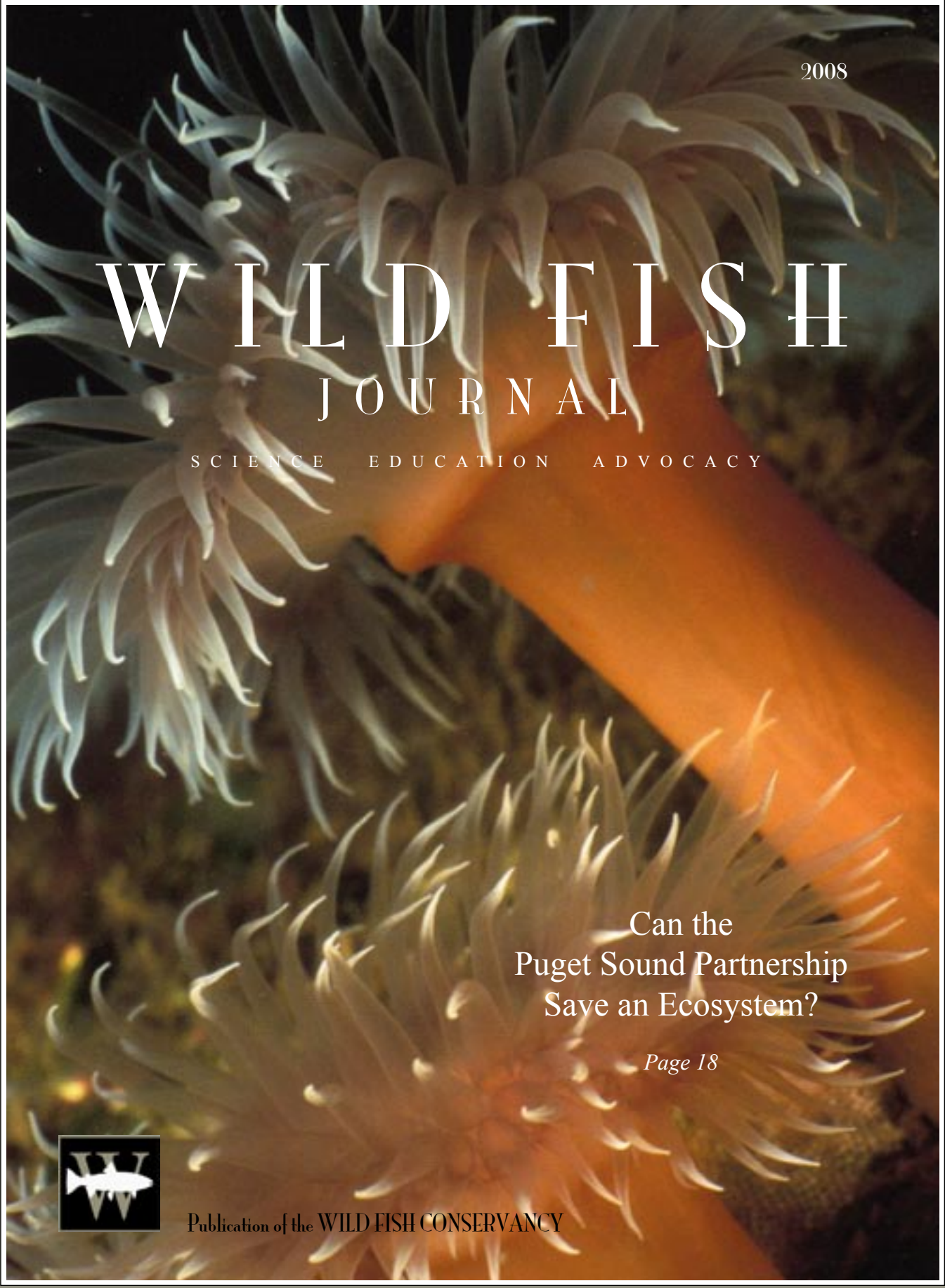

2008

WILD FISH JOURNAL

SCIENCE EDUCATION ADVOCACY

Can the Puget Sound Partnership Save an Ecosystem?

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Publication of the WILD FISH CONSERVANCY

WILD FISH JOURNAL

Cover photo:
Metridium anemone.
Photo taken in Puget Sound
by Katrina Kruse.

Inside

Visit our web site at
www.wildfishconservancy.org

The Wild Fish Journal is a publication of the Wild Fish Conservancy.
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Letter from the Director

This issue of the *Wild Fish Journal*, our annual report to our members and other supporters, has numerous stories about our science, advocacy, and education efforts. It also has a story about the launch of our new web site. I'm singling out this story for attention here because I'm excited about the features on our web site and how it better communicates what we have been doing. The new web site features striking graphics, updated and expanded content, and a more user-friendly appearance and feel. I encourage you to visit the site, bookmark it, and check back frequently as we will regularly be updating and expanding it. Also, please spread the word about the new site to your friends and colleagues who may not know about Wild Fish Conservancy and the important work we're doing.

The web site is also worth mentioning because it gives me an avenue to thank all of you for your generous support and how that support makes a real difference for Wild Fish Conservancy. At last year's Wild Fish Soirée and Benefit Auction we expressed the need to update our antiquated web site. Your response during the *Fund a Dream* portion of the live auction was overwhelming. To kick off the bidding, Bruce McNae set the pace with a $15,000 contribution and when all was said and done over $29,000 was raised to build the new site. Your generosity at the Soirée enabled us to take this step to turn our website into an effective outreach and education tool. Without your support, our new website would not be possible.

That is true, of course, of all of our efforts to preserve, protect, and restore the region's wild fish and the ecosystems on which they depend. This year your support will help fund countless projects. Your support allows us to partner with the state of Washington to restore ecological functions in the Dosewallip, Duckabush, and Snoqualmie River basins. Your support allows us to take children outdoors and teach them about wild fish and their habitats. Your support helps us to partner with British Columbia scientists on issues that will help resolve the effects of Atlantic salmon net pens on wild fish ecosystems. Your support allows us to advocate on behalf of wild fish to the public and government agencies. These are just a few of the projects we are working on this year and without you, we would not be able to do any of these things.

As you read this issue of *Wild Fish Journal*, I hope you are as pleased and proud as I am at the progress we have made. Together, we are making a real difference. But make no mistake -- our work continues and new challenges and difficult decisions arise every day. With your help, we can continue to meet those challenges. I again thank you for your past support, and hope that we can continue to count on you to help us work for wild fish.

Sincerely,
Kurt Beardslee, Executive Director
Wild Fish Conservancy

17TH Annual Wild Fish Soirée & Benefit Auction

Join us on May 17, 2008 at the Chateau Ste. Michelle, Washington's oldest and most acclaimed winery, for a memorable evening of gourmet food, fine wine, and lively socializing.

The Wild Fish Soirée, Wild Fish Conservancy's principal fundraising event, will begin with a silent auction and champagne reception at 5:00 p.m. followed by a gourmet dinner and live auction at 6:30 p.m. The Soirée is a great opportunity to meet and mingle with the Wild Fish Conservancy's staff, Board of Directors, and members while bidding on a variety of items including exotic fishing trips, fly fishing equipment and accessories, weekend getaways, gourmet dinners, books, fine art, and much more.

Last year's event was a tremendous success, raising nearly $80,000 for Wild Fish Conservancy's unique science, education, and advocacy initiatives. Of course, we hope to surpass that this year, but we can't do it alone. To continue working for wild fish, the Wild Fish Conservancy depends on the support of individuals like you who are committed to wild fish conservation. Help us meet the challenges and opportunities that lie ahead by attending this year's Wild Fish Soirée and Benefit Auction.

Proceeds from the Benefit Auction go directly to support the Wild Fish Conservancy's work to preserve, protect, and restore the region's wild fish and the habitats on which they depend. The Wild Fish Conservancy is reaching out to communities, influencing policy leaders, and advocating bold, innovative, and effective approaches to conserving salmon, steelhead, trout, and other wild fish populations throughout the region.

Admission to the Wild Fish Soirée is $110 by May 9th and $125 after May 9th and includes a champagne reception with hors d'oeuvres, gourmet dinner, wine, and a one-year Wild Fish Conservancy membership.

Visit www.wildfishconservancy.org for a current list of auction donors and featured items. For more information about the 2008 Wild Fish Soirée & Benefit Auction please contact Tyler Cluverius at tyler@wildfishconservancy.org or call (425) 788-1167.

Science Updates

ICICLE PROJECT UPDATE

By Audrey M. Thompson, WFC Biologist

The 2007 season was a pilot sampling year for Wild Fish Conservancy on Icicle Creek in the Wenatchee River basin. Our goal was to develop a baseline understanding of the ecology of the Icicle basin, with particular focus on rainbow trout (*Oncorhynchus mykiss)* and the factors affecting their distribution, population structure, foraging strategy and growth, and genetic diversity. This year was important also because the Leavenworth National Fish Hatchery (LNFH) on the lower Icicle Creek has changed the management of two structures on Icicle Creek, the "Headgate"and "Dam 5" to allow greater fish passage into the upper basin. In light of these exciting changes, our initial work explores the current ecological status and establishes a baseline to assess the expected future upstream recolonization of anadromous Pacific salmon (*Oncorhynchus* spp.), bull trout (*Salvelinus confluentus*), and other species from below the LNFH to the headwaters.

Of particular interest to Wild Fish Conservancy is the life history of rainbow trout of the Icicle. As you may know, rainbow trout and steelhead are different life history forms of the same species, *Oncorhynchus mykiss.* The larger, anadromous steelhead life history form is present elsewhere in the Wenatchee watershed, and is believed to have been historically present in the Icicle watershed. Now

This juvenile rainbow was carefully measured to obtain baseline data.

that passage of anadromous fishes into and out of Icicle Creek is improving, we are eager to learn whether resident Icicle rainbow trout will develop this steelhead life history.

As much information as possible is entered along the stream to minimize errors.

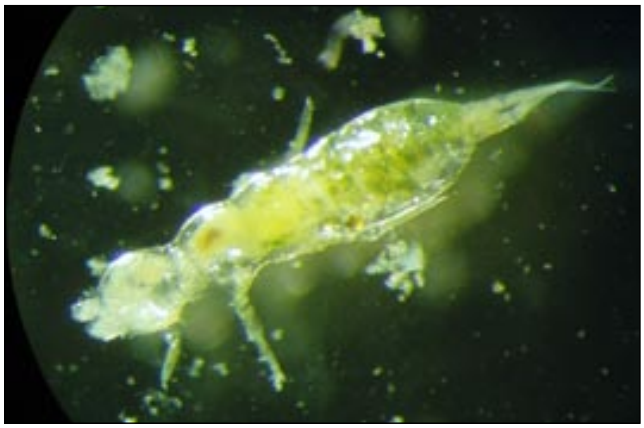
Rainbow trout were sampled, primarily using fly angling, at three main sites in the Icicle basin (and one site in the neighboring Chiwaukum basin). This sampling method, which used barbless hooks on dry invertebrate imitation "flies," allowed for a large number of fish to be brought to hand with minimal detriment to the fish, insignificant mortality rates, and at a rate compatible with the efficiency of our streamside processing crew.

All fish captured (800+ between July and September) were measured and weighed, photographed, and fin-clipped to obtain genetic material. Additionally, each fish was implanted with a passive integrated transponder (PIT) tag. This unique tag identifies each fish and can be subsequently queried without further handling of the fish, thus answering questions of in-basin movement and specific growth rate.

Two particularly interesting research topics related to life history of Icicle resident rainbow trout are being pursued by WFC biologist Audrey Thompson. To determine the prey of resident fishes, Audrey is employing a technique known as "gastric lavage", meaning that she pumps out fish stomachs and analyzes the contents relative to fish size, and habitat. Additionally, Audrey reads the annual growth rings on scale samples from Icicle fish to determine their age. Both of these topics are important in understanding life history.

It may seem unlikely that there would be much worth looking at in stomach contents, but since fish swallow their prey whole, the invertebrates, fish and frogs that they

consume are very well preserved in their stomachs. Often, invertebrates can be identified to the family level. We count and identify all the stomach contents for each fish so we can make some useful comparisons. For example, we found that smaller fish spend more time eating a lot of small prey like mayflies and adult midges, while larger fish seem to hunt for larger, high calorie items like smaller fish, frogs, and tadpoles. Also, we found that rainbow in the mainstem consume a lot of drifting aquatic invertebrates, whereas fish in Jack Creek (a small boulder-filled tributary) for example, consume more terrestrial invertebrates like spiders and leaf hoppers which fall from the overhanging



The contents of a fish's stomach are examined under a dissecting microscope. This adult Collembola was found in many of the samples.

vegetation. These and other comparisons help us understand how rainbow in Icicle Creek feed, which is directly related to how they grow and develop fat stores for the winter. Both of these in turn are very important in determining life history strategy.

Population age structure is critical to our investigation of resident trout ecology, especially for determining a baseline length to age relationship. How fish grow, and where they spend their time can be read in their scales. Like tree "rings", fish scales have "scleri" and "annuli" which can show not only how long a fish has been alive, but whether it is growing quickly or slowly. In winter, when food is limited, the distance between scleri (rings) is very small. In the summer, the distance is greater. By counting the number of narrow regions (annuli) we know how many winters the fish has survived. Thus we know how old each fish is. This is critical information as we compare size-age structure to growth rates and feeding habits.

This winter we started analyses and were pleased to find we have a robust dataset on how rainbow trout of Icicle Creek eat and grow. This is exciting for us not only because we may begin comparing Icicle rainbows to rainbows in other systems, but because we can watch how these factors change as anadromous fish presence in the basin increases over the coming decades.

CHERRY VALLEY – A MODEL OPPORTUNITY FOR FISH AND FARMS

By Jamie Glasgow, WFC Science and Research Director

The Cherry Creek watershed flows from the forests and wetlands in the Cascade foothills, through a wide floodplain managed for farming and recreation, and into the Snoqualmie River east of Seattle. There, an aging agricultural drainage system that includes a pump house, flood gates, and over 10,000 meters of ditched channels, compromises salmon habitat and natural processes promoting salmon production. In 1998, WFC documented that the unscreened "macerating" pump facility, operated by a Drainage District that includes the Washington Department of Fish and Wildlife, was a direct cause of mortality to thousands of juvenile salmonids including ESA-protected juvenile chinook. In addition to the direct impacts of the macerating pump, fish habitat in Cherry Valley was limited by poor water quality, a ditched and straightened mainstem channel, and simplified and disconnected floodplain channels that lack habitat complexity and diversity. Unfortunately, Cherry Valley is not unique; there are dozens of valleys with similar characteristics across western Washington and elsewhere in the Pacific Northwest where fish and farms compete for limited resources.

WFC is investigating the "fish friendliness" of the pumps at the lower Cherry Creek floodgate.

Continued on page 30

Advocacy Updates

WIN-WIN SOLUTIONS TO LOW FLOW PROBLEMS IN THE STILLAGUAMISH BASIN
By Mary Lou White, WFC Project Manager/Field Biologist

The North Fork Stillaguamish River provides important habitat for five Pacific salmon species (fall chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), pink (*O. gorbuscha*), and chum (*O. keta*)) and bull trout (*Salvelinus confluentus*), as well as cutthroat and rainbow trout (sea-run cutthroat/cutthroat (*O. clarki*), and steelhead/rainbow (*O. mykiss*)).

Some of these fish populations are in a precarious state. Puget Sound chinook, Puget Sound steelhead, and bull trout are currently listed as "threatened" under the Endangered Species Act (ESA), while Puget Sound coho salmon is a "species of concern." In the "Salmon and Steelhead Stock Inventory" (SASSI), an assessment done by the state and western Washington treaty tribes, the Stillaguamish coho population is listed as "depressed" and the three summer runs of steelhead as "critical" or "unknown." The SASSI report considers the single Stillaguamish winter steelhead run as "healthy."

Salmonids in the Stillaguamish are limited by many of the same factors that affect these fish all over the Northwest. For example, we all know that fish need water of sufficient quality and quantity. Extreme low flow conditions can impede salmonid migration, cause stranding, decrease available dissolved oxygen, increase

The Stillaguamish Low Flow Water Rights Assessment Project is basin wide and will encompass the entire Stillaguamish Basin; however, reaches identified in the Stillaguamish Watershed Chinook Salmon Recovery Plan will be targeted first: Stillaguamish River - lower mainstem, Jorgenson Slough/Church Creek, Pilchuck Creek, and NF Stillaguamish River - from Oso to Whitehorse. The Harvey/Armstrong Creek watershed (highlighted above) was identified in the state's 1999 Salmon Habitat Limiting Factors Report as potentially contributing to low instream flow and will also be a priority watershed.

water temperatures, and have a negative impact on water quality by concentrating pollutants. Low flow conditions can also contribute to saline movement upstream compared to historical conditions. Assessments of the Stillaguamish basin have identified low flow as a problem for salmonids during July through September.

At present, four sub-basins have been identified in the Stillaguamish Watershed Chinook Salmon Recovery Plan as potentially contributing to low instream flow. Yet, there is no complete inventory or analysis of sub-basins within the watershed that are flow-impaired under current water rights. In fact, the existing registers of water right holders need significant updating.

With support from the Washington Water Trust, Department of Ecology (DOE), Stillaguamish Tribe, Tulalip Tribes, and Snohomish County, Wild Fish Conservancy applied for and received Puget Sound Watershed Protection and Restoration funds to implement Phase I of the *Stillaguamish Low Flow Water Rights Project.* The goal of the project is to increase and/or maintain adequate flow for all salmonid and native fish species in the Stillaguamish River. During Phase I of the project WFC will be: 1) assessing existing water rights, 2) conducting a literature review and field reconnaissance of existing flow conditions to identify water right projects, 3) developing restoration and water right management opportunities with individual land owners, and 4) prioritizing water right actions on potential flow restoration projects.

Once prospective projects have been identified and prioritized in Phase I, WFC will move into Phase II of the project which will be seeking funds to: 1) acquire water rights for instream flows, 2) design and construct restoration projects, and 3) complete GIS work on water right place-of-use points.

WFC will work with DOE, Washington Water Trust, and individual water rights holders to discuss restoration and water right opportunities and if appropriate, negotiate water right acquisition. We will use market-based incentives to encourage willing landowners to participate in flow restoration programs, resulting in improved water quality and increased flow for native fish species. Possible market-based incentive approaches include purchasing, leasing, donations, changes in diversion points, changes

Finding solutions that work for both landowners and fish will help to build overall community support for salmon recovery in the Stillaguamish River.

in water source, conservation measures, split-season leases, dry-year leases, rotational pool agreements, and water banking.

Ultimately, it is our hope that the project will build community support for salmon recovery in the Stillaguamish Watershed by getting willing landowners involved in the process of recovery. Wild Fish Conservancy and partners have the opportunity to establish trust and build personal relationships with landowners which could result in additional restoration opportunities that the community can support. Best of all, habitat conditions for native fish will be improved as flow restoration strategies are implemented.

The Leavenworth Hatchery was constructed to mitigate for habitat blocked by Grand Coulee Dam. Ironically, the Hatchery itself blocked 21 miles of near-pristine habitat on Icicle Creek for nearly 70 years.

With the flooding that occurs in the spring and fall, it is hard to imagine a problem with low flows in our Northwest waterways. Yet, the effects of growth are depleting our flows and having a negative impact on native fish. Sustainable water management means adequate water for people and fish. If you know of someone who may be interested in our Stillaguamish Water Rights project or in learning more about opportunities for water right management in any Washington watershed, encourage them to call our office at (425) 788-1167 and ask for Mary Lou White or call the Washington Water Trust directly at (206) 675-1585 x100 and ask for Amanda Cronin.

ICICLE CREEK RESTORATION INITIATIVE

By Mark Hersh, WFC Water Quality Specialist

Wild Fish Conservancy continues to work to achieve more normative fish passage and flows in Icicle Creek, Chelan County. There are three avenues by which we are voicing our concerns about operations at the Leavenworth National Fish Hatchery (LNFH): 1) Endangered Species Act/National Environmental Policy Act lawsuit, 2) Clean Water Act "Certification" and 3) the "PASS" or Project Alternative Solution Study process led by the Bureau of Reclamation. In 2007, we've made progress in each, but we still have work to do (see the 2007 *Wild Fish Journal* for more background).

First, we continue with a lawsuit in federal court alleging that the US Fish and Wildlife Service (FWS) is violating the ESA by adversely affecting bull trout (*Salvelinus confluentus*), a federally-threatened species. Last year, we alleged that the 2006 Biological Opinion unduly restricted fish passage, including that of bull trout. In order for migratory bull trout to reach the upper tributaries of the Icicle Creek basin (one of the largest wilderness watersheds in Washington), the fish need to be able to get past the LNFH when flows are still relatively high (e.g., June). Unfortunately this is the same time of year when LNFH completely closes the stream to prevent upstream movement of hatchery spring chinook salmon, facilitating its broodstock collection and enhancing the tribal fishery for the hatchery fish.

In a rare move, the FWS asked the court to be allowed to revise the 2006 Biological Opinion. The court agreed and the FWS recently completed the revision; now Wild Fish Conservancy is reviewing this latest Biological Opinion to see if our concerns were addressed. Wild Fish Conservancy also continues to be concerned that the operation schedule of the LNFH, which outlines when fish are allowed to pass, violates the National Environmental Policy Act.

A second avenue is the Clean Water Act "certification" that will accompany the new wastewater discharge permit. The Washington Department of Ecology will "certify" that the discharge permit issued by the US

Upper Icicle Creek during summer flow conditions.

Environmental Protection Agency will meet the state's "water quality standards." Wild Fish Conservancy provided comments to Ecology on the certification in late 2006; one of our concerns was that a full "antidegradation" review should be conducted (go to our website www.wildfishconservancy.org to see our correspondence). Because Ecology's final regulations on "antidegradation" were not approved until May 2007, a delay was necessary. While we are not happy with yet another delay, we are pleased that Ecology is looking seriously at this certification and we believe that the certification should include an enforceable operation plan for the "Headgate" and "Dam 5," one that will maximize passage for native fish.

The third avenue is the "Project Alternative Solution Study" or "PASS" process. These are facilitated discussions between all of the relevant state and federal agencies, plus WFC and the Yakama Nation. The first round of discussions was aimed at reaching our best solution for the LNFH's water supply problem. While no final decisions have been made, one thing was clear – improvements at the LNFH will be expensive (see sidebar on page 15).

The second round of PASS discussions will center on what is needed to effect fish passage past the LNFH. You might remember that in 1999, the LNFH completed a full-blown Environmental Impact Statement on the "Icicle Creek Restoration Project" but never implemented "Phase II" of the project (see http://www.fws.gov/leavenworth/eis.htm). We expect and hope that the cooperative attitude of all the parties in the first round of PASS negotiations will continue in this second set, and we can come to agreement on what is needed to restore the ecological functions of Icicle Creek.

Through all three avenues, we hope that fish passage is soon maximized given the current infrastructure at the LNFH, and that any improvements to the facility will also improve fish passage, thus helping the entire ecosystem of Icicle Creek, one of Washington's wildest watersheds.

Education/Outreach Updates

ENVIRONMENTAL DISCOVERY PROGRAM
By Casey Ralston, WFC Education Coordinator

In its fifth year, Wild Fish Conservancy's Environmental Discovery Program served more than 400 third, fourth, and fifth grade students from Seattle, Duvall, Carnation and Monroe. Wild Fish Conservancy staff and volunteers continued to provide a successful classroom and field-based program where students learn about native plants and animals, habitats, water quality, and healthy ecosystems through hands-on, interactive lessons.

WFC's Casey Ralston helps a student with a water quality test "in the field."

In 2007, we focused on improving our water quality curriculum. Students like this lesson because it is very participatory, but teachers are excited about it because it fosters critical thinking and allows students to study issues in science, math, and social studies simultaneously. We expanded our pre-fieldtrip lesson to review the water cycle and to introduce new information about watersheds, run off and water pollution. Students identify different human activities that impact aquatic ecosystems, and then in the field they collect water samples, conduct chemical tests, and record data so they can later determine if the Snoqualmie River is a healthy home for salmon and other aquatic organisms. During the follow-up class visit, the students work together to collect, share, and analyze their data, and to consider what "healthy" really means. We hope these lessons are helping kids make connections between what they are learning in school and real-life environmental issues in the Puget Sound region.

As we wrap up another successful year, it is important to remember everyone who makes this program possible. So, thank you to our generous funders, to the classroom teachers who make the extra effort to get your kids outside, and to our wonderful field instructors who share your time, your knowledge, and your stories with our students. We hope to see you again next year!

NATURE AND CAREER EXPLORATION AT BARN BEACH RESERVE
By Casey Ralston, WFC Education Coordinator

In June, we conducted our first education program at Barn Beach Reserve in Leavenworth. Approximately 40 eighth grade students from Wenatchee's Pioneer Middle School GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) program spent the day learning about the ecology, biology, and cultural history of the Wenatchee River and Leavenworth Area. GEAR UP provides unique learning opportunities for at-risk students to help keep them in school and prepare them for college.

WFC biologist Audrey Thompson uses underwater cameras to give the students an entirely new perspective on aquatic life.

All students visited four different hands-on stations (fish observation, butterfly ecology, native bird identification, and nature journaling). In the fish session, we talked to the students about riparian ecosystems, the salmon lifecycle, and our research in Icicle Creek. We also set up a couple of underwater cameras and television monitors so students could look into the river and see what

they could find living beneath the surface. Each session was different, but the students observed many juvenile coho and chinook, a couple of rainbows, and one largescale sucker. The kids enjoyed looking at fish but the undisputed highlight of the day was one group's discovery of a caddisfly larvae. Who knew that that little critter would catch everyone's attention? The day program at Barn Beach Reserve was a great way for these kids to connect with their natural environment and to explore a variety of environmental science careers.

STILLAGUAMISH FESTIVAL OF THE RIVER
By Casey Ralston, WFC Education Coordinator

For the third year in a row, Wild Fish Conservancy staff and volunteers hosted a booth at the *Stillaguamish Festival of the River* near Arlington in August. This popular two-day festival continues to attract large crowds and is designed to "help people who live and work in the Stillaguamish Watershed and surrounding regions understand how their actions can help make their environment cleaner for people, fish, and wildlife." Our booth was consistently busy as we talked with many visitors about the kinds of work Wild Fish Conservancy is involved in. Children decorated salmon "fish hats" while we helped them learn how to identify different species of fish that live in the Stillaguamish River and discussed the importance of protecting fish habitats.

HAPPY ARTISTS AT THE HAPPY SALMON HOMECOMING POSTER CONTEST
By Tyler Cluverius, WFC Outreach & Development Coordinator

Wild Fish Conservancy staff and volunteers hosted the 2007 Happy Salmon Homecoming Poster Contest at the Wenatchee River Salmon Festival at the Leavenworth National Fish Hatchery, September 20th – 23rd. The Wild Fish Conservancy booth, transformed into an outdoor art studio, buzzed with activity as children twelve and under painted posters depicting happy wild salmon and trout returning to their natal home of Icicle Creek. The contest was a tremendous success with nearly 500 entries, and a great time was had by all that participated.

This year's winner was six-year-old Britany Larson from Milton, WA. For her artistic efforts, she received a $25 gift certificate for art supplies from McDee's Art Center in Wenatchee. Also, Britany's poster will be turned into a Wild Fish Conservancy Celebration Poster and used to promote our participation at next year's festival.

Six-year-old Britany Larson of Milton smiles as she displays her winning poster.

As Wild Fish Conservancy and others look forward to new developments in the Icicle Creek Restoration Initiative, perhaps the children's posters of happy salmon and trout returning to pristine habitat after nearly seventy years will serve as a good omen for the future of Icicle Creek's wild fish.

WILD FISH CONSERVANCY PILOTS NEW EDUCATION PROGRAM FOR LEAVENWORTH STUDENTS
By Casey Ralston, WFC Education Coordinator

A couple of weeks after the Wenatchee River Salmon Festival, we were back in Leavenworth again; this time we helped deliver a new field-based environmental education program. Working with Barn Beach Reserve, who received a grant from the Washington State Office of Superintendent of Public Instruction, Wild Fish Conservancy helped develop a five-day field program for the fourth graders from Osborn Elementary School in Leavenworth, WA.

Wild Fish Conservancy was one of several partners responsible for planning, preparing, and delivering this program which was designed to complement and expand upon what students learned during their visit to the Salmon Festival. For our portion of the multi-day program we developed three different field lessons to teach students

Give children a little knowledge and they are quickly finding things out for themselves.

about Icicle Creek and the Wenatchee River watershed. Topics included watersheds, riparian environments, fish habitat, salmon behavior, and water quality. In addition to teaching some basic ecological concepts and answering questions from students and teachers, we shared information about the work we've been doing in Icicle Creek and talked to the students about how and why we do fisheries research.

The students especially enjoyed the day when our biologists donned their wetsuits and showed the kids how they use underwater cameras to explore beneath the surface. Many of the students have spent time along the Wenatchee River and are familiar with the local area so this was an exciting and unusual opportunity to see what things look like from an underwater perspective. During another activity, the students used binoculars and spotting scopes to observe salmon spawning in the river. Overall the new education program was a big success and we hope to continue this program next fall. Wild Fish Conservancy is still in the early phases of our research in Icicle Creek and we hope that we will continue to find new and interesting ways to share what we are learning in the field with students in local communities.

HANG TEN TO THE NEW AND IMPROVED WFC WEBSITE

By Nickolas Haldeman, WFC GIS/IT Analyst

If you haven't visited www.wildfishconservancy.org in the last six months you owe it to yourself to check out our new website. We at Wild Fish Conservancy are proud to announce the recent launch of our newly-created website.

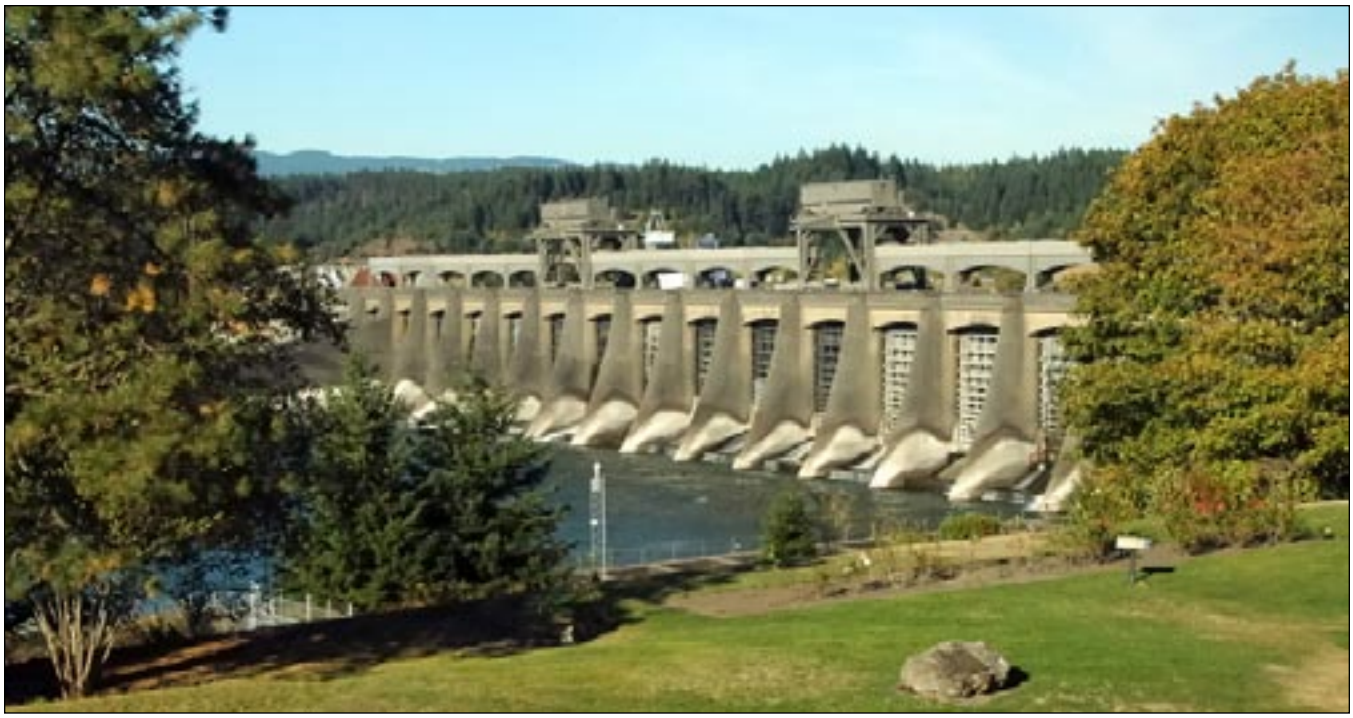
Gone are the days of the antique www.washingtontrout.org website and its html format. Thanks to the generous and ongoing support from Bruce McNae and the support and experience of ONE/Northwest, we now have a new website that better reflects our commitment to recover and conserve the region's wild fish ecosystems through our science, education, and advocacy initiatives. The new web site features an exciting new look with striking graphics, updated and expanded content, and a more user-friendly appearance and feel.

Through the use of the "Plone" framework we are able to update the content of our webpage much more quickly and easily. We hope to soon have a functioning online store stocked with Wild Fish Conservancy logo gear and other unique items available for purchase.

We encourage you to visit the new site, bookmark it, and check back frequently as we will be regularly updating and expanding it. One recent expansion is an online south Puget Sound Water Type Assessment map interface, which allows users to view the water type results for Thurston County using a familiar Google Earth background. For each stream surveyed, users will be able to view water type details, stream photos, and notes taken at the given location. Additionally, users can view Light Detection and Ranging (LiDAR) for the area, which gives detailed elevation data of the earth's surface. Future expansions of this technology will include water-type projects in Mason County and water-typing efforts on Orcas and San Juan Islands in San Juan County.

Keeping up with current technology seems to be the way of life in our technology-driven world. In an effort to stay ahead, Wild Fish Conservancy has now made it easier to contribute to our preservation, restoration, and conservation efforts through an online donation form. Using either a credit card or a PayPal account, users can donate directly to Wild Fish Conservancy without having to write and send a check. By making a donation, users are automatically added to our database and sent the annual *Wild Fish Journal* and other important literature. In addition, users are able to subscribe to the bi-monthly *Wild Fish Runs* through the website.

Since the launch of the improved Wild Fish Conservancy website in October 2007 we've had over 5,000 visitors to our site from 57 countries/territories, proof that people beyond the Northwest are interested in our efforts. So next time you are surfing the Internet, hang ten to the new and improved www.wildfishconservancy.org and enjoy the ride.



Bonneville Dam

Mitigation and Salmon Recovery: Are They Reconcilable?

By Nick Gayeski, WFC Aquatic Ecologist

Hatchery-dominated "mitigation" activities have been ongoing for decades in the Columbia River basin. These activities are largely driven by legislation authorizing the Grand Coulee Dam (1935) and the Mitchell Act (1938). These federal laws fund hatchery programs to mitigate for the federal dams. For the most part, hatchery mitigation means providing hatchery salmon and steelhead for harvest by commercial, recreational, and tribal fishers in both the Columbia River and in the ocean. Recently, it has also included funding so-called "conservation hatchery" programs that aim to "supplement" wild populations with hatchery fish founded from local wild broodstock. Meanwhile, more dams were built on the Columbia mainstem, tributary habitats suffered, and the system of federal and state-owned hatcheries expanded--and wild salmon and steelhead populations in the basin steadily declined.

That culminated in spring chinook salmon and steelhead being listed as endangered under the Endangered Species Act since 1999 and 1997, respectively. A recovery plan for these species was completed in 2007. Independent of the development of this plan, ESA-driven mitigation requirements have been imposed by NOAA Fisheries on Public Utility Districts (PUDs) that own and operate hydroelectric dams on the Columbia River mainstem since the ESA listings.

Mitigation: the production of hatchery fish to compensate for losses to fish populations that most often result from habitat loss, the creation of insurmountable barriers to fish passage, pollution, or the introduction of non-native species.

Augmentation: the production of hatchery fish for harvest. The fish produced are replacements for the wild

NOAA Fisheries is on the verge of releasing an Environmental Impact Statement (EIS) on the Mitchell Act program that will focus primarily on evaluating the impact of the Act's hatchery programs on salmon recovery throughout the Columbia basin. As the region prepares to expand its investment in salmon recovery, it is worth asking whether hatchery-based mitigation actions, regardless of authorization, are or can be made compatible with the preservation and recovery of native, wild salmon and steelhead populations in the Columbia River basin (see sidebar on the dollar costs to refurbish Columbia-basin National Fish Hatcheries, one portion of the overall hatchery system).

Wild spring chinook salmon in the Wenatchee River basin are listed as endangered under the ESA. The primary factor limiting the recovery of these populations is the condition of the mainstem of the Columbia River that affects the passage of returning adults upstream and outmigrating juveniles downstream. While tributaries like Nason and Peshastin creeks suffer significant habitat impairment – particularly loss of instream cover and habitat complexity and severely reduced summer low flows – the largest tributaries, the Chiwawa and White Rivers, are nearly pristine. The largest of these populations, the Chiwawa River population, has been the subject of a supplementation hatchery program begun in 1991. Here, “supplementation,” means a program aimed at rebuilding the wild population, and this particular supplementation program is a component of Chelan County PUD’s mitigation requirements.

In 2003 the Independent Scientific Advisory Board (ISAB), at the request of NOAA Fisheries and the Northwest Power and Conservation Council, conducted an extensive review of supplementation in the Columbia River basin, including the Chiwawa program. The ISAB found no evidence that the program was having a positive effect on the rebuilding of the Chiwawa population and recommended that no new hatchery programs of any kind be initiated in the entire Columbia basin until current supplementation programs had been subjected to a rigorous and statistically valid evaluation. This was echoed by the evaluations of hatchery practices in the context of salmon recovery conducted by the Salmon Recovery Science Review Panel (RSRP) in 2003 and 2004.

Both independent review bodies emphasized the need to evaluate supplementation and related "conservation hatchery" practices by comparing them over several salmon generations (i.e., for 10 or more years) to "reference" or "control" populations that were as similar as possible to supplemented populations, but that lacked hatchery populations. In most sub-basins in the Columbia basin it is nearly impossible to find any wild population that is completely free from some impacts from hatchery activities. Given these circumstances, the ISAB and RSRP were very clear that hatchery-free populations needed to be created by terminating hatchery activities in selected streams and sub-basins and undertaking monitoring designed to compare the performance of supplemented and hatchery-free (unsupplemented) populations.

Unfortunately, these recommendations have been steadfastly ignored by all management parties in the upper Columbia. NOAA Fisheries, the state and tribal co-managers, and the PUD's are planning to expand the supplementation

fish that presumably would have been produced naturally were the river not impaired by human impacts, such as dams.

Supplementation: the use of hatchery techniques to produce fish from local, naturally spawned broodstock in order to produce increased numbers of local wild (naturally spawning) fish. The idea is to provide a brief numeric boost to the local wild population for one or more generations that helps buy time for the population while other limiting factors in the environment are improved. (Also known as conservation hatchery.)

Hatcheries Need Millions to Keep Operating

By Mark Hersh, WFC Water Quality Specialist

The US Fish and Wildlife Service operates twenty-one fish hatcheries in the Columbia basin and they range in age from 40 to over 100 years old. Many of the hatchery programs are “mitigation” for the fish lost due to the dams. These old facilities need not only operating and regular maintenance funds but also some large capital expenditures if they are to keep operating.

Large public efforts (and the expenditures) often trigger periodic reviews. This has been especially true of salmon hatcheries after

Methow River. Photo by Steve Bondi, Methow Conservancy.

of spring chinook and steelhead. This is occurring most prominently in the Wenatchee River basin, where NOAA Fisheries has required Grant County PUD to finance new spring chinook supplementation programs in the White River, upstream of Lake Wenatchee, and in Nason Creek. This would leave the Little Wenatchee River as the only remaining independent sub-population in the Wenatchee that is not directly supplemented. Outside of the Icicle Creek basin, which does not have a native spring chinook population, the three largest sub-basins in the Wenatchee are the White and Chiwawa Rivers, and Nason Creek. The Little Wenatchee is one of the smallest sub-basins.

Each of the spring chinook sub-populations in the Wenatchee is significantly depressed. For example, the average abundance of ESA-listed spawners in the entire basin during the past ten years is 236, compared to the minimum threshold for recovery identified by the Interior Columbia Technical Recovery Team of 2,000 fish. So the temptation to employ hatchery techniques to boost numbers may be understandable. However, the fundamental problem is that scientifically, it is unknown whether supplementation (and related hatchery-based activities such as captive broodstock development) is a *bona fide* conservation tool. It is unknown if it will postpone extinction; it is unknown if it will rebuild sustainable wild populations; and worst of all, there are very good biological reasons and some evidence to believe that supplementation will act to further depress the reproductive fitness of the subject wild population. In short, supplementation may have a detrimental effect on the wild populations it is purportedly helping.

Because of the very real possibility that supplementation can actually impair the target wild population, the ISAB and RSRP recommended evaluating supplementation by creating well-monitored long-term comparisons of *some* currently supplemented populations with an array of unsupplemented ones. This, of course, is the only way to evaluate the *hypothesis* that supplementation can postpone further population decline without compromising the long-term fitness of the population being supplemented.

Endangered Species Act (ESA) listings of Pacific Northwest salmonids created new legal and ecological standards. In 2005, the US Fish and Wildlife Service began an effort to review its Columbia River hatchery programs, noting that there were *six* previous major efforts to review Columbia basin hatcheries in 1990-2005.

The Fish and Wildlife Service has completed much of this latest review, hatchery by hatchery, and buried in the appendices are some fairly hefty price tags if society wants the fish hatchery infrastructure to continue to operate in the 21st century. For example, the Leavenworth National Fish Hatchery will need $29 million in the next 10 years, and its smaller sister hatcheries at Entiat and Winthrop will need $16 million.

But wait, there's more! Four Columbia River Gorge hatcheries need $22 million and the Eagle Creek National Fish Hatchery in Oregon needs $9.5 million. The Fish and Wildlife Service plans on completing the reviews this year, so we shall have to wait and see how much more than the *$80 million* already rung up for construction projects is actually needed. That's not the annual cost of operation or the costs to expand these facilities, it is what's needed to maintain what is already in place.

Undertaking this recommended type of evaluation will require forgoing currently planned supplementation programs for the White River and Nason Creek. Moreover, it will also probably require ceasing some hatchery activities in the Entiat and Methow basins. The specific array of supplemented and unsupplemented streams and populations, plus the associated monitoring protocols that would best achieve this evaluation, should be at the center of recovery planning in the Columbia, because we need to know just how hatcheries can aid in, and not prevent, recovery. An independent scientific review body, most appropriately under the auspices of the National Academy of Sciences, should be formed to recommend the best way to achieve this evaluation.

There are two concerns with following the approach recommended by the ISAB and RSRP. One practical concern is that one or more of the sub-populations that are not supplemented may indeed go extinct in the near future. The other concern is more bureaucratic: cessation of hatchery activities reduces the direct production of (hatchery) fish for mitigation, and NOAA Fisheries and the state and tribal co-managers are loathe to let the PUDs off the hook with respect to producing hatchery fish to mitigate mainstem hydropower project impacts. Supplementation is only a fraction of the mitigation hatchery production that NOAA requires of the PUDs. A preponderance of PUD mitigation requirements are for hatchery "augmentation," the production of hatchery fish for harvest in the Columbia mainstem, the ocean, and/or tributaries such as lower Icicle Creek. These augmentation hatchery production requirements are the counterpart of the Mitchell Act requirements for the federal hydropower system impacts upstream and downstream of the PUD's dams.

NOAA Fisheries and the state and tribal co-managers are loathe to let the PUDs off the hook with respect to producing hatchery fish.

So, in addition to mitigation directives that conflict with the need to engage in a scientifically valid evaluation of supplementation as a recovery tool, mitigation directives also require hatchery production for harvest. But neither supplementation nor augmentation has been evaluated to determine whether they are compatible with salmon recovery in the Columbia basin.

For example, Grant County's mitigation obligations derive from the 2004 Biological Opinion (BiOp) for the Priest Rapids complex that includes the Wanapum and Priest Rapids projects (each project consists of the dam itself, the tailrace below the dam and the reservoir upstream of the dam). The 2004 BiOp has recently been updated but the new BiOp re-asserts Grant County's hatchery mitigation requirements:

> To help recover natural populations to self-sustaining and harvestable levels, fund and develop the hatchery facilities necessary to annually produce 600,000 yearling spring Chinook salmon, and 100,000 steelhead smolts.

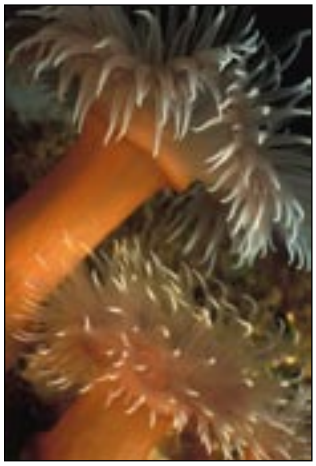
Continued on page 20

The completed reviews are like many past reviews in that they state that hatcheries must be operated on "scientific principles." That sounds very reasonable, and expected from an agency staffed with well-educated and dedicated scientists. The reviews do not, however, bother to question the scientific basis for hatchery production to "mitigate" for blocked or degraded habitat, or overfished wild stocks. That is considered a "given." To be fair, it is not a government agency's place to question the numerous laws, court cases, and treaties that give them orders. They will try to carry out their orders, even if it seems to consist of pounding a square peg into a round hole.

Nonetheless, from our point of view it seems as if the peg that has been and continues to be pounded is wild fish and their habitats. Given the questions surrounding the science behind mitigation, and the high dollar cost, it is time that Congress directed that all aspects of the hatchery system of the Columbia basin be investigated by an independent body.

Can the Puget Sound Partnership Save an Ecosystem?

by Kurt Beardslee, WFC Executive Director



"If there is magic on this planet, it is contained in water," said the literary naturalist Loren Eiseley. Although I have been working for the Northwest's wild fish for many years, I never cease to marvel at our waters and the magic they contain. Here in western Washington, we have small streams, large rivers, wetlands, salt marshes, and that wonderful, magical fjord known as Puget Sound, home to delicate sea anemones, mighty killer whales, and many other plants and animals. In last year's *Wild Fish Journal,* we talked about the problems facing the Puget Sound ecosystem, and what we think needs to be done to save it. Wild Fish Conservancy continues to make Puget Sound restoration one of its top priorities.

Governor Christine Gregoire signed legislation in May 2007 that established the Puget Sound Partnership as a new state agency, replacing the Puget Sound Action Team. The legislation sets a goal of restoring Puget Sound by 2020 and incorporates many of the recommendations of the 2006 Puget Sound Partnership, an advisory board appointed by the Governor.

The role of the new agency is to coordinate the considerable private and public efforts to protect and restore the Sound. David Dicks, an environmental attorney from Seattle, was appointed as the first Executive Director. There is also a nine-member Leadership Council that is to help the agency in its efforts. Also in supporting roles are a Science Panel, providing independent science advice; and a twenty-seven member Ecosystem Coordination Board, representing geographic areas, political bodies, businesses, and environmental groups.

All of these groups are to help prepare and implement the "Action Agenda," the plan that outlines the measures that need to be taken to protect and restore the Sound. The Action Agenda will be based on existing plans, but will be a "living" document. The Action Agenda should be in place by December 2008 and public meetings are now being held throughout the region to solicit input.

Wild Fish Conservancy is a member of a coalition of public interest groups known as the Puget Sound Environmental Caucus which has been closely following the effort. The Caucus was asked to provide two members to sit on the Ecosystem Coordination Board. Mark Hersh, WFC's water quality specialist, is one of the Caucus's two alternate representatives. As part of that work, the Caucus will also be developing position statements on all aspects of Puget Sound restoration and protection, and will be advocating for inclusion of those positions in the Action Agenda.

them, and for that reason they will be closely examining the efforts of state and local governments in implementing the Action Agenda once it is developed. Certainly, that is one reason why citizens and local governments are being asked for their input. So now is the time to tell the Partnership that we need Marine Protected Areas, that we need to protect our headwater streams, and that we need enough wild chinook salmon to feed our killer whales and fully seed our streams, to name a few.

You might remember that this is not the first effort or state agency to be charged with the task of protecting and restoring Puget Sound. In 1985 the Legislature created the Puget Sound Water Quality Authority, and in 1996 created the Puget Sound Water Quality Action Team. When Governor Gregoire announced the 2006 Puget Sound Partnership, Daniel Jack Chasan, a Northwest attorney and author, noted the past efforts in a newspaper op-ed entitled "We're Off To Save The Sound Again."

So… what is different this time? Well, first of all, some new federal mandates are at work. Four Puget Sound salmonid species are listed as "threatened" under the Endangered Species Act: chinook, Hood Canal summer-run chum, steelhead, and bull trout. Puget Sound coho salmon are a "species of concern." Declines have been noted in other Puget Sound fish. And "Southern Resident" killer whales, one of the iconic species of Puget Sound, are listed as "endangered" under the ESA. The first purpose of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved." It is hard to imagine a clearer wake-up call than those ESA listings.

There is a strong emphasis on science. The Action Agenda is to establish benchmarks to measure progress toward the goals and objectives, and the Science Panel is to help identify what those benchmarks are and to provide overall independent advice.

There is also a sense of urgency and responsibility. Everyone involved with this effort knows of the failures of the past efforts. "Accountability" is a word used frequently in regard to the Partnership. The Leadership Council believes that the buck stops with

These things will require that all of us make sacrifices. Saving Puget Sound will take an effort from all of us.

Because it is clear that saving an ecosystem cannot fall on "government" alone. An honest effort to restore and protect an ecosystem has to include, directly or indirectly, everyone in that system. The trick is to ensure that the burdens and costs are equitably distributed. If indeed we take pride ourselves in "our" Puget Sound and "our" democratic system, then it shouldn't be any other way.

In one way, this challenge is even bigger than Puget Sound. This is nothing less than the ultimate test of us as a people. Not how the local coffee company has gone worldwide, or how many operating systems the local software company has produced, or how many airplanes the local manufacturer has built, but how we have cared for the magical ecosystem that we call home, that we call "Puget Sound."

So the question is not can the Puget Sound Partnership save the Sound. It can, in that the framework is there.

The question is, do we want it to?

Mitigation continued from page 17

Although the requirement is broken out by sub-basin, the exact apportionment of these 600,000 between supplementation and harvest augmentation is not clearly specified. Presumably, all of this production is for supplementation. The BiOp is in fact open-ended in regard to this issue, noting only that the general purposes of such requirements are

> (1) to help recover natural populations to self-sustaining and harvestable levels throughout the mid-Columbia region, and (2) to compensate for a portion of the continuing mortality from hydroelectric operations.

As described above, however, it has not been demonstrated that supplementation helps recovery, and no rigorous tests of supplementation are planned. Regarding the second purpose, the same question arises: how does this massive effort affect salmon recovery? All of the relevant BiOps and the Upper Columbia Salmon Recovery Plan simply assume that there is no conflict; recovery and the hatchery effort can proceed together.

Do they really believe this? The answer may be found in the draft Hatchery Genetic Management Plan for the White River supplementation program and related documents. They contain statements stating that mitigation hatchery production is expected to be required for the *fifty year* duration of the new licenses for the PUD dams:

> One of several significant mortality factors facing this stock is mortality experienced while passing through mainstem hydropower facilities during downstream smolt migration. Passage improvements to hydropower facilities have been underway for decades. However, *even when passage protection is maximized* there will continue to be a level of mortality that is *expected to require continued artificial propagation* (emphasis added).

According to the NOAA Fisheries BiOp for the Priest Rapids Project, the measures taken to "maximize passage protection" at the Wanapum and Priest Rapids projects should be achieved by 2010. The dammed river juvenile survival standard, 93%, is already being met, as it is 95% of what NOAA estimates is the un-dammed river juvenile survival standard, which is 97%. Little improvement to wild stocks can be expected from the remaining passage improvements to mainstem dams that are or will be required by NOAA Fisheries.

So while NOAA and the co-managers believe that the required project-level juvenile survival standard is the best that can be achieved, they must also believe that the mainstem survival standard, close as it may appear to be to an un-dammed river, is insufficient to assure recovery, because they expect a need for this hatchery effort to continue for fifty years.

Could sufficient improvements, outside the mainstem Columbia, bring about recovery? Unfortunately, none of these BiOps include any analysis of where other improvements could occur in the freshwater life cycle of juvenile or adult spring chinook. Assuming for the sake of argument that the 93% project-level mainstem Columbia survival requirement is both biologically significant and the best that can be obtained, then there must be some corresponding minimal rate of survival from egg deposition on the spawning grounds to the time outmigrating juveniles enter the mainstem Columbia that, when combined with the mainstem survival standard, would assure recovery in the long run. That survival rate must also be a requirement for recovery. Yet nothing is said about this.

Nowhere in any of the Biological Opinions or related documents for the PUD hydropower facilities, or for the lower mainstem federal facilities for that matter, is there a clear cumulative survival analysis that demonstrates that recovery has a high probability of being achieved if specific survival rates -- at each key stage in the freshwater life cycles of juvenile and adult spring chinook -- are achieved. One would expect a comprehensive recovery analysis to show how recovery will be assured by achieving specific minimal survival rates at each stage of the freshwater life cycle, and perhaps most importantly, to outline the specific kinds of activities that are needed to achieve each of the stages' survival targets. Without a cumulative survival analysis that links habitat-based recovery actions in the mainstem and the tributary basins of the Columbia, there can be no recovery planning, no path to get to recovery, and no recovery.

In the case of the Priest Rapids project one is left with the inescapable suspicion that the 93% juvenile survival standard is simply the best that NOAA currently believes it can require of Grant County. If NOAA is correct that the 93% survival standard is the best that can be obtained, and is also correct that supplementation is required for the next fifty years to maintain some naturally spawning adult spring chinook in the tributaries, it is next to impossible not to interpret this as a tacit admission that recovery is not achievable.

If recovery is really impossible in the Upper Columbia, then continued or even expanded mitigation

Columbia River mitigation hatchery complex.

hatchery production is one alternative the region can consider. But this conclusion needs to result from a thorough assessment of current conditions and a complete accounting of the minimum life stage survival rates that are required to achieve and sustain recovery. Conversely, if the region is genuinely committed to securing recovery the same comprehensive life stage survival analysis is required. Such an analysis should guide the specification of minimum survival targets for key life stages in tributary sub-basins and through the dammed and undammed reaches of the Columbia River mainstem.

Wild Fish Conservancy believes that recovery is indeed possible and must be the highest priority for fishery managers in the Columbia. What can be done? Consider that most of the large tributaries that produce spring chinook in the Wenatchee basin are in relatively good condition, as is the mainstem of the Wenatchee during out-migration of juveniles in May and June. We suspect that the mainstem hydropower survival targets are too low and that more must be required of the PUD's and the federal operators to improve juvenile and adult survival through the mainstem projects (see our website for an analysis of Columbia River mainstem juvenile survival). Reliance on supplementation without the proper evaluation of its efficacy and risks will only further postpone recovery and likely reduce the probability that recovery can ever be achieved.

We will be reviewing and providing commentary on NOAA's Mitchell Act EIS and the forthcoming Remanded Biological Opinion on the Federal Columbia River Hydropower System. Regardless of this latest review, given the questions surrounding whether mitigation activities can be made compatible with recovery, and the high dollar cost of these activities (see sidebar page 15), perhaps it is time for Congress to re-examine the manner in which mitigation for the impacts of the hydropower system on the Columbia River salmon ecosystem is pursued.

Evaluating the Impact of California Sea Lions on the Recovery of Columbia and Snake River Salmon and Steelhead

By Nick Gayeski, WFC Aquatic Ecologist

On March 24, 2008, Wild Fish Conservancy joined the Humane Society of the United States (HSUS) and two private citizens in filing a lawsuit asking the US District Court for Oregon to stop NOAA Fisheries from lethally removing California sea lions (*Zalphous californianus californianus*) from the lower Columbia River in the vicinity of Bonneville Dam. NOAA issued the permit to the states of Idaho, Oregon, and Washington in response to a permit application they submitted under Section 120 of the Marine Mammal Protection Act (MMPA). We oppose the issuance of the permit because the case has not been made that the estimated level of California sea lion predation is "having a significant negative impact on the decline or recovery" of the listed stocks from the five affected ESUs (Upper Columbia River spring chinook, Snake River spring/summer chinook, Snake River steelhead, Upper Columbia River steelhead, and Mid-Columbia River steelhead). Specifically, we question how NOAA, when assessing factors that may inhibit recovery, can consider the level of take by sea lions to be significant when they consider higher levels of take by harvest and the hydropower dams to be insignificant.

Once an application is filed under Section 120, the Secretary of Commerce must determine that sufficient evidence has been presented as to the potential problem posed by pinniped predation. Then the Secretary establishes a Pinniped-Fishery Interaction Task Force to review the application and accompanying data, and then to recommend to the Secretary whether to approve or deny the application. In the present case, the Task Force was comprised of eighteen individuals, including retired marine mammal and fishery scientists, members of conservation organizations, including one member of the HSUS, members of sport fishing organizations, members from each of the four Columbia River treaty tribes and one from the Columbia River Intertribal Fish Commission, one staff member of NOAA's Marine Mammal Lab and one from NOAA's Salmon Recovery Division, representatives from the Washington and Oregon Departments of Fish and Wildlife, and one representative from the US Army Corps of Engineers. Wild Fish Conservancy was not a member of the Task Force.

The take of salmonids by sea lions, while obvious, is considerably less than the take by dams or harvest.

If the Task Force recommends approval of the application, NOAA Fisheries must produce an Environmental Assessment (EA) to determine whether or not an Environmental Impact Statement (EIS) needs to be completed. If, as in the present case, the EA concludes with a Finding of No Significant Impact (FONSI), NOAA proceeds to issue the appropriate permit. On November 5, 2007, seventeen of the eighteen members recommended approval of the application and issued the final Report of the Task Force. The lone dissenting member was the representative of the HSUS.

Section 120 was added as an amendment to the MMPA in 1994 to address the unique circumstances of California sea lion predation on wild Cedar River steelhead at the Ballard Locks in Seattle. The removal of individual sea lions at the Locks was limited in time and duration, and in fact, no individuals were legally killed at the Locks under the Section 120 authorization. Three clearly identified problem individuals were captured and shipped to Sea World in Orlando, Florida. Moreover, this action occurred only after all directed tribal and sports fisheries for all Lake Washington (including Cedar River) steelhead had been closed for several years prior to the removals, and sea lion predation at the Locks was clearly identified as

contributing significantly to the continuing decline of wild steelhead. This was the only case in which Section 120 authority has been exercised, until the recent application.

For areas outside the Ballard Locks, Section 120 sets very clear standards for when sea lions can be removed from an area, including 1) the species being taken must be ESA-listed or thought by the Secretary to be approaching threatened or endangered status and, 2) the individual pinnipeds that are having a "significant negative impact on the decline or recovery" of the fish must be "individually identifiable."

California sea lions were apparently uncommon in the lower Columbia River and estuary near Astoria during the first half of the 20th century but began to arrive in small numbers in the mid-the late-1980s. By the early 1990s, several hundred were regularly observed in the Astoria area and soon after some individuals began foraging further upriver, preying on several fish species including smelt and salmon. By the late 1990s, about a dozen sea lions were observed in the lower Willamette River (128 miles upstream from the mouth of the Columbia and 18 miles downstream of Bonneville Dam) up to the fishway at Willamette Falls regularly foraging for winter steelhead and spring chinook. It is worth noting that the Willamette River has a large hatchery spring chinook run that may be the attraction for sea lions moving this far up the lower Columbia. It is also worth noting that the California sea lion population is healthy with a current population size estimated at 238,000 in US waters. NOAA's decision to issue the permit does not occasion a direct conservation concern with respect to California sea lions.

The animals were observed in the vicinity of Bonneville Dam (146 miles upstream from the mouth of the Columbia) in 2000. In 2001, approximately six sea lions were reported in the period between January and the end of May. These numbers increased from 2002 through 2004 (30, 106, 101, respectively), then decreased from 2005 through 2007 (80, 72, 69). During this period several individuals have been captured and tagged and others identified by unique natural markings. According to the observational data maintained by the US Army Corps of Engineers, 151 animals have been tagged and have been "unambiguously" identified between years, but only fifteen have been "unambiguously" identified from natural markings between years. Another 53 tagged individuals can be identified "with high confidence" between years, and another 72 naturally marked individuals can be identified "with high confidence" within years.

For these individuals, estimates have been made of the number of salmon or steelhead each has been observed to consume. From 2002 to 2007 a total of 77 CSL have been individually identified ("unambiguously" or "with high confidence"), documented to have been present in the vicinity of the Dam in two or more years, and observed eating salmon or steelhead. Of these 77, only a relatively small proportion have been observed consuming ten or more salmon in more than one year.

Quite apart from these details regarding the extent to which individual sea lions are identifiable, and estimates of how many salmon or steelhead each such individual may have consumed in any year, NOAA and the Corps of Engineers have made estimates of the minimum numbers of salmon and steelhead combined that have been consumed by sea lions and the proportion of the total run that passed Bonneville Dam that the estimated consumption represents (Table 1).

These are not trivial numbers. However, it is important to remember that the majority of fish are unlisted hatchery fish, so the actual numbers of listed Upper Columbia and Snake River spring chinook and steelhead and Mid-Columbia steelhead eaten by sea lions are smaller. The percentages of the listed stocks that are taken are

Table 1. California sea lion take, 2002 - 2007

Year	Total Run (approx.)	Total CSL	Sea Lion Take	Percent of Run
2002	252,200	30	1,010	0.4%
2003	211,700	106	2,329	1.1%
2004	185,900	101	3,533	1.9%
2005	85,900	80	3,023	2.8%
2006	108,000	72	3,023	2.8%
2007	91,900	69	3,859	4.2%

unknown, although without better data we must assume that the percentages are probably close to the percentages of the total Bonneville passage, namely 0.4% to 4.2%.

It is also worth noting that there does not appear to be a positive correlation between the size of the run and the absolute number of salmon consumed. More salmon have been consumed during relatively smaller runs. Nor does there appear to be a positive correlation between the absolute number consumed and the total number of sea lions observed in the vicinity of the Dam during the duration of the run. For example, the 2003 run was nearly as large as the estimate for 2008 and although the largest number of sea lions was observed, the percentage of the run consumed was only 1.1%. Given these data it appears very unlikely that sea lion consumption this year would exceed 4,000 fish or 1.8% of the estimated run of 217,000. In contrast, the take by harvest will be approximately 26,000 returning fish (12%) and the dams will take almost 47,000 fish (21.5%).

Fish ladders have helped, but each hydroelectric dam continues to kill both juvenile and adult salmon.

The fundamental issue is whether or not the states and NOAA have complied with the standards of Section 120. Have they made an adequate case for allowing the requested actions? WFC believes that this is a four-step process:

- measure each potential source of mortality to salmon and steelhead in the Columbia mainstem and tributaries;
- articulate a quantitative standard for finding that California sea lions in the Columbia River are having a significant negative impact on listed salmonid stocks;
- compare the estimated level of removals of ESA-listed salmonids by sea lions with authorized levels of incidental and directed take from other sources, and explain why some sources are considered significant while others are not; and
- identify the level at which predation by sea lions is no longer significant, and adopt that level as the goal of any authorized removal program.

In short, we believe NOAA must show that the amounts of incidental take allowed to the operators of the federal and private hydropower system in the Columbia and Snake Rivers, along with the take allowed to commercial, sports, and tribal harvesters are consistent with recovery and commensurate with the standard that is being applied to sea lions such that they are singled out for removal.

For example, under the current provisions of the Columbia River Fish Management Plan governing harvest in the Columbia and Snake rivers, the expected total run size (wild and hatchery) for the Upper Columbia spring chinook and Snake River spring/summer chinook of 217,000 establishes a maximum allowed (by NOAA) total harvest rate on the listed components of these stocks of 12%. NOAA's recently released October 30, 2007 draft Biological Opinion for the Federal Columbia River Power System (the re-written version of the 2004 FCRPS BiOp that was remanded by Judge James Redden in the US District Court of Oregon in 2005; that decision was upheld by the 9th Circuit Court of appeals in 2007) brags that the current rate of survival for adult Upper Columbia spring chinook from Bonneville Dam up to (but not past) McNary Dam is "approximately 90.3%" or "96.6% per project." Using that average survival rate (96.6% per dam) and following the run upstream to the mouth of the Wenatchee River--upstream of Rock Island Dam, seven dams from the mouth of the Columbia--means that 78.5% of adults will have survived.

In other words, we are to believe that a mortality rate of 21.5% of Wenatchee River-bound listed spring chinook combined with potential incidental harvest of 12% is compatible with recovery and therefore is permissible, but a predation impact by California sea lions of at most 4% -- is not. Sea lions must be removed or killed, but these dam and fishery impacts do not have to be reduced! (It is also worth noting here that the recovery target for the Wenatchee River spring chinook population established by the Interior Columbia Technical Recovery Team is 2,000 fish, while the recent 10-year average return is only 236 chinook, according to the draft 2007 FCRPS BiOp.)

The logic of NOAA and the states is worse than this, however. NOAA is allowing for the removal of up to 85 individual California sea lions per year from the area between Bonneville Dam and marker 85, approximately six miles downstream of the Dam. This number was chosen not because some specific targeted reduction in sea lion predation would occur from the removal of the 85 individuals, but instead because 85 individuals represent 1% of the allowable biological removal based on the current size of the California sea lion population. This has nothing whatsoever to do with the necessary reduction in predation that would permit recovery of the ESA-listed stocks that are affected by the predation—that number has not yet been articulated by NOAA.

WFC is not alone in this assessment of the justification of the proposed action provided by the Task Force and NOAA. Prior to writing the EA, NOAA requested comment on the Task Force report from the Marine Mammal Commission, an entity created by the MMPA to advise NOAA on scientific matters. The Commission consulted with its Committee of Scientific Advisors on Marine Mammals and replied to NOAA in a letter dated November 23, 2007. The Commission found that the Task Force report fell short of providing the necessary justification for approving the states' request. The Commission's recommendations are the basis for the four-step approach described above (the Commission's letters are available on our website www.wildfishconservancy.org).

NOAA says harvest by humans does not impede salmon recovery, while harvest by sea lions, although much smaller, does.

NOAA ignored the Commission's response to its request, as well as later comments from the Commission on the Draft and Final EA's (issued January 2008, and March 2008, respectively). In their February 19, 2008 letter, the Commision repeats their earlier comments and notes that NOAA had by and large ignored their earlier recommendations:

> At present, we still have no quantitative guidance for determining what constitutes significance. We believe the lack of such guidance undermines the Secretary's ability to make and support sufficiently the findings required under section 120 of the MMPA. For that reason, **the Marine Mammal Commission again recommends** that the Service develop and include in its decision documents a clearly articulated quantitative standard to support any finding that pinnipeds are having a significant negative impact on salmonid stocks (original emphasis).

NOAA's disregard of the Commission's repeated comments is distressing, but unfortunately, not too surprising. This is the same agency that has had a number of tries to develop a Biological Opinion for Bonneville Dam and the rest of the federally-owned Columbia hydropower system, only to have those opinions repeatedly rejected by federal courts.

Like those rejected Biological Opinions, NOAA's decision documents (as well as the Task Force report) shows a lack of rigor and comprehensiveness--required qualities if salmon recovery in the Columbia Basin is to be achieved. A clear quantitative standard of "significant negative impact" is required by which to measure the magnitude of each potential source of mortality to adult and juvenile salmon and steelhead in the Columbia mainstem and tributaries. Without such a standard it is impossible to fairly and accurately measure the impact each source has on the ability of listed stocks to achieve recovery and to compare the relative magnitude of impacts (e.g., dam passage, in-river harvest, sea lion predation). The failure to provide a comprehensive survival analysis by which to judge the significance of specific impacts was identified as a critical fault of the 2004 FCRPS BiOp by both US District Court of Oregon Judge Redden in his 2005 decision remanding the BiOp, and in the Ninth Circuit Court of Appeals decision upholding Judge Redden's remand in 2007.

Management agencies, both federal and state, need to be diligent about providing and articulating such standards, and they need to apply them rigorously and transparently across the board to all sources of mortality. The public interest in salmon recovery is poorly served when the agencies fail, as is sadly exemplified by the proceedings thus far regarding the presumed problem of California sea lion predation at Bonneville Dam.

Designing River Restoration Projects Using a Geomorphic Approach

By Micah Wait, WFC Conservation Ecologist

While rip-rapped stream banks may appear to have high habitat value, bank armoring effectively prevents habitat-forming processes from occurring.

From lazy meanders to whitewater cascades, rivers and their floodplains create a diverse array of habitats that are some of the most productive in the world. Biological processes in a floodplain ecosystem, such as the establishment of vegetation and the cycling of nutrients, are played out on the stage set by physical processes.

Erosion and sedimentation are two important geologic processes that drive the formation of habitat patches on the landscape in an alluvial floodplain. Erosion is the downhill movement of alluvium such as silt, sand, gravel, cobbles, and even boulders, while sedimentation is the deposition and storage of these alluvial materials. As a river meander migrates downstream, vegetation establishes itself in newly available soils. Eventually the vegetation at this site develops into a mature riparian forest, until the river migrates through this location again. Similarly, avulsions occur when the combination of erosion, through head cutting, and sedimentation, through in-channel aggradation, create a more energy efficient pathway for the flow of water across the floodplain, resulting in the relict river channels known as an oxbows.

Nature, through biodiversity, organizes itself around floodplain valleys; the dynamic physical landscape creates an assortment of habitats and supports a tremendous number of species. Humans have frequently settled in or around floodplain valleys in order to take advantage of plentiful local resources. Unfortunately, the water, fertile soils, and transportation corridors that make these ecosystems appealing to humans are the same resources that make them good habitats for other species and when humans modify the landscape to suit their needs, it is often at the expense of the ecosystem functions.

This year Wild Fish Conservancy received funding to design three restoration projects in the Puget Sound region using various geomorphic assessment techniques. These projects will occur in the Snoqualmie, Dosewallips, and Duckabush River basins. In the Snoqualmie and lower Dosewallips River we will use a geomorphic assessment technique developed by researchers at the Flathead Lake Biological Station (FLBS) of the University of Montana using remotely-sensed data to predict river migration. In the upper reaches of the Dosewallips and Duckabush we will conduct assessments using a more traditional technique that involves site-scale measurements of stream processes and a model developed by the Army Corps of Engineers.

Erosion and sedimentation in an alluvial floodplain can be modeled by examining the current morphology of the system, including channel slope, water depth, and current velocity, and forecasting these values under flood conditions. Most of the erosion and sedimentation which occurs in a river happens during flood events, and the ability to understand the magnitude, frequency, and consequences of flood events is an important step in predicting future conditions in a basin.

The assessments generated using the FLBS methodology will be derived from a combination of remotely-sensed data and empirical measurements of flow velocity and water depth collected using an acoustic Doppler profiler, or ADP. These geomorphic assessments will be the foundation for our restoration planning efforts in these basins.

Remotely-sensed data are any data regarding a location or object that are acquired by a sensing device that is not in contact with the location or device. In the environmental field this generally takes the form of images, collected via an airplane or satellite, of the earth's surface. Our projects will utilize a low elevation plane flight to gather multispectral images of our project reaches. Multispectral images include the bands of light visible to the human eye - red, green, and blue, as well as bands of light from frequencies not visible to the human eye, such as infrared.

Acoustic Doppler profilers are instruments that collect water velocity and depth values via sonar. The ADP unit creates a pulse of sound from a transducer and records the echoes of this sound pulse from both the river bottom and particulate matter in the water. The echo from the bottom gives the instrument a value for the depth of a site, while the echoes from the particulate matter are used to determine water velocity via the shifted frequencies of moving objects, i.e., the Doppler Effect. The ADP unit is linked with a survey grade GPS (Geographic Positioning System) unit that gives the exact location of the unit at the time of every reading.

We will use the ADP unit to generate depth and velocity values within each of our project sites; however, it would be cost and time prohibitive to collect these data for every square foot of our project reaches, which range from 2 to 18 miles, so the ADP data will primarily be used for field verification of the remotely-sensed data. This reduces the tradeoff of resolution for scale that is characteristic of measurements of the natural world.

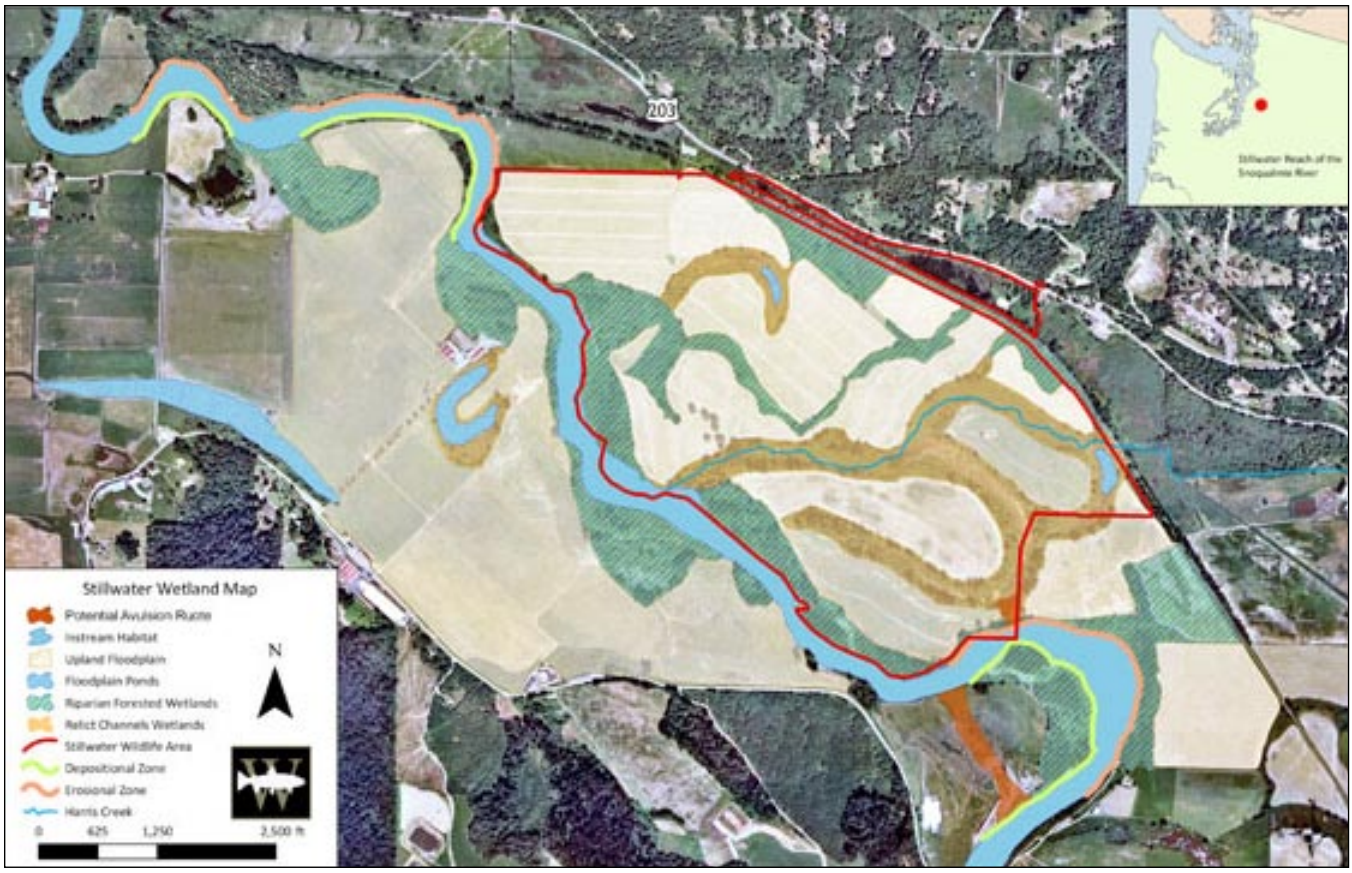
Water depth and velocity data, when overlaid on a detailed topographic model of a floodplain reach, generate maps of stream power and shear stress for the entire floodplain. Stream power is the theoretical ability of a stream to transport bedload, while shear stress is a measure of the tangential or parallel stress applied to the face of an object. Both of these metrics are in turn used to generate maps of the potential for erosion and sedimentation in a river.

The Stillwater Reach of the Snoqualmie

The Stillwater Unit of the Snoqualmie Wildlife Area is a 456-acre natural area on the eastern banks of the Snoqualmie River between Duvall and Carnation. The Washington Department of Fish and Wildlife manages the Wildlife Area, and a major objective for the unit is the protection, restoration, and enhancement of wetland and riparian habitats in the unit. The Snoqualmie River has an environmental history in common with many of the other river basins that drain into Puget Sound. One of the earliest post-settlement alterations to the instream structure of Snoqualmie River was the removal of large woody debris from the main channel, termed "desnagging" by the Army Corps of Engineers. The floodplain forests of the Snoqualmie Valley were originally logged and cleared in the 1920's, and as in many of the lowland floodplain valleys of the Puget Sound, large stretches of the Snoqualmie River were diked and armored in the 1950's and 60's in an attempt to control flooding and accommodate agricultural practices on the modified floodplain.

Today, the Stillwater Wildlife Unit bears the marks of dynamic riverine processes: flood channels, oxbow wetlands, and river meander bends. These unique wetland and fluvial habitats are mostly intact within the unit, and, when considered in combination with planned restoration projects in this reach of the Snoqualmie, offer an important opportunity for ecological process restoration on a landscape scale. Proposed restoration actions at the site include the removal of bank armament that is inhibiting river meander migration, the installation of engineered log jams (ELJs) to restore lost instream structural elements, and the planting of native riparian forests throughout the Wildlife Area.

Our geomorphic assessment of the Stillwater reach will allow us to gauge four things: 1) the erosion risk posed to adjacent and downstream landowners, 2) the likelihood of an avulsion occurring at the rip-rap removal site, 3) ideal locations for ELJs, and 4) ideal locations for riparian planting sites.



This map depicts floodplain habitat types found in the Stillwater Reach of the Snoqualmie River. The inside bend of a river, where stream power is low, is an area of sedimentation, where suspended sediment is deposited. The outside bend has higher flow rates that erode sediments stored in the river bank. Over the years this subtle process leads to a migration of the river's channel across the floodplain. Avulsion channels form during floods when water flows across the neck of a meander loop, cutting off that loop as the flow path comes into equilibrium with a shorter, steeper, and more energetically favorable route.

Any actions in a river that change the hydraulics along the river bank, such as rip-rap removal, can have cascading consequences downstream. By modeling the stream power in the reach under current and future conditions we can better predict the chances of bank erosion downstream of our restoration site.

The site of the proposed rip-rap removal is also a potential nick point that could lead into a channel avulsion, where the mainstem of the Snoqualmie abandons its current channel and jumps into a relict channel and oxbow system. This could significantly alter the nature of the access in the Wildlife Area, but would result in formation of a large amount of habitat beneficial for salmonids. Our modeling efforts will generate a quantitative estimate of the likelihood of a channel avulsion at this site.

Large woody debris naturally tends to accumulate in locations where sediment is deposited by the river. As the river loses stream power, it loses its ability to transport material and deposition results. Our analysis will identify locations of low relative stream power in the reach and these areas will be targeted for ELJs. This will not only mimic natural patterns of wood deposition in a river, but will result in jam placement in locations that are the least dangerous for boaters.

Understanding river migration patterns and likely avulsion sites can lead to more cost-effective riparian planting design. Planting trees in areas that are likely to be eroded away by river migration is not an efficient use of restoration funds.

The National Forest Reaches of the Duckabush and Dosewallips Rivers

The Duckabush and Dosewallips Rivers flow east from the high peaks of Olympic National Park, through the Olympic National Forest to Hood Canal. These rivers are two of the largest tributaries to Hood Canal, and are home to the mid-Hood Canal stock of Puget Sound chinook, as well as stocks of summer and fall-run chum salmon, steelhead, coho salmon and pink salmon.

The Dosewallips and Duckabush Rivers have similar natural and anthropogenic histories. Before European

settlement these two river systems were historically disturbed by infrequent catastrophic fires, seasonal flooding, and the rare earthquake or tsunami. Logging and land clearing began in the 1860's with oxen teams, culminating in industrial logging in the 1920's. Extensive clearing of instream wood and riparian logging coupled with harvest and hatchery actions have left both river systems impaired, and chinook salmon stocks are at historic lows.

A recent river-wide floodplain assessment for the Dosewallips River has identified a chronic lack of large woody debris as a major habitat limitation in a number of the upriver reaches of the Dosewallips. The study found that although there is an abundance of smaller LWD, this wood is generally more mobile and does not form stable log jams. An ecosystem diagnosis model that was run for both the Dosewallips and the Duckabush Rivers identified large woody debris supplementation as the highest priority action for the recovery of chinook stocks in these basins.

Our geomorphic assessment will identify the best sites for the installation of engineered log jams (ELJs) in over eighteen miles of river in the reaches flowing through Olympic National Forest. An assessment of this type will allow for the placement of wood jams in locations that

The Dosewallips and Duckabush Rivers are important for recovery of Hood Canal salmon stocks.

are likely to foster persistent jam formation through the recruitment of available smaller wood to our jams. While there are only a few private residences adjacent to these reaches, there is a U. S. Forest Service access road that parallels the Dosewallips. Road washouts have been a major concern in local communities, where residents see access roads into the National Park as economic engines for the region. Our reach analyses will allow us to site ELJs in areas where they are least likely to impact the Forest Service access road on the Dosewallips, and may even help to protect it. Additionally, this analysis will allow us to site log jams in locations where they are most likely to reconnect the channel with its floodplain. Floodplain connectivity creates critical off-channel rearing habitat and is also important for the dispersal of flow across the floodplain.

Lower Dosewallips Floodplain and Estuary Restoration

The Wild Fish Conservancy, in partnership with the Dosewallips State Park, has been actively working on restoring ecosystem processes in the lower Dosewallips River and Estuary for over four years. The first phase of the project involved the removal of a remnant dike in the salt marsh estuary and was conducted in 2004 (see the 2005 issue of the Washington Trout report for more details). The second phase of the project will go to construction this summer and will involve the placement of six ELJs in the lower river, and the removal of 1000 feet of levee and rip-rap along the river's southern bank. The third phase of the project involves the potential removal of bank armament and park infrastructure along 1200 feet of river bank above and below the US Route 101 highway bridge. If this restoration occurs it will include the removal of 18 riverside campsites and an access road. These sites would be replaced by an upslope property acquisition and the construction of new campsites outside of the river's floodplain.

In order to justify these major changes to the park, we will model future conditions using our stream power assessment, assuming that the park infrastructure and bank armament have been removed. This will allow us to determine the potential habitat gains made by the proposed project. The bulk of the project site is downstream of the US 101 bridge. The bridge itself, and the road prism that makes up the approach to the bridge could potentially constrain the amount of river migration at this location. Our geomorphic assessment will determine the extent to which floodplain reestablishment can occur and will establish the boundaries for our floodplain restoration. Additionally our assessment will help to determine locations for any future large woody debris placement in the reach.

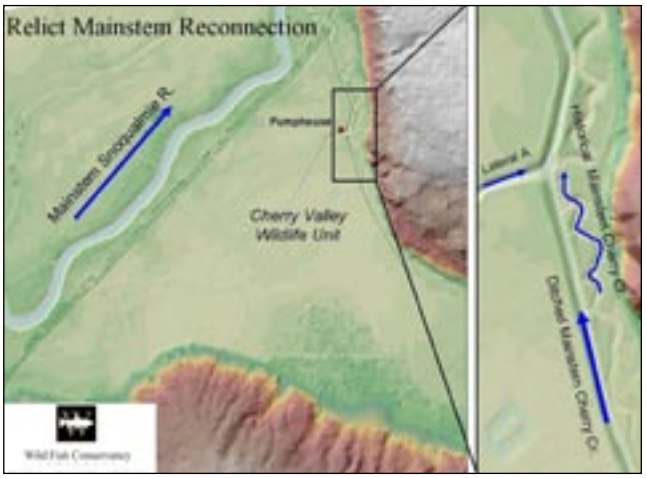
Science Updates continued from page 6

Lowland tributaries to Cherry Creek have been simplified and straightened for agricultural purposes.

In 2003, Wild Fish Conservancy conducted a feasibility study to assess how effectively salmon rearing and spawning habitat could be improved and natural processes restored in Cherry Valley without impacting existing agricultural land use. WFC worked closely with King County Drainage District 7, the Snohomish Conservation District, Washington Department of Fish and Wildlife, NOAA Fisheries, and affected landowners to develop a restoration plan with a high likelihood of success. The plan, agreed upon by the farmers, the agencies, and Wild Fish Conservancy, included improvements at the pump facility as well as instream and riparian habitat restoration.

In 2004, the Drainage District with assistance from the Snohomish Conservation District, upgraded the pump facility with a more fish-friendly system to improve fish passage to and from critical floodplain habitat. In 2006 WFC, in partnership with the Snoqualmie Indian Tribe, Drainage District #7, Snohomish Conservation District, and WDFW, received funding to evaluate the effectiveness of the new unscreened Hidrostal pumps at the Cherry Valley pump house. That spring, WFC's pilot study documented much lower mortality of fish passing through the pumps; while fish mortality assessed immediately after pump passage was less than 5% on average, fish injury rates ranged from 4 to 37%, with the higher rates associated with larger fish and higher impeller speeds. WFC's fish passage effectiveness study will be expanded during spring 2008 to further evaluate the extent to which the new pump provides safe fish passage, and with assistance from the Tulalip Tribes, to better understand the water quality conditions that limit fish habitat in Cherry Valley. Project consultant Living Water Innovations will also be working with WFC in 2008 to run tests at the pump facility that will help identify the pump speed and impeller type that minimizes impacts to fish while still providing the flood-reduction function required by the Drainage District.

Our 2006 study was compromised by dramatically low dissolved oxygen events that occured in the agricultural channels. Many of the sample specimens died before we could begin testing. This year's work includes efforts to identify the sources that contributed to the pre-test mortality.



One aspect of the project is to increase sinuosity and habitat complexity in the mainstem.

Finally, after years of research, modeling, meetings, grant writing, and collaborative planning, WFC will be implementing the Cherry Creek Floodplain Habitat Restoration Project in 2009. This extensive habitat restoration project will restore streamflow into the sinuous relict mainstem Cherry Creek to recover the in-stream and riparian habitat complexity and channel processes that were lost when the lower mainstem was ditched and straightened. The project will also abandon three straightened and ditched floodplain tributaries and replace them with one naturalized, sinuous channel that has a diverse range of instream habitats, a native riparian

corridor, and instream large woody debris. The project may be complemented by an adjacent seasonal wetland restoration project proposed by Ducks Unlimited.

The Cherry Creek Floodplain Restoration Project will include substantial community involvement, including the recruitment of volunteers to assist in implementation monitoring, long-term landowner maintenance of the new pump and floodgate facility, and public outreach measures to illustrate the cooperation of agricultural stakeholders in the restoration of Cherry Creek. The public will be invited to learn about the restoration effort and its ecological significance via media releases, interpretive signs and guided tours of the project site.

Funding for the project totaling $735,000 has been awarded by the Salmon Recovery Funding Board, the National Fish and Wildlife Foundation, King County, and the King Conservation District.

LAMPREY: ANCIENT FISH OF THE NORTHWEST

By *John Crandall, WFC Ecologist*

Lamprey (family Petromyzontidae) are far and away the most primitive form of vertebrate currently in existence. Indeed, of the 46,000 or so species of vertebrates on Earth, lamprey (and their close cousins, the hagfish) are the only surviving jawless vertebrates (or "agnath" meaning without jaws) with family lines dating back over 500 million years. Lamprey are slender fish that resemble eels. They possess a distinctive oral disc for a mouth and lack the jawed mouth, scales and paired fins that we associate with most fish.

Two Pacific lamprey during a pre-spawn event. Photo by Boa Le, USFWS.

Today, three species of lamprey occur in Washington: the Pacific lamprey, the river lamprey, and the western brook lamprey. Both the Pacific and river lamprey are anadromous and parasitic while the western brook lamprey is both non-migratory and non-parasitic. For the most part, these species exhibit somewhat similar distributions across the state and occur in streams throughout Puget Sound, the Columbia River basin, as well as in coastal streams.

Compared to other groups of fish, such as the salmonids, we know relatively little about the ecology, biology and status of lamprey in the Pacific Northwest. Yet we do know several important aspects of their life history. Similar to salmonids, lamprey excavate nests and spawn over gravel substrates. Their larvae, called ammocetes, are blind and occupy soft substrates associated with slack water habitats. Being blind, ammocoetes are filter feeders and may remain in freshwater for up to seven years before migrating to the ocean. In saltwater, Pacific and river lamprey are parasitic (feeding on the bodily fluids and flesh of their host) on a variety of fish species including salmon, herring, halibut and rockfish. After spending a year or two in the ocean, they migrate back into freshwater to spawn. Conversely, brook lamprey never leave their natal freshwater habitats, are non-parasitic and do not feed as adults. All in all, lamprey have similar habitat requirements to salmonids. As such, the habitat degradation and alterations that have combined to decimate Northwest salmon populations have also likely negatively impacted lamprey populations.

Entosphenus tridentatus. *Photo by Wydocki & Whitney.*

Indeed, populations of Pacific lamprey have undergone drastic declines in the recent past and this has sparked interest in the conservation, protection and restoration of lamprey populations and their habitat. The decline of Pacific lamprey in the Columbia River basin has been especially precipitous, and, currently, Pacific lamprey are a federal species of concern. Yet, relatively little is known about lamprey in this region and fundamental questions regarding their status, distribution and life history remain unanswered. To address these concerns, Wild Fish Conservancy has recently initiated an effort to investigate the status and distribution of lamprey in the Methow River

watershed. WFC is also engaged in determining potential lamprey related restoration opportunities in the Methow.

Downstream of the Methow, nine mainstem Columbia River dams and their impoundments likely pose significant passage challenges for anadromous lamprey; consequently, lamprey returning to and inhabiting the Methow may be among the most regionally imperiled. Without fundamental information, effective and responsible conservation, protection, and restoration efforts will not be possible. Furthermore, these data gaps make it challenging to determine the short- and long-term effects that salmonid-based restoration projects have on the lamprey that occupy these same stream reaches and whether lamprey-specific modifications of such projects are either justified or appropriate. Although it is likely that most salmonid-based habitat restoration would benefit lamprey, this aspect has not received adequate attention. For example, the mesh screening used on diversions to prevent entrainment of young salmonids into irrigation canals is commonly too large to prevent the entrainment of the tiny lamprey ammocoetes (as well as other native species that have small larvae, such as sucker and minnows). As such, lamprey will continue to be entrained and likely killed. Habitat degradation associated with agriculture, road construction and flood control practices is also likely negatively affecting lamprey in the Methow. Yet scant data exist related to the distribution and abundance of, or habitat used by, adult and juvenile lamprey in the Methow.

WFC has recently received a generous grant from the National Fish and Wildlife Foundation to conduct a systematic basin-wide survey in the Methow to address uncertainties regarding lamprey distribution, relative abundance and habitat. This effort, slated to begin in August, will convene a collaborative partnership including the University of Manitoba, Western Fishes, USFWS, USFS, and Douglas County PUD. The integration of this baseline information with several salmonid-based restoration planning efforts currently underway in the Methow will assist with the identification and prioritization of stream reaches where on-going and future restoration may benefit lamprey. Additionally, our project will obtain tissue samples of Methow lamprey in order to genetically identify species composition and their relationships to other lamprey populations in the Northwest. WFC views this opportunity as a crucial step towards unraveling the ecology of lamprey in the upper Columbia basin and the development of a lamprey conservation plan that will provide direction to further the conservation and protection of the world's oldest living vertebrate.

ELLSWORTH CREEK FISH DISTRIBUTION AND SALMONID ABUNDANCE SURVEY

By *Thomas Buehrens, WFC Biologist*

Ellsworth Creek is a 5,000 acre watershed which flows into southwest Washington's sprawling Willapa Bay, one of the few large estuary ecosystems on the West Coast left relatively undisturbed. The Ellsworth watershed is owned in its entirety by The Nature Conservancy (TNC) and is being managed as a preserve for conservation and research. Ranging from sea level to 1,570 ft. in elevation at its headwaters, the watershed boasts a pristine 349-acre estuarine emergent marsh at its mouth and over 300 acres of old growth western red cedar, western hemlock, and Sitka spruce forest fueled by coastal rainfall totaling more than 100 inches annually. It is home to black bear, cougar, Roosevelt elk, and marbled murrelets in addition to native fish.

Much of the Ellsworth Creek watershed was historically industrial timberland, with logging occurring right up until its acquisition by TNC during the last decade. As a result of past land use, damage from anthropogenic impacts including clearcuts, landslides, and debris-choked tributary streams is present in parts of the preserve. TNC is implementing an ambitious long-term research strategy for the watershed to study the effects of a range of ecosystem management and restoration activities. As part of the foundation for this research, TNC contracted Wild Fish Conservancy (WFC) to perform a systematic study of fish species composition, summer distribution, and abundance throughout the Ellsworth Preserve during 2007.

Ellsworth Creek was sampled from the estuary to the headwaters.

Frank Staller, WFC field technician, is assisted by Liane Davis, ecologist from The Nature Conservancy, as they electrofish Ellsworth Creek.

Wild Fish Conservancy crews were on the ground in the preserve from mid-July through mid-August, walking the streams by day and tent camping by night. Field work was conducted by two experienced two-person WFC crews and employed several survey methods including single and multiple-pass electrofishing, snorkeling, and visual observation. The survey area included all previously identified potential fish-bearing waters with the exception of tidally-influenced habitat at the creek mouth and headwater reaches that were too small to survey or were covered in debris jams and thick vegetation.

The field work proved fruitful, allowing WFC to provide TNC with a good baseline understanding of native fish resources in Ellsworth Creek, and leading to the identification of future research questions. WFC crews documented the presence and distribution of eight species of native fish including coho salmon, coastal cutthroat trout, rainbow trout, riffle/reticulate sculpin, torrent sculpin, coastrange sculpin, prickly sculpin, and western brook lamprey. The species found were typical of small watersheds in Willapa Bay, which often lack the diversity of larger rivers. Additionally, WFC estimated the abundance of coho salmon and cutthroat and rainbow trout in the watershed using data from snorkeling and electrofishing in conjunction with Bayesian statistical techniques. Although chum salmon are also known to use the watershed, their life history does not include an extended juvenile freshwater rearing phase, and they were not present at the time of the survey. Because of the location and condition of the watershed, it is possible that Ellsworth Creek supports populations of freshwater mussels and/or Olympic mudminnow. However, despite the thorough and extensive sampling we performed during the course of this study, we observed neither. Still, due to the sampling approach employed, the possibility that they are present in the watershed cannot be dismissed.

During the course of the study, WFC personnel made several observations which helped them identify the need for future research. While identifying juvenile cutthroat and rainbow trout in WFC Photariums, WFC investigators noted that a sizable proportion of individuals appeared to be cutthroat-rainbow hybrids – they displayed a phenotype intermediate between rainbow and cutthroat trout. WFC personnel considered this observation in light of recent studies documenting hybridization between the two species and concluded that there is a need for greater understanding of geneflow between coastal cutthroat and rainbow trout. Although hybrids have been documented throughout the native range of both species, it is unknown whether hybridization represents a risk to either species or whether hybridization is more or less prevalent in areas that have been heavily impacted by land use practices. The answers to these questions could have important implications for resource managers charged with the protection of native fish. WFC, in partnership with TNC, has received funding to conduct genetic analyses of trout in Ellsworth Creek to add to the understanding of genetic interactions between both species in southwest Washington, an area where cutthroat are a U.S. Fish and Wildlife Service "Species of Concern."

Altogether, the Ellsworth Creek Fish Distribution and Salmonid Abundance Survey was a great opportunity for WFC to learn about and work in a new region, and to strengthen an already-good working relationship between WFC and The Nature Conservancy.

For more detail on the Ellsworth Creek Fish Distribution and Salmonid Abundance Survey please see the completed final report, which is available on the Wild Fish Conservancy website, www.wildfishconservancy.org.

WEST WHIDBEY JUVENILE FISH-USE ASSESSMENT

By Micah Wait, WFC Conservation Ecologist

In 2005 and 2006 Wild Fish Conservancy researchers conducted an assessment of juvenile salmon usage in the nearshore along the western shoreline of Whidbey Island (view the results from this study on our website, www.wildfishconservancy.org). Juvenile salmon in the western Whidbey nearshore are non-natal fish, meaning that they were not spawned in the streams of Whidbey Island, but rather were migrating to these waters from the major rivers and numerous small creeks which drain into Puget Sound. The western shoreline of Whidbey Island is bounded by

Admiralty Inlet in the south, and the Strait of Juan de Fuca in the north. Admiralty Inlet is a major bottleneck for tidal flow into and out of Puget Sound, and the majority of salmon in Puget Sound must pass through this corridor as they migrate into the Pacific Ocean. We recovered hatchery-origin chinook and coho with Coded Wire Tags (CWT) from over 14 different drainages in the region, from the Skokomish River in Hood Canal to the south, to the Chilliwack River of the Fraser system in British Columbia to the north. The basins from which we recovered tagged fish on the west Whidbey shoreline support over 75% of the individual stocks that make up the ESA-threatened Puget Sound chinook population.

Sub-adult chinook collected during a west Whidbey nearshore survey.

This year the Wild Fish Conservancy is working in Partnership with the Skagit River System Cooperative (SRSC), and the Island County Beachwatchers to identify the basins of origin for the wild chinook using the west Whidbey shoreline. WFC staff are working with local volunteers from the Beachwatchers to collect juvenile chinook salmon and take a small fin clip for genetic sampling. Our work is a component of a larger project being conducted by the SRSC attempting to determine basins of origin for wild chinook in the north Puget Sound, including the San Juan Islands, Skagit Bay, Possession Sound, and Port Susan. The CWT data collected by WFC in 2005 and 2006 only determines the basin of origin for hatchery stocks that have been implanted with CWT's. However, we know that hatchery origin and wild origin fish behave very differently, and that using only hatchery stock as a proxy for wild fish could lead to false conclusions regarding the patterns of nearshore migration for wild chinook in Puget Sound. Wild-spawned fish will provide the backbone of Puget Sound chinook recovery, and understanding their migration patterns and distribution within Puget Sound will fill a critical data gap in our knowledge and understanding of the ecology of chinook salmon.

In Memorial

Wild Fish Conservancy gratefully acknowledges donations made in memory of

Aileen D. Prodan

These memorial gifts will directly fund *Wild Fish Conservancy's* advocacy, research, and restoration initiatives.

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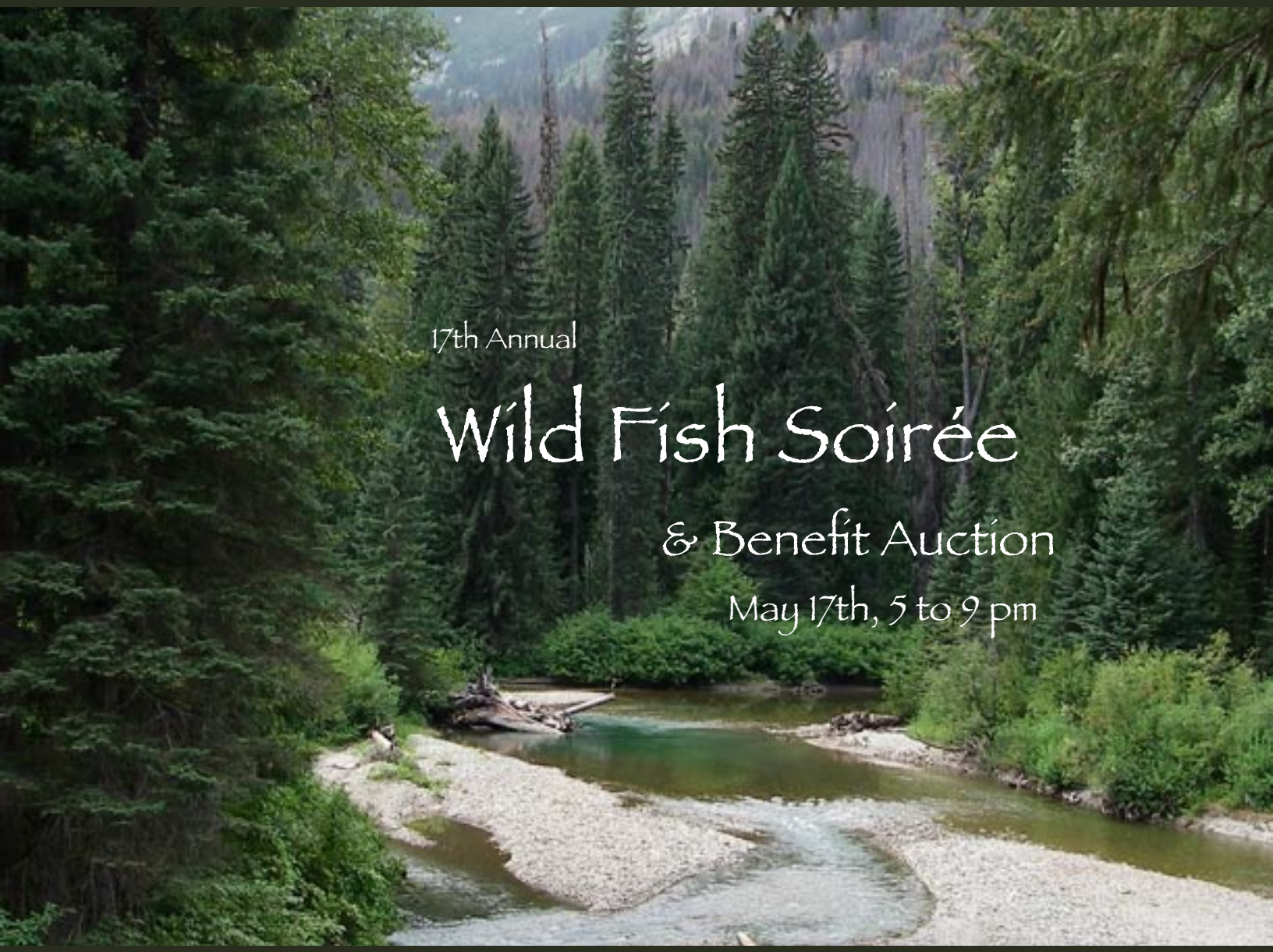
Harrison House Suites &
Tucker House Inn
Hidden Wild Image
Hill's Discount Flies
Vicki Hoagland
Hoodsport Winery
Icicle Outfitters and Guide, Inc.
Idylwilde Flies
Jim Teeney Inc.
Kaufmann's Streamborn
Joe Kelly
Krieger Enterprises
LaCrosse Footwear, Inc.
Harry Lemire
Hugh Lewis & Lynn Peterson
Little Stone Flyfisher
Lost River Winery
Madison River Fishing Co.
Doris McFarland
Bill and Lynn McMillan
Bruce McNae
Microsoft Corporation
Montana Fly Co.
Morris Communications
Mount Rainier Guest Services
Mountain Press Publishing Co.
Ed Newbold
Northwest Film Forum
Northwest Outdoor Center
Northwest Women Flyfishers
Orvis
Patagonia
Pioneer Organics
Portalis Wine Shop & Bar
Red Hook Brewery
Redington
River Run Angler
Doug Rose
Royal Wulff Products
Sage Manufacturing
San Juan Safaris
Sawtooth Winery
Scherer Designs
Scott Fly Rod Company
Seastar Restaurant & Raw Bar
Seattle Art Museum
Seattle Symphony
Sheraton Bellevue
Silver Creek Outfitters
Southern Chile Expeditions
Sport Restaurant & Bar
Stackpole Books
Suncadia
Temple Fork Outfitters
The Avid Angler
The Book Mailer
The Center for Wooden Boats
The Don McCune Library
The Fly Shop
The Irish Angler
The Summit at Snoqualmie
The Third Floor Fish Café
Third Place Books
Thomas & Thomas Rod Makers, Inc.
Tom Douglas Restaurants
Marilyn & Craig Tuohy
Ramon Vanden Brulle
Wellspring Spa at Mount Rainier
Wilderness Awarness School
Wing-It Productions
Ken Winkleblack
Women's Flyfishing Alaska
Woodinville Printing
Yamsi Ranch/John Hyde



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