



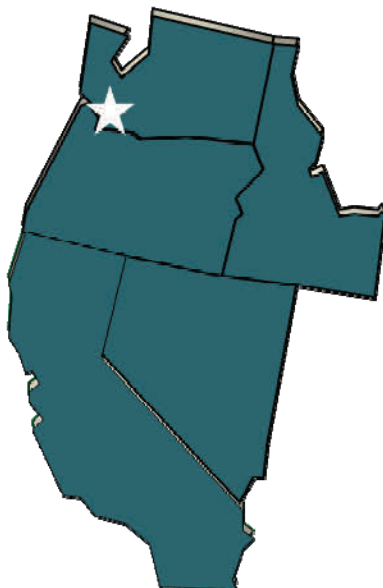
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A Big Day for a Little Fish!



Adult Santiam River Basin Oregon chub. Photo credit: P. DeHaan.



February 19th was a big day for a little fish native to the Willamette River system in Oregon. On that day the Oregon chub became the first fish ever to be removed from listing under the Endangered Species Act because all the recovery goals for the species had been met. Pat DeHaan attended the delisting event for the Oregon Chub at Finley National Wildlife Refuge in Corvallis, OR. The event featured a number of speakers from Federal and state natural resource agencies, private landowners with Oregon chub populations on their properties, and Oregon Congressman Peter DeFazio. All of the speakers talked about the strong partnerships between government agencies, non-governmental groups, and private citizens that made Oregon chub recovery possible. At the end of the event the attendees got to see live chub from ponds on the refuge and enjoy some chub-themed refreshments.

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Representative Peter DeFazio speaks at the Oregon chub delisting.
Photo credit: P. DeHaan.

Oregon chub continued.....

The Conservation Genetics Program at AFTC has conducted a number of studies on Oregon chub. The initial study used genetic data to help determine the number of Oregon chub populations and how viable different populations were. A second study that was completed last year used genetic data to evaluate introduced populations of Oregon chub. Currently the Conservation Genetics Program is conducting a study that uses genetic information to examine the movements of Oregon chub from one population to another. The information generated from these studies was important for monitoring Oregon chub populations and helped with the determination that Oregon chub had met recovery goals necessary for delisting.

For more on the Oregon chub recovery story, check out these websites:

<http://www.fws.gov/oregonfwo/>

<http://odfwnfi.forestry.oregonstate.edu/oregon-chub-recovery>



Who can resist a "chub" cake? Photo credit: P. DeHaan.

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Kelli Hawke, Biological Science Technician

Quantitative Ecology & Technology

Doug Peterson, Senior Scientist/Program Head

Ben Kennedy, Fish Ecologist

Will Simpson, Fish Ecologist

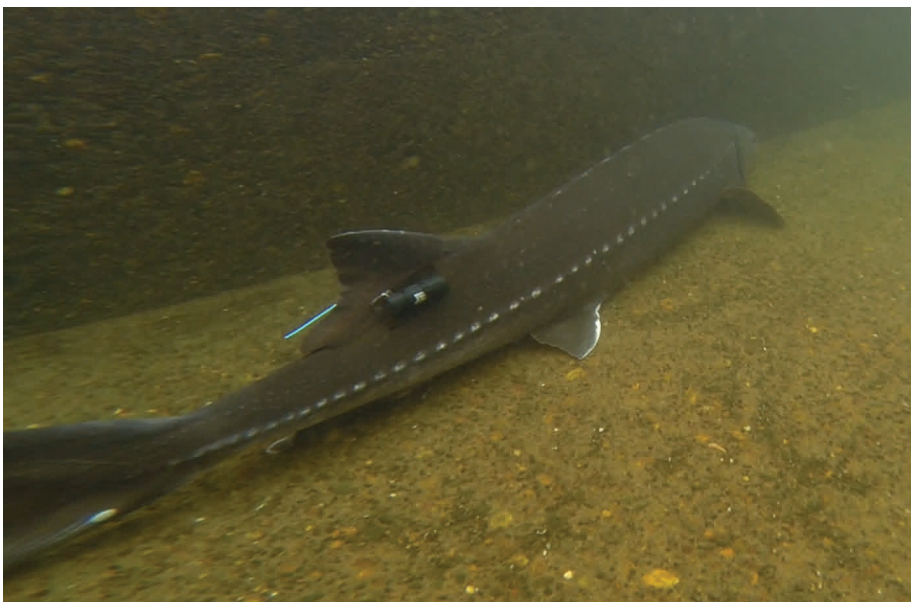
Kurt Steinke, Electronics Engineer

Dalhousie University and AFTC collaborate on White Sturgeon Study

White sturgeon, North America's largest freshwater fish, historically supported large commercial fisheries on the West Coast. It continues to be the focus of large sport fisheries in the Columbia and Fraser Rivers. Sturgeon can live long lives (sometimes over 100 years), take a long time to mature and spawn (10+ years, depending on growth rate) and may only spawn every 4-11 years. Some sturgeon also appear to be homebodies and can be caught multiple times per year in approximately the same spot. Researchers from Dalhousie University, Nova Scotia, Canada, have been conducting research on Fraser River white sturgeon to monitor seasonal migrations. Their goal is to determine if angling related stress can impact spawning. As part of the study small accelerometer transmitters are surgically implanted into angled sturgeon to monitor the activity of a fish for months after catch and release. In collaboration with Kyle Hanson, Dal-

housie University researchers worked to calibrate the transmitters using white sturgeon maintained at AFTC for research. Montana McLean, a Ph.D. candidate under Dr. Glenn Crossin, Petra Szekeres, Graham Neely, Neil Fowler and Jeffrey Beardsall traveled to Abernathy FTC to conduct the research. White sturgeon in the raceways were captured, surgically implanted with an accelerometer, had an external calibration transmitter attached, and blood drawn to measure stress. The data from this project will be used to both calibrate the transmitters and to determine how handling can stress adult white sturgeon and impact behavior.

Ms. McLean also gave a lunch time seminar entitled "All Things *Acipenseridae*" to AFTC employees. The presentation covered her research on using telemetry to monitor movement patterns of Atlantic and white sturgeon.



White sturgeon with a calibration tag attached to its dorsal fin. Photo credit: M. McLean.

Publications

Twibell, R. G., S. Ostrand, A. L. Gannam, J. B. Poole, and J. A. S. Holmes. 2015. Evaluation of lipid sources in diets fed to bull trout, *Salvelinus confluentus*. *Aquaculture Nutrition* Article first published online: 12 FEB 2015 | DOI: 10.1111/anu.12288

Smith, C. T., J. Baumsteiger, W. R. Ardren, Y. Dettlaff, D. Hawkins, and D. M. Van DoorNIK. 2015. Eliminating variation in age-at-spawning leads to genetic divergence within a single coho salmon population. *Journal of Fish and Wildlife Management* 6(1): online early.

Von Bargen, J., J. Rueth, and C. T. Smith. 2015. Development of a Chinook Salmon Sex Identification SNP Assay based on the Growth Hormone Pseudogene. *Journal of Fish and Wildlife Management* 6(1): online early.

Reports:

Adams, B., and P. DeHaan. 2015. Rapid Response Genetic Analysis and Genetic Estimation of Spawner Abundance of Bull Trout Collected in the Lewis River, WA. AFTC Final Report FY2014.

DeHaan, P., B. Adams, T. Whitesel, and J. Doyle. 2015. Genetic Species ID and Population Origin Analysis of Wallowa Lake and River Bull Trout. AFTC Final Report.

Smith, M. J., J. Von Bargen, D. M. Faber, and W. H. Wilson. 2014. Investigation of the relative reproductive success of hatchery and wild steelhead in the Deschutes River Basin. AFTC Final Report FY2013.

Peterson, D. P., and coauthors. 2015. Strategic modeling to assist conservation of bull trout in the Lower Clark Fork River. 93 pp. + Appendices.

AFTC Program Highlights

Physiology & Nutrition

As part of the project "Natural Reproductive Success and Demographic Effects of Hatchery-Origin Steelhead in Abernathy Creek, Washington", 122 adult winter steelhead were captured by the end of February. Twenty four were natural-origin, 75 were hatchery-origin, and 23 were out-of-basin strays. Adults passed upstream to spawn naturally were 9 females (6 natural-origin, 3 hatchery-origin) and 13 males (10 natural-origin, 3 hatchery-origin). Seven natural-origin adults were retained to be included into the hatchery broodstock, these adults were live spawned and released downstream. One natural-origin adult was captured as a kelt and released downstream. Adult trapping will continue into June.

The tale of the wandering coho: While tracking returning passive integrated transponder (PIT) tags, Ben Kennedy identified a natural-origin coho male captured at Abernathy FTC on 10/15/14 that had been originally tagged at Bonneville Dam on 10/9/14.



Coho salmon that migrated from Bonneville Dam to Abernathy Creek, ~ 90 river miles, in 6 days. Photo credit: J. Holmes.

Twelve feeds were received in January and February from National Fish Hatcheries for fish feed quality control analysis. As part of the routine analyses, all feeds from the hatcheries were checked for rancidity. Ann Gannam wrote the feed memos and contacted the feed mills if necessary. We also received ingredients from Rangen, Inc. to be analyzed for the Abernathy Diet as per the feed contract. With the proximate composition data from the analyzed ingredients, the Diet can be formulated and the formulation sent to Rangen for production.



Ron Twibell and James Barron collecting water samples as part of Pacific Lamprey research. Photo credit: A. Gannam.

Water quality was sampled from the tanks in the ongoing lamprey ammocoete ration level study on January 8th and 9th. In addition to the lamprey research at AFTC, James Barron and Ann Gannam contributed to a book chapter on Pacific lamprey propagation with partners from the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, National Oceanic and Atmospheric Administration and U.S. Geological Survey.

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AFTC Program Highlights— continued



Jennifer Von Bargaen preparing genetic samples for analysis. Photo credit: J. Gordon



Spalding's catchfly. Photo credit: P. Lesica

Ron Twibell is preparing for the diet trial with steelhead raised at Abernathy for the ongoing BPA project. He will use a commercial feed that has no fish oil top-coated so that he has control of the amount of lipid added to the feed. The treatments used in this study will be a low lipid and a high lipid diet to examine the effects of dietary lipid level on growth rates, whole body lipid levels, smolting and adult returns in hatchery steelhead.

Richard Glenn finished conducting ATPase assays from gill tissues collected from coho salmon in the recirculating aquaculture study. The analysis of this enzyme will be used to determine if rearing salmon in recirculating aquaculture systems impacts smoltification rates.

Richard Glenn and Kyle Hanson collected gill biopsies from steelhead during PIT tagging. These biopsies will be analyzed for ATPase enzyme activity to determine smoltification rates in steelhead that will be released next spring.

Conservation Genetics

Jennifer Von Bargaen completed processing of samples for our gene expression work examining which up-regulated genes are associated with residualism.

Jennifer Von Bargaen and Kieslana Wing analyzed microsatellite markers in 1,159 bull trout from the Clark Fork River in Idaho under a collaboration with Avista Power. Jennifer further tested genetic sex identification markers in several of these samples.

Brice Adams and Kieslana Wing extracted DNA from 400 Oregon chub and analyzed them using a suite of microsatellite markers.

Jennifer Von Bargaen and Matt Smith worked with our Pacific Southwest Region and the University of California, Davis to develop SNP markers for Devil's Hole Pupfish. Twenty markers have been analyzed to date, and another fifty are under development.

Brice Adams sequenced chloroplast DNA from samples of Spalding's Catchfly as part of an assessment of population structure in that species.

Quantitative Ecology & Technology

Will Simpson, Kurt Steinke, and Doug Peterson conducted pilot studies to determine which electrical waveform causes the greatest mortality in fertilized eggs. The information

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Interested in learning more about our research projects?

Check out our Publications web page at: <http://www.fws.gov/aftc/publications.html>

or

our Reports web page at: <http://www.fws.gov/aftc/reports.html>

AFTC Program Highlights — continued

from the pilot study will be used to design an experiment to test whether electricity can be used to help control recruitment of invasive common carp in Lake Malheur National Wildlife Refuge.

Kyle Hanson, Will Simpson, Kurt Steinke, Richard Glenn, Doug Peterson, and Ben Kennedy measured, weighed, collected genetic samples and PIT tagged 1,500 juvenile hatchery steelhead from Abernathy Fish Technology Center. These fish will be released in April and May and they will be monitored on their way to the Columbia River via PIT tag antenna arrays as well as a screw trap that is operated by the Washington Department of Fish and Wildlife.

In early January, heavy rain led to a high-flow event that dislodged the debris jam and ultimately destroyed four of the six PIT antennas installed under the bridge in Abernathy Creek. Physiology and Quantitative Ecology & Technology Programs staff worked together to repair the damaged systems.

Kurt Steinke continued evaluation of the Biomark IS1001-ACN PIT tag reader, including evaluation of a 35 foot long by 5 foot wide figure-8 pass-over antenna design to span Abernathy Creek at AB1, and replace those antennas destroyed by the high-flow event.

Kurt Steinke was visited by Melissa Kjelvik, a graduate student at Michigan State University, who needed assistance with the design of a pass-through antenna for an Allflex RM310 reader. Melissa intends to

use the antenna to monitor movement of juvenile bluegill using 7mm FDX PIT tags. Multiple narrow loops were required in the antenna in order to read the very small tags.

Administration

A meeting was held to facilitate coordination with Washington Department of Fish and Wildlife on the Abernathy Creek Winter Steelhead Reproductive Success Study. In attendance from WDFW were Cindy LeFleur, Bryce Glaser, and Mara Zimmerman.

Dave Tilton project leader at the Lake Champlain Fish and Wildlife Resources Office paid a visit to get a better understanding of AFTC's business model.

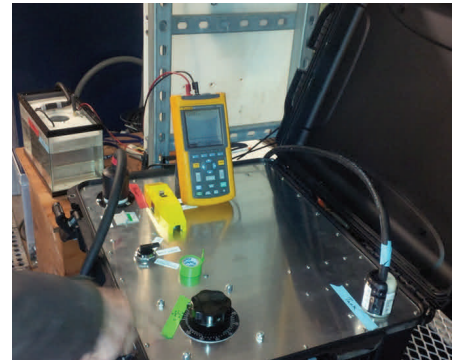
Judy Gordon and Patty Crandell attended the Pacific Region Fishery Resource Office Coordination Meeting held at the Columbia River Fisheries Program Office.

The second quarter Safety Committee Meeting was held.

Judy Gordon provided the January Safety Training on the facility's Emergency Action Plan.

Patty Crandell and Kyle Hanson met with Rich Turner (NOAA Fisheries) and Michelle Guay (Bonneville Power Administration) to discuss AFTC's Hatchery Genetic Management Plan for the BPA funded Abernathy Creek steelhead project.

Judy Gordon and Patty Crandell participated in two meetings to discuss options for the electric barrier



Transformer unit used to generate different electrical waveforms to test their effects on eggs from invasive common carp in Lake Malheur. Photo credit: D. Peterson.



Kyle Hanson, Richard Glenn, Will Simpson, Doug Peterson, and Ben Kennedy repairing storm damaged remote monitoring antenna array in Abernathy Creek. Photo credit: K. Hawke.



Antenna to be used to monitor movement of juvenile bluegill fitted with very small (7 mm) PIT tags. Photo credit: K. Steinke.

weir with RO and NFH staff.

Judy Gordon and Patty Crandell took part in the monthly Fisheries Resources Program's project leader calls.

Patty Crandell participated in two Regional Climate Board meetings.

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AFTC Program

Highlights — continued

Patty Crandell summarized the status of the Quilcene NFH vulnerability assessment for the co-managers and invited them to provide input into development of the adaptive capacity/strategies section for the facility. A meeting was tentatively planned for late April or May.



Abernathy Creek in winter.
Photo credit: J. Gordon.

Meetings and Conferences

- Christian Smith gave a presentation entitled “Genetic composition of the Warm Springs River Chinook salmon population maintained following eight generations of hatchery production” at *The Hatchery vs. Wild Symposium* hosted by the Oregon Chapter of the American Fisheries Society.
- Christian Smith gave a webex presentation on AFTC’s work with Quilcene NFH coho salmon as part of the Advanced Topics in Conservation Genetics hosted by NCTC. See the presentation online: <http://nctc.fws.gov/topic/online-training/webinars/advanced-conservation-genetics.html>.
- Christian Smith and Pat DeHaan participated in a Hatchery Evaluation Team Meeting for Eagle Creek NFH.
- Christian Smith and Judy Gordon participated in a Hatchery Evaluation Team Meeting for Makah NFH.
- Judy Gordon participated in the Hatchery Evaluation Team Meeting for Quinalt NFH.
- Judy Gordon participated in the a meeting of the Science-Traditional Ecological Knowledge Subcommittee of the North Pacific Landscape Conservation Cooperative.
- Pat DeHaan attended “Chubfest” the celebration for the recovery and delisting of Oregon chub.
- Jennifer Von Barga completed work for an online course called *Writing with Clarity*.
- Kurt Steinke, Doug Peterson, Ben Kennedy, and Will Simpson attended the in 2015 PIT Tag Workshop, January 27-29, in Stevenson, WA.
- Ben Kennedy traveled to Winthrop, WA, to collaborate with the USFWS Mid-Columbia River Fishery Resource Office and NOAA Fisheries Manchester Research Station on survival analyses of the alternative steelhead rearing programs at USFWS Winthrop National Fish Hatchery.
- Ann Gannam gave an online presentation to the Rocky Reach Fish Forum (RRFF) describing our capabilities and abilities to raise lamprey ammocoetes. Mary Moser (NOAA) and Ralph Lampman (Yakama Nation) also provided presentations about their capabilities and their research.
- James Barron traveled to National Conservation Training Center for USFWS Foundations training from January 12-16.
- Kyle Hanson attended the U.S. Army Corps of Engineers Willamette River Fisheries Science Review.
- Ann Gannam had a conference call with Bob Rose, Ralph Lampman (Yakama Nation) and Mary Moser (NOAA) to discuss upcoming research proposals regarding lamprey ammocoete rearing.
- Ron Twibell and Ann Gannam gave presentations at the World Aquaculture meeting February 19-22. Ron’s presentation was titled “Evaluation of lipid sources in diets fed to the endangered Lost River sucker (*Deltistes luxatus*)”. Ann’s talk was titled “Physiological effects of recirculating aquaculture system flow regime on steelhead *Oncorhynchus mykiss*”.

Ongoing Projects

Use of restriction-associated DNA sequence data for single nucleotide polymorphism detection in listed Devil's Hole pupfish. *Management Need:* Develop genetic markers to monitor genetic diversity of a listed population held in refugia. *Partners:* Sacramento FWO; University of California, Davis.

Population genetic structure of Spalding's catchfly: a terrestrial plant. *Management Need:* Develop genetic markers and monitor genetic diversity of populations to identify management units and inform conservation planning. *Partners:* Idaho FWO; University of Montana.

Genetic needs assessment for endangered Lost River and shortnose suckers of the Klamath River Basin, OR. *Management Need:* Develop genetic markers to monitor genetic diversity of listed populations. *Partners:* Klamath Falls FWO; U.S. Geological Survey.

Rapid response genetic analysis of threatened bull trout collected below dams in the Clark Fork River, MT. *Management Need:* Provide data to inform upstream fish passage decisions for listed bull trout. *Partners:* Avista Corporation; Confederated Salish Kootenai Tribes; Idaho Fish and Game; Kalispel Tribe of Indians; Montana Fish Wildlife & Parks; Montana Ecological Services Field Office; Pend Oreille Public Utility District; Pennsylvania Power & Light, MT.

Genetic identification of endangered winter-run Chinook salmon in the Sacramento River, CA. *Management Need:* Rapid response broodstock identification for spawning of listed species. *Partners:* Livingston Stone NFH; Red Bluff FWO; NOAA Fisheries.

Genetic species identification and population origin analysis for bull trout in Wallowa Lake and Wallowa River, OR. *Management Need:* Identify species and/or population, determine within population genetic diversity, and determine level of hybridization with invasive brook trout. *Partners:* PacifiCorp Energy; Columbia River FPO.

Strategic modeling of bull trout conservation actions in the lower Clark Fork River, MT. *Management Need:* Determine impacts of hydroelectric facilities on listed bull trout populations and prioritize conservation actions. *Partners:* Avista Corporation; Montana Fish Wildlife & Parks; Montana Ecological Services Field Office; Idaho Fish and Game.

Movement patterns of Oregon chub. *Management Need:* Determine movement patterns and gene flow among populations of a recently delisted species using genetic data. *Partners:* Oregon Department of Fish & Wildlife, U.S. Army Corps of Engineers.

Suppression of common carp in Malheur Lake using electrofishing to target eggs and embryos. *Management Need:* Determine the feasibility of using electrofishing to kill eggs and embryos for control of invasive common carp in Malheur Lake. *Partner:* Malheur NWR.

Water velocity effects on salmon as reared in recirculating systems. *Management Need:* Determine the effects of water velocity on composition, growth, condition, and performance of juvenile salmon reared in aquaculture recirculating systems proposed for Pacific Region NFHs. *Partners:* The Freshwater Institute, Pacific Region National Fish Hatcheries, and Fishery Resources Program via Fisheries Operations and Need System (FONS).

Diet development for Lost River and short nose suckers in the Klamath River Basin. *Management Need:* Determine dietary needs of listed populations to assist in recovery. *Partners:* Klamath Tribes, Klamath Falls FWO, California/Nevada FHC.

Development of diets and rearing techniques for the culture of Pacific lamprey. *Management Need:* Assist Tribal partners in developing methods for the artificial propagation of Pacific lamprey, a species of concern. *Partners:* Yakama Nation; Fishery Resources Program via FONS.

Assessing the effects of multiple tagging methods on Pacific lamprey ammocoetes. *Management Need:* Assist Tribal partners in developing methods for the monitoring and evaluation of this species of concern. *Partners:* Yakama Nation; Fishery Resources Program via FONS.

The physiological response of white sturgeon to handling stress in captivity. *Management Need:* Determine if the stress from catch and release angling is detrimental to survival of white sturgeon, a species of concern. *Partners:* Dalhousie University; Carleton University.

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Ongoing Projects—continued

Pacific Region’s Fish Feed Quality Control (FFQC) Program. The FFQC Program, the only one of its kind in the FWS, provides quarterly monitoring of the quality of the commercially produced fish feeds used at Pacific and Pacific Southwest Regions’ NFHs. Information is compiled on an annual basis and used in the development of the Pacific Region fish feed contract. *Management Need:* Conduct quality assurance/quality control of commercially produced fish feeds used at Pacific and Pacific Southwest Regions’ NFHs. *Partners:* Pacific and Pacific Southwest Region’s NFHs, Oregon, Washington, Idaho, and Tribal fish hatcheries.

Genetic profiles of broodstock at Pacific Region National Fish Hatcheries. *Management Need:* Determine impacts of hatchery origin fish (HOR) on naturally occurring fish (NOR) and monitor the effects of aquaculture practices on HOR populations. *Partners:* Pacific Region NFHs; Fishery Resources Program via FONS.

Antenna design for the Biomark IS1001 PIT tag reader. *Management Need:* Provide expert level engineering and technical assistance to partners monitoring species of interest using new technologies while reducing biologist time spent in design and troubleshooting. *Partner:* NOAA Fisheries.

Natural reproductive success and demographic effects of hatchery-origin steelhead in Abernathy Creek, WA. *Management Need:* Provide information to help managers minimize differences between NOR and HOR fish. *Partners:* Bonneville Power Administration; Washington Department of Fish and Wildlife.

Climate change vulnerability assessments of Pacific Region National Fish Hatcheries. *Management Need:* An understanding of the anticipated habitat changes under different climate change scenarios provides managers with information to proactively respond to these conditions and their impact on NFHs. *Partners:* Pacific Region NFHs; Mid-Columbia River FRO; Fishery Resources Program via FONS.

Development of genetic markers associated with smoltification in steelhead and salmon. *Management Need:* Identify genetic markers associated with downstream migration to provide managers with information to proactively manage early onset smolting levels. *Partners:* Fishery Resources Program via FONS.



Kelli Hawke with floy tagged coho salmon. Photo credit: J. Holmes.

