washington from New Mexico, which had great beach terrain but no ocean. A past instructor in the UW Writers' Program, he has written on environmental and marine issues for Northwest newspapers and magazines for more than 30 years. His books include *Puget Sound: Sea Between the Mountains, Love War and Circuses* (on elephants), *Michelangelo's Mountain* (on the marble quarries of Carrara), and, with Curtis E. Ebbesmeyer, *Flotsametrics* (on ocean currents). *Sweetening the Waters*, his 2012 examination of strategies for addressing ocean acidification, can be found appended to the report of Washington's Blue Ribbon Panel on Ocean Acidification, fortress.wa.gov/ecy/publications/SummaryPages/1201015.html. He's delighted to be able to spend more time on marine subjects at WSG. *Eric Scigliano: 206.616.9568, escig@uw.edu.*

We bid a fond farewell to WSG's able communications manager, **Dan Williams**, who's retired, and administrator, **Karen Mooseker**, (below), who's left to become the Northshore School District's director of support services, and a warm welcome to our new administrator, **Gwyn Hinton**, (right). With seven years' experience managing the UW College of Education's fiscal operations (and pinch-hitting as college administrator, grants manager and payroll coordinator), plus five as program operations manager at the Evans School of Public Affairs, Gwyn has what it takes to keep our ship under sail.



Michigan native **Jamie Mooney** came to Sea Grant as a Hershman Fellow in 2010 after obtaining her MA in Marine Affairs from the University of Washington. As a Fellow, and subsequently as a staff member at Washington State's Emergency Management Division, she worked on coastal hazards, emergency preparedness, and coastal community resilience, dealing often with local, state, federal and tribal officials. All this helped prepare her for her current role as WSG's coastal resource specialist, helping communities deal with various coastal hazards and development issues. She also serves as liaison to the Pacific Marine Environmental Laboratory on tsunamis. *Jamie Mooney: 206.616.3368, mooneyja@uw.edu.*

Chicago-born **Bridget Trosin**, WSG's marine spatial planning specialist, worked on Washington's MSP process as a Marc Hershman Fellow at the Department of Ecology. But her passion for involving local communities in the process was inspired by her experience in the Philippines, where she researched subsistence fishing communities for her Master's thesis at UW's School of Marine and Environmental Affairs. "There's a long history of decentralized, community-based management of resources there". Still there are differences: "Here there's a lot of top-down management. There it's almost too decentralized, because government is so weak. You need both to make management work." *Bridget Trosin: 206.616.6129, bemmett@uw.edu.*

FLOATABLE & QUOTABLE

Let the Sculpins Do the Dirty Work

“We’ll get some blowback over this. People ask us, ‘What are you wasting your time on sculpin for?’ Our answer: They sample our environment for us.” –Sea Grant researcher Glenn VanBlaricom on how he and his colleagues monitor the biota on geoduck aquaculture beds by tracking the diets of the voracious staghorn sculpin residing there.



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