COVER STORY

PUGET SOUND: SAVING A NORTHWEST GEM

By Marita Graube

It's a chilly morning on Bainbridge Island as Paul Dorn slowly moves his net over the still water. Below him, a glittering mob of anchovies dart about, ducking under our boat at the first sense of movement. Our crew of scientists and volunteers watch the hunt intently, bundled up in the morning mist against the backdrop of downtown Seattle across the Puget Sound.

The sudden splash of a hungry salmon breaks the silence, mocking our efforts to catch just one wily anchovy. Dorn, a salmon recovery expert with the Suquamish tribe, has invited us along on this hip-wader adventure. We're on a catch-and-release mission to survey the island's shallow waters, tallying the perch, anchovies, crabs, and any other creatures that inhabit this narrow interface between land and sea: the nearshore.

Scientists have long studied the water and land, but the interaction between the two systems is still a relative unknown, only recently reaching the spotlight. Studies are underway to determine just how the beaches, marshes, and bluffs of the nearshore ecosystem play into the overall health of the Puget Sound. The hope is to recommend a recovery plan for the Puget Sound system, considered to be yet another fatigued estuary on the verge of collapse.

Teeming with natural beauty, it may be difficult for untrained eyes to notice the signs of distress.

Sandwiched between the snow-peaked Cascade and Olympic ranges, the Puget Sound is a photographer's delight. Glacially-carved valleys and fjords collect the deposits of 10,000 streams and rivers, mixing twice a day with the tides. The region supports hundreds of fish species, a few dozen marine mammal species, and around one hundred types of seabirds.

But one-third of this 2500-mile shoreline has been modified, cemented with bulkheads, dredged for ports, or filled in for cities or farmland. Human waste continues to spew into the waters and storm drains eject the run-off of the streets' oils and pollutants. Salmon populations have declined, commercial shellfish beds have intermittently closed, and local orca populations are listed as endangered.

For many years, these troubling issues of Puget Sound have been recognized by many local, state, and federal groups. The U.S. Army Corps of Engineers and the U.S. Geological Survey are creating a feasibility report for the proposed restoration project. Specific restorations could include changing land use, removing invasive species and dikes, and better managing existing species.

If Congress approves the recommendations in 2007 or 2008, it could mean billions of dollars over at least twenty years to start restoring Puget Sound. Then the Sound would join the ranks of other high profile restoration projects already underway: Chesapeake Bay, Florida Everglades, and San Francisco Bay. But Puget Sound differs from other projects because there's no one single factor contributing to its demise.

"We don't know what's specifically wrong in Puget Sound," says Fred Goetz, fish biologist for the U.S. Army Corps of Engineers in Seattle, Wash. "The problem still isn't identified. It's hard to sort out what the natural system is doing on its own versus what we may have done." Goetz says that some of the problems are identified, but they need to put all those elements together to determine what actions to take.

A Nearshore Focus

The Puget Sound restoration places great emphasis on the nearshore environment, considered an essential nursery habitat for young fish and home to nine of the ten threatened or endangered species in the Puget Sound.

Jim Brennan, Marine Habitat Specialist for Washington Sea Grant Program in Seattle, Wash., has studied this transition area and identified a number of links between fish and the uplands. In one analysis of stomach contents of juvenile Chinook salmon caught along marine shorelines, he determined that about one-half of the prey items were terrestrial insects. "That draws a nice ecological link between the fish in the water and the vegetation on the shoreline," he says. Maintaining the shoreline vegetation, says Brennan, supports many of the vital connections between the land and the water.

Important forage fishes, such as smelt and sandlance, lay their eggs high on beaches and the hatchlings use the shallow waters to feed. Eelgrass provides an underwater forest for the sea creatures, while bluffs and cliffs slowly erode to replenish the necessary sediments and nutrients. Shoreline trees cast cool shadows over the beaches and drop leaves that are soon broken down by insects, making nutrients available to the food web.

"The nearshore is sort of like the bathtub ring: It sits at the focal point," says Kurt Fresh, a research fisheries biologist at the Northwest Fisheries Science Center in Seattle, Wash. "But the fundamental problem is basically people," says Fresh. "We have an environment here in Puget Sound that we all love. Yet the very things that we love it for make it incredibly vulnerable."

Naturally, the nearshore is a choice spot for recreation and homes. Census data points to increasing population growth along the nearshore. In 2005, 4.2 million people lived in Washington's 12 coastal counties, nearly two-thirds of the state's population. Of those, 85 percent lived within 10 miles of the shoreline. By 2025, another 1.5 million people will squeeze into the Puget Sound region, adding greater pressure to the infrastructure and coastal environments.

If the region's growth and development continues at today's pace, how will it affect Puget Sound? Marina Alberti, professor of urban design and planning at the University of Washington, can give us some predictions.

Alberti's project, called "Future Without," is designed to predict how our urban nearshore environment would appear if we continued the same pace of development without any intervention. Her team uses land satellite imagery to classify the types of land cover, such as forest, plains, or paved surfaces. They model how changes in land cover coupled with factors like population growth, climate change, and economic changes, can affect issues like water quality, bird diversity, and marine ecosystems.

With the project, Alberti hopes to forge more interaction between policy makers and the scientific community and help influence development decision making. "We have an opportunity in this region that few other regions have," says Alberti. "It is still not all developed and there are some things that we can do to avoid the mistakes that others have made. So on the positive side, we really have an option to these alternative futures to make a choice of what future we want."

In the present day, many groups are working now to change the future of the Sound. At the Nisqually National Wildlife Refuge near Olympia, Wash., a conservation plan was completed last year to restore 700 acres of the refuge back to a saltwater estuary by removing an old farming dike. "This is the largest estuarine restoration project going on in the Northwest that is this far along," says Jean Takekawa, manager at the Nisqually Refuge. "There's so little estuary left in Puget Sound, in particular salt marshes. Eighty percent of estuarine habitat has been lost in the Sound," she says. The refuge is also acquiring more property to expand its existing boundaries.

Farther upstream, the South Puget Sound Salmon Enhancement Group (SPSSEG) is clearing the way for salmon to return to spawn in their native streams with unfettered access. They work with landowners to expand or replace troublesome culverts that block the salmons' paths. "We're not creating new habitat but just opening up access to existing habitat," explains Lance Winecka, field biologist for SPSSEG in Olympia, Wash. Other shoreline projects include beach nourishment, riparian plantings, and removing shoreline bulkheads and human placed fill, which can drastically alter forage fish spawning beaches and juvenile salmon migration corridors.

"You'll find that you have noticeable differences after one to two years in small areas," says Goetz of small scale projects. "But it may take years to decades to see changes at a large scale in Puget Sound."

Science in the Sound

Beyond the nearshore, scientists still have much to learn about the Puget Sound and ocean waters. But it's an involved process to send out a boat of researchers to study the water. So instead of crewing a ship, scientists have created a remote controlled device that does all the work for a fraction of the cost. One device is called ORCA, the Oceanic Remote Chemical-optical Analyzer. Three ORCA buoys are bobbing in the Hood Canal, measuring the amounts of dissolved oxygen, nutrients, temperature, and salinity. The canal is more of a deep fjord, a narrow elbow of the Puget Sound that can become stagnant due to its underwater topography.

Hood Canal has long suffered from hypoxia, or lack of oxygen mixing into the water. When excess nutrients like nitrogen enter the waters, algal blooms result. When the algae die, they decompose with the little remaining dissolved oxygen. As a result, the amount of dissolved oxygen in the water decreases and many marine creatures cannot survive.

Jan Newton, professor of oceanography at the University of Washington, studies the connections between Hood Canal, the ocean, and humans. She, like other scientists, tends to characterize Puget Sound with knowns and unknowns. "We know that our climate is very dynamic and we have forces from El Niño that are really profound on the Pacific Coast. We know that we have climate change and we know that the number of people in our region is increasing whereas the size of the basin is static."

The main unknown is how much of Hood Canal's problem is exacerbated by human influence like septic runoff and how much is a result of natural processes like wind, tides, and sunlight. All these factors tie into the water's health. With remote sensing devices like ORCA, Newton and other scientists hope to have the data to help us make choices on how to fix the problem.

The effects of human pollution are of particular concern to Bill Dewey, owner of Taylor Shellfish Company in Shelton, Wash. For several years, the area's tidelands have been closed several times to shellfish harvesting due to unsafe levels of pollution. Historically, the tidelands were first threatened by runoff from nearby pulp mills. Today the battle is against non-point source pollution, the accumulated runoff from storm water, fertilized lawns, leaky septic systems, and flushed chemicals. Dewey has worked to strengthen regulations to help keep waters clean. "The efforts are great but are not keeping pace with the rate at which we're polluting it," he says.

Runoff issues may be mitigated by a new project underway in the Northern end of the Puget Sound near Dungeness Bay. Scientists at Battelle Marine Sciences Laboratory in Sequim, Wash., have set up an experiment at a local dairy farm to see if farm runoff can be treated with hungry fungi in a holding tank. They hope to lower the amount of fecal coliform that pollutes downstream shellfish beds.

This fungal technique is called micro-remediation, explains scientist Dana Woodruff. The fungi, she says, "are scavenging on bacteria and nutrients like nitrogen and phosphorus, sequestering it and preventing it from moving out into the nearshore environment." If successful, the technology could be implemented into other sources of runoff.

Government Involvement

While science is key to understanding the problem and determining the solutions, policy and legislation play an important role in the health of Puget Sound.

"If we are not working at the policy end, we're missing a huge part of what is needed to protect most of our Puget Sound," says Kathy Fletcher, executive director of People for Puget Sound in Seattle, Wash., an advocacy group with a mission to save the Sound through education and legislation. Fletcher has been embroiled in the issues since the early 1980s and started People for Puget Sound in 1991.

"The sad truth of the matter is that twenty years later, we're still fighting to stay even. It's really clear that more is needed to be done and it needs to be done at a bigger scale and faster if we're going to have a healthy Puget Sound ecosystem."

Fletcher was recently tapped by Governor Gregoire to serve on the Puget Sound Partnership, an advisory council. The Governor also announced a proposal for a $42 million Puget Sound budget to clean up contaminated lands, restore estuaries, and prevent toxic waste and spills.

Bill Ruckelshaus, former administrator of the U.S. Environmental Protection Agency, and current Seattle resident is also part of the Governor's advisory council. "The Sound is really in trouble," says Ruckelshaus. "Unless we all pull together to get it out of trouble, just as we've inadvertently pulled together to get it into trouble, it won't emerge. We all have to see this as part of our problem, not somebody else's problem to solve."

If we end up solving all the problems, the benefits won't be evident instantly. After restoration, it may take 20 to 30 years for the system to recover, explains Hugh Shipman of the Washington Department of Ecology. This timescale is often a problem, he says, because "we live in a society that wants instant results." In addition, politicians may be compelled to choose short-term economical gains that often work against long-term ecological health.

As Puget Sound faces additional pressures associated with growth and development, citizens have many choices to make. Says Takekawa from the Nisqually National Wildlife Refuge: "We have some tremendous opportunities to try to turn things around before we are faced with eventual collapse of the system, like what has happened in other parts of the country. But with our growing human population and growing urbanization we're going to have to be really creative and assertive about that. Everybody is going to have to pitch in and work together to be sure that it remains an amazing place."

Marita Graube has a degree in technical communication and has studied science writing at the University of Washington.

Images

Top: Paul Dorn, salmon recovery expert, surveys the fish of the nearshore. Photo: Marita Graube

Middle: Almost all of the Seattle shoreline has been modified. Photo: NOAA

Bottom: Surveyors help determine the type of fish they found in the nearshore. Photo: Marita Graube

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