R & E Grant Application

Project #:

Genetics of spring and fall Chinook

Project Information

Requested Cycle:	17-6
R&E Project Request:	$64,308
Other Funding:	$159,354
Total Project:	$223,662
Spending Start Date:	7/1/2017
Spending End Date:	6/30/2019
Project Start Date:	7/1/2017
Project End Date:	6/30/2019
Organization:	Oregon Department of Fish and Wildlife

Applicant Information

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Past Recommended or Completed Projects

This applicant has no previous projects that match criteria.

Authorized Agent

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Authorized Agent

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Location Information

Where is it?

The project will not occur on any property

Project Summary

Project Summary

Please provide a couple sentence summary of the proposal.

Spawning surveys for spring and fall Chinook cannot identify run type accurately. This project will use genetic analysis to differentiate fall and spring Chinook salmon within the Sandy and Clackamas basins. This will benefit fisheries management by improving estimates of pHOS, run size, and distribution for ESA listed populations.

Overall Project Goals

Describe the primary goals or outcomes of the entire project, including elements not requesting funding from R&E.

Develop a genotypic baseline for each basin from known fall and spring Chinook

Use genetics to assign fall or spring Chinook sampled during spawning surveys

Analyze samples from 2002-2007 to determine if timing and distribution have changed

Quantify current timing and distribution of the two runs in both the Sandy and Clackamas basins based on genetic analysis

Quantify timing and distribution of the two runs from 2002-2006, before major changes took place in each basin

Calculate run-specific estimates of abundance and the proportion of hatchery spawners based on spawning ground surveys.

Primary objectives of R&E funding

Please describe the measurable objectives for the R&E portion of the funding request.

Develop a genotypic baseline for each basin from known fall and spring Chinook. Obtain tissue samples from known spring and fall Chiook, 400 from each basin (800 total).

Use genetic stock identification to assign fall or spring Chinook recovered during spawning surveys. A subsample will be taken from 2015-2017 (100 per basin per year; 600 total).

Analyze samples from 2002-2007 to determine if timing and distribution have changed after a dam removal in the Sandy Basin and improved fish passage in the Clackamas Basin. A subsample of 200 will be taken from each basin (400 total).

Uses genetic assignments to correct estimates of pHOS, run size, and spawner distribution in each basin. Report these results to fishery managers responsible for run reconstruction and forecast used for fishing quotas.

Current Situation/Justification

Please describe the current situation and explain why this funding is needed.

Fall and spring run Chinook salmon are native to the Sandy and Clackamas basins and are

currently listed as threatened under the Endangered Species Act (ESA). Spawning surveys for spring and fall Chinook salmon are conducted separately by ODFW to estimate the number of spawners and to collect biological samples. Surveyors are often unable to distinguish between fall and spring Chinook salmon carcasses on the spawning grounds. We currently don't have any way to correct our survey data for overlap in these two runs. Preliminary genetics data indicates significant overlap in certain areas of the Sandy basin. Less is know about overlap of the two runs in the Clackamas basin. This adds uncertainty to estimates of the percentage of Hatchery Origin Spawners (pHOS) and spawner abundance, critical metrics for fishery management in these basins. Adjusting these estimates can help increase fishing opportunity in future years by estimating run forecasts more accurately by run.

Recreation and Commercial Benefit

This project will provide benefits to:

Recreational fisheries
Commercial fisheries

Explain how this project will contribute to current (and/or potential) fishing opportunities, access, or fisheries management.

Both runs are listed under the ESA and the NOAA permit for hatchery operations require pHOS of 10% or less. This goal is met in part by excluding hatchery fish from the upper basins and through reduced releases of hatchery smolts in the Sandy Basin. By consistently achieving this management goal, hatchery operations can continue to release good numbers of juvenile Chinook for recreational fisheries. Furthermore, a better understanding of the run timing and overlap between wild spring and fall Chinook could improve water management in the Clackamas basin. Better conservation of the wild runs may allow for increased fishing opportunities in each basin because PHOS targets are easier to meet when wild runs are high. Changing distribution of fall Chinook affects fishing seasons on the lower Columbia River

Percent benefit split between Commercial and Recreational anglers:

20 % Commercial
80 % Recreational

Please explain, or justify, how the percentage split was determined:

Hatchery Chinook returning to the Sandy and Clackamas basins are mostly targeted by recreational anglers. However, these runs contribute to the commercial harvest in the lower Columbia River.

This project has been identified as an ODFW priority for:

Local/watershed
Basin/regional

Does this project directly support implementation of the ODFW Strategic Plan and/or current Fish Division priorities?

Please briefly explain when this was identified as a priority and what process or workgroup was used to identified this as an ODFW priority.

Identify any plan or other document that identifies this priority.

Spawning Survey Report - Lower Columbia Fall Chinook

Spawning Survey Report - Sandy River Spring Chinook

Is this project part of an approved Salmon-Trout Enhancement Program (STEP) activity?

No

This project is intended to benefit the following species:

Fall Chinook Salmon
Spring Chinook Salmon

This project will benefit anglers or fishery by providing:

Monitoring/Research

Monitoring/Research

This project will be used to evaluate:

Hatchery releases and/or stray rates
Population composition (i.e age, species, survival, size, or genetics)
Distribution (i.e. presence, abscence, abundance)

Has this project been reviewed or developed by an individual with appropriate qualifications (i.e ODFW biometrician, research professor)?

Yes
Kathleen O'Malley, the State Fisheries Geneticist, reviewed this proposal and will help with this project

Is this study critical to fishery management decisions?

Yes
Unknown run type of spawning Chinook affects estimates of abundance and pHOS in these basins. Results from this project will improve estimates and help fisheries managers understand timing and distribution of the two runs. Also, timing of when the two runs spawn can affect water management in the Clackamas basin. Addressing these management concerns will allow for continued fishing opportunity in these basins.
Yes
Results will improve important metrics used to manage Chinook salmon in these basin, including hatchery Chinook released to support fisheries. Also, it would help managers to know if distribution and timing has changed after dam removal or improved fish passage. Healthy and increasing runs of wild Chinook will make it easier to meet PHOS targets and possibly allow for releasing more hatchery fish in these basins. Informing run reconstructions with these results may affect fishing seasons on the lower Columbia River.

Is there a plan to repeat this monitoring or research in the future?

No

Will the data be reported or published?

Yes
Preliminary results will be summarized and reported to the R & E Board as soon as they are available. 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.

Project Description

Schedule

Activity	Date	RE Funding

Compile and organize tissue samples	5/2018	No
Develop genotypic baseline	6/2018	No
Conduct spawning surveys, collect tissue samples from spawners	9/2015	No
Conduct spawning surveys, collect tissue samples from spawners	9/2016	No
Conduct spawning surveys, collect tissue samples from spawners	9/2017	No
Use genetic stock identification to assign spring or fall Chinook to samples taken on spawning surveys	8/2018	No
Use genetic stock identification to assign spring or fall Chinook to samples taken from 2002-2006	10/2018	No
Analyze and summarize data	11/2018	No
Write information report and publication	12/2018	No

Permits

Permit	Secured?	Date Expected
ESA Section 7 Scientific Take Authorization	No	1/1/2017
Oregon Scientific Take Permit	No	1/1/2017

Project Design and Description

Please describe in detail the methods or approach that will be used to achieve the project objectives.

Alternatives

ODFW projects coordinate surveys in these basins. The timing of surveys is intended to minimize overlap in surveys targeting spring or fall Chinook. Most surveys for spring Chinook are in areas of the upper basin where few fall Chinook are presumed to occur. Also, size and color of carcasses can be used to help identify fall Chinook, although this method is unreliable. In recent years, survey effort has increased on the mainstem Sandy and Bull Run rivers to address concerns that hatchery spring Chinook may be spawning in these areas. Surveys for spring Chinook in the Sandy Basin now go later into October to address concerns about hatchery spring Chinook spawning in areas in the upper basin once the weirs are removed. Surveys still focus on time periods and areas that target spring or fall Chinook, although these recent changes may increase overlap in the spawning populations.

Design

Luke Whitman will design this project with input from Kathleen O'Malley, the State Fisheries Geneticist, and Todd Alsbury, the ODFW District Biologist.

Methods

1) Compile Chinook tissue samples collected by ODFW and other agencies from the Sandy and Clackamas basins. Obtain tissue samples from known spring and fall Chinook at hatcheries and fish passage facilities. Randomly select samples for analysis.

2) Extract DNA from tissue samples and amplify 13 standardized microsatellite loci from these samples via polymerase chain reactions (PCR). Following this approach, we will develop a genotypic baseline for each basin from known fall and spring Chinook, using standard methods (ONCOR; Kalinowski et al. 2007). The baseline will be developed with 400 samples from each basin (800 total).

3) Use genetic stock identification (GSI) to assign fall or spring Chinook from tissue samples collected during spawning ground surveys. The most likely source population will be identified using methods described by Seeb et al. (2007). We can expect accurate identification of either fall or spring Chinook as this analysis is used widely in the region. A randomly selected

subsample of 100 fish each from 2015, 2016, and 2017 from each basin (600 total) will be used to characterize the current proportions of spring and fall Chinook encountered during spawning surveys.

4) Use GSI to determine populations of origin for archived samples collected from 2002-2006. These samples were collected by ODFW, CoPWB, and the U.S. Forest Service during surveys for spring Chinook. These results will indicate the historical proportions of fall Chinook in the Sandy and Clackamas basin, allowing us to determine if distribution has changed in recent years. We plan to obtain about 200 archived samples from each basin (400 total).

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/pdffiles/reports/2016-17LCTuleSummary.pdf

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 S. Hart. 2016. Sandy Basin spring Chinook salmon spawning surveys – 2016. Annual Progress Report F-163-R-21/22. Oregon Department of Fish and Wildlife, Salem.

Inspector

Results will be reviewed internally by ODFW managers, the ODFW district biologists, and other projects at ODFW conducting spawning surveys in the Sandy and Clackamas basins.

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 significant matched funds, including analysis and reporting by the Project Leader. In addition, match funds will be provided by the State Fisheries Geneticist while reviewing lab work and helping with analysis.

Engineering

Does the project involve capital improvement, engineering, site grading or other construction?

No

Project Management and Maintenance

What is the life expectancy of R&E funded construction, structures, equipment, supplies, data or fishery?

The genotypic baseline will be of value to other geneticists in the region and available indefinitely. Data and results will be provided to all interested parties. Results will be valid until any major change in river conditions or fish passage takes place.

Who is responsible for long term management, maintenance, and oversight of the project beyond what is funded by R&E.

ODFW staff at the Corvallis Research Lab will maintain the database, which will be shared with OSU.

Will the project require ongoing maintenance?

No

Is there a plan to collect baseline data and to conduct monitoring efforts to measure the effectiveness of the project?

No

Project Funding

Funding

Have you applied for OWEB funding for this project?

No

Has this proposal, or similar proposal for this project location, previously been denied by OWEB or other funding source?

[{"source":"Sportfish Restoration Fund","type":"Other","secured":"Secured","dollarValue":152728,"comments":"Supports spawning surveys in the Sandy and Clackamas basins"},{"source":"ODFW - State Fisheries Geneticist","type":"Other","secured":"Secured","dollarValue":6626,"comments":"Supports genetics research throughout the state"}]

Other Funding Source	Type	Secured	Dollar Value	Comments
Sportfish Restoration Fund	Other	Secured	152728	Supports spawning surveys in the Sandy and Clackamas basins
ODFW - State Fisheries Geneticist	Other	Secured	6626	Supports genetics research throughout the state
		Total	159354	

Budget

Item	Unit Number	Unit Cost	In-kind or non-cash contributions	Funding from other sources	R&E Funds	Total Costs
PROJECT MANAGEMENT						
ODFW NRS-3 per month, project management, data analysis and reporting	1	8224.00	0	8224	0	8224
		SUBTOTAL	0	8224	0	8224
IN-HOUSE PERSONNEL						
ODFW NRS-2 per month, obtaining and organizing samples	1	7849.00	0	0	7849	7849
ODFW Spawning Survey Crew per year, surveys and carcass recovery	3	48168.00	0	144504	0	144504
State Fisheries Geneticist per week, review and analysis	2	3313.00	0	6626	0	6626
		SUBTOTAL	0	151130	7849	158979
CONTRACTED SERVICES						
OSU Faculty Research Assistant per month, genetics analysis	4	69778.00	0	0	27911	27911
		SUBTOTAL	0	0	27911	27911
TRAVEL						
			0	0	0	0
		SUBTOTAL	0	0	0	0
SUPPLIES/MATERIALS						
Materials and machine costs per sample	1800	15.86	0	0	28548	28548
		SUBTOTAL	0	0	28548	28548
EDUCATION/OUTREACH						
			0	0	0	0
		SUBTOTAL	0	0	0	0
EQUIPMENT						
			0	0	0	0
		SUBTOTAL	0	0	0	0
FISCAL ADMINISTRATION						
			0	0	0	0
		SUBTOTAL	0	0	0	0
		BUDGET TOTAL	0	159354	64308	223662

Additional Files

Budget Information

Maps

Photos

Design Information

Management Plans and Supporting Documents

2016 Spring Chinook Spawning Surveys	*Report on spawning surveys for spring Chinook in the Sandy basin*
2016/2017 Lower Columbia Fall Chinook Report	*Report on spawning surveys for fall Chinook*

Permits and Reviews

Partnerships

Public Comment

Administrative Documents

Manager Authorization	*Manager authorization for spring and fall Chinook project*
Racial and Ethnic Statement	*R&E Racial and Ethnic Statement for spring and fall Chinook project*

Completion Report

A completion report has not been submitted for this project.