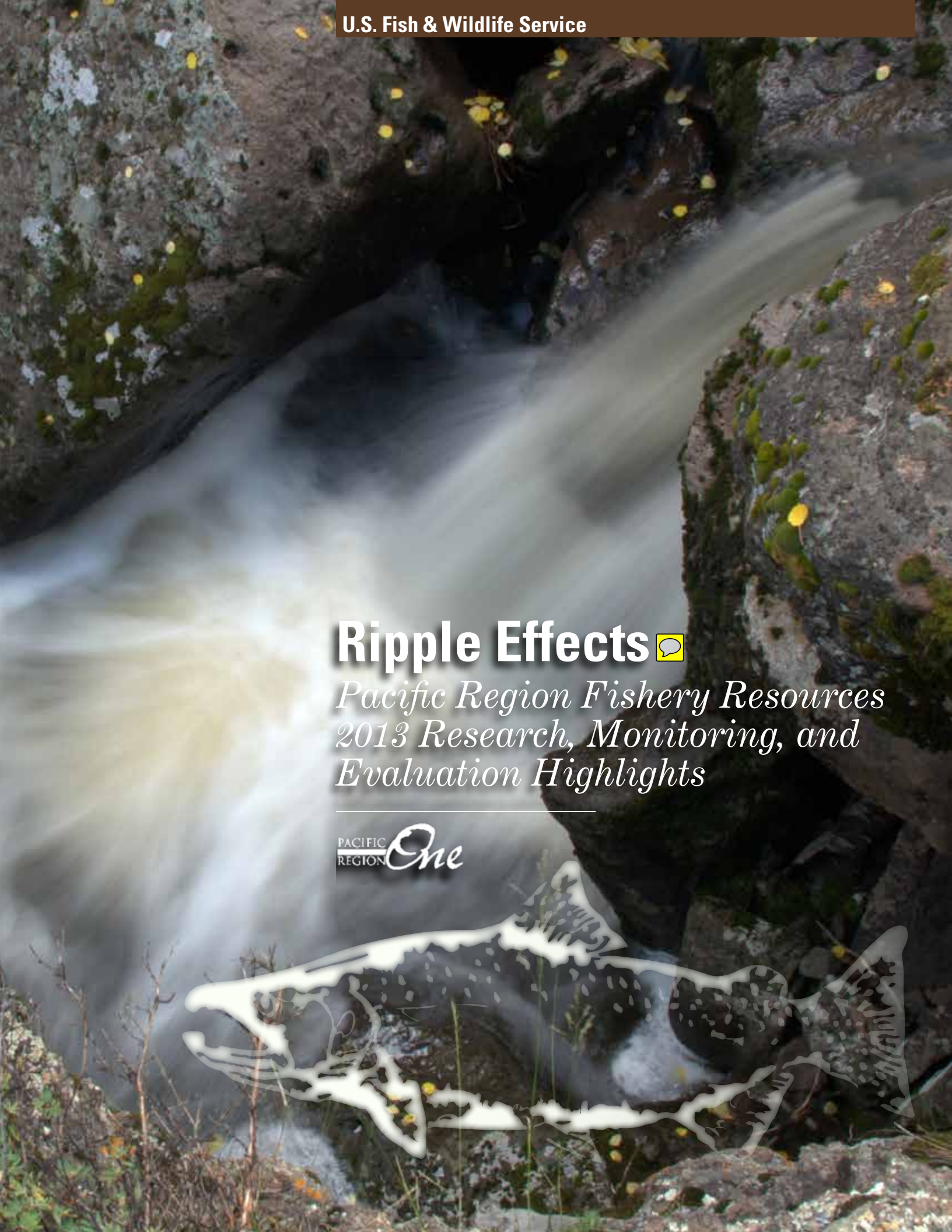


Ripple Effects

Pacific Region Fishery Resources 2013 Research, Monitoring, and Evaluation Highlights

PACIFIC REGION One

"Sound science is a critical component of conservation."

– Dan Ashe, Director, U.S. Fish & Wildlife Service

Michael Carrier -
Assistant Regional Director,
Fishery Resources 2011-2013

This annual issue of HIGHLIGHTS once again reports on many activities and accomplishments of the past year to restore, protect and conserve fish and aquatic resources in the Pacific Region. It also profiles our work to support sustainable fisheries with a keen eye on assuring that propagation programs become better at avoiding adverse impacts on wild fish.

The Fish and Wildlife Service approaches conservation guided by a simple model called Strategic Habitat Conservation (SHC). There are four components of SHC - biological planning, conservation design, conservation delivery, and outcome-based monitoring.

Most accomplishment reports focus on the first three phases of SHC. The outcome-based monitoring component is often overlooked because it takes time (often years to measure biological response), requires highly technical and scientific methods, and is expressed in language that may be indecipherable to non-scientists. Yet, without monitoring and evaluation (m&e), it is impossible to accurately determine the return on our conservation investments. Moreover, absent m&e, there is no ability to adapt our conservation targets, design, and delivery to be more and more effective.

This report features examples of monitoring and evaluation in its many and varied forms, from elementary schools to FWS science laboratories to highly specialized bio scientists spending hours sampling in the field and even more hours running regression analyses on their computers. As we celebrate our conservation achievements, we should be mindful that those achievements rest firmly on a foundation of monitoring and evaluation essential to informing the work that created these achievements.

Mike Carrier

Google Earth
Image Landsat
Data SIO, NOAA, USNAVY, NGA, GEBCO
Image IBCAO

Hatchery Management

The Service owns, operates, or administers 25 fish hatcheries in the states of Idaho, Oregon, and Washington.

Continuous monitoring and evaluation of programs is a cornerstone of Strategic Hatchery Management, ensuring our facilities operate using the best scientific principles in a manner consistent with conservation and harvest goals for both hatchery-propagated and natural populations.

Rod Engle /USFWS

Egg incubation trays

U.S. Fish & Wildlife Service

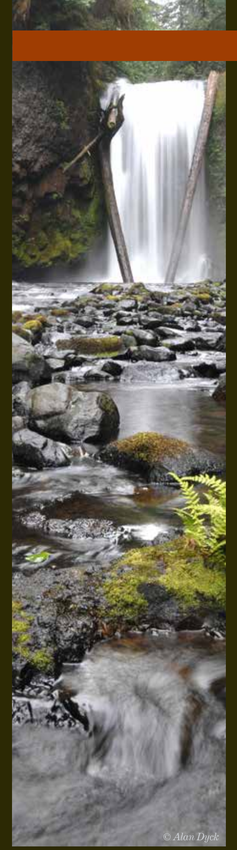
Hatchery Management

Spelling Strategic Hatchery Management With Three Letters: H…E…T

Hatchery Evaluation Teams (HETs) across the Pacific Region help to ensure that over 750 recommendations to improve 53 Pacific Northwest hatchery programs are being addressed. The HETs, which consist of Service hatchery managers, researchers, fish health experts, and, for some hatcheries, tribal co-managers, evaluate hatchery programs and make improvements to hatchery practices. HETs fill a key Service niche: deploying multi-disciplinary hatchery program expertise to continuously monitor and improve hatchery operations ranging from spawning techniques to monitoring adult returns and their interactions with wild fish. The HETs use tools such as night snorkel surveys, rotary screw traps, and electro-shocking to gather data to inform decisions.

While the HET concept has existed in the Pacific Region since 1991, a region wide Hatchery Review report published in 2013 codified the benefit and function of HETs. HET-led monitoring and evaluation projects proliferated across the region last year, from construction of a de-gas system and oxygen tower at Idaho's Hagerman NFH to improve water quality for hatchery steelhead and trout to completion of an updated Winthrop NFH Hatchery and Genetic Management Plan. The accomplishments in this section reflect collaborative efforts between Hatchery Evaluation Team members and our partners to use the best science available to innovate our programs, support sustainable fisheries, and help naturally spawning fish populations.

Hatchery Evaluation Teams take a 'whole system' approach of studying hatchery fish populations both on station and in the wild.
Matt Howe / USFWS



© Alan Dyck

A 'Model Study' for Icicle Creek Fish Habitat & Passage

There's a new tool to help resource managers find the balance between maintaining hatchery operations, managing instream flows, and improving fish passage on central Washington's Icicle Creek. A Service study completed in 2013 combined traditional fieldwork with two-dimensional hydrodynamic modeling (River2D) and advanced GIS techniques for cell-based habitat modeling to assess habitat and fish passage conditions in sections of the creek impacted by three instream structures operated by Leavenworth National Fish Hatchery.

Service researchers simulated different stream flows to explore how different flow conditions impact the quantity and quality of habitat for coho, spring and summer Chinook salmon, Endangered Species Act-listed bull trout, and steelhead at various life stages. The results, now being interpreted by technical experts, fisheries managers, and stakeholders, will aid future decisions that address the impacts of hatchery operations, help find solutions to enhance Icicle Creek habitat and passage.

Makah NFH Screen Set to 'Time Travel'

You don't need a huge budget for time travel—at least not when we're talking about the traveling screen at Makah National Fish Hatchery. Makah uses surface water drawn from the Tsoo-Yess River for fish propagation. Before the water is used, it has to be passed through five levels of screening, settling, and filtering to remove detritus and sediment. For the past 30 years, one of these five steps has involved the labor-intensive process of operating a manual traveling screen. In 2009, the Hatchery Review report recommended installing an automated timer on the traveling screen—a project that the manufacturer bid at over $28,000. In 2013, Makah NFH maintenance mechanic Vern Toliver was able to make this 'time travel' happen quicker, cheaper, and more efficiently. Tolliver parlayed over two decades of experience studying and refining the hatchery's water treatment systems into an in-house design and installation of the automated timing device for only $2,500 in material and labor. This innovative approach not only reduced construction costs, it also saves money by reducing labor hours and stabilizing its water supply.

Passive Integrated Transponders or PIT tags – microchip implants a little larger than a grain of rice – are used to monitor the movement of migratory fish such as Carson NFH spring Chinook (see adjacent story)

Stock Exchange: Sustained Collaboration Produces Healthier Fish

What do you get when two hatchery programs combine forces? Healthier fish.

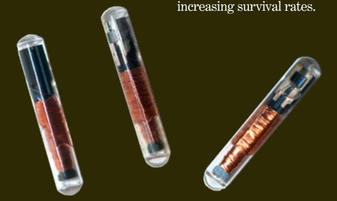
Historically, it's been difficult for the Quinault National Fish Hatchery to collect enough broodstock to meet the fall Chinook program's annual production goal. Meanwhile, it was difficult for the Quinault Indian Nation to rear their winter steelhead during the summer due to warm water and pathogen issues in Lake Quinault. The solution? In 2012, Quinault NFH's fall Chinook program was transferred to the Nation's fisheries program. The Nation's winter steelhead program has been transferred to Quinault NFH for summer rearing in the cooler Cook Creek water.

Partnering to raise healthy fish is an ongoing commitment for these two hatcheries. In 2013, the Service purchased six nets to assist the Nation in replacing the 35-year-old net pen system. Studies demonstrated that moving to the new, larger pens lowered fall Chinook rearing densities, and reduced predation by birds, mammals, and other fish. The new nets also have mesh small enough to allow easy transfer of the fish directly from incubators into the net pens. The upgrade reinforces the Service and Quinaults' efforts to operate hatchery programs vital to the Tribe and the local economy.

Carson NFH Evaluates, Adapts, and Improves its Programs

2013 was a breakthrough year for research and facility improvements at Carson National Fish Hatchery. The hatchery installed shade covers on all of its raceways to protect fish during hot summer months and opened a new visitor information building. Spring Chinook returns in summer 2013 also provided preliminary results for a multi-year monitoring study recommended by the facility's 2007 Hatchery Review. When completed, the study will provide insight into how Coded Wire Tags and Passive Integrate Transponder (PIT) tags—critical for fisheries management and research—affect salmonids' survival during migration.

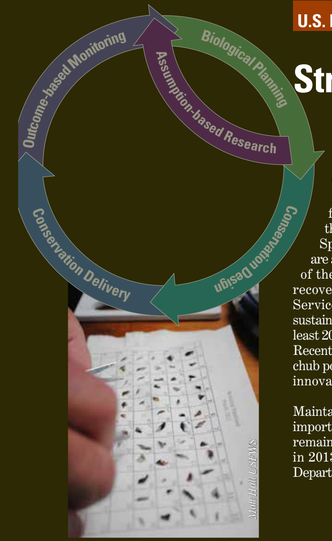
Another study, initiated by Carson's Hatchery Evaluation Team in 2013, is evaluating whether alternative feeding methods can be used to minimize the number of male fish that reach sexual maturity without migrating to the ocean. The phenomenon, known as precocity, can have adverse effects on local wild populations as precocious males often stay in local waterways, compete for food and habitat, and reduce the number of returning adults available for tribal, commercial, and sport fish harvest. The HET also worked with hatchery staff to enhance early stage incubation of spring Chinook eggs by switching from incubating buckets to vertical trays, increasing survival rates.



USFWS

Sustaining or restoring imperiled species, commercially or culturally vital fish stocks, and the habitats they depend upon requires conservation at scales ranging from individual watersheds to regional-level landscapes. Our scientists track adult returns, investigate fish health for both wild and hatchery populations, conduct genetic analyses, and deploy a host of other monitoring and evaluation activities vital for timely, cost-effective, and scientifically-defensible natural resource management.

Strategic Habitat Conservation



Small fin clips enable Service researchers to investigate DNA

U.S. Fish & Wildlife Service

Strategic Habitat Conservation

Oregon Chub: Small Fish, Big Genes

The Oregon chub may be a small fish, but efforts to recover this floodplain minnow listed as threatened under the Endangered Species Act over two decades ago are anything but little. Reintroduction of the species has been a critical recovery tool that has enabled the Service and partners to reach and sustain the species' recovery goal of at least 20 populations of 500 adult fish. Recent reintroductions of new Oregon chub populations have been guided by innovative genetic research.

Maintaining genetic diversity is important for species' numbers to remain stable or even increase, so in 2013 the Service and Oregon Department of Fish and Wildlife began a genetic evaluation using a Strategic Habitat Conservation framework to examine exactly how different introduction histories have affected reintroduced populations.

Each introduced population of Oregon chub has a unique, well-documented record of the number of donor stocks used, the number of founding individuals used, and the duration of the introduction effort. Study results will not only facilitate chub population studies—the species was recently proposed for removal from the ESA and if delisted must by law be monitored for at least five additional years—they will also help plan recovery actions for other threatened and endangered species.

10-Year Partnership Produces Benefits for Bull Trout

2013 marked the 10th year of a unique partnership between the Service and Avista Utilities. The partners have been working to conserve bull trout in the Clark Fork River where three dams prevent bull trout from migrating upstream to spawn. Using genetic data, biologists from the Service, Avista, and the states of Montana and Idaho developed a method to determine whether bull trout collected below dams should be moved to areas of the river upstream of the dams.

Service-led genetic analyses have guided the upstream transfer of nearly 350 bull trout over the last decade, and the sustained effort is producing results for bull trout conservation. Service and Avista biologists recently published a paper in the North American Journal of Fisheries Management showing that bull trout moved upstream of the dams are not only helping increase small populations, but that many fish are returning to—and using—key bull trout spawning areas.

Pacific Lamprey Conservation Shifts into High Gear

As a follow-up to last year's 2012 'Lamprey III' summit, scientists are accelerating Pacific lamprey conservation efforts across the Northwest. Lamprey-friendly fish ladders, like one installed on the North Fork Umpqua's Winchester Dam, help re-open miles of previously inaccessible upstream habitat. Tribal and federal agency biologists are also studying the feasibility of hatchery propagation programs that might accelerate efforts to reintroduce and restore lamprey populations.

A recently-published 2013 study conducted by Service and U.S. Geological Survey biologists resolves a concern raised by regional fish managers that lamprey may transmit infectious diseases to wild or hatchery salmon and steelhead. Expanding earlier National Wild Fish Health Survey research, federal scientists extensively tested Pacific lamprey ammocoetes and found no evidence that the juvenile fish either carry or transmit salmonid viruses like the infectious hematopoietic necrosis virus or viral hemorrhagic septicemia. The research will further assist tribal and conservation agency efforts to help restore this ecologically and culturally important species.

Total Adult Production = Improvements for Fall Chinook Salmon

Good news for tribal and sportfish anglers in Oregon and Washington: Northwest fisheries co-managers and the U.S. Army Corps of Engineers revised the John Day Mitigation Program in a manner that helps the Corps better meet authorized mitigation levels and increases fall Chinook fishing opportunities. The Corps' Program traditionally measured success through annual propagation of 17.1 million Chinook smolts and the return of 30,000 adults to area hatcheries. The new Total Adult Production, or TAP, model was developed over the past twenty years by Service fisheries biologists and others. Using the most recent data analyses and science, the TAP model helps to formulate an adult salmon survival goal that explicitly accounts for fishery losses from construction and operation of John Day Dam on the Columbia River. The model also provides the Corps and its partners with more options to adjust the stocks of fall Chinook salmon to better meet in-place and in-kind harvest opportunities while minimizing impacts to ESA-listed salmon and steelhead runs.

Can Additional Spill Save Salmon and Steelhead?

Dams and reservoirs in the Pacific Northwest provide multiple benefits to local communities throughout the region including flood control, navigation, water storage, and renewable energy. Their operations affect migrating Pacific salmon and steelhead. To reduce these impacts, many hydro-power facilities currently send water over their spillways, rather than through the turbines, to help protect juvenile salmon.

In March 2013, the U.S. Fish and Wildlife Service helped assemble over 20 leading experts to review a simulation of spill scenarios within the Columbia River to determine whether additional spill could improve juvenile salmon and steelhead survival. The scenarios were developed using a multi-agency Comparative Survival Study (CSS) initiated in 1996; the CSS is based on many years of observed data collected from tagging programs, peer-reviewed studies, and continuously refined models.

Steve Haeseker / USFWS

Tag, You're It: Service Data-Sharing Aids Regional Fisheries Managers

What's one of most effective tools the Service has for helping conserve protected West Coast salmon runs, evaluate harvest, and guide decisions that influence multi-billion dollar Pacific Northwest tribal, commercial, and sport fishing industries? Keeping tabs on the annual marking and tagging of millions of Service-propagated salmon and steelhead.

Conducting extensive fishery and hatchery evaluations, developing and tracking index stocks, and then supplying this data to the Regional Mark Processing Center's Regional Mark Information System database enables partners like the Pacific Salmon Commission and Pacific Fishery Management Council to forecast upcoming adult returns. This information helps with complex negotiations that determine harvest allocations between the United States and Canada and between tribal, commercial, and sport fisheries, all while meeting Endangered Species Act regulations.

The exchange of data in 2013 was substantial, covering hatchery releases from 17 Pacific Northwest and California National Fish Hatcheries of over 47 million Chinook, coho, and steelhead, including 9.6 million coded-wire tagged fish raised at 17 Pacific Northwest and California National Fish Hatcheries. The 2013 data also included tag information for nearly 12,000 returning adults, including 'index stocks' like Spring Creek NFH's tule fall Chinook salmon.

Ron Wong/USFWS

Rotary screw traps are used by Service biologists to capture and monitor migrating juvenile fish like bull trout, Pacific lamprey, or Chinook salmon.

Connecting People With Nature

The Service connects all generations of people with nature. We use hands-on, outdoor, inquiry-based activities to spark and sustain the public's love of the natural world. We inspire students, retirees, volunteers, and educators to unleash their inner scientist—to play, learn, serve, and work with aquatic resources.

Photo by: Meghan Kearney, USFWS

A student uses a hydroscope to study freshwater mussels in a Chehalis Basin stream.

© Kathy Jacobsen

New Zoo Revue: Bull Trout Conservation Making a Splash in Native Fish Exhibits

Hatcheries and zoos share many of the same conservation goals: advancing species conservation through research, enhancing captive rearing expertise, and identifying creative outreach opportunities. For years the Service and other partners have been studying ways to integrate small scale conservation programs within existing hatcheries to support the recovery of species like bull trout, which were recently reintroduced into Oregon's Clackamas River Basin. After developing captive rearing protocols for bull trout at Willard National Fish Hatchery, the Service saw an opportunity to use the bull trout raised at Willard and area zoos' broad public reach to more fully tell the fish's story.

In summer 2013, the Service and Oregon State University collaborated with the Oregon Zoo in Portland and central Oregon's High Desert Museum in Bend to create exhibits spotlighting the species' decline, recovery actions, and the role conservation hatcheries play in these efforts. Live bull trout raised during the captive rearing studies now swim in native fish aquaria at both locations, providing the public with a rare, live, up-close glimpse of this Northwest native fish.

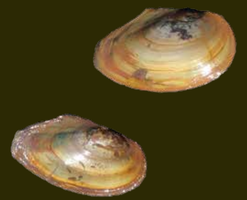
20 Years of Learning & Fun with Kids in the Creek

2013 marked the 20th anniversary of the Kids in the Creek education program. Kids in the Creek connects high school students with aquatic and riparian ecosystems through hands-on field experience led by resource professionals. The program's curriculum fosters understanding of watersheds and the critical role of human land management activities by teaching vocabulary and introducing aquatic ecosystem concepts. While Kids in the Creek covers a range of wet and wild ecology lessons, a particular highlight is the field day when students become citizen scientists. Joining actual biologists, students don waders and venture into the water to sample and classify macroinvertebrates, test water quality, measure stream flow and fish habitat features, investigate riparian vegetation, and explore fish health. For their final project, the students develop and present land-use plan scenarios. Since the first Kids in the Creek field trip in 1993, thousands of students along with multiple resource agencies have participated in this award-winning educational program.

Putting Some Mussel Behind Chehalis Basin Monitoring

Over 200 students participated in a first-of-its-kind freshwater mussel monitoring program in Washington State throughout the 2012-2013 school year. The Service teamed up with Education Service District 113 (ESD 113) to highlight the ecological significance of Pacific Northwest native mussels and teach research and monitoring skills to seven middle and high school classes and their teachers.

In September 2012, ESD 113 staff, Service employees, and a master's student from Evergreen State College held a Freshwater Mussel Academy to teach students and volunteers about native freshwater mussel species and monitoring protocols. The students and 20 community volunteers then sampled five different Western Washington creek and river monitoring sites during fall 2012 and spring 2013. The data will create an information baseline that can be used by the Service and our conservation partners to manage and further study distribution, population, evolution, and location of native freshwater mussel populations in area rivers.



If You Haven't Heard of Otoliths, Check Your Ears

Did you know that fish biologists can tell how old a fish is, what stream its parents came from, and whether the fish strayed from its home stream just by examining a 1- to 4-millimeter bone from its inner ear? These information-rich little bones are called otoliths and they are playing a key role in monitoring the success of Lake Sammamish kokanee supplementation efforts.

2013 marked the first year that hatchery-propagated Lake Sammamish kokanee returned and spawned in the lake's tributaries, making it the first opportunity to evaluate the effectiveness of Kokanee supplementation efforts. Monitoring and evaluation of these first kokanee relied on collaboration with multiple agencies and volunteers.

Volunteers assisted with stream surveys and helped collect spawned-out kokanee so that the fishes' otoliths could be examined.

Service fish biologists collected and examined 325 otoliths from 1,177 returning kokanee. Stream surveys also found kokanee spawning in tributaries where they haven't been seen in recent years. Overall, the 2013 monitoring efforts provide good news for Lake Sammamish kokanee conservation—preliminary results indicate that the species' range may be in increasing and that supplementation is helping maintain populations while habitat is restored so they can survive on their own.

Students Study Floating Pu'uhonua (Refuges) At Work in Hawaii Streams

Habitat-enhancing floating plant racks anchored in two estuaries on Kauai are not only attracting native species, they are also luring students. During 2013, 31 floating plant racks were installed in Waipa Stream, Waioli Stream, and a fishpond off of Waioli Stream as part of a Hawaii Fish Habitat Partnership-funded project to reduce nutrient and sediment loading and provide habitat for native freshwater fish, crustaceans, mollusks, and waterfowl.

So far, students ranging from 5th grade to high school have contributed nearly 400 hours to assist with monitoring efforts—a student from a local high school visited the streams monthly to monitor the number and variety of native aquatic fauna living on the racks as part of a science project and school groups from Hawaii and Colorado have also participated in seining and monitoring.

This monitoring experience is providing students with a hands-on opportunity to apply scientific principles and learn about conservation. The data they gather is valuable, too. Students' efforts complement other monitoring studies by the Service and partners to evaluate the impact of restoring emergent aquatic vegetation in estuarine habitats.

While the study won't be finished until summer 2014, preliminary results indicate the racks are helping to re-establish populations of culturally and recreationally important aquatic native species like Omilu (Bluefin Tervally), Hawaiian gobies, and even 'Alae 'ula (Hawaiian Common Moorhen) by providing attractive habitat and refuge (Pu pohonua).

Want to see more? Check out the flicker site with photos of students immersed in this engaging partnership. http://www.flickr.com/photos/usfwspacific/

Salmon in the Classroom Comes to North Portland

For the first time since its inception at Spring Creek National Fish Hatchery more than a decade ago, Salmon in the Classroom came to the Portland Metro area during the 2012-2013 school year. Support from partners in the Black Parent Initiative, Oregon Youth Development Council, and Portland Public Schools made it possible for the Service to bring this program to the students at Boise-Eliot-Humboldt Elementary School in Northeast Portland, Oregon.

Salmon in the Classroom engages students in raising salmon from egg to fry stages in their classroom, providing the opportunity observe and learn about the life cycles of these fish and the importance of ecosystem health. Service biologists work with teachers to provide guidance at each stage of growth, lead activities that build an understanding of salmon's importance, and foster greater environmental stewardship. The curriculum culminated with a 70-mile field trip to the Columbia River Gorge where nearly 100 fourth- and fifth-grade students released their Chinook salmon fry in Washington's Drano Lake.

Thanks to this program, students' enthusiasm for learning about salmon, environmental stewardship, and conservation career pathways is on the rise at Boise-Eliot/Humboldt. That fits well with the Service's efforts to increase access to its conservation education programs and inspire people of all ages to learn about and care for fish, wildlife, plants, and their habitats.

Play Learn Serve Work

Global Climate Change

Addressing and remediating the effects of global climate change is one of the most complex environmental challenges we face today. Through fieldwork, modeling, and thorough study of facility operations, the Service is tackling climate change head on. We use a three-pronged approach: evaluation of energy and water efficient improvements at our hatcheries to mitigate climate change effects; monitoring restoration actions and population dynamics to adapt conservation strategies for changing landscapes; and engaging with partners to safeguard aquatic resources.

Global Climate Change

Reduce, Reuse, Recycle: Dworshak NFH Recognized for Green Innovations

8.6 million kilowatt hours. That's enough energy to meet the annual power requirements of 1,500 homes. It's also the amount of energy saved each year at Dworshak National Fish Hatchery since the facility completed significant infrastructure improvements in 2010. Innovative improvements at Dworshak included: doubling egg capacity in the incubation room to reduce the use of costly electric boilers, replacing and rerouting water pipelines to increase efficiency, and installing variable frequency drives on hatchery pumps to improve energy and water efficiency while maintaining or improving fish rearing conditions. In 2013, Dworshak also recycled approximately 200,000 pounds of plastic from the old water filtration system. It's all part of Dworshak's efforts to do their part to address global climate change and decrease the facility's environmental footprint. In recognition of these green innovations and energy savings, Dworshak received both the Department of Interior Hatchery of the Year Award and the Region 1 Environmental Leadership Award for Green Innovation in 2013.

Fish Passage, Trains, and Automobiles

Nestled between steep slopes, Pacific Northwest coastal river basins and their floodplains have historically made great areas for human byways like roads or rail lines. While that's helped transport people and goods, it's also caused decades of ecological damage to streams like Washington's Clearwater River Basin and Oregon's Nehalem River Basin. Now, due to global climate change, coastal rivers will likely experience higher, more frequent, and more intense peak flows in the future. That could impact the transportation of both native fish and people as coho, trout, and lamprey rely on the streams and humans rely on streamside structures like bridges and roads.

Luckily for native fish and people, the Service and its restoration partners are designing and completing restoration projects that provide safe passage for both people and fish. The Service and partners are using techniques to more rapidly restore damaged ecosystems, speed up in-stream restoration, and withstand more intense future weather events. In Washington's Clearwater River in 2013, partners began Phase I of a two-year project that will remove a mile of unneeded road, 10 culverts, and reconnect a network of 19 side channels to the river. At least 30 acres of floodplain passage have already been reconnected for pink and coho salmon, steelhead, and bull trout and Puget Sound Chinook salmon.

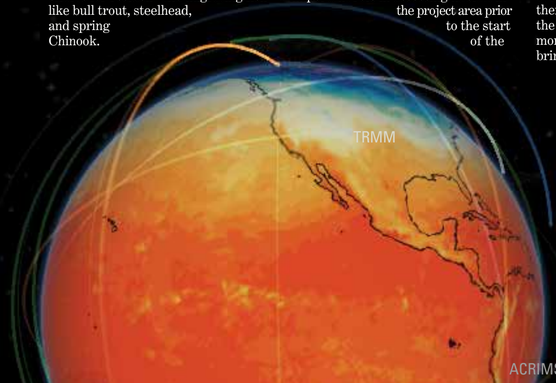
In Oregon, partners replaced two 80-foot long, fish passage-blocking culverts with a new 36-foot wide bridge across the mouth of Roy Creek, a Lower Nehalem River tributary. The re-designed bridge still carries both vehicular traffic and rail cars along the Oregon Coast and is more than one and a half times Roy Creek's bankfull channel width to better accommodate higher flows during storms. Service biologists and partners collect data before and after construction of restoration projects to ensure the designs are effective at improving conditions for native fish. Evaluation efforts include sampling fish, plants, and invertebrates, as well as habitat and substrate mapping. Lessons learned help improve future project designs.

© Alan Dyck

More Instream Flow a 'Go' in the Wenatchee River

The 53-mile Wenatchee River in Central Washington provides water vital to Chelan County communities, Wenatchee Valley agriculturalists, whitewater rafters and anglers, and native fish populations. Projections of a nearly 30 percent decrease in the Wenatchee's feeder snowpack by 2040 sounded a warning that already chronically low in-stream flows and water shortages would likely get worse over time. Low flows could translate to more frequent water restrictions to the Pioneer Irrigation District (PIC) and its customers and set back recovery efforts for resident and migrating fish like bull trout, steelhead, and spring Chinook.

But that scenario may not unfold now, thanks to the completion of a four-year project in April 2013 by the Service, Trout Unlimited (TU), PIC and Pioneer Water Users Association, Chelan County, Bonneville Power Administration, and others. The Wenatchee Instream Flow Enhancement Project has re-engineered irrigation on the lower 7.5 miles of the Wenatchee by moving the PIC 's point of diversion to the Columbia River and replacing a 100 year old irrigation ditch and relic diversion dam with a new, sophisticated water supply system and fish screen. Service staff played an important role in assessing habitat in the project area prior to the start of the $3.4 million dollar project. New groundwater wells, piping, and a pressurized water system have already yielded lower-cost water and a net savings of 38.27 cubic feet per second. That translates into a nearly 5 percent increase in water during low summer flows while reducing PIC water intake by 66 percent. Intensive monitoring through the Bonneville Power Administration-funded Columbia Habitat Monitoring Program and the Integrated Status and Effectiveness Monitoring Program will help determine just how much fish benefit over time. But one thing is certain: now there'll be more—and cooler—water in the lower Wenatchee during summer months, no matter what the climate brings.



Different NASA satellites collect data on various factors of Earths climate including the height of the ocean surface, precipitation and weather trends as well as the sun's role in global climate change

The Service uses satellite imagery and other modeling tools to assess the effects of climate change to Pacific Northwest and Hawaiian Island species and habitats.

Protecting Fish Health in the Face of Climate Change: It's In Our DNA

The infectious hematopoietic necrosis virus—IHNV, for short—not only sounds bad, it is bad for Pacific steelhead and salmon like Chinook and sockeye. It can be deadly for juvenile fish and is one of the most costly viral diseases to manage in Columbia Basin hatcheries. So how can scientists track and help control a disease that may spread due to climate change impacts on the Basin's water flow and temperature patterns?

Controlling IHNV lies in research and partnerships. The U.S. Geological Survey's Western Fisheries Research Center, the Washington Cooperative Fish and Wildlife Research Unit, the Yakama Nation, and the Service's Idaho Fish Health Center expanded their research efforts in 2013. Building on studies begun in the 1990s, the partners are expanding recent IHNV investigations both in Idaho's Clearwater Basin and other parts of the region using genetics and shared study data to track the virus' movement patterns at landscape levels.

Pacific Northwest geneticists and microbiologists are also creating an existing virus baseline to identify strains that may cause future disease events. A publication is in the works that will assess Dworshak National Fish Hatchery's 2009 effort to control a trout-adapted IHNV strain. Spotlighting effective management actions and expanding capacity for 'IHNV typing,' as it's known, will help experts better evaluate transmission patterns at local watershed and ecosystem scales if virus strains mutate. The information could save hundreds of thousands of dollars and the lives of millions of fish.

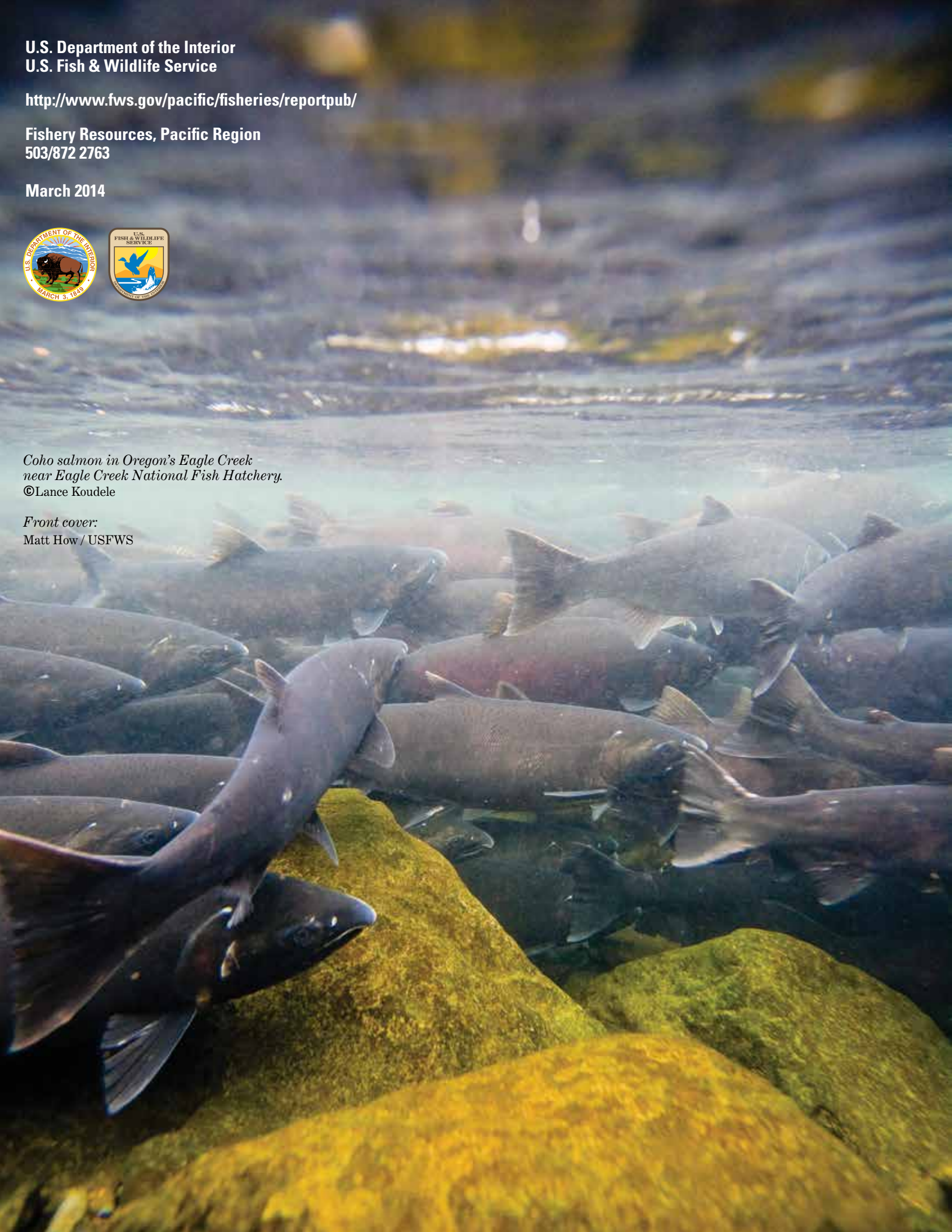
Assessing fish health using samples from a Service hatchery. USFWS photo

U.S. Department of the Interior
U.S. Fish & Wildlife Service

http://www.fws.gov/pacific/fisheries/reportpub/

Fishery Resources, Pacific Region
503/872 2763

March 2014



Coho salmon in Oregon's Eagle Creek near Eagle Creek National Fish Hatchery.

Front cover:
Matt How / USFWS