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Oregon Water Typing: Safeguarding Headwater Streams, Native Fish Habitat, and Clean Water in Oregon

Summary

Nearly fifteen years after the listing of coastal salmon and steelhead populations under the federal Endangered Species Act (ESA), Oregon still lacks consistent and reliable maps documenting the distribution and extent of freshwater salmonid habitat. Existing maps under-represent the true extent of fish-bearing streams, jeopardizing imperiled populations of native fish, clean water, and other downstream beneficial uses and values. State leaders have failed to prioritize resources for agencies to remedy and improve the maps, and there is a lack of understanding of the magnitude of the challenge among the general public. There is an urgent need for advocacy and case studies by native fish and watershed advocates to conduct

Background and Need

To protect stream and riparian habitat from harmful land use impacts, Oregon relies on two parallel water typing systems that identify streams warranting habitat protection for the benefit of fish and wildlife, clean water, and other public values and resources. Oregon Department of Forestry (ODF) maintains maps showing fish presence/stream size. In parallel, the Department of State Lands (DSL) and Oregon Department of Fish and Wildlife (ODFW) maintain maps of Essential Salmonid Habitat (ESH), identifying stream segments with known state/federal sensitive, threatened, or endangered anadromous fish populations. The maps are used to regulate in-stream work and riparian land use, through the ODF-administered forest practices act, the DSL-administered wetland fill-removal rules, as well as local government development regulations.

Both ODF and DSL prescribe greater protection for streams identified as fish habitat, with lower levels/no protection for non-fish streams (or streams lacking threatened/endangered anadromous fish on ESH maps). Stream maps are periodically updated, but incomplete data on the extent of fish populations limits their accuracy, particularly on small headwater tributaries that have never been surveyed. Tributaries harboring native fish populations may be erroneously classified as “non-fish-bearing,” of “unknown” status, or simply not mapped. ODFW, the Tribes, and others may submit data on a stream-by-stream basis to correct and augment maps, but rarely are systematic surveys conducted to characterize and correct the incomplete fish distribution maps.

Previous Work

Tribes, landowners, and the nonprofit Wild Fish Conservancy (WFC) have conducted systematic water typing surveys in Washington State over the past 20 years. WFC water typing assessments in Puget Lowland streams reveal high rates of error, with Washington Department of Natural Resources (WDNR) regulatory stream maps typically showing only one-half or less of the true extent of fish habitat.

In Puget Sound, WFC water typing surveys over the past ten years have resulted in improved on-the-ground habitat protection, safeguarding hundreds of miles of salmon and trout streams (<http://wildfishconservancy.org/resources/maps>). In Clark County, Washington, water typing surveys in Salmon Creek during 2010-2012 documented 23 miles of previously-unmapped streams, and 14 miles of new fish-bearing streams, including reaches harboring threatened coho salmon. In 2011-12 Multnomah County fish distribution studies of Upper Johnson and Beaver Creeks (<https://multco.us/roads/fish-surveys>) approximately eight miles of new salmonid-bearing streams were documented, including approximately two miles of stream harboring threatened coho salmon.

Why Water Typing?

Comprehensive surveys documenting the extent of headwater trout and salmon populations have been completed for only a handful of Oregon watersheds. ODFW habitat biologists know the limitations of regulatory stream maps and rely on spot surveys for fish presence in headwater streams during permit review. Others lacking expertise (e.g. County planners, landowners) may use error-prone ODF stream maps without field-truthing. Through permit applications, state agencies may catch and correct mapping errors on a case-by-case basis, but in other circumstances fish habitat may not be adequately protected due to mapping errors.

Native fish advocates seeking watershed stewardship opportunities can restore habitat, advocate for wise land use, seek to change laws, or work to strengthen existing habitat protection programs. Water typing falls into the latter category. Since water typing does not require continuous channel surveys or access to every stream-side property in a watershed, the approach represents a rapid, cost-effective tool to safeguard headwater habitat. Through field-truthing and upgrading undocumented streams to “fish-bearing” status, fish advocates can incrementally, stream-by-stream improve conservation prospects for threatened fish.

Geography of Need

More comprehensive surveys of headwater fish distribution are needed across Oregon, but in certain basins and jurisdictions there is a high need. In particular, water typing surveys are needed most where there are high development pressures overlapping with gaps in habitat protection on streams harboring at-risk fish populations.

On forestry lands, landowners understand the ODF map challenges and there is a system for correcting stream maps during pre-harvest planning. On urban lands there have been past efforts to field inventory and update stream maps¹, though additional work remains to be done. On rural non-forestry lands, water typing maps are frequently inaccurate, and jurisdictions lack resources to correct maps during the land use decision-making process².

¹ Typically conducted through the Goal 5 natural resources inventory process, including those completed by Metro, City of Portland, Multnomah County, Lane Council of Governments, ODFW, and others.

² Some local governments typically apply the Oregon LCDC “safe harbor” buffer standard, which requires building setbacks of 50 ft from the OHWM of all streams and wetlands (regardless of fish presence/absence), while others only apply stream buffers on documented “fish streams”.

In rural areas of Oregon counties like Clackamas, Douglas, Jackson, Josephine, Deschutes, and other Oregon counties, small fish-bearing streams are protected by 50-foot riparian buffers, but non-fish-bearing streams receive little or no habitat protection. Each of these counties have increasing development pressures, placing additional risk on tributaries of the Clackamas, Rogue, Umpqua, and Deschutes rivers. Headwater streams typically have had little/no biological inventories, placing them at greater risk as compared to larger, named streams and rivers.

2014 Pilot Assessment

In May 2014, we conducted an eight-day pilot water typing effort in north Clackamas County’s Beaver and Abernethy watersheds, two independent drainages to the Willamette River south of Oregon City with a mix of land uses and growing development pressures (Table 1)³.

Table 1. Abernethy and Beaver creeks watershed information (ICF International 2010).

	Abernethy Creek	Beaver Creek
Watershed area (sq miles)	33.7	31.4
Stream density (mi/sq mile)	5.3	1.5
Land use/land cover:		
Urban	8%	8%
Agriculture/rural residential	44%	64%
Forestry	44%	23%
Transportation	4%	3%

Methods - We followed ODF-ODFW protocols⁴ to survey streams for fish presence and collect physical measurements of bankfull channel width, gradient, pool depths and other features. In advance of fieldwork, we reviewed available ODF fish presence/stream size and LiDAR topographic data in GIS to identify streams mapped as ‘non-fish’ or ‘unknown’ with potential to harbor fish based on proximity to fish-bearing waters and drainage area size. We also identified potential unmapped stream locations to field check, based on the presence of ravines visible in LiDAR topography.

Using GPS we navigated to target streams, conducted visual inspections from public road crossings, and went door-to-door to seek access permission from willing landowners for stream surveys. At each accessed stream, we surveyed 50-150 feet of channel for fish presence/absence and channel physical attributes, collected photographs, and recorded GPS positions. Captured fish were identified to species, measured, photographed, and released unharmed. Since we lacked time and an ODFW fish collection permit for handling threatened/endangered fish, we focused on headwater areas isolated from reaches with documented populations of anadromous fish.

³ ICF International. 2010. Greater Oregon City Watershed Assessment. (ICF Project 00223.09.) Portland, OR. Prepared for the Greater Oregon City Watershed Council, Oregon City, OR. http://www.gocwc.org/images/PDFS/AssessmentReport_OregonCity_040810.pdf

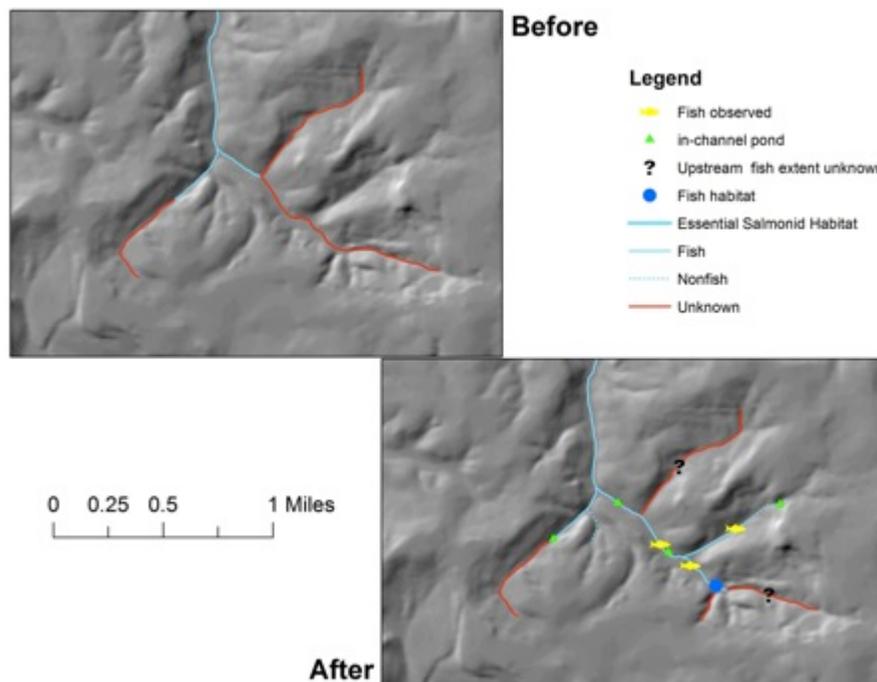
⁴ ODF and ODFW. 1995. Surveying forest streams for fish use. Oregon Dept. of Forestry, Salem, Oregon. 30 pages. <http://www.oregon.gov/odf/privateforests/docs/fishpresnecsurveyprotocol.pdf>

Preliminary Results – Over eight field days, we identified 9.1 miles (+14.3%) of new fish-bearing streams that were previously classified as ‘non-fish’, ‘unknown’, or not mapped on ODF regulatory maps. Fish species captured included native cutthroat trout, sculpin, brook lamprey, and three-spine stickleback, as well as non-native bluegill, mosquitofish, and fathead minnow. In one tributary, we documented a population of Pacific giant salamander – which is relatively uncommon in Willamette Valley streams⁵.

Detailed LiDAR topography proved useful for pinpointing streams that were not shown on ODF maps, which were concentrated in the Beaver Creek watershed. Though Abernethy and Beaver creeks had similar watershed areas, ODF-mapped stream densities for Abernethy Creek were more than 3.5 times higher than Beaver Creek (Table 1). This difference was likely due to an artifact in ODF stream mapping procedures rather than real differences in ecological setting, but this could help inform future work strategies.

Landowners contacted during the course of fieldwork were generally receptive and interested in learning about “their” stream fish. Certain landowners accompanied us during the surveys and we took the opportunity to photograph them holding fish in a “photarium” (Figure 4). For certain headwater areas, we were unable to secure landowner access on short notice but these were flagged for follow up surveys in 2015 and beyond.

Figure 1. South fork Parrot Creek, a headwater tributary of Beaver Creek. The original ODF stream map is shown at top left, and the updated water typing is shown at bottom right. Note the presence of numerous ravines, several of which harbored undocumented stream channels. A question mark shows streams where the upper extent of fish use was not established.



⁵ Tippery, S. E. and K. K. Jones. 2011. Amphibian distribution in wadeable streams and ponds in western and southeast Oregon, 2009-1010. ODFW, Fish Research Project, Progress Report, Corvallis. http://www.dfw.state.or.us/conservationstrategy/docs/2011_Amphibian_Progress_Report.pdf

Figure 2. Beaver Creek headwaters. The original ODF stream map is shown at top left, and the updated water typing is shown at bottom right. A question mark shows streams where the upper extent of fish use was not established.

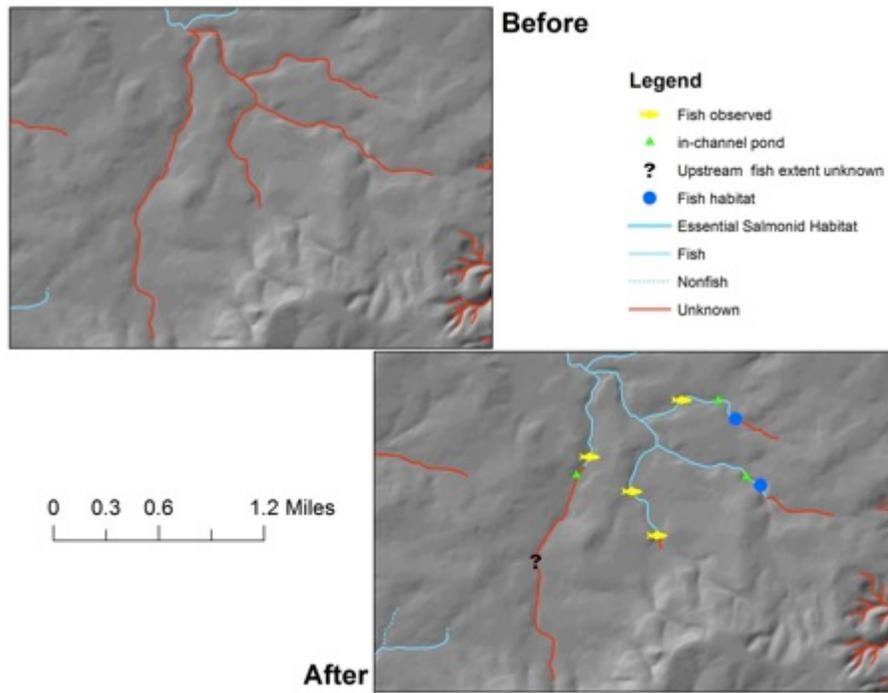
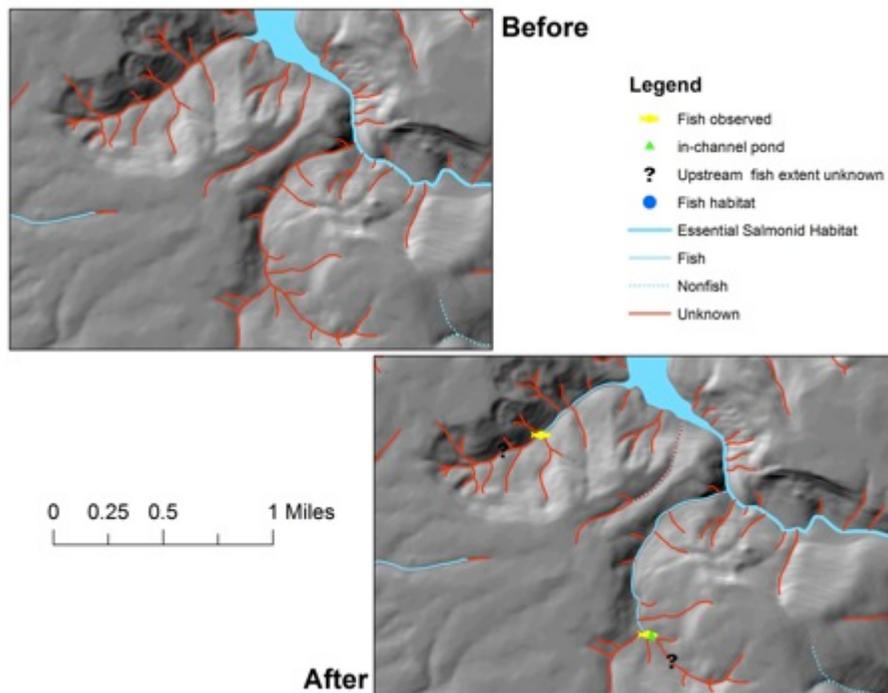


Figure 3. Middle Abernethy Creek tributaries. The original ODF stream map is shown at top left, and the updated water typing is shown at bottom right. A question mark shows streams where the upper extent of fish use was not established.



Though we lacked sufficient resources to systematically field truth stream maps across both watersheds in 2014, our preliminary results indicate a need for additional surveys to correct regulatory stream maps and secure headwater habitats for the benefit of resident and downstream anadromous fish populations. As a result of these stream upgrades, we estimate that ~110.6 acres of riparian lands bordering these headwater streams now qualify for protection under the Clackamas County zoning and development ordinance⁶.

Next Steps

Several follow up steps are needed develop and better define the utility of systematic water typing surveys in Oregon to improve on-the-ground habitat protection for native fish. Additional research and networking with stakeholders is needed to better define opportunities and challenges with field-truthing the State of Oregon's water typing maps.

In particular, we need to:

1. Learn about the data submission and approval process for upgrading streams to 'fish-bearing' status, under both the ODF fish presence/stream size, and DSL/ODFW essential salmonid habitat data sets. What opportunities are there to leverage existing data sets from watershed councils and others to correct the maps?
2. Assess the geography of need: what communities are experiencing rapid growth, development, or land use conversion where this work would be especially valuable? Potential target geographies could include Douglas, Jackson, Josephine, and Clackamas counties.
3. Identify funding opportunities to support future field-truthing efforts and collect additional case-studies showing systematic mapping errors. This could include conversations with private foundations, which may be interested in expanding the capacity of an Oregon-based organization to lead water typing surveys.
4. Network with key agency staff and like-minded organizations to better understand the legal and policy context for water typing.

Expected Results

Systematic water typing surveys will benefit conservation agencies, landowners, and the general public through reduction/avoidance of future habitat loss and conflict or delay associated with permitting. Collected information will be submitted to ODFW and ODF to assist in regulatory decision-making and stream map upgrades. Identified headwater fish habitat and migration barriers will help prioritize replacement/repair of downstream barriers. Landowners and trained volunteers engaged through this effort will learn about fish habitat conservation and may become more effective advocates for wild fish conservation. Though some may discount or overlook the habitat value of small headwater streams, they represent important cold-water refugia for salmon and trout.

For more information and to discuss this work, please contact Ted Labbe at 503-758-9562 or ted.labbe@gmail.com.

⁶ See <http://www.clackamas.us/planning/documents/zdo/ZDO704.pdf>

Acknowledgments

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Figure 4. Example photos of landowners with “their fish” from the 2014 Abernethy and Beaver creeks water typing pilot. Captured fish were measured and photographed in a photarium, visible in both photos.

