R & E Grant Application 13 Biennium

Project #: 13-098

Genetics of Chinook salmon in the Sandy Basin

Project Information

R&E Project Request:	$52,745.16
Match Funding:	$162,756.75
Total Project:	$215,501.91
Start Date:	8/15/2014
End Date:	6/30/2015
Project Email:	luke.whitman@oregonstate.edu
Project Biennium:	13 Biennium
Organization:	ODFW - Corvallis Research Lab

Applicant Information

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Past Recommended or Completed Projects

Number	Name	Status
13-084	Recovering Coded Wire Tags in the Sandy Basin	Recommended

Project Summary

This project is NOT part of ODFW's 25 Year Angling Plan.

Activity Type: Research

Summary: Fall and spring Chinook salmon are native to the Sandy Basin, with both runs supplemented by hatchery releases. Surveys for spring Chinook have recently been expanded to cover more of the basin later into October, increasing the likelihood that fall Chinook will be encountered. Surveyors are often unable to distinguish between fall and spring Chinook carcasses. This adds uncertainty to estimates of Percentage of Hatchery Origin Spawners (pHOS) and spawner abundance, critical metrics for fishery management. Our project will use genetic analysis to differentiate fall and spring Chinook salmon within the Sandy Basin to improve run-specific abundance and pHOS estimates.

Objectives: The primary objective of our project is to determine the percentage of fall Chinook

salmon present in spawning surveys for spring Chinook salmon in the Sandy Basin. Since the removal of Marmot Dam, the extent of overlap between these two runs is unknown and likely to increase now that the dam is gone. Recently expanded surveys for spring Chinook increase the likelihood that fall Chinook will be counted as spring Chinook on these surveys. This in turn may increase estimates of pHOS for spring Chinook in the basin, as both runs are supplemented by hatchery releases. Surveys for fall Chinook salmon also have difficulty distinguishing fall and spring Chinook salmon in some areas, which will be improved by this project. The second objective is to determine the proportions of fall and spring Chinook salmon recovered in Bull Run and the mainstem Sandy River. These areas are more likely to have fall Chinook salmon than the upper basin and may have an undo effect on pHOS estimates for spring Chinook salmon. The third objective is to analyze archived samples collected prior to the removal of Marmot Dam to determine the percentage of fall Chinook during that period for comparison to current levels (objective 1). This analysis can detect shift towards more fall Chinook salmon spawning in the upper Sandy Basin, which will affect future management activities.

Preliminary data from the Bull Run River provided by City of Portland Water Bureau (CoPWB) indicated a surprising amount of overlap between populations even in September. However, all carcasses recovered in the Bull Run River were used in our estimates of PHOS. Although limited, this example demonstrates how the presence of fall Chinook salmon can affect estimates of PHOS for spring Chinook salmon. Reports by Oregon Adult Salmonid Inventory and Sampling Project (OASIS) also comment on the uncertainty of origin for carcasses recovered during surveys for fall Chinook surveys. More fall Chinook salmon are now released from hatcheries in the lower Columbia with an adipose fin clip, making it more difficult to separate these fish from hatchery spring Chinook salmon.

Fishery Benefits:

Both runs are listed under the Endangered Species Act (ESA) and the NOAA permit for hatchery operations in the Sandy Basin requires pHOS of 10% or less. This goal is met in part by excluding hatchery fish from the upper basin where most wild fish spawn. By achieving this management goal, hatchery operations can continue to provide fish from both runs for recreational anglers. Expanded surveys in the mainstem Sandy River and Bull Run may incorrectly increase the pHOS for spring Chinook salmon when some of these fish are in fact fall Chinook salmon of hatchery origin. Furthermore, a better understanding of the run timing and overlap between wild spring and fall Chinook can improve management in the Sandy River, which supports many wild runs of salmon.

Watershed Benefits:

Improving estimates of pHOS applies directly to fishery management goals in the basin. Both run types are released by hatcheries to support popular recreational fisheries. A better understanding of how hatchery fish affect wild spawners from both runs will help guide better management in the basin through actions such as targeted hatchery releases or exclusion from spawning areas with weirs if pHOS goals aren't met. This can provide more opportunity for anglers to catch hatchery salmon with less risk to native fish that are listed under the ESA.

Current Situation:

Overall habitat and water quality is good in the upper basin where most wild spring

Chinook salmon spawn. Warmer water temperatures in Bull Run may negatively affect spawning spring Chinook salmon. The U.S. Forest Service continues to improve spawning habitat in the upper basin by adding logs, gravel, and other in-stream structures. Weirs are used to exclude hatchery spring Chinook salmon from the Salmon, Zigzag, and Bull Run rivers.

Alternatives: We coordinate our surveys with the Oregon Adult Salmonid Inventory and Sampling Project (OASIS) at ODFW. Our project targets spring Chinook salmon while OASIS conducts surveys for fall Chinook salmon in the Sandy Basin. The timing of our surveys is used to reduce the likelihood that we sample fall Chinook salmon and most surveys for spring Chinook salmon are in areas of the upper basin where few fall Chinook salmon are presumed to occur. Also, size and color of carcasses can be used to comment on a potential fall Chinook salmon. In recent years, we have put more effort into surveying the mainstem Sandy and Bull Run rivers to address concerns that hatchery spring Chinook salmon may be spawning in these areas. In addition, we now survey later into October to address concerns about hatchery spring Chinook salmon moving into spawning areas in the upper basin once the weirs are removed. Although our surveys still focus on time periods and areas for spring Chinook salmon, these recent changes increase the likelihood that we will encounter fall Chinook salmon.

Designer: Luke Whitman will design this project with Marc Johnson, a geneticist at the Corvallis Research Lab, and input from Todd Alsbury, the district biologist.

Methods: Objective 1) Use genetic stock identification (GSI) to classify fall or spring Chinook salmon from tissue samples collected during spawning ground surveys that target spring Chinook salmon from the Sandy Basin in September and October. A standard GSI method (ONCOR; Kalinowski et al. 2007) will be used to assign each sample to its population of origin using data from microsatellite loci, as described by Seeb et al. (2007). We can expect accurate identification of either fall or spring Chinook salmon from the Sandy Basin as this analysis is used widely in the region. We will randomly select a subsample of 100 fish each from 2012, 2013, and 2014 for a total of 300 tissue samples that will be used to characterize the current proportion of fall Chinook salmon encountered during spawning surveys for spring Chinook salmon. Another 50 samples of known spring Chinook salmon from a hatchery population will be analyzed to provide baseline population data.

Objective 2) Use GSI to identify the population of origin for carcasses recovered in the Bull Run and mainstem Sandy rivers. We will include samples collected by the CoPWB and OASIS surveys that often occur later than surveys for spring Chinook salmon. This will allow us to determine the proportion of spring Chinook salmon in OASIS surveys used to monitor fall Chinook. In addition, CoPWB conducts a continuous survey for all Chinook salmon in the Bull Run River. This analysis will be done on as many as 100 tissue samples from these specific areas and the later part of the spring Chinook spawning season in October.

Objective 3) Use GSI to determine populations of origin for archived samples collected before the removal of Marmot Dam. These samples were collected by

ODFW, CoPWB, and the U.S. Forest Service during surveys for spring Chinook salmon from 2002 – 2006. These results will indicate the historical proportions of fall Chinook salmon in the Sandy Basin during this period, when Marmot Dam was used to exclude clipped hatchery fish from the upper basin. We plan to obtain about 100 archived samples for analysis.

Preliminary results will be summarized and reported to the R & E board in June, 2015. A more detailed analysis will be completed and presented in an Information Report with ODFW. Once complete, results will be shared with cooperating agencies and fisheries managers. Finally, a manuscript will be developed and submitted for publication in a peer-reviewed regional journal.

Kalinowski, S. T., K. R. Manlove, M. L. Taper. ONCOR: A computer program for genetic stock identification.
Available at:
http://www.montana.edu/kalinowski/ONCOR/ONCOR_Manual_21Oct2007.pdf

ODFW (Oregon Department of Fish and Wildlife). 2013. 2012-13 Lower Columbia Fall Chinook Survey Summary. Oregon Department of Fish and Wildlife, Salem. Available at: http://oregonstate.edu/dept/ODFW/spawn/pdf files/reports/2012-13LCTuleSummary.pdf

Schroeder, K., B. Cannon, L. Whitman, and M. Walker. 2013. Sandy Basin spring Chinook salmon spawning surveys – 2012. Annual Progress Report F-163-R-17/18. Oregon Department of Fish and Wildlife, Salem.

Seeb, L.W., A. Antonovich, M.A. Banks, T.D. Beacham, M.R. Bellinger, S.M. Blankenship, M.R. Campbell, N.A. Decovich, J.C. Garza, C.M. Guthrie, T.A. Lundrigan, P. Moran, S.R. Narum, J.J. Stephenson, K.J. Supernault, D.J. Teel, W.D. Templin, J.K. Wenburg, S.F. Young, and C.T. Smith. 2007. Development of a Standardized DNA Database for Chinook Salmon. Fisheries 32 (11): 540-552.

Whitman L., B. Cannon, and M. Walker. 2014. Sandy Basin spring Chinook salmon spawning surveys – 2013. Annual Progress Report F-163-R-18/19. Oregon Department of Fish and Wildlife, Salem.

Inspector: Results will be reviewed internally by ODFW managers, the district biologists for the Sandy Basin, and other projects at ODFW conducting spawning surveys in the Sandy Basin.

Funding Elements: R&E funds will be used primarily to pay for genetic analysis of tissue samples. A small amount of personnel time is requested to support some of the ODFW staff working on this project. I am requesting one month of time for an Assistant Project Leader (NRS-2) to organize tissue samples, coordinate with other agencies to obtain archived samples, and summarize the biological data associated with all tissue samples used in this study. All other ODFW staff time will be provided in matched funds.

Partners: Yes

Oregon State University will analyze tissue samples. The OASIS project at ODFW will help collect tissue samples from Chinook salmon carcasses in certain areas of the Sandy Basin. The City of Portland Water Bureau will help collect tissue samples from Chinook salmon in the Bull Run River and will provide archived tissue samples from previous years. The U.S. Forest Service will provide archived tissue samples from before the removal of Marmot Dam.

Existing Plan: No

Affected Contacted: No

Affected Supportive: No

Project Schedule/Participants/Funding

Activity	Date	Participants
2012 Spawning Surveys	8/15/2012	EBA surveyors (ODFW)
2013 Spawning Surveys	8/15/2013	EBA surveyors (ODFW)
2014 Spawning Surveys	8/15/2013	EBA surveyors (ODFW)
DNA Sequencing of Tissue Samples	11/15/2014	Michael Banks Lab (Oregon State University)
Analysis of populations of origin	3/1/2015	Luke Whitman (ODFW)
Report on the percentage of fall and spring Chinook in the Sandy Basin	6/1/2015	Luke Whitman (ODFW)

Affected Species: Chinook Salmon

Project Permits

Name	Issued By	Secured?	Date Secured	Date Expected
ESA Section 7 Take Authorization	NMFS	Yes	1/1/2014	8/1/2014
Oregon Scientific Take Permit	ODFW	Yes	1/1/2014	8/1/2014

Project Monitoring

Organization	Address	Activity	Frequency

Oregon Department of Fish and Wildlife	28655 Highway 34 Corvallis, OR 97333	Spawning surveys to monitor spring Chinook salmon in the Sandy Basin	Annually since 2002, August 15th through October 31st.

Project Maintenance

This project has no maintenance plans.

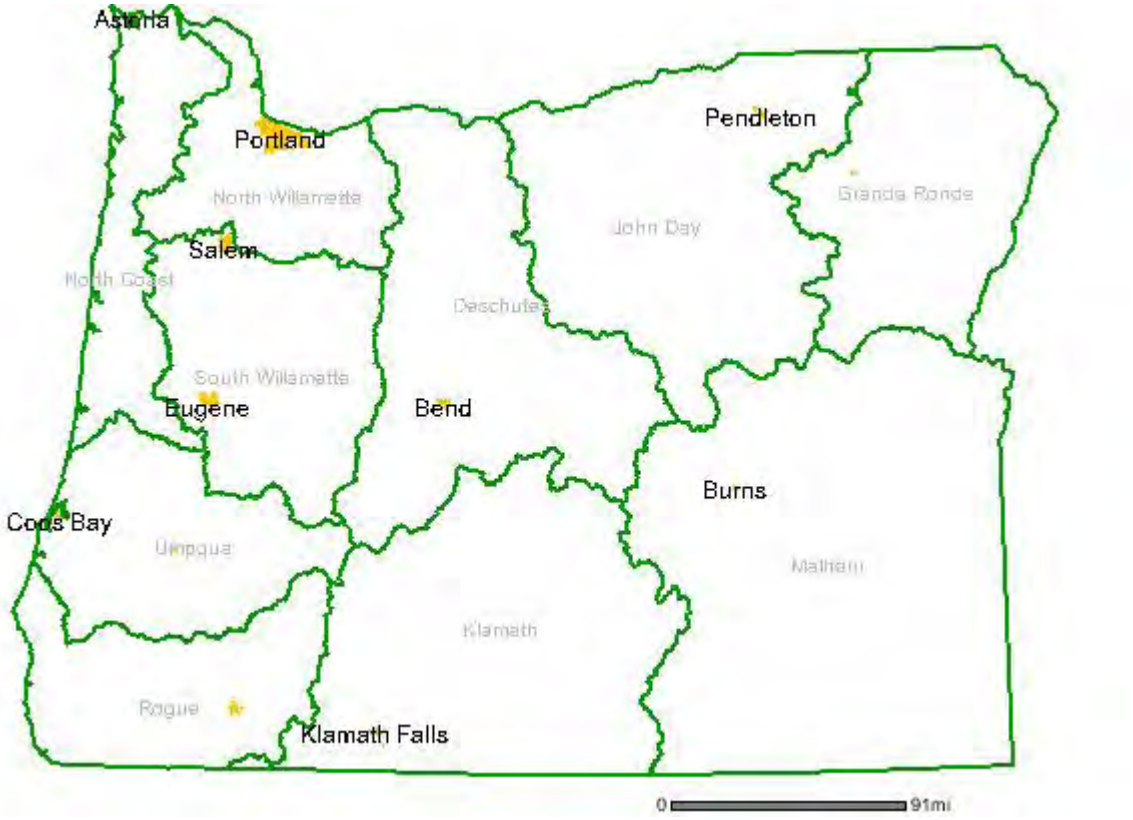
Project Match Funding

Funding Source	Cash	In-Kind	Other	Description	Total	Secured?	Conditions?	Comments
R&E Request	$52,745.16	$0.00	$0.00		$52,745.16	No	No	
ODFW	$0.00	$162,756.75	$0.00		$162,756.75	Yes	No	
				Total Match Funding:	$215,501.91			

Project Budget

Item	Item Type	Units	Unit Cost	R&E Funds	Match Funds	Total
DNA Sequencing of 550 tissue samples	Contracted Services	550	$82.00	$45,100.00	$0.00	$45,100.00
2012-2014 EBA spawning surveyors	Personnel	3	$51,587.25	$0.00	$154,761.75	$154,761.75
ODFW NRS-2 Obtaining and Organizing Samples	Personnel	1	$7,645.16	$7,645.16	$0.00	$7,645.16
ODFW NRS-3; Data analysis and reporting	Personnel	1	$7,995.00	$0.00	$7,995.00	$7,995.00
					Total Budget:	$215,501.91

Project Map

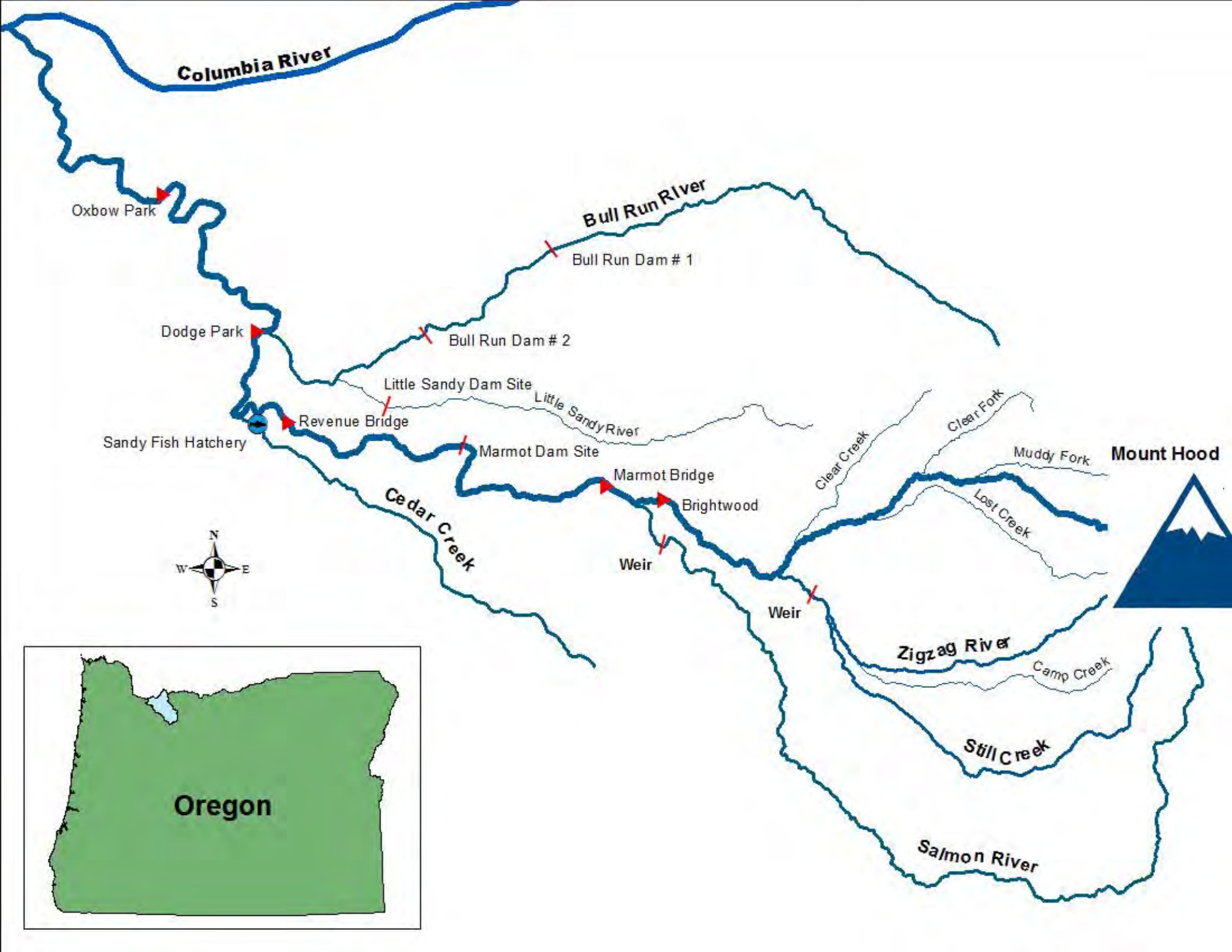


Additional Files

Click a link to view that particular file.

Map of the Sandy Basin

Signature Authorization Page


Columbia River
Oxbow Park
Bull Run River
Bull Run Dam # 1
Dodge Park
Bull Run Dam # 2
Little Sandy Dam Site
Little Sandy River
Revenue Bridge
Sandy Fish Hatchery
Marmot Dam Site
Marmot Bridge
Brightwood
Cedar Creek
Weir
Clear Creek
Clear Fork
Muddy Fork
Lost Creek
Mount Hood
Weir
Zigzag River
Camp Creek
Still Creek
Salmon River
N
W
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S
Oregon

Applicant Signature Page
Fish Restoration and Enhancement Program
(Oregon Department of Fish and Wildlife Applicants)

I hereby make an application for financial assistance under the terms and conditions of the Fish Restoration and Enhancement Program as described in my project application. I acknowledge that:

- This proposal is an identified priority at the ☐ district, ☐ region, and/or ☐ state level and has been identified as such in the application (**check box** for appropriate level).
- This proposal is consistent with any applicable goals, policies, rules, species or basin management plans adopted by the F&W Commission and this has been explained in the application.
- This proposal will not be used to cover, back fill, or fund shift elements that have been cut or defunded as part of agency budget reductions. Approved deferred maintenance or projects with division approval are exceptions.

I understand that if my project proposal is approved for Restoration and Enhancement (R&E) Program funding, the following will apply:

- Applicants must sign an agreement containing the terms and conditions for the project implementation, release of funds, and documentation of completion. Non-compliance may impact future funding opportunities.
- The R&E Program will not pay for expenses which occur before the approved start date or after the end date.
- Funding is available one biennium only without prior authorization by the R&E Board.
- Applicant agrees to notify the R&E Program of all funds not needed for the project upon determination.
- Any inappropriate expenses using R&E funds will be corrected by the applicant immediately. By the close of the biennium any expenses exceeding, or not identified in, the grant approval will be reverted to a local cost code.
- Copies of all landowner, monitoring and maintenance agreements must be submitted to the R&E Program.
- Educational products resulting from projects are public domain.
- Information collected is subject to Oregon Public Records Law.
- As applicable, the project will be consistent with all federal, state, and local regulations, including the State Land Use Planning Goals & Local Land Use Plans, prior to any on the ground work.

By signing this application, I certify to the best of my knowledge that the information contained in the application are true, complete and accurate. If awarded funding the applicant agrees to follow all terms and conditions outlined in the agreement.

Project Title: Genetics of Chinook salmon in the Sandy Basin

Applicant Name: Luke Whitman Title: Acting Project Leader

Applicant Signature: [redacted] Date: 7/11/2014

Manager Certification:

To be completed by Watershed Manger, Hatchery Coordinator, Program Manager, or higher level manager.

- I concur with the statements above and the applicant has permission to request these funds.

Manger Name: Kelly Moore Title: PEM-D Research Program Manager

Manager Signature: [redacted] Date: 7/11/2014