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**Director's Greeting....**

By the time you see this issue of our newsletter it will be January. So on behalf of the entire AFTC staff, we wish you all a healthy and happy New Year!

**AFTC VISITS WILLAPA NWRC**



Shaun Matthews, Willapa NWRC, Engineering Equipment Operator uses his specialized training to decommission unused logging roads into new forested habitat.

USFWS: P. Crandell

**Staff:**

**Administration/Facilities:**

Judy Gordon, Center Director  
 Patty Crandell, Deputy Center Director  
 Vince Bocci, Administrative Officer  
 Toni Scholder, Administrative Assistant  
 Mark Hack, IT Specialist  
 John Holmes, Fish Biologist  
 Jeff McLaren, Biological Technician  
 Scott Gronbach, Facilities Op Specialist  
 Jeff Poole, Water Treatment Plant Operator  
 Jim Lowell, Maintenance Worker

**Nutrition:**

Ann Gannam, Regional Nutritionist  
 Ron Twibell, Fish Nutritionist  
 Nathan Hyde, Biological Technician  
 James Barron, Biologist

**Conservation Genetics:**

Denise Hawkins, Regional Geneticist  
 Christian Smith, Conservation Geneticist  
 Pat DeHaan, Conservation Geneticist  
 Brice Adams, Biological Technician  
 Matt Smith, Fish Geneticist  
 Jennifer Von Bargaen, Lab Geneticist  
 Dan Bingham, Fish Geneticist

**Ecological Physiology:**

Chris Taylor, Regional Eco-Physiologist  
 Kyle Hanson, Fish Physiologist  
 Ben Kennedy, Fish Ecologist  
 Richard Glenn, Microbiologist  
 Will Simpson, Fish Ecologist  
 Kurt Steinke, Electronics Engineer

**Modeling and Management Decision Support:**

Doug Peterson, Senior Scientist

On Monday, November 29, 2012, Judy Gordon and Patty Crandell had an opportunity to return a visit to Jackie Ferrier and Eva Kristofik, Complex Manager and Deputy Complex Manager at Willapa National Wildlife Refuge Complex. They gave a fantastic tour of two of their habitat restoration projects: the removal of a dike to restore estuary habitat; and a *Partners for Fish and Wildlife* project decommissioning an old logging road on adjacent Nature Conservancy land. By removing the dike and reestablishing connectivity with Willapa Bay, former habitat was made available for use by native species. Although there is more of the dike to be removed, fish and waterfowl have already moved into this formerly inaccessible area. By decommissioning logging roads, Willapa NWRC works with their neighbor, The Nature Conservancy, on a landscape scale forest restoration project. Road decommissioning removes unstable roads, restores the historic slope, and removes stream blockages to promote watershed health, while using minimally invasive logging methods to harvest timber in order to diversify the age, structure and species composition of the forest. This is not only a great example of partners working together to restore habitat, but also of thinking outside of the box to use existing staff and equipment in new ways. We look forward to working with Willapa NWRC, as our nearest FWS neighbor, to identify and use efficiencies to help both stations to continue to meet the FWS mission.

# Program Highlights....

## Nutrition

The Nutrition Program analyzed 24 feed samples for fish feed quality control in November and December. As part of the routine analyses, all feeds from the hatcheries were checked for rancidity. Ann Gannam wrote the feed memos and then contacted the feed mills when necessary. In addition, four feeds made at AFTC for the feeding trials were analyzed for proximate composition.

Two feeding trials were initiated in November and a third, the lamprey trial, was terminated in December. One of the feeding trials is evaluating the use of algae in feed for steelhead. The second ongoing trial is concerned with testing low phosphorus feed for spring Chinook. Coho eggs were also obtained from the Oregon Department of Fish and Wildlife (ODFW) Big Creek Hatchery to be used in future studies.



Ammocoetes fed various diets for four months. The letters represent the diets and they are as follows: A. Baker's yeast, B. Liquid algae (four species), C. 80% yeast + 20% larval fish feed, D. 100% yeast + 20% fish oil emulsion, E. 100% algae + 20% fish oil emulsion, F. 50% yeast + 50% algae, G. 50% yeast + 50% algae + 20% fish oil emulsion.

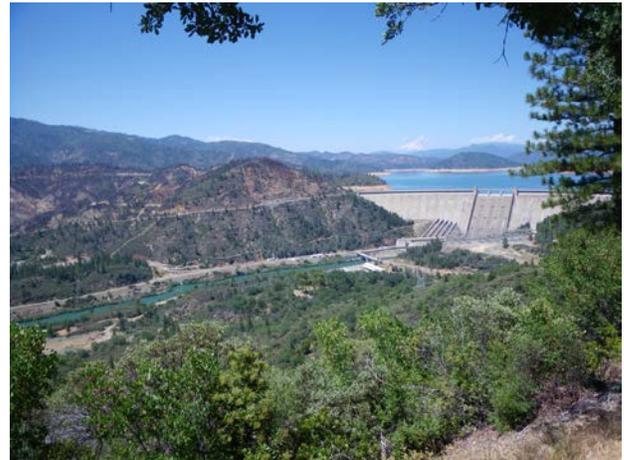
USFWS: J. Barron

## Nutrition cont....

One manuscript was reviewed for Aquaculture as was a Small Business Innovative Research proposal for the National Institute of Food and Agriculture.

## Conservation Genetics

Jennifer Von Barga and Christian Smith finalized new Standard Operating Procedures (SOPs) for the use of SNPs (single nucleotide polymorphisms) in determining run-of-origin for potential winter-run Chinook broodstock for Livingston Stone NFH.



View of Livingston Stone NFH located at the base of Shasta Dam on the Sacramento River, CA

USFWS: C. Smith

Paul Scheerer from the ODFW Native Fish Investigations Project visited AFTC and presented a noon time seminar on Warner sucker biology and the work ODFW has been doing to monitor Warner suckers over the last 6 years.

## Program Highlights cont....

### Conservation Genetics....cont

Jennifer Von Bargen and Pat DeHaan began work on an assessment of 23 redband trout populations within 6 interior basins of southeast OR in collaboration with ODFW. The goal of this study is to assess the abundance, viability, and threats from climate change and non-native species to redband trout in these basins. Collection of genetic data will be important for determining population structure, assessing population viability, and determining the level of introgression with non-native rainbow trout in each population.



Redband trout collected in the Twentymile Creek system in the Warner basin, OR. *USFWS: P. DeHaan*

Dan Bingham completed two chapters for the AFTC project funded by Bonneville Power Administration (BPA) assessing relative reproductive success (RRS) of hatchery- and natural-origin steelhead spawning in Abernathy Creek. These two chapters compare the genetic signature of the hatchery and natural components of the steelhead juveniles and calculate the annual RRS based on production of juvenile offspring.

### Conservation Genetics....cont

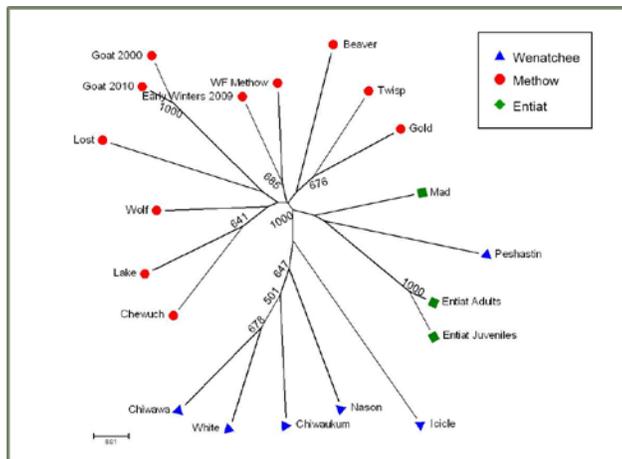
We continue to see divergence between our hatchery juveniles and wild produced juveniles in genetic characteristics and a decrease in RRS in hatchery adults spawning in the creek.



Collecting data and genetic samples for steelhead returning to AFTC. *USFWS*

Pat DeHaan traveled to Wenatchee to present the results of our study on Upper Columbia River bull trout to the Upper Columbia Salmon Recovery Board Meeting. The objective of our study was to conduct a more thorough sampling of local bull trout populations in each of the Upper Columbia River sub-basins and then conduct a fine-scale analysis of genetic variation within the Upper Columbia Basin. Specifically we wished to examine levels of genetic diversity within local bull trout populations as well as the level of genetic variation among local populations. This information will be useful for further refining local population boundaries, prioritizing local populations for conservation measures, inferring levels of gene flow among local populations, and inferring patterns of movement within the basin.

## Conservation Genetics cont....



Genetic relationships among upper Columbia River bull trout.  
USFWS: P. DeHaan

## Ecological Physiology

Will Simpson and Kurt Steinke connected communications equipment to passive integrated transponder (PIT) tag antenna arrays that monitor irrigation canals diverting water from the Umatilla River, OR. The antenna arrays are used to quantify entrainment and survival of PIT tagged juvenile steelhead diverted into irrigation canals for the Bureau of Reclamation (BOR). The equipment will allow AFTC staff to remotely operate the antenna arrays in areas with poor accessibility. A PIT packing (mobile PIT tag antenna array) survey was also used to assess entrainment and potential mortality of Endangered Species Act (ESA) listed Mid-Columbia steelhead within irrigation canals.

Kyle Hanson, Denise Hawkins (Conservation Genetics), and Patricia Crandell (Administration) participated in database training for MonitoringMethods.org. The database is currently being implemented for use by BPA.

## Ecological Physiology cont....

Kurt Steinke, Will Simpson, Chris Taylor and Ben Kennedy partnered with Trout Unlimited and Nevada Department of Wildlife to monitor the connectivity of Lahontan cutthroat trout populations in the Maggie Creek watershed, NV. PIT tag detection equipment installed on newly replaced road culverts were used to track fish movement through ephemeral portions of the watershed.

Kyle Hanson, Richard Glenn, Jim Lowell (Facilities), and Jeff McLaren (Administration) removed a PIT tag antenna array from Abernathy Creek prior to winter high flows. The antenna array is used to monitor migration of tagged juvenile steelhead as part of an ongoing research project at AFTC.

Ben Kennedy provided a friendly review of a paper for San Marcos Aquatic Resource Center.

## Modeling and Management Decision Support

Doug Peterson analyzed a dataset for presence of westslope cutthroat trout in stream segments isolated by culvert barriers. He is currently working on a manuscript.

Victoria O'Byrne successfully completed her 6-month Geographic Information System (GIS) internship at AFTC. The internship was coordinated by the Student Conservation Association (SCA).

## Modeling and Management Decision Support cont....

Doug Peterson attended a Great Northern LCC webinar titled "Pacific Northwest Aquatic Monitoring Partnership: Tools to support design & documentation of monitoring programs" by Jen Bayer and Jacque Schei, with the US Geological Survey.

Doug Peterson and Victoria O'Byrne visited the Carson, Little White Salmon, Willard, and Spring Creek NFHs. They toured the facilities and discussed an ongoing climate vulnerability assessment for NFHs with each hatchery manager.



Victoria O'Byrne, GIS Intern at AFTC (L) and Casey Risley, Hatchery Manager, Little White Salmon NFH (R).  
USFWS: D. Peterson



One of the spring water sources at Spring Creek NFH.  
USFWS: D. Peterson

## Administration/Facilities

The Abernathy Creek coho salmon spawning run has ended. A total of 201 natural-origin (79 females, 97 males, and 25 jacks) and 71 hatchery-origin (1 female, 1 male, and 69 jacks) were trapped at AFTC. The winter steelhead adult returns are being trapped through May for the BPA funded project "Natural Reproductive Success and Demographic Effects of Hatchery-Origin Steelhead in Abernathy Creek, WA". Totals at the end of December were 2 natural-origin (released upstream), 5 hatchery-origin (retained for broodstock) and 16 stray out-of-basin hatchery-origin steelhead (euthanized).

Staff from Conservation Genetics, Ecological Physiology and Administration Programs finished the annual report on Abernathy steelhead to be submitted to BPA.

November brought friendly reminders to begin getting the facility ready for the winter season. Winterizing activities included cleaning and repairing the residence chimney, performing routine maintenance on the Main Laboratory Building boiler, cleaning the sludge build-up from the above ground diesel tanks, and contracting the bi-annual Cummins generator preventive maintenance and load testing. As expected, our generators are looking great and ready to keep things powered during the next winter storm.

In terms of safety training at AFTC, November and December's safety themes were centered around all-things holidays. Be it crime prevention, electrical safety, fall hazards, or choking hazards, we seemed to cover the gamut while keeping safety at the forefront this holiday season.

## Program Highlights cont....

### Administration/Facilities cont....

In not so fortunate news, AFTC was invaded by carpenter and sugar ants this fall. Their entrenched lifestyles, along with rainwater and the damaged siding, wreaked havoc on the Nutrition Office conference room walls. We hired an environmentally safe and friendly exterminator to eradicate the insects in and around the building. We also removed much of the damaged insulation board and soggy drywall from the room and are preparing to rehabilitate the space in the summer. In the spring, the landscape bark used in landscaping around the facility which is prime habitat for the ants, will be replaced with river rock.

Scott Gronbach has begun working as an onsite project inspector at Little White Salmon NFH during their upgrade to the spawning building. Jeff Poole has begun efforts to replace obsolete and damaged flow meters from the aeration tower with meters that are able to log and transmit flows at the touch of a button while requiring little-to-no preventive maintenance. Jim Lowell has all but completed the modification project at the fish ladder. This project was needed to remedy a safety hazard and also to beautify the fish ladder area for visitation by aquatic and mammalian visitors.

### Administration/Facilities cont....

In December, the big story for the Facilities Department was installing the highly anticipated new flammable storage building for the Conservation Genetics Program. After many months of design, contracting, and site preparations, AFTC officially received the 17' X' 24' explosion and fire resistant building. Jim Lowell and Scott Gronbach assisted the CEO and building designer from Green Horizon Manufacturing with the offload and installation of the building despite foul weather and cramped quarters. The new building will be able to hold 750,000 biological samples!



Jim Lowell (operating the forklift) and Scott Gronbach moving one portion of the new Conservation Genetics building.  
USFWS



Final section of the building being placed on the pad.  
USFWS

## *Inside Abernathy....*

The Ecological Physiology Program (Program) is the focus of this issue's *Inside Abernathy*.

The Program started in 2000 with the hire of a Behavioral Physiologist. Offices, laboratories and wet lab space were constructed in 2004. Additional specialized facilities were developed in 2005 to meet the needs of the electronics arm of the Program. The Program currently consists of three disciplines: physiology, ecology, and electronics engineering. Program staff are technical specialists providing capabilities and technical services in: evaluating hatchery and wild fish interactions and their differences; ; determining how fish respond physiologically to environments and changes in those environments; assisting tribal governments to answer research questions; determining the impacts of water diversion structures fish behavior and developing and evaluating remote monitoring technologies.

The Program staff has conducted a number of studies examining the differences between hatchery-produced and naturally-occurring/wild fish. The role of hatchery stocks as a conservation tool has been increasingly debated, especially in light of declining abundance of many naturally-occurring Pacific salmon populations. Numerous reviews of hatchery practices have recommended new practices concerning everything from release strategies to feeding methods that might improve the performance, especially survival to return as adult spawners, of fish produced from NFH programs. Young hatchery fish are usually larger than wild fish giving them a temporary competitive advantage over naturally-occurring fish. Also, large male fish raised in hatcheries may not undergo smoltification, the transition to life in salt water. Thus, it is important to reduce hatchery fish size yet produce smolts that emigrate after their release. The Program has produced papers and conducted studies comparing hatchery-produced and naturally-occurring/wild fish. For example, a study was conducted to examine if hatchery steelhead growth rates could be decreased so as to reduce potential intraspecific competition with naturally-occurring steelhead and yet still produce smolts within one year. At release, data on fish size, body composition, and hormones for smoltification were collected for comparison with naturally-occurring fish.

The Program works extensively with tribal partners on issues affecting aquatic resources. Since 2010, the Program has collaborated with the Cowlitz Indian Tribe to investigate the impacts of sedimentation on developing eggs of eulachon (Pacific smelt). Eulachon runs have diminished significantly in recent years leading to the species being listed as 'threatened' under ESA. Research at AFTC focuses on the potential impacts of sediment movement on the spawning population in the Cowlitz River. The Program also developed surgical protocols for implantation of transmitters into eulachon. The Program, in conjunction with the Nutrition Program at AFTC, has also collaborated with the Yakama Nation in developing new techniques for raising Pacific lamprey. Multiple diets were developed and tested to determine which would lead to optimal growth and survival in newly hatched lamprey.

## Inside Abernathy cont....



Surgical implantation of an acoustic transmitter into an adult eulachon.  
*USFWS: W. Simpson*

The Program has been instrumental in determining impacts of water diversion structures on fish behavior and the recovery of listed species. For example, NOAA-Fisheries issued a Biological Opinion (BiOp) for ongoing operations and maintenance of the Umatilla Basin Project. The BiOp directs BOR to avoid or minimize “take” (including delay, residualism, survival, and mortality) of Mid-Columbia River steelhead as a result of its Umatilla River water diversion structure operations. The Program constructed, maintained, and monitored PIT tag antenna arrays at two BOR operated water surface diversion structures (Feed and Maxwell Canals) as well as one at Three Mile Fall dam. The antenna arrays have allowed the Program to quantify and evaluate how to reduce incidental fish “take” at water surface diversion structures.



Antennas deployed at a water diversion, Umatilla, OR, are used to determine if juvenile steelhead enter the irrigation system.  
*USFWS: W. Simpson*

## *Inside Abernathy cont....*

Various management plans and Endangered Species Act related BiOps stress the need to evaluate the distribution, freshwater habitat use, and migration patterns of declining, threatened, and endangered species of fish such as bull trout, cutthroat trout, and other salmonids. This critical need has led to the Program to develop monitoring technologies which avoid some of the pitfalls of traditional monitoring methods (i.e. fixed traps, mark-recapture, and radio telemetry) such as flow dependent efficiencies, labor costs associated with field operations, and the handling effects on individual fish. For example, the Program has developed PIT tag interrogation units for imperiled Columbia River Basin salmon and trout, in cooperation with PIT tag information from various partners that have been implemented at Columbia River basin monitoring sites established in WA and OR. At each site, construction, installation, monitoring, and where necessary, upgrades of PIT tag antenna arrays have enabled the evaluation of trout and salmon distribution, freshwater habitat use, and migration patterns. Data collected via PIT tag antenna arrays continue to demonstrate the utility of this new PIT tag technology application to monitor and evaluate seasonal movements of fish, determine over winter survival and migration timing, identify micro-habitat use, and examine smolt to adult survival. The Program has the technological knowledge and tools to design and develop remote monitoring devices for detecting movements of fish, frogs, or other aquatic organisms. The Program has developed both stationary and mobile remote monitoring systems to measure fish movements through water diversions, culverts, estuarine habitats, near dams, and in streams. These systems, designed to be 'biologist budget' friendly, are individually tailored to the needs of each unique project and include biological (animal size and behavior), environmental (stream size, substrate characteristics, hydrology) and logistical (remote communication and data access, duration of deployment) considerations. The Program staff works with partners to customize a design for their specific needs.



Antennas deployed in Abernathy Creek, WA are used to monitor the annual migration of juvenile steelhead.

*USFWS: J. Anderson*

## Inside Abernathy cont....

Chris Taylor, Regional Ecological Physiologist and Program Head

As Regional Ecological Physiologist and Program Head, Chris acts as the point of contact for the Pacific Regions and its partners on issues concerning remote monitoring technologies and fish behavior and ecology.

Kyle Hanson, Physiologist and Program Lab Manager

Kyle has oversight for the Program's laboratory activities and purchases. In addition, Kyle has taken the lead for the Program on aquatic resource issues impacting local tribal groups, such as eulachon and Pacific lamprey. He is also co-technical lead on the Pacific and Pacific Southwest Region's efforts to assess NFHs' vulnerabilities to Climate Change.

Ben Kennedy, Ecologist

Ben is the point of contact on field operations for the AFTC's Abernathy Creek steelhead reproductive success study. This long term (>12 years) research focuses on identifying differences between genetically similar, hatchery and natural-origin winter steelhead in the natural environment. Funded by BPA, this cross-Programmatic work has also involved partners from NOAA-Fisheries and Washington Department of Fish and Wildlife (WDFW).

Will Simpson, Ecologist

Will is the point of contact for technical assistance on the impacts of water diversion structures on fish movements and behavior. He currently works on providing technical assistance to a BOR funded study examining impacts of their water diversion structures in eastern OR on fish movements.

Kurt Steinke, Electronics Engineer

Kurt provides technical expertise to the FWS and its partners on the electronics behind remote monitoring technologies. This includes adapting existing equipment into new applications, for example developing new sources of power for use in remote locations such as wind, solar, hydropower.

Richard Glenn, Microbiologist

Richard is responsible for conducting physiological laboratory analyses, including those to better understand differences in hormone levels between hatchery and wild fish.

Recent peer-reviewed publications (2011 to present). AFTC staff names are in bold.

**Glenn, R. A.**, P. W. Taylor, and **K. C. Hanson**. 2011. The use of a real-time PCR primer/probe set to observe infectivity of *Yersinia ruckeri* in Chinook salmon, *Oncorhynchus tshawytscha* (Walbaum), and steelhead trout, *Oncorhynchus mykiss* (Walbaum). Journal of Fish Diseases 34(10):783-791.

**Hanson, K. C.**, **W. L. Gale**, **W. G. Simpson**, **B. M. Kennedy**, and **K. G. Ostrand**. 2011. Physiological characterization of hatchery origin juvenile steelhead (*Oncorhynchus mykiss*) adopting divergent life history strategies. Journal of Fish and Wildlife Management 1:61-71.

**Hanson, K. C.**, and **K. G. Ostrand**. 2011. Potential effects of global climate change on National Fish Hatchery operations in the Pacific Northwest, USA. Aquaculture Environment Interactions 1(3):175-186.

## Inside Abernathy cont....

Nielsen, J. K., G. H. Niezgod, S. J. Taggart, S. J. Cooke, P. Anson, C. T. Hasler, **K. C. Hanson**, and G. Carl. 2012. Mobile positioning of tagged aquatic animals using a synthetic hydrophone array. American Fisheries Society Symposium Proceedings, Advances in Fish Tagging and Marking Technology. American Fisheries Society, Bethesda, MD. 76:230-255.

**Ostrand, K. G., G. B. Zydlewski, W. L. Gale**, and J. D. Zydlewski. 2012. Long term retention, survival, growth, and physiological indicators of salmonids marked with passive integrated transponder tags. Symposium Proceedings Advances in Fish Tagging and Marking Technology. American Fisheries Society, Bethesda, MD. 76:135-146.

**Ostrand, S., R. A. Glenn, A. Gannam**, and **K. C. Hanson**. 2012. Inhibitory effects of rosemary oil on the in vitro growth of six common finfish pathogens. North American Journal of Aquaculture 74(2):230-234.

**Simpson, W. G., and K. G. Ostrand**. 2012. Effects of entrainment and bypass at screened irrigation canals on juvenile steelhead. Transactions of the American Fisheries Society 141(3):599-609.

**Hanson, K. C., K. G. Ostrand**, and **R. A. Glenn**. 2012. Physiological correlates of habitat utilization by migrating juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in the lower Columbia River. Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology. 163:343-349.



Back row, left to right: Chris Taylor, Ben Kennedy, Jerone Anderson (former employee), and Kyle Hanson. Front row, left to right: Kurt Steinke, Will Simpson and Richard Glenn.

# Workshops, Conferences, and Meetings....

## ***Nutrition:***

- Ann Gannam participated in a conference call with Martin Chen and Marcia House (Northwest Indian Fish Commission) and Mike Huff (Susquamish Hatchery) to discuss submitting a proposal to test the efficacy of dietary fluoride in reducing the mortality in salmon caused by bacterial kidney disease.
- Ron Twibell, James Barron, Nathan Hyde and Ann Gannam attended the 63<sup>rd</sup> annual Northwest Fish Culture Conference (NWFCC) in Portland, OR. Ann chaired a session, Fish Health and Nutrition.

## ***Conservation Genetics:***

- Christian Smith participated in the winter Chinook Interagency Ecological Program Salmonid Genetics Project Workteam Meeting in CA and provided an update of our genetic determination of run-of-origin for potential winter-run broodstock.
- Christian Smith provided an overview of our gene expression project (which is a collaborative project with the AFTC Ecological Physiology program) designed to assess differences related to smoltification to the Coleman NFH Hatchery Evaluation Team.

## ***Ecological Physiology:***

- Kyle Hanson and Chris Taylor participated in a conference call with R2 Resource Consultants, who have been contracted by Puget Sound Energy to analyze the success of the new floating surface collector recently completed on Lake Shannon.

## ***Administration/Facilities:***

- Patty Crandell attended a Regional Climate Board meeting at the RO.
- John Holmes gave a presentation at the NWFCC, "Differences in egg size between natural-origin and genetically similar hatchery-origin winter steelhead in Abernathy Creek, WA".

## Employee Spotlight...



Will Simpson  
Ecological Physiology  
Fish Biologist

Will is a native Northwesterner. He was born in Portland, OR and spent most of his youth across the Columbia River in Vancouver, WA. He completed his B.S. and M.S. in Biology at Portland State University and began his federal career with the USGS at the Columbia River Research Laboratory where he spent most of his time monitoring the survival of salmonids passing hydroelectric dams. Will came to AFTC in 2006.

Will and his wife Jenny spend time absorbing kid logic from their 2 wonderful children, Sean (8), and Megan (5). Will also enjoys the obligatory Portlander hobbies of hiking, home brewing, playing soccer, and yelling at the TV during Trailblazer games. He is also a big fan of travel, especially of the few fortunate opportunities he has had to travel to Europe.



Will Simpson and Richard Glenn locate tagged juvenile steelhead in Abernathy Creek using mobile PIT packs.  
USFWS