R & E Grant Application 23-25 Biennium

Project #: 23-010

Coastal Fall Chinook Fecundity Estimation

Project Information

Requested Cycle:	23-1
R&E Project Request:	$14,350
Other Funding:	$49,400
Total Project:	$63,750
Spending Start Date:	7/1/2023
Spending End Date:	6/30/2024
Project Start Date:	7/1/2023
Project End Date:	6/30/2024
Organization:	Oregon Department of Fish and Wildlife

Applicant Information

Name:	Micki Varney
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Past Recommended or Completed Projects

This applicant has no previous projects that match criteria.

Authorized Agent

Name:	Scott Patterson
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Fax:	541-963-6670
Email:	Scott.D.Patterson@odfw.oregon.gov

Location Information

<u>*Where is it?*</u>

The project will occur Statewide
The project will occur on public land owned or managed by the applicant

<u>*Site Description*</u>

Street Address, nearest intersection, or other descriptive location.

1. Salmon River Hatchery--575 N North Bank Road, Otis, OR 97368
2. Trask Hatchery--15020 Chance Road, Tillamook, OR 97141

Directions to the site from the nearest highway junction.

Salmon River Hatchery: seven miles north of Lincoln City off Highway 18 near Otis

Trask Hatchery: eight miles east of Tillamook on Chance Road off State Highway 6.

Following project completion, public anglers will be allowed the following level of access to the project site:

Full access

Please describe what leases, easements, agreements are in place to ensure angler access to the project site, and what is the length of each agreement.

ODFW will provide access to anglers as long as the property is owned or managed by ODFW

Dominant Land Use Type:

Forest

<u>*Project Location*</u>

General Project Location.

County:	Lincoln, Tillamook
Town/City:	Otis, Tillamook
ODFW Dist:	North Coast
Stream/Lake/Estuary Name:	Salmon River, Trask River
Tributary of:	Salmon, Trask

Specific Project Location.

Latitude	Longitude
45.016972	-123.937531
45.433231	-123.725212

Project Summary

<u>*Project Summary*</u>

Please provide a couple sentence summary of the proposal.

Data collected from this project will be used to inform broodstock collection goals and establish an accurate baseline relationship between fork length, age, origin, and fecundity. Results will also be used to improve fishery management by revising the metrics used to estimate fall Chinook reproductive potential of select stocks.

Overall Project Goals

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

Describe the relationship between fork length, age and fecundity for select fall Chinook programs

Increase the precision of estimates fishery managers use to determine allowable harvest on specific stocks.

Revise Broodstock collection goals where applicable.

Evaluate and compare the accuracy of alternate methods used to estimate fecundity.

Primary objectives of R&E funding

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

Collect fork length, age, and origin data on a subsample of fall Chinook females trapped at the Salmon River and Trask Hatcheries

Provide empirical data that would support an revision of broodstock collection goals for select hatchery programs.

Develop a data set which will improve the precision of metrics used by fishery managers to increase the precision of estimates allowable harvest on select stocks.

Create data summary table providing the metrics which can be used to describe the relationship between fork length, fecundity, egg size and origin for select hatcheries.

Using charts demonstrate graphically relationships between fork length and fecundity, and age and fecundity for both hatchery and wild origin fall Chinook at select hatcheries

collect additional data (ovary mass weight, portion of ovary weight on 20% of females sampled) to test efficacy of alternative method of fecundity estimation.

Current Situation/Justification

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

A review of biological data collected in fisheries, at ODFW hatcheries and instream traps, and on spawning grounds over the past 25 years indicates that the size and age of mature salmon at time of capture is decreasing. This phenomenon is likely similarly impacting the reproductive potential of both hatchery and wild stocks because the average number of eggs per female has also been decreasing.

Fishery managers use estimates of the potential productivity of prior year escapements to determine allowable harvest levels on specific stocks. Therefore, their estimated number of recruits available for fisheries and for escapement to hatcheries and spawning grounds is directly related to the reproductive potential of the parents.

The current method to estimate average fecundity at ODFW hatcheries is to sum the number of viable eggs taken from all females during spawning and dividing that egg number by the number of females spawned. Fecundity data on individual females is not being collected. Therefore, we do not know whether the decrease in average fecundity is occurring similarly at all ages, sizes or at the same magnitude for both hatchery and naturally produced salmon. This funding is needed to collect the data which can provide us that information.

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.

The number of fish available for harvest is greatly impacted by the reproductive capacity of the parents. Eventual recruitment of fish to a fishery is a function of both the abundance and reproductive potential of the parent stock. Salmon begin their lives in freshwater, migrate to the nutrient-rich ocean to feed and grow, then as adults, return to freshwater to spawn. Record increases in temperatures, changing ocean currents and dynamically fluctuating flows in streams impact salmon at all phases of their life-cycle as the ecosystem and their long-established food web changes.

Fisheries are managed to allow harvest yet prevent over-harvest. Enough fish must be able to escape the fisheries and return to spawn to perpetuate the stock. Fishery managers use estimates of the potential productivity of prior year escapements to determine harvest levels on specific stocks. Many of us are familiar with line-graphs showing escapement numbers of a stock over time. Often there are two lines; one for the forecasted number and one for the actual number. The closer our estimates are to the actual number, the better we can manage our fisheries. This project will provide one of the tools that can be used to improve our estimates.

Percent benefit split between Commercial and Recreational anglers:

5 % Commercial
95 % Recreational

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

Both Salmon River and Trask River stock Fall-Run Chinook salmon migrate north and are harvested in fisheries from Oregon to Alaska. Using the past 4 years of CWT recovery data, an estimated 65% of the CWT's are recovered in various fisheries and at the hatchery in Oregon. For the Trask stock, an estimated 50% are recovered in various fisheries and at the hatchery Oregon. Considering CWT recoveries from only Oregon fisheries, 96% of the wires are recovered from recreational fisheries and 4% are recovered in the Oregon ocean troll fisheries.

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?

Yes

Under the ODFW Agency Mission "To protect and enhance Oregon's fish and wildlife and their habits for use and enjoyment by present and future generations", this project is directly applicable to the identified agency principle to "Provide proactive and solution-based fish and wildlife management based on sound science."

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

This project directly supports implementation of the ODFW Strategic Plan and key priorities identified by the agency, by the Inland Fish program and by Fish Propagation for the 2019-2021 Biennium

Identify any plan or other document that identifies this priority.

Coastal Multi-Species Plan
Link between population viability, and risks, and the warming climate and reproductive productivity of populations (tables 2 and 26)

Hatchery Genetic Management Plans
HGMP's describe biologically-based artificial propagation management strategies that ensure the conservation of salmon and steelhead populations.

Hatchery Program Management Plans
HPMP's provide clear management objectives that describe the role and expectations for hatchery programs relative to species conservation, watershed health and fisheries.

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

This project will benefit anglers or fishery by providing:

Angling Opportunity
Monitoring/Research

Angling Opportunity

This project will:

This applies to both Angling Opportunity and to Monitoring/Research:
Results from the fecundity estimation study will be used to inform broodstock collection goals and establish a current baseline relationship between fork length, age and fecundity for both hatchery and naturally produced fish. Results will also be used to improve fishery management by revising estimates of fall Chinook reproductive productivity associated with escapement estimates.

Monitoring/Research

This project will be used to evaluate:

Population composition (i.e age, species, survival, size, or genetics)
Hatchery production methods
Fishery contribution
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
The project was developed by the Project Lead, Micki Varney, who has 30 years of experience as a hatchery evaluations biologist and has conducted similar fecundity investigations on ESA listed Snake River Fall Chinook. This project has been reviewed and approved by the ODFW Biometrician, Michelle Jones.

Is this study critical to fishery management decisions?

Yes
Are our current methods of estimating reproductive potential from escapement estimates

sufficient to adequately manage our fisheries so as to allow enough Fall-Run Chinook to escape fisheries, return to natal streams and to propagate future generations?

Yes

Results from this study will provide another tool to estimate productivity, numbers of fish available for harvest and ultimately better manage our fisheries.

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

Yes

There is a desire to duplicate this research and documentation at other ODFW hatcheries and for other species.

Will the data be reported or published?

Yes

An ODFW Information Report will be produced and submitted at the end of the funding period. Additionally, progress reports and a final report on the Salmon River Fecundity Estimation Project will be submitted to NOAA within their specified guidelines.

Project Description

Schedule

Activity	Date	RE Funding
Purchase supplies, meet with hatchery and other project personnel at Salmon River and Trask Hatcheries to coordinate data collection at spawning and during incubation.	July 2023 – September 2023	Yes
Fall-run Chinook Salmon spawning at Salmon River Hatchery—data collection on adults	October 2023 – November 2023	No
Fall-run Chinook Salmon spawning at Trask Hatchery—data collection on adults	November 2023- December 2023	Yes
Salmon River Hatchery--egg enumeration and data collection. Data review and initial analysis	November 2023- January 2024	No
Trask Hatchery--egg enumeration and data collection. Data review and initial analysis	December 2023- February 2024	Yes
Additional analysis incorporating results from scale reading and CWT recovery data when they become available. Begin writing reports.	February 2024-May 2024	Yes
Complete and submit ODFW Information Report for Trask Hatchery and Salmon River Hatchery fecundity projects.	June 2024	Yes
U.S. Chinook Technical Committee (CTC) LOA Workshop Presentation	December 2024	No
Prepare and submit first semi-annual progress report to GrantsOnline.gov	January 2025	No
Prepare and submit second semi-annual progress report to GrantsOnline.gov	July 2025	No
Prepare and submit final performance report to GrantsOnline.gov	September 2025	No

Permits

Permit	Secured?	Date Expected
No permits are exclusively required in order to conduct the fecundity estimates.	No	

Project Design and Description

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

This funding request is to cover expenses related to data collection, analysis and report generation.

At Salmon River Hatchery, fall-run Chinook Salmon spawning begins around mid-October and continues through mid-November. At Trask Hatchery, fall Chinook spawning begins in mid-November and continues through December and sometimes early January. Depending on availability and ripeness of females each week, the spawning year lasts from two to six spawning weeks. The number of female Fall Chinook Salmon spawned the past five return years has ranged from 76 to 107 at Salmon River Hatchery and 42 to 157 at Trask River Hatchery.

METHODS AND PROCEEDURES---DATA COLLECTION AND PROCESSING

Spawning and Eggtake

Females used in the fecundity analysis will be selected based on four fork length groupings (60-69, 70-79, 80-89, 90+cm). The number of females selected from each length grouping will be at the same proportions as is the total return of females to the hatchery. For example, fork length data collected on females returning to Salmon River Hatchery indicates that 21.8% of the females are 60-69cm, 28.2% are 70-79cm, 40.2% are in the 80-89cm range, and 10% are 90+cm. It may be necessary to occasionally select an unspawned female to include in the study to ensure that representation.

1. A unique identifying number will be attached to each female that is selected for the study. Data (spawn date, fork length, Snout ID (for CWT tracking), scales, fin clips and origin) will be collected on each female.
2. Ripe females selected for broodstock will be spawned into individual buckets. Eggs will be fertilized according to standard hatchery procedures
3. The unique female number will be attached to the bucket of eggs and any subsequent containers as the eggs are transported and processed according to standard hatchery procedures.
4. Individual incubation trays will be marked using the unique female number until the eggs in each tray are shocked and enumerated at the eye stage.

Fecundity estimation

1. Per incubation tray/individual female--pick out any dead, haploid or non-fertilized eggs and record number alongside appropriate female number on data sheet.
2. Count 100 fully live eggs, weigh and record the weight of the 100-egg sample to the nearest 0.1 gram. Determine the average weight per egg.
3. Pour eggs from incubation tray into a large colander to remove excess water.
4. Pour the 100-egg sample in the colander as well, then weigh and record the total volume of live eggs (0.1 gram) for that female.
5. Return live eggs to incubation trays or baskets according to standard hatchery practices. At this point, eggs may be combined with other females' eggs.
6. A similar procedure will be followed for water hardened eggs from females that are not used for broodstock.
7. To calculate the fecundity of each female:
   a. Subtract approximately 4% of the live-egg weight from the total live-egg weight value to compensate for excess water.
   b. Divide the adjusted live-egg weight by the average weight per egg (calculated from the 100 egg sample) to yield the estimated number of live eggs.
   c. Add the number of estimated live eggs and counted dead eggs to yield an estimated fecundity for each sampled female.
8. Constant calibration--in order to determine the constant representing the percentage of the live egg weight attributed to excess water, the number of live eggs from three females will be

hand counted.

Analysis

1. Scatter plots based on fork length and estimated fecundity will be generated for each age class and origin to show the relationship of fecundity to fork length.
2. Differences in the relationships between size and fecundity for each age class and origin will be included in the analysis.
3. Summary tables will list average and median fecundities by brood year, total age, years in salt water, number of females sampled, average fork length, and average egg size (0.01gm) for both hatchery and natural origin females.
4. Given continued support to collect this information into future years, our stock assessment section will work together with both, CTC members and ODFW Conservation and Recovery staff to bring those differential assessments between hatchery and wild fecundities and any observed changes through time into a stock assessment framework that will allow for those comparative productivities to appropriately contribute to both, stock assessment and stock forecasting for Oregon coast populations.
5. Assuming success with this pilot program for two of Oregon's Chinook Salmon production groups, a template would be constructed to collect identical metrics and observations available for other hatchery production groups in Oregon's hatchery system.

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?

All supplies and equipment (scale and calibration weight) will be stored with ODFW fish propagation at Salem Headquarters.

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

Fish Propagation personnel.

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?

No

Other Funding Source	Type	Secured	Dollar Value	Comments
Pacific Salmon Commission-- The U.S. Section of the Chinook Technical Committee	Cash	Secured	38500	On 2/15/23 I received confirmation that the Salmon River Fecundity portion has been approved for funding. The combined Salmon/Trask projects will better inform abundance-based management of Chinook salmon.
ODFW	In-Kind	Pending	10900	In-House personnel and Volunteer Labor
		Total	49400	

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, Salmon River (Micki Varney, Project lead)	352	71.00	0	25000	0	25000
ODFW NRS-3, Trask Hatchery (Micki Varney, Project lead)	176	710.00	0	0	12500	12500
		SUBTOTAL	0	25000	12500	37500
IN-HOUSE PERSONNEL						
FW Supervisor (Salmon River)	24	66.00	1600	0	0	1600
FW Technician (Salmon River)	24	43.00	1100	0	0	1100
Biological Science Asst. (Salmon River)	24	40.00	1000	0	0	1000
Volunteer Labor (Salmon River)	64	31.00	2000	0	0	2000
FW Manager 1 (Trask Hatchery)	30	71.00	2100	0	0	2100
FW Technician (Trask Hatchery)	48	39.00	2000	0	0	2000
ODFW NRS-3 (Logan Kent)	16	71.00	1100	0	0	1100
		SUBTOTAL	10900	0	0	10900
CONTRACTED SERVICES						
			0	0	0	0
		SUBTOTAL	0	0	0	0
TRAVEL						
ODFW Vehicle Rental and Fuel (Salmon River)	13	100.00	0	1300	0	1300
Lodging-Lincoln City/PDX (Salmon River)	3	250.00	0	850	0	850
ODFW Vehicle Rental and fuel (Trask Hatchery)	13	100.00	0	0	1300	1300
Lodging-Tillamook (Trask Hatchery)	1	200.00	0	0	200	200
		SUBTOTAL	0	2150	1500	3650
SUPPLIES/MATERIALS						
Raingear and boots	0	0.00	0	150	100	250
egg counters, pickers, colanders, tags, ties	0	0.00	0	300	100	400
clip boards, write-in-rain paper	0	0.00	0	100	0	100
photocopies, office supplies	0	0.00	0	50	50	100
		SUBTOTAL	0	600	250	850
EDUCATION/OUTREACH						
			0	0	0	0
		SUBTOTAL	0	0	0	0
EQUIPMENT						
Gram Scale and calibration weight	0	0.00	0	750	100	850
		SUBTOTAL	0	750	100	850
FISCAL ADMINISTRATION						
Indirect/overhead	0	0.00	0	10000	0	10000
		SUBTOTAL	0	10000	0	10000
		BUDGET TOTAL	10900	38500	14350	63750

Internal Review Results

Review Score: 1.1 out of 3

(0 = Do Not Fund, 1 = Strengthen Proposal, 2 = Recommend, 3 = Strongly Recommend)

Summary of Review Team Comments

Internal Review Team was concerned about the majority of R&E funds on this project were used to pay for ODFW staff time.

Specific Review Team Comments

The vast majority of requested funds are for ODFW personnel time and expenses. What is the justification? Not a clear connection to angling benefit and doesn't address other issues like watershed carrying capacity.

Fecundity is more of a surrogate for the fact that size/age at return are declining. Perhaps just as relevant to the expressed objectives/strategies in the application are: (1) whether hatchery operations, fisheries management, or some other mechanism are causing returns of younger/smaller fish; (2) does that result in population productivity issues; and (3) does that also translate to angler dissatisfaction? How will this be used to assess wild fish? How is a representative sample of wild escapement captured?

The budget has a line item for Indirect/Overhead. There are no indirect charges associated with R&E funds when ODFW is the applicant.

Not a good use of RE dollars, funds current full time staff member (12.5K).

Even down at the southern end of the fall chinook range, drastic decreases in adult spawner sizes are being observed so there is a need for this work and hopefully the data collected from these two hatcheries could be used well outside of the north coast populations, or at least could inform similar studies in other areas.

Specific Review Team Questions

Why isn't this type of work being done in house with hatchery staff and HQ staff?

> HQ staff is not funded to deal with field research, hence the request to fund an assessment biologist to oversee and analyze the data. Most of the work will be completed by hatchery staff. Hatchery staff complies with the HGMP on spawning protocols which often suggest additional egg collections and culling back to target numbers. All the eggs from each female might not be collected from each spawn since many eggs will be discharged to meet a target. The extra brood helps with genetic diversity and lower inbreeding depression and results in more bulk incubation. Collecting fecundity counts and survival to eyed eggs, and swim-up to fry on individual fish requires more planning and oversite. The intent is to deploy hatchery staff on spawning, incubation, etc., but the oversite and analysis would occur with this grant.

Additional Files

Budget Information

Maps

Photos

Design Information

Management Plans and Supporting Documents

Responses to IRT Comments	*Responses to Internal Review Teams questions and comments*
Supplemental Information	*Fecundity comparisons Trask Salmon other hatcheries*
Support of Agency Priorities	*How Project supports identified Agency Priorities*

Permits and Reviews

Partnerships

Public Comment

Administrative Documents

Signature Authorization Page

Completion Report

A completion report has not been submitted for this project.