West End Natural Resources News

A publication of the North Pacific Coast Marine Resources Committee (NPC MRC) and NPC Lead Entity for Salmon Recovery.

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Mudminnows!

Where the Smelt Eggs Are:

Coastal Forage Fish Spawning Survey Underway

By Tami Pokorny

When David Hudson, Hoh Tribe council member and fisheries/natural resources tribal representative, was a boy, he would ride with his dad in their Model A south along the coast from the mouth of the Hoh River to fish for smelt. "We got 100 pounds in one scoop of a dip net back then. Nowadays, our younger generation have gillnet seines and they can barely fill a cooler with smelt," he remarked. Smelt, like the other abundant resources of the ocean, forest and rivers, were included in meals at family gatherings, naming parties and memorials. Kathy Dickson, a lifetime Hoh Valley resident and daughter of prominent pioneer, Elizabeth Fletcher Barlow, also remembers smelting from her childhood as "a really wet and fun family activity. We cleaned and flattened out the fish, floured and fried them. They were delicious."

In addition to their cultural and dietary significance to humans, smelt and other 'forage species' are a critical prey item for seabirds, salmon and countless other animals. Their abundance is vital to the health and diversity of the ocean. Although high numbers of individual forage fish exist worldwide, many of these species are vulnerable to overfishing, as well as changes to ocean conditions and degradation of spawning habitat. Eulachon – a type of smelt that spawns in fresh water – was listed as Threatened in 2010 under the Endangered Species Act. Its designated critical habitat includes the lower Columbia and Quinault Rivers.

Each forage fish species has particular requirements for spawning, and these requirements are as diverse as the fish themselves. For example, surf smelt lay their eggs in shallow water along sand and gravel beaches. The eggs adhere to grains of sediment in the upper third of the beach and hatch out two to four weeks later, depending on temperature, with

Continues on page 3

Across the North Pacific Coast, tribal staff members are participating with the WA Dept. of Fish and Wildlife (WDFW) in the Coastal Forage Fish Spawning Survey by collecting and processing beach samples in search of smelt eggs. These individuals include, from left to right: Russell Markishtum and Zacarias Espinoza, forage fish project technicians for the Makah Tribe; Greg Urata, fisheries technician for the Quileute Tribe; Jennifer Hagen, marine biologist for the Quileute Tribe; Graywolf Nattinger, biological technician for the Hoh Tribe; and Scott Mazzone, shellfish and marine biologist for the Quinault Indian Nation.

2013 Salmon Recovery Project Proposals

This year, Pacific Coast Salmon Coalition (PCSC) and 10,000 Years Institute are proposing a combined total of four salmon recovery projects to the North Pacific Coast Lead Entity (NPCLE). Across Washington State, lead entities are community-based groups, including tribal, local and state agencies, citizens and stakeholders, tasked with developing strategies to restore salmon habitat. On an annual cycle, they review project applications for potential funding by the Washington State Recreation and Conservation Office.

To learn more about salmon recovery projects, visit the Habitat Work Schedule website http://hws.ekosystem.us or attend a NPCLE meeting. Meetings are typically held on third Tuesdays from 1:00- 3:30 PM at the UW Olympic Natural Resource Center (ONRC).

Dickey Camp Pond #13-1283: This project will restore crucial overwintering habitat for fish in the Dickey River watershed in Clallam County. The pond flows into Skunk Creek, which is a tributary to the Dickey River. The pond's outflow has been altered in the recent past and drained the pond to about 30% of its original capacity. PCSC will create a new outlet channel, raise the pond to its original height, and allow for unrestricted fish passage. The project will enhance overwintering and rearing habitat to many fish species including coho salmon and cutthroat and steelhead trout.

Goodman Creek. Photo courtesy of PCSC

Dickey Camp Pond. Photo courtesy of PCSC

New knotweed plant on root wad near Dismal Creek. Photo courtesy of 10,000 Years Institute

Goodman Creek Assessment #13-1285: PCSC is proposing to assess fish habitat conditions in Goodman Creek. The creek is an independent salmon- and steelhead-producing coastal stream located to the north of the Hoh River and south of the Quillayute River basin in Jefferson County. Three assessment components (reference point surveys, habitat surveys, and large woody debris surveys) will be used to develop a prioritized list of future instream, riparian and fish passage restoration opportunities.

Hoh River Restoration Project #13-1147: 10,000 Years Institute will address invasive species over 30 miles of the Hoh River floodplain in Jefferson County, from the Olympic National Park boundary downstream to the river's mouth at the Pacific Ocean. Invasive species control is a critical component of riparian restoration on the Hoh River. This project's objective is to prevent and control invasive knotweed, Scotch broom and reed canary grass. These invasive species interfere

Sullivan Ponds project site. Photo courtesy of PCSC

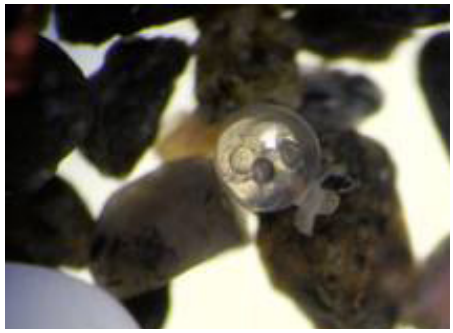
with the natural riparian environment and the food web that supports Hoh River wild Chinook and coho salmon, steelhead, and bull trout. This project will provide information on the effectiveness of control strategies and the impact of invasive plants on aquatic and riparian habitats.

Sullivan Ponds #13-1284: PCSC is proposing to enhance and expand overwintering ponds on the North Fork Calawah River in Clallam County in order to provide refuge for juvenile salmon during the dry season. Ponds will be created where the historic channel has been destroyed by illegal ORV access. This project will enhance habitat benefitting coho salmon and cutthroat and steelhead trout. There will also be an outreach and education component to address illegal ORV access.

***SMELT** Continued from page 1*

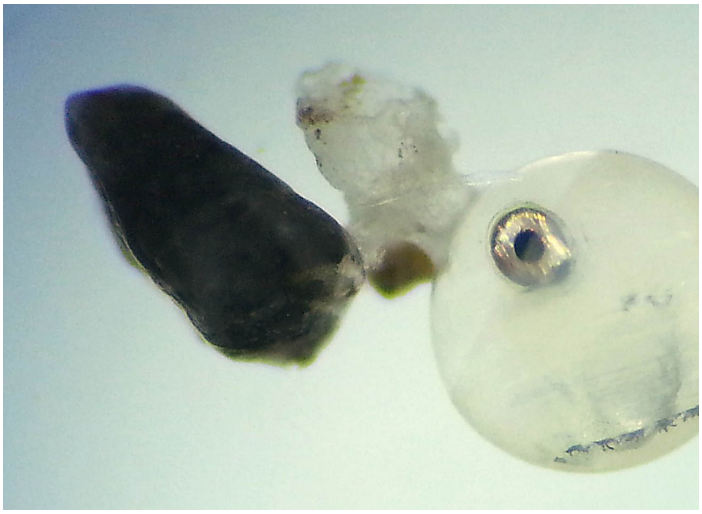
the next high tide. Pacific sardine, by contrast, spawn in the open ocean in the upper portion of the water column and their oval eggs float for only about three days before hatching.

In Puget Sound and the Strait, where risks to shoreline habitat from development have been particularly intense, over 30,000 intertidal forage fish egg surveys were conducted by WDFW and its partners during the past thirty years. Hundreds of additional surveys have targeted herring spawn attached to subtidal vegetation. Documented intertidal spawning sites are protected under "no net loss" regulations by Washington Administrative Code (WAC 220-110). Over the same 30-yr period, about 100 Pacific Coast surveys found smelt eggs on 11 sites. Several of these finds, at Rialto, Ruby and Kalaloch-area beaches, confirmed what the tribes had long observed.



This tiny smelt egg was tucked into a Kalaloch beach by the surf until it was scooped up by a Hoh Tribe technician in March. Photo: Mariko Langness

"Vast additional areas of the outer coast also seem to support the fine gravel/coarse sand … used by spawning surf smelt," remarked Dan Penttila in a May, 2012 email. "I'm certain that additional surf smelt spawning beaches would be found if such surveys were undertaken."



"Late-eyed" surf smelt egg attached to a bit of gravel by its pedicle. Late-eyed means that the egg is in a late stage of development where the eye of the embryo is clearly visible and the body is starting to look like a proper fish. This occurs just a few days prior to hatching. Photo: Mariko Langness

Dan collected most of the existing data on smelt and sand lance spawning in Washington before retiring from a long career with WDFW to start Salish Sea Biological in Anacortes. "Unfortunately our forage fish funding more or less tied us to the Puget Sound basin, and very little of our time could be spent in habitat surveys in western Jefferson and Clallam Counties. Grays Harbor and Pacific Counties were similarly short-changed except for occasional herring spawning habitat surveys in Grays Harbor and Willapa Bay, even though populations of surf smelt and sand lance are known to exist there."

Thanks to WA Department of Natural Resources funding linked to Coastal and Marine Spatial Planning and

Erin Dilworth, WDFW technician, and project biologist Mariko Langness prepare to sample Long Beach for forage fish eggs. Photo: Mariko Langness

matching contributions from tribes, the first comprehensive survey of Washington's outer coast for forage fish eggs began last October. The Coastal Forage Fish Spawning Survey is a truly collaborative State/Tribal effort. The study was designed by WDFW senior research scientists Drs. Dayv Lowry and Kirk Krueger and is directed by Lorna Wargo and co-managed by project biologist Mariko Langness and coastal treaty tribe biologists Joe Gilbertson (Hoh Tribe), Jennifer Hagen (Quileute Tribe), Scott Mazzone (Quinault Nation) and Joe Peterson (Makah Tribe). Mariko is compiling the data collected across the coast and entering it into the state's forage fish database for processing.

"When we began this project we knew that smelt spawned on the outer coast during the late summer and fall. We had little data outside of this window, though, and created a comprehensive sampling design to capture potential spawning during other times of year. We were pleasantly surprised to also find spawning in the spring this year and two previously undocumented spawning sites. We fully expect, due to our sample design, to discover additional "new" summer and fall spawning locations in coming months," commented Dr. Lowry.

Biologists and technicians collect samples of beach sands and gravels on a monthly basis from pre-selected beaches. Graywolf Nattinger, biological technician for the Hoh Tribe, remarks, "The most challenging part of the project has been accessing the sample sites. For a few of the sites we must walk several miles, often with no trail, to get into remote beach locations. The most interesting part has been sifting through the samples with a microscope."

After filtering the samples through a series of sieves and collecting a subsample, biologists and technicians look for the 1mm smelt eggs among similarly sized grains of sand and beach detritus. Identifying tiny eggs among tiny grains of sand is, needless to say, a painstaking process. The information being gathered now is designed to facilitate predictions about future spawning events. "We are developing an 'occupancy' model to evaluate the question: How ubiquitous in space and time is surf smelt (*Hypomesis sp.*) and night smelt (*Thalyicthys starski*) spawning across sandy beach habitat on Washington's outer coast?" says Joe Gilbertson, research biologist for the Hoh Tribe.

None of the more than 700 samples collected between October 16, 2012 and January 22, 2013 contained forage fish eggs, but a February sample taken near the mouth of the Hoh River held two of them. One egg appeared viable under the microscope; the other had been perforated at some point but was still easily recognizable as an egg. Two eggs are enough to indicate a "presence" of spawning at a beach station (1,000- foot segment) according to the long-standing state standard. The eggs are being retained for genetic testing to determine which species of smelt they are (surf, night or eulachon). Since that first discovery, seven additional smelt spawning stations have

The locations of forage fish egg surveys as of 2011.

Smelting has a long tradition at First Beach and La Push and elsewhere along the North Coast. Photo courtesy of the Quileute Tribe

been documented from the surveys conducted through April 2013. Three spawning sites were identified in March in the Kalaloch region and four other sites were located south of the Queets River. The stations near the mouth of the Hoh River and south of the Queets River are new to science. May and June are peak times for spawning and samples from this period are being analyzed now.

Michele Culver, regional director for WDFW, is excited about the forage fish spawning survey. "Over time, monitoring changes in forage fish could help inform us about the ecological health of Washington's coast and the broader California Current Ecosystem," she says. The Coastal Forage Fish Spawning Survey has been funded through October 2013 and plans are underway to continue sampling, with the help of volunteers, for an additional two years. Watch this newsletter for future citizen volunteer training opportunities.

The author wishes to thank Dr. Lowry and Mariko Langness for their assistance with this article.

Smelt fishermen and children at Ruby Beach, Jefferson ca. 1935. Photographer unknown. Photo courtesy of the family of Elizabeth Fletcher Barlow

Lake Ozette Sockeye Steering Committee (LOSC):

Ongoing Partnership Strides Ahead

LOSC membership includes tribal governments, local, state and federal agencies, landowners, scientists, salmon recovery organizations, and interested citizens.

By Roy Morris

Many hands make a load lighter! Years of conversations and collaborations in the context of the Lake Ozette Sockeye Steering Committee (LOSC) are evolving into a growing list of accomplishments. One of the LOSC subcommittees is looking closely at issues associated with predation of adult and juvenile Lake Ozette sockeye, a "Risk Factor" identified for this stock in its Recovery Plan. The group is working to develop projects that will fill data gaps in our understanding of the role predation plays in sockeye recovery, as well as to identify specific actions that can be taken now to limit the number of sockeye that are eaten by other animals. More news on this as it develops.

Joe Hinton, Makah Fisheries hatchery manager, demonstrating otolith or "ear bone" sampling techniques, and how they are used to distinguish hatchery progeny from naturally spawned progeny. Photo courtesy of Peggy Foreman

A second subcommittee focuses on public outreach and education. This year LOSC partners hosted more than fifty students from Quileute Tribal School, Forks High School, and Clallam Bay High School for field trips to the lake to observe returning sockeye. "It was a true joy to see students filming the sockeye salmon and deducing which dentition from 6 or 7 skulls could have preyed on a salmon that was found at Umbrella Creek," claimed Peggy Foreman of NOAA Fisheries, Northwest Regional Office, who helped coordinate the support for these field trips. Each of the schools took different approaches to engage their students in this experience. For example, the Quileute Tribal School brought two of their canoes, elders, and biologists from their Natural

Introduction to Lake Ozette with Forks High School. Photo courtesy of: Casey Ralston

Resources Department to spend the afternoon with their middle and high school students filming, interviewing, and paddling across the lake. Forks High School involved a Pacific Northwest History class, Marine Biology class, and one of their technology classes. Clallam Bay was able to dissect fish donated by Makah Fisheries. These students all had the opportunity to learn directly from salmon recovery experts who are actively working to restore this sockeye population. The schools have created videos about the importance of salmon to their communities and to shed light on this experience.

We would like to thank everyone involved with the field trips and especially Joe Hinton, with Makah Fisheries, for allowing students to tag fish, introducing them to age and growth studies with otoliths (ear bones), and connecting with these students personally. We would also like to highlight Dean Butterworth, with Olympic National Park, for creating two lessons, "Pacific Salmon: Anadromous Lifestyles" and "What is a Watershed", as well as Jacilee Wray who helped gather names that students could reach out to interview or learn more about Lake Ozette sockeye. A huge thanks to Jacqueline Laverdure, with the Olympic Coast National Marine Sanctuary and Casey Ralston, from NOAA Fisheries Northwest Fisheries Science Center, for their commitment to supporting pre-visit lessons with the technol-

ogy, field trip preparation and enthusiasm on all three field trips. Lastly, we want to thank Roy Morris, Nancy Messmer, Cathy Lear, and Nicole Rasmussen for reaching out to students in their quest to learn more.

For more information on sockeye salmon in Olympic National Park and Lake Ozette Sockeye Recovery, visit www.nps.gov/olym/naturescience/sockeye-salmon.htm. A new brochure is available to download and share at www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/lake_ozette/lake_ozette_recovery_plan.html. Look for LOSC displays and meeting materials in local libraries. Plans are also underway for signs, field trips, tours, and interpretive programs.

Quileute Tribal School students learn stories from an elder at a Lake Ozette beach. Photo: Jacqueline Laverdure

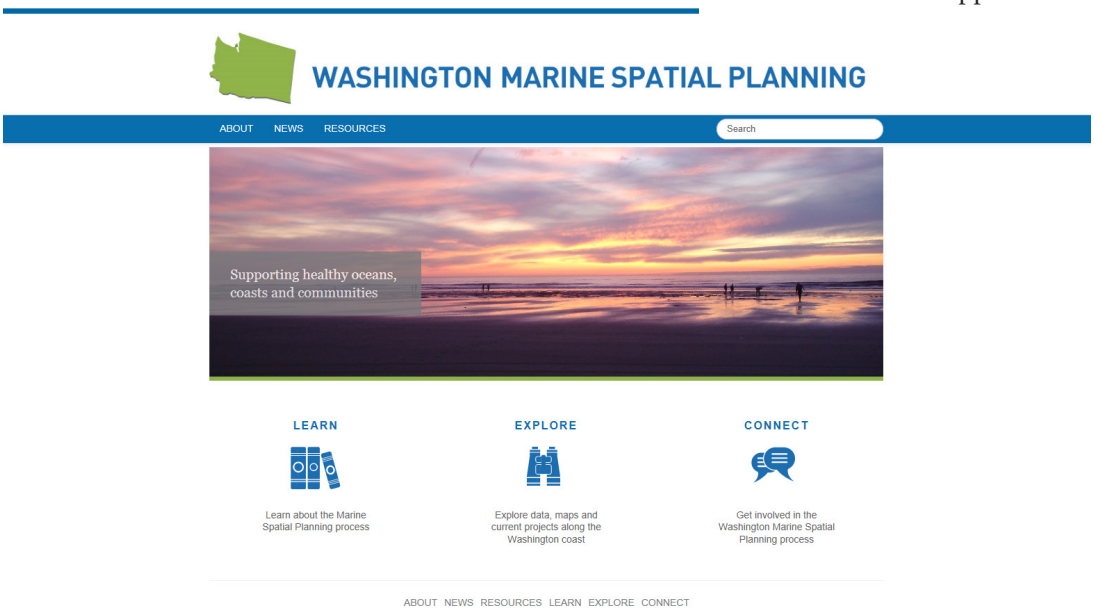
Marine Spatial Planning – Council is a Voice for Washington's Pacific Coast

Marine Spatial Planning (MSP) is underway for the coast of Washington as a result of the marine spatial planning law passed in 2010 (Chapter 43.372 RCW). Public participation is at the heart of this effort to determine the future of our marine waters and coast. The four coast MRCs have worked together over the past few years to create and participate in a coast-wide body to advise state agencies on ocean policy, including MSP. This group also included stakeholders from a variety of businesses, as well as technical experts, and NGOs.

On May 21, Governor Inslee signed a bill (ESB 5603) to re-establish this group, the Washington Coast Marine Advisory Council, under the Governor's Office. The council will, among other duties, serve as a forum for discussion on coastal waters issues and provide recommendations to the governor, legislature, and state and local agencies. It now has seven state departments on the council in new positions.

Members of the WCMAC also recently participated with tribal, local, state, and federal personnel, as well as business and NGO representatives, in a series of workshops to identify draft goals and objectives for state marine spatial planning on the Pacific Coast. The statements are intended to guide the development of a comprehensive marine management plan that is respectful of existing uses and tribal treaty rights while providing economic opportunities and avoiding significant harm to the environment.

Learn about opportunities to comment on these statements and stay informed about the MSP process generally by subscribing to the mailing list at http://www.msp.wa.gov/about/#respond. A new website: www.msp.wa.gov provides access to a wealth of information about coast resources, existing resource use, and places where new uses – such as renewable ocean energy – could emerge over time. Increasingly, the website is making interactive viewers and tools available in order to map and consider existing patterns and potential future scenarios.



The Olympic Mudminnow:
A Friendly Look at a Western Washington Original

By Tami Pokorny

Washington State waters play host to dozens of species of freshwater fishes. But just one of them is found here and no other place. The Olympic Mudminnow (*Novumbra hubbsi*) is Washington's only endemic fish. Although it's small (usually less than 3 inches) and not technically a minnow, lives in dark places and has some anger management issues, the Olympic mudminnow also possesses unique and impressive qualities. Its presence in a nearby wetland may have important benefits for people, too

James Pond. Photo: Roger Tabor USFWS

Olympic mudminnows live in bogs, wetlands, ponds, slow-moving creeks and along lakeshores at low elevations through much of western Washington, especially southern Puget Sound, in the Chehalis Basin and on the Pacific Coast as far north as Lake Ozette. They occupy habitats which managed to escape the onslaught of glaciers during the Pleistocene Epoch about 15,000 years ago.

Although mudminnows are restricted to a relatively small area of the world, they are nevertheless prolific and resilient where they do exist. Thriving in places other fish find suffocating, mudminnows keep company with frogs in the warm, oxygen-deficient waters common to marshes and other muddy, wet places with abundant water-loving plants.

Through genetics research, scientists have learned that the Olympic mudminnow is more closely related to pikes than other mudminnows. And like pikes, they are patient, stealthy predators who camouflage themselves among the leaves and roots of aquatic plants. When an aquatic invertebrate has the misfortune to appear, this opportunistic carnivore darts out from its refuge and captures its prey in a mouth that is surprisingly large in relation to its body. In some areas, the diet of Olympic mudminnows includes the larval forms of biting midges (no-see-ums) and mosquitos. Where mudminnows are locally abundant, they may exact a meaningful toll on these pests.

Setting a (mud) minnow trap in James Pond. The trap is baited with frozen bloodworms to lure the fish in and then left overnight. Photo: Roger Tabor USFWS

As spawning time approaches, usually in early spring, male Olympic mudminnows become brilliantly striped and increasingly fierce. Once he sets up his territory (of about 17 inches by 44 inches), the mudminnow patrols it tirelessly and defends it against other male mudminnows, salmon fry, sticklebacks and all other comers – except one. When a female mudminnow enters the territory the male launches into a display that has come to be known, in close-knit piscatorial circles, at the "wigwag dance". When and if the female is suitably impressed, the pair retreats to nearby vegetation in order to spawn. Only one or two eggs are released at a time although spawning may occur repeatedly over the course of

A single minnow-trap haul of Olympic mudminnows from James Pond. Photo: Roger Tabor USFWS

an hour or more. When the eggs hatch nine days later, the light brown fry have the good sense to extrude sticky mucus from two pores on the side of their heads, which they then use to attach themselves to vegetation until they grow large enough to actively avoid being eaten.

Olympic mudminnows recognize good habitat when they see it but humans, even trained biologists, can sometimes mistake a mudminnow lair as an ordinary roadside ditch or isolated, fishless wetland. So despite the fact that mudminnows are tough little beasts, their favorite addresses are not. It's estimated that historical wetland loss in western Washington was as high as 39 percent, as lands were altered for agriculture, industry and ports. Although government regulations have become increasingly protective of wetlands, and some private land owners go above and beyond what's

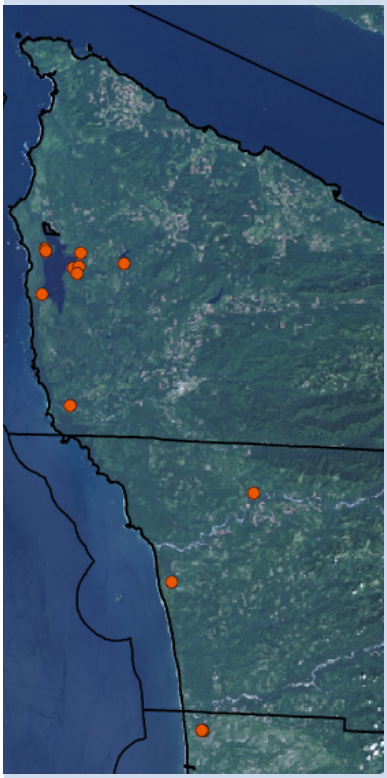
Trapped mudminnows are held in a bucket for genetic sampling (a small fin clip is taken from each fish and they are returned to the pond). Photo: Roger Tabor USFWS

required in support of fish-friendly surroundings, wetland habitats are still at risk. Pollution from roads and lawn care chemicals, and invasions of exotic plants and animals, may impact mudminnows and other wildlife adversely. The presence of introduced fish like largemouth bass, in particular, spell big trouble for mudminnows. Due to the limited range of the Olympic mudminnow and the vulnerability of its habitat, WDFW considers it a State Sensitive Species and an increasing priority for conservation.

In western Jefferson County, mudminnows live in Steamboat Creek bog and some of the Hoh River drainages. In western Clallam County, mudminnows swim in a beaver pond adjacent to Lake Ozette, in the lake itself and in James Pond near the Mora ranger station in Olympic National Park. "According to recent genetics work, the north coast population is considered unique and distinct from mudminnows in the Chehalis watershed and Puget Sound," said Roger Tabor, fish biologist, at USFWS, in a recent phone interview. "Mudminnows present a good opportunity for citizen scientists to help fill in our understanding of where these fish live and how best to protect them. We need to start paying closer attention to these fish."

Studies are getting underway this summer in the Chehalis River basin to determine the vegetation preferences of Olympic mudminnows and the effects of invasive weed removal on their habitat. Plans are also being developed for the fish to star in an educational film!

Mudminnow paradise near Lake Ozette. Photo: Roger Tabor USFWS



State Sensitive Species: A native species that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

Map excerpt from the distribution of Olympic mudminnow, Novumbra hubbsi, *Washington State Distribution produced in 2009. Source: WDFW Wildlife Survey Data Management*

2013 Resources Fair: Showcase for West End Programs and Accomplishments

The NPC MRC held its 5th annual outreach event this year at the UW ONRC in Forks. Attendance broke all previous records (more than 60 people). Participants learned about a wide range of programs and projects related to the coast and its resources. The band "Bootlegger Hill" played folk and blues during a dinner which included fabulous grilled salmon and many wonderful potluck dishes. "Good weather prevailed and everyone seemed to have a great time. They also enjoyed watching the movie *Ocean Frontiers*," remarked event organizer and NPC MRC Coordinator Rich Osborne. NPC MRC members wish to thank Rich and the UW ONRC as well as all of the volunteers, students, organizations, and participants who made this year's event such a success.

Cathy Lear, Nicole Rasmussen, Garrett Rasmussen, and several others prepare small gifts for student presenters at this year's event. Photo: Katie Krueger

"Bootlegger Hill" entertains during the potluck. Photo: Katie Krueger

Steve Allison, grill master extraordinaire, puts the finishing touches on a round of salmon fillets. Photo: Katie Krueger

Nancy Messmer greets friends near the CoastSavers display at the entrance to the ONRC. Photo: Katie Krueger

WA Coast Cleanup 2013 – It's all connected.

At Second Beach in Olympic National Park, 8-year old Norah Schmidt alerts her mom to marine debris that, though portable, isn't likely to fit inside her trash bag. Photo: Jenny Schmidt
Inset: Northern Fulmars, Fulmarus glacialis. *Photo: Dick Daniels (http://carolinabirds.org)*

Once again, volunteers have stepped up to the challenge of removing marine debris. On April 20, nearly 30,000 pounds of ocean trash were collected from beaches spanning Washington's Pacific Coast and outer Strait by more than a thousand people. Olympic Coast National Marine Sanctuary Superintendent Carol Bernthal said after the cleanup, "We depend on the work and dedication of volunteers to help remove the smaller items that are showing up on our coast that would otherwise have devastating impacts on marine life."

Last year, University of British Columbia analyses of Northern Fulmars beached in the Pacific Northwest found an average of 37 plastic pieces in the stomachs of each bird – equivalent in weight to 10 quarters for a human. According to a recent article in the *Los Angeles Times*, "Plague of Plastic Chokes the Seas," cigarette lighters, bucket handles, toothbrushes, syringes, fishing line, Styrofoam, and bottle caps all wind up in the stomachs of seabird chicks – even hundreds of miles from the nearest shore.

Although it's commonly thought ships are to blame, most marine pollution starts out on land. "About four-fifths of marine trash comes from land, swept by wind or washed by rain off highways and city streets, down streams and rivers, and out to sea. The rest comes from ships," reported *Times* staff writer Kenneth R. Weiss.

A Coast Mystery: Trees in a Cliff

Trees in a cliff? That's right. Wood of unknown origin has been rediscovered recently in an undisclosed (and hazardous) location along the North Coast by NPC MRC member Chiggers Stokes. Even more interesting is the fact that the trees are entrained in sediment at the bottom of the *rather tall* cliff. Still more interesting is the fact that the wood is wood and not rock. In other words the wood isn't petrified and could be on the order of thousands, maybe even hundreds of thousands of years old! One thing is for certain, scientists who have seen only pictures and not visited the site are not ready to speculate how old the wood might be. Plans are underway for a more thorough investigation. No matter its age though, this "legacy wood" will likely have something to tell us about the climate at the time the surrounding forest lived, and that is bound to be more interesting still. Stay tuned!

Photo: Chiggers Stokes

North Pacific Coast MRC
c/o Rich Osborne
1455 S. Forks Ave., P.O. Box 1628
Forks, WA 98331

NPC MRC
Richard W. Osborne, Ph.D.,
Resource Forum Facilitator
University of Washington,
College of the Environment, School of
Environmental & Forest Sciences,
Olympic Natural Resources Center,
1455 S. Forks Ave., P.O. Box 1628,
Forks, WA 98331
Phone: 360-374-4560
Email: osborner@uw.edu
Editor: Tami Pokorny
tpokorny@co.jefferson.wa.us

Steve Allison (Hoh Tribe)
Katie Krueger (Quileute Tribe)
Dana Sarff (Makah Tribe)
Jennifer Hagen (Quileute Tribe)
Rod Fleck (City of Forks)
Tami Pokorny (Jefferson County)
Cathy Lear (Clallam County)
Roy Morris (Citizen 1, Clallam)
Christopher Clark (Citizen 2, Clallam)
John Hunter (Citizen 3, Clallam)
John Richmond (Citizen 1, Jefferson)
Chiggers Stokes (Citizen 2, Jefferson)
Jill Silver (Citizen 3, Jefferson)

North Pacific Coast Marine Resources Committee
NPC MRC

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A couple of Olympic mudminnows size up the photographer from beneath a tangle of roots, decaying leaves and algal growth.
Photo: Roger Tabor USFWS