Hatchery Improvement Master Plan – Southern Resident Killer Whale Prey Enhancement

Washington State Department of Fish and Wildlife

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Olympia, WA

Contents

Tables

Figures

Appendices

Abbreviations

CBD	Current Brood Document
CP	Capital Plan
cfs	cubic feet per second
Commission	Washington Fish and Wildlife Commission
CRITFC	Columbia River Inter-Tribal Fish Commission
CWA	Clean Water Act
DNR	Department of Natural Resources
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EO	Executive Order
ESA	Endangered Species Act
FBD	Future Brood Document
FPA/N	Forest Practices Application/Notification
fpp	Fish per pound
gpm	gallons per minute
HGMP	Hatchery and Genetic Management Plan
LHO	Low head oxygenator
MACC	maximum allowable construction cost
mm	Millimeter
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NWIFC	Northwest Indian Fisheries Commission
NWP	nationwide permit
O&M	operation and maintenance
OFM	Office of Financial Management
PA	pollution abatement
PRAS	partially recirculating aquaculture systems
RAS	recirculating aquaculture systems
RM	river mile
SRKW	Southern Resident Killer Whales
TPU	Tacoma Public Utilities
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

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Executive Summary

In 2018, Governor Inslee established Executive Order (EO) 18-02 directing a state initiative to reverse the decline of Southern Resident Killer Whales (SRKWs; *Orcinus orca*). Established by EO 18-02, the Southern Resident Orca Task Force was directed to identify immediate and long-term actions to benefit SRKWs. One of the three key threats advanced by the Orca Task Force to explain the recent decline of the state- and federally endangered SRKWs was a lack of their primary prey, Chinook Salmon (*Oncorhynchus tshawytscha*). This lack of prey is believed to contribute to poor SRKW health and reproductive failure.

In 2018, the Orca Task Force developed 16 recommendations that addressed threats to SRKW persistence and recovery. Of these, Recommendation #6 includes a significant increase in hatchery production to benefit SRKWs in a manner consistent with existing state and federal policies. The increased hatchery production goal is 50 million smolts, based on 2018 production levels. To meet this goal, since 2018 the Washington Department of Fish and Wildlife (WDFW), as well as several tribes and one utility, have increased hatchery production of Chinook Salmon, Coho Salmon (*O. kisutch*), and Chum Salmon (*O. keta*) at existing facilities through modified operations and maximized facility use, in an effort to increase prey abundance for the endangered SRKW. Combined, salmonid production goals under all programs from 2019 to 2020 have increased by 26,075,200 salmon (of all species) compared to production levels prior to 2018 (WDFW 2019). Specific to Chinook Salmon, the 2019 production goal for WDFW facilities was 9,125,000 fish. This annual Chinook Salmon production goal was specifically intended to increase prey for SRKWs. The WDFW established similar Chinook Salmon production goals for 2020 and beyond.

In concert with these ongoing releases and in further response to Recommendation #6 of the Orca Task Force, legislative direction and funding from the general state appropriation for fiscal year 2021 was provided for WDFW to conduct a master planning process. Specifically, the SRKW Infrastructure Proviso states:

> *$500,000 of the general fund—state appropriation for fiscal year 2021 is provided solely for the department to conduct a master planning process, to result in a plan, to assess and prioritize hatchery improvements based on the recommendations of the southern resident killer whale task force, including prioritization given for a new Cowlitz River salmon hatchery. The plan must include prioritized capital budget projects. The plan shall be submitted to the fiscal committees of the legislature by January 15, 2021.*

To that end, WDFW has prepared this Master Plan to identify actions to increase salmon production in Puget Sound, on the Washington Coast, and in the Columbia River basin. This Master Plan prioritizes hatchery improvements at statewide facilities based on the recommendations of the Orca Task Force and includes a feasibility assessment for the potential development of a new hatchery on the Cowlitz River. This Master Plan focuses on strategies and facility improvements to increase Chinook Salmon production via expansion of existing state and private hatcheries, and through construction of two new state hatcheries, one of which would specifically produce salmon for SRKW prey enhancement on the Cowlitz River. The increased production from expansion of existing

facilities and from new facilities, when combined with 2018–2020 releases in the state, annually would provide over 50 million additional Chinook Salmon smolts compared to production levels prior to 2018.

WDFW recognizes that it maintains an obligation to share and discuss this plan with co-managers and federal agencies prior to implementing changes in production numbers. Due to the short time frame allotted to execute the legislative directive, consultation was not carried out in the master planning process. Consultation will take place during predesign and planning phases for individual projects.

This is a living document and the numbers reflected will change with the dynamic hatchery programs and policies, funding, coordination with regulators and public interest groups, and consultation with co-managers.

Hatchery Screening and Master Planning process

To develop this Master Plan, WDFW implemented a screening and planning process to identify a prioritized list of projects to achieve Chinook Salmon production goals (Figure ES-1). To identify potential hatcheries with the capacity and resources needed to expand salmonid production pathways (i.e., a facility or combination of facilities proposed to support increased Chinook Salmon production) WDFW implemented a two-step screening evaluation of select hatcheries statewide (Figure ES-2). This screening evaluation helped WDFW target hatcheries for further evaluation and project development. During the first step, or Initial Screening, state-hatcheries were generally removed from further consideration if they were not owned by the WDFW, do not produce salmon, or are constrained by production limits established under consultation with federal entities pursuant to the Endangered Species Act (ESA). For ESA constraints, a facility was only screened out from further consideration if successful reinitiation of ESA consultation (for increased production) was not likely feasible.

Following the Initial Screening, data were collected for the refined list of hatcheries to better understand their capacity for expanded production for the second step of evaluation, or Secondary Screening. During the Secondary Screening, additional facilities were removed from further evaluation based on site-specific factors including land and water availability to support new development, or hatchery production constraints under existing state and federal policies including the ESA. As a result of the Initial and Secondary screening analyses, select rearing locations were carried forth and further evaluated for their potential to support increased Chinook Salmon production. This Master Plan briefly discusses those facilities that did not pass the Initial or Secondary Screening analyses and provides the primary rationale for exclusion from current consideration for each facility (see Section 3). It is important to note that the currently excluded facilities may be revisited later. Similarly, additional facilities not included in this Master Plan may be identified in the future for their potential to support increased salmonid production.

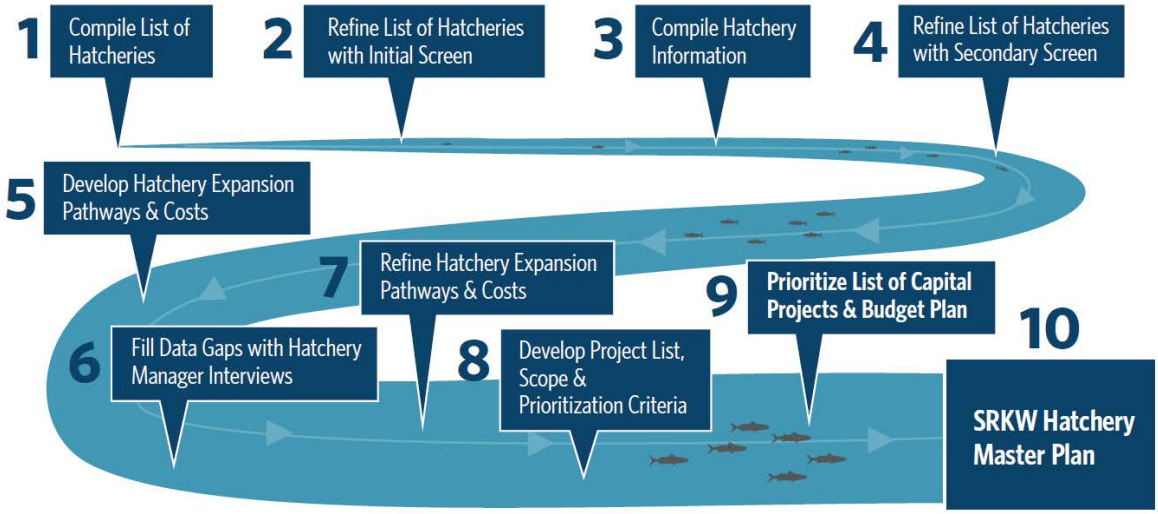

Figure ES-1. Master Planning Process

Figure ES-2. Disposition of Facilities Evaluated in the SRKW Hatchery Improvement Master Plan.

Project Definition and Cost Estimating

The next step in the master planning process was to define the improvement and expansion projects at each facility that passed the Initial and Secondary screening, and then prioritize these improvements based on specific criteria. For each facility, potential Chinook Salmon production, new infrastructure requirements (e.g., incubation and rearing units, flow rates, additional water needs), and costs were developed. Conceptual designs and preliminary capital costs were developed in terms of the Office of Financial Management (OFM) C-100 forms, Maximum Allowable Construction Costs, and annual operation and maintenance costs (Table ES-1). Proposed infrastructure improvements and costs were added to WDFW's existing 10-Year Capital Budget for hatchery infrastructure. The existing 10-Year Capital Plan (CP) is independent of the costs associated with developments targeted for enhanced SRKW prey production in this Master Plan. The 10-Year CP targets infrastructure improvements necessary for the maintenance of the state's hatchery facilities, regardless of the SRKW prey enhancement directive.

Project Prioritization and Budgeting

Following the identification of existing, proposed, or potential new facilities that could support additional Chinook Salmon production, the WDFW bundled the facility improvements into pathways. These pathways may include more than one facility to expand Chinook Salmon production, however, most pathways are contained within a single facility. Pathways may include acclimation and release at existing or new marine net pens. Each pathway was prioritized based on 1) prey availability, 2) co-manager consultation, 3) consistent with ESA principles, 4) constructability and water availability, and 5) cost-benefit ratio (Figure ES-3). Resulting priority scores are presented in Table ES-1.

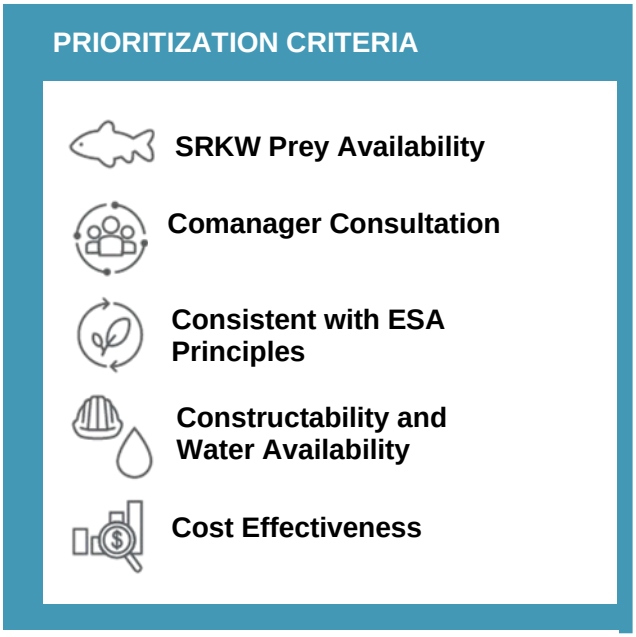

Figure ES-3. Prioritization Criteria

The prioritization scoring and capital costs presented in Table ES-1 were used to develop an implementation schedule and budget request for SRKW prey enhancement pathways proposed in this Master Plan for each fiscal biennium, through FY 45- 47 (Table ES-2). Cost centers for each biennium include predesign, design, and construction. In some cases, construction for one project may exceed one biennium. The implementation schedule was developed relative to an approximate biennial budget of $15 million dollars plus applied escalation. Table ES-2 also summarizes funds requested in the existing Capital Budget, for comparison.

Of note, The FY21-23 budget request was developed before the completion of this plan. WDFW elected to include budget request for all or part of the Kendall Creek SRKW Expansion, Voights Creek SRKW Expansion, Sol Duc SRKW Expansion, and New Cowlitz Hatchery projects in this biennium budget request. Since this request, the estimates costs and scopes of these projects has been refined. As such, the cost estimates are included in the “SRKW Capital Budget Request” portion of Table ES-2, and not the Existing Capital Budget Request.

Table ES-1. Prioritized List of Capital Projects for SRKW Prey Production and Associated Costs

Priority Rank	Priority Score	Project Name (Production Pathway)	Hatchery	Scope	Owner	Legislative District	SRKW Zone	Proposed SRKW Prey Production	Predesign Cost (escalated)	Design Cost (escalated)	Construction Cost (escalated)	Total Capital Costs (escalated)	Additional Annual O&M Cost
1	85	Voights Creek SRKW Expansion Project	Voights Creek Hatchery	50% PRAS, incubation, & circular tanks	WDFW	31	Puget Sound	1,000,000	$77,000	$997,000	$6,081,000	$7,155,000	$161,000
2	85	Samish SRKW Expansion Project	Samish Hatchery	New wells, 70% PRAS, incubation, & raceway	WDFW	40	Puget Sound	1,000,000	$101,000	$1,243,000	$8,094,000	$9,438,000	$141,000
3	81	Palmer Ponds SRKW Expansion Project	Palmer Ponds Hatchery	Spring rehabilitation, incubation, & raceways	WDFW	5	Puget Sound	600,000	$49,000	$774,000	$3,971,000	$4,794,000	$152,000
4	80	Puyallup SRKW Expansion Project	Puyallup Hatchery	70% PRAS & raceways	WDFW	25	Puget Sound	575,000	$62,000	$897,000	$5,026,000	$5,985,000	$97,000
5	75	Naselle SRKW Expansion Project	Naselle Hatchery	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	WDFW	19	Coastal	2,000,000	$129,000	$1,487,000	$10,338,000	$11,954,000	$249,000
6	74	Kendall Creek SRKW Expansion Project	Kendall Creek Hatchery	New wells, incubation, & raceways	WDFW	42	Puget Sound	700,000	$0	$641,000	$3,015,000	$3,658,000	$103,000
NA	74	Speelyai SRKW Expansion Project	Speelyai Hatchery	No capital project required	Private	20	Columbia Basin	500,000	$0	$0	$0	$0	$157,000
NA	71	Scatter Creek SRKW Expansion Project	Cooke Aquaculture - Scatter Creek	No capital project required	Private	35	Puget Sound	1,400,000	$0	$0	$0	$0	$254,800
7	70	Beaver Creek SRKW Expansion Project	Beaver Creek Hatchery	Incubation & raceways	WDFW	19	Columbia Basin	2,000,000	$110,000	$1,341,000	$9,245,000	$10,696,000	$213,000
8	70	McKernan SRKW Expansion Project	McKernan Hatchery	New wells, incubation, & raceways	WDFW	35	Puget Sound	500,000	$0	$811,000	$4,052,000	$4,863,000	$101,000
NA	70	Carlson Farms SRKW Expansion Project	Carlson Salmon Farms	No capital project required	Private	35	Puget Sound	750,000	$0	$0	$0	$0	$136,500
9	69	Wallace River SRKW Expansion Project	Wallace River Hatchery	50% PRAS, incubation, surface water filtration, & circular tanks	WDFW	39	Puget Sound	1,000,000	$89,000	$1,201,000	$7,835,000	$9,125,000	$172,000
10	69	Hupp Springs SRKW Expansion Project	Hupp Springs Hatchery	50% PRAS, incubation, circular tanks, PA pond modifications	WDFW	26	Puget Sound	650,000	$93,000	$1,238,000	$8,184,000	$9,515,000	$129,000
11	66	Coulter Creek SRKW Expansion Project	Coulter Creek Ponds	Raceways	WDFW	35	Puget Sound	500,000	$0	$710,000	$3,393,000	$4,103,000	$108,000
12	64	Marblemount SRKW Expansion Project	Marblemount Hatchery	Incubation & raceways	WDFW	39	Puget Sound	2,000,000	$121,000	$1,457,000	$9,866,000	$11,444,000	$262,000
13	63	Lyons Ferry SRKW Expansion Project	Lyons Ferry Hatchery	New wells, incubation, & raceways	USFWS	9	Columbia Basin	2,000,000	$241,000	$2,502,000	$20,900,000	$23,643,000	$219,000
14	62	Sol Duc SRKW Expansion Project	Sol Duc Hatchery	50% PRAS w/ incubation and circular tanks	WDFW	24	Coastal	1,000,000	$93,000	$1,177,000	$7,865,000	$9,136,000	$155,000
15	62	Elwha SRKW Expansion Project	Elwha Channel Hatchery	Incubation & raceways	WDFW	24	Puget Sound	2,000,000	$121,000	$1,445,000	$9,624,000	$11,190,000	$277,000
16	60	Humptulips SRKW Expansion Project	Humptulips Hatchery	Incubation, raceways, feed storage & head tank	WDFW	24	Coastal	2,000,000	$149,000	$1,746,000	$13,122,000	$15,017,000	$278,000

Priority Rank	Priority Score	Project Name (Production Pathway)	Hatchery	Scope	Owner	Legislative District	SRKW Zone	Proposed SRKW Prey Production	Predesign Cost (escalated)	Design Cost (escalated)	Construction Cost (escalated)	Total Capital Costs (escalated)	Additional Annual O&M Cost
17	59	Nemah SRKW Expansion Project	Nemah Hatchery	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	WDFW	19	Coastal	1,000,000	$92,000	$1,215,000	$7,749,000	$9,056,000	$166,000
18	58	Bogachiel SRKW Expansion Project	Bogachiel Hatchery	50% PRAS, incubation, circular tanks, spring improvements	WDFW	24	Coastal	2,000,000	$160,000	$1,844,000	$14,102,000	$16,106,000	$111,000
19	55	Whitehorse SRKW Expansion Project	Whitehorse Hatchery	New wells, 50% PRAS, incubation, & circular tanks	WDFW	39	Puget Sound	1,000,000	$102,000	$1,326,000	$9,018,000	$10,446,000	$141,000
20	51	Dungeness SRKW Expansion Project	Dungeness Hatchery	50% PRAS, incubation, raceways, new wells, & surface water treatment	WDFW	24	Puget Sound	1,000,000	$250,000	$2,618,000	$22,126,000	$24,994,000	$405,000
NA[1]	NA	New Deschutes River Hatchery Project	Deschutes River Hatchery (proposed)	New facility	WDFW (proposed)	22	Puget Sound	4,000,000	NA	NA	NA	NA	NA
NA[1]	NA	New Cowlitz Hatchery Project	Cowlitz Hatchery (proposed)	New facility	WDFW (proposed)	20	Columbia Basin	5,250,000	NA	NA	NA	NA	NA
					Total New SRKW Chinook Prey Production Potential under Master Plan			36,425,000					
					WDFW – 2019 Chinook Salmon Production Goal			9,125,000					
					Tribal and Utility Chinook Salmon Production – 2019 Production Goal[3]			5,350,200					
					TOTAL SRKW Prey Enhancement – Chinook Salmon			50,950,200					

[1] Proposed or potential facility; prioritization score not yet evaluated.

[2] Production at Coulter Ponds may be supported by expansion of the hatchery building at the Minter Creek Hatchery. The additional annual O&M costs for Coulter Ponds include the additional O&M costs needed for incubation at Minter Creek Hatchery.

[3] Funding for Tribal and Utility production is based on a two-year funding allotment; the future of this funding allotment is uncertain.

4 The Scatter Creek and Carlson Farms additional O&M costs are internal estimates which have not yet been negotiated between WDFW and the owners of these hatcheries. These O&M costs should be understood as order of magnitude estimates.

Table ES-2. Biennium Budget Requests for Southern Resident Killer Whale Hatchery Improvement Master Plan Production and Existing Capital Budget ($ escalated)[1]

Priority	Project	FY21-23	FY23-25	FY25-27	FY27-29	FY29-31	FY31-33	FY33-35	FY35-37	FY37-39	FY39-41	FY41-43	FY43-45	FY45-47
1	Voights Creek SRKW Expansion Project	$3,551,000	$3,604,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
2	Samish SRKW Expansion Project	$-	$101,000	$1,243,000	$8,094,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
3	Palmer Ponds SRKW Expansion Project	$-	$49,000	$774,000	$3,971,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
4	Puyallup SRKW Expansion Project	$-	$62,000	$897,000	$5,026,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
5	Naselle SRKW Expansion Project	$-	$129,000	$1,487,000	$10,338,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
6	Kendall Creek SRKW Expansion Project	$4,317,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
7	Beaver Creek SRKW Expansion Project	$-	$110,000	$1,341,000	$-	$9,245,000	$-	$-	$-	$-	$-	$-	$-	$-
8	McKernan SRKW Expansion Project	$-	$-	$-	$-	$811,000	$4,052,000	$-	$-	$-	$-	$-	$-	$-
9	Wallace River SRKW Expansion Project	$-	$-	$-	$-	$-	$89,000	$-	$1,201,000	$7,835,000	$-	$-	$-	$-
10	Hupp Springs SRKW Expansion Project	$-	$-	$-	$-	$93,000	$-	$1,238,000	$-	$-	$8,184,000	$-	$-	$-
11	Coulter Creek SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$710,000	$-	$3,393,000	$-	$-
12	Marblemount SRKW Expansion Project	$-	$-	$121,000	$1,457,000	$4,933,000	$4,933,000	$-	$-	$-	$-	$-	$-	$-
13	Lyons Ferry SRKW Expansion Project	$-	$-	$-	$-	$241,000	$-	$2,502,000	$10,450,000	$10,450,000	$-	$-	$-	$-
14	Sol Duc SRKW Expansion Project	$975,000	$-	$-	$8,161,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
15	Elwha SRKW Expansion Project	$-	$-	$121,000	$1,445,000	$9,624,000	$-	$-	$-	$-	$-	$-	$-	$-
16	Humptulips SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$149,000	$-	$1,746,000	$13,122,000	$-	$-	$-
17	Nemah SRKW Expansion Project	$-	$-	$92,000	$-	$1,215,000	$-	$7,749,000	$-	$-	$-	$-	$-	$-
18	Bogachiel SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$160,000	$1,844,000	$7,051,000	$7,051,000
19	Whitehorse SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$102,000	$1,326,000	$9,018,000	$-
20	Dungeness SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$250,000	$2,618,000	$11,063,000	$11,063,000
NA	SRKW- New Cowlitz Hatchery	$300,000	$4,500,000	$20,000,000	$13,986,000									
NA	**Total SRKW Budget Request**	**$9,143,000**	**$8,555,000**	**$26,076,000**	**$52,478,000**	**$26,162,000**	**$9,074,000**	**$11,638,000**	**$11,651,000**	**$20,741,000**	**$21,818,000**	**$9,181,000**	**$27,132,000**	**$18,114,000**
NA	Existing 10-Year Capital Budget Request[2,3]	$272,977,000	$200,282,000	$276,068,000	$125,551,000	$482,866,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NA	**Total Budget Request[4, 5]**	**$282,120,000**	**$208,858,000**	**$300,109,000**	**$164,570,000**	**$500,888,000**	**$18,779,000**	**$11,653,000**	**$11,675,000**	**$20,785,000**	**$21,894,000**	**$9,166,000**	**$27,214,000**	**$18,166,000**

[1] Costs in the table, particularly FY 23-25 costs, represent a snapshot in time and are expected to change
[2] These existing 10-Year capital budget requests do not include SRKW FY 21-23 project requests for Kendall Creek, Voights Creek, and Sol Duc, and New Cowlitz Hatchery projects, which are included in the SRKW line items in the table..
[3] Does not include re-appropriation.
[4] The total budget request does not include expected future capital budget request, needed to maintain current production levels, beyond FY29-31. It is expected this will be developed in the future.
[5] Future budget, beyond FY21-23, will not perfectly match WDFW's current budget forecast for SKRW projects, due to escalation and recommended changes.

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Timeline Considerations and Next Steps

This Master Plan summarizes additional factors that will affect the timeline of project implementation for hatchery production pathways presented herein. The receipt of legislative approval and funding is just the first step to bring these projects to fruition. Following funding and project phasing over several biennia, projects must undergo co-manager consultation, consider the need for coordination with landowners for facility development, compliance with environmental regulations, compliance with dynamic hatchery programs and policies, coordination with public interests groups, and implementation of long-term monitoring plans to ensure the programs are meeting established goals and objectives. WDFW must also coordinate closely with co-managers and regulators on policies established under the ESA to ensure the long-term viability of proposed production pathways.

WDFW will continue to coordinate with other partners, including federally operated hatchery facilities, tribal hatcheries, upper Columbia facilities, and private facilities to determine if additional SRKW prey enhancement is possible in concert with ongoing production, and production goals recommended herein. Consultation with the Oregon Department of Fish and Wildlife will also occur to determine if Columbia Basin hatcheries in Oregon have the capacity to participate in the effort to enhance prey for SRKW.

Conclusion

In summary, this Master Plan identifies a Chinook Salmon production increase of approximately 36.425 million fish from improvements at existing facilities and from two new state hatchery facilities (Deschutes River Hatchery and Cowlitz River State Salmon Hatchery) that would support SRKW prey production. With WDFW's ongoing annual program of over 9.125 million Chinook Salmon for SRKW prey enhancement, plus 5.35 million Chinook Salmon from tribal and utility production initiated in 2018, the total potential Chinook Salmon (approximately 51 million) now exceeds the EO 18-02 goal of 50 million Chinook Salmon smolts. However, it demonstrates that the goal of EO 18-02 is achievable with the recommended Chinook Salmon production pathways presented in this Master Plan.

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1 Introduction

In 2018, Governor Inslee established Executive Order (EO) 18-02[1] directing a state initiative to reverse the decline of Southern Resident Killer Whales (SRKWs; *Orcinus orc*a). Established by EO 18-02, the Southern Resident Orca Task Force was directed to identify immediate and long-term actions to benefit SRKWs. One of the three key threats advanced by the Orca Task Force to explain the recent decline of the state- and federally endangered SRKWs was a lack of their primary prey, Chinook Salmon (*Oncorhynchus tshawytscha*). This lack of prey is believed to contribute to poor SRKW health and reproductive failure.

To address the lack of SRKW prey and assist in SRKW recovery, the Orca Task Force developed 16 recommendations for increasing Chinook abundance (Southern Resident Orca Task Force 2019), including the following (Recommendation #6):

> *Significantly increase hatchery production and programs to benefit Southern Resident orcas consistent with sustainable fisheries and stock management, available habitat, recovery plans and the Endangered Species Act. Hatchery increases need to be done in concert with significantly increased habitat protection and restoration measures.*

Recommendation #6 encourages the Washington Department of Fish and Wildlife (WDFW) and co-managers to significantly increase hatchery production in a manner consistent with sustainable fisheries and stock management and the Endangered Species Act (ESA). Decisions on hatchery production are made by WDFW and tribal co-managers, with ESA consultation from NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS), where appropriate. In addition to Recommendation #6, legislative funding was provided to WDFW from the general state appropriation for fiscal year 2021 to conduct a master planning process. Specifically, the SRKW Infrastructure Proviso states:

> *$500,000 of the general fund—state appropriation for fiscal year 2021 is provided solely for the department to conduct a master planning process, to result in a plan, to assess and prioritize hatchery improvements based on the recommendations of the southern resident killer whale task force, including prioritization given for a new Cowlitz River salmon hatchery. The plan must include prioritized capital budget projects. The plan shall be submitted to the fiscal committees of the legislature by January 15, 2021.*

In response to EO 18-02, legislative mandates, and Recommendation #6 of the Orca Task Force (2019), WDFW has prepared this Master Plan to identify actions that prioritize Chinook Salmon production to enhance prey opportunities for the SRKW in Puget Sound, on the Washington Coast, and in the Columbia River basin. The Master

[1] The full Executive Order can be found at https://www.governor.wa.gov/sites/default/files/exe_order/eo_18-02_1.pdf ; the key tasking to the Washington Department of Fish and Wildlife relative to this proposal was: "*Identify the highest priority areas and watersheds for Southern Resident prey to focus or adjust, as needed, . . . hatcheries . . . policies and programs."*

Plan focuses on expanded Chinook Salmon production, providing up to 50 million additional smolt releases from 2018 levels, using existing state or several private hatcheries, acclimation facilities, and/or net pens. As prioritized by the legislature, this Master Plan also includes conceptual designs for the development of a potential new hatchery on the Cowlitz River specifically focused on the rearing of salmon for SRKW prey enhancement.

The purpose of this Master Plan is to:

- Identify strategies for increased Chinook Salmon production by evaluating existing and potential new hatcheries that are state or privately-owned
- Develop planning–level opinions of cost for each suggested project to increase production to allow for biennium-phased planning
- Identify attributes of each project to evaluate the cost-effectiveness (benefit-cost ratio) of pathways to achieve the goals of this Master Plan
- Develop a prioritized 10-year plan, including cost-loaded schedule of improvements.

The production increases presented herein build upon those previously implemented by WDFW and others from 2018 to 2020. In addition to this ongoing production and the recommended increases in production presented herein, WDFW will continue to explore other opportunities to further expand production. WDFW will seek out opportunities to work co-managers to find acceptable opportunities for prey enhancement. WDFW will also reach out to additional private and federal hatchery facilities in the state of Washington and will coordinate with hatchery operators in the state of Oregon to advance the objectives established by the Orca Task Force.

WDFW strongly supports Governor Inslee's EO 18-02 to recover the state's SRKWs population and is committed to play a role in that effort. Increased hatchery production, paired with investments in habitat protection and restoration to support hatchery and wild salmon, are the state's best opportunities to increase the prey of SRKWs in the near term.

This Master Plan is organized into sections that introduce planning goals and objectives, identify existing and proposed facilities to meet those objectives, and provide a cost-based analysis to inform funding needs to support the plan.

- Section 2 cites specific goals and objectives of this Master Plan are provided along with report limitations, how this Master Plan considers and aligns with existing hatchery policies, and SRKW prey enhancement achievements to date.
- Section 3 summarizes the process that WDFW employed to preliminarily screen existing facilities for production expansion potential, summarizes a list of projects advancing to the final screening analyses, and provides rationale for the exclusion of some state-owned facilities from this Master Plan.
- Section 4 provides a summary of potential production pathways (i.e., facilities or combination of facilities for salmonid production) to achieve the goals of this Master Plan.

- Section 5 discusses the approach to final screening and prioritization, or ranking, of hatchery improvements for SRKW prey enhancement. It defines the "5 Basic Criteria" used to prioritize pathways in this Master Plan including: 1) Prey Availability, 2) Co-manager Consultation, 3) Consistent with ESA principles, 4) Land/Water Availability, and 5) Cost-Benefits ratios.
- Section 6 summarizes the implementation plan and an economic analysis completed for hatchery production pathways and presents a preliminary schedule for implementation of prioritized projects.
- Section 7 provides a description of projects identified for enhanced Chinook Salmon production, including proposed program goals, estimated land and water availability, conceptual site plans, and summary costs.
- Section 8 summarizes the results of a feasibility study prepared for the potential development of a new hatchery on the Cowlitz River whose primary objective would be to enhance salmon production.
- Section 9 takes a deeper dive into some of the factors that will affect the timeline for the implementation of actions proposed under this Master Plan including consistency with existing policies and funding plans and environmental compliance requirements.
- Section 10 summarizes next steps to consider.
- Section 11 includes references cited in the Master Plan.

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2 Master Plan Program Description

2.1 Goals and Objectives

The goal of this Master Plan is to prioritize hatchery improvements to increase Chinook Salmon production, pursuant to the overall goal of providing 50 million additional smolts for enhanced SRKW prey opportunities. The goal of 50 million additional Chinook Salmon smolts considers both ongoing (2018-2020) hatchery releases and the production expansion potential identified in this Master Plan. Pursuant to Orca Task Force recommendations, the Master Plan has three main goals:

1. Evaluate WDFW salmon hatcheries supporting salmon production for the Puget Sound, Washington Coast, and Columbia River Basin to significantly increase hatchery production in a manner consistent with sustainable fisheries, stock management, and the ESA.
2. Evaluate the feasibility of developing a new hatchery on the Cowlitz River to support salmon production for SRKW prey enhancement.
3. Create a master plan that evaluates infrastructure, operations, cost, and prioritized ranking of capital improvement projects.

The Master Plan identifies hatchery improvements at existing facilities that would increase Chinook Salmon production but does not include infrastructure evaluations of the existing hatcheries. This plan considers the current WDFW 10-year Capital Plan (CP) and identifies opportunities to combine existing facility improvements with newly identified opportunities presented in this report.

The WDFW anticipates that future climate change will reduce available water and degrade water quality, as well as increase pathogens. Water resource demands will continue to increase for WDFW and the public making new water sources increasingly difficult to come by. Therefore, the Master Plan aims to implement technologies at existing and new facilities that reduce water demand, such as partially recirculating aquaculture systems (PRAS).

Actions proposed under this Master Plan have been thoughtfully developed under a set of limitations, and development of any new or expanded facility will face challenges beyond the preliminary funding phases. Further, actions must align with existing programs and policies, the most critical of which are summarized below and described in detail in Section 9.7.

2.2 Limitations of Report

Although every effort was made to establish a resilient and long-term plan, plan development was limited by constraints that prevented the ability to confirm all the priorities developed within this document. Limitations include the following:

- Only a 6-month timeframe allotted in the legislative language, which did not give enough time to fully identify, prioritize and discuss options and increases in production with co-managers and federal entities whose opinions and partnerships are critical for implementation.

- Covid-19 restrictions prevented face-to-face meetings and on-site visits that would have further clarified options determined by calculated numbers.
- Current Master Plan is developed from existing data. Time did not allow for any new data collection, such as water quality or most recent return numbers.

The recommended production program pathways (i.e., facility or combination of facilities proposed to increase production for specific programs) identified in this Master Plan represent a snapshot in time, based on existing facility conditions and ESA and co-manager policies that were in place during the Master Plan development. Depending on the implementation timing of prioritized projects presented herein, conditions may change, and new challenges may arise that must be considered. One potential change is the state's hatchery policy, currently under development by WDFW and tribal partners with the opportunity for public input. While known elements of that policy were considered during development of this Master Plan, the hatchery policy will not be finalized prior to Master Plan completion and future unknown policy changes could affect the prioritization of facilities and programs presented herein.

2.3 Framework of Existing Programs and Policies

WDFW must ensure that all actions proposed in this Master Plan consider existing programs and policies that are currently in place and established by Washington Fish and Wildlife Commission, WDFW, tribal governments, and federal agencies.

A key process and reporting mechanism for communicating hatchery production plans is the Future Brood Document (FBD). This is a preseason planning document for fish hatchery production in Washington State for the upcoming brood stock collection and fish rearing season (July 1–June 30). The FBD is coordinated between WDFW, the Northwest Indian Fisheries Commission (NWIFC), the USFWS, and treaty tribes from the Puget Sound, and Washington Coast for the operation of fish hatcheries.

The purpose of the FBD is to detail agreed-to production goals and plans for hatcheries. The FBD describes goals for egg-takes, transfers, and releases and would be the main vehicle to report production objectives in the Master Plan.

Coordination with the co-managers for multi-year planned production under the Master Plan must occur prior to development of the FBD.

The WDFW anticipates that the FBD will be used to communicate subsequent years' planned production under the Master Plan. After agreement, the FBD becomes the Current Brood Document (CBD). Changes made in-season are processed through an in-season change form and may be either permanent or one-time only.

2.3.1 Washington State Programs and Policies

The Washington State Hatchery and Fishery Reform Policy (C-3619) is currently under review and an update is in development with a new policy coming in 2021. Although specifics for the update are not yet available or incorporated into this Master Plan, WDFW acknowledges that the policy will guide SRKW production and production pathways proposed in the SRKW Master Plan and the plan will need to be evaluated for consistency with this policy.

New hatchery production under the Master Plan must be consistent with ground and surface water right availability (Chapters 90.3, 90.44, 90.54, and 90.54 RCW; Chapter 173-152 Washington Administrative Code [WAC]). Water right permits, and certificates are issued by the Washington State Department of Ecology (Ecology), in coordination with protecting instream flows for potentially affected surface waterbodies.

New hatchery production under the Master Plan must be consistent with Washington State's wastewater discharge standards and effluent limitations (Chapters 43.21A, 90.48, 90.52, and 90.54 RCW; Chapter 173-221A WAC). Effluent limitations are enforced and permitted under Ecology's National Pollutant Discharge Elimination System (NPDES) program. Most upland finfish hatcheries are permitted under the Upland Fin-Fish Hatching and Rearing General Permit, although individual NPDES permits may be issued for hatcheries that require specific wasteload allocations or measures.

All changes in hatchery production at existing facilities or production at new facilities proposed by WDFW, must be coordinated with affected federally recognized tribes, and tribal government co-managers (i.e., Treaty tribes[2]). WDFW policy 5007 (WDFW 2020) describes key principals for communication, coordination, and consultation with tribal governments.

Principles guiding this policy include:

- Recognition of the right of each federally recognized Tribe to self-governance, with sovereign powers over its members and territories;
- Respecting the government-to-government relationship between WDFW and Indian Tribes;
- Promoting co-management principles;
- Enhancing communication and coordination, and improving meaningful state-tribal relations;
- Implementing the appropriate level of engagement in the coordination and consultation process;
- Promoting tribal input into WDFW decision making processes;
- Detailing early tribal involvement in the design of a process or action implicating tribal interests; and
- Promoting transparency and encouraging tribal participation.

2.3.2 Federal Programs, Policies, and Endangered Species Act

Proposed production expansion must consider hatchery rearing and release protocols and limits established under the ESA. These include adherence to the ESA Biological Opinions that define terms and conditions for production and rearing protocols described in Hatchery and Genetic Management Plans (HGMPs) for each production program, and

[2] Treaty Tribes are those with Treaties with US Government that reserved rights to fish, hunt, etc. Treaty tribes are co-managers of the resources with the state of Washington. Some hatchery production pathways proposed in this Master Plan may need coordination with federally recognized tribes that are not Treaty Tribes. The only two that related to the pathways proposed herein are the Chehalis Tribe and The Shoalwater Bay Tribe.

Environmental Assessments (EA) and Environmental Impact Statements (EIS) for combined watershed production programs (most watersheds have multiple production programs/HGMPs for different species and races propagated at facilities in the watershed).

In addition, depending on the region, some facilities and release protocols must abide by existing broodstock collection and release limits established by National Oceanic and Atmospheric Administration (NOAA) Fisheries in existing ESA consultation documents. For example, the Mitchell Act Biological Opinion (NOAA Fisheries 2017) sets hatchery broodstock and release limits for hatchery programs that are funded through the Mitchell Act, and covers such programs through 2025.

2.3.3 Treaty Tribe Co-Managers

Treaty tribe co-managers in Puget Sound, Washington Coast, and Columbia River will need to evaluate proposed hatchery production plans against their own policies, goals and objectives for fisheries in their region. The NWIFC and Columbia River Inter-Tribal Fish Commission (CRITFC) provide technical support and coordination for the Treaty tribes. However, they do not set policies; as policies are set by the individual tribal governments. Production pathways identified in this Master Plan will need consultation and in some cases coordination with the individual tribes. WDFW has in place well-coordinated communication, data sharing, and processes for working with technical staff of individual tribes. This works best when WDFW and the tribes provide a clear analysis of benefits and potential impacts of a proposed pathway. Production pathways will be reviewed by the tribe's technical staff and they will communicate recommendations to tribal policy representatives and tribe's fish commissions. Government to Government communication at the policy level is an important part of this process and to communicate goals of the SRKW Master Plan and to elicit refinements to the pathways that may be more consistent with tribal goals and objectives and meet the objectives of the SRKW Master Plan.

2.4 Achievements to Date

Prior to 2018, WDFW had significantly reduced annual salmonid production due to lack of funding and hatchery reform. This contributed to a lack of salmon available for SRKW consumption. Historic declines in hatchery production, by region, ranged from a high of approximately 275 million salmon in 1989 to a low of approximately 145 million in 2017 as reported in the WDFW's January 2019 *Proposal to Increase Hatchery Production to Benefit Southern Resident Killer Whales* (WDFW 2019). However, as a result of the Orca Task Force recommendations, Washington State, tribes, and public utility districts received $13.54 million from the Legislature operating budget to increase hatchery production consistent with sustainable fisheries and stock management, available habitat, recovery plans and the ESA (Southern Resident Orca Task Force 2019). As a result, WDFW recently has increased production, and production for years 2018 through 2021 demonstrate WDFW's commitment to reverse the previous trend and provide more salmon for SRKWs.

In addition to recent increases in production, for the past decade, WDFW has been working toward the development of a new state salmon hatchery on the Deschutes River

near the city of Tumwater. This facility would provide up to 4.0 million Chinook Salmon for the recreational and tribal fishery in south Puget Sound, and contribute to SRKW prey enhancement objectives.

2.4.1 Hatchery Production Increases 2018–2020

Throughout 2018, the SRKW Prey Working Group of the Orca Task Force discussed hatchery increases to provide more prey for SRKW over the next 3 to10 years. WDFW led discussions with the Working Group on the approach to facility site selection as related to production increases, and determined that increased production should be:

- Accomplished in conjunction with increased habitat protection and restoration so that hatchery and wild fish can be successful,
- Implemented carefully to have minimal effects on natural salmon stocks, and
- Monitored closely to better understand and adapt production as necessary.

In 2018, in conjunction with EO 18-02, and utilizing funding provided by the Legislature, WDFW identified current facilities where salmon production could be increased to provide immediate relief to SRKWs, and make progress toward the 50 million Chinook Salmon production goal identified by the Orca Task Force. WDFW directed numerous state-owned facilities to increase production to benefit SRKWs, with significant increases in production percentages compared to previous programs.

WDFW identified facilities based on existing capacity, co-manager agreement, and concurrence from NOAA Fisheries. Selected facilities and the associated production were presented to the SRKW Prey Working Group and shared with the Hatchery Scientific Review Group, established by Congress in 1999 to review regional hatchery reform efforts.

Based upon the WDFW efforts, production increased over current levels with 7.7 million more fish propagated in 2018 for release in 2019 (WDFW 2019). Selected production facilities align closely with the report “Southern Resident Killer Whale Priority Chinook Stocks” (adapted from WDFW 2019, Appendix 6), produced by WDFW in partnership with NOAA Fisheries. The report uses a Chinook stock spatial-temporal overlay and SRKW distribution, as well as other factors, to create a model to prioritize Chinook stocks.

Following the hatchery production increases implemented in 2018, the Orca Task Force sent its Year 1 report to Governor Inslee, including recommendations for additional hatchery production. Concurrently, the Washington Fish and Wildlife Commission (Commission) released a policy statement to provide guidance for the WDFW Director. In September 2018, the Commission adopted general policy intent and guidance, proposing enhanced Chinook Salmon abundance to benefit SRKW recovery while acknowledging secondary benefits for fisheries. The Commission proposed an increase of 50 million smolts beyond 2018 levels, along with additional hatchery enhancement proposals.

To that end, WDFW worked with co-managers and federal partners from 2018-2019 to determine which salmon stocks and facilities would be best suited for additional production increases to benefit SRKWs in the 2019-2020 biennium. Key steps in this process included:

- Identifying Chinook Salmon as the top priority for increased production because Chinook Salmon make up 80-90 percent of the SRKW's diet. Some smaller production increases are proposed for Chum Salmon and Coho Salmon.
- Identifying places where production could be increased with the least impact to natural salmon stocks and within the scope of existing ESA permits.
- Reinitiating consultation with co-managers and NOAA to gain support for increased production of priority stocks where increased production was not included in existing ESA permits. WDFW is updating information necessary for ESA consultation.
- Initiating discussions with co-managers, USFWS, and NOAA to scope expansion opportunities at hatchery facilities that would allow for future increased production.
- Incorporating hatchery reform measures into the evaluation of production proposals, especially regarding monitoring the proportion of hatchery-origin spawners on the spawning grounds.
- Adopting adaptive management measures to allow for course adjustments should significant increases in hatchery fish on spawning grounds be observed.

Based on the principles and process considerations discussed above, WDFW developed a hatchery production plan for years 2019–2021. The proposed production targets for years 2019 and 2020 are provided below (Table 2-1). The supplemental funding to increase production was $837,000 for 2019 and $3.5M for 2020.

Table 2-1. WDFW's Salmon Production Proposal for SRKW Prey Enhancement, and Actual Juvenile Releases, by Species, for 2019 and 2020

Facility Name	Region	Species	Increased Proposal
Chinook Salmon Production			
Kendall	North Sound	Spring Chinook	500,000
Whatcom Cr.	North Sound	Fall Chinook	500,000
Hupp Springs	South Sound/Hood Canal/Straits	Spring Chinook	500,000
Samish	North Sound	Fall Chinook	1,000,000
Wallace River	North Sound	Summer Chinook	400,000
Wallace River	North Sound	Summer Chinook	100,000
Soos/Palmer	North Sound	Fall Chinook	2,000,000
Marblemount	North Sound	Spring Chinook	400,000
Sol Duc	Washington Coast	Summer Chinook @ 50 fish per pound	500,000
Sol Duc	Washington Coast	Summer Chinook @ 8 fish per pound	75,000

Facility Name	Region	Species	Increased Proposal
Minter	South Sound/Hood Canal/Straits	Fall Chinook	400,000
Naselle	Washington Coast	Fall Chinook	2,500,000
Forks Creek	Washington Coast	Fall Chinook	50,000
Lewis River	Columbia River	Spring Chinook	200,000
Total Chinook			**9,150,000 (Total Chinook)**
Coho Salmon Production			
Beaver Creek	Columbia River	Coho	225,000
Ringold	Columbia River	Coho	250,000
Wallace	North Sound	Coho	150,000
Kendall	North Sound	Coho	200,000
Marblemount	North Sound	Coho	250,000
Dungeness	South Sound/Hood Canal/Straits	Coho	300,000
Humptulips	Washington Coast	Coho	500,000
Forks Creek	Washington Coast	Coho	300,000
Total Coho			**2,175,000 (Total Coho)**
Chum Salmon Production			
Nemah	Washington Coast	Chum	1,000,000
Wallace River	North Sound	Chum	1,000,000
Kendall	North Sound	Chum	500,000
Hood Canal	South Sound/Hood Canal/Straits	Chum	3,000,000
Total Chum			**5,500,000 (Total Chum)**
Totals			**17,025,000 (all species)**

Source: WDFW. 2020. Email from Kelly Smith to Chad Wiseman 11/16/20.

WDFW's total proposed production for the 2019-2020 brood years, by region, for Chinook Salmon, Coho Salmon, and Chum Salmon was:

- North Sound: 7,000,000
- South Sound/Hood Canal/Straits: 4,200,000

- Washington Coast: 5,350,000
- Columbia River: 475,000

Concurrent with WDFW efforts, several tribes have increased salmon production to enhance prey abundance for SRKW (Table 2-2). In addition to tribal efforts and one public utility have increased summer Chinook Salmon production by 500,000 in recent years.

Table 2-2. Tribal Production Proposal for SRKW Prey Enhancement, including Puget Sound and Columbia River Tribes (Production Year 2019)[1]

Tribe	Species	Number of Fish
Quinault	Fall Chinook	500,000
Tulalip	Pilot Studies	0
Quileute	Summer Chinook	75,000
Puyallup	Fall Chinook	1,075,200
Puyallup	Chum	1,000,000
Port Gamble S'Klallam Tribe	Coho	400,000
Muckleshoot	Spring Chinook	200,000
Squaxin	Coho	800,000
Squaxin	Fall Chinook	500,000
Skokomish	Chum	1,500,000
Lummi Nation	Spring Chinook	500,000
Lummi Nation	Early Fall Chinook	1,000,000
Yakama Nation	Fall Chinook	1,000,000
Totals		**8,550,200**
Total Tribal Production by Species	Spring Chinook	700,000
	Fall Chinook	4,075,200
	Summer Chinook	75,000
	Coho	1,200,000
	Chum	2,500,000
	Total	**8,550,200**

[1]Funding for Tribal and Utility production is based on a two-year funding allotment; the future of this funding allotment is uncertain

Combined, WDFW, Tribal, and utility hatchery production from 2019 to 2020 has targeted releases of 26,075,200 salmon for SRKW salmonid prey enhancement. Combined production from all sources, by region, for Chinook Salmon, Coho Salmon, and Chum Salmon is:

- North Sound: 8,500,000
- South Sound/Hood Canal/Straits: 9,750,200
- Washington Coast: 5,850,000
- Columbia River: 1,975,000

Among these totals, for 2019 production goals, WDFW, Tribal, and utility hatchery production has targeted the release of 14,475,200 Chinook Salmon for SRKW salmonid prey enhancement.

2.4.2 Adaptive Management

In meeting the SRKW prey enhancement objective through hatchery production increases, the Orca Task Force acknowledged and recommended that WDFW adopt a variety of adaptive management efforts to test and refine production measures, using emerging science, knowledge and experience to guide those decisions.

To that end, WDFW has or intends to implement several monitoring and adaptive management strategies to meet the objective of providing more salmon for SRKWs without compromising native stocks. To minimize the proportion of hatchery-origin fish in natural spawning areas, adaptive management solutions include:

- Installing weirs and/or traps if feasible.
- Increasing fishing in terminal areas to directly target hatchery fish.
- Adjusting production levels to protect ESA listed species.
- Coded-wire tag fish at rates that allow for effective monitoring of survival rates, stray rates, contributions to SRKWs and fisheries, and impacts to ESA listed species.

If WDFW finds that survival rates are decreasing due to increased hatchery production, WDFW may investigate the following possible remedies:

- Evaluate ocean conditions.
- Utilize pilot studies results to adjust release timing, size of fish at release, or other variables that may reduce impacts on natural stocks or increase survival of smolts.
- Adjust production levels.
- Maintain the highest standard of fish health standards, monitoring, and treatment.

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3 Facility Screening for Expanded Production

WDFW screened existing state and several private hatchery facilities to determine whether expanded Chinook Salmon production was feasible at specific locations. Screening was implemented in two steps (initial and secondary screening). Facilities that passed through screening were packaged into production pathways (Section 4), developed as projects, and prioritized for implementation (Section 5.1).

The screening process resulted in the exclusion of certain state hatcheries. Despite current exclusion from this Master Plan, WDFW will continue to consider all opportunities to accommodate expanded production to meet the goals of the Orca Task Force. For this reason, some facilities that are currently excluded from production enhancement under this Master Plan may be considered for Chinook Salmon expansion under future planning phases.

3.1 Initial Screening

WDFW developed a list of state and private hatchery facilities for initial screening, including existing facilities and one proposed facility (Deschutes River Hatchery near Tumwater, WA). Initial screening removed sites that 1) do not currently produce salmon, 2) are not owned by the WDFW or are currently closed, and, 3) have ESA restrictions on expansion that are unlikely to change (Table 3-1; Appendix A). Some exceptions were made, based on fish culture capabilities, geography, land/water availability, and/or ability to move existing production. For example, the Whitehorse Hatchery and the Tokul Creek Hatchery are currently trout facilities but are being considered for this Master Plan. The Speelyai Hatchery (Pacific Corp.), Lyons Ferry Hatchery (USFWS), Tucannon Hatchery (USFWS), and the South Sound/Squaxin Island Net Pen (Squaxin Island Tribe) were carried forward through the initial screening, even though they are not owned by the WDFW. Finally, many facilities were considered in this Master Plan with ESA restrictions, under the premise that the facilities may be able to contribute within those restrictions, or that those restrictions could be reconsidered with re-initiation of Section 7 consultation with the USFWS and NOAA Fisheries.

Although facility ownership did not automatically discount potential consideration and advancement of a specific facility to the next screening phase (secondary screening), ownership was considered when other criteria were present that would make successful use of specific facilities unlikely. WDFW will continue to advance opportunities to work with hatcheries that are owned by others, including tribal co-managers and utilities, to determine if SRKW prey enhancement can be accommodated at their facilities. However, utilities have specific production goals for ESA mitigation and partnerships may prove challenging.

Table 3-1. Facilities That Did Not Meet Initial Screening

WDFW Region	Hatchery	Ownership	Legislative District	Primary Rationale for Exclusion from SRKW Prey Production Enhancement
1	Colville Hatchery	Tribal (Stevens County in process of Purchasing)	7	Not WDFW-owned
1	Cottonwood Creek Rearing Pond	USFWS	9	Not WDFW-owned
1	Curl Lake Acclimation Pond	USFWS	16	ESA constraints[1]
1	Dayton Acclimation Pond	USFWS	16	ESA constraints
1	Ford Hatchery	WDFW	7	Trout hatchery[2]
1	Sherman Creek Hatchery	BPA	7	Trout hatchery + ESA constraints
1	Spokane Hatchery	WDFW	6	Trout hatchery
2	Chelan Falls Annex	Chelan PUD, Satellite Eastbank Hatchery	12	Not WDFW-owned
2	Chelan Hatchery	Chelan PUD, WDFW	12	ESA constraints
2	Chiwawa Ponds	Satellite Eastbank Hatchery		ESA constraints
2	Eastbank Hatchery	Chelan PUD	12	ESA constraints + not WDFW-owned
2	Lake Wenatchee/Chiwawa Ponds	CLOSED	12	Closed
2	Methow Hatchery	Douglas PUD	12	Not WDFW-owned
2	Nason Creek	Grant County PUD	12	ESA constraints
2	Omak Hatchery	WDFW	7	Trout hatchery
2	Similkameen Pond Hatchery	Chelan PUD	7	Not WDFW-owned
2	Wells Hatchery	Douglas Co. PUD	12	Not WDFW-owned
3	Columbia Basin Hatchery	WDFW	13	Trout hatchery
3	Naches Hatchery	WDFW	14	Trout hatchery
3	Priest Rapids Hatchery	Grant County PUD	13	Not WDFW-owned
4	Baker Lake Hatchery	Seattle City Light	42	ESA constraints + not WDFW-owned
4	Barnaby Slough Hatchery	CLOSED	39	Closed
4	Bellingham Hatchery	WDFW	40	Trout hatchery
4	Cedar River Hatchery	Seattle Public Utilities	5	ESA constraints + not WDFW owned
4	Icy Creek Pond Hatchery	WDFW	5	ESA constraints
4	Lake Whatcom Hatchery	WDFW	40	Trout hatchery

WDFW Region	Hatchery	Ownership	Legislative District	Primary Rationale for Exclusion from SRKW Prey Production Enhancement
5	Cowlitz Trout Hatchery	Tacoma City Light	20	Not WDFW-owned
5	Elochoman Hatchery	WDFW (CLOSED)	19	Closed
5	Goldendale Hatchery	WDFW	14	Trout hatchery
5	Grays River Hatchery	WDFW (CLOSED)	19	Closed
5	Klickitat Hatchery	Yakima Nation	14	Not WDFW-owned
5	Merwin Hatchery	Pacific Corp.	20	Trout hatchery
5	Mossyrock Hatchery	WDFW	20	Trout hatchery
5	Skamania Hatchery	WDFW	14	ESA issues
5	Vancouver Trout Hatchery	WDFW	17	Trout hatchery
6	Eells Springs Hatchery	WDFW	35	Trout hatchery
6	Morse Creek Hatchery	WDFW will be closing	24	Closed
6	Skookumchuck Hatchery	WDFW	20	ESA issues

[1] ESA constraints include existing policies that are in place to protect native, ESA-listed salmonid populations. For facilities located in watersheds that have ESA-listed populations, additional salmonid production may not align with policies and limits established through ESA Section 7 consultations or Hatchery Genetic Management Plans. Reinitiation of consultation would be required to increase production at these facilities and may not be achievable.

[2] Existing facilities that currently produce trout, and not anadromous salmonids, do not always have the infrastructure necessary to support salmonid rearing. Rearing raceways may be too small, and water quality may not support rearing needs. In addition, disease concerns and potential transfer among species is a greater issue for biosecurity.

3.2 Secondary Screening and Facility Selection

Following the initial screening, and considering exclusion criteria and exceptions, select facilities were advanced to a secondary screening analysis (Appendix A). Data was collected for each of these facilities to evaluate them for expanded Chinook Salmon production. Documents were compiled for each hatchery, including summary descriptions, aerial photos, parcel lines, water rights, capital budget requests, and recent renovations. In addition, a questionnaire was developed for WDFW hatchery managers to populate, to obtain information on land availability, water availability, existing infrastructure, and existing production (Appendix B). Questionnaires were processed and follow-up interviews were conducted. WDFW Hatchery managers participated (through phone interviews) in data collection and review of proposed expansion concepts.

Following data collection, each of the select facilities that advanced to the secondary screening phase were evaluated. Scores were assigned to determine a facility's existing conditions, using a number of ranking criteria (Table 3-2; Appendix C).

Table 3-2. Secondary Screening Criteria

Criterion	Low (0-1 pt)	Medium (2-3 pts)	High (4-5 pts)	Weight
Location of facility (Region)	Region 1	Regions 2, 3	Region 4, 5, 6	1
Facility owner	Private	PUD & Tribal	WDFW	1
Usable Land available for development	Less than 1 acre	1-3 Acres	Over 3 Acres	4
Flood issues	Known Flood Issues	Unknown	No Issues	1
ESA Issues	Formal Consultation	Informal Consultation	No Affect	2
Unused Ground water available	Up to 350 gpm[1]	Up to 700 gpm	1,400 gpm +	4
Unused Surface water available	Up to 3500 gpm	Up to 7000 gpm	10,000 gpm +	3
1st pass surface water available	1600 gpm	3200 gpm	5000 gpm	4
Intake Water quality issues	Known water quality issues	Unknown, further research needed	No water quality issues	1
Average Annual Water temperature	Less than 48°F/ Higher than 60°F	48°F–52°F or 57°F–60°F	50–57°F	2
Fish species reared/Biosecurity	No Chinook/pathogen issues	Chinook/other species/potential pathogen issues	Chinook/no pathogens	1
Effluent Treatment NPDES	Individual NPDES with WLAs		General NPDES	1
Underutilized incubation space	2 full stacks	10 full stacks	20 full stacks	1
Underutilized early rearing volume	Up to 300 cubic feet	Up to 600 cubic feet	Up to 900 cubic feet	2
Underutilized rearing volume	Up to 4,000 cubic feet	Up to 20,000 cubic feet	Up to 40,000 cubic feet	3
Primary Power on Site	120/240, 1-Ph only	120/208, 3-PH	120/240, 3-PH	2
Emergency Power on Site	None	Yes, partial site backup	Yes, full site backup	1
Useful life of Existing Piping/Infrastructure	20 years and older	10 to 20 years old	0 to 10 years old	2

[1]gpm = gallons per minute

Based on the scores received in the secondary screening evaluation, additional hatchery facilities were excluded from further consideration (Table 3-3; Appendix C). Rationale for exclusion considered similar criteria evaluated in the initial screening process, combined with site-specific information on each facilities' available land, groundwater, and surface water to support increased salmonid production.

Table 3-3. Facilities That Did Not Meet Secondary Screening

WDFW Region	Hatchery	Ownership	Legislative District	Primary Rationale for Exclusion from SRKW Prey Production Enhancement	Potential Support Facility for Production Pathway
1	Tucannon Hatchery	USFWS	16	ESA constraints + flood issues	Broodstock and Incubation for Lyons Ferry
2	Turtle Rock Hatchery	CLOSED	12	Not WDFW-owned; lack of groundwater	None
3	Ringold Springs/Meseberg Hatchery	WDFW	9	Lack of available ground/surface water	None
4	Arlington Hatchery	WDFW	10	Lack of available ground/surface water + flood issues	None
4	Issaquah Hatchery	WDFW	5	Lack of available ground/surface water + ESA constraints	None
4	Soos Creek Hatchery	WDFW	47	Lack of available surface water + ESA constraints	None
4	Tokul Creek Hatchery	WDFW	5	ESA constraints	None
4	Reiter Pond Hatchery	WDFW	39	Lack of available ground/surface water + ESA constraints	None
5	Washougal Hatchery	WDFW	14	Lack of available groundwater + ESA constraints	None
5	Kalama Falls Hatchery	WDFW	20	Lack of available groundwater + ESA constraints	None
5	Lewis River Hatchery	WDFW	20	Lack of available land and ground/surface water	Acclimation and release for Speelyai
5	North Toutle Hatchery	WDFW	20	Lack of available groundwater + ESA constraints	None
5	Fallert Creek Hatchery	WDFW	20	Lack of available groundwater + ESA constraints	None
5	Cowlitz Salmon Hatchery	Tacoma Public Utilities	20	Lack of available land; ownership	Collaboration with new Cowlitz Hatchery
6	Tumwater Falls Hatchery	WDFW	22	Lack of available land and ground/surface water	Broodstock collection for Minter and Deschutes
6	Hurd Creek Hatchery	WDFW	24	Lack of available surface water; flood issues; ESA constraints	Broodstock collection for Dungeness
6	Satsop Springs Hatchery	WDFW coop	35	Lack of available groundwater	None

WDFW Region	Hatchery	Ownership	Legislative District	Primary Rationale for Exclusion from SRKW Prey Production Enhancement	Potential Support Facility for Production Pathway
6	Lake Aberdeen Hatchery	WDFW	24	Lack of available groundwater + ESA constraints	None
6	Lakewood Hatchery	WDFW	28	Lack of available ground/surface water	None
6	Garrison Springs Hatchery	WDFW	28	Lack of available land	None
6	Mayr Brothers Rearing Hatchery/ Gray Harbor Poggie Club	WDFW Coop	24	Lack of available ground/surface water	None
6	George Adams	WDFW	35	Lake of available surface water + ESA constraints	McKernan
6	Hoodsport	WDFW	35	Lack of available land and ground/surface water + ESA constraints	None
6	Forks Creek Hatchery	WDFW	19	Lack of available land	None
6	Chambers Creek Hatchery	WDFW	28	Lack of available ground/surface water	None
6	Bingham Creek Hatchery	WDFW	35	Lack of available land; flooding issues	None

Facilities were screened out from further consideration if a site lacked sufficient water or land, or if the watershed had regulatory constraints that might preclude additional production. Some facilities were screened out because there was little to no available ground or surface water available for additional rearing. Securing additional water resources may not be feasible because of a lack of availability or because additional water rights cannot be obtained in that basin.

Some facilities were removed from further consideration if there was a lack of available land on the existing hatchery grounds for expanded development (e.g., addition of rearing raceways). It was assumed that the purchase of new lands or easements would preclude it from current consideration and may not be feasible at some locations. If available land was in the floodplain, the site scored lower, though this was not necessarily a fatal flaw. Many facilities were constructed in the 100-year floodplain prior to the establishment of many state, federal, and local ordinances that currently prohibit such development. Facility expansion in the floodplain under the current regulatory framework is not always achievable but may be possible with mitigation to compensate for lost floodplain storage.

Existing ESA constraints, including limits on broodstock collection and juvenile releases, are intended to minimize ecological interactions with native salmonid stocks. For facilities located in watersheds that have ESA-listed populations, additional salmonid production may not align with policies and limits established through ESA Section 7 consultations or

Hatchery Genetic Management Plans. Reinitiation of ESA consultation would be required to increase production at these facilities and may not be achievable. Modifying established ESA restrictions is a time-consuming process, and changes may not be authorized by NOAA Fisheries or USFWS.

Existing facilities that currently produce trout, and not anadromous salmonids, were typically screened out because they do not always have the infrastructure necessary to support Chinook Salmon rearing. For example, rearing raceways may be too small, and/or water quality may not support rearing needs. In addition, disease concerns and potential disease transfer among species is a greater issue for biosecurity.

As a result of the secondary screening analysis and consideration of the screening criteria presented in Table 3-2, select existing hatchery facilities advanced to the final screening and prioritization (Table 3-4; Appendix C). These facilities advanced because of their higher secondary screening scores as well as subsequent information collected during follow-up interviews with hatchery staff. In addition to existing state facilities, a new hatchery proposed on the Deschutes River has gone through design and will be considered for prioritization. Two private facilities in Thurston County that can produce fish without any capital improvements (i.e., Carlson Salmon Farms and Cook Aquaculture - Scatter Creek) were also advanced to the prioritization phase.

Figure 3-1. State and Private Facilities Screened for Inclusion in the SRKW Master Plan, including Existing and Potential Marine Net Pens.

Table 3-4. State-owned, State-operated, or Private Hatchery Facilities in Washington State Currently Meeting Screening Criteria for SRKW Prey Production.

WDFW Region	Legislative District	Hatchery	SRKW Zone	Hatchery Production Pathway	Annual O&M Cost[c]	Total Capital Cost ($ 2020)	SRKW Prey Production
6	24	Sol Duc Hatchery	Coastal	Sol Duc	$155,000	$7,814,000	1,000,000
6	24	Humptulips Hatchery	Coastal	Humptulips	$278,000	$10,675,000	2,000,000
5	19	Beaver Creek Hatchery	Columbia Basin	Beaver Creek	$213,000	$8,725,000	2,000,000
6	24	Bogachiel Hatchery	Coastal	Bogachiel	$111,000	$11,446,000	2,000,000
6	24	Elwha Channel Hatchery	Puget Sound	Elwha Channel	$277,000	$8,670,000	2,000,000
1	9	Lyons Ferry Hatchery	Columbia Basin	Lyons Ferry	$219,000	$16,787,000	2,000,000
4	39	Wallace River Hatchery	Puget Sound	Wallace River	$172,000	$6,498,000	1,000,000
4	39	Whitehorse Ponds	Puget Sound	Whitehorse Ponds	$141,000	$7,434,000	1,000,000
6	19	Naselle Hatchery	Coastal	Naselle	$249,000	$10,174,000	2,000,000
6	19	Nemah Hatchery	Coastal	Nemah	$166,000	$6,728,000	1,000,000
4	39	Marblemount Hatchery	Puget Sound	Marblemount	$262,000	$8,680,000	2,000,000
6	24	Dungeness Hatchery	Puget Sound	Dungeness	$405,000	$17,743,000	1,000,000
4	5	Palmer Ponds Hatchery	Puget Sound	Palmer Ponds	$152,000	$4,087,000	600,000
6	31	Voights Creek Hatchery	Puget Sound	Voights Creek	$161,000	$6,839,000	1,000,000
6	25	Puyallup Hatchery	Puget Sound	Puyallup	$97,000	$5,100,000	575,000
4	40	Samish Hatchery	Puget Sound	Samish	$141,000	$8,036,000	1,000,000
5	20	Speelyai Hatchery	Columbia Basin	Speelyai	$157,000		500,000

WDFW Region	Legislative District	Hatchery	SRKW Zone	Hatchery Production Pathway	Annual O&M Cost[c]	Total Capital Cost ($ 2020)	SRKW Prey Production
4	42	Kendall Creek Hatchery	Puget Sound	Kendall Creek	$103,000	$3,568,000	700,000
6	26	Hupp Springs Hatchery	Puget Sound	Hupp Springs	$129,000	$6,775,000	650,000
6	35	McKernan Hatchery	Puget Sound	McKernan	$101,000	$3,771,000	500,000
6	35	Coulter Creek Ponds	Puget Sound	Coulter Creek Ponds	$108,000[a]	$2,933,000	500,000
6	35	Carlson Salmon Farms	Puget Sound	Carlson Salmon Farms	$137,000[b]	$0	750,000
6	35	Cooke Aquaculture - Scatter Creek	Puget Sound	Cooke Aquaculture - Scatter Creek	$255,000[b]	$0	1,400,000
4	22	Deschutes River Hatchery (proposed)	Puget Sound	Deschutes River (proposed)	$347,000	$36,974,239	4,000,000

[a] These O&M costs for Coulter Creek Ponds include expansion of incubation capacity at the Minter Creek Hatchery.

[b] These internal estimates of O&M costs are not yet negotiated between WDFW and the owners of these hatcheries. These O&M costs should be understood as order of magnitude estimates.

[C] O&M costs were rounded up to nearest thousand-dollar amount based on O&M estimates presented in Appendix G: Operation and Maintenance Costs.

Note: Garrison Springs is no longer under consideration but could provide production in the future.

The secondary screening analysis identified “pathways” for Chinook Salmon SRKW prey production that were carried forward into conceptual design. In many cases, those production pathways were achieved by using only one facility for all production needs. However, in some cases, multiple facilities would be required to support Chinook Salmon production. These production pathways are discussed in Section 4. The pathways and individual projects (when only one facility would support production) presented in Table 3-4 were prioritized for implementation (Section 1), and sequencing into an implementation plan (Section 6) The sequencing of these prioritized projects were considered within the context of the existing 10-Year CP to develop a prioritized, operable plan to implement production pathways proposed under this Master Plan. Conceptual site plans for prioritized projects are presented in Section 7.

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4 Expanded Chinook Salmon Production Pathways

Expanded fish production may occur wholly within one hatchery or with a combination of two of more facilities. Broodstock collection, incubation, growout, and acclimation and release may occur at one facility or a combination of multiple facilities. Most pathways in this SRKW Master Plan prescribe all pathway components to occur wholly within one hatchery (Table 4-1). However, the following pathways require multiple facilities.

- Fish production at Palmer Ponds requires broodstock collection at the Soos Creek Hatchery.
- Fish production at the Beaver Creek hatchery requires acclimation and release at the Deep River net pens.
- Fish production at the Speelyai Hatchery requires acclimation and release at the Lewis River Hatchery.
- Growout at Hupp Springs requires incubation and early rearing at the Minter Creek Hatchery. Alternatively, incubation and early rearing may also occur at Hupp Springs.
- Growout at the Coulter Creek Ponds requires incubation and early rearing at the Minter Creek Hatchery.
- Fish production at the McKernan Hatchery requires broodstock collection at the George Adams Hatchery.
- Fish production at the Puyallup and Voights Creek hatcheries may require broodstock collection at the other facility, respectively.
- Fish production at the Carlson Salmon Farms requires off-site acclimation and release, because the Carlson Salmon Farms is a land-locked facility, relying wholly on groundwater. Acclimation and release could occur at a Puget Sound net pen. This facility must be provided with green or eyed eggs from a WDFW facility.
- Fish production at the Cooke Aquaculture - Scatter Creek Hatchery requires off-site acclimation and release, because the Cooke Aquaculture - Scatter Creek Hatchery is a land-locked facility, relying wholly on groundwater. Acclimation and release could also occur at a Puget Sound net pen. This facility must be provided with green or eyed eggs from a WDFW facility.
- Fish production at multiple facilities requires acclimation and release within or at off-station locations within the watershed.
- Additional fish production at Whitehorse will require an out of basin release site location.

In addition, the WDFW will retain flexibility in defining variations in pathways that may include multiple facilities. Examples include the following:

- Fish production at the Wallace River Hatchery may require acclimation and release outside of the Skykomish basin. Potential options include acclimation and release at the Samish Hatchery or in a marine net pen to align better with management objectives.
- Fish production at the Humptulips Hatchery could result in acclimation and release outside of the Humptulips/Chehalis watershed or at a marine net pen to align better with management objectives.
- Fish production at the Bogachiel Hatchery could result in acclimation and release outside of the Bogachiel watershed or at a marine net pen to align better with management objectives.
- Fish production at the Elwha Hatchery could result in acclimation and release outside of the Elwha watershed or at a marine net pen to align better with management objectives.
- Coho Salmon production at north sound hatcheries (e.g., Marblemount Hatchery) intended for Squaxin Net Pen release may be accommodated by expansion of south sound WDFW facilities (e.g., Puyallup Hatchery), thereby allowing for more Chinook production at north sound WDFW facilities.
- Fish production at the Carlson Salmon Farms and Cooke Aquaculture - Scatter Creek hatcheries may include acclimation and release at a WDFW-owned hatchery, and/or a Puget Sound net pen for delayed release.
- Fish production at the Carlson Salmon Farms and Cooke Aquaculture - Scatter Creek hatcheries may be used to replace Coho Salmon or steelhead production currently programmed for WDFW facilities, so that Chinook salmon may be produced at those WDFW facilities. The Carlson Salmon Farms and Cooke Aquaculture - Scatter Creek hatcheries are examples of facilities that have year around groundwater that are also suited for yearling fish production.
- Fish production at the proposed Deschutes River Hatchery may require broodstock collection at the Tumwater Falls Hatchery.

During implementation of the SRKW Hatchery Management Plan, the WDFW will leverage facility capacity in their network, as appropriate and consistent with other policies and HGMPs, to maximize additional fish production for increased SRKW prey availability.

Table 4-1. Pathways for Expanded Chinook Production at Existing Facilities

WDFW Region	Pathway Name	Broodstock	Incubation/Early Rearing	Grow Out	Acclimation/ Release	Production
1	Lyons Ferry	Lyons Ferry	Lyons Ferry	Lyons Ferry	Lower Snake	Fall Chinook Subs
4	Kendall Creek	Nooksack River	Kendall Creek	Kendall Creek	Nooksack River	Spring Chinook Subs
4	Palmer Ponds	Soos Creek	Palmer Ponds	Palmer Ponds	Green River Watershed	Fall Chinook Subs
4	Samish	Samish River	Samish	Samish	Samish	Fall Chinook Subs
4	Wallace River	Wallace River	Wallace River	Wallace River	Wallace River	Summer Chinook Subs
4	Whitehorse[2]	TBD	Whitehorse	Whitehorse	TBD	Chinook Subs
5	Beaver Creek	TBD	Beaver Creek	Beaver Creek	Deep River Net Pens	Fall/Spring Chinook Subs
5	Speelyai	Lewis River	Speelyai	Speelyai	Lewis River	Spring Chinook Subs
6	Bogachiel	TBD	Bogachiel	Bogachiel	Bogachiel	Chinook Subs
6	Dungeness	Hurd Creek	Dungeness	Dungeness	Dungeness	Spring Chinook Yearlings
6	Elwha	Elwha	Elwha	Elwha	Elwha	Fall Chinook Subs
6	Humptulips	TBD	Humptulips	Humptulips	Humptulips	Fall Chinook Subs
6	Hupp Springs	Minter Creek	Minter Creek[1]	Hupp Springs	Hupp Springs	Fall Chinook Subs
6	Coulter Creek	Minter Creek	Minter Creek	Coulter Creek	Coulter Creek	Fall Chinook Subs
6	McKernan	George Adams	McKernan	McKernan	Skokomish Watershed	Fall Chinook Subs
6	Naselle	Naselle	Naselle	Naselle	Naselle	Fall Chinook Subs
6	Nemah	Nemah	Nemah	Nemah	Nemah	Fall Chinook Subs
6	Puyallup	Puyallup/ Voights	Puyallup	Puyallup	Puyallup Watershed	Fall Chinook Subs

WDFW Region	Pathway Name	Broodstock	Incubation/Early Rearing	Grow Out	Acclimation/ Release	Production
6	Voights Creek	Puyallup/ Voights	Voights	Voights	Puyallup Watershed	Fall Chinook Subs
6	Sol Duc	Sol Duc River	Sol Duc	Sol Duc	Sol Duc	Summer Chinook Subs
6	Carlson Salmon Farms	TBD	Carlson Salmon Farms	Carlson Salmon Farms	PS Net Pens	Fall Chinook Subs
6	Cooke Aquaculture - Scatter Creek	TBD	Cooke Aquaculture - Scatter Creek	Cooke Aquaculture - Scatter Creek	PS Net Pens	Fall Chinook Subs
6	Deschutes	Deschutes River	Deschutes	Deschutes	Deschutes	Fall Chinook Subs (3.0M); Fall Chinook Yearlings (0.2); Fall Chinook Subs to TF (0.8M)

[1] Incubation may also occur at Hupp Springs, using broodstock from Minter Creek.

[2]Understanding the current recovery program on the Stillaguamish would not support the release of additional chinook into the system, Whitehorse exists in this Master Plan as having the land and water available to rear fish which could be released in a different location. Opportunities could be considered to enhance the existing restoration process after additional consultation between co-managers.

4.1 Marine Net Pens

State, tribal, and private hatchery operators have used marine net pens for many years to acclimate native salmonid smolts to the marine environment and encourage fidelity to interior waters of Puget Sound. WDFW is currently evaluating the use of net pens for acclimation and late- or delayed-rearing and release.

In the context of this Master Plan, the use of marine net pens for juvenile acclimation and release may be considered for hatchery programs located in watersheds that have limits on freshwater releases imposed by co-managers or existing ESA policies. The transfer of juveniles from hatcheries to marine net pens for release would avoid freshwater releases of juvenile hatchery salmon into waterbodies that are occupied by native populations that have state or federal protections, including release thresholds established under the ESA to limit ecological interactions between hatchery and wild fish (e.g., competition, predation).

WDFW's approach to the use of marine net pens for acclimation or delayed release of salmon for SRKW prey enhancement considers the following steps for potential implementation:

1. Locate a land-based facility for freshwater rearing, this may even include leased options at private facilities. This step is mandatory before proceeding to subsequent steps.
2. Upon location of a land-based facility for freshwater rearing, determine net pen array design, layout, construction options, and installation. WDFW's preference is to approach net pens in smaller increments and build upon those numbers over time.
3. Consultation with co-managers to develop agreements for net pen use in SRKW prey enhancement pathways
4. Consult with NOAA Fisheries and/or USFWS to determine potential ESA compliance pathways, and initiate permitting for installation and use of net pens. This includes obtaining NPDES permits for fish effluent in the marine environment. WDFW notes that freshwater NPDES permitting for existing net pens (e.g., Deep River Net Pens) is difficult to obtain; however, permits in the marine environment appear attainable.

The co-manager consultation and ESA/Permitting steps would occur simultaneously. Ideally, a pilot project would be developed in the South Sound, where ESA compliance may be more easily attainable. Under this strategy, the WDFW would ideally focus marine net pen use at existing and potential new facilities that are in dead end bays near a freshwater outlet, to improve the chances of adult homing to natal waters and reduce straying. Successful pilot projects would be used to demonstrate that adult straying can be limited by such an approach.

Currently, the following net pen facilities are considered under this Master Plan and considered in the prioritization analysis (see Section 4 and Section 1): South Sound/Squaxin Island Net Pen (existing facility, Region 6), Agate Passage Net Pen (potential facility, Region 6), Southern Hood Canal Net Pens (potential facility, Region 6), and Deep River Net Pens (existing freshwater facility near Grays Harbor, Region 5). In addition, the Cooke Aquaculture (Cooke) net pens may be available for WDFW lease.

4.2 Private Hatchery Partnerships

Two of the proposed production pathways (i.e., Carlson Salmon Farms and Cooke Aquaculture - Scatter Creek) include the use of private facilities to rear or incubate Chinook Salmon for SRKW prey enhancement. As the pathways are further refined, WDFW will continue to coordinate with private facilities to advance these partnerships. WDFW will also outreach to additional private facilities to determine if other partnerships are possible to support this objective.

One distinct advantage of private facilities is that they typically have the capacity to support production immediately. No capital funds are required for development or upgrades to accommodate production needs. The WDFW may choose to contract with the private entity to produce the fish within certain specifications with their own staff. The private entity would cover their own O&M costs. Alternatively, the WDFW could lease the private facility and operate the facility with state employees and O&M associated with staffing, feed, and utility needs.

4.3 Government/Tribal Hatchery Partnerships

As discussed in Section 2.3, WDFW has coordinated with tribes and local utilities to increase salmonid production at existing facilities since 2019. These entities have a shared desire to address the Orca Task Force hatchery recommendations, and continued partnership toward the 50 million smolt production objective is anticipated. In general, tribal and non-WDFW governmental hatcheries will be explored for additional fish production to enhance SRKW prey availability in future planning efforts. However, this SRKW Hatchery Management Plan includes one federal facility owned by USFWS (Lyons Ferry Hatchery). In addition, Squaxin Island Net Pens (Squaxin Island Tribe) may be used in combination with existing pathways.

5 Hatchery Improvement Projects Prioritization

Increasing Chinook Salmon smolt production to achieve the EO 18-02 directive of 50 million smolts (combined with ongoing Chinook Salmon production targeted for SRKW prey) will require significant operating and infrastructure improvements to existing WDFW hatcheries, as well as creating new hatcheries. The required improvements to support SRKW prey enhancement are additive to WDFW's 10-year CP, which identifies needed rehabilitation of infrastructure to continue current levels of salmon production. This infrastructure will represent a significant investment, and likely will be phased over time. To bring the greatest value for cost, HDR developed a set of prioritizations criteria to inform the potential phasing and sequencing of these improvements while still fitting within expected budget constraints. These criteria are based on the themes and hatchery attributes used when the hatcheries were initially prioritized to determine the order of analysis. However, this step in the prioritization evaluates not just the attributes of the hatcheries, but the attributes of the improvements themselves so that WDFW can look at implementing the most effective solutions as quickly as possible. These prioritization criteria are described below, and are:

a. Prey Availability (35 percent)

b. Co-Manager Consultation (20 percent)

c. Consistent with ESA Principles (20 percent)

d. Constructability/Water Availability (15 percent)

e. Cost-Benefit Ratio (10 percent)

HDR developed definitions for these criteria, weighted them using a point system, and created scales (on a 1 to 5 basis) for each criterion to be used when scoring each pathway (Appendix H). Scores for each of the five prioritization criteria were then weighted to reflect relative importance on a percentage scale. This chapter will discuss the definitions, weights, and scales for the criteria in greater detail, and present the ranked inventory of pathways and projects as a result of this prioritization.

5.1 Prey Availability (35 percent weight)

Prioritization based on prey availability was based on three criteria: 1) prey availability score, 2) ranking of project pathways based on scores, and 3) adult return. An average of the three criteria was used for an overall prey availability score for prioritization.

Prey Availability Score: Pathways were evaluated for prey availability based on scores reported in NOAA and WDFW (2018). NOAA Fisheries and WDFW developed a prey availability framework to identify Chinook Salmon stocks that are important to SRKW to assist in prioritizing actions to increase critical prey for the whales.

The framework includes three factors that contribute to the identification of priority Chinook Salmon stocks, including:

1. Is Chinook stock observed in diet? If a Chinook stock was more than 5 percent of the diet the stock receives 1 point.
2. Is the Chinook stock consumed during times of potential reduced body condition? If a stock is consumed from October to May it receives 1 point.
3. What is the degree of spatial and temporal overlap with SRKW? Seven spatial and temporal overlap combinations were defined and weighted. The weighting applied the highest score to Salish Sea and Washington coast waters. These areas were twice as important as other areas, because of the spatial and temporal overlap with the SRKW.

A total score is calculated by adding up the three individual factor scores. The Chinook Salmon stocks with the highest total scores were the highest priority to increase abundance to benefit the whales.

Existing NOAA and WDFW Hatchery Ranking: The individual pathways were population specific and were cross-referenced to the stock groups with prey availability scores. Pathways were scored from 5 (highest prey availability score) to 1 (lowest score). NOAA and WDFW (2018) did not provide a prey availability score for Puget Sound summer Chinook. It was assumed for this analysis summer and summer/fall pathways in Puget Sound should receive the Puget Sound Fall Chinook score. Timing of Puget Sound summer/fall hatchery populations tends to range from July to September with river entry from mid-August to early October.

Adult Returns: WDFW provided survival rates from release to adult for pathways that are an expansion of an existing program. Survival rates provided varied from 0.10 percent to 0.82 percent. Rates were from a range of release years and were not consistent among the pathways therefore should only be used as an approximate estimate of potential adult return from a pathway. Most of the rates were between 0.30 percent and 0.60 percent. Pathways with a survival rate less than 0.30 percent were scored a 1 (6 pathways), pathways with a rate between 0.30 percent and 0.60 percent were scored a 3 (13 pathways), and pathways with a rate greater than 0.60 percent were score a 5 (5 pathways). Pathways that do not have an existing program (e.g., Puget Sound net pen releases) were scored a 3.

5.2 Co-Manager Consultation (20 percent weight)

WDFW has used information expressed in previous informal discussions with co-managers to guide the screening process with the affected tribal governments and will continue consultation consistent with WDFW policy 5007 (WDFW 2020) for communication, coordination, and consultation with tribal governments (see Section 2.3). Co-manager consultation on production increases for SRKW may be complex and may require additional monitoring resources with a phased approach for some pathways. Additional formal conversations will be required with the tribal governments.

Pathways were evaluated and scored based on past WDFW informal meetings/ conversations with different tribes. A score of 1 was used for pathways that co-managers are less aligned with to existing watershed basin strategies and a score of 5 was used for pathways that are more aligned with existing watershed basin strategies.

5.3 Consistent with Endangered Species Act Principles (20 percent weight)

Nearly all pathways will require consultation with NOAA Fisheries for ESA compliance (3 score). Pathways that occur in watersheds with no ESA listed salmonids were scored a 5. Watersheds where the hatchery is a key component of the population recovery plan and increased production may not be consistent with the recovery plan were scored a 1.

5.4 Constructability/Water Availability (15 percent weight)

Constructability was evaluated in terms of the speed of (construction) implementation. A low score of 1 indicates that the expansion is significant and would require site investigations such as floodplain, cultural resources, environmental surveys, etc. There may be other impediments that require approval from county, state or federal agencies. Predesign and design are required and funding for the project has not been secured. A high score of 5 indicates that the area designated for construction needs little or no outside agency approval, investigations are not required (usually previously disturbed soils) and the construction cost is less than $5,000,000 eliminating the need for predesign analysis. Funding is anticipated to be (or has been) approved by the state legislature.

Water availability for a pathway was given a low score of 1 if the existing water supply is fully or over-utilized (reuse), geotechnical reviews indicate lack of available groundwater and existing water rights are utilized. Surface water quality and or temperature degradation increasing due to changes within the watershed and/or climate change adverse impacts also influenced a lower score. A high score of 5 indicates that developed groundwater water supplies are not fully utilized allowing for expansion without improving infrastructure, and/or no need for development of new water and no need for increasing water rights. Surface water supplies are scored slightly less as they are not considered to be pathogen free and are not immune to water quality degradation outside of WDFW control.

An average of both criteria was used for an overall constructability/ water availability score for prioritization.

5.5 Cost-Benefit Ratio (10 percent weight)

The cost per benefit of each facility was estimated in terms of cost per fish produced, on a 30-year basis. WDFW estimated the capital costs plus 30 years of O&M costs. The capital and O&M costs are in present-day dollars. Benefits are the number of fish produced over those same 30 years. The cost per benefit metric was calculated by dividing the cost by the benefit. Cost per benefit was scored on a relative basis, trisecting distribution among the pathways. A high score of 5 indicates a cost-benefit ratio less than $0.31 per fish. A medium score of 3 indicates a cost-benefit ratio between $0.31 and $0.39 per fish. Finally, a low score of 1 indicates a cost-benefit ratio greater than $0.39 per fish.

5.6 Prioritization Results – Ranked List of Projects

Each project received a total priority score based on the scoring scales and criteria weights described above. Existing capital projects in the 10-year CP were not scored using this process but are included in the implementation plan. This prioritization process is paired with a tool to help WDFW target high-value, highly feasible projects first. This tool, developed by HDR Engineering Inc., is called EconH2O and will support WDFW in being flexible. This also includes accomplishing predesign and design activities in the right timeframe, and balancing construction needs as possible. However, conditions change over a 10-year planning window, and WDFW is utilizing the EconH2O tool to keep the master plan up to date. The tool also considers available budget, predecessor relationships, and relative to priority, the tool automatically develops a suggested implementation schedule. Section 1 discusses the suggested implementation plan and schedule based on priority scores and budget assumptions.

Table 5-1. Ranked Inventory of SRKW Projects.

Priority #	Priority Score	Project Name	Expense Type
1	85.00	Voights Creek- Predesign	SRKW Pathway
1	85.00	Voights Creek- Design	SRKW Pathway
1	85.00	Voights Creek- Construction	SRKW Pathway
2	84.50	Samish- Predesign	SRKW Pathway
2	84.50	Samish- Design	SRKW Pathway
2	84.50	Samish- Construction	SRKW Pathway
3	81.33	Palmer Ponds- Predesign	SRKW Pathway
3	81.33	Palmer Ponds- Design	SRKW Pathway
3	81.33	Palmer Ponds- Construction	SRKW Pathway
4	79.50	Puyallup 1- Predesign	SRKW Pathway
4	79.50	Puyallup 1- Design	SRKW Pathway
4	79.50	Puyallup 1- Construction	SRKW Pathway
5	74.50	Naselle- Predesign	SRKW Pathway
5	74.50	Naselle- Design	SRKW Pathway
5	74.50	Naselle- Construction	SRKW Pathway
6	73.89	Kendall Creek- Predesign	SRKW Pathway
6	73.89	Kendall Creek- Design	SRKW Pathway
6	73.89	Kendall Creek- Construction	SRKW Pathway
7	70.47	Beaver Creek- Predesign	SRKW Pathway
7	70.47	Beaver Creek- Design	SRKW Pathway
7	70.47	Beaver Creek- Construction	SRKW Pathway
8	70.00	McKernan- Predesign	SRKW Pathway
8	70.00	McKernan- Design	SRKW Pathway

Priority #	Priority Score	Project Name	Expense Type
8	70.00	McKernan- Construction	SRKW Pathway
9	69.33	Wallace River- Predesign	SRKW Pathway
9	69.33	Wallace River- Design	SRKW Pathway
9	69.33	Wallace River- Construction	SRKW Pathway
10	69.33	Hupp Springs- Predesign	SRKW Pathway
1210	69.33	Hupp Springs- Design	SRKW Pathway
1210	69.33	Hupp Springs- Construction	SRKW Pathway
11	66.17	Coulter Creek- Predesign	SRKW Pathway
11	66.17	Coulter Creek- Design	SRKW Pathway
11	66.17	Coulter Creek- Construction	SRKW Pathway
12	63.72	Marblemount- Predesign	SRKW Pathway
12	63.72	Marblemount- Design	SRKW Pathway
12	63.72	Marblemount- Construction	SRKW Pathway
13	62.92	Lyons Ferry- Predesign	SRKW Pathway
13	62.92	Lyons Ferry- Design	SRKW Pathway
13	62.92	Lyons Ferry- Construction	SRKW Pathway
14	62.44	Sol Duc- Predesign	SRKW Pathway
14	62.44	Sol Duc- Design	SRKW Pathway
14	62.44	Sol Duc- Construction	SRKW Pathway
15	62.17	Elwha- Predesign	SRKW Pathway
15	62.17	Elwha- Design	SRKW Pathway
15	62.17	Elwha- Construction	SRKW Pathway
16	59.94	Humptulips- Predesign	SRKW Pathway
16	59.94	Humptulips- Design	SRKW Pathway
16	59.94	Humptulips- Construction	SRKW Pathway
17	59.00	Nemah- Predesign	SRKW Pathway
17	59.00	Nemah- Design	SRKW Pathway
17	59.00	Nemah- Construction	SRKW Pathway
18	57.94	Bogachiel- Predesign	SRKW Pathway
18	57.94	Bogachiel- Design	SRKW Pathway
18	57.94	Bogachiel- Construction	SRKW Pathway
19	55.17	Whitehorse- Predesign	SRKW Pathway
19	55.17	Whitehorse- Design	SRKW Pathway
19	55.17	Whitehorse- Construction	SRKW Pathway
20	51.05	Dungeness- Predesign	SRKW Pathway

Priority #	Priority Score	Project Name	Expense Type
20	51.05	Dungeness- Design	SRKW Pathway
20	51.05	Dungeness- Construction	SRKW Pathway

6 Prioritization Results and Implementation Plan

With the list of projects established, this chapter focuses on using the prioritized list of capital projects to develop the long-term capital plan and budget. Implementation planning includes placing the prioritized facility improvements in the context of WDFW's existing schedule of the 10-year CP and establishing opinions of probable construction cost (cost estimates) for each of the improvements. WDFW used the Office of Financial Management (OFM) C-100 Forms to compile cost estimates, and these forms are provided for each project in Appendix E. The recommended improvements are assumed to be in addition to the existing CP, which is needed to maintain current salmon production. This chapter will present the budget and capital planning process, connections between projects, opinions of probable construction cost, and estimated budget forecasts and project implementation schedule.

The implementation plan does not include the Speelyai Hatchery or the private facilities (i.e, Carlson Ponds and Scatter Creek Hatchery) because no capital projects are required to accomplish additional Chinook production. The implementation plan does not include the proposed Deschutes River Hatchery as it is already established in the CP, or the potential Cowlitz River State Salmon Hatchery as it was established by the legislature as a priority and requires further evaluation.

6.1 Prioritized List of Projects and Proposed Implementation Plan

The various improvements are modeled to be completed over the next 10 to 20 years, depending on budget and resources available. Each of these SRKW pathway projects must complete predesign (if over $5M total project cost), permitting, cultural review, and design before moving into a construction phase. The schedule assumes $7.5M each year (or $15M per biennium) available for SRKW pathway improvements. It is possible that some predesign and design activities could be accelerated to use more available budget early-on. However, to avoid sunk costs (i.e., money that has already been spent and which cannot be recovered) or major changes, these activities are assumed to occur immediately before construction is scheduled. Projects are sequenced in priority order when possible, with respect to the constraints described above.

There is an exception to the FY 21-23 projects. As the deadline for submission of the FY 21-23 capital budget was prior to the submission of this report, the FY 21-23 projects were identified by WDFW's Fish Program and chosen for their ability to be accomplished within a biennium, and provide a quick response for the need for more SRKW prey.

Table 5-1 shows the ranking of the SRKW Capital Projects along with the 10-year CP (represented each biennium). Appendix I shows the full implementation schedule of the master plan, combined with the 10-year CP.

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Table 6-1. Pathway Implementation Schedule and Escalated Costs

Priority	Project	FY21-23	FY23-25	FY25-27	FY27-29	FY29-31	FY31-33	FY33-35	FY35-37	FY37-39	FY39-41	FY41-43	FY43-45	FY45-47
1	Voights Creek SRKW Expansion Project	$3,551,000	$3,604,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
2	Samish SRKW Expansion Project	$-	$101,000	$1,243,000	$8,094,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
3	Palmer Ponds SRKW Expansion Project	$-	$49,000	$774,000	$3,971,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
4	Puyallup SRKW Expansion Project	$-	$62,000	$897,000	$5,026,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
5	Naselle SRKW Expansion Project	$-	$129,000	$1,487,000	$10,338,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
6	Kendall Creek SRKW Expansion Project	$4,317,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
7	Beaver Creek SRKW Expansion Project	$-	$110,000	$1,341,000	$-	$9,245,000	$-	$-	$-	$-	$-	$-	$-	$-
8	McKernan SRKW Expansion Project	$-	$-	$-	$-	$811,000	$4,052,000	$-	$-	$-	$-	$-	$-	$-
9	Wallace River SRKW Expansion Project	$-	$-	$-	$-	$-	$89,000	$-	$1,201,000	$7,835,000	$-	$-	$-	$-
10	Hupp Springs SRKW Expansion Project	$-	$-	$-	$-	$93,000	$-	$1,238,000	$-	$-	$8,184,000	$-	$-	$-
11	Coulter Creek SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$710,000	$-	$3,393,000	$-	$-
12	Marblemount SRKW Expansion Project	$-	$-	$121,000	$1,457,000	$4,933,000	$4,933,000	$-	$-	$-	$-	$-	$-	$-
13	Lyons Ferry SRKW Expansion Project	$-	$-	$-	$-	$241,000	$-	$2,502,000	$10,450,000	$10,450,000	$-	$-	$-	$-
14	Sol Duc SRKW Expansion Project	$975,000	$-	$-	$8,161,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
15	Elwha SRKW Expansion Project	$-	$-	$121,000	$1,445,000	$9,624,000	$-	$-	$-	$-	$-	$-	$-	$-
16	Humptulips SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$149,000	$-	$1,746,000	$13,122,000	$-	$-	$-
17	Nemah SRKW Expansion Project	$-	$-	$92,000	$-	$1,215,000	$-	$7,749,000	$-	$-	$-	$-	$-	$-
18	Bogachiel SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$160,000	$1,844,000	$7,051,000	$7,051,000
19	Whitehorse SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$102,000	$1,326,000	$9,018,000	$-
20	Dungeness SRKW Expansion Project	$-	$-	$-	$-	$-	$-	$-	$-	$-	$250,000	$2,618,000	$11,063,000	$11,063,000
NA	SRKW- New Cowlitz Hatchery	$300,000	$4,500,000	$20,000,000	$13,986,000									
NA	**Total SRKW Budget Request**	**$9,143,000**	**$8,555,000**	**$26,076,000**	**$52,478,000**	**$26,162,000**	**$9,074,000**	**$11,638,000**	**$11,651,000**	**$20,741,000**	**$21,818,000**	**$9,181,000**	**$27,132,000**	**$18,114,000**
NA	Existing 10-Year Capital Budget Request[2,3]	$272,977,000	$200,282,000	$276,068,000	$125,551,000	$482,866,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NA	**Total Budget Request[4, 5]**	**$282,120,000**	**$208,858,000**	**$300,109,000**	**$164,570,000**	**$500,888,000**	**$18,779,000**	**$11,653,000**	**$11,675,000**	**$20,785,000**	**$21,894,000**	**$9,166,000**	**$27,214,000**	**$18,166,000**

[1] Costs in the table, particularly FY 23-25 costs, represent a snapshot in time and are expected to change
[2] These existing 10-Year capital budget requests do not include SRKW FY 21-23 project requests for Kendall Creek, Voights Creek, and Sol Duc, and New Cowlitz Hatchery projects, which are included in the SRKW line items in the table.
[3] Does not include re-appropriation.
[4] The total budget request does not include expected future capital budget request, needed to maintain current production levels, beyond FY29-31. It is expected this will be developed in the future.
[5] Future budget, beyond FY21-23, will not perfectly match WDFW's current budget forecast for SKRW projects, due to escalation and recommended changes.

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6.2 Pathway Cost Estimates Using OFM C-100 Methodology

Using the OFM C-100 form for estimating capital costs, WDFW created opinions of probable construction costs for each of the proposed SRKW Projects (Appendix E). The estimated MACC, total project cost, and operation and maintenance costs for the selected hatcheries are listed in Table 6-2 and detailed in Appendix F. The implementation plan includes the MACC value, total project cost, as calculated in the C-100 form. The C-100 form also includes cost assumptions for additional consultant services for each project—a geotechnical investigation ($15,000, $ 2020), site survey ($15,000, $ 2020), permitting ($150,000, $ 2020), and wetland study ($25,000, $ 2020). Costs are presented both in 2020 base-year dollars, as well as estimated escalated costs based on the proposed implementation plan in Section 6.1. Escalation is to the midpoint of design and midpoint of construction, using the C-100 value of 2.38 percent. The C-100 form only has available a design completion window through 2030 and construction completion window through 2036. As such, projects that are scheduled from 2036 through 2042 have been escalated to 2036 for the purposes of this report. The actual escalation for these projects will be larger than what is shown on the C-100 forms. The total estimated O&M costs for each facility considered costs associated with power needs, labor, maintenance, fish feed, and fish health. Preliminary O&M cost opinions are provided in Appendix G.

6.3 10-Year Capital Planning and Budgeting Process

WDFW creates and submits a capital budget biennially as a part of the State of Washington's two-year budget cycle. The budget includes requested funds to make investments in existing and new infrastructure. O&M costs are not included in the capital budget and are submitted separately in a biennial operating budget request. WDFW has an existing 10-year CP, which does not currently include any of the proposed SRKW improvements introduced in this master plan beyond FY21-23, pending finalization of this report. Prior to completing this report and the prioritized project list, WDFW selected certain projects to move forward in the FY21-23 budget. This report has further refined the costs of these projects, which differs from the current capital budget request. These projects are:

- Kendall Creek SRKW Hatchery Expansion (Predesign, Design, Construction)
- Voights Creek SRKW Hatchery Expansion (Predesign, Design, Construction)
- Sol Doc SRKW Hatchery Expansion (Predesign, Design)
- New Cowlitz Hatchery (Predesign)

The capital budget process is detailed and includes several critical steps prior to construction. Typically, initiating a project includes the following steps:

1. Identifying project need
2. Prioritizing projects by agency need
3. Developing C-100 budget request form and securing funding

4. Communication with co-managers, special interest groups, and legislature.

Once funded by the legislature, the project implementation begins.

1. Predesign for projects that cost over $5,000,000
2. Permitting and environmental review and coordination
3. Design
4. Construction
5. Closeout and startup

In developing the prioritized list of projects and implementation plan for this master plan, it is assumed that Steps 1 through 4 is an ongoing process in which a final budget request is submitted on even numbered years for submittal to the legislature prior to session. Step 5 would then occur over the course of one biennium. Steps 6 and 7 occur over the course of another biennium, and Step 8 occurs over the course of a third biennium. For projects with a cost greater than $13M, construction (Steps 8-9) should be expected to span two biennia. Only three projects are estimated to fall into this exception when costs are escalated: Marblemount Hatchery Expansion, Lyons Ferry, Bogachiel, and the New Cowlitz Hatchery.

It is important to consider escalating (or inflating) costs over time. This accounts for the increase of prices from the current cost estimate, which was completed in 2020 dollars. Figure 6-1 graphically shows the expected budget presented in Table 6-1. The escalation of these costs was calculated using the OFM C-100 forms. The light blue bars are existing capital projects and the dark blue bars represent additional budget anticipated for the proposed SRKW pathway improvements to increase salmon production.

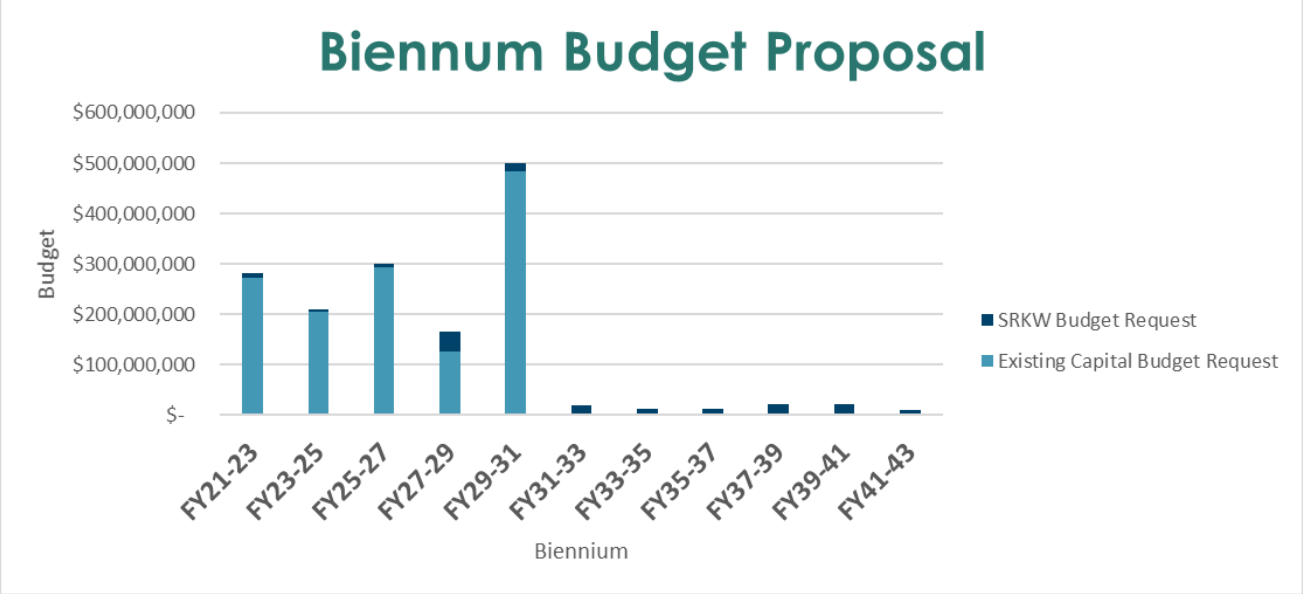

Figure 6-1. Biennium budget proposal ($ escalated).

Table 6-2. Southern Resident Killer Whale Hatchery Improvement Master Plan pathway MACC and annual O&M costs ($ 2020).

Priority Rank	Priority Score	Project Name (Production Pathway)	Hatchery	Scope	Owner	Legislative District	SRKW Zone	Proposed SRKW Prey Production	Predesign Cost (escalated)	Design Cost (escalated)	Construction Cost (escalated)	Total Capital Costs (escalated)	Additional Annual O&M Cost
1	85	Voights Creek SRKW Expansion Project	Voights Creek Hatchery	50% PRAS, incubation, & circular tanks	WDFW	31	Puget Sound	1,000,000	$77,000	$997,000	$6,081,000	$7,155,000	$161,000
2	85	Samish SRKW Expansion Project	Samish Hatchery	New wells, 70% PRAS, incubation, & raceway	WDFW	40	Puget Sound	1,000,000	$101,000	$1,243,000	$8,094,000	$9,438,000	$141,000
3	81	Palmer Ponds SRKW Expansion Project	Palmer Ponds Hatchery	Spring rehabilitation, incubation, & raceways	WDFW	5	Puget Sound	600,000	$49,000	$774,000	$3,971,000	$4,794,000	$152,000
4	80	Puyallup SRKW Expansion Project	Puyallup Hatchery	70% PRAS & raceways	WDFW	25	Puget Sound	575,000	$62,000	$897,000	$5,026,000	$5,985,000	$97,000
5	75	Naselle SRKW Expansion Project	Naselle Hatchery	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	WDFW	19	Coastal	2,000,000	$129,000	$1,487,000	$10,338,000	$11,954,000	$249,000
6	74	Kendall Creek SRKW Expansion Project	Kendall Creek Hatchery	New wells, incubation, & raceways	WDFW	42	Puget Sound	700,000	$0	$641,000	$3,015,000	$3,658,000	$103,000
NA	74	Speelyai SRKW Expansion Project	Speelyai Hatchery	No capital project required	Private	20	Columbia Basin	500,000	$0	$0	$0	$0	$157,000
NA	71	Scatter Creek SRKW Expansion Project	Cooke Aquaculture - Scatter Creek	No capital project required	Private	35	Puget Sound	1,400,000	$0	$0	$0	$0	$254,800
7	70	Beaver Creek SRKW Expansion Project	Beaver Creek Hatchery	Incubation & raceways	WDFW	19	Columbia Basin	2,000,000	$110,000	$1,341,000	$9,245,000	$10,696,000	$213,000
8	70	McKernan SRKW Expansion Project	McKernan Hatchery	New wells, incubation, & raceways	WDFW	35	Puget Sound	500,000	$0	$811,000	$4,052,000	$4,863,000	$101,000
NA	70	Carlson Farms SRKW Expansion Project	Carlson Salmon Farms	No capital project required	Private	35	Puget Sound	750,000	$0	$0	$0	$0	$136,500
9	69	Wallace River SRKW Expansion Project	Wallace River Hatchery	50% PRAS, incubation, surface water filtration, & circular tanks	WDFW	39	Puget Sound	1,000,000	$89,000	$1,201,000	$7,835,000	$9,125,000	$172,000
10	69	Hupp Springs SRKW Expansion Project	Hupp Springs Hatchery	50% PRAS, incubation, circular tanks, PA pond modifications	WDFW	26	Puget Sound	650,000	$93,000	$1,238,000	$8,184,000	$9,515,000	$129,000
11	66	Coulter Creek SRKW Expansion Project	Coulter Creek Ponds	Raceways	WDFW	35	Puget Sound	500,000	$0	$710,000	$3,393,000	$4,103,000	$108,000
12	64	Marblemount SRKW Expansion Project	Marblemount Hatchery	Incubation & raceways	WDFW	39	Puget Sound	2,000,000	$121,000	$1,457,000	$9,866,000	$11,444,000	$262,000
13	63	Lyons Ferry SRKW Expansion Project	Lyons Ferry Hatchery	New wells, incubation, & raceways	USFWS	9	Columbia Basin	2,000,000	$241,000	$2,502,000	$20,900,000	$23,643,000	$219,000
14	62	Sol Duc SRKW Expansion Project	Sol Duc Hatchery	50% PRAS w/ incubation and circular tanks	WDFW	24	Coastal	1,000,000	$93,000	$1,177,000	$7,866,000	$9,136,000	$155,000
15	62	Elwha SRKW Expansion Project	Elwha Channel Hatchery	Incubation & raceways	WDFW	24	Puget Sound	2,000,000	$121,000	$1,445,000	$9,624,000	$11,190,000	$277,000
16	60	Humptulips SRKW Expansion Project	Humptulips Hatchery	Incubation, raceways, feed storage & head tank	WDFW	24	Coastal	2,000,000	$149,000	$1,746,000	$13,122,000	$15,017,000	$278,000

Priority Rank	Priority Score	Project Name (Production Pathway)	Hatchery	Scope	Owner	Legislative District	SRKW Zone	Proposed SRKW Prey Production	Predesign Cost (escalated)	Design Cost (escalated)	Construction Cost (escalated)	Total Capital Costs (escalated)	Additional Annual O&M Cost
17	59	Nemah SRKW Expansion Project	Nemah Hatchery	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	WDFW	19	Coastal	1,000,000	$92,000	$1,215,000	$7,749,000	$9,056,000	$166,000
18	58	Bogachiel SRKW Expansion Project	Bogachiel Hatchery	50% PRAS, incubation, circular tanks, spring improvements	WDFW	24	Coastal	2,000,000	$160,000	$1,844,000	$14,102,000	$16,106,000	$111,000
19	55	Whitehorse SRKW Expansion Project	Whitehorse Hatchery	New wells, 50% PRAS, incubation, & circular tanks	WDFW	39	Puget Sound	1,000,000	$102,000	$1,326,000	$9,018,000	$10,446,000	$141,000
20	51	Dungeness SRKW Expansion Project	Dungeness Hatchery	50% PRAS, incubation, raceways, new wells, & surface water treatment	WDFW	24	Puget Sound	1,000,000	$250,000	$2,618,000	$22,126,000	$24,994,000	$405,000
NA[1]	NA	New Deschutes River Hatchery Project	Deschutes River Hatchery (proposed)	New facility	WDFW (proposed)	22	Puget Sound	4,000,000	NA	NA	NA	NA	NA
NA[1]	NA	New Cowlitz Hatchery Project	Cowlitz Hatchery (proposed)	New facility	WDFW (proposed)	20	Columbia Basin	5,250,000	NA	NA	NA	NA	NA
					Total New SRKW Chinook Prey Production Potential under Master Plan			36,425,000					
					WDFW – 2019 Chinook Salmon Production Goal			9,125,000					
					Tribal and Utility Chinook Salmon Production – 2019 Production Goal[3]			5,350,200					
					TOTAL SRKW Prey Enhancement – Chinook Salmon			50,950,200					

[1] Proposed or potential facility; prioritization score not yet evaluated.

[2] Production at Coulter Ponds may be supported by expansion of the hatchery building at the Minter Creek Hatchery. The additional annual O&M costs for Coulter Ponds include the additional O&M costs needed for incubation at Minter Creek Hatchery.

[3] Funding for Tribal and Utility production is based on a two-year funding allotment; the future of this funding allotment is uncertain.

4 The Scatter Creek and Carlson Farms additional O&M costs are internal estimates which have not yet been negotiated between WDFW and the owners of these hatcheries. These O&M costs should be understood as order of magnitude estimates.

For the purpose of creating the implementation plan, it was assumed that the additional budget identified for SRKW specific projects will be an approximate additional $15M per biennium in 2020 dollars, however it is expected that this value will escalate as well. With this assumed constraint, the SRKW improvements carry on beyond the existing 10-year CP, however it is likely that this forecast will be updated with additional capital projects needed to manage existing infrastructure beyond the current 10-year horizon. Given that each of the pathways will need preliminary design, design, and permitting prior to construction, these lower-cost items are completed earlier in this 27-year horizon. $15M per year each biennium as a constraint is not enough to fund all the SRKW improvements in 20 years. As such, the projects are forecasted to continue through FY45-47.

6.4 Comparison of Projects Common to 10-Year Capital Plan and SRKW Master Plan

The SRKW pathway improvements are largely proposed at the existing hatchery facilities. Existing CP projects in the 10-year budget will also be making needed improvements at these facilities to maintain current levels of fish production. While the two activities are not tied together, this section presents the potential connections that exist between these two types of investment activities. Where possible, the plan notes potential reliance of the SRKW pathway on the pre-existing CP project and the recommended sequence of events. This information is not currently used in the implementation plan but is intended to be considered during detailed planning and predesign efforts for the improvements. Table 6-3 presents these relationships by hatchery.

6.5 Adaptive Management

Adaptive Management is the principle of updating the implementation plan as needed to meet changing conditions, needs, or goals. The schedule described above represents a point in time, based on what is known today. The schedule will need to be flexible as WDFW implements pathways, receives additional guidance from the Orca Task Force or Governor's office, and as more biological information becomes available regarding the SRKWs. This plan has built up to the principal that these pathways are the best means to achieve WDFW's goal of increasing salmon production. Using the EconH2O tool will support this process of adapting the plan.

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Table 6-3. Comparison of Projects Common to 10-Year Capital Plan and SRKW Master Plan

Hatchery	WDFW 10-yr Capital Budget (10-yr CB) Plan Projects			SRKW Hatchery Master Plan			Do SRKW MP improvements rely on Capital Budget Improvements?	Does SRKW MP construction overlap/follow/precede Capital Budget construction?
	Ten Year CB Rank	Description	Years Proposed	SRKW Prioritization	Description	Years Proposed		
Voights	55	Construct Additional Raceways	2029-2031	1	50% PRAS, incubation, & circular tanks	2021-2025	No	Precede
Samish	22	Friday Creek Intake & Fish Passage	2023-2027	2	New wells, 70% PRAS, incubation, & raceway	2021-2027	Yes	Overlap
Samish	33	Adult Pond Renovation	2025-2029	2	New wells, 70% PRAS, incubation, & raceway	2021-2027	No	Overlap
Palmer Ponds	NA	NA	NA	3	Spring rehabilitation, incubation, & raceways	2021-2027	NA	NA
Puyallup	NA	NA	NA	4	70% PRAS & raceways	2021-2027	NA	NA
Naselle	7	Renovation - Phases 2 and 3 of significant upgrades	2021-2025	5	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	2021-2029	Yes	Overlap
Kendall	21	Replace Gravity and Pumped Intakes	2021-2027	6	New wells, incubation, & raceways	2021-2023	No	Overlap
Beaver Creek	13	Repairs for raceways, holding ponds, and PA pond; Intake improvements	2021-2027	7	Incubation & raceways	2021 - 2031	Yes	Overlap
McKernan	61	Renovate Adult Pond	2029-2031	8	New wells, incubation, & raceways	2029-2033	No	Follow
Wallace River	3	Replace Intakes and Ponds - 3 phases of Upgrades Pending	2021-2025	9	50% PRAS, incubation, surface water filtration, & circular tanks	2031-2039	Yes	Follow
Hupp Springs	NA	NA	NA	10	50% PRAS, incubation, circular tanks, PA pond modifications	2031-2041	NA	NA
Coulter Creek	NA	NA	NA	11	Raceways	2037 - 2043	NA	NA
Marblemount	20	Upgrade intakes on the Cascade River and Clark Creek; Construction of new adult (3) 20X140 adult ponds; Demolition of existing channels; Construction of new super raceways' Construction of a 2-bay pollution abatement pond	2021-2027	12	Incubation & raceways	2025-2035	Yes	Overlap
Lyon's Ferry	NA	NA	NA	13	New wells, incubation, & raceways	2029-2039	NA	NA
Sol Duc	54	Replacing 12 rearing ponds and 1-acre pond; expanding the pollution abatement facilities	2029-2031	14	50% PRAS w/ incubation and circular tanks	2021-2029	No	Precede
Elwha	41	Demolishing the existing asphalt fish rearing channel and residences; Replace with new raceway rearing ponds, a half-acre release pond, bird exclusion, incubation, and new residences.	2027-2031	15	Incubation & raceways	2025-2033	No, but could combine incubation needs	Overlap
Humptulips	56	Replace Ponds and Pipeline; Upgrade large asphalt rearing pond with 20 X 120 WDFW standard design ponds; Upgrade the adult collection pond with WDFW standard design 20 foot wide raceways with crowders	2029-2031	16	Incubation, raceways, feed storage & head tank	2033-2041	Yes	Follow
Nemah	23	Replacement of Facility Access Bridge	2023-2025	17	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	2025-2035	Yes	Follow

Hatchery	WDFW 10-yr Capital Budget (10-yr CB) Plan Projects			SRKW Hatchery Master Plan			Do SRKW MP improvements rely on Capital Budget Improvements?	Does SRKW MP construction overlap/follow/precede Capital Budget construction?
	Ten Year CB Rank	Description	Years Proposed	SRKW Prioritization	Description	Years Proposed		
Nemah	40	Replace large asphalt adult/rearing pond with new adult ponds; Intake upgrade including new diversion weir; New surface water settling pond to pre settle water; Replace 60 year old water supply lines; Replace distribution tower with new water distribution box; Extend Existing hatchery building to increase incubation; Replace existing pollution abatement pond to current standards; Develop new domestic water supply	2027-2031	17	Surface water collection/treatment, 50% PRAS, incubation, & circular tanks	2025-2035	Yes	Overlap
Bogachiel	NA	NA	NA	18	50% PRAS, incubation, circular tanks, spring improvements	2039 - 2047	NA	NA
Whitehorse	NA	NA	NA	19	New wells, 50% PRAS, incubation, & circular tanks	2039-2045	NA	NA
Dungeness	57	Construction of new adult fish collection, holding, and spawning facilities; Replacement of the existing large fish release pond.	2027-2031	20	50% PRAS, incubation, raceways, new wells, & surface water treatment	2039-2047	Yes	Follow
Dungeness	82	Pond renovation	2025 -2029	20	50% PRAS, incubation, raceways, new wells, & surface water treatment	2039-2047	No	Follow
Carlson Ponds	NA	NA	NA	NA	No capital project required	NA	NA	NA
Scatter Creek	NA	NA	NA	NA	No capital project required	NA	NA	NA
Speelyai	NA	NA	NA	NA	No capital project required	NA	NA	NA

Note: Appendix I shows more detailed costs by year. At this level of detail, some projects do not have expenditures in each year of a biennium.

7 Conceptual Designs and Costs-SRKW Expansion

Prioritized projects (Figure 7-1) were analyzed for water resource and land availability to accommodate increased production of Chinook Salmon. Biological program models (see Section 7.1.3) were used to specify the potential fish production increases by number and pounds of fish at each facility. These models determined water and infrastructure needs for incubation and fish rearing (growout) (Appendix D). After the secondary screening, WDFW indicated that early rearing was not used for Chinook Salmon as a defined culture stage requiring separate intermediate vessels because buttoned-up fry were placed directly into the growout vessels. In some cases, however, early rearing refers to partial growout at the early stage until transfer to another facility. The following infrastructure components were included in the hatchery expansion concepts:

- Incubation infrastructure includes vertical incubation trays (16-tray vertical incubation units) for egg incubation, which are used before transfer to growout units. In some cases, incubation and/or growout included PRAS that recirculate water with treatment between uses.
- Growout infrastructure includes standard raceways (10’x100’x4’ water depth), super raceways (20′ x 175′ x 4′ water depth), and circular rearing tanks (8’ diameter, 20′ diameter, and 30′ diameter; all 4.5′ water depth).
- Water supply improvements are proposed such as intake structure improvements, well installation and/or improvements, spring improvements, and water quality/pathogen treatment.
- Pollution abatement ponds and related effluent treatment infrastructure were included in conceptual designs if the existing ponds are insufficient to treat the increased pollutant load from the proposed additional fish rearing and feeding.

A plan-view concept diagram was developed for each hatchery prioritized for improvements to support Chinook Salmon production. Concept plans depict potential locations of additional infrastructure components, at-scale. An opinion of probable cost was developed for these capital improvements, in terms of Office of Financial Management (OFM) C-100 form costs (Appendix E), a maximum allowable construction cost (MACC) (Appendix F), and anticipated operation and maintenance (O&M) costs (Appendix G).

O&M costs were estimated by an evaluation of power, labor, and feed productions costs. In addition, a category for “other” O&M costs was identified, including expenses for fish medications, equipment maintenance, and mass marking and off-site release. The “other” O&M costs were assumed to comprise 25 percent of the total O&M cost. Labor costs were typically estimated following discussions with the hatchery manager. Costs varied based upon the size of the existing and proposed programs.

The capacity of each hatchery to accommodate increased Chinook Salmon production was also considered in conjunction with other facilities (e.g., incubation, growout, acclimation and release at one or more facilities). Regardless of whether one or more facilities were necessary to produce additional Chinook Salmon, each approach was

termed a “pathway.” Multiple pathways may be leveraged from a combination of hatcheries to achieve production increases (See Section 4).

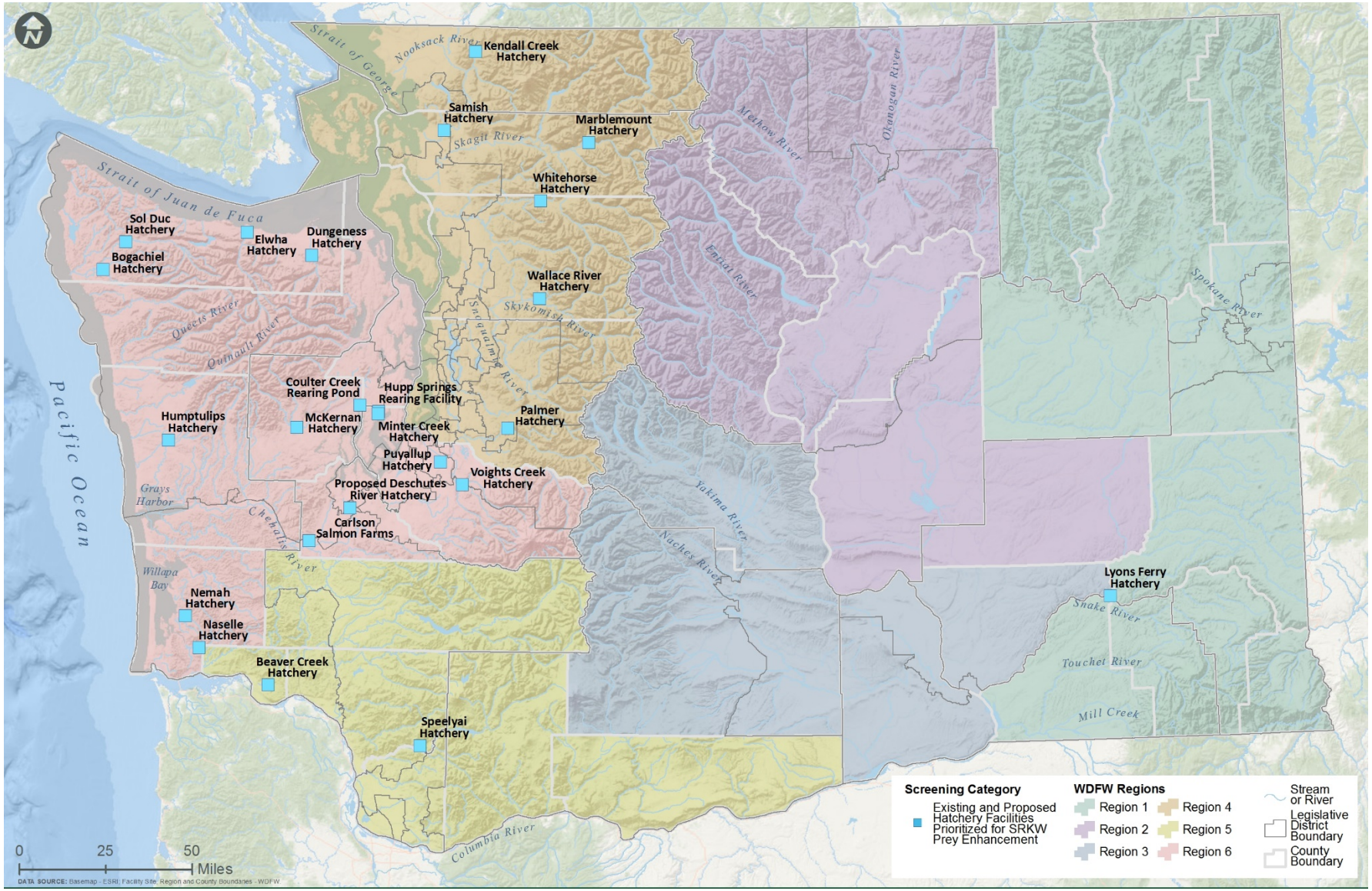

Figure 7-1. Facilities Prioritized for SRKW Chinook Production in this Master Plan

7.1 Explanation of Components

7.1.1 Recirculating Aquaculture System Overview

Recirculation describes the re-use of water that is pumped back to the head of the production series after some form of treatment. The terms recirculating aquaculture systems (RAS) or partial recirculating aquaculture systems (PRAS) are often used for these methods of operation. The main goal of recirculation treatment is to reduce levels of metabolic waste products in the recirculated water to levels that remain safe for fish rearing. Recirculating systems specifically reduce source water volume requirements and conserve heat energy. Pumped recirculation provides a method to continue system operation during drought, fall/winter low flow periods or any other catastrophic loss of water supply volume. However, facility operation and maintenance costs will be increased due to treatment and pumping requirements. Pumped systems are subject to power failures and mechanical difficulties, so back-up power and/or equipment redundancy is required.

For WDFW facilities, we have selected a PRAS approach which recirculates 50-70 percent of the water. Using circular, dual drain tanks, the recirculated water is removed from a drain off the side of the tank. The remaining 30-50 percent is removed from the center drain which contains most solids. At lower percent recirculation rates, treatment generally includes some form of solids removal, re-oxygenation and disinfection. Further treatment is required for higher-level recirculation rates (>70 percent) including biofiltration (for ammonia control), CO_2 management and alkalinity adjustment. All WDFW sites in this evaluation only considered recirculation levels lower than 70 percent to reduce the higher costs and operational complexities associated with the advanced treatment requirements at higher percent recirculation rates. A system providing PRAS treatment equipment, emergency electrical backup and instrumentation/alarming is recommended. When the water is mechanically heated, the recirculated water's heat can be reused and heat loss will be minimized with the discharge. Typical components of a RAS or PRAS system are depicted below (Figure 7-2).

In order to supply an appropriate amount of water flow to a system where temperature control, water quality management, biosecurity, and/or lack of available water supply occurs, recirculation treatment systems have been proposed. Recirculating aquaculture systems clean, disinfect and condition previously used production water from the rearing units for recirculation through the system. Once cleaned and disinfected, the water will be suitable for use within a variety of rearing unit types.

In this Master Plan, where proposed, the PRAS configuration allows for 50 to 70 percent recirculation with the remaining volume of water as new or makeup water. Preliminary estimates of makeup water at each facility were determined based upon available new water (typically spring or well water as the preference over surface water). Groundwater for PRAS was favored over surface water for biosecurity and to minimize disease issues. Each PRAS system will have filtration, UV disinfection, recirculation pumping and gas balancing columns.

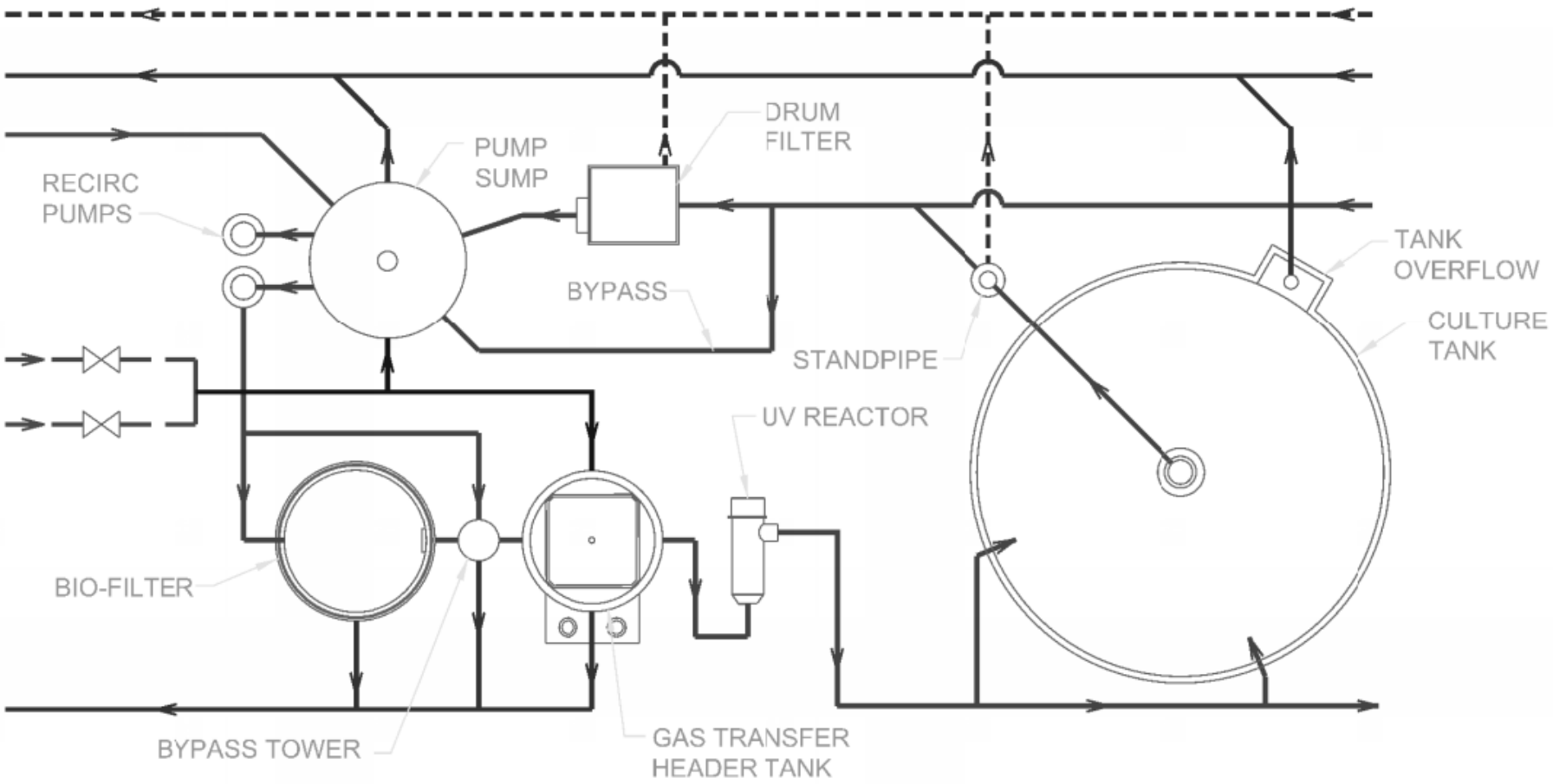

Figure 7-2. Example RAS or PRAS System Components

7.1.2 Additional Rearing Capacity

Carrying capacity requirements for fish throughout their life history on site are set by a density index which WDFW set at 0.2 lbs/cf/in for subyearling Chinook Salmon and 0.15 lb/cf/in for yearling Chinook Salmon. These density indices determine the amount of rearing space required for production increases. For most facilities evaluated herein, flow-through raceways, typically 10′ x 100′ by 4.0′ (water depth) in size, are proposed to accommodate additional rearing capacity. A few exceptions are proposed such as the Samish Hatchery conceptual expansion, which incorporates 20′ x 180′ by 5′ (water depth) super raceways and a PRAS system.

For WDFW facilities, the typical 10′ x 100′ raceway flow is 600 gallons per minute (gpm). However, a flow index of 1.0 lb/gpm/in is also considered for raceway flows when sufficient water is available. This index is generally more conservative than the set 600 gpm per raceway. The process flow for the flow-through systems begins with collection of the source water typically pumped to an aeration tower, which then feeds the raceways. At some facilities, a lift station is needed to convey the supply flow to the proposed raceway location. All facilities, except for Lyon's Ferry, incorporate single pass raceways. Lyon's Ferry has 13 first pass raceways followed by 12 second pass raceways. For each hatchery, flow leaving the raceways is conveyed to the hatcheries' effluent treatment facility, typically a pollution abatement (PA) pond. In some cases, a lift station may be needed between the raceways and an existing PA pond.

7.1.3 Biological Programming (Bioprogram Modeling)

Fish hatchery bioprogramming is a tool utilized to estimate the fish rearing environment (e.g., space and water) necessary to meet the established production goals. The process references fish culture specifications obtained from recognized fish culture manuals as well as established fish rearing facilities and fish production managers. Site specific assumptions and proponent preferences contribute to creating a model of anticipated growth, desired rearing space, and required inflow to produce healthy fish.

A draft bioprogram for each hatchery was developed based on input from WDFW staff, calculations from HDR staff based on similar hatchery bioprograms for focus species, and background literature (e.g., Piper et al. and WDFW Fish Health Unit 2010). Bioprograms for each facility consider production goals, flow indices, density indices, adult spawning dates, juvenile release dates, and periods during which specific life stages are "on station." Bioprogramming details are presented in Appendix D.

The bioprogram determines the preferred rearing unit style and timing of fish transfers between production phases based on water temperatures and preferred marking/tagging sizes. In addition, species-specific condition factors, annual water temperature profiles (e.g., surface and ground), growth rates, mortality rates, and initial weights and lengths provided in the bioprogram assumptions are utilized to formulate the anticipated growth models for each species.

It should be noted that while modeling for all pathways uses exact numbers and conditions, these conditions vary. It is probable that conditions can be altered to achieve the target goals. For example, this can be accomplished with adjustments to the rearing temperature and/or increasing the final densities several weeks before release. Minor

adjustments to feed rations by hatchery staff may achieve desired decreases/increases in target size of release groups.

7.2 Prioritized Site Plans

Site plans were developed for the selected rearing locations for SRKW Chinook expansion. The order of presentation of sites in this subsection follows the final screening analysis of prioritized sites presented in Section 5.6.

7.2.1 Voights Creek Hatchery SRKW Expansion – Plan and Cost

The Voights Creek Hatchery currently produces subyearling fall Chinook Salmon and Coho Salmon. The Voights Creek Hatchery has been included in the 10-Year WDFW Capital Budget Plan to construct additional raceways (2029 – 2031: $5.4 M).

Land and water availability

The Voights Creek Hatchery appears to have adequate land available for expansion. An area south of the existing hatchery buildings appears suitable for development (Figure 7-3).

The Voights Creek Hatchery has availability of 2,400 gpm of surface water for a subyearling fall Chinook Salmon program which is within the water right of 9,000 gpm. Maximum consumption of 6,600 gpm occurs in May. An investigation may be required to identify potential groundwater for supplying adult holding system and fall Chinook Salmon expansion potential.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of late January and a release date of late May. The bioprogram indicates that fish will reach 91 mm or 73 fpp by the end of May.

Proposed expansion – components

It appears limited surface water is available for a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage (Appendix D). To meet targeted release dates, incubation water temperature will need to be increased with a 90 percent PRAS system. The bioprogram indicates a total maximum flow of 3,797 gpm for the growout phase. With a PRAS system, the growout phase makeup water requirement would be 1,898 gpm.

The bioprogram analysis calculates the requirement for an incubation building for 16 16-tray vertical incubation units (Appendix D) and 14 circular tanks (20′ diameter x 4.5′ water depth).

Costs

The opinion of the MACC for the improvements described above is $4,729,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $161,000 ($ 2020). The O&M cost breakdown can be found in Appendix G

and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

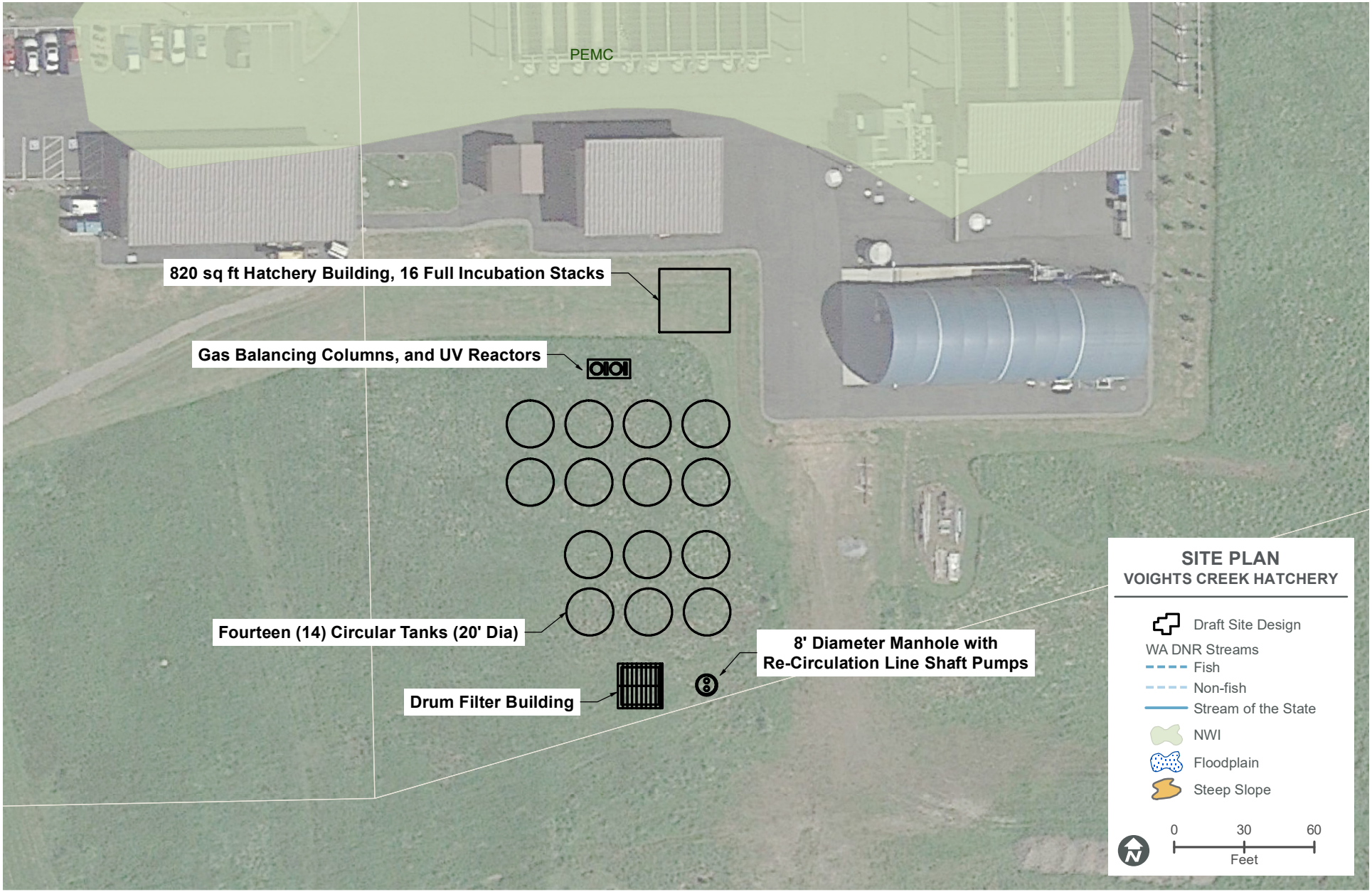

Figure 7-3. Voights Creek Hatchery - Proposed Renovations for SRKW Expansion

7.2.2 Samish Hatchery SRKW Expansion – Plan and Cost

The Samish Hatchery currently produces fall Chinook Salmon. The Samish Hatchery has been included in the 10-Year WDFW Capital Budget Plan for the Friday Creek Intake & Fish Passage (2023-2025: $550K; 2025-2027: $6.9 M) and Adult Pond Replacement (2025 – 2027: $1.2 M; 2027 – 2029: $7.92 M).

Land and water availability

The Samish Hatchery appears to have adequate land available for expansion (Figure 7-4).

The Samish Hatchery runs out of water each spring. Expansion should consider adding two new wells (1,000 gpm each). The current shallow well is inoperable. Surface water is not suitable for incubation. Eggs are incubated offsite at Kendall Creek. Creek water reaches 70°F in mid-May.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling fall Chinook Salmon expansion was developed based upon an assumption of well water providing 50°F water temperature. Following the facilities' existing program, we have a ponding date of early January and a release date of early April. The bioprogram indicates that fish will reach 89 mm or 80 fpp by mid-April.

Proposed expansion – components

Through an improved well supply system, it is anticipated that additional water could be provided for a 70 percent PRAS system. This system would recirculate water with a 70 percent makeup water supply for the growout life stage. The bioprogram indicates a total flow of 3,656 gpm (Appendix D). With a 70 percent PRAS system, the makeup water requirement would be 1,097 gpm.

The bioprogram analysis calculates the requirement for incubation space for 16 16-tray vertical incubation units (Appendix D) and 13 circular tanks (20′ diameter by 4.5′ water depth).

For adult holding requirements it may be more advantageous to change the rearing unit requirement to one 20′ x 180′ raceway (5′ water depth). This raceway option is currently selected for the expansion program to provide flexibility for hatchery operations.

Costs

The opinion of the MACC for the improvements described above is $5,604,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $141,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (7 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning

infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

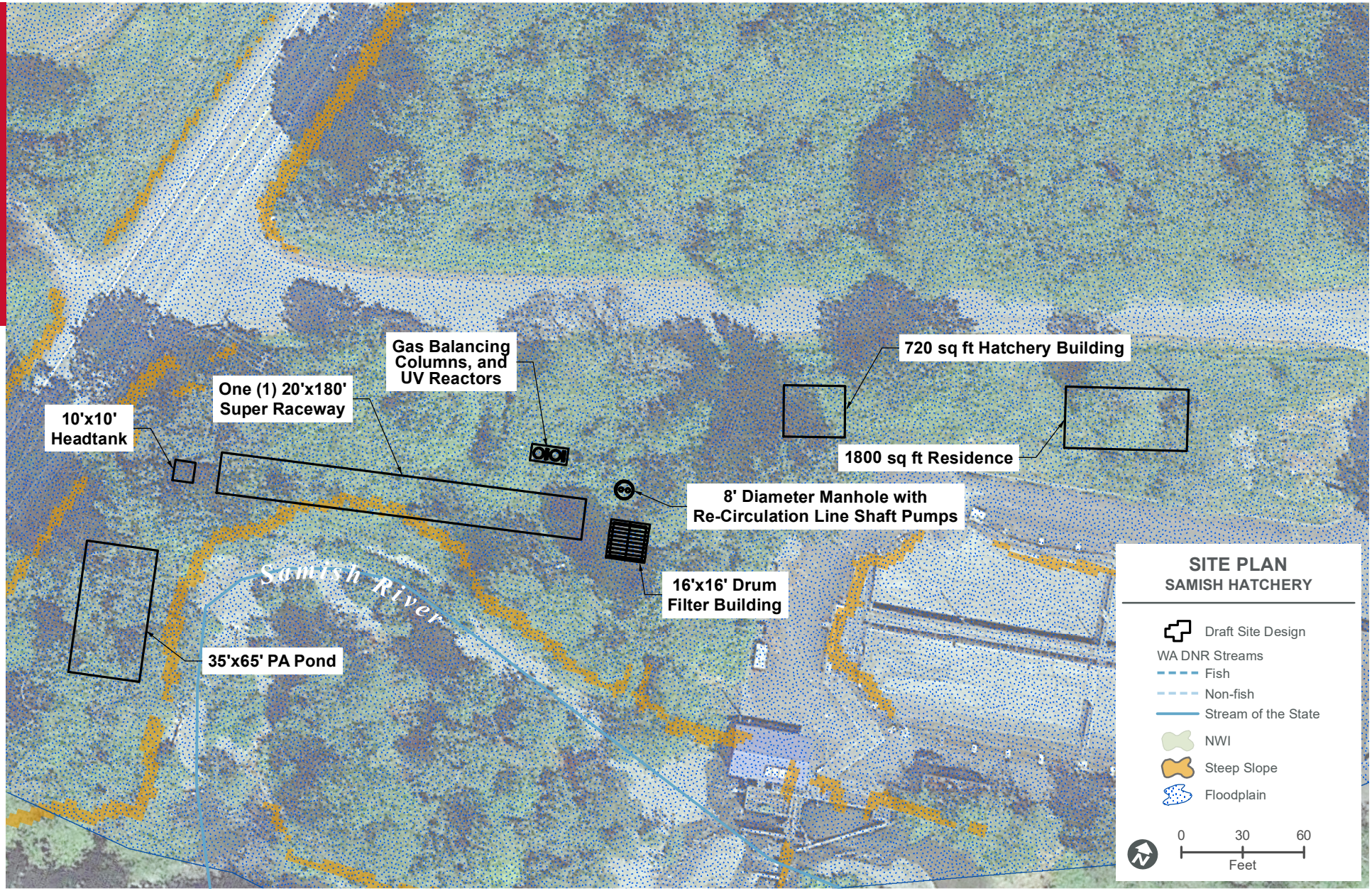

Figure 7-4. Samish Hatchery - Proposed Renovations for SRKW Prey Expansion

7.2.3 Palmer Ponds Hatchery SRKW Expansion– Plan and Cost

The Palmer Ponds Hatchery currently produces fall Chinook Salmon and Coho Salmon.

Land and water availability

The Palmer Ponds Hatchery appears to have adequate land available for expansion (Figure 7-5). The expansion would be located south of the larger rearing pond.

This site has 1,700 gpm of surface water, however, the current river intake/pump system delivers 1,000 gpm. An additional spring supply has water rights of 6,732 gpm although it appears approximately 4,000 gpm is being utilized. This facility has excellent quality spring water with desirable water temperatures.

Geotechnical information indicates that the geology is favorable as the site is located at the base of a terrace that is mapped as Terrace Deposits/Outwash (GeoEngineers 2020). This information indicates that the spring may be rehabilitated to increase water flow to the existing water right.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 600,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early February and a release date of mid-May. The bioprogram indicates that fish will reach 92 mm or 70 fpp by the end of May.

Proposed expansion – components

By increasing the spring water flow to the water right limit it is assumed an additional 2,700 gpm may be available (Appendix D). This amount of spring water would provide pathogen free makeup water. The bioprogram indicates a total flow of 2,359 gpm.

The bioprogram analysis calculates the requirement for 10 16-tray vertical incubation units (Appendix D) and three 100′ raceways (100′ x 10′ x 4′ water depth).

Costs

The opinion of the MACC for the improvements described above is $2,730,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $152,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (7 months) will be required for this expansion.

Figure 7-5. Palmer Ponds Hatchery - Proposed Renovations for SRKW Prey Expansion

7.2.4 Puyallup Hatchery SRKW Expansion– Plan and Cost

The Puyallup Hatchery currently produces spring Chinook Salmon, Coho Salmon, and Rainbow Trout. It should be noted that the Puyallup Hatchery is sometimes referenced as the Puyallup-Clarks Creek Hatchery. This facility is currently under construction for a major rebuild of the entire site.

Land and water availability

The Puyallup Hatchery appears to have adequate land available for minimal expansion in the southwest corner of the property (Figure 7-6).

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 575,000 subyearling fall Chinook Salmon expansion was developed based upon monthly spring water temperatures (48°F) provided by WDFW using a ponding date of early January and a release date of late April. The bioprogram indicates that fish will reach 86 mm or 88 fpp by the end of April.

Proposed expansion – components

The bioprogram indicates a total flow requirement of 1,910 gpm (Appendix D). It is assumed that the current production does not allow for this flow requirement. The addition of a 70 percent PRAS facility would require 573 gpm of spring water (30 percent of total flow) to produce the expansion target of 575,000 subyearling fall Chinook Salmon.

The bioprogram analysis calculates the requirement for nine 16-tray vertical incubation units (Appendix D) and three raceways (100′ x 10′ x 4′ water depth). It is assumed with the rebuild there will be enough incubation capacity for this expansion.

Costs

The opinion of the MACC for the improvements described above is $3,463,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $97,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (7 months) will be required for this expansion.

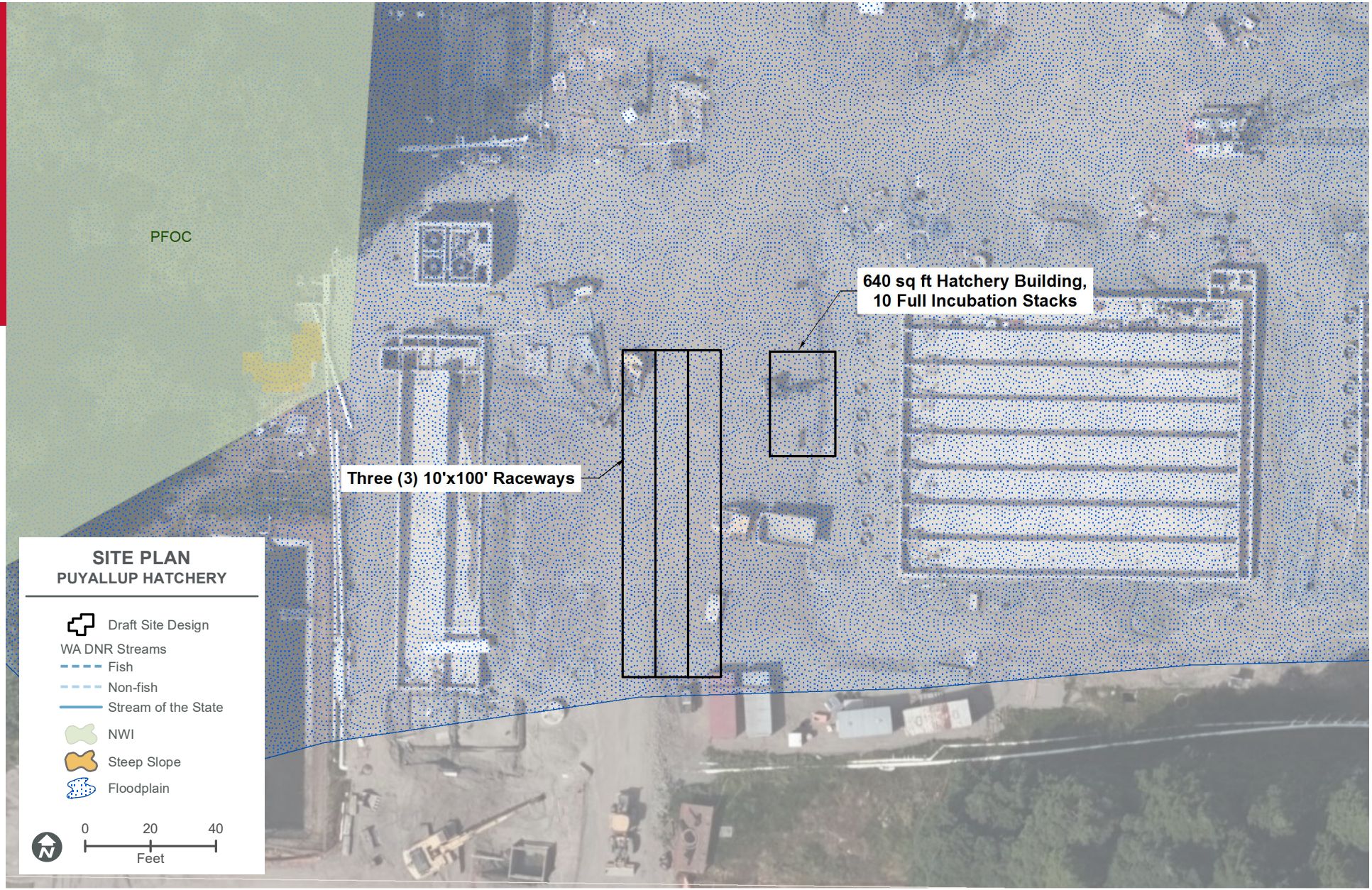

Figure 7-6. Puyallup Hatchery - Proposed Renovations for SRKW Expansion

7.2.5 Naselle Hatchery SRKW Expansion– Plan and Cost

The Naselle Hatchery currently produces fall Chinook Salmon, Coho Salmon, Chum Salmon, and winter steelhead. The Naselle broodstock is part of the Willapa Bay stock which is the same as the Nemah broodstock. Adult Chinook Salmon returning to the Nemah Hatchery can be compromised due to high temperatures causing mortality on these adults. The Nemah Hatchery will rely on the Naselle Hatchery for its egg take when water quality conditions in the Nemah River are such that an adequate egg take is not possible. The Naselle Hatchery has been included in the 10-Year WDFW Capital Budget Plan and is scheduled for renovation (2021 – 2023: $20 M; 2023 – 2025: $9.75 M).

Land and water availability

The Naselle Hatchery appears to have adequate land available for expansion (Figure 7-7). The hatchery is supplied by the Naselle River (50 cfs water right) and Crusher Creek (15 cfs water right). WDFW records indicate a maximum usage 16,000 gpm from the Naselle River in March leaving 4,000 gpm available for expansion.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early February and a release date of late May. The bioprogram indicates that fish will reach 88 mm or 82 fpp by the end of May.

Proposed expansion – components

Through an improved surface water collection system (pathogen treatment) it is anticipated that surface water could be provided to a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram indicates a total flow of 7,076 gpm (Appendix D). With a PRAS system, the makeup water requirement would be 3,538 gpm.

The bioprogram analysis calculates the requirement for 31 16-tray vertical incubation units (Appendix D). It is assumed that a separate incubation building will be required. The analysis demonstrates a requirement of 25 circular tanks (20′ diameter by 4.5′ water depth).

Costs

The opinion of the MACC for the improvements described above is $7,176,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $249,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

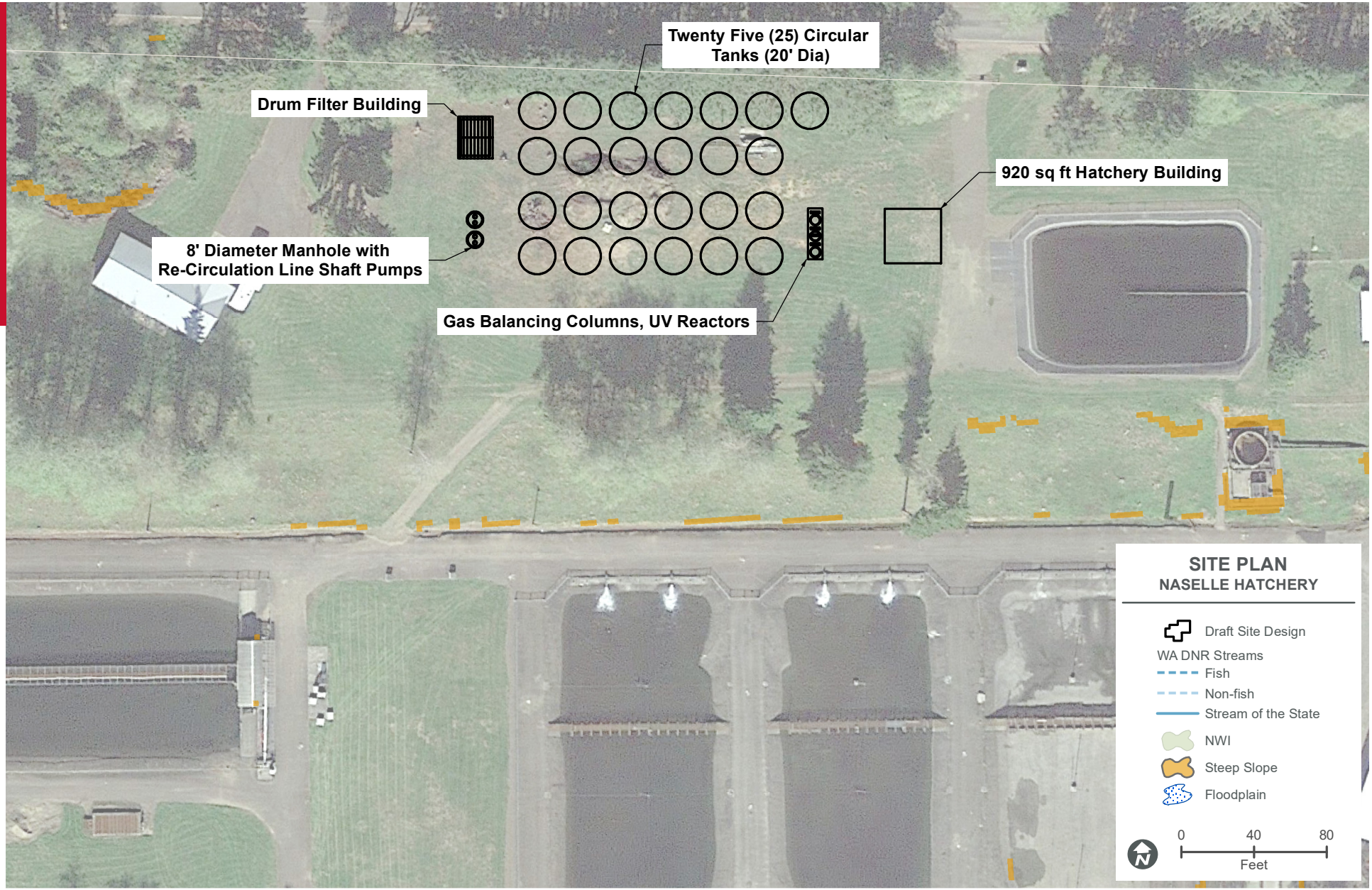

Figure 7-7. Naselle Hatchery - Proposed Renovations for SRKW Expansion

7.2.6 Kendall Creek Hatchery SRKW Expansion– Plan and Cost

The Kendall Creek Hatchery currently produces spring Chinook Salmon, Coho (Lummi) Salmon, Chum Salmon, Rainbow Trout, Cutthroat Trout, Brown Trout, and winter steelhead. The Kendall Creek Hatchery has been included in the 10-Year WDFW Capital Budget Plan for the replacement of gravity pump intakes (2021 – 2023: $120 K; 2023-2025: $1.1 M; 2025-2027: $8.165 M).

Land and water availability

The Kendall Creek Hatchery appears to have adequate land available for expansion. Areas east of the north rearing pond appear suitable for development (Figure 7-8).

This facility has excellent quality well water with desirable water temperatures (47°F). However, the current production has a maximum flow demand approaching 8,000 gpm in February. This flow is augmented by creek water and some reuse. The gravity pump intake is out of compliance and existing wells do not produce as much as originally designed for. Flow reductions due to well screens getting plugged limit existing well production. Water rights should accommodate additional well production and it is proposed that two wells (1,000 gpm each) be investigated for development.

If 2,000 gpm additional well water is not feasible then adding a 50 percent PRAS system is another option. Through prioritization of first pass well water from other programs, coupled with steelhead releases on the first of March, a PRAS system can be utilized. This system would recirculate water with 50 percent makeup water for the growout life stage. The bioprogram indicates a total flow of 2,167 gpm. With a PRAS system, the makeup water requirement would be 1,083 gpm. Note: this PRAS alternative is not included in the cost estimate.

Rearing Chinook Salmon in circular tanks at the Kendall Creek Hatchery has been inconsistent. It is suspected that the existing water supply system is not designed properly to provide proper velocities for circular tanks at this site. For the purposes of costing, it is proposed that a raceway system be utilized assuming that additional well water can be secured. Geotechnical information indicates optimism for developing additional wells.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 700,000 subyearling spring Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of late January and a release date of late April. The bioprogram indicates that fish will reach 82 mm or 100 fpp by end of April.

Proposed expansion – components

Two additional wells (1,000 gpm each) and corresponding aeration towers would be required for proposed expansion (Appendix D). Additional well water would be used within existing adult holding ponds for temperature control. There is a desire to reinstall a pump on Kendall Creek to access water for adult holding. In addition, adult attraction and holding facilities need improvement.

The bioprogram analysis calculates the requirement for 11 16-tray vertical incubation units (Appendix D) and three raceways (100′ x 10′ x 4′ feet water depth).

Costs

The opinion of the MACC for the improvements described above is $2,386,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $103,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (7 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

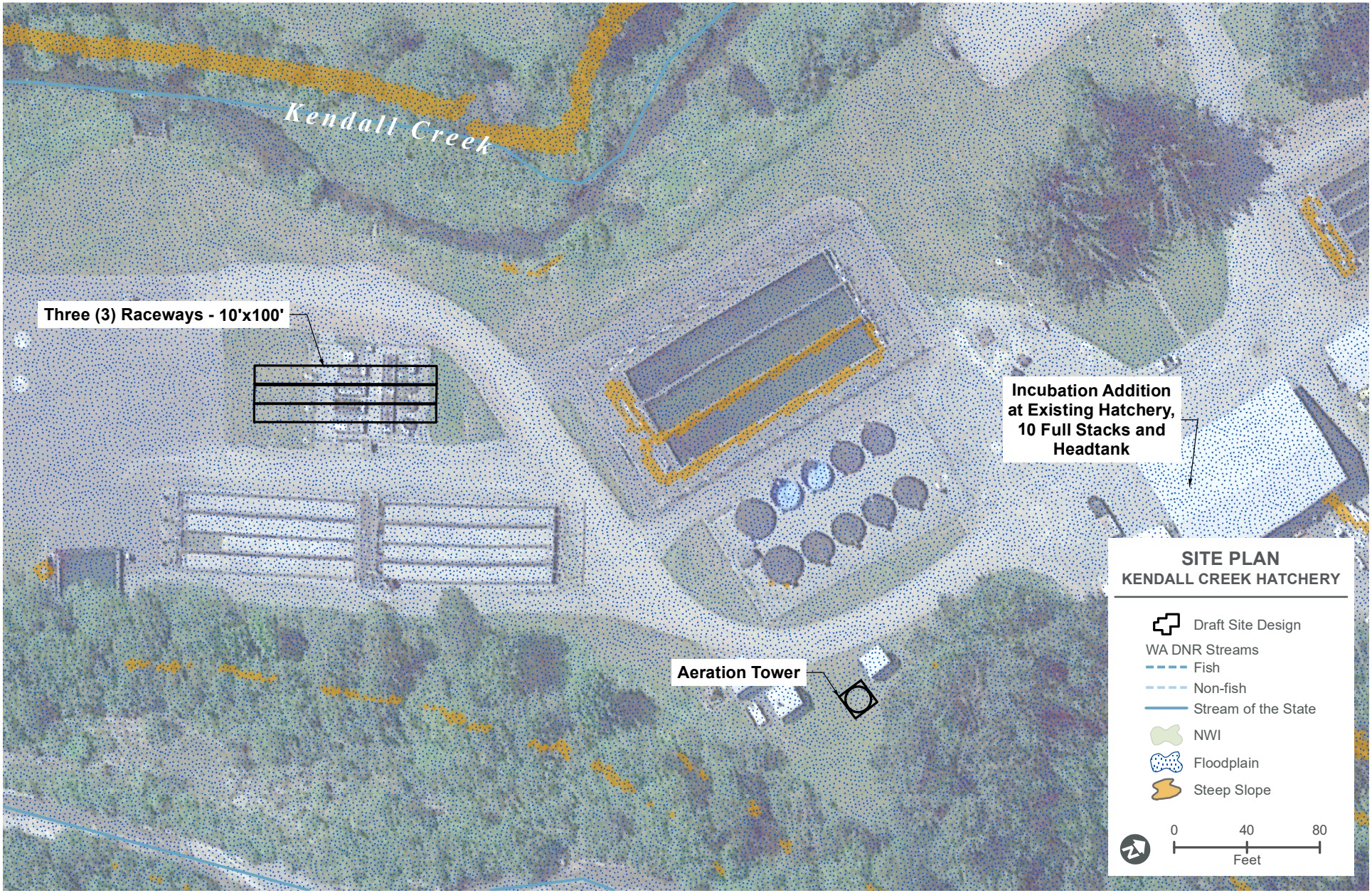

Figure 7-8. Kendall Creek Hatchery - Proposed Renovations for SRKW Expansion

7.2.7 Speelyai Hatchery SRKW Expansion– Plan and Cost

The Speelyai Hatchery currently produces spring Chinook Salmon, Kokanee Salmon, and Rainbow Trout.

Land and water availability

The Speelyai Hatchery appears to have adequate land and water available for expansion.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 500,000 subyearling spring Chinook Salmon expansion was developed based upon monthly creek water temperatures provided by WDFW. The bioprogram indicates that fish will reach 89 mm or 78 fpp by the beginning of May.

These fish will be transferred to Lewis River Hatchery in May and released to the Lewis River in June.

Proposed expansion – components

This bioprogram analysis calculates the requirement for eight 16-tray vertical incubation units (Appendix D) and three raceways (100′ x 10′ x 4′ water depth). Existing facilities at the Speelyai Hatchery can accommodate this expansion without additional cost.

Costs

The opinion of the annual O&M costs for the improvements for this facility is approximately $157,000. The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

7.2.8 Cooke Aquaculture - Scatter Creek SRKW Expansion – Plan and Cost

Cooke Aquaculture is interested in rearing Chinook Salmon for WDFW under a contract or lease arrangement. They have two sites, Cooke Aquaculture - Scatter Creek, and Cooke Aquaculture - Black River. The Scatter Creek site is fully developed and available for lease. The Black River site has been inactive for 10 years and will require some facility renovation. It is the desire of Cooke Aquaculture that their staff operate this facility with cooperation and oversight from WDFW.

Land and water availability

Two developed freshwater sites, Scatter Creek and Black River, are both in the Rochester area. Scatter Creek water rights are 14,000 gpm - well water at 50°F, Black River water rights are 7,000 gpm - well water at 50°F. For the Scatter Creek Hatchery, the water hardness is low (20 ppm) and a system is in place to increase hardness. Outdoor tanks will need rehabilitated netting covers for bird predation.

Proposed expansion – fish production

The Scatter Creek site has twelve 16-foot-diameter fiberglass tanks in an indoor facility. The outdoor facilities contain twelve 16-foot-diameter, six 26-foot-diameter and twenty-two 50-foot-diameter tanks. It is assumed that WDFW would be comfortable rearing fish in the 16- and 26-foot-diameter tanks. While Chinook could be reared in the 50-foot-diameter tanks, this possibility needs to be further explored with WDFW.

By utilizing all 16-foot-diameter tanks (Scatter Creek Bioprogram RUN 1; Appendix D) and the 26-foot-diameter tanks (Scatter Creek Bioprogram RUN 2; Appendix D), 1,400,000 fall Chinook subyearlings can be produced on a flow through system using well water. These fish would reach 60 fpp for release at the end of April. The use of the 50-foot-diameter tanks (22) could produce an additional 6,500,000 fall Chinook sub yearlings with a PRAS system (60 percent) requiring approximately 11,000 gpm. This alternative would need discussions regarding water supply availability. This site may begin aquaculture operations for steelhead, however, the schedule for these operations have not been determined. Both programs could be conducted simultaneously.

The Black River site has water rights in trust and Canadian ownership would prefer Cooke Aquaculture staff to operate this site. A bioprogram analysis has not been conducted for this site as it has been inactive for over a decade and would require refurbishment (the extent of which has not been determined).

Costs

No capital costs are necessary for operation of this private facility. If this facility were to produce fish, it would be done on a contractual basis between the WDFW and the owner.

7.2.9 Beaver Creek Hatchery SRKW Expansion – Plan and Cost

The Beaver Creek Hatchery currently produces yearling Coho Salmon, spring Chinook Salmon, winter and summer steelhead, and wild fall Chum Salmon. The spring Chinook Salmon program has fall and spring releases with some production transferred to the Deep River net pens. The Beaver Creek Hatchery has been included in the 10-Year WDFW Capital Budget Plan for renovation (2021 – 2023: $2.0 M; 2023-2025: $9.5 M; 2025-2027: $9.498 M).

Land and water availability

The Beaver Creek Hatchery appears to have adequate land available for expansion. Areas west of the hatchery building appear suitable (Figure 7-9).

An existing well produces 450 gpm, the Elochoman provides 3,500-10,000 gpm, and Beaver Creek provides 450-6,000 gpm. It appears there is enough surface water to expand a subyearling spring or fall Chinook Salmon program. Future discussions with co-managers will determine which stock is most appropriate.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling fall/spring Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early January and a release date of early May based upon historical production with spring Chinook Salmon. The bioprogram indicates that fish will reach 80 mm or 107 fpp by the end of April. The fish will have reached 90 fpp by early May which is the size at transfer to the Deep River net pens should this be the release location. A portion of this production may be held until November to a larger size (15 fpp) for transfer to Deep River net pens.

Proposed expansion – components

The bioprogram indicates a total flow of 5,914 gpm (Appendix D).

This bioprogram analysis calculates the requirement for 31 16-tray vertical incubation units (Appendix D) and 8 raceways (100′ x 10′ x 4′ water depth).

Costs

The opinion of the MACC for the improvements described above is $6,110,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $213,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary personnel (8 months) will be required for this expansion.

Figure 7-9. Beaver Creek Hatchery - Proposed Renovations for SRKW Expansion

7.2.10 McKernan Hatchery SRKW Expansion – Plan and Cost

The McKernan Hatchery currently produces fall Chum Salmon and late fall Chinook Salmon. While the McKernan, George Adams, and Hoodsport Hatcheries are supporting the SRKW Program with a Chum Salmon expansion of 3,000,000 fish, there is an opportunity for a small additional subyearling fall Chinook Salmon program. McKernan Hatchery has been included in the 10-Year WDFW Capital Budget Plan and is scheduled for adult handling facility renovation (2029 – 2031: $5.987 M).

Land and water availability

The McKernan Hatchery appears to have adequate land available for expansion. An area between the creek pond and existing raceways could accommodate several additional standard raceways (Figure 7-10).

The current water supply is obligated for the existing program. The hatchery location is known for excellent groundwater availability.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 500,000 subyearling fall Chinook Salmon expansion was developed based upon monthly groundwater temperatures (assuming 50°F) using a ponding date of early January and a release date of early April. The bioprogram indicates that fish will reach 93 mm or 70 fpp.

Proposed expansion – components

The bioprogram indicates a total flow of 2,014 gpm (Appendix D). It is assumed that two wells (1,000 gpm each) will be provided.

This bioprogram analysis calculates the requirement for eight 16-tray vertical incubation units (Appendix D). The McKernan Hatchery has space for these eight stacks, however, these stacks with associated plumbing will have to be provided. The analysis demonstrates a requirement of three raceways (100′ x 10′ x 4′ water depth).

Costs

The opinion of the MACC for the improvements described above is $2,534,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $101,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (7 months) will be required for this expansion.

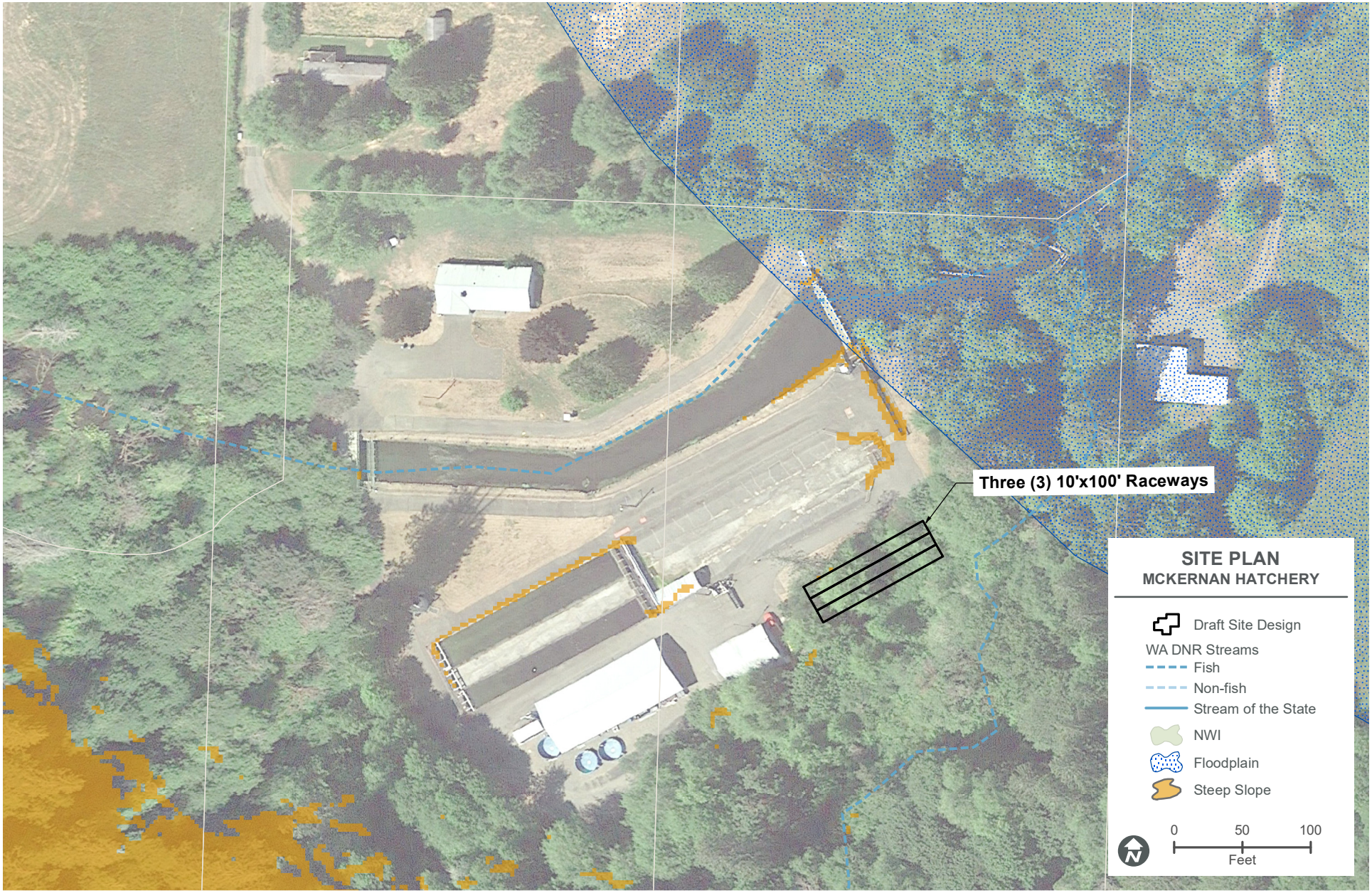

Figure 7-10. McKernan Hatchery - Proposed Renovations for SRKW Expansion

7.2.11 Carlson Salmon Farms SRKW Expansion – Plan and Cost

The Carlson Salmon Farms are located on 65 acres in Rochester, Washington. It is a private aquaculture site used primarily for rearing Atlantic salmon smolts for the net pen aquaculture industry. Carlson Salmon Farms and WDFW may negotiate a personal services contract which determines the amount of fish, size at delivery, fish health and compensation terms. The facility is available for immediate use as a contract or lease opportunity to be operated by the owner or by WDFW staff.

Land and water availability

The facility has four 50-foot-diameter concrete ponds, one 22′ x 60′ hatchery building with eight 9′ x 4′ fiberglass tanks, one 22′ x 60′ hatchery building with 35 3-foot-square tanks, 21 vertical column incubators, and eight stacks of 8-tray incubators.

Water right – 2,400 gpm

Well #1- 1,200 gpm

Well #2 - 400 gpm + 100 gpm (two pumps)

The owner may consider improvements to well #2 to gain the maximum water right flow.

Proposed expansion – fish production

This facility could rear fall Chinook subyearlings and/or yearlings. The facility could also be used for rearing other species such as Coho Salmon to make available space at existing WDFW hatcheries. Private aquaculture practices produce fish under different biological criteria than what is generally expected by WDFW. Using WDFW fall Chinook subyearling assumptions, the limiting factor at this site would be first pass well water. The available well water (1,600 gpm) can produce 750,000 subyearling fall Chinook Salmon at 60 fpp released at the end of April. The production of 750,000 subyearling fall Chinook Salmon would occupy two of the four 50-foot-diameter concrete ponds (31,400 cubic feet) (Appendix D).

It is envisioned that the effluent from these two rearing ponds can be screened for solids, re-aerated and then recirculated creating a PRAS system (50 percent). The PRAS approach would allow the remaining two tanks to be utilized thus doubling production to 1,5000,000 subyearling fall Chinook Salmon.

Costs

No capital costs are necessary for operation of this private facility. If this facility were to produce fish, it would be done on a contractual basis between the WDFW and the owner.

7.2.12 Wallace River Hatchery SRKW Expansion – Plan and Cost

The Wallace River Hatchery currently produces summer Chinook Salmon, winter steelhead, Coho Salmon, Chum Salmon, and Coastal Cutthroat Trout. The Wallace River Hatchery has been included in the 10-Year WDFW Capital Budget Plan and is scheduled for replacement of intakes and ponds (2021 - 2023:$13 M; 2023 – 2025: $12.3 M). Co-managers and NOAA consider the Wallace Creek Hatchery to be available for expansion.

Land and water availability

The Wallace Hatchery appears to have adequate land available for expansion (Figure 7-11). An area northeast of hatchery facilities may be available for development though the floodplain may impose certain restrictions.

It appears that limited surface water is available which could be provided for a PRAS system. If surface water is used it will need to be filtered for cryptobia. Geotechnical investigations may identify new sources of groundwater for this site and if available, could be substituted for the surface water supply in predesign evaluations.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling summer Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early-January and a release date of mid-May. The bioprogram indicates that fish will reach 86 mm or 88 fpp by the end of May.

Proposed expansion – components

It appears limited surface water is available that could be provided for a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. To meet targeted release dates, incubation water temperature will need to be increased to 50°F with a 90 percent PRAS system. The bioprogram indicates a total maximum flow of 3,359 gpm for the growout phase (Appendix D). With a PRAS system, the growout phase makeup water requirement would be 1,679 gpm.

The bioprogram analysis calculates the requirement for an incubation space for 16 16-tray vertical incubation units (Appendix D) and 12 circular tanks (20′ diameter x 4.5′ water depth).

Surface water filtration for cryptobia will need to be added to the intake water supply.

Costs

The opinion of the MACC for the improvements described above is $4,480,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual Operation and Maintenance costs for the improvements for this facility is approximately $172,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health.

It is anticipated that one temporary employee (8 months) will be required for this expansion.

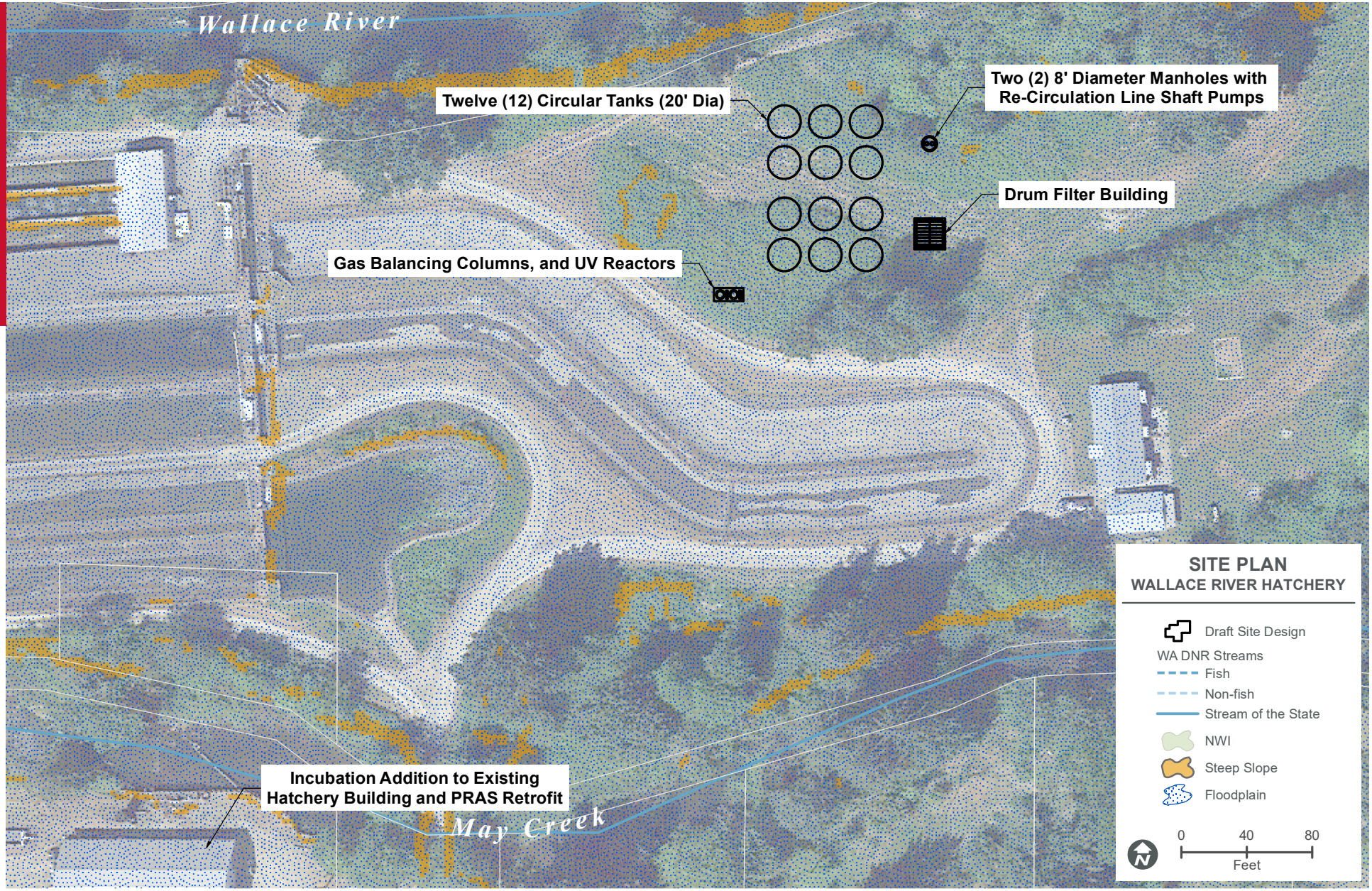

Figure 7-11. Wallace River Hatchery - Proposed Renovations for SRKW Expansion

7.2.13 Hupp Springs Hatchery SRKW Expansion – Plan and Cost

The Hupp Springs Hatchery currently produces White River spring Chinook Salmon and Minter Coho Salmon.

Land and water availability

The Hupp Springs Hatchery appears to have adequate land available for expansion. Areas north of the existing raceways appear suitable (Figure 7-12).

This facility has excellent quality spring water with desirable water temperatures. Hupp Springs currently produces 1,600 gpm. However, the current production has a flow demand utilizing the existing 1,600 gpm spring flow. It is estimated that an additional 400 gpm of spring water could be obtained within the hatchery site. It is recommended that a well water supply be developed providing an additional 900 gpm. The additional 1,300 gpm of spring and well sources would provide enough flow for a 50 percent PRAS system for 650,000 subyearling fall Chinook Salmon. It is assumed that surface water is to be avoided if groundwater is available to limit potential disease/pathogen issues.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 650,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early January and a release date of late April. The bioprogram indicates that fish will reach 93 mm or 69 fpp by end of April.

Proposed expansion – components

A PRAS system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram indicates a total flow of 2,597 gpm based (Appendix D). With a PRAS system, the makeup water requirement would be 1,299 gpm.

The bioprogram analysis calculates the requirement for an incubation building with space for 10-16 tray vertical incubation units (Appendix D). Currently eggs are provided by Minter Creek Hatchery and could also be supplied by Coulter Creek Hatchery. The analysis demonstrates a requirement of 10 circular tanks (20′ diameter by 4′ water depth).

In addition, expansion will require a lift station with drum filter for PA pond. Hatchery expansion design should include bio-security measures to avoid cross contamination from different stocks (White River Chinook Salmon may have BKD) and creek water.

Costs

The opinion of the MACC for the improvements described above is $4,682,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $129,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

Pathways

One pathway would be to conduct incubation at Minter Creek Hatchery avoiding the need for incubation facilities at this site.

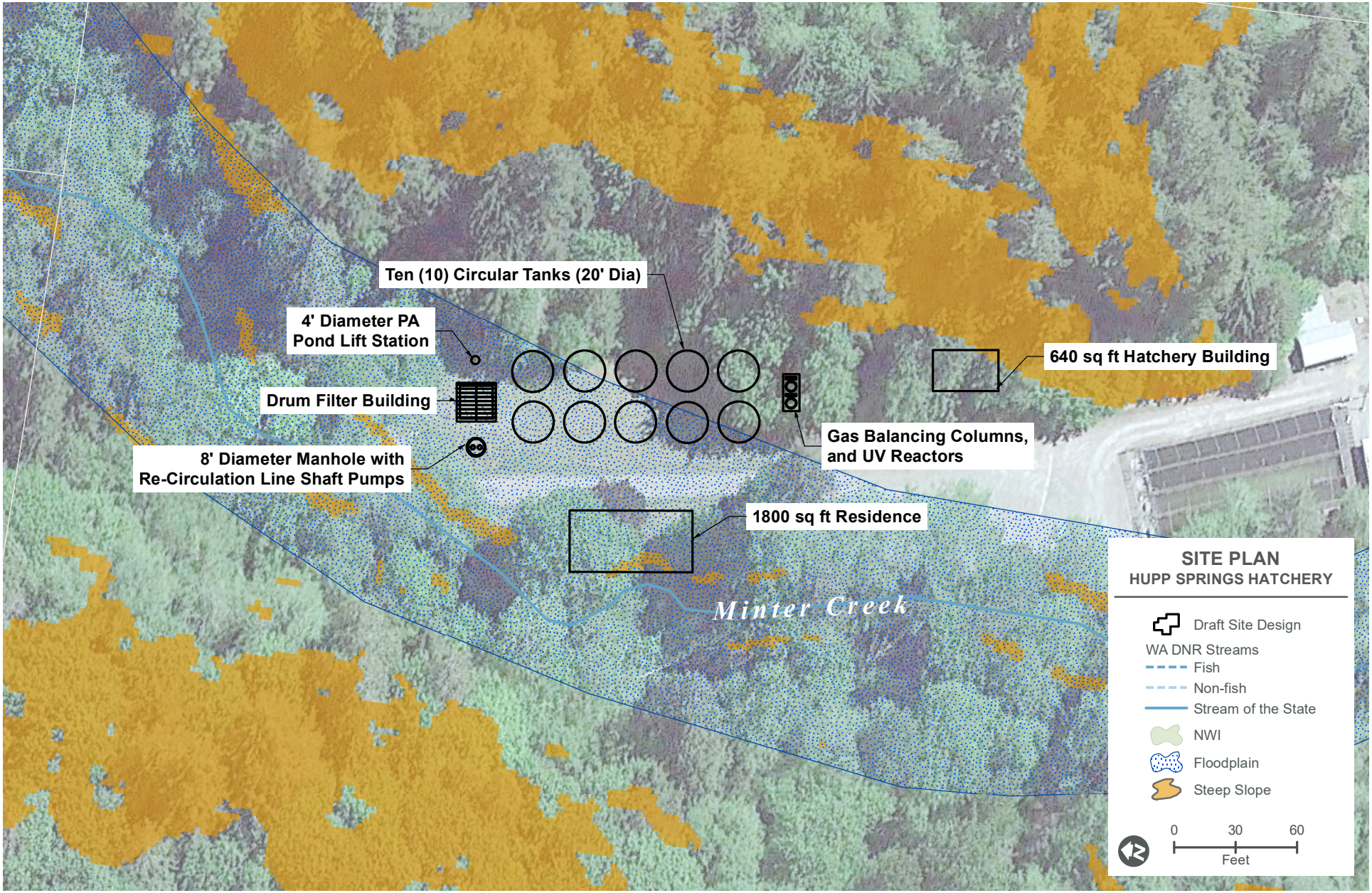

Figure 7-12. Hupp Springs Hatchery - Proposed Renovations for SRKW Expansion

7.2.14 Coulter Creek Hatchery SRKW Expansion – Plan and Cost

The Coulter Creek Hatchery currently produces Deschutes fall Chinook Salmon.

Land and water availability

The Coulter Creek Hatchery appears to have adequate land and water available for expansion (Figure 7-13).

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 500,000 subyearling fall Chinook Salmon eggs expansion is based upon monthly surface water temperatures provided by WDFW using a ponding date of mid-January and a release date of mid-May. The bioprogram indicates that fish will reach 88 mm or 82 fpp..

Proposed expansion – components

The bioprogram indicates a total flow of 1,750 gpm. WDFW typically uses a flow of 600 gpm per standard raceway of 10′ x 100′ x 4′ feet (water depth) which equates to 1,200 gpm for two raceways.

Costs

The opinion of the MACC for the improvements described above is $1,924,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $105,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

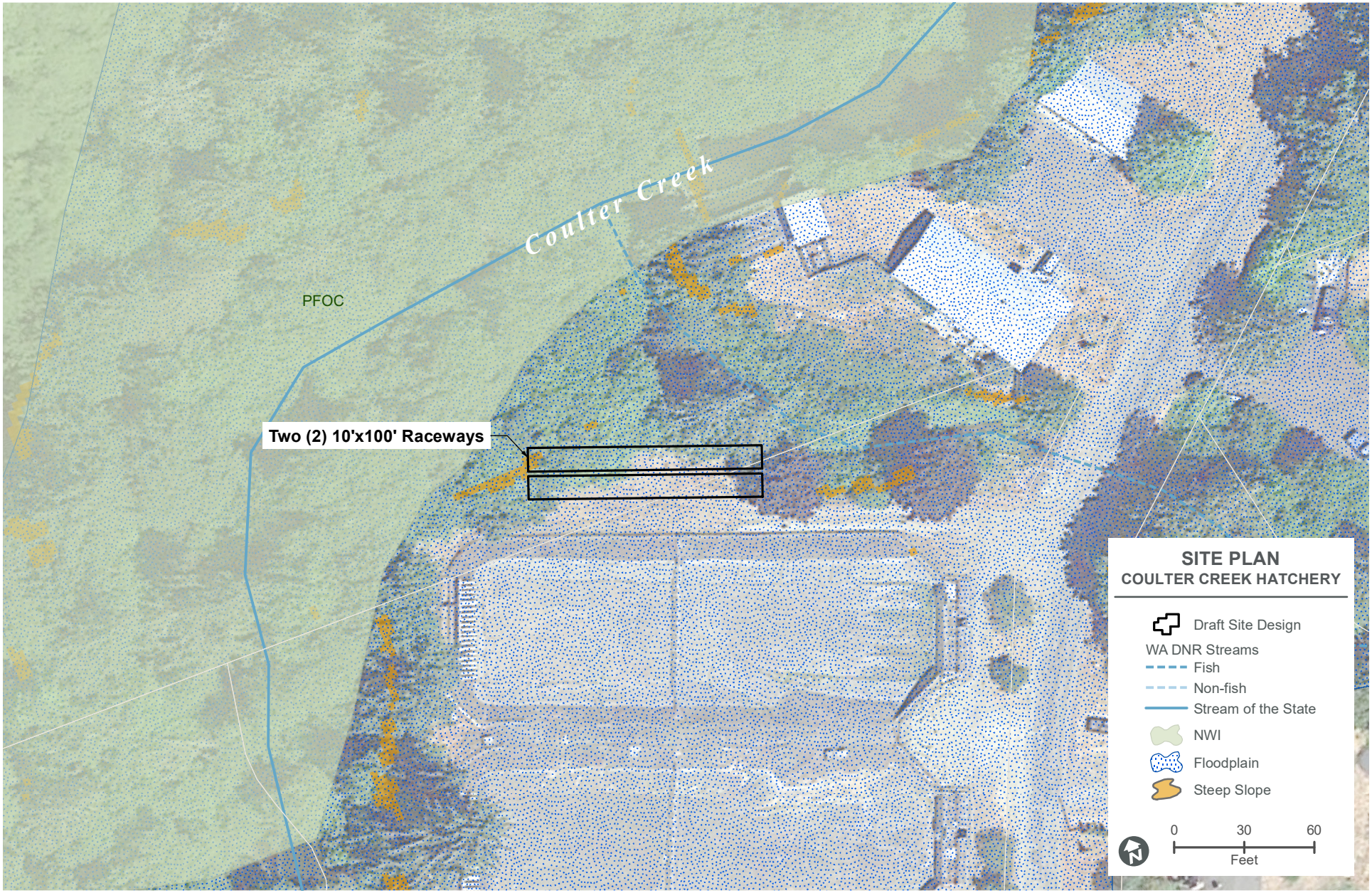

Figure 7-13. Coulter Creek Hatchery - Proposed Renovations for SRKW Expansion

7.2.15 Minter Creek Hatchery SRKW Expansion – Plan and Cost

The Minter Creek Hatchery currently produces White River spring Chinook Salmon, Minter Creek fall Chinook Salmon, Minter Creek Coho Salmon, Minter Creek Chum Salmon, and Deschutes River Chinook Salmon. The Minter Creek Hatchery has been included in the 10-Year WDFW Capital Budget Plan and is scheduled for replacement of intakes (2021-2023: $184 K; 2023 – 2025: $7.894 M).

Land and water availability

A bioprogram analysis (Appendix D) for 1,300,000 incubated fall Chinook Salmon eggs expansion was developed based upon monthly well water temperatures (49°F) provided by WDFW using a ponding date of late-September and a release date of early January. WDFW records indicate 1,080 gpm are available from four wells supplying an existing incubation facility. Records indicate 150 full stacks requiring between 750–900 gpm if all were in use at the same time. Assuming staggered use based upon timing of the different species/stocks, 200 gpm should be available to operate the incubation expansion described below.

Proposed expansion – fish production

This egg incubation increase consists of 500,000 eyed eggs to Coulter Creek and 800,000 eyed eggs to Hupp Springs.

Costs

The opinion of the annual O&M costs for the additional incubation at this facility is approximately $3,000 ($ 2020) of additional labor time. The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, maintenance, and fish health. It is anticipated that the additional labor required for the hatchery modifications would be performed by existing staff.

Subsequent evaluation of Hupp Springs (Section 7.2.25) includes an incubation facility eliminating the need for 800,000 egg incubation egg capacity at Minter Creek. The Coulter Creek facility egg incubation requirement (500,000) is assumed to be provided by the existing incubation facilities as Minter Creek Hatchery is currently supplying Coulter Creek. Therefore, there is no capital budget associated with the Minter Creek Hatchery.

7.2.16 Marblemount Hatchery SRKW Expansion – Plan and Cost

The Marblemount Hatchery currently produces spring and summer Chinook Salmon, Coho Salmon, Rainbow Trout, and Chum Salmon. The Marblemount Hatchery has been included in the 10-Year WDFW Capital Budget Plan for hatchery renovations (2021-2023: $120K; 2023-2025: $12 M; and 2025-2027: $11.072 M).

Land and water availability

The Marblemount Hatchery appears to have adequate land available for expansion (Figure 7-14).

This facility has available surface water to operate a flow through system for 2,000,000 subyearling spring/summer Chinook Salmon.

Proposed expansion – fish production

A bioprogram analysis for Marblemount Hatchery (Appendix D) for 2,000,000 subyearling spring/summer Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW and using a ponding date of early-December and a release date of early May. The bioprogram indicates that fish will reach 91 mm or 73 fpp by the beginning of May.

Proposed expansion – components

The bioprogram indicates a total flow of 7,330 gpm (Appendix D).

The bioprogram analysis calculates the requirement for 31 16-tray vertical incubation units and 10 raceways (100′ x 10′ x 4′ water depth).

Costs

The opinion of the MACC for the improvements described above is $6,077,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $262,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

Figure 7-14. Marblemount Hatchery - Proposed Renovations for SRKW Expansion

7.2.17 Lyon's Ferry Hatchery – Plan and Cost

The Lyon's Ferry Hatchery is in the Lower Snake River watershed and is owned by the USFWS. Lyon's Ferry Hatchery currently produces Snake River fall Chinook Salmon yearlings and subyearlings, Tucannon spring Chinook Salmon, Wind River Spring Chinook, Touchet spring Chinook Salmon, Tuccanon steelhead, Touchet steelhead, and Wallowa steelhead, Rainbow Trout catchables, and Rainbow Trout jumbos and fingerlings.

Land and water availability

The Lyon's Ferry Hatchery appears to have adequate land available for expansion. Land to the north of the third long pond (south of residence access road) and in the southeast corner of property adjacent to existing raceways are potential options (Figure 7-15). However, the southeast portion is scheduled to have rearing ponds constructed in this location in the near future.

The hatchery is supplied by well water which is abundant but has high levels of iron and manganese. The high levels of these heavy metals require a higher flow and a lower density than is typically used at other hatcheries which is captured in the bioprogram analysis for Lyon's Ferry Hatchery.

Two new wells (or more) producing a total of 4,000 gpm are required, assuming 6,000 gpm is available during maximum demand during the month of May.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of late January and a release date of early May based upon historical production with fall Chinook Salmon. The bioprogram indicates that fish will reach 92 mm or 71 fpp by the end of April. Release timing options may include moving fish at 70 fpp to acclimate upstream of Lower Granite Dam in coordination with the Nez Perce Tribe or releasing on site at 50 fpp (~May 31).

Proposed expansion – components

The bioprogram analysis calculates the requirement for an incubation space for 31 16-tray vertical incubation units (Appendix D) and 25 raceways due to the more conservative density index. Due to the low densities and high flows, the ammonia toxicity, based upon the well water temperature and a pH of 7.5, which is low, allows for reuse of this water to a second tier of 12 raceways receiving water from an upper tier of 13 raceways. Low head oxygenators (LHO's) would be installed in the second tier to provide desired oxygen saturation levels.

Lyon's Ferry is unique in that it uses 850 gpm per standard raceway of 10′ x 100′ x 4′ feet (water depth) which equates to 10,400 gpm for 12 raceways. This higher flow is used as part of the analysis.

Costs

The opinion of the MACC for the improvements described above is $12,081,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $219,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (6 months) will be required for this expansion.

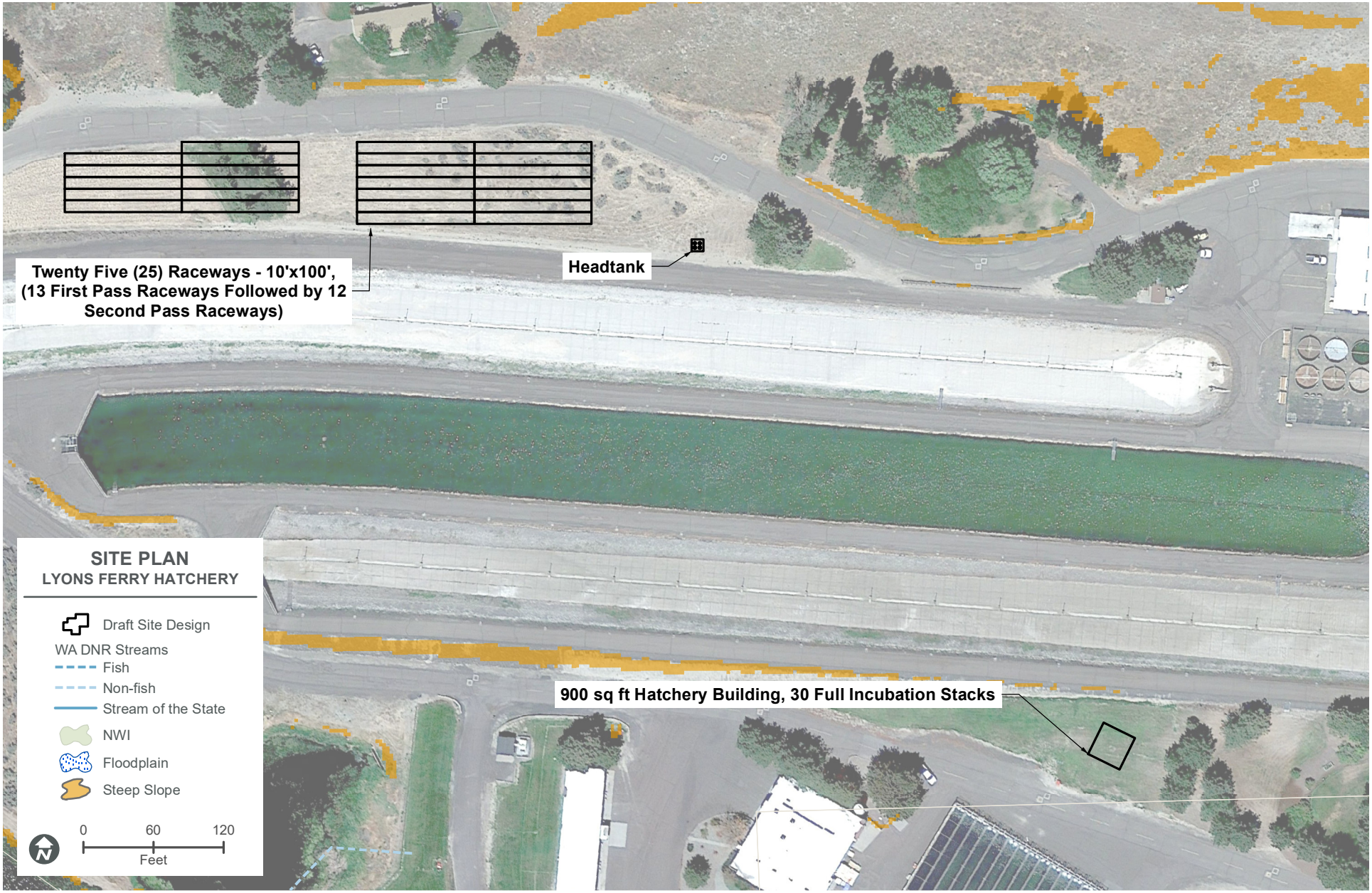

Figure 7-15. Lyon's Ferry Hatchery - Proposed Renovations for SRKW Expansion

7.2.18 Sol Duc Hatchery SRKW Expansion – Plan and Cost

The Sol Duc Hatchery currently produces summer Chinook Salmon, Coho Salmon, and Rainbow Trout. Increasing production for subyearling summer Chinook Salmon will require additional consultation between co-managers and WDFW to determine acceptable opportunities for prey enhancement at Sol Duc. The Sol Duc Hatchery has been included in the 10-Year WDFW Capital Budget Plan to renovate ponds in 2029-2031 ($13.9 M).

Land and water availability

The Sol Duc Hatchery appears to have adequate land available east of the existing pond suitable for expansion (Figure 7-16).

It appears adequate spring water is available to produce 1,000,000 subyearling summer Chinook Salmon if 50 percent PRAS is incorporated.

Proposed Expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling summer Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of late January and a release date of late May. The bioprogram indicates that fish will reach 89 millimeters (mm) long or 80 fpp by the end of May.

Proposed expansion – components

The Sol Duc Hatchery has excellent quality spring water with desirable water temperatures. However, the current production has a flow demand approaching 5,700 gpm in June. Spring flows vary from 3,000 gpm to 25,000 gpm depending on climate conditions. It is assumed that additional spring water would be available during the spring months, enough for a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram (Appendix D) indicates a total flow of 3,611 gpm is needed to accommodate the increased production. With a PRAS system, the makeup water requirement would be 1,806 gpm.

The bioprogram analysis (Appendix D) calculates the requirement for 16-16 tray vertical incubation units. The analysis demonstrates a requirement of 13 circular tanks (20′ diameter x 4.5′ water depth). In addition, proposed expansion would require an expanded pollution abatement pond and an aeration/head tank.

Costs

The opinion of the MACC for the improvements described above is $5,442,000, in present-day dollars ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $155,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary personnel (8 months) will be required for this expansion.

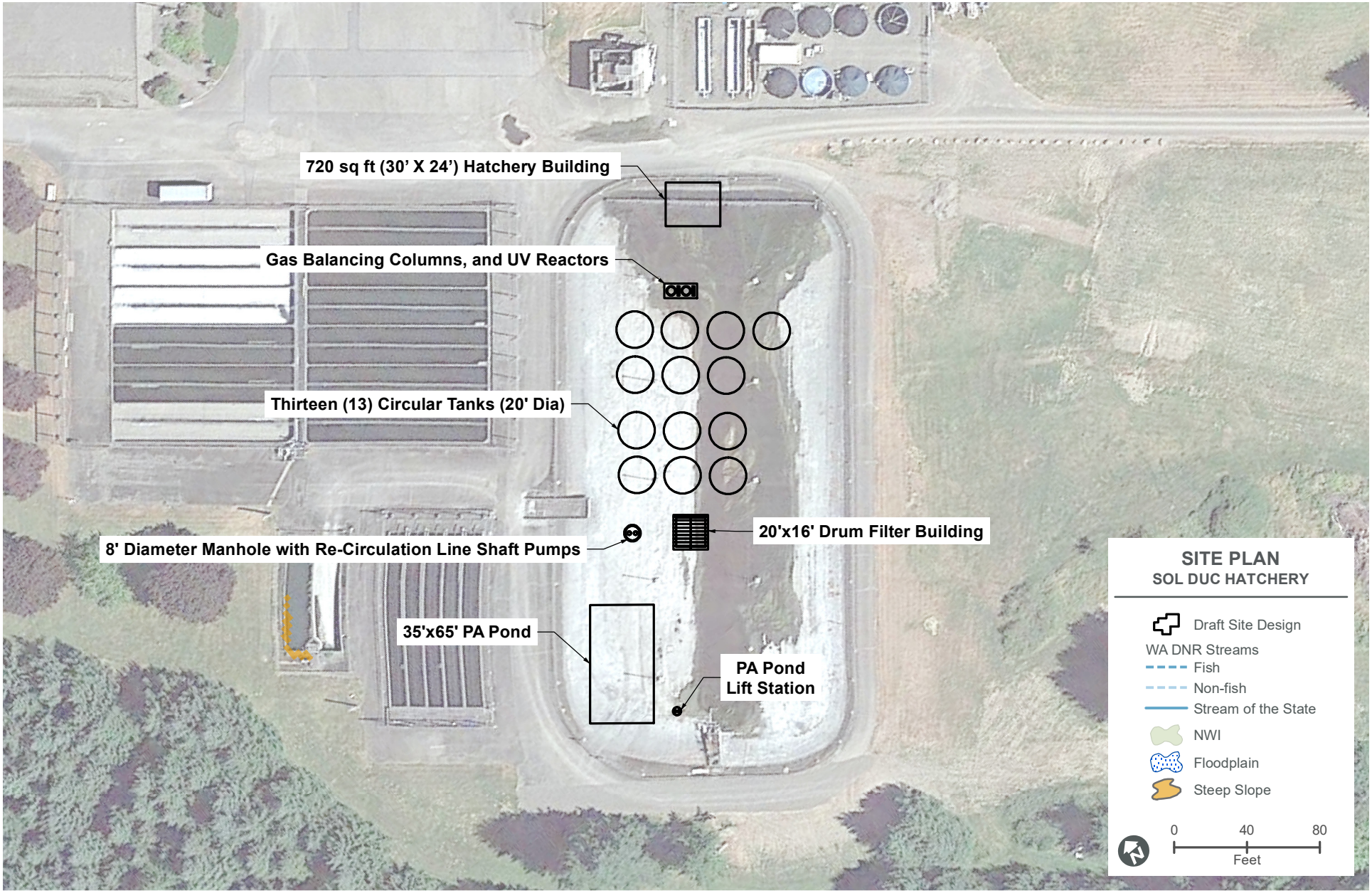

Figure 7-16. Sol Duc Hatchery - Proposed Renovations for SRKW Expansion

7.2.19 Elwha Hatchery SRKW Expansion – Plan and Cost

The Elwha Hatchery currently produces Chinook Salmon. No incubation occurs at this facility. The Elwha Hatchery has been included in the 10-Year WDFW Capital Budget Plan for hatchery renovations starting in the 2027-2029 ($1.2 M) and 2029-2031 ($12 M).

Land and water availability

The Elwha Hatchery appears to have adequate land available for expansion. Areas east of the primary rearing channel appear suitable (Figure 7-17).

There are five existing wells that yield 2,400-3000 gpm on average, depending upon river flow. The use of the Elwha River as a water source depends on available river flow (2,000–8,000 gpm). Flows within the Elwha River get low in August and September. Previous geotechnical evaluations (Robinson Noble 1995) indicate that the ground water aquifer (alluvial fan deposit) is directly connected with the Elwha River. Well water would be targeted for incubation should that phase of production be included. Fish are spawned and eggs are transported to either the Hurd Creek or Sol Duc Hatcheries for incubation and then transported back to the Elwha Hatchery for rearing in February

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early February and a release date of late May. The bioprogram indicates that fish will reach 88 mm or 80 fpp by the end of May.

Proposed expansion – components

The bioprogram indicates a total maximum surface water flow of 7,254 gpm for the growout phase (Appendix D).

The bioprogram analysis calculates the requirement for incubation space for 31 16-tray vertical incubation units (Appendix D) and 10 raceways (100′ x 10′ x 4′ water depth).

Costs

The opinion of the MACC for the improvements described above is $6,070,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $213,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

Pathways

The addition of an incubation facility at this site will eliminate the transfer of eggs to and from Hurd Creek and Sol Duc Hatcheries.

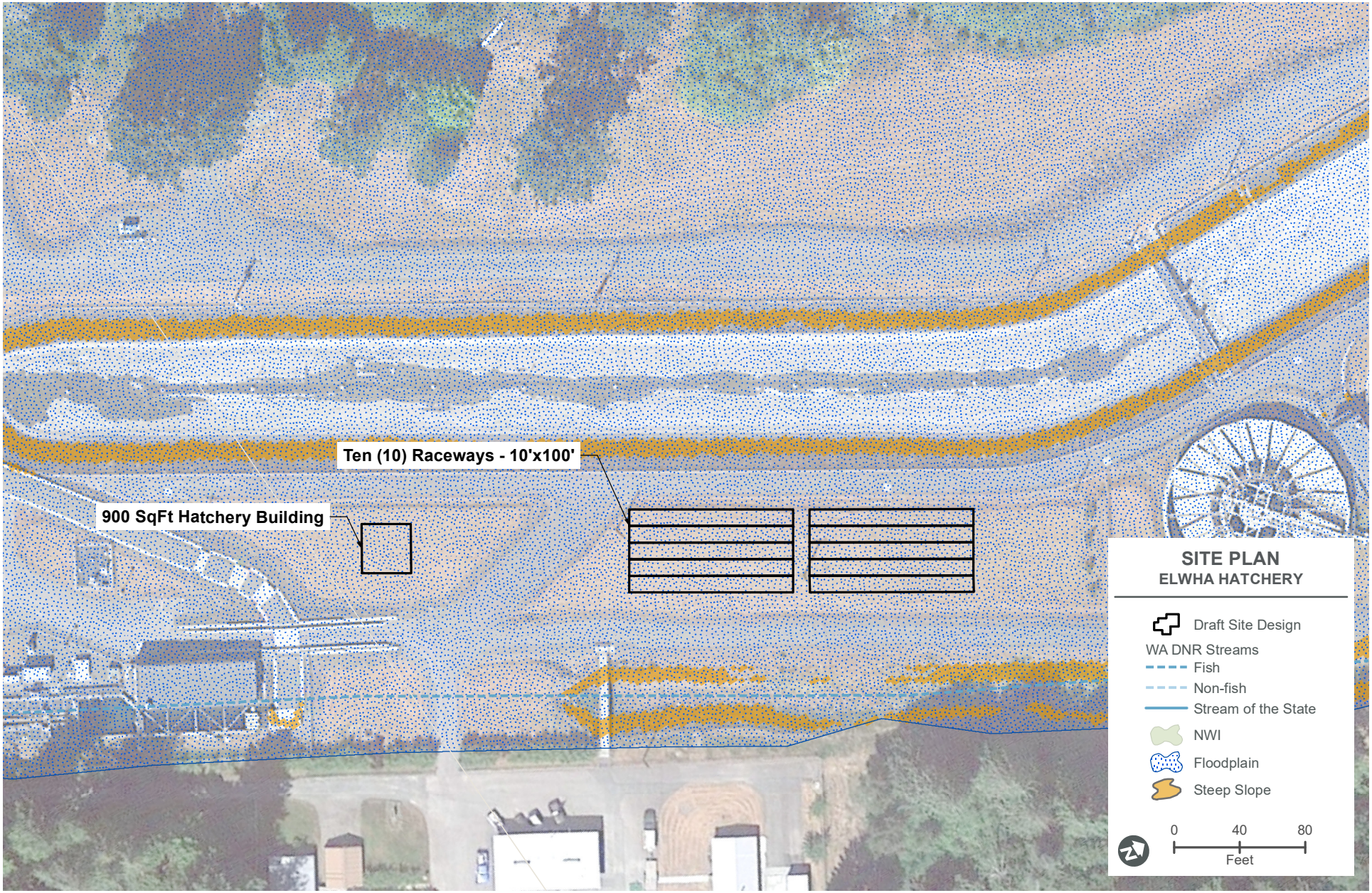

Figure 7-17. Elwha Hatchery - Proposed Renovations for SRKW Expansion

7.2.20 Humptulips Hatchery SRKW Expansion – Plan and Cost

The Humptulips Hatchery currently produces fall Chinook Salmon, late and normal-run Coho Salmon, summer and winter steelhead, and Rainbow Trout. At this time, it is uncertain whether this facility would expand to rear fall Chinook Salmon subyearlings as proposed or to rear fish for another facility. Consequently, additional consultation is needed between co-managers and WDFW to determine acceptable opportunities at Humptulips Hatchery for prey enhancement. The Humptulips Hatchery been included in the 10-Year WDFW Capital Budget Plan for pond renovations (2029-2031: $15.296 M).

Land and water availability

The Humptulips Hatchery appears to have adequate land available for expansion. Areas north of the existing raceways appear suitable (Figure 7-18).

The Humptulips Hatchery is supplied by surface water from Humptulips River (30 cubic feet per second [cfs]), Stevens Creek (20 cfs) and Hatchery Creek (2 cfs). Current production appears to not exceed 18 cfs (April) indicating that additional flow is available for a subyearling fall Chinook Salmon expansion.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early January and a release date of late May based upon historical production with fall Chinook Salmon. The bioprogram indicates that fish will reach 93 mm or 68 fpp by the end of May.

Proposed expansion – components

The bioprogram indicates that a flow rate of 8,022 gpm is required to accommodate 2,000,000 subyearlings.

The bioprogram analysis (Appendix D) calculates the requirement for an incubation space for 31 16-tray vertical incubation units. The analysis demonstrates a requirement of 10 raceways (10′ x 100′ x 4′ water depth). Feed storage, and aeration facilities would also be required. Existing river pumps may need to be rebuilt to meet expansion needs though the Humptulips Hatchery is scheduled to replace ponds and pipeline in 2029–2031 ($15.3M).

Costs

The opinion of the MACC for the improvements described above is $7,545,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $278,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary personnel (8 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

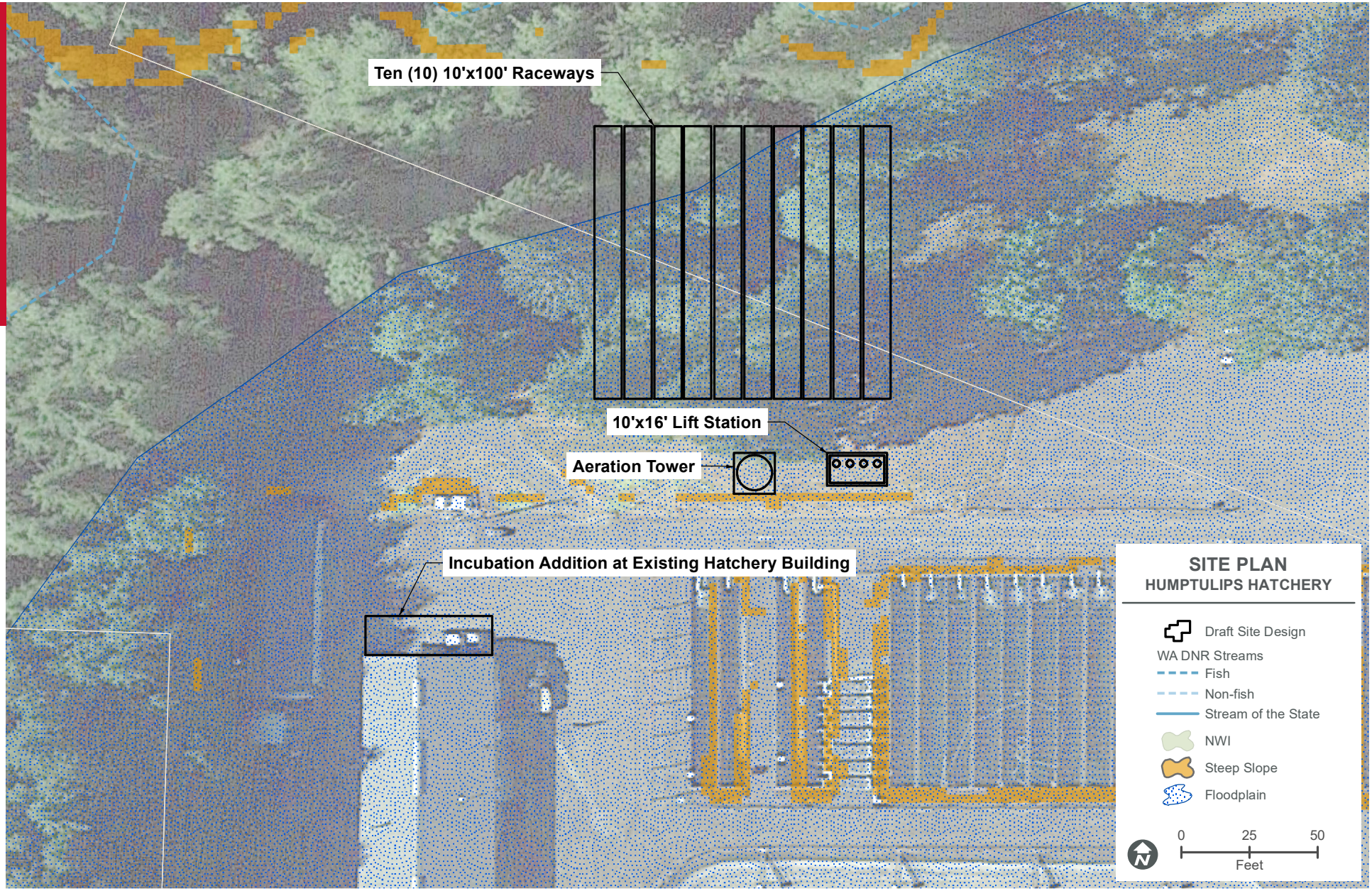

Figure 7-18. Humptulips Hatchery - Proposed Renovations for SRKW Expansion

7.2.21 Nemah Hatchery SRKW Expansion– Plan and Cost

The Nemah Hatchery currently produces fall Chinook Salmon, Chum Salmon, Naselle Coho Salmon, and Goldendale Rainbow Trout. Currently, returning adult Chinook are compromised when water flows are low and temperatures are high. The Naselle Hatchery can hold fish for Nemah to resolve this issue. The Nemah Hatchery has been included in the 10-Year WDFW Capital Budget Plan for intake and pond renovation (2027 – 2029: $1.8 M; 2029 – 2031: $14.014 M) and bridge replacement (2023 – 2025: $1.608 M).

Land and water availability

The Nemah Hatchery appears to have adequate land available for expansion. Areas north of the hatchery building appear suitable for development (Figure 7-19).

Maximum water consumption occurs in May (approximately 9,000 gpm of surface water). It appears that approximately 4,000 gpm of surface water is available.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling fall Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of late January and a release date of early May. The bioprogram indicates that fish will reach 93 mm or 69 fpp by the end of May.

Proposed expansion – components

Through an improved surface water collection system (pathogen treatment and sediment removal) it is anticipated that surface water could be provided to a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram indicates a total flow of 3,966 gpm (Appendix D). With a PRAS system, the makeup water requirement would be 1,983 gpm.

The bioprogram analysis calculates the requirement for 16 16-tray vertical incubation units (Appendix D) and 14 circular tanks (20′ diameter x 4.5′ water depth).

Costs

The opinion of the MACC for the improvements described above is $4,648,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $166,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

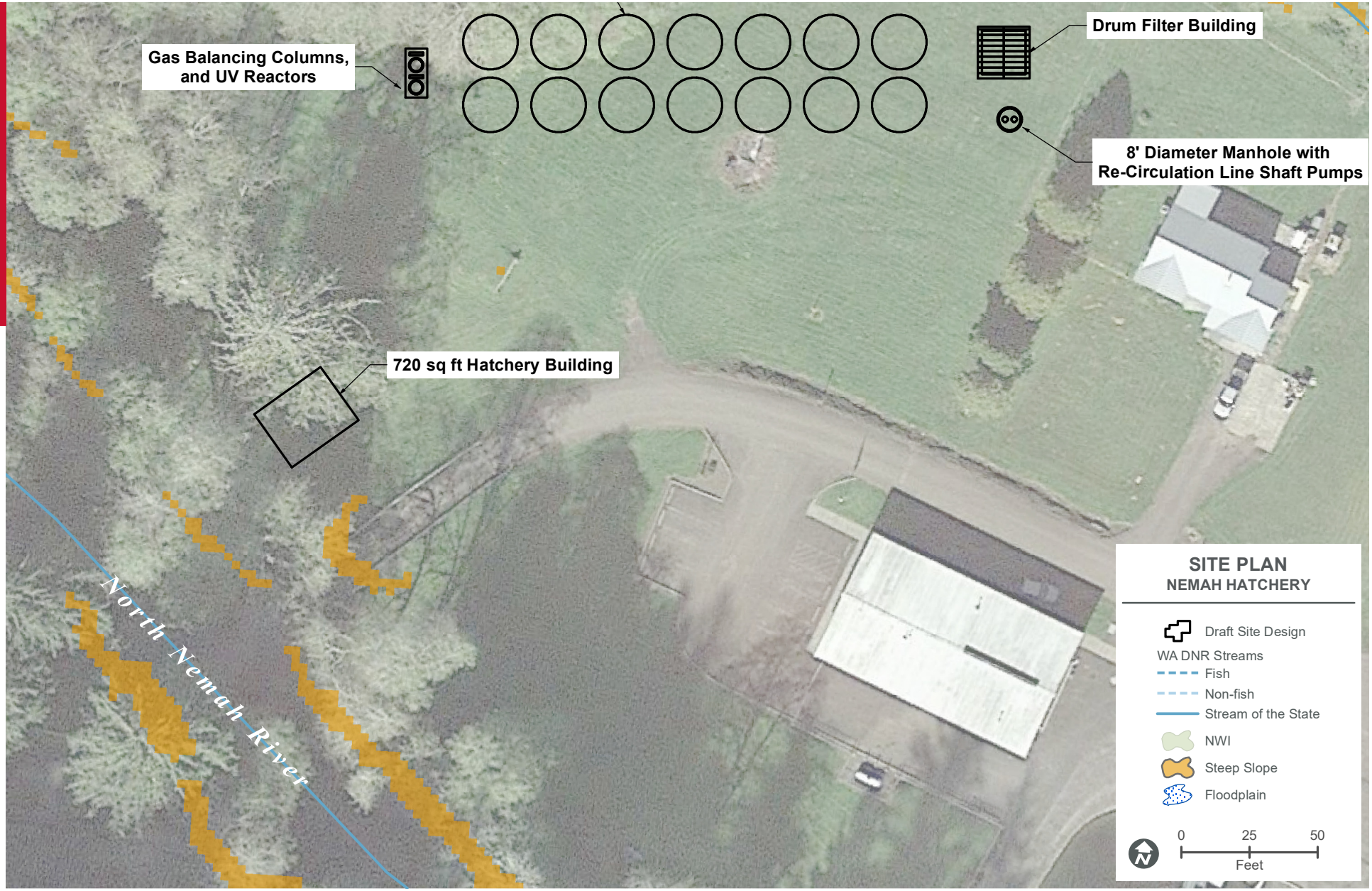

Figure 7-19. Nemah Hatchery - Proposed Renovations for SRKW Expansion

7.2.22 Bogachiel Hatchery SRKW Expansion – Plan and Cost

The Bogachiel Hatchery currently produces summer, winter, and wild late winter steelhead. This hatchery is a dedicated steelhead hatchery with no history of salmon plants in the Bogachiel River. The hatchery will not be able to support the release of Chinook Salmon from the site for the foreseeable future due to ongoing release site concerns. The Bogachiel Hatchery could raise more steelhead which would open Chinook Salmon production at other facilities. Therefore, co-manager consultation would be required if Chinook Salmon were to be reared at Bogachiel and released from a different location. It is anticipated that this would not occur within the next five biennia.

If subyearling fall Chinook Salmon production at the Bogachiel Hatchery is considered in the future, the following discussion details this potential expansion. If a decision is made in the future to expand yearling steelhead production, the total weight and the total water requirement for the fall Chinook (Appendix D) would produce approximately 250,000 yearling steelhead. However, the construction cost for rearing steelhead may be different depending on rearing vessels selected.

Land and water availability

This site has available land adjacent to existing infrastructure and good water. The North pond has the greatest potential for additional spring water development (2000 gpm) while the South pond has the potential for increasing spring water though this would require a geotechnical evaluation. The Bogachiel Hatchery sits on land previously leased from a private timber company The North and South ponds currently sit on private timberlands. The lease agreement will need to be revisited in the event production is added at these ponds. It is not clear whether water rights were included in the previous lease or would be negotiated in a future lease.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 2,000,000 subyearling Chinook Salmon was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of mid-January and a release date of early May. The bioprogram indicates that fish will reach 97 mm or 61 fpp by the beginning of May.

Proposed expansion – components

This facility has excellent quality spring water with desirable water temperatures. However, the current production has a flow demand approaching 14,000 gpm in February. With an improved spring collection system and connected to a PRAS system it is anticipated that the expansion program could be accommodated. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram (Appendix D) indicates a total flow of 8,600 gpm is required for the production increase. With a PRAS system, the makeup water requirement would be 4,300 gpm.

The bioprogram analysis (Appendix D) calculates the requirement for 31 16-tray vertical incubation units (Figure 7-20) and 31 circular tanks (20′ diameter x 4.5′ water depth).

Costs

The opinion of the MACC for the improvements described above is $8,115,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $111,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

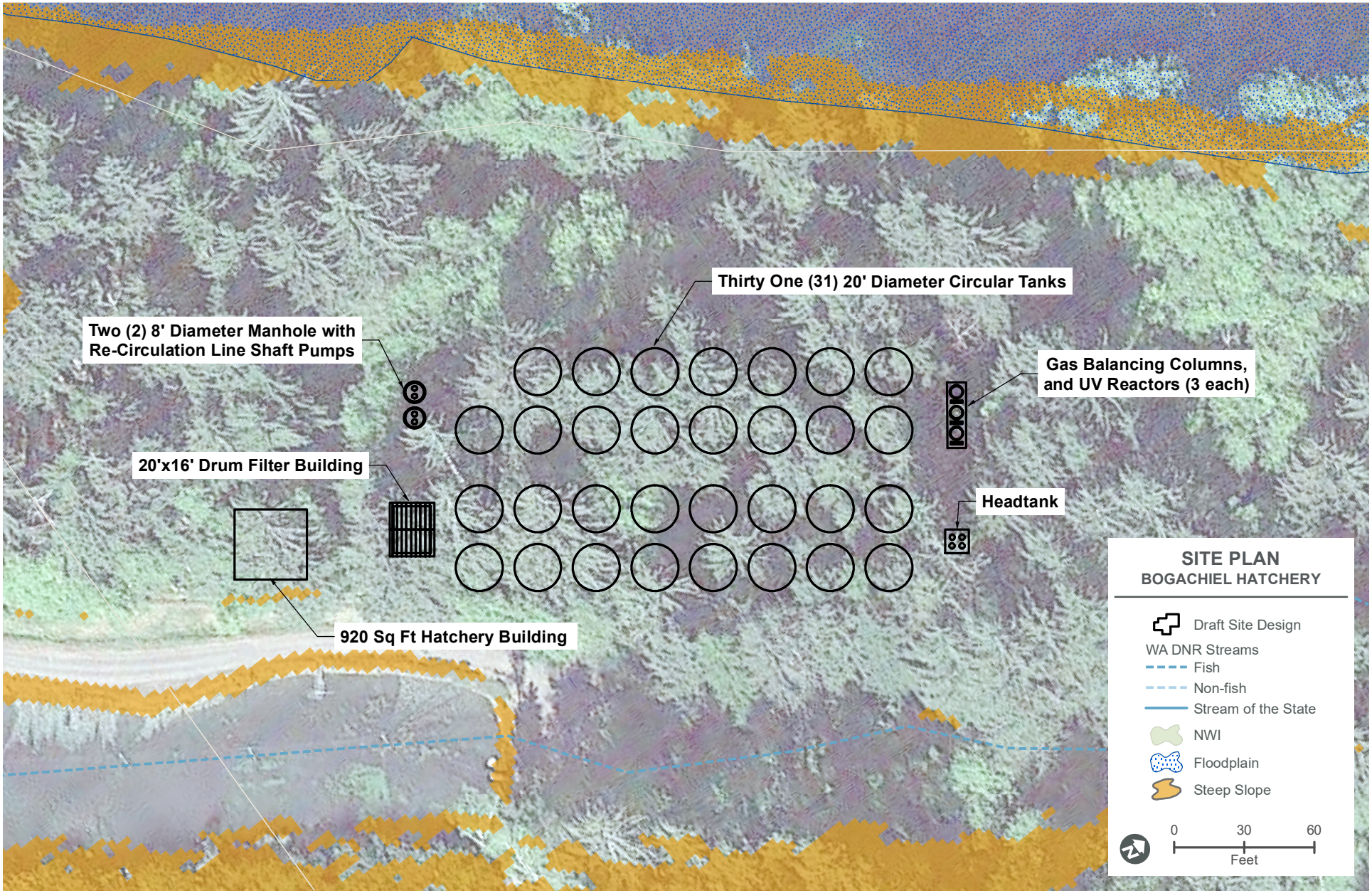

Figure 7-20. Bogachiel Hatchery - Proposed Renovations for SRKW Expansion

7.2.23 Whitehorse Hatchery SRKW Expansion– Plan and Cost

The Whitehorse Hatchery currently produces summer and winter steelhead, summer Chinook Salmon subyearlings, and Rainbow Trout "catchables." It is unclear how recovery plan efforts will affect production expansion at this site. Additional consultation between co-managers and WDFW will be necessary to determine acceptable opportunities at the Whitehorse Hatchery for prey enhancement.

Land and water availability

The Whitehorse Hatchery appears to have adequate land available for expansion with approximately two acres available for expansion (Figure 7-21). An area south of hatchery facilities is satisfactory for development with additional lots owned by WDFW available ¼ mile north of site.

The Whitehorse Hatchery has access to 1,900 gpm of surface water as well as two wells (150 gpm per well) in March). Available water totals 2,650 gpm while maximum demand in March is 7,650 gpm. Reuse is conducted three times onsite to make up the deficit. Initial geotechnical review indicates the area is favorable for more well development (GeoEngineers 2020). It is possible that the existing spring catchment system could be improved for additional water as well. The existing water rights documents containing information summarized from previous hydrogeological reports from 2003 to 2004, will help define the potential for new well water.

This site will require additional groundwater in the form of two new wells (790 gpm each) to provide pathogen free water for a 50 percent PRAS configuration.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 subyearling Chinook Salmon expansion (with broodstock holding to be determined) was developed based upon well and spring water temperatures provided by WDFW using a ponding date of early February and a release date of late May. The bioprogram indicates that fish will reach 82 mm or 98 fpp by the end of May.

Understanding the current recovery program on the Stillaguamish would not support the release of additional chinook into the system, Whitehorse exists in this Master Plan as having the land and water available to rear fish which could be released in a different location. Opportunities could be considered to enhance the existing restoration process after additional consultation between co-managers.

Proposed expansion – components

The bioprogram analysis calculates the requirement for an incubation building with space for 16 16-tray vertical incubation units and 12 circular tanks (20′ diameter x 4.5′ water depth).

It is assumed that a combination of well and spring flows can be prioritized for expansion using a PRAS system. This system would recirculate water with a 50 percent makeup water supply for the growout life stage. The bioprogram indicates a total flow of 3,148 gpm. With a PRAS system, the makeup water requirement would be 1,574 gpm from two new wells.

Costs

The opinion of the MACC for the improvements described above is $5,164,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $141,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It is anticipated that one temporary employee (8 months) will be required for this expansion.

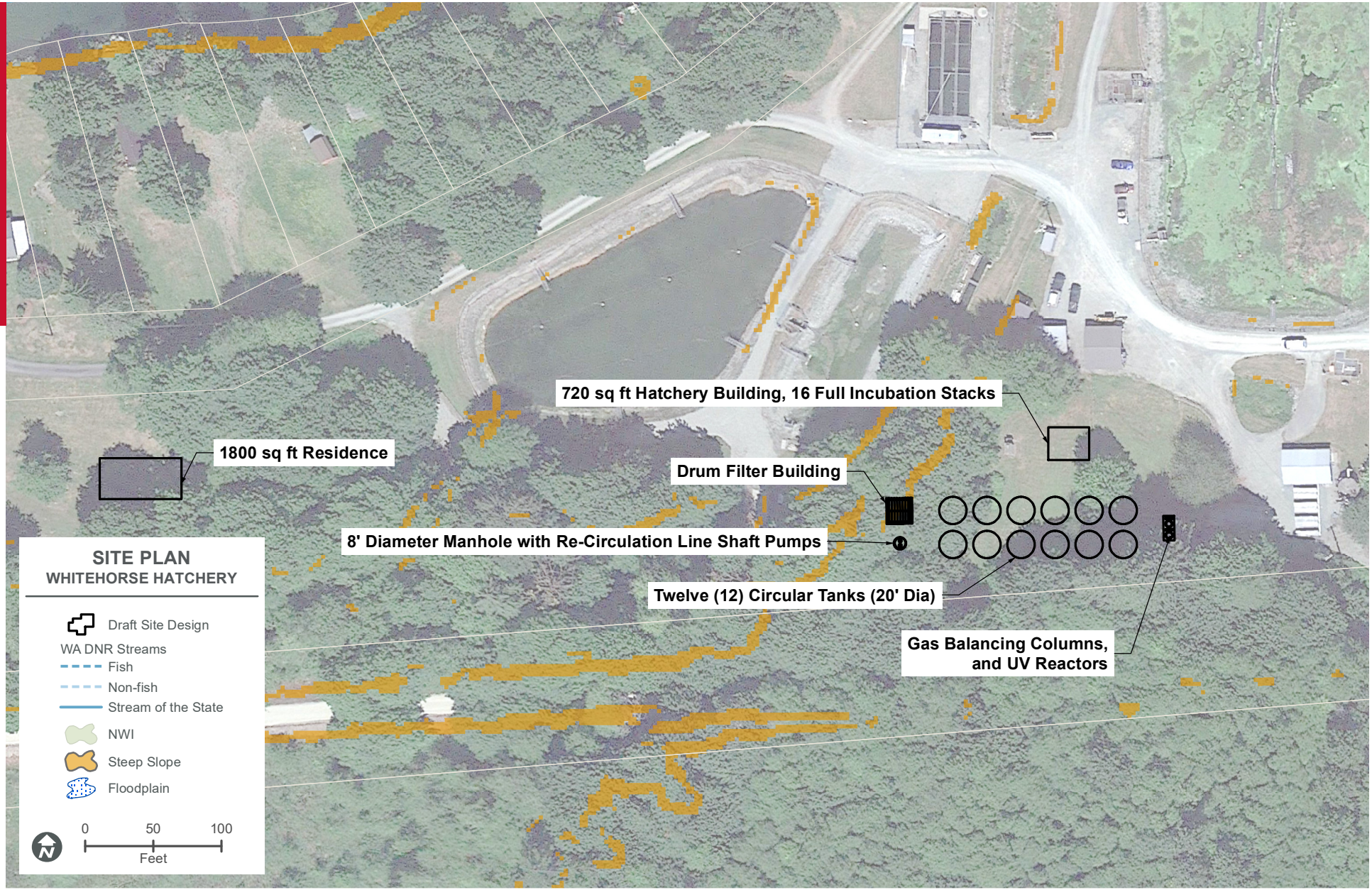

Figure 7-21. Whitehorse Hatchery - Proposed Renovations for SRKW Expansion

7.2.24 Dungeness Hatchery SRKW Expansion – Plan and Cost

The Dungeness Hatchery currently produces spring Chinook Salmon, winter steelhead, and Coho Salmon. The Dungeness Hatchery has been included in the 10-Year WDFW Capital Budget Plan for hatchery renovation (2027-2029: $1.9 M; 2029-2031: $13.871 M) and Pond Renovations (2025 – 2027: $2.002 M; 2027 – 2029: $12.15 M).

Land and water availability

The Dungeness Hatchery appears to have adequate land available for expansion. Areas west of the ten existing raceways appear suitable (Figure 7-22).

There are two existing wells onsite that yield 250-300 gpm with an average estimated temperature of 47°F. The available surface water source is the Dungeness River which is extremely cold from November-April with average temperatures of 32-41°F. The surface water source has cryptobia after the spring snow melt which requires a filtration system to manage. It is assumed that surface water will be minimized if ground water is determined to be available (+/- 1,500 gpm) to limit potential disease issues.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 1,000,000 yearling spring Chinook Salmon expansion was developed based upon monthly surface water temperatures provided by WDFW using a ponding date of early-December–January and a release date of early-April of the second year. To meet targeted release dates, incubation water temperature will need to be increased to 48°F with a 90 percent PRAS system. The bioprogram indicates that fish will reach 189 mm or 8fpp by the beginning of April.

Proposed expansion – components

The bioprogram indicates a total maximum flow of 15,411 gpm for the growout phase (Appendix D). It is anticipated that existing and proposed well water expansion combined with treated surface water (cryptobia filter) will provide sufficient flow if combined with a 70 percent PRAS system. At time of release the PRAS system will require 4,600 gpm of makeup water for both the zero-age and yearlings. An aeration/head tank will be required. A geotechnical evaluation was developed recently to determine availability of additional groundwater.

The bioprogram analysis calculates the requirement for 16 16-tray vertical incubation units (Appendix D). This facility has adequate incubation to accommodate the expansion. The analysis demonstrates a requirement of 20 raceways (100′ x 10′ x 4′ water depth). Three raceways are required for the zero-age fish and 17 raceways for the yearlings both in the month of April.

Costs

The opinion of the MACC for the improvements described above is $12,798,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the improvements for this facility is approximately $405,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health. It

is anticipated that one temporary employee (8 months) will be required for this expansion.

While not evaluated, adult holding and handling will need to be thoroughly evaluated during each pre-design event to verify if the existing hatchery adult holding and spawning infrastructure will need to be augmented to support the new production proposed in the master plan. The potential cost for each facility may range from $1M to $4M depending on program information, infrastructure condition and program expansion.

Pathways

A pathway has been identified where the Bogachiel Hatchery could assume the rearing of the early winter steelhead program (100,000 fish). This programmatic transfer would release an additional 300-500 gpm for the expansion program, additional raceway space, and potential reduction in temporary personnel.

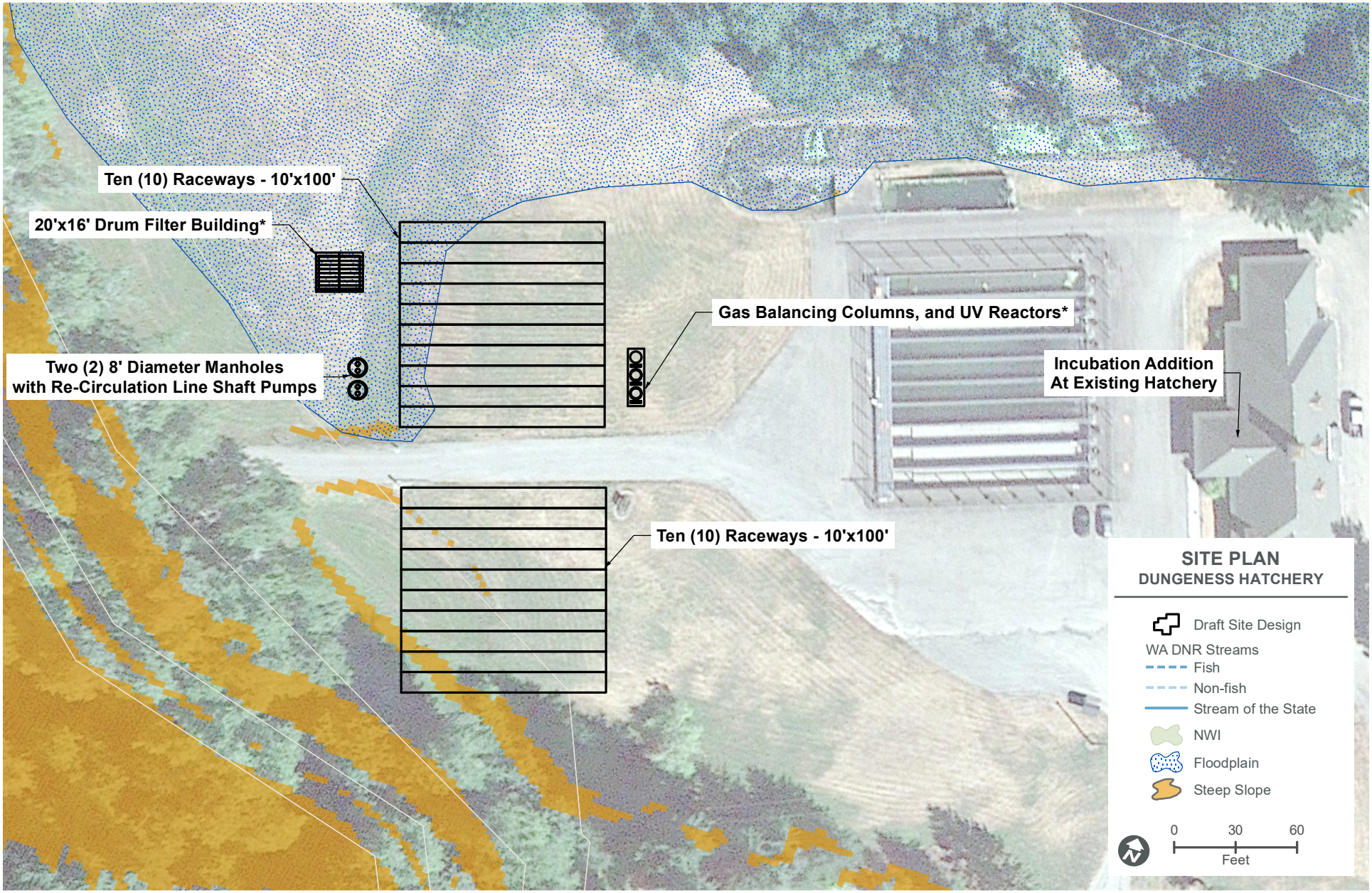

Figure 7-22. Dungeness Hatchery - Proposed Renovations for SRKW Expansion

7.2.25 Garrison Springs Hatchery SRKW Expansion – Plan and Cost

Plan and Cost

The Garrison Springs Hatchery produces subyearling fall Chinook Salmon and Coho Salmon. This facility is associated with the Chambers Creek and Lakewood Hatcheries. The Garrison Springs Hatchery has been included in the 10-Year WDFW Capital Budget Plan for fishway repairs (2029-2031: $4.613 M).

Land and water availability

The Garrison Springs Hatchery initially appeared to have adequate land available for expansion. Areas west of the existing raceways appeared suitable. Subsequent, recent investigations by WDFW indicated that property boundaries and water supply infrastructure prevent expansion as presented below. This analysis is preserved in the event that future changes to existing structures and/or adjustments to property boundaries may warrant further consideration of this expansion.

The facility is fed by springs (1,800–2200 gpm). Maximum spring use is in May (700 gpm). Spring water is being lost through the conveyance structure and is scheduled to be replaced in the 2021 biennium. Institutional knowledge indicates that there is a lot of water potential from wells. There is the potential for some programmatic changes to release fish at a smaller size (to acclimation sites at Chambers Creek) to make available additional spring water. It is assumed that the combination of two new wells (800 gpm each) and more aggressive use of acclimation sites would provide 1,600 gpm of groundwater for a 400,000 subyearling fall Chinook Salmon program.

Proposed expansion – fish production

A bioprogram analysis (Appendix D) for 400,000 subyearling fall Chinook Salmon expansion was developed upon the available flow described above using a constant 56°F temperature and using a ponding date of mid-December. The bioprogram indicates that fish will reach 92 mm or 72 fpp by the first of March.

Proposed expansion – components

Chinook Salmon fry are delivered to the site from Lakewood Hatchery therefore incubation space is not required for this facility. The bioprogram analysis determines that two raceways (100′ x 10′ x 4′ water depth) are required (Appendix D).

7.2.26 Deschutes River Hatchery – Plan and Cost

The Deschutes River Hatchery would consist of a new facility located on the Deschutes River that would produce four million Chinook Salmon annually (HDR 2019). Planning for the Deschutes River Hatchery has been on-going and is independent of the SRKW master planning process. A design for the hatchery has been completed for a possible location at Pioneer Park in the city of Tumwater, Washington (Figure 7-23); however a definitive site has not yet been selected and alternative sites are undergoing further evaluation. The proposed hatchery would include the following:

- Hatchery Building
- Utility building
- Upper and lower raceways
- Pollution abatement pond
- Settling pond
- Surface water intake structure
- Pump stations

Costs

The opinion of the MACC for the improvements described above is $33,616,000 ($ 2020). The C100 form for this facility is included in Appendix E and the cost breakdown for the MACC is provided in Appendix F.

The opinion of the annual O&M costs for the O&M to produce the Chinook portion of the production estimated for this facility is approximately $347,000 ($ 2020). The O&M cost breakdown can be found in Appendix G and includes anticipated costs for power, labor, maintenance, fish feed, and fish health.

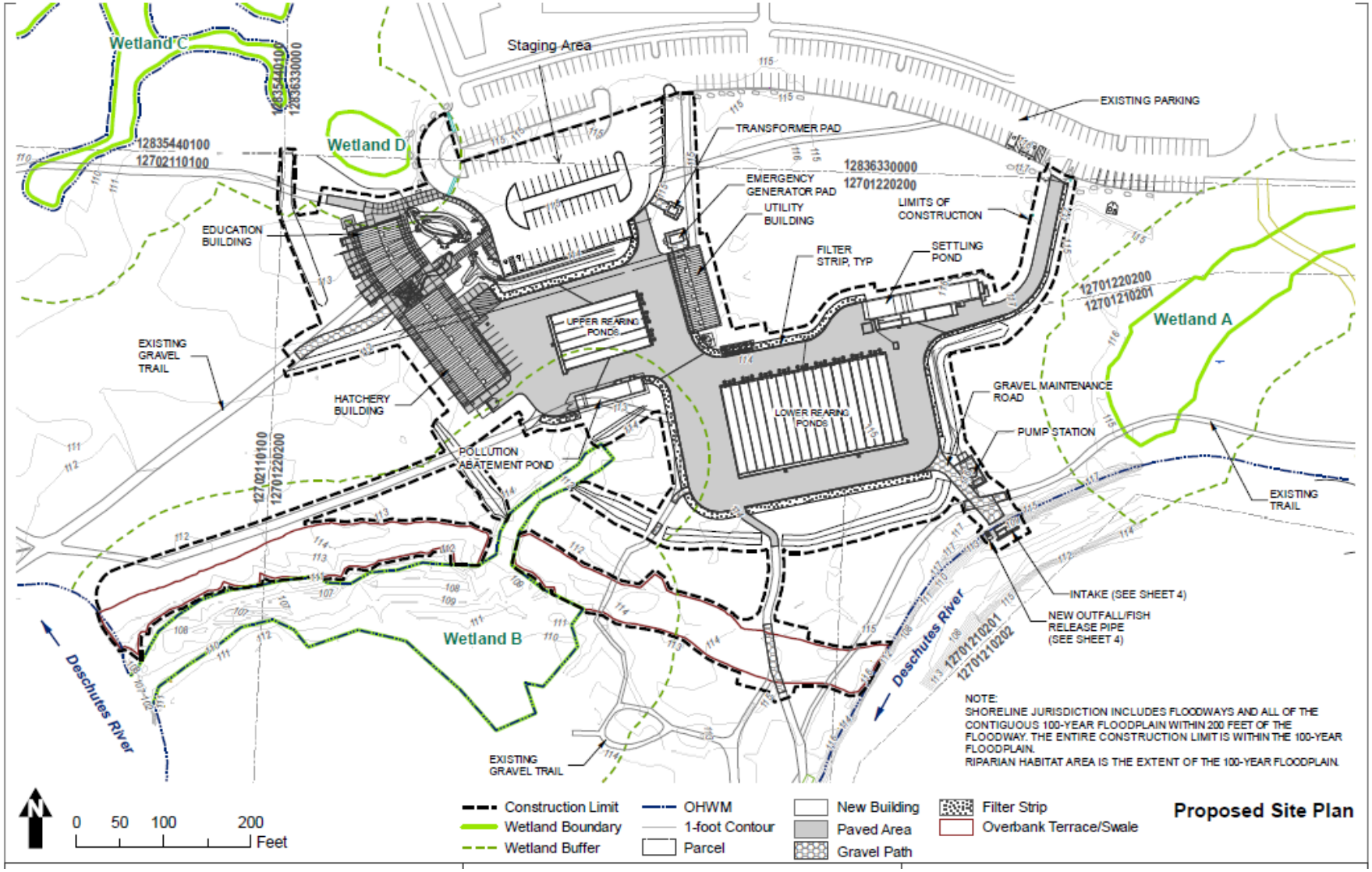

Figure 7-23. Proposed Deschutes River Hatchery Site Plan at the Pioneer Park Location

8 New Cowlitz River State Salmon Hatchery Feasibility Study Summary

One element of the master planning effort prioritized by the Orca Task Force and funded by the legislature was an investigation into the potential development of a new state salmon hatchery on the Cowlitz River to increase salmon production for SRKW prey enhancement. The base production for the new hatchery could support adult collection, egg incubation, and juvenile rearing of Chinook Salmon, with optional production of Coho Salmon and steelhead trout (*O. mykiss*). The following section summarizes the results of a feasibility assessment prepared for the potential development of a new state-owned hatchery facility on the Cowlitz River in Lewis County, Washington (HDR and GeoEngineers 2020). The complete feasibility study is provided in Appendix K.

8.1 Site Location

Prior to selection of a preferred alternative site for potential development of a new state salmon hatchery on the Cowlitz River, WDFW conducted an initial site screening analysis to identify sites on the Cowlitz River that could accommodate a facility. Based on the minimum site criteria identified and ranked in the initiate site screening analysis (HDR 2020), WDFW selected a preferred site to carry forth into an assessment of development feasibility. The selected site could combine portions of two existing parcels on the left (south) bank of the Cowlitz River near river mile (RM) 49.6, just downstream from Mayfield Dam and across the river from the existing Cowlitz River Salmon Hatchery, owned and operated by Tacoma Public Utilities (TPU) (Figure 8-1).

The selected candidate parcels include portions of privately managed designed forest owned by Jorgenson Timber LLC, and portions of state-owned land currently managed by the Department of Natural Resources (DNR) (Figure 8-2). The Jorgensen Timber site is in Section 23 of Township 17N, Range 1W in Lewis County, Washington on Lewis County Parcel Number 028082000000. As reported by the Lewis County Assessor's Office, the total parcel is 179.05 acres. WDFW could acquire or lease the northernmost 80 acres of the parcel for hatchery development.

The second parcel is owned by the state and managed by DNR. It is adjacent to the Jorgenson Timber site to the east. The DNR parcel is located on Lewis County Parcel Number 028105000000 in Section 23, Township 17N, Range 1W in Lewis County. As reported by the Lewis County Assessor's Office, the total parcel is 251.40 acres. For hatchery development, WDFW could propose to lease, acquire an easement for, or request land management of an approximately 40-acre portion of the DNR site.

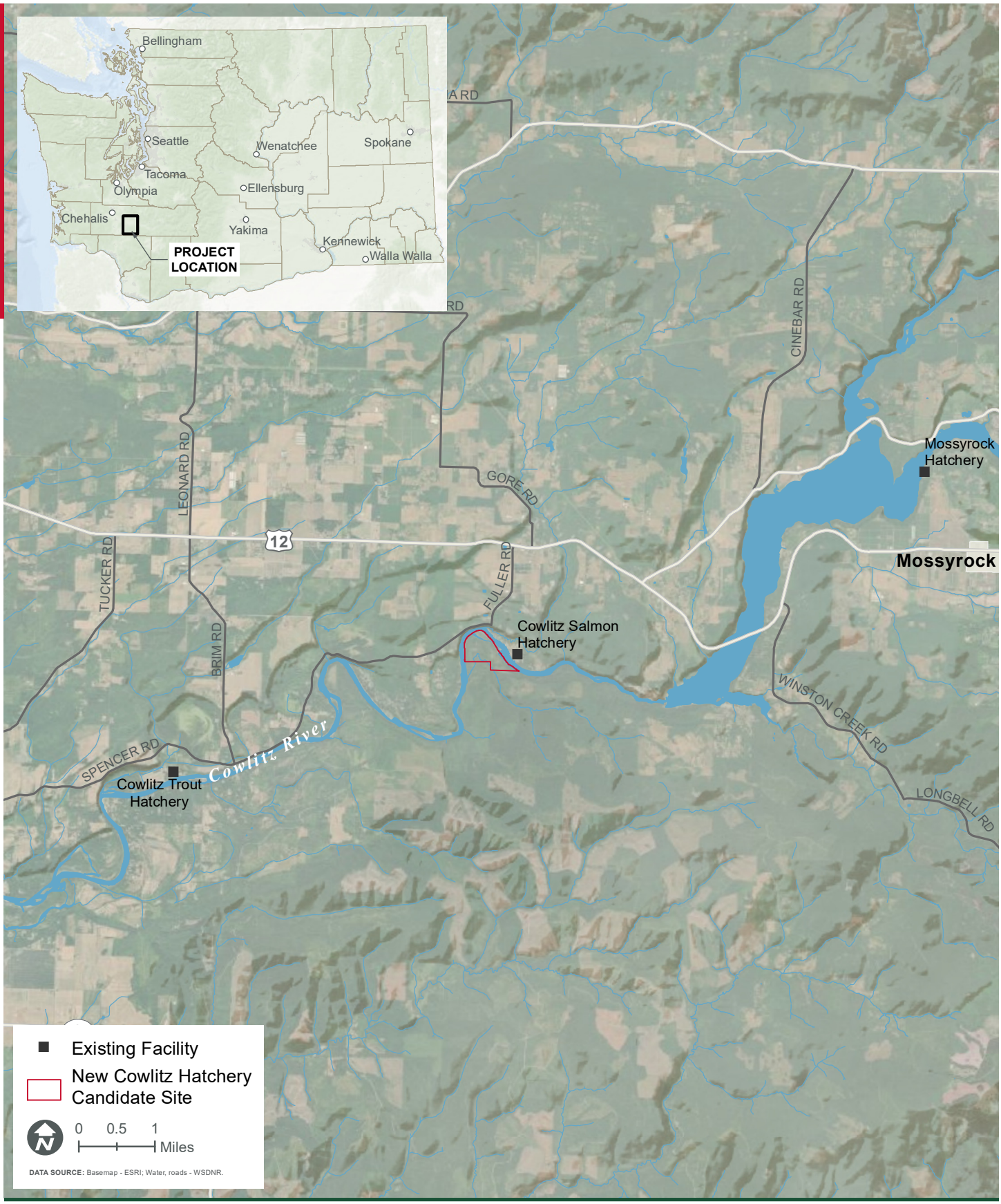

Figure 8-1 Vicinity Map for Candidate Site for Potential New Cowlitz River State Salmon Hatchery

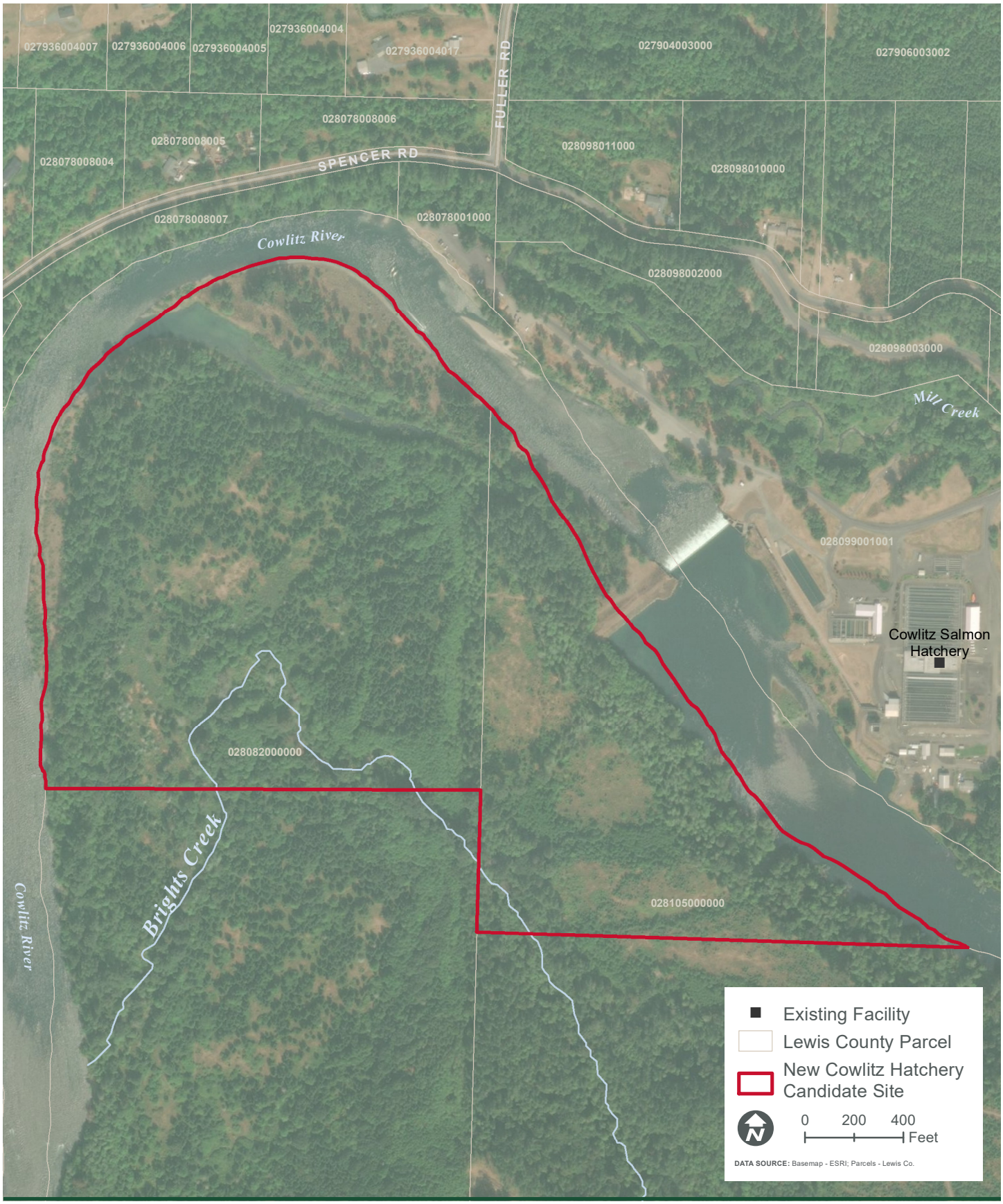

Figure 8-2. Potential Candidate Site for New Cowlitz River State Salmon Hatchery Candidate Site, Showing Parcels.

8.2 Evaluation Criteria and Summary of Existing Conditions

HDR conducted a desktop review of the selected candidate site, and assessed the following elements to determine the feasibility of the site to support hatchery development:

- Geotechnical hazards
- Hydrogeology and Groundwater Development Potential
- Surface Water Quantity and Quality
- Permitting Summary and Potential

8.2.1 Geotechnical Conditions

As part of the feasibility study, GeoEngineers evaluated geotechnical conditions on the subject parcels (i.e., “the site”) (HDR and GeoEngineers 2020). Most of the site is located on a broad alluvial plain that is generally flat to gently sloping. Steep slope areas, bordered by flat upland terraces, are located southeast and southwest of the project site. These features are likely remnant river terraces that may have formed during the last period of regional glaciation. The slopes range from about 20′ to about 80′ in vertical height.

It appears the steep slopes in the southeast part of the site meet the technical criteria for Landslide and Erosion Hazard Areas; however, these areas would likely not be limiting factors for the hatchery development, provided the hatchery is not located near steep slopes in the southeast portion of the subject parcels. Most of the subject parcels are likely classified as a Seismic Hazard Areas because of interpreted soil types (alluvium and outwash) and an anticipated shallow groundwater table.

Hatchery site development could occur within the flat to gently sloping portion of the site on the Jorgenson Timber parcel. This area is underlain by alluvium, with soils that are usually in a loose to medium dense condition. Soft, settlement sensitive materials (peat and silt) can also be present within alluvial materials. Because of this, shallow and deep foundation systems may be required for the hatchery, and dewatering may be required for project construction. These factors should be considered in facility predesign.

8.2.2 Hydrogeology and Groundwater Development Potential

The subject parcels are located within the Cowlitz River Valley. The valley is incised into a relatively flat to gently sloping upland area that extends north, west and southwest from the parcels. Most of the subject parcels appear to be located on an alluvial plain that is generally flat to gently sloping. Surface materials over most of the site area are comprised of Alluvium, which is described as a loose mixture of silt, sand, gravel and occasional peat that was deposited by the Cowlitz River.

GeoEngineers (HDR and GeoEngineers 2020) reviewed the Ecology Water Well Log database to determine the presence of wells located at and near the subject parcels. No well logs were associated with the property, though well logs were identified on properties southwest west of the site, across the Cowlitz River. These wells appear to

have encountered a productive sand and gravel aquifer at depths of about 30 feet below ground surface. Other wells northeast and east of the subject parcels appear to have encountered fine grained soils and/or bedrock at shallow to deep depths. Logs for wells at TPU's Cowlitz River Salmon Hatchery were not contained within the Ecology database.

Based on a review of available information, the surface geology at the subject parcels appears favorable for near-surface groundwater development, either through wells or through exfiltration trench systems. Deeper groundwater supplies could exist within outwash sand and gravel, should these materials exist beneath the mapped alluvium. A subsurface exploration program, including testing and analyses of aquifers encountered, is required to accurately assess groundwater availability at the site. Regardless of availability, further evaluation is required to determine if enough quantities of groundwater exist on the subject parcels, within the current study area, to support the desired fish production at the hatchery.

8.2.3 Surface Water Quantity and Quality

The potential, conceptual hatchery site is adjacent to the Cowlitz River, approximately 2.2 river miles downstream from Mayfield Dam. Surface flows downstream of the dam are regulated. Based on mean monthly flow data (USGS 2020) for USGS gauge 14238000 (Cowlitz River Below Mayfield Dam) from water years 1934 to 2020, mean flows range from 2,710 cfs in August to 9,750 cfs in December. Surface water quality appears consistent with hatchery production of salmonids; however, treatment may be required during late spring through early fall to filter out fish pathogens that are present when the water exceeds 50°F.

In addition to the Cowlitz River, Brights Creek, a small, left bank tributary to the Cowlitz River flows through the northern half of the Jorgenson Timber parcel. Brights Creek has an approximate drainage area of 2.42 square miles, with mean annual precipitation of 51.4 inches (StreamStats 2020). Although published monthly flow data was not available for Brights Creek, mean monthly flow was estimated with data from similar watersheds using modeling methods to compare a site to other low-flow streams in western Washington (Curran et al. 2012). Using these methods, the estimated mean monthly flow for Brights Creek is predicted to range from a low of 1.8 cfs in August to a high of 18.3 cfs in December. The estimated 2-year peak flood is 90.4 cfs, and the 100-year flood is 351 cfs, based on Mastin et al. (2016).

Brights Creek is not included in the Category 5 – 303d listing for impaired waterbodies; however, additional water quality data, including temperature data, were unavailable. Further study is recommended to determine water quality conditions in this tributary, and potential use in hatchery production.

8.2.4 Permitting Summary and Natural Resource Considerations for Development

If the Jorgenson Timber and DNR sites are developed for a new state hatchery, WDFW would apply for state, local, and federal permits prior to construction and operation. Anticipated permits are summarized below (Table 8-1). The list of permits is subject to change and additional authorizations may be required following a more in-depth analysis

of the subject sites. The estimated timeline for permit acquisition is approximately 2 years following completion of predesign.

Table 8-1. Anticipated Permits for Development of a New State Salmon Hatchery on the Cowlitz River

Jurisdiction	Permit
Lewis County	Critical Areas Review
	Shoreline Conditional Use Permit
	Construction Permit SA-014 for clearing, grading, and excavation activities
	Building permit
	Flood Hazard Zone Permit[1]
Washington State Department of Ecology	NPDES Construction Stormwater General Permit
	Clean Water Act Section 401 Water Quality Certification
	NPDES Upland Finfish Hatching & Rearing General Permit (or Individual Permit, TBD)
	Surface Water and Groundwater Right Permits
WDFW	State Environmental Policy Act (SEPA) compliance
	Hydraulic Project Approval (HPA)
Washington Department of Natural Resources	Forest Practices Permit
U.S. Army Corps of Engineers (USACE)[2, 3]	Clean Water Act (CWA) Section 404 Discharge Authorization for Streams and Wetlands
U.S. Fish and Wildlife Service	ESA Section 7 compliance (required for USACE permit)
National Marine Fisheries Service	ESA Section 7 compliance (required for USACE permit) Magnuson Stevens Act Essential Fish Habitat Assessment
Washington State Department of Archaeology and Historic Preservation (DAHP)	National Historic Preservation Act (NHPA) Section 106 Compliance
DNR	Aquatic Lands Authorization (pre-statehood navigability is assumed) Land Use Agreement (exchange or easement) Forest Practices Application/Notification (FPA/N)[4]

[1] Per Lewis County code: A development permit entitled flood hazard zone permit shall be obtained before construction or development begins within any area of special flood hazard established in LCC 15.35.060. The permit shall be for all structures including manufactured homes, as set forth in LCC 15.35.040, and for all other development including fill and other activities, also as set forth in LCC 15.35.040.

[2] Development of a hatchery at this location would not require a Section 10 Rivers and Harbors Act permit because the intake could be located just upstream of TPU's Barrier Dam at RM 49.6 (American Whitewater 2020). Per the USACE navigable waters list for Washington (USACE 2008), the Cowlitz River is considered navigable to RM 35.5, with only the first 5 miles maintained. Therefore, the facility could be located upstream of the delineated navigable reach.

[3] For the purposes of this evaluation, development of a new facility is assumed to be covered under the nationwide permit (NWP) program for CWA Section 404 Discharge Authorization. Coverage under the NWP also assumes coverage for each verified NWP activity under the National Environmental Policy Act (NEPA). Under these assumptions, an individual NEPA analysis would not be required.

[4]Coordination with DNR is required to determine FPA/N requirements and delineation of the Riparian Management Zone on both parcels.

8.3 Potential Salmonid Production and Biological Program

For the purposes of bioprogramming, HDR assumes that the primary, or base, production at a potential new Cowlitz River State Salmon Hatchery would focus on fall Chinook and spring Chinook Salmon. Optional production of Coho Salmon and steelhead could be phased in, over time, as funding allows. Production program goals for all four stocks, including base Chinook Salmon production and optional Coho Salmon and steelhead production, were provided by WDFW (Table 8-2). If a facility were developed at this location, WDFW could rear up to 4,100,000 fall Chinook Salmon and 1,250,000 spring Chinook Salmon. For the purposes of bioprogramming, if Coho Salmon and steelhead production were implemented over time, WDFW could rear 1,000,000 Coho Salmon and 250,000 steelhead. Chinook and Coho salmon production would contribute toward SRKW prey enhancement objectives directed under EO 18-02 and established by the Orca Task Force. Note that the potential production numbers are the maximum possible. Coordination and discussions with the Services regarding ESA constraints, as well as co-managers will be necessary before finalizing any production numbers.

Table 8-2. New Cowlitz State Salmon Hatchery Program Goals

Species	Flow Index[1]	Density Index[2]	Program	Spawn Date	Size at release (fpp[3])	Release Date	Total Pounds	Sample Production Period (months)
Base Facility – Chinook Salmon Production Only								
Fall Chinook	1.0	0.2	4,100,000	Oct 15	80	May 30	51,250	10/15/2020 through 5/30/2021
Spring Chinook	0.6	0.1	1,250,000	Sep 19	5	Mar 1	250,000	9/19/2020 through 3/1/2022
Optional Coho Salmon and Steelhead Production								
Coho	1.0	0.3	1,000,000	Nov 1 and Dec 1	15	May 1	66,667	11/15/2020 through 5/1/2022
Steelhead	1.0	0.3	250,000	Apr 8	7	May 7	35,714	4/8/2020 through 5/7/2021
Total			**6,600,000**				**403,631**	

[1] Flow Index = lbs/gpm/inch
[2] Density Index = lbs/ft3/inch
[3] fpp = fish per pound
Source: WDFW (2020)

Using the desired production targets for the new hatchery, a draft bioprogram was developed (HDR and GeoEngineers 2020). Fish hatchery bioprogramming is a tool utilized to estimate the fish rearing environment (e.g., space and water) necessary to meet the established production goals. The process references fish culture specifications obtained from recognized fish culture manuals as well as established fish rearing facilities and fish production managers. Site specific assumptions and proponent preferences contribute to creating a model of anticipated growth, desired rearing space, and required inflow to produce healthy fish. Using this information, HDR estimated the type and number of rearing units that would be required to meet base and optional production goals (Table 8-3).

Table 8-3. Rearing Unit Requirements for New Cowlitz River State Salmon Hatchery

Species	Full stacks	100-foot Raceways	175-foot Raceways	8-foot-diameter circulars	30-foot-diameter circulars
Fall Chinook	63		3		
Spring Chinook	20	10	13[1]		
Coho	16	3	2		
Winter Steelhead	4			15[2]	5[2]

[1]The site plan (see Figure 8-3) includes 12 175′ raceways for spring Chinook. The 13th 175′ raceway would be provided by an unused fall Chinook raceway in February-March (capturing multi-use purpose).

[2] The site plan (see Figure 8-3) includes 16 8′ circulars and 6 30′ circulars for steelhead. The extra tanks depicted on the site plan are for fish culture purposes for grading/marking, and not for rearing.

Based on the bioprogram developed for a potential new Cowlitz River State Salmon Hatchery, both surface and groundwater would be required to meet desired production goals for base (Chinook Salmon) and optional (Coho Salmon and steelhead) production (Table 8-4).

Table 8-4. Surface and Groundwater Requirements for base Chinook Salmon (fall and spring) programs and optional Coho Salmon and winter steelhead programs

Species	Water Source	Maximum Monthly Water Consumption (cfs)											
		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Chinook Species	Ground	0.00	0.52	2.19	2.15	5.16	7.80	9.51	13.48	0.00	0.00	0.00	0.00
	Surface	16.59	19.93	23.98	27.23	29.97	38.54	44.02	49.52	27.98	40.50	9.99	12.81
Coho	Ground	0.00	0.00	0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00
	Surface	9.73	12.43	15.11	18.54	20.92	23.28	25.24	27.71	32.40	34.80	4.71	6.79
Steelhead	Ground	1.57	2.24	3.24	4.17	5.47	6.55	7.71	8.96	10.74	11.09	0.54	0.98
	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

8.4 Conceptual Design

For hatchery siting, HDR assumes that acquisition of an easement or land exchange with DNR is achievable. The design and use of DNR lands would be contingent upon securing such an agreement between DNR and WDFW.

The conceptual design discussed below includes the following facilities on DNR lands: screened surface water intake, buried water conveyance lines, and a hatchery access road. All other hatchery-related facilities would be located on the Jorgenson Timber parcel.

8.5 Site Layout Concept

Based on WDFW's desired production program and subsequent bioprogramming developed for a potential new hatchery on the Cowlitz River, HDR developed a conceptual layout of major process facilities and ancillary support facilities including:

- Surface water intake and screening facility
- Surface water head tank and groundwater headtank
- Backup power generators
- Groundwater development
- Groundwater treatment
- Incubation and administration building; chillers
- Circular tank buildings
- Shop and feed storage buildings
- Rearing raceways
- Adult fish ladder, trap and sorting facility
- Adult holding ponds
- Pollution abatement
- Facility outfall and juvenile release pipe
- PRAS stations
- Facility access road and utilities

The conceptual site plan (Figure 8-3) was developed by combining all available and known information, including required regulatory setbacks for known critical resources located within the subject parcels, such as shorelines and stream buffers. Additional regulatory considerations may further restrict site development potential (e.g., channel migration zone, well development). The conceptual site plan described below is considered the best configuration that addresses the specific site, operational, and maintenance elements for development of a large-scale production hatchery on the subject parcels. See Appendix K for a description of proposed facility elements at this

conceptual level of design. Optional UV and ozone disinfection facilities, and rearing units for optional Coho Salmon and steelhead production are depicted on the site plan.

Based on a lack of recreational fishing access in this reach of the Cowlitz River, the conceptual site plan also considers the feasibility of including a public access trail to the river, along with Americans with Disabilities Act (ADA)-compliant parking and a restroom.

The fisheries components of the above list will be further vetted with WDFW for biosecurity, the ability to meet program goals now and into the future, availability of new surface water rights and groundwater rights, operational flexibility, maintenance, reliability, and fisheries monitoring and evaluation.

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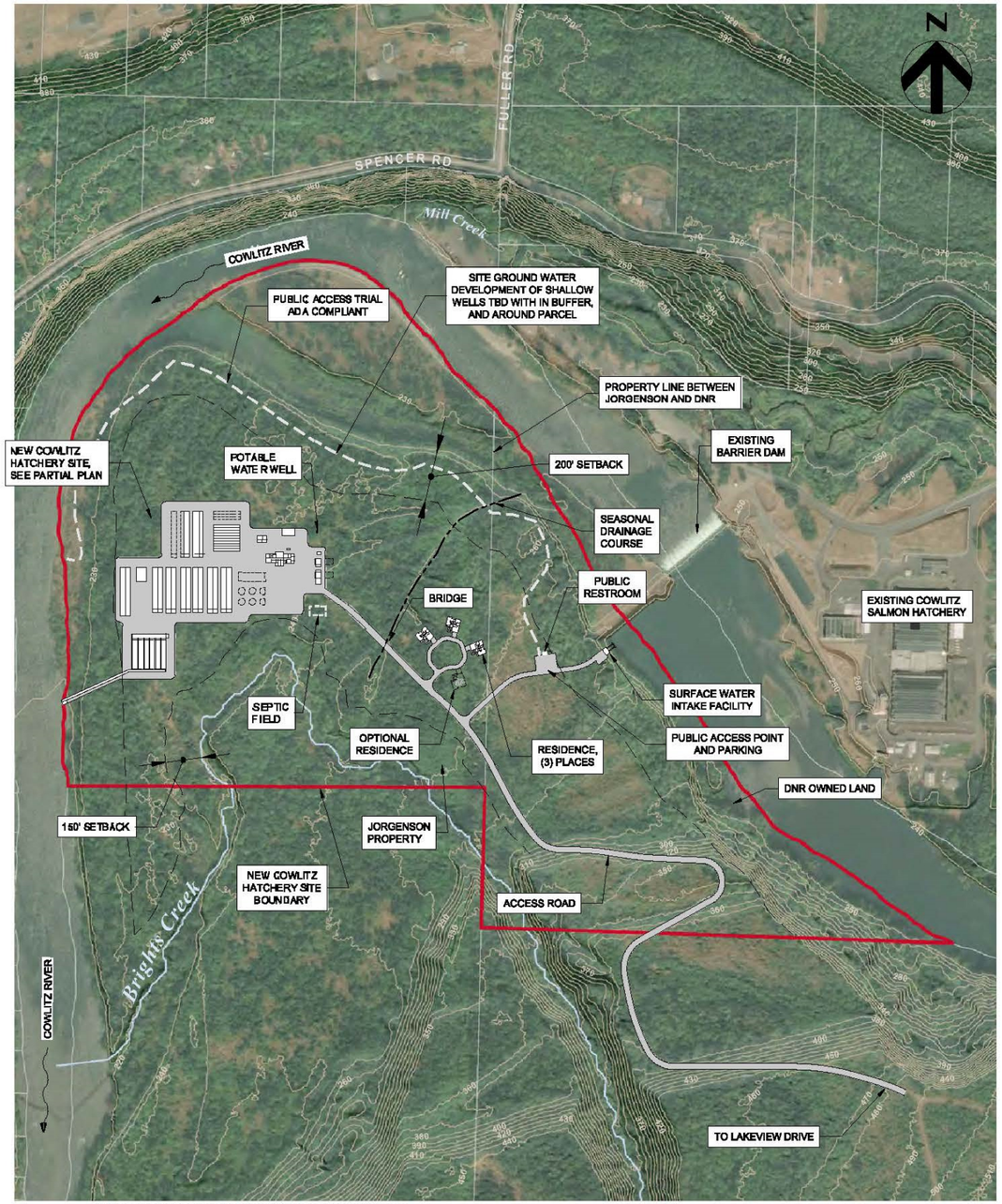
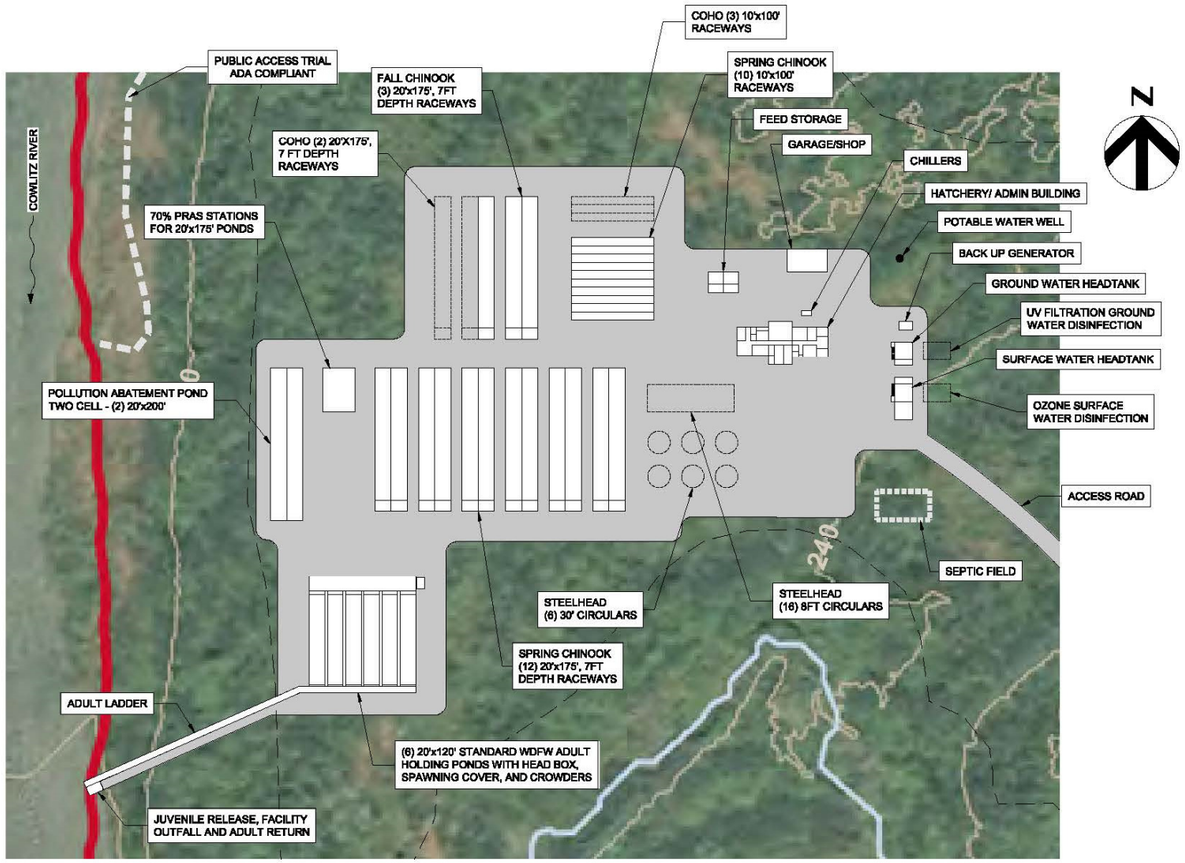


NEW COWLITZ HATCHERY SITE PLAN



NEW COWLITZ HATCHERY PARTIAL PLAN

Figure 8-3. Conceptual Site Layout for Potential New Cowlitz River State Salmon Hatchery, with Optional Features (Shaded)

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8.6 Opinion of Probable Costs for Potential New Cowlitz River State Salmon Hatchery

8.6.1 Construction, Design, Permitting

A Class 4 planning level cost for development of a potential new hatchery to support spring and fall Chinook Salmon production is presented below (Table 8-5). The reader is reminded that the estimated costs presented below consider development of a new facility at a relatively remote, undeveloped location that lacks access, utilities, water, and broodstock collection facilities. Further, as noted, the planning level estimate does not include costs associated with acquisition of portions of the Jorgenson Timber LLC parcel as property acquisition is not a capital cost. Interagency arrangements for acquisition, leasing, or land exchanges between DNR and WDFW must meet mandates for both agencies. Future negotiations with private and state landowners/managers will be critical next steps should the proposal to consider hatchery development at this location advance to the predesign phase.

A breakdown of estimated costs by facility component, for base production (i.e., Chinook Salmon production only), is presented as an attachment to Appendix K. Appendix K also contains an attachment providing cost opinions for “add-ons” or optional infrastructure, including facilities that could support Coho Salmon and steelhead production, additional surface and groundwater requirements, and water disinfection systems.

8.6.2 Operations & Maintenance

Costs associated with facility O&M would be developed during predesign phases, in coordination with WDFW.

Table 8-5. Class 4 Cost Estimate for Development of a New Cowlitz River State Salmon Hatchery, with Assumptions

CLASS 4 ESTIMATE L=15%;H=30%	ITEM	(-) 15%	SUBTOTAL	(+) 30%
	Component Cost	$43,961,044	$51,718,875	$67,234,538
	Mobilization	$2,637,662.63	$3,103,133	$4,034,072.25
	Taxes	$3,956,493.94	$4,654,699	$6,051,108.38
	B&O Taxes	$879,220.88	$1,034,378	$1,344,690.75
	Escalation	-	-	-
	MACC	**$51,434,421**	**$60,511,084**	**$78,664,409**
	Predesign	$514,344	$605,111	$786,644
	Design (Engr/Arch) Basic Fee	$3,575,676	$4,206,678	$5,468,681
	Site Investigations	$514,344	$605,111	$786,644
	Permitting Local/Federal	$514,344	$605,111	$786,644
	Construction Field Oversite	$1,543,033	$1,815,333	$2,359,932
	WDFW Mgt And Support	$1,543,033	$1,815,333	$2,359,932
	Total	$59,639,195	$70,163,759	$91,212,887

MACC = Maximum Allowable Construction Cost (including MOB, taxes, and B&O taxes)
This estimate does not include Property Procurement
This estimate is based on past projects and lump sum values for major equipment
This estimate is not based on RS Means
This estimate does not have vender quotes to support values
All values in this estimate need to be verified through the Predesign Process following OFM format
This estimate is a Class 4 Planning level estimate and does not include escalation.
This estimate is reflective of the detailed information noted in the Master Plan "Cowlitz Hatchery Feasibility Study."
While the costs shown are greater than the original hatchery request of $38M, these costs will be vetted in greater detail during the Predesign Phase.

If development of a new hatchery at the subject parcels is advanced beyond the feasibility assessment, the Class 4 planning level cost presented above will be refined in predesign.

9 Project Limitations and Timelines

Hatchery production expansion actions proposed under this Master Plan must consider factors that could affect the success and timeline for individual project implementation. As with any capital improvement project, many steps must take place from project inception to actual construction. Legislative approval and distribution of funds for projects proposed under this Master Plan do not guarantee individual project success, and several other factors must be considered, as discussed below.

9.1 Operation and Maintenance

Facility O&M costs must be considered for all hatchery production pathways. These annual costs will vary by site. Preference may be given to one site over another if the two facilities have similar hatchery production goals, but differing O&M costs. In this case, the facility with the lower O&M costs would likely be selected for hatchery production increases. Therefore, WDFW will consider these costs when ultimately advancing biennium budgets for approval.

9.2 Monitoring

Hatchery programs that are implemented for special initiatives such as SRKW prey enhancement must be managed consistent with harvest and conservation goals. Each hatchery program must establish measurable goals based on the needs of both the hatchery and affected natural populations. These goals must be coordinated with and approved by applicable co-managers, and in the case of watersheds that contain ESA-listed species, NOAA Fisheries and USFWS. Such coordination and approval will take time and may impact individual project timelines. As programs are more fully developed, WDFW will coordinate with respective agencies to develop monitoring strategies to ensure that SRKW prey enhancement objectives at individual hatchery sites are consistent with existing policies and resources.

9.3 Approvals for New or Modified Water Rights

The Department of Ecology manages the water resources of the state and issues the right to use surface and groundwater. Ecology is also responsible for protecting instream resources for the benefit of aquatic species and the public. Most existing state hatchery facilities have surface or ground water rights for hatchery production, and some were established many decades ago. Over time, over-appropriation of water rights has become a contentious issue. Under the Master Plan, facilities proposed for production expansion, including new facilities, may require new or adjusted water rights to meet incubation and rearing objectives. Depending on the watershed, adjacent users, existing water quality, instream flows, any modification to existing, or request for new water rights will require extensive coordination with Ecology to ensure the long-term protection of the resource.

9.4 Permitting Timelines

Following legislative approval and funding, prioritized projects progress into several development phases. Typically, projects advance through development phases on a biennial schedule during which subsequent phases are funded and implemented. For example, following approval and preliminary funding, a project typically proceeds to predesign phasing in the first biennium, followed by design and permitting in the next biennium, and construction in the next. Considering this process, depending on project complexity and development or permitting factors, prioritized projects may require several biennia to become operational and reap the benefits of the enhanced production. Permitting requirements often affect these phases and, ultimately, the project schedule.

The nature and extent of required regulatory compliance for prioritized projects in this Master Plan will be site-specific and will depend upon the nature and location of work proposed at each site. In some cases, where existing facilities are adequate to accommodate increased production or where all construction would take place in uplands and outside of sensitive resources (e.g., wetlands), permitting pathways may be expedited. In other cases, where projects require in-water work (e.g., modifications to adult collection facilities or intake structures) that is necessary to fulfill Master Plan objectives, permitting pathways can become complicated and time-consuming, and may affect project schedule. A snapshot of likely permitting requirements for generalized actions considered in this Master Plan is provided below (Table 9-1). A description of each authorization or compliance requirement is provided in Appendix J.

Table 9-1. Snapshot Permitting Summary and Estimated Timeline for Actions Proposed under the SRKW Mater Plan

Master Plan Action	Examples	Applicable Sites[1]	Possible Required Authorizations	Permitting Timeline[1]
No New Ground-Disturbing Activities	• New incubation stacks in existing building • Existing raceways can accommodate production	• Carlson Salmon Farms	• NPDES upland finfish permitting modifications	• 3-6 months
New Development <1 acre No in-water work, no wetland impacts	• New raceways or circulars • New upland-based water reuse system • Water supply modifications, no increase in water rights • Effluent water management upgrades	• Kendall Creek • Marblemount • Whitehorse • Speelyai • Hupp Springs • Minter Creek • Naselle • Puyallup • Sol Duc • Voights Creek	• ESA • Executive Order 05-05 (for projects with no federal nexus) • SEPA • NPDES upland finfish permitting modifications • Local Permits	• 6-12 months

Master Plan Action	Examples	Applicable Sites[1]	Possible Required Authorizations	Permitting Timeline[1]
New Development >1 acre No in-water work, no wetland impacts		• Palmer Ponds • Wallace River • Elwha • Humptulips	• ESA • Executive Order 05-05 (for projects with no federal nexus) • SEPA • NPDES upland finfish permitting modifications • NPDES construction permit • Local permits	• 6-18 months
New Development with in-water work or wetland impacts	• New/upgraded raceways or circulars with upgrades to surface water intake or outfall • Water supply modifications, potential increase in water rights • Upgrades to broodstock collection facilities • Upgrades to outfall structures to accommodate increase water supply • Development of new hatcheries	• New Cowlitz River State Hatchery • Lyons Ferry • Samish • Beaver Creek • Bogachiel • Dungeness • McKernan • Nemah • Deschutes River Hatchery (proposed) • Marine Net Pens	• Clean Water Act 404/401 • Section 10 Rivers & Harbors[4] • ESA and MSA • NHPA • FEMA floodplain development • NEPA/SEPA • HPA • NPDES construction permit (if >1 acre) • NPDES upland finfish permitting modifications or NPDES for marine rearing • Water Rights • DNR aquatic use authorization • DNR Forest Practices Notification • Local permits	• 18-30 months[5]

[1] Preliminary only, based on quantity of land available for development and anticipated water needs; final pathway to be determined during predesign; some facilities may require upgrades to existing in-water infrastructure to support increased production.

[2] In-water work requirement, or wetland impacts, to be determined

[3] Permitting timeline estimate is from predesign to approval/permit issuance.

[4] Applicability of Section 10 authorization is dependent upon federal navigability status of subject waterbodies where in-water work would occur. Likely not applicable to most systems.

[5] Projects requiring new or modified water rights may take longer than timeframe indicated; additionally, projects requiring co-manager approval or variances to established broodstock collection or juvenile release limits may require re-initiation of consultation with NOAA Fisheries under ESA. These consultations may extend the timeline for individual projects.

9.5 Landowner Agreements

For those prioritized projects that are privately owned, or, in some cases, require easements with adjacent landowners for construction, site access, or use, landowner negotiations may be necessary. Although WDFW has successfully negotiated such easements for other projects, the process takes time and may affect the schedule for site development and fulfillment of Master Plan objectives at individual project locations.

9.6 Public Interest Groups

The Orca Task Force recommendations are intended to provide steps to restore and rebuild Washington's endangered SRKWs. While many public interest groups have praised these efforts, some believe that the recommendations do not go far enough. Other groups may not believe that enhanced hatchery production is the answer. To that end, WDFW must balance that hatchery-based Master Plan objectives presented herein with those groups that prefer habitat-based strategies. As stated previously, increased hatchery production, paired with investments in habitat protection and restoration to support hatchery and wild salmon, are the state's best opportunities to increase the prey of SRKWs in the near term.

9.7 Consistency with Other Planning Strategies

WDFW has initiated initial discussions with tribal co-managers on proposed production increases for SRKW and there is agreement in some watersheds for increases described in Section 2.4. However, additional consultation will be needed to advance the pathways and likely will included revisions to some pathways to be consistent with co-manager and WDFW policies.

9.7.1 ESA and Stock Management Considerations in the Master Plan

The production pathways proposed under this Master Plan will fall under a range of existing and future ESA consultation pathways. Consultation for some watersheds (e.g., Duwamish River/Green) are complete and expanded production may be included in existing Biological Opinions issued for the programs. However, even in watersheds that have an ESA permitted production plan that includes increases for SRKW, production increases described in the SRKW Master Plan may exceed the permitted program size.

Most watersheds and hatchery programs are in various stages of consultation. Review draft HGMPs have been submitted for all existing programs that have the potential to adversely affect ESA listed species. These draft HGMPs will need to be revised to reflect proposed production increases for those hatchery programs for which production expansion is not currently included under the proposed action. This will reinitiate consultation in some cases and in others all that may be needed is for WFDW to pull-back the draft HGMP and prepare a new HGMP addressing additional production. New pathways not included in an HGMP will require WDFW to prepare a HGMP for ESA consultation.

9.7.2 Washington State Hatchery Policy

The Washington state policy for hatcheries is in development with a new policy in the next year. The new policy will not be available in time for inclusion and consideration in the Master Plan. For this reason, all pathways recommended herein must be evaluated for consistency with the new policy.

9.7.3 Co-manager Coordination and Agreements

Most production pathways recommended in this Master Plan will require co-manager consultation. WDFW understands that coordination with co-managers is necessary to advance pathways. Projects advanced from the Master Plan will reflect the level of consultation with co-managers, based on WDFW feedback to the HDR team.

10 Summary and Next Steps

Combined with production increases by WDFW, Tribes, and Public Utilities that have been implemented from 2018 to date (Section 2.4), this plan represents an additional step toward addressing Recommendation #6 of the Orca Task Force in response to EO 18-02. This Master Plan has identified facility improvements and potential new hatcheries that could rear 36,425,000 million Chinook Salmon over the next 20 years to address the recommendations of the Orca Task Force. Combined with ongoing state, tribal, and utility releases since 2018, the production recommended in this Master Plan exceeds the Orca Task Force 50 million smolt goal.

Prior to implementation of the recommendations proposed herein, several steps must take place to fulfill the production targets. These include:

- Coordination and consultation with co-managers and federal resource agencies (NOAA Fisheries and USFWS) to discuss recommendations for increased production presented in this Master Plan to determine if such actions are attainable considering existing co-manager policies and ESA limitations.
- Coordination with other partners, including federally operated hatchery facilities, tribal hatcheries, upper Columbia facilities, and private facilities to determine if more enhancement is possible in addition to production recommended in this Master Plan. Consultation with other state agencies, including ODFW, should also occur to determine if Columbia River hatcheries in Oregon have the capacity to participate in this effort to enhance prey for SRKW.
- Upon legislative approval, conduct site-specific investigations to further assess individual facility requirements and feasibility for enhanced production.
- Advance conceptual designs to the predesign level, in coordination with resource agencies.

Finally, while WDFW recognizes the primary purpose of significantly increasing hatchery production of Chinook Salmon is to benefit SRKWs, it should be noted that this effort provides added benefits to the Treaty and Non-treaty fisheries. This additional contribution of Chinook Salmon will significantly improve the commercial and recreational fisheries in the Salish Sea, Washington Coast and Columbia River.

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Appendix A. Initial Screening Results

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Table A-1. State Owned, State Operated and Private Facilities Initially Screened for Inclusion in SRKW Hatchery Improvements Master Plan and Screening Determination

Region	Hatchery	Complex	Salmon/Trout	Ownership	ESA Restriction (yes	Determination
Region 1	Lyons Ferry Hatchery	Lyons Ferry Complex	Salmon, Steelhead,	USFWS	YES	Pass
Region 1	Tucannon Hatchery	Lyons Ferry Complex	Salmon, Steelhead,	USFWS	YES	Pass
Region 2	Turtle Rock Hatchery	Eastbank Complex		CLOSED	CLOSED	Pass
Region 3	Ringold Springs/Meseberg Hatche	Priest Rapids Complex	Salmon/Trout/Tiger	WDFW	No	Pass
Region 4	Arlington Hatchery	Cascade Complex	Salmon, Trout	WDFW	Maybe	Pass
Region 4	Issaquah Hatchery	Cascade Complex	Salmon	WDFW	Yes	Pass
Region 4	Kendall Creek Hatchery	MT. Baker Complex	Salmon	WDFW	Yes	Pass
Region 4	Marblemount Hatchery	MT. Baker Complex	Salmon	WDFW	Yes	Pass
Region 4	Palmer Ponds Hatchery	Rainier Complex	Salmon	WDFW	Yes	Pass
Region 4	Reiter Pond Hatchery	Cascade Complex	Salmon	WDFW	Yes	Pass
Region 4	Samish Hatchery	MT. Baker Complex	Salmon	WDFW	Maybe	Pass
Region 4	Soos Creek Hatchery	Rainier Complex	Salmon	WDFW	Yes	Pass
Region 4	Tokul Creek Hatchery	Cascade Complex	Trout	WDFW	Yes	Pass
Region 4	Wallace River Hatchery	Cascade Complex	Salmon	WDFW	Yes	Pass
Region 4	Whitehorse Ponds	Cascade Complex	Trout	WDFW	Maybe	Pass
Region 5	Beaver Creek Hatchery	Lower Columbia River Complex	Salmon	WDFW	Yes	Pass
Region 5	Cowlitz Salmon Hatchery	Cowlitz Complex		Tacoma City Light	Maybe	Pass
Region 5	Deep River Net Pens					Pass
Region 5	Fallert Creek Hatchery	Lower Columbia River Complex	Salmon	WDFW	Yes	Pass
Region 5	Kalama Falls Hatchery	Lower Columbia River Complex	Salmon	WDFW	Yes	Pass
Region 5	Lewis River Hatchery	Lewis River / Washougal Complex	Salmon	WDFW	Maybe	Pass
Region 5	North Toutle Hatchery	Lower Columbia River Complex	Salmon	WDFW	Yes	Pass
Region 5	Speelyai Hatchery	Lewis River / Washougal Complex	Salmon	Pacific Corp.	Maybe	Pass
Region 5	Washougal Hatchery	Lewis River / Washougal Complex	Salmon	WDFW	Yes	Pass
Region 6	Bingham Creek Hatchery	Twin Harbors Complex	Salmon/Steelhead	WDFW	No	Pass
Region 6	Bogachiel Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon/Steelhead/	WDFW	No	Pass
Region 6	Chambers Creek Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon/Trout	WDFW	Maybe	Pass
Region 6	Coutler Creek Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW	Maybe	Pass
Region 6	Dungeness Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW	Yes	Pass
Region 6	Elwah Channel Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW	Yes	Pass
Region 6	Forks Creek Hatchery	Twin Harbors Complex	Salmon/Steelhead/	WDFW	No	Pass
Region 6	Garrison Springs Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon/Trout	WDFW	Maybe (affects release timing)	Pass
Region 6	George Adams Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon	WDFW	Yes	Pass
Region 6	Hoodsport Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon	WDFW	Yes	Pass
Region 6	Humptulips Hatchery	Twin Harbors Complex	Salmon/steelhead/	WDFW	No	Pass
Region 6	Hupp Springs Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW	Yes	Pass

Table A-1. State Owned, State Operated and Private Facilities Initially Screened for Inclusion in SRKW Hatchery Improvements Master Plan and Screening Determination

Region	Hatchery	Complex	Salmon/Trout	Ownership	ESA Restriction (yes	Determination
Region 6	Hurd Creek Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon/Trout	WDFW	Yes	Pass
Region 6	Lake Aberdeen Hatchery	Twin Harbors Complex	Salmon/Steelhead/	WDFW	No	Pass
Region 6	Lakewood Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon/Trout	WDFW	Maybe (if releasing)	Pass
Region 6	Mayr Brothers Rearing Hatchery /	Twin Harbors Complex	Salmon/Steelhead	WDFW Coop	No	Pass
Region 6	McKernan Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon/Trout	WDFW	Yes	Pass
Region 6	Minter Creek Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW	Yes	Pass
Region 6	Naselle Hatchery	Twin Harbors Complex	Salmon/Steelhead	WDFW	No	Pass
Region 6	Nemah Hatchery	Twin Harbors Complex	Salmon/Trout	WDFW	No	Pass
Region 6	Puyallup Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon/Trout	WDFW	Yes	Pass
Region 6	Satsop Springs Hatchery	Twin Harbors Complex	Salmon/Trout	WDFW coop	No	Pass
Region 6	SolDuc Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon/Trout	WDFW	No	Pass
Region 6	South Sound/Squaxin Island Net Pens		Salmon	Collaborative program bet	Maybe	Pass
Region 6	Tumwater Falls Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon	WDFW	No	Pass
Region 6	Voights Creek Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon	WDFW	Yes	Pass
Region 1	Colville Hatchery	Spokane Complex		Tribal (Stevens County in process of Purchasing		Did Not Meet Criteria
Region 1	Cottonwood Creek Rearing Pond	Lyons Ferry Complex	Steelhead	USFWS	No	Did Not Meet Criteria
Region 1	Curl Lake Acclimation Pond	Lyons Ferry Complex	Salmon, Steelhead	USFWS	YES	Did Not Meet Criteria
Region 1	Dayton Acclimation Pond	Lyons Ferry Complex	Salmon, Steelhead	USFWS	YES	Did Not Meet Criteria
Region 1	Ford Hatchery	Spokane Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 1	Sherman Creek Hatchery	Spokane Complex	Trout, Sturgeon, Ko	BPA	ESA for Sturgeon	Did Not Meet Criteria
Region 1	Spokane Hatchery	Spokane Complex	Trout, Kokanee	WDFW	No	Did Not Meet Criteria
Region 2	Chelan Falls Annex		Salmon	Chelan PUD, Satellite Eastb	No	Did Not Meet Criteria
Region 2	Chelan Hatchery	Eastbank Complex	Steelhead/Trout	Chelan PUD, WDFW	YES	Did Not Meet Criteria
Region 2	Chiwawa Ponds		Salmon/Steelhead	Satellite Eastbank Hatcher	YES	Did Not Meet Criteria
Region 2	Eastbank Hatchery	Eastbank Complex	Salmon/Trout/Steel	Chelan PUD	YES	Did Not Meet Criteria
Region 2	Lake Wenatchee/Chiwawa Ponds	Eastbank Complex		CLOSED	CLOSED	Did Not Meet Criteria
Region 2	Methow Hatchery	Wells Complex		Douglas PUD	PUD	Did Not Meet Criteria
Region 2	Nason Creek		Salmon	Grant County PUD	YES	Did Not Meet Criteria
Region 2	Omak Hatchery	Wells Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 2	Similkameen Pond Hatchery	Wells Complex	Salmon	Chelan PUD	No	Did Not Meet Criteria
Region 2	Wells Hatchery	Wells Complex		Douglas PUD	PUD	Did Not Meet Criteria
Region 3	Columbia Basin Hatchery	Priest Rapids Complex	Trout/Sturgeon	WDFW	No	Did Not Meet Criteria
Region 3	Naches Hatchery	Priest Rapids Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 3	Priest Rapids Hatchery	Priest Rapids Complex	Salmon	Grant County PUD	No	Did Not Meet Criteria
Region 4	Baker Lake Hatchery	MT. Baker Complex	Salmon	Seattle City Light	Yes	Did Not Meet Criteria

Table A-1. State Owned, State Operated and Private Facilities Initially Screened for Inclusion in SRKW Hatchery Improvements Master Plan and Screening Determination

Region	Hatchery	Complex	Salmon/Trout	Ownership	ESA Restriction (yes	Determination
Region 4	Barnaby Slough Hatchery	MT. Baker Complex		CLOSED		Did Not Meet Criteria
Region 4	Bellingham Hatchery	MT. Baker Complex	Trout	WDFW	Unknown	Did Not Meet Criteria
Region 4	Cedar River Hatchery	Rainier Complex	Salmon	Seattle Public Utilities	Yes	Did Not Meet Criteria
Region 4	Icy Creek Pond Hatchery	Rainier Complex	Salmon	WDFW	Yes	Did Not Meet Criteria
Region 4	Lake Whatcom Hatchery	MT. Baker Complex	Trout	WDFW	unknown	Did Not Meet Criteria
Region 5	Cowlitz Trout Hatchery	Cowlitz Complex		Tacoma City Light	Maybe	Did Not Meet Criteria
Region 5	Elochoman Hatchery	Lower Columbia River Complex	Salmon	WDFW (CLOSED)	No	Did Not Meet Criteria
Region 5	Goldendale Hatchery	Lewis River / Washougal Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 5	Grays River Hatchery	Lower Columbia River Complex	Salmon	WDFW (CLOSED)	Yes	Did Not Meet Criteria
Region 5	Klickitat Hatchery	Lewis River / Washougal Complex	Salmon	Yakima Nation	Unknown	Did Not Meet Criteria
Region 5	Merwin Hatchery	Lewis River / Washougal Complex	Steelhead/Trout	Pacific Corp.	Maybe	Did Not Meet Criteria
Region 5	Mossyrock Hatchery	Lower Columbia River Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 5	Skamania Hatchery	Lewis River / Washougal Complex	Steelhead/Trout	WDFW	Yes	Did Not Meet Criteria
Region 5	Vancouver Trout Hatchery	Lower Columbia River Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 6	Eells Springs Hatchery	South Sound / Lakewood / Hood Canal Complex	Trout	WDFW	No	Did Not Meet Criteria
Region 6	Morse Creek Hatchery	Minter / Dungeness / Sol Duc Complex	Salmon	WDFW will be closing and	Yes	Did Not Meet Criteria
Region 6	Skookumchuck Hatchery	South Sound / Lakewood / Hood Canal Complex	Salmon/Steelhead	WDFW	Yes	Did Not Meet Criteria

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Appendix B. Questionnaire Form

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SRKW Hatchery Master Plan Initial Questionnaire

General Facility

Please fill out the following general questions.

1. Do you and your hatchery staff crew members have ideas on how to best increase fish production at your facilities?

2. Facility Name *

3. Primary Contact Name

4. Primary Contact Title

5. Telephone

6. Email

7. Total Site Acreage

8. Developed Acreage

9. Usable Acreage For Hatchery Development

10. Elevation (ft. MSL) - If Known

11. 100-Year Flood Elevation - If Known

12. List Known Flood Problems (past or present)

13. Describe general condition of access roads and pavement.

14. List general site issues (access, roads, drainage, etc.)

15. Select buildings at the facility

- [ ] Hatchery Building
- [ ] Shop Building
- [ ] Chemical Storage Building
- [ ] Office Building
- [ ] Feed Storage Building
- [ ] Vehicle Storage Building
- [ ] Residences
- [ ] Visitor Facility
- [ ] Gas Balancing/Aeration Facilities
- [ ] Other

16. Select rearing units at the facility

- [ ] Exterior Earthen Ponds
- [ ] Exterior Lined Ponds
- [ ] Exterior Raceways
- [ ] Interior Raceways
- [ ] Exterior Circular Tanks

(continued on the next page)

- [ ] Interior Circular Tanks
- [ ] Incubation Jars
- [ ] Incubation Trays
- [ ] Early Rearing Troughs
- [ ] Early Rearing Circular Tanks
- [ ] Other

General Hatchery Building

Please fill out the following general hatchery building questions.

17. Water Sources Available in Hatchery Building

- [ ] Well
- [ ] Lake
- [ ] Stream or River
- [ ] Pumped re-circulation
- [ ] Other

18. Total Building Flow (gpm) - Each Water Source

19. If more than one type of water is available, is water common piping or independent?

- ( ) Common Piping
- ( ) Independent Piping
- ( ) Both

(continued on the next page)

Other

Under Utilized Rearing Unit(s)

Please fill out the following questions regarding the rearing unit.

20. Rearing Unit Type

21. Total Number of Units

22. Unit Material (fiberglass, concrete, glass, etc.)

23. Unit Dimensions

Water Supply

Please fill out the following questions regarding the water supply.

24. Water Sources (check all that supply)

Well

(continued on the next page)

- [ ] Spring
- [ ] Stream
- [ ] Reservoir
- [ ] River
- [ ] Other

25. Please indicate available flows from water sources and indicate units.

26. Is there additional water available at site?

- ( ) Yes
- ( ) No

27. If yes, please describe additional water supply and flow.

28. Are there any known water quality issues?

29. Do you have water quality information available?

**If yes, please attach information in the Data Share portion of the SharePoint site.*

- ( ) Yes
- ( ) No

Effluent Treatment

Please fill out the following questions regarding effluent treatment.

30. Type of treatment system(s). Please check all that apply.

- [ ] Clarifier
- [ ] Filtration
- [ ] Settling Pond
- [ ] Microscreens
- [ ] Aerated Lagoon
- [ ] Other

31. Please describe NPDES sampling requirements.

Utility

Please fill out the following questions regarding the utilities.

32. Site Electrical

- [ ] 120/240V, 1PH, 3 Wire
- [ ] 120/240V, 3PH, 4 Wire
- [ ] 120/208V, 3PH, 4 Wire
- [ ] 277/480V, 3PH, 4 Wire

33. Approximate number of times per year facility loses power and relies on generator?

34. How long was longest outage (hours, days, etc.)?

35. Does facility have emergency generator(s)?

- Yes
- No

36. Do generators pick up entire facility?

- Yes
- No

Appendix C. Secondary Screening Scores

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Table C-1. Facilities Subject to Secondary Screening, and Associated Screening Criteria and Scores

Hatchery	Sol Duc	Humptulips	Bogachiel	Beaver Creek	Elwha	Lyons Ferry	Wallace River	Whitehorse	Naselle	Nemah	Marblemount	Bingham Creek	Dungeness	Tokul Creek	Palmer Ponds	Hurd Creek	Tucannon Fish	Arlington	George Adams	Washougal	Voights Creek	Forks Creek	Soos Creek	Puyallup	Samish	Kalama Falls	Satsop Springs	Speelyai	Kendall Creek	Garrison Springs	Hupp Springs	Minter Creek	Fallert Creek	Lewis River	Ringold Springs	Issaquah	Mckernan	Cowlitz Trout	Lakewood	North Toutle	Tumwater Falls	Coulter Creek	Lake Aberdeen	Reiter Ponds	Hoodsport	Mayr Bros	Chambers CReek	S. Sound Net Pens	Turtle Rock
Location of facility (Region)	5	5	5	5	5	1	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	3
Facility owner	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	3	5	5	5	3	5	5	5	5	5	5	
Usable Land available for development	5	3	5	5	2	5	5	5	5	5	5	1	5	3	5	3	5	5	5	5	5	0	5	5	2	3	5	0	3	1	3	3	5	0	5	0		5	5	5	0	0		5	0		1	0	
Flood issues	5	3	1	1	1	3	1	5	1	1	1	1	1	5	5	1	1	1	3	1	1	1	1	5	5	5	1	5	1	5	5	1	1	5	5	1	3	1	5	1	5	1	1	1	1	5	5	
ESA Issues	5	5	5	1	1	1	1	3	5	5	1	5	1	1	1	1	1	3	1	1	1	5	1	1	5	1	5	3	1	3	1	1	1	3	5	1	1	3	3	1	5	3	5	1	1	5	3	3	
Unused Ground water availabile	4	1	3	4	4	5	1	1	0	0	5	3	2	3	5	5	4	1	4	0	1	1	1	0	2	0	0	1	1	5	2	3	0	0	0	1	4	0	0	0	0	0	0	0	1	0	0	0	1
Unused Surface water available	3	5	4	5	5	0	5	0	5	4	0	1	5	2	1	1	2	0	1	1	3	3	0	0	0	5	2	3	0	0	1	0	1	0	0	1	0	3	0	1	0	1	1	1	1	1	0	5	4
1st pass surface water avaiable	5	5	5	5	5	5	4	3	5	4	3	5	5	3	3	3	4	1	3	3	3	4	4	1	2	1	2	3	1	1	3	0	1	5	0	4	1	0	1	1	0	2	3	3	2	2	1	0	2
Intake Water quality issues	5	4	3	1	1	2	4	4	1	1	5	3	2	4	5	4	5	4	4	3	2	3	2	5	4	1	5	4	4	5	4	1	4	4	4	4	5	1	4	1	2	3	2	3	3	3	3	4	4
Average Annual Water temperature	5	4	5	1	3	5	3	3	3	5	3	3	2	4	5	3	5	3	4	4	3	4	3	3	2	5	3	4	3	5	3	4	3	4	3	4	2	5	3	2	2	2	3	2	1	1	1	3	1
Fish species reared/Biosecurity	5	3	3	3	5	4	3	4	3	3	3	3	3	4	5	3	4	3	3	4	3	3	2	4	2	3	4	4	3	4	4	3	5	3	3	3	3	1	4	1	3	4	3	3	3	3	2	3	4
Effluent Treatment NPDES	3	3	3	3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	5	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3
Under utilized incubation space	1	0	0	1	0	0	0	2	1	1	0	0	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Under utilized early rearing volume	1	0	0	1	5	0	5	3	1	1	0	0	2	1	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Under utilized rearing volume	1	3	0	0	1	3	5	5	1	1	5	5	1	5	2	3	0	5	0	5	0	1	0	0	5	5	1	0	0	5	1	2	2	5	0	1	0	2	0	2	5	2	3	0		1	3	2	0	3
Primary Power on Site		5	5	5	5	5		5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5		5	5	5	5	5	5	3	1	5		5	5	5	5	5			5	5	5		5	1		0	
Emergency Power on Site	5	5	3	3	5	3	5	5	5	5	5	5	2	3	3	3	5	5	5	5	5	5	5	5	1	3	1	5	5	0	1	5	3	3	1	5	5	3	3	5	5	5	1	0	3	3	5	0	0
Useful life of Existing Piping/Infrastructure	1	3	1	5	1	1	1	2	2	3	0	3	1	1	1	4	1	1	1	1	5	2	5	5	0	3	1	5	2	1	1	3	1	3	1	4	3	1	1	1	5	1	2	2	4	3	4	1	
Total	126	122	119	119	117	116	116	116	114	113	112	111	111	110	108	106	106	104	101	98	97	92	91	89	89	87	86	86	83	82	82	79	78	78	78	77	77	74	73	71	68	67	65	65	63	63	58	54	49

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Appendix D. Bioprogramming Calculations

Beaver Creek Hatchery

Bogachiel Hatchery

Carlson Salmon Farms

Cooke Aquaculture - Scatter Creek

Coulter Creek Hatchery

Dungeness Hatchery

Elwha Hatchery

Garrison Springs Hatchery

Humptulips Hatchery

Hupp Springs Hatchery

Kendall Creek Hatchery

Lyon's Ferry Hatchery

Marblemount Hatchery

McKernan Hatchery

Minter Creek Hatchery

Naselle Hatchery

Nemah Hatchery

Palmer Ponds Hatchery

Puyallup Hatchery

Samish Hatchery

Sol Duc Hatchery

Speelyai Hatchery

Voights Creek Hatchery

Wallace River Hatchery

Whitehorse Hatchery

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Beaver Creek Hatchery
Bioprogramming Calculations

Beaver Creek Hatchery
Subyearling Fall/Spring Chinook
2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	54.0		2,346,667		5,500	427	61	366
1-Oct	Trays	54.0	176	2,335,168	0.5%	5,500	425	61	366
8-Oct	Trays	54.0	330	2,323,726	0.5%	5,500	423	61	366
15-Oct	Trays	54.0	484	2,312,339	0.5%	5,500	421	61	366
22-Oct	Trays	54.0	638	2,301,009	0.5%	5,500	419	60	360
29-Oct	Trays	54.0	792	2,289,734	0.5%	5,500	417	60	360
5-Nov	Trays	47.0	897	2,281,720	0.4%	5,500	415	60	360
12-Nov	Trays	47.0	1002	2,273,734	0.3%	5,500	414	60	360
19-Nov	Trays	47.0	1107	2,265,776	0.3%	5,500	412	59	354
26-Nov	Trays	47.0	1212	2,257,846	0.3%	5,500	411	59	354
3-Dec	Trays	45.0	1303	2,249,943	0.4%	5,500	410	59	354
10-Dec	Trays	45.0	1394	2,242,068	0.3%	5,500	408	59	354
17-Dec	Trays	45.0	1485	2,234,221	0.3%	5,500	407	59	354
24-Dec	Trays	45.0	1576	2,226,401	0.3%	5,500	405	58	348
31-Dec	Trays	45.0	1667	2,218,609	0.3%	5,500	404	58	348
7-Jan	Trays	43.0	1744	2,210,844	0.3%	5,500	402	58	348
14-Jan	Trays	43.0	1821	2,203,106	0.3%	5,500	401	58	348

Growout

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Jan	Raceways	43.0	1.41	35.79	0.38	1205.6	2,202,004		1,827	6,477	1.6	1,295	0	0%	1,295
22-Jan	Raceways	43.0	1.50	38.07	0.45	1001.3	2,186,590	0.7%	2,184	7,279	1.8	1,456	0	0%	1,456
29-Jan	Raceways	43.0	1.59	40.36	0.54	840.7	2,172,815	0.6%	2,584	8,127	2.0	1,625	0	0%	1,625
5-Feb	Raceways	45.0	1.70	43.15	0.66	687.9	2,159,126	0.6%	3,139	9,232	2.3	1,846	0	0%	1,846
12-Feb	Raceways	45.0	1.81	45.94	0.80	569.9	2,145,524	0.6%	3,765	10,399	2.6	2,080	0	0%	2,080
19-Feb	Raceways	45.0	1.92	48.73	0.95	477.5	2,132,007	0.6%	4,465	11,628	2.9	2,326	0	0%	2,326
26-Feb	Raceways	45.0	2.03	51.52	1.12	404.0	2,118,575	0.6%	5,244	12,917	3.2	2,583	0	0%	2,583
5-Mar	Raceways	46.0	2.15	54.57	1.33	340.0	2,105,228	0.6%	6,191	14,398	3.6	2,880	0	0%	2,880
12-Mar	Raceways	46.0	2.27	57.61	1.57	288.9	2,091,965	0.6%	7,241	15,949	4.0	3,190	0	0%	3,190
19-Mar	Raceways	46.0	2.39	60.66	1.83	247.5	2,078,786	0.6%	8,397	17,568	4.4	3,514	0	0%	3,514
26-Mar	Raceways	46.0	2.51	63.71	2.12	213.7	2,065,689	0.6%	9,666	19,254	4.8	3,851	0	0%	3,851
2-Apr	Raceways	47.0	2.64	67.01	2.47	183.7	2,052,676	0.6%	11,176	21,166	5.3	4,233	0	0%	4,233
9-Apr	Raceways	47.0	2.77	70.30	2.85	159.0	2,039,744	0.6%	12,828	23,155	5.8	4,631	0	0%	4,631
16-Apr	Raceways	47.0	2.90	73.60	3.27	138.6	2,026,893	0.6%	14,627	25,220	6.3	5,044	0	0%	5,044
23-Apr	Raceways	47.0	3.03	76.90	3.73	121.5	2,014,124	0.6%	16,579	27,358	6.8	5,472	0	0%	5,472
30-Apr	Raceways	47.0	3.16	80.20	4.24	107.1	2,001,435	0.6%	18,687	29,569	7.4	5,914	0	0%	5,914
Stocking							**2,001,435**	**10%**	**18,687**						

Bogachiel Hatchery
Bioprogramming Calculations

Bogachiel Hatchery
Subyearling Fall Chinook
2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
8-Oct	Trays	50.0		2,340,000		5,500	426	61	366
15-Oct	Trays	50.0	144.00	2,328,534	0	5,500	424	61	366
22-Oct	Trays	50.0	270.00	2,317,124	0	5,500	422	61	366
29-Oct	Trays	50.0	396	2,305,770	0.5%	5,500	420	60	360
5-Nov	Trays	50.0	522	2,294,472	0.5%	5,500	418	60	360
12-Nov	Trays	50.0	648	2,283,229	0.5%	5,500	416	60	360
19-Nov	Trays	50.0	774	2,275,238	0.4%	5,500	414	60	360
26-Nov	Trays	50.0	900	2,267,274	0.3%	5,500	413	59	354
3-Dec	Trays	50.0	1026	2,259,339	0.3%	5,500	411	59	354
10-Dec	Trays	50.0	1152	2,251,431	0.4%	5,500	410	59	354
17-Dec	Trays	50.0	1278	2,243,551	0.3%	5,500	408	59	354
24-Dec	Trays	50.0	1404	2,235,699	0.3%	5,500	407	59	354
31-Dec	Trays	50.0	1530	2,227,874	0.4%	5,500	406	58	348
7-Jan	Trays	50.0	1656	2,220,076	0.3%	5,500	404	58	348
16-Jan	Trays	50.0	1818	2,210,086	0.4%	5,500	402	58	348

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
17-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	2,208,981		1,832	6,497	4.6	1,299	650	50%	650
24-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	2,194,291	0.7%	2,513	8,002	5.7	1,600	800	50%	800
31-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	2,179,699	0.7%	3,339	9,652	6.8	1,930	965	50%	965
7-Feb	Circular tanks	50.0	1.89	47.97	0.91	500.6	2,165,204	0.7%	4,325	11,443	8.1	2,289	1,144	50%	1,144
14-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	2,150,806	0.7%	5,483	13,373	9.5	2,675	1,337	50%	1,337
21-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	2,136,503	0.7%	6,824	15,438	10.9	3,088	1,544	50%	1,544
28-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	2,122,295	0.7%	8,360	17,637	12.5	3,527	1,764	50%	1,764
7-Mar	Circular tanks	50.0	2.53	64.21	2.17	208.7	2,108,925	0.6%	10,106	19,972	14.1	3,994	1,997	50%	1,997
14-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	2,095,638	0.6%	12,070	22,436	15.9	4,487	2,244	50%	2,244
21-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	2,082,436	0.6%	14,264	25,025	17.7	5,005	2,503	50%	2,503
28-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	2,069,316	0.6%	16,698	27,738	19.6	5,548	2,774	50%	2,774
4-Apr	Circular tanks	50.0	3.17	80.46	4.28	106.1	2,056,280	0.6%	19,382	30,571	21.6	6,114	3,057	50%	3,057
11-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	2,043,325	0.6%	22,326	33,523	23.7	6,705	3,352	50%	3,352
18-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	2,030,452	0.6%	25,540	36,590	25.9	7,318	3,659	50%	3,659
25-Apr	Circular tanks	50.0	3.65	92.64	6.53	69.5	2,017,660	0.6%	29,032	39,769	28.1	7,954	3,977	50%	3,977
2-May	Circular tanks	50.0	3.81	96.70	7.42	61.1	2,004,949	0.6%	32,811	43,059	30.5	8,612	4,306	50%	4,306
Stocking							**2,004,949**	**10%**	**32,811**						

Carlson Salmon Farms
Bioprogramming Calculations

Carlson Ponds
Subyearling Fall Chinook
750,000

Incubation

Date	Phase	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Incubation	Trays	50.0		875,000		5,500	160	23	138
8-Oct	Incubation	Trays	50.0	144	870,713	0.5%	5,500	159	23	138
15-Oct	Incubation	Trays	50.0	270	866,446	0.5%	5,500	158	23	138
22-Oct	Incubation	Trays	50.0	396	862,200	0.5%	5,500	157	23	138
29-Oct	Incubation	Trays	50.0	522	857,976	0.5%	5,500	156	23	138
5-Nov	Incubation	Trays	50.0	648	853,772	0.5%	5,500	156	23	138
12-Nov	Incubation	Trays	50.0	774	850,783	0.4%	5,500	155	23	138
19-Nov	Incubation	Trays	50.0	900	847,806	0.3%	5,500	155	23	138
26-Nov	Incubation	Trays	50.0	1026	844,838	0.3%	5,500	154	22	132
3-Dec	Incubation	Trays	50.0	1152	841,881	0.3%	5,500	154	22	132
10-Dec	Incubation	Trays	50.0	1278	838,935	0.4%	5,500	153	22	132
17-Dec	Incubation	Trays	50.0	1404	835,999	0.3%	5,500	152	22	132
24-Dec	Incubation	Trays	50.0	1530	833,073	0.3%	5,500	152	22	132
31-Dec	Incubation	Trays	50.0	1656	830,157	0.3%	5,500	151	22	132
7-Jan	Incubation	Trays	50.0	1782	827,251	0.4%	5,500	151	22	132

Rearing

Date	Phase	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Growout	Circular tanks	50.0	1.41	35.79	0.38	1205.6	826,838		686	2,432	0.3	486	243	50%	243
15-Jan	Growout	Circular tanks	50.0	1.57	39.85	0.52	873.3	821,050	0.7%	940	2,994	0.4	599	299	50%	299
22-Jan	Growout	Circular tanks	50.0	1.73	43.91	0.69	652.7	815,877	0.6%	1,250	3,613	0.5	723	361	50%	361
29-Jan	Growout	Circular tanks	50.0	1.89	47.97	0.91	500.6	810,737	0.6%	1,620	4,285	0.5	857	428	50%	428
5-Feb	Growout	Circular tanks	50.0	2.05	52.03	1.16	392.3	805,629	0.6%	2,054	5,009	0.6	1,002	501	50%	501
12-Feb	Growout	Circular tanks	50.0	2.21	56.09	1.45	313.1	800,554	0.6%	2,557	5,785	0.7	1,157	578	50%	578
19-Feb	Growout	Circular tanks	50.0	2.37	60.15	1.79	253.9	795,510	0.6%	3,134	6,611	0.8	1,322	661	50%	661
26-Feb	Growout	Circular tanks	50.0	2.53	64.21	2.17	208.7	790,499	0.6%	3,788	7,486	1.0	1,497	749	50%	749
5-Mar	Growout	Circular tanks	50.0	2.69	68.27	2.61	173.6	785,519	0.6%	4,524	8,410	1.1	1,682	841	50%	841
12-Mar	Growout	Circular tanks	50.0	2.85	72.34	3.11	146.0	780,570	0.6%	5,347	9,380	1.2	1,876	938	50%	938
19-Mar	Growout	Circular tanks	50.0	3.01	76.40	3.66	123.9	775,652	0.6%	6,259	10,397	1.3	2,079	1,040	50%	1,040
26-Mar	Growout	Circular tanks	50.0	3.17	80.46	4.28	106.1	770,766	0.6%	7,265	11,459	1.5	2,292	1,146	50%	1,146
2-Apr	Growout	Circular tanks	50.0	3.33	84.52	4.96	91.5	765,910	0.6%	8,369	12,566	1.6	2,513	1,257	50%	1,257
9-Apr	Growout	Circular tanks	50.0	3.49	88.58	5.71	79.5	761,085	0.6%	9,573	13,715	1.7	2,743	1,372	50%	1,372
16-Apr	Growout	Circular tanks	50.0	3.65	92.64	6.53	69.5	756,290	0.6%	10,882	14,907	1.9	2,981	1,491	50%	1,491
23-Apr	Growout	Circular tanks	50.0	3.81	96.70	7.42	61.1	751,525	0.6%	12,299	16,140	2.1	3,228	1,614	50%	1,614
Stocking								**751,525**	**10%**	**12,299**						

Cooke Aquaculture – Scatter Creek
Bioprogramming Calculations

RUN 1 Scatter Creek Hatchery-Cooke Aquaculture
Subyearling Fall Chinook
600,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	50.0		700,000		5,500	128	19	114
8-Oct	Trays	50.0	144	696,570	0.5%	5,500	127	19	114
15-Oct	Trays	50.0	270	693,157	0.5%	5,500	127	19	114
22-Oct	Trays	50.0	396	689,760	0.5%	5,500	126	18	108
29-Oct	Trays	50.0	522	686,381	0.5%	5,500	125	18	108
5-Nov	Trays	50.0	648	683,017	0.5%	5,500	125	18	108
12-Nov	Trays	50.0	774	680,627	0.3%	5,500	124	18	108
19-Nov	Trays	50.0	900	678,244	0.3%	5,500	124	18	108
26-Nov	Trays	50.0	1026	675,871	0.3%	5,500	123	18	108
3-Dec	Trays	50.0	1152	673,505	0.3%	5,500	123	18	108
10-Dec	Trays	50.0	1278	671,148	0.3%	5,500	123	18	108
17-Dec	Trays	50.0	1404	668,799	0.3%	5,500	122	18	108
24-Dec	Trays	50.0	1530	666,458	0.4%	5,500	122	18	108
31-Dec	Trays	50.0	1656	664,125	0.3%	5,500	121	18	108
7-Jan	Trays	50.0	1782	661,801	0.3%	5,500	121	18	108

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	661,470		549	1,946	0.9	389	0	0%	389
15-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	656,840	0.7%	752	2,395	1.1	479	0	0%	479
22-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	652,702	0.6%	1,000	2,890	1.4	578	0	0%	578
29-Jan	Circular tanks	50.0	1.89	47.97	0.91	500.6	648,590	0.6%	1,296	3,428	1.6	686	0	0%	686
5-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	644,504	0.6%	1,643	4,007	1.9	801	0	0%	801
12-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	640,443	0.6%	2,046	4,628	2.2	926	0	0%	926
19-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	636,408	0.6%	2,507	5,289	2.5	1,058	0	0%	1,058
26-Feb	Circular tanks	50.0	2.53	64.21	2.17	208.7	632,399	0.6%	3,030	5,989	2.8	1,198	0	0%	1,198
5-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	628,415	0.6%	3,619	6,728	3.2	1,346	0	0%	1,346
12-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	624,456	0.6%	4,277	7,504	3.5	1,501	0	0%	1,501
19-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	620,522	0.6%	5,007	8,318	3.9	1,664	0	0%	1,664
26-Mar	Circular tanks	50.0	3.17	80.46	4.28	106.1	616,613	0.6%	5,812	9,167	4.3	1,833	0	0%	1,833
2-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	612,728	0.6%	6,695	10,052	4.7	2,010	0	0%	2,010
9-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	608,868	0.6%	7,659	10,972	5.2	2,194	0	0%	2,194
16-Apr	Circular tanks	50.0	3.65	92.64	6.53	69.5	605,032	0.6%	8,706	11,926	5.6	2,385	0	0%	2,385
23-Apr	Circular tanks	50.0	3.81	96.70	7.42	61.1	601,220	0.6%	9,839	12,912	6.1	2,582	0	0%	2,582
Stocking							**601,220**	**10%**	**9,839**						

RUN 2 Scatter Creek Hatchery-Cooke Aquaculture
Subyearling Fall Chinook
800,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	50.0		933,333		5,500	170	25	150
8-Oct	Trays	50.0	144	928,760	0.5%	5,500	169	25	150
15-Oct	Trays	50.0	270	924,209	0.5%	5,500	169	25	150
22-Oct	Trays	50.0	396	919,680	0.5%	5,500	168	24	144
29-Oct	Trays	50.0	522	915,174	0.5%	5,500	167	24	144
5-Nov	Trays	50.0	648	910,690	0.5%	5,500	166	24	144
12-Nov	Trays	50.0	774	907,502	0.3%	5,500	166	24	144
19-Nov	Trays	50.0	900	904,326	0.4%	5,500	165	24	144
26-Nov	Trays	50.0	1026	901,161	0.3%	5,500	164	24	144
3-Dec	Trays	50.0	1152	898,007	0.3%	5,500	164	24	144
10-Dec	Trays	50.0	1278	894,864	0.3%	5,500	163	24	144
17-Dec	Trays	50.0	1404	891,732	0.3%	5,500	163	24	144
24-Dec	Trays	50.0	1530	888,611	0.3%	5,500	162	24	144
31-Dec	Trays	50.0	1656	885,501	0.3%	5,500	162	24	144
7-Jan	Trays	50.0	1782	882,401	0.3%	5,500	161	23	138

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	881,960		732	2,594	3.6	519	0	0%	519
15-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	875,786	0.7%	1,003	3,194	4.4	639	0	0%	639
22-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	870,269	0.6%	1,333	3,854	5.4	771	0	0%	771
29-Jan	Circular tanks	50.0	1.89	47.97	0.91	500.6	864,786	0.6%	1,728	4,570	6.3	914	0	0%	914
5-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	859,338	0.6%	2,191	5,343	7.4	1,069	0	0%	1,069
12-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	853,924	0.6%	2,727	6,170	8.6	1,234	0	0%	1,234
19-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	848,545	0.6%	3,342	7,052	9.8	1,410	0	0%	1,410
26-Feb	Circular tanks	50.0	2.53	64.21	2.17	208.7	843,199	0.6%	4,041	7,985	11.1	1,597	0	0%	1,597
5-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	837,887	0.6%	4,826	8,970	12.5	1,794	0	0%	1,794
12-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	832,608	0.6%	5,703	10,006	13.9	2,001	0	0%	2,001
19-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	827,362	0.6%	6,676	11,090	15.4	2,218	0	0%	2,218
26-Mar	Circular tanks	50.0	3.17	80.46	4.28	106.1	822,150	0.6%	7,750	12,223	17.0	2,445	0	0%	2,445
2-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	816,970	0.6%	8,927	13,403	18.6	2,681	0	0%	2,681
9-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	811,824	0.6%	10,211	14,629	20.3	2,926	0	0%	2,926
16-Apr	Circular tanks	50.0	3.65	92.64	6.53	69.5	806,709	0.6%	11,608	15,901	22.1	3,180	0	0%	3,180
23-Apr	Circular tanks	50.0	3.81	96.70	7.42	61.1	801,627	0.6%	13,119	17,216	23.9	3,443	0	0%	3,443
Stocking							**801,627**	**10%**	**13,119**						

Scatter Creek Hatchery-Cooke Aquaculture
Subyearling Fall Chinook
6,500,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	50.0		7,583,333		5,500	1379	197	1182
8-Oct	Trays	50.0	144	7,546,175	0.5%	5,500	1373	197	1182
15-Oct	Trays	50.0	270	7,509,199	0.5%	5,500	1366	196	1176
22-Oct	Trays	50.0	396	7,472,404	0.5%	5,500	1359	195	1170
29-Oct	Trays	50.0	522	7,435,789	0.5%	5,500	1352	194	1164
5-Nov	Trays	50.0	648	7,399,354	0.5%	5,500	1346	193	1158
12-Nov	Trays	50.0	774	7,373,456	0.3%	5,500	1341	192	1152
19-Nov	Trays	50.0	900	7,347,649	0.3%	5,500	1336	191	1146
26-Nov	Trays	50.0	1026	7,321,932	0.3%	5,500	1332	191	1146
3-Dec	Trays	50.0	1152	7,296,305	0.3%	5,500	1327	190	1140
10-Dec	Trays	50.0	1278	7,270,768	0.3%	5,500	1322	189	1134
17-Dec	Trays	50.0	1404	7,245,320	0.3%	5,500	1318	189	1134
24-Dec	Trays	50.0	1530	7,219,962	0.4%	5,500	1313	188	1128
31-Dec	Trays	50.0	1656	7,194,692	0.3%	5,500	1309	187	1122
7-Jan	Trays	50.0	1782	7,169,510	0.3%	5,500	1304	187	1122

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	GPM @ Fixed Exchange	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	7,165,926		5,944	21,078	3.3	4,216	13	2,529	60%	1,686
15-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	7,115,764	0.7%	8,148	25,950	4.1	5,190	8,238	3,114	60%	2,076
22-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	7,070,935	0.6%	10,833	31,310	5.0	6,262	9,940	3,757	60%	2,505
29-Jan	Circular tanks	50.0	1.89	47.97	0.91	500.6	7,026,388	0.6%	14,037	37,134	5.9	7,427	11,789	4,456	60%	2,971
5-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	6,982,122	0.6%	17,799	43,412	6.9	8,682	13,782	5,209	60%	3,473
12-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	6,938,134	0.6%	22,160	50,135	8.0	10,027	15,916	6,016	60%	4,011
19-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	6,894,424	0.6%	27,157	57,294	9.1	11,459	18,189	6,875	60%	4,584
26-Feb	Circular tanks	50.0	2.53	64.21	2.17	208.7	6,850,989	0.6%	32,829	64,880	10.3	12,976	20,597	7,786	60%	5,190
5-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	6,807,828	0.6%	39,211	72,883	11.6	14,577	23,138	8,746	60%	5,831
12-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	6,764,939	0.6%	46,339	81,296	12.9	16,259	25,808	9,756	60%	6,504
19-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	6,722,320	0.6%	54,245	90,109	14.3	18,022	28,606	10,813	60%	7,209
26-Mar	Circular tanks	50.0	3.17	80.46	4.28	106.1	6,679,969	0.6%	62,965	99,313	15.8	19,863	31,528	11,918	60%	7,945
2-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	6,637,885	0.6%	72,528	108,901	17.3	21,780	34,572	13,068	60%	8,712
9-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	6,596,067	0.6%	82,967	118,864	18.9	23,773	37,735	14,264	60%	9,509
16-Apr	Circular tanks	50.0	3.65	92.64	6.53	69.5	6,554,511	0.6%	94,311	129,194	20.5	25,839	41,014	15,503	60%	10,335
23-Apr	Circular tanks	50.0	3.81	96.70	7.42	61.1	6,513,218	0.6%	106,590	139,882	22.2	27,976	44,407	16,786	60%	11,191
Stocking							**6,513,218**	**10%**	**106,590**							

RUN 3 Scatter Creek Hatchery-Cooke Aquaculture
Subyearling Fall Chinook
6,500,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	50.0		7,583,333		5,500	1379	197	1182
8-Oct	Trays	50.0	144	7,546,175	0.5%	5,500	1373	197	1182
15-Oct	Trays	50.0	270	7,509,199	0.5%	5,500	1366	196	1176
22-Oct	Trays	50.0	396	7,472,404	0.5%	5,500	1359	195	1170
29-Oct	Trays	50.0	522	7,435,789	0.5%	5,500	1352	194	1164
5-Nov	Trays	50.0	648	7,399,354	0.5%	5,500	1346	193	1158
12-Nov	Trays	50.0	774	7,373,456	0.3%	5,500	1341	192	1152
19-Nov	Trays	50.0	900	7,347,649	0.3%	5,500	1336	191	1146
26-Nov	Trays	50.0	1026	7,321,932	0.3%	5,500	1332	191	1146
3-Dec	Trays	50.0	1152	7,296,305	0.3%	5,500	1327	190	1140
10-Dec	Trays	50.0	1278	7,270,768	0.3%	5,500	1322	189	1134
17-Dec	Trays	50.0	1404	7,245,320	0.3%	5,500	1318	189	1134
24-Dec	Trays	50.0	1530	7,219,962	0.4%	5,500	1313	188	1128
31-Dec	Trays	50.0	1656	7,194,692	0.3%	5,500	1309	187	1122
7-Jan	Trays	50.0	1782	7,169,510	0.3%	5,500	1304	187	1122

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	GPM @ Fixed Exchange	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	7,165,926		5,944	21,078	3.3	4,216	13	2,529	60%	1,686
15-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	7,115,764	0.7%	8,148	25,950	4.1	5,190	8,238	3,114	60%	2,076
22-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	7,070,935	0.6%	10,833	31,310	5.0	6,262	9,940	3,757	60%	2,505
29-Jan	Circular tanks	50.0	1.89	47.97	0.91	500.6	7,026,388	0.6%	14,037	37,134	5.9	7,427	11,789	4,456	60%	2,971
5-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	6,982,122	0.6%	17,799	43,412	6.9	8,682	13,782	5,209	60%	3,473
12-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	6,938,134	0.6%	22,160	50,135	8.0	10,027	15,916	6,016	60%	4,011
19-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	6,894,424	0.6%	27,157	57,294	9.1	11,459	18,189	6,875	60%	4,584
26-Feb	Circular tanks	50.0	2.53	64.21	2.17	208.7	6,850,989	0.6%	32,829	64,880	10.3	12,976	20,597	7,786	60%	5,190
5-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	6,807,828	0.6%	39,211	72,883	11.6	14,577	23,138	8,746	60%	5,831
12-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	6,764,939	0.6%	46,339	81,296	12.9	16,259	25,808	9,756	60%	6,504
19-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	6,722,320	0.6%	54,245	90,109	14.3	18,022	28,606	10,813	60%	7,209
26-Mar	Circular tanks	50.0	3.17	80.46	4.28	106.1	6,679,969	0.6%	62,965	99,313	15.8	19,863	31,528	11,918	60%	7,945
2-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	6,637,885	0.6%	72,528	108,901	17.3	21,780	34,572	13,068	60%	8,712
9-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	6,596,067	0.6%	82,967	118,864	18.9	23,773	37,735	14,264	60%	9,509
16-Apr	Circular tanks	50.0	3.65	92.64	6.53	69.5	6,554,511	0.6%	94,311	129,194	20.5	25,839	41,014	15,503	60%	10,335
23-Apr	Circular tanks	50.0	3.81	96.70	7.42	61.1	6,513,218	0.6%	106,590	139,882	22.2	27,976	44,407	16,786	60%	11,191
Stocking							**6,513,218**	**10%**	**106,590**							

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Coulter Creek Hatchery
Bioprogramming Calculations

Coulter Creek Hatchery
Subyearling Fall Chinook
500,000

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Jan	Raceways	45.0	1.41	35.79	0.38	1205.6	550,501		457	1,619	0.4	324	0	0%	324
22-Jan	Raceways	45.0	1.52	38.58	0.47	962.3	546,648	0.7%	568	1,869	0.5	374	0	0%	374
29-Jan	Raceways	45.0	1.63	41.37	0.58	780.4	543,204	0.6%	696	2,135	0.5	427	0	0%	427
5-Feb	Raceways	43.0	1.72	43.65	0.68	664.2	539,782	0.6%	813	2,363	0.6	473	0	0%	473
12-Feb	Raceways	43.0	1.81	45.94	0.80	569.9	536,381	0.6%	941	2,600	0.6	520	0	0%	520
19-Feb	Raceways	43.0	1.90	48.22	0.92	492.7	533,002	0.6%	1,082	2,847	0.7	569	0	0%	569
26-Feb	Raceways	43.0	1.99	50.51	1.06	428.8	529,644	0.6%	1,235	3,103	0.8	621	0	0%	621
5-Mar	Raceways	45.0	2.10	53.30	1.24	364.9	526,307	0.6%	1,442	3,434	0.9	687	0	0%	687
12-Mar	Raceways	45.0	2.21	56.09	1.45	313.1	522,991	0.6%	1,670	3,779	0.9	756	0	0%	756
19-Mar	Raceways	45.0	2.32	58.88	1.68	270.6	519,696	0.6%	1,920	4,138	1.0	828	0	0%	828
26-Mar	Raceways	45.0	2.43	61.68	1.93	235.5	516,422	0.6%	2,193	4,512	1.1	902	0	0%	902
2-Apr	Raceways	47.0	2.56	64.97	2.25	201.4	513,169	0.6%	2,548	4,976	1.2	995	0	0%	995
9-Apr	Raceways	47.0	2.69	68.27	2.61	173.6	509,936	0.6%	2,937	5,459	1.4	1,092	0	0%	1,092
16-Apr	Raceways	47.0	2.82	71.57	3.01	150.7	506,723	0.6%	3,363	5,962	1.5	1,192	0	0%	1,192
23-Apr	Raceways	47.0	2.95	74.87	3.45	131.6	503,531	0.6%	3,825	6,483	1.6	1,297	0	0%	1,297
30-Apr	Raceways	47.0	3.08	78.17	3.92	115.7	500,359	0.6%	4,326	7,023	1.8	1,405	0	0%	1,405
7-May	Raceways	53.0	3.27	82.99	4.69	96.7	497,206	0.6%	5,144	7,866	2.0	1,573	0	0%	1,573
14-May	Raceways	53.0	3.46	87.82	5.56	81.6	494,074	0.6%	6,056	8,751	2.2	1,750	0	0%	1,750
Stocking							**494,074**	**11%**	**6,056**						

Dungeness Hatchery
Bioprogramming Calculations

Dungeness Hatchery
Yearling Spring Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Aug	Trays	48.0		1,177,778		5,500	215	31	186	167	90%	19
22-Aug	Trays	48.0	128	1,172,007	0.5%	5,500	214	31	186	167	90%	19
29-Aug	Trays	48.0	240	1,166,264	0.5%	5,500	213	31	186	167	90%	19
5-Sep	Trays	48.0	352	1,160,549	0.5%	5,500	212	31	186	167	90%	19
12-Sep	Trays	48.0	464	1,154,862	0.5%	5,500	210	30	180	162	90%	18
19-Sep	Trays	48.0	576	1,149,204	0.5%	5,500	209	30	180	162	90%	18
26-Sep	Trays	48.0	688	1,145,181	0.3%	5,500	209	30	180	162	90%	18
3-Oct	Trays	48.0	800	1,141,173	0.3%	5,500	208	30	180	162	90%	18
10-Oct	Trays	48.0	912	1,137,179	0.4%	5,500	207	30	180	162	90%	18
17-Oct	Trays	48.0	1024	1,133,199	0.4%	5,500	207	30	180	162	90%	18
24-Oct	Trays	48.0	1136	1,129,233	0.3%	5,500	206	30	180	162	90%	18
31-Oct	Trays	48.0	1248	1,125,281	0.4%	5,500	205	30	180	162	90%	18
7-Nov	Trays	48.0	1360	1,121,342	0.3%	5,500	204	30	180	162	90%	18
14-Nov	Trays	48.0	1472	1,117,417	0.4%	5,500	204	30	180	162	90%	18
23-Nov	Trays	48.0	1616	1,112,389	0.4%	5,500	203	29	174	157	90%	17
2-Dec	Trays	48.0	1760	1,107,383	0.4%	5,500	202	29	174	157	90%	17

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
3-Dec	100' Raceways	48.0	1.41	35.79	0.38	1205.6	1,106,830		918	3,256	0.8	651	456	70%	195
10-Dec	100' Raceways	48.0	1.51	38.27	0.46	985.5	1,099,857	0.6%	1,116	3,700	0.9	740	518	70%	222
17-Dec	100' Raceways	48.0	1.61	40.76	0.56	815.9	1,092,927	0.6%	1,340	4,171	1.0	834	584	70%	250
24-Dec	100' Raceways	48.0	1.70	43.25	0.66	683.0	1,086,042	0.6%	1,590	4,666	1.2	933	653	70%	280
31-Dec	100' Raceways	48.0	1.80	45.74	0.79	577.6	1,079,200	0.6%	1,869	5,185	1.3	1,037	726	70%	311
7-Jan	100' Raceways	48.0	1.90	48.22	0.92	492.7	1,072,401	0.6%	2,177	5,728	1.4	1,146	802	70%	344
14-Jan	100' Raceways	48.0	2.00	50.71	1.07	423.7	1,065,645	0.6%	2,515	6,294	1.6	1,259	881	70%	378
21-Jan	100' Raceways	48.0	2.10	53.20	1.24	367.0	1,058,931	0.6%	2,885	6,883	1.7	1,377	964	70%	413
28-Jan	100' Raceways	48.0	2.19	55.69	1.42	320.0	1,052,260	0.6%	3,288	7,494	1.9	1,499	1,049	70%	450
4-Feb	100' Raceways	40.0	2.24	56.75	1.50	302.3	1,045,631	0.6%	3,459	7,735	1.9	1,547	1,083	70%	464
11-Feb	100' Raceways	40.0	2.28	57.82	1.59	285.9	1,039,043	0.6%	3,634	7,977	2.0	1,595	1,117	70%	479
18-Feb	100' Raceways	40.0	2.32	58.88	1.68	270.6	1,032,497	0.6%	3,815	8,222	2.1	1,644	1,151	70%	493
25-Feb	100' Raceways	40.0	2.36	59.95	1.77	256.5	1,027,438	0.5%	4,006	8,481	2.1	1,696	1,187	70%	509
4-Mar	100' Raceways	43.0	2.43	61.55	1.91	237.0	1,023,123	0.4%	4,317	8,902	2.2	1,780	1,246	70%	534
11-Mar	100' Raceways	43.0	2.49	63.15	2.07	219.4	1,018,826	0.4%	4,643	9,331	2.3	1,866	1,306	70%	560
18-Mar	100' Raceways	43.0	2.55	64.75	2.23	203.6	1,014,547	0.4%	4,984	9,768	2.4	1,954	1,368	70%	586
25-Mar	100' Raceways	43.0	2.61	66.35	2.40	189.2	1,010,286	0.4%	5,340	10,213	2.6	2,043	1,430	70%	613
1-Apr	100' Raceways	48.0	2.71	68.83	2.68	169.4	1,006,042	0.4%	5,938	10,947	2.7	2,189	1,533	70%	657
8-Apr	100' Raceways	48.0	2.81	71.32	2.98	152.3	1,001,817	0.4%	6,577	11,704	2.9	2,341	1,638	70%	702
15-Apr	100' Raceways	48.0	2.91	73.81	3.30	137.4	997,609	0.4%	7,259	12,481	3.1	2,496	1,747	70%	749
22-Apr	100' Raceways	48.0	3.01	76.29	3.65	124.4	993,419	0.4%	7,984	13,281	3.3	2,656	1,859	70%	797
29-Apr	100' Raceways	48.0	3.10	78.78	4.01	113.0	989,247	0.4%	8,754	14,101	3.5	2,820	1,974	70%	846
6-May	100' Raceways	48.0	3.20	81.27	4.41	102.9	985,092	0.4%	9,569	14,943	3.7	2,989	2,092	70%	897
13-May	100' Raceways	48.0	3.30	83.76	4.82	94.0	980,955	0.4%	10,431	15,805	4.0	3,161	2,213	70%	948
20-May	100' Raceways	48.0	3.40	86.24	5.27	86.1	976,835	0.4%	11,341	16,687	4.2	3,337	2,336	70%	1,001
27-May	100' Raceways	48.0	3.50	88.73	5.73	79.1	972,732	0.4%	12,299	17,589	4.4	3,518	2,463	70%	1,055
3-Jun	100' Raceways	48.0	3.59	91.22	6.23	72.8	968,647	0.4%	13,306	18,511	4.6	3,702	2,592	70%	1,111
10-Jun	100' Raceways	48.0	3.69	93.71	6.75	67.2	964,578	0.4%	14,364	19,453	4.9	3,891	2,723	70%	1,167
17-Jun	100' Raceways	48.0	3.79	96.19	7.31	62.1	960,527	0.4%	15,473	20,413	5.1	4,083	2,858	70%	1,225
24-Jun	100' Raceways	48.0	3.89	98.68	7.89	57.5	956,493	0.4%	16,634	21,392	5.3	4,278	2,995	70%	1,284
1-Jul	100' Raceways	50.0	4.00	101.52	8.59	52.8	952,476	0.4%	18,038	22,547	5.6	4,509	3,157	70%	1,353
8-Jul	100' Raceways	50.0	4.11	104.37	9.33	48.6	948,475	0.4%	19,513	23,727	5.9	4,745	3,322	70%	1,424
15-Jul	100' Raceways	50.0	4.22	107.21	10.12	44.8	944,492	0.4%	21,063	24,932	6.2	4,986	3,491	70%	1,496
22-Jul	100' Raceways	50.0	4.34	110.05	10.94	41.5	940,525	0.4%	22,687	26,162	6.5	5,232	3,663	70%	1,570
29-Jul	100' Raceways	50.0	4.45	112.89	11.81	38.4	936,575	0.4%	24,388	27,415	6.9	5,483	3,838	70%	1,645
5-Aug	100' Raceways	52.0	4.57	116.09	12.84	35.3	932,641	0.4%	26,409	28,868	7.2	5,774	4,042	70%	1,732
12-Aug	100' Raceways	52.0	4.70	119.29	13.93	32.6	928,724	0.4%	28,532	30,353	7.6	6,071	4,249	70%	1,821
19-Aug	100' Raceways	52.0	4.83	122.49	15.09	30.1	924,823	0.4%	30,759	31,868	8.0	6,374	4,461	70%	1,912
26-Aug	100' Raceways	52.0	4.95	125.69	16.30	27.8	920,939	0.4%	33,092	33,412	8.4	6,682	4,678	70%	2,005
2-Sep	100' Raceways	48.0	5.05	128.17	17.29	26.2	917,071	0.4%	34,948	34,602	8.7	6,920	4,844	70%	2,076
9-Sep	100' Raceways	48.0	5.15	130.66	18.31	24.8	913,219	0.4%	36,867	35,807	9.0	7,161	5,013	70%	2,148
16-Sep	100' Raceways	48.0	5.25	133.15	19.38	23.4	909,384	0.4%	38,849	37,027	9.3	7,405	5,184	70%	2,222
23-Sep	100' Raceways	48.0	5.34	135.63	20.48	22.1	905,564	0.4%	40,894	38,262	9.6	7,652	5,357	70%	2,296
30-Sep	100' Raceways	48.0	5.44	138.12	21.63	21.0	901,761	0.4%	43,004	39,511	9.9	7,902	5,532	70%	2,371
7-Oct	100' Raceways	48.0	5.54	140.61	22.82	19.9	897,974	0.4%	45,179	40,775	10.2	8,155	5,709	70%	2,447
14-Oct	100' Raceways	48.0	5.64	143.10	24.05	18.9	894,202	0.4%	47,419	42,053	10.5	8,411	5,887	70%	2,523
21-Oct	100' Raceways	48.0	5.74	145.58	25.33	17.9	890,446	0.4%	49,726	43,345	10.8	8,669	6,068	70%	2,601
28-Oct	100' Raceways	48.0	5.83	148.07	26.65	17.0	886,707	0.4%	52,098	44,651	11.2	8,930	6,251	70%	2,679
4-Nov	100' Raceways	48.0	5.93	150.56	28.02	16.2	882,982	0.4%	54,538	45,969	11.5	9,194	6,436	70%	2,758
11-Nov	100' Raceways	48.0	6.03	153.05	29.43	15.4	879,274	0.4%	57,045	47,301	11.8	9,460	6,622	70%	2,838
18-Nov	100' Raceways	48.0	6.13	155.53	30.89	14.7	875,581	0.4%	59,621	48,646	12.2	9,729	6,810	70%	2,919
25-Nov	100' Raceways	48.0	6.23	158.02	32.39	14.0	871,903	0.4%	62,265	50,004	12.5	10,001	7,001	70%	3,000
2-Dec	100' Raceways	43.0	6.29	159.62	33.39	13.6	868,241	0.4%	63,904	50,806	12.7	10,161	7,113	70%	3,048
9-Dec	100' Raceways	43.0	6.35	161.22	34.40	13.2	864,595	0.4%	65,568	51,612	12.9	10,322	7,226	70%	3,097
16-Dec	100' Raceways	43.0	6.42	162.82	35.43	12.8	860,964	0.4%	67,254	52,420	13.1	10,484	7,339	70%	3,145
23-Dec	100' Raceways	43.0	6.48	164.42	36.49	12.4	857,348	0.4%	68,964	53,230	13.3	10,646	7,452	70%	3,194
30-Dec	100' Raceways	43.0	6.54	166.02	37.56	12.1	853,747	0.4%	70,698	54,042	13.5	10,808	7,566	70%	3,243
6-Jan	100' Raceways	41.0	6.59	167.26	38.41	11.8	850,161	0.4%	71,995	54,624	13.7	10,925	7,647	70%	3,277
13-Jan	100' Raceways	41.0	6.64	168.50	39.28	11.5	846,590	0.4%	73,304	55,207	13.8	11,041	7,729	70%	3,312
20-Jan	100' Raceways	41.0	6.69	169.75	40.15	11.3	843,035	0.4%	74,624	55,790	13.9	11,158	7,811	70%	3,347
27-Jan	100' Raceways	41.0	6.74	170.99	41.04	11.1	839,494	0.4%	75,956	56,372	14.1	11,274	7,892	70%	3,382
3-Feb	100' Raceways	43.0	6.80	172.59	42.20	10.7	835,968	0.4%	77,779	57,190	14.3	11,438	8,007	70%	3,431
10-Feb	100' Raceways	43.0	6.86	174.19	43.39	10.5	832,457	0.4%	79,625	58,010	14.5	11,602	8,121	70%	3,481
17-Feb	100' Raceways	43.0	6.93	175.79	44.59	10.2	828,961	0.4%	81,494	58,832	14.7	11,766	8,236	70%	3,530
24-Feb	100' Raceways	43.0	6.99	177.39	45.82	9.9	825,479	0.4%	83,387	59,656	14.9	11,931	8,352	70%	3,579
3-Mar	100' Raceways	46.0	7.07	179.52	47.49	9.6	822,012	0.4%	86,066	60,842	15.2	12,168	8,518	70%	3,650
10-Mar	100' Raceways	46.0	7.16	181.65	49.20	9.2	818,559	0.4%	88,795	62,034	15.5	12,407	8,685	70%	3,722
17-Mar	100' Raceways	46.0	7.24	183.78	50.96	8.9	815,122	0.4%	91,572	63,232	15.8	12,646	8,852	70%	3,794
24-Mar	100' Raceways	46.0	7.33	185.91	52.75	8.6	811,698	0.4%	94,398	64,435	16.1	12,887	9,021	70%	3,866
31-Mar	100' Raceways	46.0	7.41	188.05	54.59	8.3	808,289	0.4%	97,273	65,645	16.4	13,129	9,190	70%	3,939
7-Apr	100' Raceways	48.0	7.51	190.53	56.78	8.0	804,894	0.4%	100,759	67,110	16.8	13,422	9,395	70%	4,027
Stocking							**1,006,042**	**10%**	**5,938**						

Elwha Hatchery
Bioprogramming Calculations

Elwha Hatchery
Subyearling Fall Chinook
2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
15-Oct	Trays	48.0		2,353,333		5,500	428	62	372
22-Oct	Trays	48.0	128	2,341,802	0.5%	5,500	426	61	366
29-Oct	Trays	48.0	240	2,330,327	0.5%	5,500	424	61	366
5-Nov	Trays	48.0	352	2,318,909	0.5%	5,500	422	61	366
12-Nov	Trays	48.0	464	2,307,546	0.5%	5,500	420	60	360
19-Nov	Trays	48.0	576	2,296,239	0.5%	5,500	418	60	360
26-Nov	Trays	48.0	688	2,288,202	0.3%	5,500	417	60	360
3-Dec	Trays	48.0	800	2,280,193	0.3%	5,500	415	60	360
10-Dec	Trays	48.0	912	2,272,213	0.3%	5,500	414	60	360
17-Dec	Trays	48.0	1024	2,264,260	0.4%	5,500	412	59	354
24-Dec	Trays	48.0	1136	2,256,335	0.3%	5,500	411	59	354
31-Dec	Trays	48.0	1248	2,248,438	0.4%	5,500	409	59	354
7-Jan	Trays	48.0	1360	2,240,568	0.3%	5,500	408	59	354
14-Jan	Trays	48.0	1472	2,232,726	0.4%	5,500	406	58	348
21-Jan	Trays	48.0	1584	2,224,912	0.4%	5,500	405	58	348
28-Jan	Trays	48.0	1696	2,217,125	0.3%	5,500	404	58	348
4-Feb	Trays	48.0	1808	2,209,365	0.3%	5,500	402	58	348

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
5-Feb	Raceways	48.0	1.41	35.79	0.38	1205.6	2,208,260		1,832	6,495	1.6	1,299	0	0%	1,299
12-Feb	Raceways	48.0	1.55	39.34	0.50	907.5	2,194,348	0.6%	2,418	7,800	1.9	1,560	0	0%	1,560
19-Feb	Raceways	48.0	1.69	42.89	0.65	700.2	2,180,524	0.6%	3,114	9,214	2.3	1,843	0	0%	1,843
26-Feb	Raceways	48.0	1.83	46.45	0.82	551.4	2,166,786	0.6%	3,929	10,736	2.7	2,147	0	0%	2,147
5-Mar	Raceways	42.0	1.91	48.48	0.94	485.0	2,153,136	0.6%	4,439	11,621	2.9	2,324	0	0%	2,324
12-Mar	Raceways	42.0	1.99	50.51	1.06	428.8	2,139,571	0.6%	4,989	12,536	3.1	2,507	0	0%	2,507
19-Mar	Raceways	42.0	2.07	52.54	1.19	381.0	2,126,091	0.6%	5,580	13,478	3.4	2,696	0	0%	2,696
26-Mar	Raceways	42.0	2.15	54.57	1.33	340.0	2,112,697	0.6%	6,213	14,449	3.6	2,890	0	0%	2,890
2-Apr	Raceways	47.0	2.28	57.87	1.59	285.1	2,099,387	0.6%	7,363	16,146	4.0	3,229	0	0%	3,229
9-Apr	Raceways	47.0	2.41	61.17	1.88	241.4	2,086,161	0.6%	8,641	17,927	4.5	3,585	0	0%	3,585
16-Apr	Raceways	47.0	2.54	64.47	2.20	206.2	2,073,018	0.6%	10,052	19,787	4.9	3,957	0	0%	3,957
23-Apr	Raceways	47.0	2.67	67.77	2.55	177.6	2,059,958	0.6%	11,602	21,727	5.4	4,345	0	0%	4,345
30-Apr	Raceways	47.0	2.80	71.07	2.95	154.0	2,052,748	0.3%	13,334	23,810	6.0	4,762	0	0%	4,762
7-May	Raceways	51.0	2.97	75.38	3.52	129.0	2,045,564	0.3%	15,857	26,696	6.7	5,339	0	0%	5,339
14-May	Raceways	51.0	3.14	79.70	4.16	109.2	2,038,404	0.3%	18,673	29,735	7.4	5,947	0	0%	5,947
21-May	Raceways	51.0	3.31	84.01	4.87	93.2	2,031,270	0.3%	21,797	32,926	8.2	6,585	0	0%	6,585
28-May	Raceways	51.0	3.48	88.32	5.66	80.2	2,024,160	0.3%	25,242	36,268	9.1	7,254	0	0%	7,254
Total Stocking							**2,024,160**	**9%**	**25,242**						

Garrison Springs Hatchery
Bioprogramming Calculations

Garrison Springs Hatchery
Subyearling Fall Chinook
400,000

Incubation

Date	Phase	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Incubation	Trays	56.0		469,333		5,500	86	13	78
8-Oct	Incubation	Trays	56.0	192	467,034	0.5%	5,500	85	13	78
15-Oct	Incubation	Trays	56.0	360	464,745	0.5%	5,500	85	13	78
22-Oct	Incubation	Trays	56.0	528	462,468	0.5%	5,500	85	13	78
29-Oct	Incubation	Trays	56.0	696	460,202	0.5%	5,500	84	12	72
5-Nov	Incubation	Trays	56.0	864	457,947	0.5%	5,500	84	12	72
12-Nov	Incubation	Trays	56.0	1032	456,344	0.3%	5,500	83	12	72
19-Nov	Incubation	Trays	56.0	1200	454,747	0.4%	5,500	83	12	72
26-Nov	Incubation	Trays	56.0	1368	453,155	0.3%	5,500	83	12	72
3-Dec	Incubation	Trays	56.0	1536	451,569	0.3%	5,500	83	12	72
10-Dec	Incubation	Trays	56.0	1704	449,989	0.3%	5,500	82	12	72
17-Dec	Incubation	Trays	56.0	1872	448,414	0.3%	5,500	82	12	72

Rearing

Date	Phase	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
18-Dec	Growout	Raceways	56.0	1.41	35.79	0.38	1205.6	448,189		372	1,318	0.3	264	0	0%	264
25-Dec	Growout	Raceways	56.0	1.63	41.37	0.58	780.4	445,052	0.7%	570	1,749	0.4	350	0	0%	350
1-Jan	Growout	Raceways	56.0	1.85	46.95	0.85	533.8	442,248	0.6%	829	2,239	0.6	448	0	0%	448
8-Jan	Growout	Raceways	56.0	2.07	52.54	1.19	381.0	439,462	0.6%	1,153	2,786	0.7	557	0	0%	557
15-Jan	Growout	Raceways	56.0	2.29	58.12	1.61	281.4	436,694	0.6%	1,552	3,388	0.8	678	0	0%	678
22-Jan	Growout	Raceways	56.0	2.51	63.71	2.12	213.7	433,942	0.6%	2,030	4,045	1.0	809	0	0%	809
29-Jan	Growout	Raceways	56.0	2.73	69.29	2.73	166.1	431,209	0.6%	2,596	4,755	1.2	951	0	0%	951
5-Feb	Growout	Raceways	56.0	2.95	74.87	3.45	131.6	428,492	0.6%	3,255	5,517	1.4	1,103	0	0%	1,103
12-Feb	Growout	Raceways	56.0	3.17	80.46	4.28	106.1	425,792	0.6%	4,013	6,330	1.6	1,266	0	0%	1,266
19-Feb	Growout	Raceways	56.0	3.39	86.04	5.23	86.7	423,110	0.6%	4,877	7,194	1.8	1,439	0	0%	1,439
26-Feb	Growout	Raceways	56.0	3.61	91.62	6.31	71.8	420,444	0.6%	5,853	8,107	2.0	1,621	0	0%	1,621
Stocking								**420,444**	**6%**	**5,853**						

Humptulips Hatchery
Bioprogramming Calculations

Humptulips Hatchery
Subyearling Fall
Chinook 2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	58.0		2,348,889		5,500	428	62	372
8-Oct	Trays	58.0	208	2,337,379	0.5%	5,500	425	61	366
15-Oct	Trays	58.0	390	2,325,926	0.5%	5,500	423	61	366
22-Oct	Trays	58.0	572	2,314,529	0.5%	5,500	421	61	366
29-Oct	Trays	58.0	754	2,303,188	0.5%	5,500	419	60	360
5-Nov	Trays	47.0	859	2,291,902	0.5%	5,500	417	60	360
12-Nov	Trays	47.0	964	2,283,881	0.3%	5,500	416	60	360
19-Nov	Trays	47.0	1069	2,275,887	0.3%	5,500	414	60	360
26-Nov	Trays	47.0	1174	2,267,921	0.3%	5,500	413	59	354
3-Dec	Trays	44.0	1258	2,259,984	0.3%	5,500	411	59	354
10-Dec	Trays	44.0	1342	2,252,074	0.3%	5,500	410	59	354
17-Dec	Trays	44.0	1426	2,244,192	0.3%	5,500	409	59	354
24-Dec	Trays	44.0	1510	2,236,337	0.3%	5,500	407	59	354
31-Dec	Trays	44.0	1594	2,228,510	0.3%	5,500	406	58	348
7-Jan	Trays	43.0	1671	2,220,710	0.3%	5,500	404	58	348
14-Jan	Trays	43.0	1748	2,212,937	0.3%	5,500	403	58	348

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Jan	Raceways	43.0	1.41	35.79	0.38	1205.6	2,211,831		1,835	6,506	1.6	1,301	0	0%	1,301
22-Jan	Raceways	43.0	1.50	38.07	0.45	1001.3	2,197,896	0.6%	2,195	7,317	1.8	1,463	0	0%	1,463
29-Jan	Raceways	43.0	1.59	40.36	0.54	840.7	2,184,050	0.6%	2,598	8,169	2.0	1,634	0	0%	1,634
5-Feb	Raceways	44.0	1.69	42.89	0.65	700.2	2,170,290	0.6%	3,100	9,171	2.3	1,834	0	0%	1,834
12-Feb	Raceways	44.0	1.79	45.43	0.77	589.2	2,156,617	0.6%	3,660	10,223	2.6	2,045	0	0%	2,045
19-Feb	Raceways	44.0	1.89	47.97	0.91	500.6	2,143,031	0.6%	4,281	11,326	2.8	2,265	0	0%	2,265
26-Feb	Raceways	44.0	1.99	50.51	1.06	428.8	2,129,530	0.6%	4,966	12,477	3.1	2,495	0	0%	2,495
5-Mar	Raceways	45.0	2.10	53.30	1.24	364.9	2,116,114	0.6%	5,799	13,807	3.5	2,761	0	0%	2,761
12-Mar	Raceways	45.0	2.21	56.09	1.45	313.1	2,102,782	0.6%	6,716	15,195	3.8	3,039	0	0%	3,039
19-Mar	Raceways	45.0	2.32	58.88	1.68	270.6	2,089,534	0.6%	7,721	16,640	4.2	3,328	0	0%	3,328
26-Mar	Raceways	45.0	2.43	61.68	1.93	235.5	2,076,370	0.6%	8,816	18,140	4.5	3,628	0	0%	3,628
2-Apr	Raceways	47.0	2.56	64.97	2.25	201.4	2,063,289	0.6%	10,243	20,006	5.0	4,001	0	0%	4,001
9-Apr	Raceways	47.0	2.69	68.27	2.61	173.6	2,053,179	0.5%	11,826	21,981	5.5	4,396	0	0%	4,396
16-Apr	Raceways	47.0	2.82	71.57	3.01	150.7	2,044,556	0.4%	13,567	24,055	6.0	4,811	0	0%	4,811
23-Apr	Raceways	47.0	2.95	74.87	3.45	131.6	2,035,969	0.4%	15,466	26,214	6.6	5,243	0	0%	5,243
30-Apr	Raceways	47.0	3.08	78.17	3.92	115.7	2,027,418	0.4%	17,528	28,455	7.1	5,691	0	0%	5,691
7-May	Raceways	54.0	3.28	83.25	4.74	95.8	2,018,902	0.4%	21,081	32,135	8.0	6,427	0	0%	6,427
14-May	Raceways	54.0	3.48	88.32	5.66	80.2	2,010,423	0.4%	25,071	36,021	9.0	7,204	0	0%	7,204
21-May	Raceways	54.0	3.68	93.40	6.69	67.8	2,001,979	0.4%	29,522	40,112	10.0	8,022	0	0%	8,022
Stocking							**2,001,979**	**10%**	**29,522**						

Hupp Springs Hatchery
Bioprogramming Calculations

Hupp Springs Hatchery
Subyearling Fall Chinook
650,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# of Trays	# Single Stacks	GPM
24-Sep	Trays	49.0		765,556		5,500	140	20	120
1-Oct	Trays	49.0	136	761,804	0.5%	5,500	139	20	120
8-Oct	Trays	49.0	255	758,071	0.5%	5,500	138	20	120
15-Oct	Trays	49.0	374	754,357	0.5%	5,500	138	20	120
22-Oct	Trays	49.0	493	750,661	0.5%	5,500	137	20	120
29-Oct	Trays	49.0	612	746,982	0.5%	5,500	136	20	120
5-Nov	Trays	49.0	731	744,368	0.3%	5,500	136	20	120
12-Nov	Trays	49.0	850	741,763	0.3%	5,500	135	20	120
19-Nov	Trays	49.0	969	739,166	0.3%	5,500	135	20	120
26-Nov	Trays	49.0	1088	736,579	0.3%	5,500	134	20	120
3-Dec	Trays	49.0	1207	734,001	0.3%	5,500	134	20	120
10-Dec	Trays	49.0	1326	731,432	0.3%	5,500	133	19	114
17-Dec	Trays	49.0	1445	728,872	0.3%	5,500	133	19	114
24-Dec	Trays	49.0	1564	726,321	0.3%	5,500	133	19	114
31-Dec	Trays	49.0	1683	723,779	0.3%	5,500	132	19	114
7-Jan	Trays	49.0	1802	721,246	0.3%	5,500	132	19	114

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	49.0	1.41	35.79	0.38	1205.6	720,885		598	2,120	1.5	424	212	50%	212
15-Jan	Circular tanks	49.0	1.56	39.59	0.51	890.2	715,839	0.7%	804	2,577	1.8	515	258	50%	258
22-Jan	Circular tanks	49.0	1.71	43.40	0.67	675.9	711,329	0.6%	1,052	3,077	2.2	615	308	50%	308
29-Jan	Circular tanks	49.0	1.86	47.21	0.86	525.2	706,848	0.6%	1,346	3,618	2.6	724	362	50%	362
5-Feb	Circular tanks	49.0	2.01	51.02	1.09	416.2	702,395	0.6%	1,688	4,198	3.0	840	420	50%	420
12-Feb	Circular tanks	49.0	2.16	54.82	1.35	335.3	697,970	0.6%	2,081	4,818	3.4	964	482	50%	482
19-Feb	Circular tanks	49.0	2.31	58.63	1.65	274.2	693,573	0.6%	2,530	5,476	3.9	1,095	548	50%	548
26-Feb	Circular tanks	49.0	2.46	62.44	2.00	227.0	689,203	0.6%	3,036	6,171	4.4	1,234	617	50%	617
5-Mar	Circular tanks	49.0	2.61	66.24	2.39	190.1	684,861	0.6%	3,603	6,902	4.9	1,380	690	50%	690
12-Mar	Circular tanks	49.0	2.76	70.05	2.82	160.7	680,546	0.6%	4,234	7,670	5.4	1,534	767	50%	767
19-Mar	Circular tanks	49.0	2.91	73.86	3.31	137.1	676,259	0.6%	4,931	8,473	6.0	1,695	847	50%	847
26-Mar	Circular tanks	49.0	3.06	77.66	3.85	117.9	671,999	0.6%	5,697	9,309	6.6	1,862	931	50%	931
2-Apr	Circular tanks	49.0	3.21	81.47	4.44	102.2	667,765	0.6%	6,536	10,180	7.2	2,036	1,018	50%	1,018
9-Apr	Circular tanks	49.0	3.36	85.28	5.09	89.1	663,558	0.6%	7,448	11,083	7.8	2,217	1,108	50%	1,108
16-Apr	Circular tanks	49.0	3.51	89.09	5.80	78.2	659,378	0.6%	8,437	12,019	8.5	2,404	1,202	50%	1,202
23-Apr	Circular tanks	49.0	3.66	92.89	6.58	68.9	655,224	0.6%	9,506	12,986	9.2	2,597	1,299	50%	1,299
Stocking							**655,224**	**10%**	**9,506**						

Kendall Creek Hatchery
Bioprogramming Calculations

Kendall Creek Hatchery
Subyearling Spring Chinook
700,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	47.0		824,444		5,500	150	22	110
1-Oct	Trays	47.0	120	820,982	0.4%	5,500	150	22	110
8-Oct	Trays	47.0	225	817,534	0.4%	5,500	149	22	110
15-Oct	Trays	47.0	330	814,100	0.4%	5,500	149	22	110
22-Oct	Trays	47.0	435	810,681	0.4%	5,500	148	22	110
29-Oct	Trays	47.0	540	807,276	0.4%	5,500	147	21	105
5-Nov	Trays	47.0	645	803,885	0.4%	5,500	147	21	105
12-Nov	Trays	47.0	750	800,509	0.4%	5,500	146	21	105
19-Nov	Trays	47.0	855	797,707	0.4%	5,500	146	21	105
26-Nov	Trays	47.0	960	794,915	0.3%	5,500	145	21	105
3-Dec	Trays	47.0	1065	792,133	0.4%	5,500	145	21	105
10-Dec	Trays	47.0	1170	789,361	0.3%	5,500	144	21	105
17-Dec	Trays	47.0	1275	786,598	0.3%	5,500	144	21	105
24-Dec	Trays	47.0	1380	783,845	0.3%	5,500	143	21	105
31-Dec	Trays	47.0	1485	781,101	0.3%	5,500	143	21	105
7-Jan	Trays	47.0	1590	778,367	0.3%	5,500	142	21	105
14-Jan	Trays	47.0	1695	775,643	0.3%	5,500	142	21	105
21-Jan	Trays	47.0	1800	772,928	0.3%	5,500	141	21	105

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	#Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
22-Jan	Circular tanks	47.0	1.41	35.79	0.38	1205.6	772,542		641	2,272	0.6	454	0	0%	454
29-Jan	Circular tanks	47.0	1.54	39.09	0.49	925.3	766,593	0.8%	828	2,690	0.7	538	0	0%	538
5-Feb	Circular tanks	47.0	1.67	42.39	0.63	725.6	761,227	0.7%	1,049	3,141	0.8	628	0	0%	628
12-Feb	Circular tanks	47.0	1.80	45.69	0.78	579.5	755,899	0.7%	1,304	3,623	0.9	725	0	0%	725
19-Feb	Circular tanks	47.0	1.93	48.98	0.96	470.1	750,607	0.7%	1,597	4,137	1.0	827	0	0%	827
26-Feb	Circular tanks	47.0	2.06	52.28	1.17	386.6	745,353	0.7%	1,928	4,680	1.2	936	0	0%	936
5-Mar	Circular tanks	47.0	2.19	55.58	1.41	321.8	740,136	0.7%	2,300	5,252	1.3	1,050	0	0%	1,050
12-Mar	Circular tanks	47.0	2.32	58.88	1.68	270.6	734,955	0.7%	2,716	5,853	1.5	1,171	0	0%	1,171
19-Mar	Circular tanks	47.0	2.45	62.18	1.97	229.8	729,810	0.7%	3,176	6,481	1.6	1,296	0	0%	1,296
26-Mar	Circular tanks	47.0	2.58	65.48	2.30	196.8	724,701	0.7%	3,683	7,137	1.8	1,427	0	0%	1,427
2-Apr	Circular tanks	47.0	2.71	68.78	2.67	169.8	719,628	0.7%	4,238	7,819	2.0	1,564	0	0%	1,564
9-Apr	Circular tanks	47.0	2.84	72.08	3.07	147.5	714,591	0.7%	4,843	8,527	2.1	1,705	0	0%	1,705
16-Apr	Circular tanks	47.0	2.97	75.38	3.52	129.0	710,339	0.6%	5,507	9,270	2.3	1,854	0	0%	1,854
23-Apr	Circular tanks	47.0	3.10	78.68	4.00	113.4	706,113	0.6%	6,224	10,040	2.5	2,008	0	0%	2,008
30-Apr	Circular tanks	47.0	3.23	81.98	4.52	100.3	701,911	0.6%	6,999	10,834	2.7	2,167	0	0%	2,167
Stocking							**701,911**	**10%**	**6,999**						

Lyon's Ferry Hatchery
Bioprogramming Calculations

Lyons Ferry
Subyearling Fall Chinook
2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
29-Oct	Trays	52.5		2,311,111		5,500	421	61	366
5-Nov	Trays	52.5	164	2,299,787	0.5%	5,500	419	60	360
12-Nov	Trays	52.5	308	2,288,518	0.5%	5,500	417	60	360
19-Nov	Trays	52.5	451	2,277,304	0.5%	5,500	415	60	360
26-Nov	Trays	52.5	595	2,266,145	0.5%	5,500	413	59	354
3-Dec	Trays	52.5	738	2,255,041	0.5%	5,500	411	59	354
10-Dec	Trays	52.5	882	2,247,148	0.3%	5,500	409	59	354
17-Dec	Trays	52.5	1025	2,239,283	0.4%	5,500	408	59	354
24-Dec	Trays	52.5	1169	2,231,446	0.3%	5,500	406	58	348
31-Dec	Trays	52.5	1312	2,223,636	0.3%	5,500	405	58	348
7-Jan	Trays	52.5	1456	2,215,853	0.3%	5,500	403	58	348
14-Jan	Trays	52.5	1599	2,208,098	0.3%	5,500	402	58	348
21-Jan	Trays	52.5	1743	2,200,369	0.3%	5,500	401	58	348
28-Jan	Trays	52.5	1886	2,192,668	0.3%	5,500	399	57	342

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	Raceway Bank #1 Flow (gpm) [1]	Raceway Bank #2 Flow (gpm) [1]
29-Jan	Raceways	52.5	1.41	35.79	0.38	1205.6	2,191,572		1,818	16,116	4.0	1,289	645	645
5-Feb	Raceways	52.5	1.60	40.48	0.54	832.9	2,173,162	0.8%	2,609	20,449	5.1	1,636	818	818
12-Feb	Raceways	52.5	1.78	45.18	0.76	599.2	2,154,908	0.8%	3,596	25,254	6.3	2,020	1,010	1,010
19-Feb	Raceways	52.5	1.97	49.87	1.02	445.4	2,136,807	0.8%	4,797	30,517	7.6	2,441	1,221	1,221
26-Feb	Raceways	52.5	2.15	54.57	1.33	340.0	2,118,858	0.8%	6,231	36,227	9.1	2,898	1,449	1,449
5-Mar	Raceways	52.5	2.34	59.26	1.71	265.5	2,101,059	0.8%	7,915	42,371	10.6	3,390	1,695	1,695
12-Mar	Raceways	52.5	2.52	63.96	2.15	211.2	2,083,410	0.8%	9,866	48,936	12.2	3,915	1,957	1,957
19-Mar	Raceways	52.5	2.71	68.65	2.66	170.7	2,070,576	0.6%	12,127	56,038	14.0	4,483	2,242	2,242
26-Mar	Raceways	52.5	2.89	73.35	3.24	140.0	2,057,822	0.6%	14,698	63,571	15.9	5,086	2,543	2,543
2-Apr	Raceways	52.5	3.08	78.05	3.90	116.2	2,045,145	0.6%	17,596	71,527	17.9	5,722	2,861	2,861
9-Apr	Raceways	52.5	3.26	82.74	4.65	97.5	2,032,547	0.6%	20,837	79,897	20.0	6,392	3,196	3,196
16-Apr	Raceways	52.5	3.45	87.44	5.49	82.7	2,020,027	0.6%	24,438	88,673	22.2	7,094	3,547	3,547
23-Apr	Raceways	52.5	3.63	92.13	6.42	70.7	2,007,584	0.6%	28,414	97,846	24.5	7,828	3,914	3,914
Stocking							**2,007,584**	**9%**	**28,414**					

[1] *Two pass raceway system with LHOs*

Marblemount Hatchery
Bioprogramming Calculations

Marblemount Hatchery
Subyearling Spring/Summer Chinook
2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
15-Aug	Trays	48.0		2,355,556		5,500	429	62	372
22-Aug	Trays	48.0	128	2,344,013	0.5%	5,500	427	61	366
29-Aug	Trays	48.0	240	2,332,528	0.5%	5,500	425	61	366
5-Sep	Trays	48.0	352	2,321,098	0.5%	5,500	423	61	366
12-Sep	Trays	48.0	464	2,309,725	0.5%	5,500	420	60	360
19-Sep	Trays	48.0	576	2,298,407	0.5%	5,500	418	60	360
26-Sep	Trays	48.0	688	2,290,363	0.3%	5,500	417	60	360
3-Oct	Trays	48.0	800	2,282,347	0.3%	5,500	415	60	360
10-Oct	Trays	48.0	912	2,274,358	0.4%	5,500	414	60	360
17-Oct	Trays	48.0	1024	2,266,398	0.4%	5,500	413	59	354
24-Oct	Trays	48.0	1136	2,258,466	0.3%	5,500	411	59	354
31-Oct	Trays	48.0	1248	2,250,561	0.4%	5,500	410	59	354
7-Nov	Trays	48.0	1360	2,242,684	0.3%	5,500	408	59	354
14-Nov	Trays	48.0	1472	2,234,835	0.4%	5,500	407	59	354
21-Nov	Trays	48.0	1584	2,227,013	0.3%	5,500	405	58	348
28-Nov	Trays	48.0	1696	2,219,218	0.4%	5,500	404	58	348
5-Dec	Trays	48.0	1808	2,211,451	0.3%	5,500	403	58	348

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
6-Dec	100' Raceways	48.0	1.41	35.79	0.38	1205.6	2,210,345		1,833	6,501	1.6	1,300	0	0%	1,300
13-Dec	100' Raceways	48.0	1.55	39.34	0.50	907.5	2,194,873	0.7%	2,419	7,802	2.0	1,560	0	0%	1,560
20-Dec	100' Raceways	48.0	1.69	42.89	0.65	700.2	2,181,045	0.6%	3,115	9,216	2.3	1,843	0	0%	1,843
27-Dec	100' Raceways	48.0	1.83	46.45	0.82	551.4	2,167,305	0.6%	3,930	10,738	2.7	2,148	0	0%	2,148
3-Jan	100' Raceways	48.0	1.97	50.00	1.03	442.0	2,153,651	0.6%	4,872	12,366	3.1	2,473	0	0%	2,473
10-Jan	100' Raceways	48.0	2.11	53.55	1.26	359.8	2,140,083	0.6%	5,949	14,096	3.5	2,819	0	0%	2,819
17-Jan	100' Raceways	48.0	2.25	57.11	1.53	296.7	2,126,600	0.6%	7,168	15,928	4.0	3,186	0	0%	3,186
24-Jan	100' Raceways	48.0	2.39	60.66	1.83	247.5	2,113,202	0.6%	8,536	17,859	4.5	3,572	0	0%	3,572
31-Jan	100' Raceways	48.0	2.53	64.21	2.17	208.7	2,099,889	0.6%	10,062	19,886	5.0	3,977	0	0%	3,977
7-Feb	100' Raceways	40.0	2.59	65.74	2.33	194.5	2,086,660	0.6%	10,727	20,709	5.2	4,142	0	0%	4,142
14-Feb	100' Raceways	40.0	2.65	67.26	2.50	181.6	2,073,514	0.6%	11,418	21,543	5.4	4,309	0	0%	4,309
21-Feb	100' Raceways	40.0	2.71	68.78	2.67	169.8	2,060,451	0.6%	12,134	22,388	5.6	4,478	0	0%	4,478
28-Feb	100' Raceways	40.0	2.77	70.30	2.85	159.0	2,047,470	0.6%	12,877	23,243	5.8	4,649	0	0%	4,649
7-Mar	100' Raceways	40.0	2.83	71.83	3.04	149.1	2,034,571	0.6%	13,645	24,108	6.0	4,822	0	0%	4,822
14-Mar	100' Raceways	40.0	2.89	73.35	3.24	140.0	2,021,753	0.6%	14,440	24,983	6.2	4,997	0	0%	4,997
21-Mar	100' Raceways	40.0	2.95	74.87	3.45	131.6	2,009,016	0.6%	15,261	25,867	6.5	5,173	0	0%	5,173
28-Mar	100' Raceways	40.0	3.01	76.40	3.66	123.9	1,996,359	0.6%	16,110	26,760	6.7	5,352	0	0%	5,352
4-Apr	100' Raceways	43.0	3.10	78.68	4.00	113.4	1,983,782	0.6%	17,487	28,205	7.1	5,641	0	0%	5,641
11-Apr	100' Raceways	43.0	3.19	80.96	4.36	104.1	1,971,284	0.6%	18,935	29,679	7.4	5,936	0	0%	5,936
18-Apr	100' Raceways	43.0	3.28	83.25	4.74	95.8	1,958,865	0.6%	20,454	31,179	7.8	6,236	0	0%	6,236
25-Apr	100' Raceways	43.0	3.37	85.53	5.14	88.3	1,946,524	0.6%	22,044	32,707	8.2	6,541	0	0%	6,541
2-May	100' Raceways	45.0	3.48	88.32	5.66	80.2	1,934,261	0.6%	24,121	34,657	8.7	6,931	0	0%	6,931
9-May	100' Raceways	45.0	3.59	91.12	6.21	73.0	1,922,076	0.6%	26,315	36,650	9.2	7,330	0	0%	7,330
Stocking							**1,922,076**	**14%**	**26,315**						

Note: Requires well refurbishment to gain 3,500 gpm

McKernan Hatchery
Bioprogramming Calculations

McKernan Hatchery
Subyearling Fall Chinook
500,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	50.0		587,222		5,500	107	16	96
1-Oct	Trays	50.0	144	584,345	0.5%	5,500	107	16	96
8-Oct	Trays	50.0	270	581,482	0.5%	5,500	106	16	96
15-Oct	Trays	50.0	396	578,632	0.5%	5,500	106	16	96
22-Oct	Trays	50.0	522	575,797	0.5%	5,500	105	15	90
29-Oct	Trays	50.0	648	572,976	0.5%	5,500	105	15	90
5-Nov	Trays	50.0	774	570,970	0.3%	5,500	104	15	90
12-Nov	Trays	50.0	900	568,972	0.3%	5,500	104	15	90
19-Nov	Trays	50.0	1026	566,980	0.3%	5,500	104	15	90
26-Nov	Trays	50.0	1152	564,996	0.3%	5,500	103	15	90
3-Dec	Trays	50.0	1278	563,018	0.3%	5,500	103	15	90
10-Dec	Trays	50.0	1404	561,048	0.3%	5,500	103	15	90
17-Dec	Trays	50.0	1530	559,084	0.3%	5,500	102	15	90
24-Dec	Trays	50.0	1656	557,127	0.3%	5,500	102	15	90
31-Dec	Trays	50.0	1782	555,177	0.3%	5,500	101	15	90

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
1-Jan	Raceways	50.0	1.41	35.79	0.38	1205.6	554,900		460	1,632	0.4	326	0	0%	326
8-Jan	Raceways	50.0	1.57	39.85	0.52	873.3	551,404	0.6%	631	2,011	0.5	402	0	0%	402
15-Jan	Raceways	50.0	1.73	43.91	0.69	652.7	547,930	0.6%	839	2,426	0.6	485	0	0%	485
22-Jan	Raceways	50.0	1.89	47.97	0.91	500.6	544,478	0.6%	1,088	2,878	0.7	576	0	0%	576
29-Jan	Raceways	50.0	2.05	52.03	1.16	392.3	541,048	0.6%	1,379	3,364	0.8	673	0	0%	673
5-Feb	Raceways	50.0	2.21	56.09	1.45	313.1	537,639	0.6%	1,717	3,885	1.0	777	0	0%	777
12-Feb	Raceways	50.0	2.37	60.15	1.79	253.9	534,252	0.6%	2,104	4,440	1.1	888	0	0%	888
19-Feb	Raceways	50.0	2.53	64.21	2.17	208.7	530,886	0.6%	2,544	5,028	1.3	1,006	0	0%	1,006
26-Feb	Raceways	50.0	2.69	68.27	2.61	173.6	527,542	0.6%	3,038	5,648	1.4	1,130	0	0%	1,130
5-Mar	Raceways	50.0	2.85	72.34	3.11	146.0	524,218	0.6%	3,591	6,300	1.6	1,260	0	0%	1,260
12-Mar	Raceways	50.0	3.01	76.40	3.66	123.9	520,916	0.6%	4,204	6,983	1.7	1,397	0	0%	1,397
19-Mar	Raceways	50.0	3.17	80.46	4.28	106.1	517,634	0.6%	4,879	7,696	1.9	1,539	0	0%	1,539
26-Mar	Raceways	50.0	3.33	84.52	4.96	91.5	515,098	0.5%	5,628	8,451	2.1	1,690	0	0%	1,690
2-Apr	Raceways	50.0	3.49	88.58	5.71	79.5	512,934	0.4%	6,452	9,243	2.3	1,849	0	0%	1,849
9-Apr	Raceways	50.0	3.65	92.64	6.53	69.5	510,780	0.4%	7,349	10,068	2.5	2,014	0	0%	2,014
Stocking							**510,780**	**8%**	**7,349**						

Minter Creek Hatchery
Bioprogramming Calculations

Minter Creek Hatchery
Subyearling Fall Chinook
1,300,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	49.0		1,444,444		5,500	263	38	228
1-Oct	Trays	49.0	136	1,437,367	0.5%	5,500	262	38	228
8-Oct	Trays	49.0	255	1,430,324	0.5%	5,500	261	38	228
15-Oct	Trays	49.0	374	1,423,315	0.5%	5,500	259	37	222
22-Oct	Trays	49.0	493	1,416,341	0.5%	5,500	258	37	222
29-Oct	Trays	49.0	612	1,409,401	0.5%	5,500	257	37	222
5-Nov	Trays	49.0	731	1,404,468	0.4%	5,500	256	37	222
12-Nov	Trays	49.0	850	1,399,552	0.4%	5,500	255	37	222
19-Nov	Trays	49.0	969	1,394,654	0.4%	5,500	254	37	222
26-Nov	Trays	49.0	1088	1,389,772	0.4%	5,500	253	37	222
3-Dec	Trays	49.0	1207	1,384,908	0.3%	5,500	252	36	216
10-Dec	Trays	49.0	1326	1,380,061	0.4%	5,500	251	36	216
17-Dec	Trays	49.0	1445	1,375,231	0.3%	5,500	251	36	216
24-Dec	Trays	49.0	1564	1,370,418	0.3%	5,500	250	36	216
31-Dec	Trays	49.0	1683	1,365,621	0.3%	5,500	249	36	216
7-Jan	Trays	49.0	1802	1,360,841	0.4%	5,500	248	36	216

Note:Unfed fry transferred to Coulter Creek (500,000) and Hupp Springs (800,000)

Naselle Hatchery
Bioprogramming Calculations

Naselle Hatchery
Subyearling Fall
Chinook 2,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# of Trays	# Single Stacks	GPM
24-Sep	Trays	55.0		2,371,111		5,500	432	62	372
1-Oct	Trays	53.0	170	2,359,493	0.5%	5,500	429	62	372
8-Oct	Trays	53.0	317	2,347,931	0.5%	5,500	427	61	366
15-Oct	Trays	53.0	464	2,336,426	0.5%	5,500	425	61	366
22-Oct	Trays	53.0	611	2,324,978	0.5%	5,500	423	61	366
29-Oct	Trays	53.0	758	2,313,585	0.5%	5,500	421	61	366
5-Nov	Trays	48.0	870	2,305,488	0.3%	5,500	420	60	360
12-Nov	Trays	48.0	982	2,297,419	0.3%	5,500	418	60	360
19-Nov	Trays	48.0	1094	2,289,378	0.3%	5,500	417	60	360
26-Nov	Trays	48.0	1206	2,281,365	0.3%	5,500	415	60	360
3-Dec	Trays	41.0	1269	2,273,380	0.3%	5,500	414	60	360
10-Dec	Trays	41.0	1332	2,265,423	0.3%	5,500	412	59	354
17-Dec	Trays	41.0	1395	2,257,494	0.3%	5,500	411	59	354
24-Dec	Trays	41.0	1458	2,249,593	0.3%	5,500	410	59	354
31-Dec	Trays	41.0	1521	2,241,719	0.3%	5,500	408	59	354
7-Jan	Trays	40.0	1577	2,233,873	0.3%	5,500	407	59	354
14-Jan	Trays	40.0	1633	2,226,055	0.3%	5,500	405	58	348
21-Jan	Trays	40.0	1689	2,218,264	0.4%	5,500	404	58	348
28-Jan	Trays	40.0	1745	2,210,500	0.3%	5,500	402	58	348
4-Feb	Trays	40.0	1801	2,202,763	0.3%	5,500	401	58	348

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
5-Feb	Circular tanks	40.0	1.41	35.79	0.38	1205.6	2,201,662		1,826	6,476	4.6	1,295	648	50%	648
12-Feb	Circular tanks	40.0	1.47	37.31	0.43	1063.9	2,187,021	0.7%	2,056	6,992	4.9	1,398	699	50%	699
19-Feb	Circular tanks	40.0	1.53	38.83	0.48	943.6	2,172,477	0.7%	2,302	7,524	5.3	1,505	752	50%	752
26-Feb	Circular tanks	40.0	1.59	40.36	0.54	840.7	2,158,030	0.7%	2,567	8,072	5.7	1,614	807	50%	807
5-Mar	Circular tanks	45.0	1.70	43.15	0.66	687.9	2,143,679	0.7%	3,116	9,166	6.5	1,833	917	50%	917
12-Mar	Circular tanks	45.0	1.81	45.94	0.80	569.9	2,129,424	0.7%	3,736	10,321	7.3	2,064	1,032	50%	1,032
19-Mar	Circular tanks	45.0	1.92	48.73	0.95	477.5	2,115,263	0.7%	4,430	11,537	8.2	2,307	1,154	50%	1,154
26-Mar	Circular tanks	45.0	2.03	51.52	1.12	404.0	2,101,196	0.7%	5,201	12,811	9.1	2,562	1,281	50%	1,281
2-Apr	Circular tanks	50.0	2.19	55.58	1.41	321.8	2,087,959	0.6%	6,489	14,816	10.5	2,963	1,482	50%	1,482
9-Apr	Circular tanks	50.0	2.35	59.64	1.74	260.4	2,074,805	0.6%	7,968	16,952	12.0	3,390	1,695	50%	1,695
16-Apr	Circular tanks	50.0	2.51	63.71	2.12	213.7	2,061,733	0.6%	9,647	19,217	13.6	3,843	1,922	50%	1,922
23-Apr	Circular tanks	50.0	2.67	67.77	2.55	177.6	2,048,745	0.6%	11,539	21,609	15.3	4,322	2,161	50%	2,161
30-Apr	Circular tanks	50.0	2.83	71.83	3.04	149.1	2,035,837	0.6%	13,654	24,123	17.1	4,825	2,412	50%	2,412
7-May	Circular tanks	55.0	3.04	77.16	3.77	120.3	2,023,012	0.6%	16,818	27,661	19.6	5,532	2,766	50%	2,766
14-May	Circular tanks	55.0	3.25	82.49	4.61	98.4	2,010,267	0.6%	20,420	31,415	22.2	6,283	3,141	50%	3,141
21-May	Circular tanks	55.0	3.46	87.82	5.56	81.6	1,997,602	0.6%	24,484	35,381	25.0	7,076	3,538	50%	3,538
Total Stocking							**1,997,602**	**10%**	**24,484**						

Nemah Hatchery
Bioprogramming Calculations

Nemah Hatchery
Subyearling Fall Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
15-Oct	Trays	54.0		1,166,667		5,500	213	31	186
22-Oct	Trays	54.0	176	1,160,950	0.5%	5,500	212	31	186
29-Oct	Trays	54.0	330	1,155,261	0.5%	5,500	211	31	186
5-Nov	Trays	51.0	463	1,149,601	0.5%	5,500	210	30	180
12-Nov	Trays	51.0	596	1,143,968	0.5%	5,500	208	30	180
19-Nov	Trays	51.0	729	1,138,362	0.5%	5,500	207	30	180
26-Nov	Trays	51.0	862	1,134,378	0.4%	5,500	207	30	180
3-Dec	Trays	48.0	974	1,130,407	0.3%	5,500	206	30	180
10-Dec	Trays	48.0	1086	1,126,451	0.3%	5,500	205	30	180
17-Dec	Trays	48.0	1198	1,122,508	0.3%	5,500	205	30	180
24-Dec	Trays	48.0	1310	1,118,580	0.3%	5,500	204	30	180
31-Dec	Trays	48.0	1422	1,114,665	0.3%	5,500	203	29	174
7-Jan	Trays	49.0	1541	1,110,763	0.3%	5,500	202	29	174
14-Jan	Trays	49.0	1660	1,106,876	0.3%	5,500	202	29	174
21-Jan	Trays	49.0	1779	1,103,002	0.3%	5,500	201	29	174

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
22-Jan	Circular tanks	49.0	1.41	35.79	0.38	1205.6	1,102,450		914	3,243	2.3	649	324	50%	324
29-Jan	Circular tanks	49.0	1.56	39.59	0.51	890.2	1,095,119	0.7%	1,230	3,943	2.8	789	394	50%	394
5-Feb	Circular tanks	47.0	1.69	42.89	0.65	700.2	1,087,836	0.7%	1,554	4,597	3.3	919	460	50%	460
12-Feb	Circular tanks	47.0	1.82	46.19	0.81	560.6	1,080,602	0.7%	1,928	5,296	3.7	1,059	530	50%	530
19-Feb	Circular tanks	47.0	1.95	49.49	1.00	455.8	1,073,416	0.7%	2,355	6,039	4.3	1,208	604	50%	604
26-Feb	Circular tanks	47.0	2.08	52.79	1.21	375.5	1,066,278	0.7%	2,839	6,825	4.8	1,365	683	50%	683
5-Mar	Circular tanks	47.0	2.21	56.09	1.45	313.1	1,059,187	0.7%	3,383	7,654	5.4	1,531	765	50%	765
12-Mar	Circular tanks	47.0	2.34	59.39	1.72	263.8	1,052,514	0.6%	3,990	8,527	6.0	1,705	853	50%	853
19-Mar	Circular tanks	47.0	2.47	62.69	2.02	224.3	1,045,883	0.6%	4,664	9,440	6.7	1,888	944	50%	944
26-Mar	Circular tanks	47.0	2.60	65.99	2.36	192.3	1,039,294	0.6%	5,405	10,394	7.4	2,079	1,039	50%	1,039
2-Apr	Circular tanks	51.0	2.77	70.30	2.85	159.0	1,032,747	0.6%	6,495	11,724	8.3	2,345	1,172	50%	1,172
9-Apr	Circular tanks	51.0	2.94	74.62	3.41	133.0	1,026,241	0.6%	7,717	13,124	9.3	2,625	1,312	50%	1,312
16-Apr	Circular tanks	51.0	3.11	78.93	4.04	112.4	1,019,775	0.6%	9,077	14,593	10.3	2,919	1,459	50%	1,459
23-Apr	Circular tanks	51.0	3.28	83.25	4.74	95.8	1,013,351	0.6%	10,581	16,130	11.4	3,226	1,613	50%	1,613
30-Apr	Circular tanks	51.0	3.45	87.56	5.51	82.3	1,006,967	0.6%	12,235	17,732	12.5	3,546	1,773	50%	1,773
7-May	Circular tanks	55.0	3.66	92.89	6.58	68.9	1,000,623	0.6%	14,516	19,831	14.0	3,966	1,983	50%	1,983
							1,000,623	**10%**	**14,516**						

Palmer Ponds Hatchery
Bioprogramming Calculations

Palmer Ponds Hatchery
Subyearling Fall Chinook
600,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
22-Oct	Trays	50.0		703,333		5,500	128	19	114
29-Oct	Trays	50.0	144	699,887	0.5%	5,500	128	19	114
5-Nov	Trays	49.0	263	696,458	0.5%	5,500	127	19	114
12-Nov	Trays	49.0	382	693,045	0.5%	5,500	127	19	114
19-Nov	Trays	49.0	501	689,649	0.5%	5,500	126	18	108
26-Nov	Trays	49.0	620	686,270	0.5%	5,500	125	18	108
3-Dec	Trays	48.0	732	683,868	0.4%	5,500	125	18	108
10-Dec	Trays	48.0	844	681,474	0.4%	5,500	124	18	108
17-Dec	Trays	48.0	956	679,089	0.3%	5,500	124	18	108
24-Dec	Trays	48.0	1068	676,712	0.3%	5,500	124	18	108
31-Dec	Trays	48.0	1180	674,344	0.3%	5,500	123	18	108
7-Jan	Trays	48.0	1292	671,984	0.3%	5,500	123	18	108
14-Jan	Trays	48.0	1404	669,632	0.3%	5,500	122	18	108
21-Jan	Trays	48.0	1516	667,288	0.3%	5,500	122	18	108
28-Jan	Trays	48.0	1628	664,952	0.4%	5,500	121	18	108
4-Feb	Trays	49.0	1747	662,625	0.3%	5,500	121	18	108

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
5-Feb	100' Raceways	49.0	1.41	35.79	0.38	1205.6	662,294		549	1,948	0.5	390	0	0%	390
12-Feb	100' Raceways	49.0	1.56	39.59	0.51	890.2	657,658	0.7%	739	2,368	0.6	474	0	0%	474
19-Feb	100' Raceways	49.0	1.71	43.40	0.67	675.9	653,054	0.7%	966	2,825	0.7	565	0	0%	565
26-Feb	100' Raceways	49.0	1.86	47.21	0.86	525.2	648,483	0.7%	1,235	3,319	0.8	664	0	0%	664
5-Mar	100' Raceways	50.0	2.02	51.27	1.11	410.0	643,943	0.7%	1,571	3,887	1.0	777	0	0%	777
12-Mar	100' Raceways	50.0	2.18	55.33	1.39	326.2	639,436	0.7%	1,960	4,496	1.1	899	0	0%	899
19-Mar	100' Raceways	50.0	2.34	59.39	1.72	263.8	634,960	0.7%	2,407	5,144	1.3	1,029	0	0%	1,029
26-Mar	100' Raceways	50.0	2.50	63.45	2.10	216.3	630,515	0.7%	2,915	5,830	1.5	1,166	0	0%	1,166
2-Apr	100' Raceways	50.0	2.66	67.51	2.53	179.6	626,322	0.7%	3,488	6,557	1.6	1,311	0	0%	1,311
9-Apr	100' Raceways	50.0	2.82	71.57	3.01	150.7	622,157	0.7%	4,128	7,320	1.8	1,464	0	0%	1,464
16-Apr	100' Raceways	50.0	2.98	75.63	3.55	127.7	618,020	0.7%	4,839	8,120	2.0	1,624	0	0%	1,624
23-Apr	100' Raceways	50.0	3.14	79.70	4.16	109.2	613,910	0.7%	5,624	8,955	2.2	1,791	0	0%	1,791
30-Apr	100' Raceways	50.0	3.30	83.76	4.82	94.0	609,827	0.7%	6,485	9,825	2.5	1,965	0	0%	1,965
7-May	100' Raceways	51.0	3.47	88.07	5.61	80.9	605,772	0.7%	7,489	10,792	2.7	2,158	0	0%	2,158
14-May	100' Raceways	51.0	3.64	92.39	6.47	70.1	601,744	0.7%	8,587	11,796	2.9	2,359	0	0%	2,359
Stocking							**601,744**	**10%**	**8,587**						

Puyallup Hatchery
Bioprogramming Calculations

Puyallup Hatchery
Subyearling Fall Chinook
575,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	48.0		677,222		5,500	124	18	108
1-Oct	Trays	48.0	128	673,904	0.5%	5,500	123	18	108
8-Oct	Trays	48.0	240	670,602	0.5%	5,500	122	18	108
15-Oct	Trays	48.0	352	667,316	0.5%	5,500	122	18	108
22-Oct	Trays	48.0	464	664,046	0.5%	5,500	121	18	108
29-Oct	Trays	48.0	576	660,792	0.5%	5,500	121	18	108
5-Nov	Trays	48.0	688	658,479	0.3%	5,500	120	18	108
12-Nov	Trays	48.0	800	656,175	0.3%	5,500	120	18	108
19-Nov	Trays	48.0	912	653,878	0.3%	5,500	119	17	102
26-Nov	Trays	48.0	1024	651,589	0.3%	5,500	119	17	102
3-Dec	Trays	48.0	1136	649,309	0.4%	5,500	119	17	102
10-Dec	Trays	48.0	1248	647,036	0.3%	5,500	118	17	102
17-Dec	Trays	48.0	1360	644,772	0.3%	5,500	118	17	102
24-Dec	Trays	48.0	1472	642,515	0.3%	5,500	117	17	102
31-Dec	Trays	48.0	1584	640,266	0.4%	5,500	117	17	102
7-Jan	Trays	48.0	1696	638,025	0.3%	5,500	117	17	102
14-Jan	Trays	48.0	1808	635,792	0.3%	5,500	116	17	102

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Jan	Raceways	48.0	1.41	35.79	0.38	1205.6	635,474		527	1,869	0.5	374	262	70%	112
22-Jan	Raceways	48.0	1.55	39.34	0.50	907.5	629,691	0.9%	694	2,238	0.6	448	313	70%	134
29-Jan	Raceways	48.0	1.69	42.89	0.65	700.2	623,961	0.9%	891	2,637	0.7	527	369	70%	158
5-Feb	Raceways	48.0	1.83	46.45	0.82	551.4	618,283	0.9%	1,121	3,063	0.8	613	429	70%	184
12-Feb	Raceways	48.0	1.97	50.00	1.03	442.0	613,090	0.8%	1,387	3,520	0.9	704	493	70%	211
19-Feb	Raceways	48.0	2.11	53.55	1.26	359.8	607,940	0.8%	1,690	4,004	1.0	801	561	70%	240
26-Feb	Raceways	48.0	2.25	57.11	1.53	296.7	602,833	0.8%	2,032	4,515	1.1	903	632	70%	271
5-Mar	Raceways	48.0	2.39	60.66	1.83	247.5	597,769	0.8%	2,415	5,052	1.3	1,010	707	70%	303
12-Mar	Raceways	48.0	2.53	64.21	2.17	208.7	592,748	0.8%	2,840	5,613	1.4	1,123	786	70%	337
19-Mar	Raceways	48.0	2.67	67.77	2.55	177.6	587,769	0.8%	3,310	6,199	1.5	1,240	868	70%	372
26-Mar	Raceways	48.0	2.81	71.32	2.98	152.3	583,860	0.7%	3,833	6,821	1.7	1,364	955	70%	409
2-Apr	Raceways	48.0	2.95	74.87	3.45	131.6	579,978	0.7%	4,406	7,467	1.9	1,493	1,045	70%	448
9-Apr	Raceways	48.0	3.09	78.43	3.96	114.5	576,121	0.7%	5,030	8,139	2.0	1,628	1,139	70%	488
16-Apr	Raceways	48.0	3.23	81.98	4.52	100.3	572,289	0.7%	5,706	8,834	2.2	1,767	1,237	70%	530
23-Apr	Raceways	48.0	3.37	85.53	5.14	88.3	568,484	0.7%	6,438	9,552	2.4	1,910	1,337	70%	573
Total Stocking							**568,484**	**11%**	**6,438**						

Samish Hatchery
Bioprogramming Calculations

Samish Hatchery
Subyearling Fall Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	50.0		1,172,222		5,500	214	31	186
8-Oct	Trays	50.0	144	1,166,478	0.5%	5,500	213	31	186
15-Oct	Trays	50.0	270	1,160,763	0.5%	5,500	212	31	186
22-Oct	Trays	50.0	396	1,155,075	0.5%	5,500	211	31	186
29-Oct	Trays	50.0	522	1,149,415	0.5%	5,500	209	30	180
5-Nov	Trays	50.0	648	1,143,783	0.5%	5,500	208	30	180
12-Nov	Trays	50.0	774	1,139,780	0.4%	5,500	208	30	180
19-Nov	Trays	50.0	900	1,135,790	0.3%	5,500	207	30	180
26-Nov	Trays	50.0	1026	1,131,815	0.3%	5,500	206	30	180
3-Dec	Trays	50.0	1152	1,127,854	0.3%	5,500	206	30	180
10-Dec	Trays	50.0	1278	1,123,906	0.3%	5,500	205	30	180
17-Dec	Trays	50.0	1404	1,119,973	0.3%	5,500	204	30	180
24-Dec	Trays	50.0	1530	1,116,053	0.3%	5,500	203	29	174
31-Dec	Trays	50.0	1656	1,112,147	0.3%	5,500	203	29	174
7-Jan	Trays	50.0	1782	1,108,254	0.4%	5,500	202	29	174

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Jan	Circular tanks	50.0	1.41	35.79	0.38	1205.6	1,107,700		919	3,258	2.3	652	456	70%	195
15-Jan	Circular tanks	50.0	1.57	39.85	0.52	873.3	1,100,101	0.7%	1,260	4,012	2.8	802	562	70%	241
22-Jan	Circular tanks	50.0	1.73	43.91	0.69	652.7	1,092,554	0.7%	1,674	4,838	3.4	968	677	70%	290
29-Jan	Circular tanks	50.0	1.89	47.97	0.91	500.6	1,085,059	0.7%	2,168	5,734	4.1	1,147	803	70%	344
5-Feb	Circular tanks	50.0	2.05	52.03	1.16	392.3	1,077,616	0.7%	2,747	6,700	4.7	1,340	938	70%	402
12-Feb	Circular tanks	50.0	2.21	56.09	1.45	313.1	1,070,223	0.7%	3,418	7,733	5.5	1,547	1,083	70%	464
19-Feb	Circular tanks	50.0	2.37	60.15	1.79	253.9	1,062,882	0.7%	4,187	8,833	6.2	1,767	1,237	70%	530
26-Feb	Circular tanks	50.0	2.53	64.21	2.17	208.7	1,055,814	0.7%	5,059	9,999	7.1	2,000	1,400	70%	600
5-Mar	Circular tanks	50.0	2.69	68.27	2.61	173.6	1,048,792	0.7%	6,041	11,228	7.9	2,246	1,572	70%	674
12-Mar	Circular tanks	50.0	2.85	72.34	3.11	146.0	1,041,818	0.7%	7,136	12,520	8.9	2,504	1,753	70%	751
19-Mar	Circular tanks	50.0	3.01	76.40	3.66	123.9	1,034,890	0.7%	8,351	13,872	9.8	2,774	1,942	70%	832
26-Mar	Circular tanks	50.0	3.17	80.46	4.28	106.1	1,028,008	0.7%	9,690	15,284	10.8	3,057	2,140	70%	917
2-Apr	Circular tanks	50.0	3.33	84.52	4.96	91.5	1,021,172	0.7%	11,158	16,753	11.8	3,351	2,345	70%	1005
9-Apr	Circular tanks	50.0	3.49	88.58	5.71	79.5	1,014,381	0.7%	12,759	18,280	12.9	3,656	2,559	70%	1097
Stocking							**1,014,381**	**9%**	**12,759**						

Sol Duc Hatchery
Bioprogramming Calculations

Sol Duc Hatchery
Subyearling Summer Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
1-Oct	Trays	47.0		1,185,556		5,500	216	31	186
8-Oct	Trays	47.0	120	1,179,746	0.5%	5,500	215	31	186
15-Oct	Trays	47.0	225	1,173,966	0.5%	5,500	214	31	186
22-Oct	Trays	47.0	330	1,168,213	0.5%	5,500	213	31	186
29-Oct	Trays	47.0	435	1,162,489	0.5%	5,500	212	31	186
5-Nov	Trays	47.0	540	1,156,793	0.5%	5,500	211	31	186
12-Nov	Trays	47.0	645	1,152,744	0.3%	5,500	210	30	180
19-Nov	Trays	47.0	750	1,148,709	0.3%	5,500	209	30	180
26-Nov	Trays	47.0	855	1,144,689	0.3%	5,500	209	30	180
3-Dec	Trays	47.0	960	1,140,682	0.3%	5,500	208	30	180
10-Dec	Trays	47.0	1065	1,136,690	0.3%	5,500	207	30	180
17-Dec	Trays	47.0	1170	1,132,712	0.3%	5,500	206	30	180
24-Dec	Trays	47.0	1275	1,128,747	0.3%	5,500	206	30	180
31-Dec	Trays	47.0	1380	1,124,797	0.3%	5,500	205	30	180
7-Jan	Trays	47.0	1485	1,120,860	0.3%	5,500	204	30	180
14-Jan	Trays	47.0	1590	1,116,937	0.3%	5,500	204	30	180
21-Jan	Trays	47.0	1695	1,113,027	0.3%	5,500	203	29	174
28-Jan	Trays	47.0	1800	1,109,132	0.4%	5,500	202	29	174

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
29-Jan	Circular tanks	47.0	1.41	35.79	0.38	1205.6	1,108,577		920	3,261	2.3	652	326	50%	326
5-Feb	Circular tanks	47.0	1.54	39.09	0.49	925.3	1,101,593	0.6%	1,190	3,865	2.7	773	387	50%	387
12-Feb	Circular tanks	47.0	1.67	42.39	0.63	725.6	1,094,653	0.6%	1,509	4,517	3.2	903	452	50%	452
19-Feb	Circular tanks	47.0	1.80	45.69	0.78	579.5	1,087,757	0.6%	1,877	5,214	3.7	1,043	521	50%	521
26-Feb	Circular tanks	47.0	1.93	48.98	0.96	470.1	1,080,904	0.6%	2,299	5,957	4.2	1,191	596	50%	596
5-Mar	Circular tanks	47.0	2.06	52.28	1.17	386.6	1,074,094	0.6%	2,778	6,744	4.8	1,349	674	50%	674
12-Mar	Circular tanks	47.0	2.19	55.58	1.41	321.8	1,067,328	0.6%	3,317	7,574	5.4	1,515	757	50%	757
19-Mar	Circular tanks	47.0	2.32	58.88	1.68	270.6	1,060,603	0.6%	3,919	8,446	6.0	1,689	845	50%	845
26-Mar	Circular tanks	47.0	2.45	62.18	1.97	229.8	1,053,922	0.6%	4,586	9,360	6.6	1,872	936	50%	936
2-Apr	Circular tanks	47.0	2.58	65.48	2.30	196.8	1,047,282	0.6%	5,322	10,314	7.3	2,063	1,031	50%	1,031
9-Apr	Circular tanks	47.0	2.71	68.78	2.67	169.8	1,040,684	0.6%	6,129	11,308	8.0	2,262	1,131	50%	1,131
16-Apr	Circular tanks	47.0	2.84	72.08	3.07	147.5	1,034,128	0.6%	7,009	12,340	8.7	2,468	1,234	50%	1,234
23-Apr	Circular tanks	47.0	2.97	75.38	3.52	129.0	1,027,613	0.6%	7,966	13,411	9.5	2,682	1,341	50%	1,341
30-Apr	Circular tanks	47.0	3.10	78.68	4.00	113.4	1,021,139	0.6%	9,001	14,519	10.3	2,904	1,452	50%	1,452
7-May	Circular tanks	47.0	3.23	81.98	4.52	100.3	1,014,706	0.6%	10,118	15,662	11.1	3,132	1,566	50%	1,566
14-May	Circular tanks	47.0	3.36	85.28	5.09	89.1	1,008,313	0.6%	11,318	16,842	11.9	3,368	1,684	50%	1,684
21-May	Circular tanks	47.0	3.49	88.58	5.71	79.5	1,001,961	0.6%	12,603	18,056	12.8	3,611	1,806	50%	1,806
Stocking							**1,001,961**	**10%**	**12,603**						

Speelyai Hatchery
Bioprogramming Calculations

Speelyai Hatchery
Subyearling Fall Chinook
500,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	53.0		592,500		5,500	108	16	96
1-Oct	Trays	50.0	147	589,597	0.5%	5,500	108	16	96
8-Oct	Trays	50.0	273	586,708	0.5%	5,500	107	16	96
15-Oct	Trays	50.0	399	583,833	0.5%	5,500	107	16	96
22-Oct	Trays	50.0	525	580,972	0.5%	5,500	106	16	96
29-Oct	Trays	50.0	651	578,125	0.5%	5,500	106	16	96
5-Nov	Trays	47.0	756	576,102	0.3%	5,500	105	15	90
12-Nov	Trays	47.0	861	574,086	0.3%	5,500	105	15	90
19-Nov	Trays	47.0	966	572,076	0.4%	5,500	105	15	90
26-Nov	Trays	47.0	1071	570,074	0.3%	5,500	104	15	90
3-Dec	Trays	47.0	1176	568,079	0.3%	5,500	104	15	90
10-Dec	Trays	47.0	1281	566,090	0.3%	5,500	103	15	90
17-Dec	Trays	47.0	1386	564,109	0.3%	5,500	103	15	90
24-Dec	Trays	47.0	1491	562,135	0.3%	5,500	103	15	90
31-Dec	Trays	47.0	1596	560,167	0.4%	5,500	102	15	90
7-Jan	Trays	47.0	1701	558,207	0.3%	5,500	102	15	90
14-Jan	Trays	47.0	1806	556,253	0.7%	5,500	102	15	90

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Jan	Raceways	47.0	1.41	35.79	0.38	1205.6	555,975		461	1,635	0.4	327	0	0%	327
22-Jan	Raceways	47.0	1.54	39.09	0.49	925.3	552,083	0.7%	597	1,937	0.5	387	0	0%	387
29-Jan	Raceways	47.0	1.67	42.39	0.63	725.6	548,605	0.6%	756	2,264	0.6	453	0	0%	453
5-Feb	Raceways	45.0	1.78	45.18	0.76	599.2	545,149	0.6%	910	2,555	0.6	511	0	0%	511
12-Feb	Raceways	45.0	1.89	47.97	0.91	500.6	541,714	0.6%	1,082	2,863	0.7	573	0	0%	573
19-Feb	Raceways	45.0	2.00	50.76	1.07	422.4	538,301	0.6%	1,274	3,186	0.8	637	0	0%	637
26-Feb	Raceways	45.0	2.11	53.55	1.26	359.8	534,910	0.6%	1,487	3,523	0.9	705	0	0%	705
5-Mar	Raceways	46.0	2.23	56.60	1.49	304.7	531,540	0.6%	1,744	3,911	1.0	782	0	0%	782
12-Mar	Raceways	46.0	2.35	59.64	1.74	260.4	528,191	0.6%	2,028	4,316	1.1	863	0	0%	863
19-Mar	Raceways	46.0	2.47	62.69	2.02	224.3	524,864	0.6%	2,340	4,738	1.2	948	0	0%	948
26-Mar	Raceways	46.0	2.59	65.74	2.33	194.5	521,557	0.6%	2,681	5,176	1.3	1,035	0	0%	1,035
2-Apr	Raceways	49.0	2.74	69.54	2.76	164.3	518,271	0.6%	3,155	5,757	1.4	1,151	0	0%	1,151
9-Apr	Raceways	49.0	2.89	73.35	3.24	140.0	515,006	0.6%	3,678	6,364	1.6	1,273	0	0%	1,273
16-Apr	Raceways	49.0	3.04	77.16	3.77	120.3	511,762	0.6%	4,254	6,997	1.7	1,399	0	0%	1,399
23-Apr	Raceways	49.0	3.19	80.96	4.36	104.1	508,538	0.6%	4,885	7,656	1.9	1,531	0	0%	1,531
30-Apr	Raceways	49.0	3.34	84.77	5.00	90.7	505,334	0.6%	5,571	8,340	2.1	1,668	0	0%	1,668
7-May	Raceways	51.0	3.51	89.09	5.80	78.2	502,150	0.6%	6,425	9,153	2.3	1,831	0	0%	1,831
Stocking							**502,150**	**10%**	**6,425**						

Voights Creek Hatchery
Bioprogramming Calculations

Voights Creek
Subyearling Fall Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
1-Oct	Trays	48.0		1,185,556		5,500	216	31	186	167	90%	19
8-Oct	Trays	48.0	128	1,179,746	0.5%	5,500	215	31	186	167	90%	19
15-Oct	Trays	48.0	240	1,173,966	0.5%	5,500	214	31	186	167	90%	19
22-Oct	Trays	48.0	352	1,168,213	0.5%	5,500	213	31	186	167	90%	19
29-Oct	Trays	48.0	464	1,162,489	0.5%	5,500	212	31	186	167	90%	19
5-Nov	Trays	48.0	576	1,156,793	0.5%	5,500	211	31	186	167	90%	19
12-Nov	Trays	48.0	688	1,152,744	0.3%	5,500	210	30	180	162	90%	18
19-Nov	Trays	48.0	800	1,148,709	0.3%	5,500	209	30	180	162	90%	18
26-Nov	Trays	48.0	912	1,144,689	0.3%	5,500	209	30	180	162	90%	18
3-Dec	Trays	48.0	1024	1,140,682	0.3%	5,500	208	30	180	162	90%	18
10-Dec	Trays	48.0	1136	1,136,690	0.3%	5,500	207	30	180	162	90%	18
17-Dec	Trays	48.0	1248	1,132,712	0.3%	5,500	206	30	180	162	90%	18
24-Dec	Trays	48.0	1360	1,128,747	0.3%	5,500	206	30	180	162	90%	18
31-Dec	Trays	48.0	1472	1,124,797	0.3%	5,500	205	30	180	162	90%	18
7-Jan	Trays	43.0	1549	1,120,860	0.3%	5,500	204	30	180	162	90%	18
14-Jan	Trays	43.0	1626	1,116,937	0.3%	5,500	204	30	180	162	90%	18
21-Jan	Trays	43.0	1703	1,113,027	0.3%	5,500	203	29	174	157	90%	17
28-Jan	Trays	43.0	1780	1,109,132	0.4%	5,500	202	29	174	157	90%	17

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	#Fish	Mortality	Weight (lbs)	Rearing Volume Req.	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
29-Jan	Circular tanks	43.0	1.41	35.79	0.38	1205.6	1,108,577		920	3,261	2.3	652	326	50%	326
5-Feb	Circular tanks	40.0	1.47	37.31	0.43	1063.9	1,101,593	0.6%	1,035	3,522	2.5	704	352	50%	352
12-Feb	Circular tanks	40.0	1.53	38.83	0.48	943.6	1,094,653	0.6%	1,160	3,791	2.7	758	379	50%	379
19-Feb	Circular tanks	40.0	1.59	40.36	0.54	840.7	1,087,757	0.6%	1,294	4,069	2.9	814	407	50%	407
26-Feb	Circular tanks	40.0	1.65	41.88	0.60	752.3	1,080,904	0.6%	1,437	4,354	3.1	871	435	50%	435
5-Mar	Circular tanks	42.0	1.73	43.91	0.69	652.7	1,074,094	0.6%	1,646	4,756	3.4	951	476	50%	476
12-Mar	Circular tanks	42.0	1.81	45.94	0.80	569.9	1,067,328	0.6%	1,873	5,173	3.7	1,035	517	50%	517
19-Mar	Circular tanks	42.0	1.89	47.97	0.91	500.6	1,060,603	0.6%	2,119	5,605	4.0	1,121	561	50%	561
26-Mar	Circular tanks	42.0	1.97	50.00	1.03	442.0	1,053,922	0.6%	2,384	6,051	4.3	1,210	605	50%	605
2-Apr	Circular tanks	48.0	2.11	53.55	1.26	359.8	1,047,282	0.6%	2,911	6,898	4.9	1,380	690	50%	690
9-Apr	Circular tanks	48.0	2.25	57.11	1.53	296.7	1,040,684	0.6%	3,508	7,795	5.5	1,559	779	50%	779
16-Apr	Circular tanks	48.0	2.39	60.66	1.83	247.5	1,034,128	0.6%	4,177	8,739	6.2	1,748	874	50%	874
23-Apr	Circular tanks	48.0	2.53	64.21	2.17	208.7	1,027,613	0.6%	4,924	9,732	6.9	1,946	973	50%	973
30-Apr	Circular tanks	48.0	2.67	67.77	2.55	177.6	1,021,139	0.6%	5,751	10,770	7.6	2,154	1,077	50%	1,077
7-May	Circular tanks	57.0	2.90	73.60	3.27	138.6	1,014,706	0.6%	7,323	12,626	8.9	2,525	1,263	50%	1,263
14-May	Circular tanks	57.0	3.13	79.44	4.12	110.2	1,008,313	0.6%	9,149	14,615	10.3	2,923	1,462	50%	1,462
21-May	Circular tanks	57.0	3.36	85.28	5.09	89.1	1,001,961	0.6%	11,246	16,736	11.8	3,347	1,674	50%	1,674
28-May	Circular tanks	57.0	3.59	91.12	6.21	73.0	995,648	0.6%	13,631	18,985	13.4	3,797	1,898	50%	1,898
Stocking							**995,648**	**11%**	**13,631**						

Wallace River Hatchery
Bioprogramming Calculations

Wallace River Hatchery
Subyearling Summer Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
24-Sep	Trays	58.0		1,185,556		5,500	216	31	186	167	90%	19
1-Oct	Trays	48.0	138	1,179,746	0.5%	5,500	215	31	186	167	90%	19
8-Oct	Trays	48.0	250	1,173,966	0.5%	5,500	214	31	186	167	90%	19
15-Oct	Trays	48.0	362	1,168,213	0.5%	5,500	213	31	186	167	90%	19
22-Oct	Trays	48.0	474	1,162,489	0.5%	5,500	212	31	186	167	90%	19
29-Oct	Trays	48.0	586	1,156,793	0.5%	5,500	211	31	186	167	90%	19
5-Nov	Trays	50.0	712	1,152,744	0.3%	5,500	210	30	180	162	90%	18
12-Nov	Trays	50.0	838	1,148,709	0.3%	5,500	209	30	180	162	90%	18
19-Nov	Trays	50.0	964	1,144,689	0.3%	5,500	209	30	180	162	90%	18
26-Nov	Trays	50.0	1090	1,140,682	0.3%	5,500	208	30	180	162	90%	18
3-Dec	Trays	50.0	1216	1,136,690	0.3%	5,500	207	30	180	162	90%	18
10-Dec	Trays	50.0	1342	1,132,712	0.3%	5,500	206	30	180	162	90%	18
17-Dec	Trays	50.0	1468	1,128,747	0.3%	5,500	206	30	180	162	90%	18
24-Dec	Trays	50.0	1594	1,124,797	0.3%	5,500	205	30	180	162	90%	18
31-Dec	Trays	50.0	1720	1,120,860	0.3%	5,500	204	30	180	162	90%	18

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
1-Jan	Circular tanks	43.0	1.41	35.79	0.38	1205.6	1,120,299		929	3,295	2.3	659	330	50%	330
8-Jan	Circular tanks	43.0	1.50	38.07	0.45	1001.3	1,113,241	0.6%	1,112	3,706	2.6	741	371	50%	371
15-Jan	Circular tanks	43.0	1.59	40.36	0.54	840.7	1,106,228	0.6%	1,316	4,138	2.9	828	414	50%	414
22-Jan	Circular tanks	43.0	1.68	42.64	0.64	712.7	1,099,259	0.6%	1,542	4,590	3.2	918	459	50%	459
29-Jan	Circular tanks	43.0	1.77	44.92	0.74	609.4	1,092,333	0.6%	1,792	5,063	3.6	1,013	506	50%	506
5-Feb	Circular tanks	38.0	1.81	45.94	0.80	569.9	1,085,452	0.6%	1,905	5,261	3.7	1,052	526	50%	526
12-Feb	Circular tanks	38.0	1.85	46.95	0.85	533.8	1,078,613	0.6%	2,021	5,462	3.9	1,092	546	50%	546
19-Feb	Circular tanks	38.0	1.89	47.97	0.91	500.6	1,071,818	0.6%	2,141	5,664	4.0	1,133	566	50%	566
26-Feb	Circular tanks	38.0	1.93	48.98	0.96	470.1	1,065,066	0.6%	2,266	5,870	4.2	1,174	587	50%	587
5-Mar	Circular tanks	45.0	2.04	51.78	1.14	398.1	1,058,356	0.6%	2,659	6,516	4.6	1,303	652	50%	652
12-Mar	Circular tanks	45.0	2.15	54.57	1.33	340.0	1,051,688	0.6%	3,093	7,192	5.1	1,438	719	50%	719
19-Mar	Circular tanks	45.0	2.26	57.36	1.55	292.8	1,045,062	0.6%	3,570	7,897	5.6	1,579	790	50%	790
26-Mar	Circular tanks	45.0	2.37	60.15	1.79	253.9	1,038,479	0.6%	4,091	8,630	6.1	1,726	863	50%	863
2-Apr	Circular tanks	47.0	2.50	63.45	2.10	216.3	1,031,936	0.6%	4,771	9,542	6.7	1,908	954	50%	954
9-Apr	Circular tanks	47.0	2.63	66.75	2.44	185.8	1,025,435	0.6%	5,520	10,494	7.4	2,099	1,049	50%	1,049
16-Apr	Circular tanks	47.0	2.76	70.05	2.82	160.7	1,018,975	0.6%	6,339	11,484	8.1	2,297	1,148	50%	1,148
23-Apr	Circular tanks	47.0	2.89	73.35	3.24	140.0	1,012,555	0.6%	7,232	12,512	8.8	2,502	1,251	50%	1,251
30-Apr	Circular tanks	47.0	3.02	76.65	3.70	122.7	1,006,176	0.6%	8,200	13,577	9.6	2,715	1,358	50%	1,358
7-May	Circular tanks	52.0	3.20	81.22	4.40	103.1	999,837	0.6%	9,694	15,148	10.7	3,030	1,515	50%	1,515
14-May	Circular tanks	52.0	3.38	85.79	5.18	87.5	993,538	0.6%	11,352	16,793	11.9	3,359	1,679	50%	1,679
Stocking							**993,538**	**12%**	**11,352**						

Whitehorse Hatchery
Bioprogramming Calculations

Whitehorse Hatchery
Subyearling Summer Chinook
1,000,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	GPM
24-Sep	Trays	47.0		1,200,000		5,500	219	32	192
1-Oct	Trays	47.0	120	1,194,120	0.5%	5,500	218	32	192
8-Oct	Trays	47.0	225	1,188,269	0.5%	5,500	217	31	186
15-Oct	Trays	47.0	330	1,182,446	0.5%	5,500	215	31	186
22-Oct	Trays	47.0	435	1,176,652	0.5%	5,500	214	31	186
29-Oct	Trays	47.0	540	1,170,887	0.5%	5,500	213	31	186
5-Nov	Trays	45.0	631	1,166,789	0.4%	5,500	213	31	186
12-Nov	Trays	45.0	722	1,162,705	0.3%	5,500	212	31	186
19-Nov	Trays	45.0	813	1,158,635	0.3%	5,500	211	31	186
26-Nov	Trays	45.0	904	1,154,580	0.4%	5,500	210	30	180
3-Dec	Trays	45.0	995	1,150,539	0.3%	5,500	210	30	180
10-Dec	Trays	45.0	1086	1,146,512	0.4%	5,500	209	30	180
17-Dec	Trays	45.0	1177	1,142,499	0.3%	5,500	208	30	180
24-Dec	Trays	45.0	1268	1,138,501	0.3%	5,500	208	30	180
31-Dec	Trays	45.0	1359	1,134,516	0.3%	5,500	207	30	180
7-Jan	Trays	45.0	1450	1,130,545	0.3%	5,500	206	30	180
14-Jan	Trays	45.0	1541	1,126,588	0.4%	5,500	205	30	180
21-Jan	Trays	45.0	1632	1,122,645	0.3%	5,500	205	30	180
28-Jan	Trays	45.0	1723	1,118,716	0.3%	5,500	204	30	180
4-Feb	Trays	45.0	1814	1,114,800	0.3%	5,500	203	29	174

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
5-Feb	Circular tanks	45.0	1.41	35.79	0.38	1205.6	1,114,243		924	3,277	2.3	655	328	50%	328
12-Feb	Circular tanks	45.0	1.52	38.58	0.47	962.3	1,107,223	0.6%	1,151	3,785	2.7	757	378	50%	378
19-Feb	Circular tanks	45.0	1.63	41.37	0.58	780.4	1,100,248	0.6%	1,410	4,325	3.1	865	432	50%	432
26-Feb	Circular tanks	45.0	1.74	44.16	0.71	641.5	1,093,316	0.6%	1,704	4,897	3.5	979	490	50%	490
5-Mar	Circular tanks	45.0	1.85	46.95	0.85	533.8	1,086,428	0.6%	2,035	5,501	3.9	1,100	550	50%	550
12-Mar	Circular tanks	45.0	1.96	49.75	1.01	448.8	1,079,584	0.6%	2,405	6,136	4.3	1,227	614	50%	614
19-Mar	Circular tanks	45.0	2.07	52.54	1.19	381.0	1,072,782	0.6%	2,816	6,801	4.8	1,360	680	50%	680
26-Mar	Circular tanks	45.0	2.18	55.33	1.39	326.2	1,066,024	0.6%	3,268	7,495	5.3	1,499	750	50%	750
2-Apr	Circular tanks	45.0	2.29	58.12	1.61	281.4	1,059,308	0.6%	3,764	8,219	5.8	1,644	822	50%	822
9-Apr	Circular tanks	45.0	2.40	60.91	1.86	244.5	1,052,634	0.6%	4,306	8,970	6.3	1,794	897	50%	897
16-Apr	Circular tanks	45.0	2.51	63.71	2.12	213.7	1,046,003	0.6%	4,894	9,750	6.9	1,950	975	50%	975
23-Apr	Circular tanks	45.0	2.62	66.50	2.41	187.9	1,039,413	0.6%	5,531	10,556	7.5	2,111	1,056	50%	1,056
30-Apr	Circular tanks	45.0	2.73	69.29	2.73	166.1	1,032,865	0.6%	6,218	11,389	8.1	2,278	1,139	50%	1,139
7-May	Circular tanks	47.0	2.86	72.59	3.14	144.5	1,026,358	0.6%	7,105	12,421	8.8	2,484	1,242	50%	1,242
14-May	Circular tanks	47.0	2.99	75.89	3.59	126.4	1,019,892	0.6%	8,067	13,490	9.5	2,698	1,349	50%	1,349
21-May	Circular tanks	47.0	3.12	79.19	4.08	111.3	1,013,466	0.6%	9,108	14,596	10.3	2,919	1,460	50%	1,460
28-May	Circular tanks	47.0	3.25	82.49	4.61	98.4	1,007,081	0.6%	10,230	15,738	11.1	3,148	1,574	50%	1,574
							1,007,081	**10%**	**10,230**						

Appendix E. C-100 Cost Forms

Beaver Creek Hatchery

Bogachiel Hatchery

Coulter Creek Hatchery

Dungeness Hatchery

Elwha Hatchery

Humptulips Hatchery

Hupp Springs Hatchery

Kendall Creek Hatchery

Lyon's Ferry Hatchery

Marblemount Hatchery

McKernan Hatchery

Naselle Hatchery

Nemah Hatchery

Palmer Ponds Hatchery

Puyallup Hatchery

Samish Hatchery

Sol Duc Hatchery

Voights Creek Hatchery

Wallace River Hatchery

Whitehorse Hatchery

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Beaver Creek Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Beaver Creek Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.90%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-23	Predesign End	December-24
Design Start	January-25	Design End	December-26
Construction Start	January-29	Construction End	December-30
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$8,724,815**	Total Project Escalated	**$10,696,114**
		Rounded Escalated Total	**$10,696,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Beaver Creek Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$92,000		
A/E Basic Design Services	$565,605		
Extra Services	$205,000		
Other Services	$254,112		
Design Services Contingency	$44,669		
Consultant Services Subtotal	**$1,161,386**	**Consultant Services Subtotal Escalated**	**$1,338,638**

Construction			
Construction Contingencies	$244,400	Construction Contingencies Escalated	$302,372
Maximum Allowable Construction Cost (MACC)	$6,110,000	Maximum Allowable Construction Cost (MACC) Escalated	$7,559,292
Sales Tax	$540,124	Sales Tax Escalated	$668,242
Construction Subtotal	**$6,894,524**	**Construction Subtotal Escalated**	**$8,529,906**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$668,905		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$668,905**	**Project Administation Subtotal Escalated**	**$827,570**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$8,724,815**	Total Project Escalated	**$10,696,114**
		Rounded Escalated Total	**$10,696,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$92,000			
Other				
Insert Row Here				
Sub TOTAL	**$92,000**	**1.1009**	**$101,283**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$565,605			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$565,605**	**1.1260**	**$636,872**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.1260**	**$230,830**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$254,112			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$254,112**	**1.2372**	**$314,388**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$44,669			
Other				
Insert Row Here				
Sub TOTAL	**$44,669**	**1.2372**	**$55,265**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,161,386**		**$1,338,638**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2096**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2096**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Hatchery Building	$458,000			
Raceways	$2,835,000			
Water Supply	$1,554,000			
Effluent Management	$1,263,000			
Insert Row Here				
Sub TOTAL	**$6,110,000**	**1.2372**	**$7,559,292**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$6,110,000**		**$7,559,292**	

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7) Construction Contingency				
Allowance for Change Orders	$244,400			
Other				
Insert Row Here				
Sub TOTAL	**$244,400**	**1.2372**	**$302,372**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2372**	**$0**	
Sales Tax				
Sub TOTAL	**$540,124**		**$668,242**	
CONSTRUCTION CONTRACTS TOTAL	**$6,894,524**		**$8,529,906**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$668,905				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$668,905**		**1.2372**	**$827,570**	

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Bogachiel Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Bogachiel Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.56%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$11,445,368**	Total Project Escalated	**$16,105,439**
		Rounded Escalated Total	**$16,105,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Bogachiel Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$122,000		
A/E Basic Design Services	$731,409		
Extra Services	$205,000		
Other Services	$328,604		
Design Services Contingency	$55,481		
Consultant Services Subtotal	**$1,442,494**	**Consultant Services Subtotal Escalated**	**$1,853,343**

Construction			
Construction Contingencies	$324,600	Construction Contingencies Escalated	$462,491
Maximum Allowable Construction Cost (MACC)	$8,115,000	Maximum Allowable Construction Cost (MACC) Escalated	$11,562,252
Sales Tax	$717,366	Sales Tax Escalated	$1,022,104
Construction Subtotal	**$9,156,966**	**Construction Subtotal Escalated**	**$13,046,847**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$845,907		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$845,907**	**Project Administation Subtotal Escalated**	**$1,205,249**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$11,445,368**	Total Project Escalated	**$16,105,439**
		Rounded Escalated Total	**$16,105,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$122,000			
Other				
Insert Row Here				
Sub TOTAL	**$122,000**	**1.2096**	**$147,572**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$731,409			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$731,409**	**1.2372**	**$904,900**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$328,604			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$328,604**	**1.4248**	**$468,196**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$55,481			
Other				
Insert Row Here				
Sub TOTAL	**$55,481**	**1.4248**	**$79,049**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,442,494**		**$1,853,343**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways				
Circular Tanks	$4,232,000			
Water Supply	$1,304,000			
PRAS	$1,816,000			
Effluent Management	$305,000			
Insert Row Here				
Sub TOTAL	**$8,115,000**	**1.4248**	**$11,562,252**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$8,115,000**		**$11,562,252**	

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7) Construction Contingency				
Allowance for Change Orders	$324,600			
Other				
Insert Row Here				
Sub TOTAL	**$324,600**	**1.4248**	**$462,491**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$717,366**		**$1,022,104**	
CONSTRUCTION CONTRACTS TOTAL	**$9,156,966**		**$13,046,847**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$845,907				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$845,907**		**1.4248**	**$1,205,249**	

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Coulter Creek Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Coulter Creek Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	14.13%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-21	Predesign End	December-22
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

Green cells must be filled in by user

Project Cost Estimate

Total Project	**$2,932,368**	Total Project Escalated	**$4,102,985**
		Rounded Escalated Total	**$4,103,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Coulter Creek Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$0		
A/E Basic Design Services	$195,088		
Extra Services	$205,000		
Other Services	$87,648		
Design Services Contingency	$19,509		
Consultant Services Subtotal	**$507,245**	**Consultant Services Subtotal Escalated**	**$647,668**

Construction			
Construction Contingencies	$76,960	Construction Contingencies Escalated	$109,653
Maximum Allowable Construction Cost (MACC)	$1,924,000	Maximum Allowable Construction Cost (MACC) Escalated	$2,741,316
Sales Tax	$170,082	Sales Tax Escalated	$242,333
Construction Subtotal	**$2,171,042**	**Construction Subtotal Escalated**	**$3,093,302**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$254,081		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$254,081**	**Project Administation Subtotal Escalated**	**$362,015**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$2,932,368**	Total Project Escalated	**$4,102,985**
		Rounded Escalated Total	**$4,103,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2096**	**$0**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$195,088			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$195,088**	**1.2372**	**$241,363**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$87,648			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$87,648**	**1.4248**	**$124,881**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$19,509			
Other				
Insert Row Here				
Sub TOTAL	**$19,509**	**1.4248**	**$27,798**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$507,245**		**$647,668**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$0			
Raceways	$711,000			
Circular Tanks	$0			
Water Supply	$908,000			
PRAS	$0			
Effluent Management	$305,000			
Sub TOTAL	**$1,924,000**	**1.4248**	**$2,741,316**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$1,924,000**		**$2,741,316**	

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7) Construction Contingency				
Allowance for Change Orders	$76,960			
Other				
Insert Row Here				
Sub TOTAL	**$76,960**	**1.4248**	**$109,653**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$170,082**		**$242,333**	
CONSTRUCTION CONTRACTS TOTAL	**$2,171,042**		**$3,093,302**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$254,081				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$254,081**		**1.4248**	**$362,015**	

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Dungeness Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Dungeness Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	11.99%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$17,742,898**	Total Project Escalated	**$24,993,735**
		Rounded Escalated Total	**$24,994,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Dungeness Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$192,000		
A/E Basic Design Services	$1,101,143		
Extra Services	$205,000		
Other Services	$494,716		
Design Services Contingency	$79,714		
Consultant Services Subtotal	**$2,072,574**	**Consultant Services Subtotal Escalated**	**$2,666,655**

Construction			
Construction Contingencies	$511,920	Construction Contingencies Escalated	$729,384
Maximum Allowable Construction Cost (MACC)	$12,798,000	Maximum Allowable Construction Cost (MACC) Escalated	$18,234,591
Sales Tax	$1,131,343	Sales Tax Escalated	$1,611,938
Construction Subtotal	**$14,441,263**	**Construction Subtotal Escalated**	**$20,575,913**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$1,229,061		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$1,229,061**	**Project Administation Subtotal Escalated**	**$1,751,167**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$17,742,898**	Total Project Escalated	**$24,993,735**
		Rounded Escalated Total	**$24,994,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$192,000			
Other				
Insert Row Here				
Sub TOTAL	**$192,000**	**1.2096**	**$232,244**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$1,101,143			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$1,101,143**	**1.2372**	**$1,362,335**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$494,716			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$494,716**	**1.4248**	**$704,872**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$79,714			
Other				
Insert Row Here				
Sub TOTAL	**$79,714**	**1.4248**	**$113,578**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$2,072,574**		**$2,666,655**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$317,000			
Raceways	$7,087,000			
Circular Tanks	$0			
Water Supply	$3,274,000			
PRAS	$1,815,000			
Effluent Management	$305,000			
Sub TOTAL	**$12,798,000**	**1.4248**	**$18,234,591**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$12,798,000**		**$18,234,591**	

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7) Construction Contingency				
Allowance for Change Orders	$511,920			
Other				
Insert Row Here				
Sub TOTAL	**$511,920**	**1.4248**	**$729,384**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$1,131,343**		**$1,611,938**	
CONSTRUCTION CONTRACTS TOTAL	**$14,441,263**		**$20,575,913**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$1,229,061				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$1,229,061**		**1.4248**	**$1,751,167**	

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Elwha Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Elwha Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.90%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-25	Predesign End	December-26
Design Start	January-29	Design End	December-30
Construction Start	January-31	Construction End	December-32
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$8,669,899**	Total Project Escalated	**$11,189,400**
		Rounded Escalated Total	**$11,189,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Elwha Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$92,000		
A/E Basic Design Services	$561,902		
Extra Services	$205,000		
Other Services	$252,449		
Design Services Contingency	$44,454		
Consultant Services Subtotal	**$1,155,805**	**Consultant Services Subtotal Escalated**	**$1,445,121**

Construction			
Construction Contingencies	$242,800	Construction Contingencies Escalated	$314,864
Maximum Allowable Construction Cost (MACC)	$6,070,000	Maximum Allowable Construction Cost (MACC) Escalated	$7,871,576
Sales Tax	$536,588	Sales Tax Escalated	$695,848
Construction Subtotal	**$6,849,388**	**Construction Subtotal Escalated**	**$8,882,288**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$664,706		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$664,706**	**Project Administation Subtotal Escalated**	**$861,991**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$8,669,899**	Total Project Escalated	**$11,189,400**
		Rounded Escalated Total	**$11,189,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$92,000			
Other				
Insert Row Here				
Sub TOTAL	**$92,000**	**1.2096**	**$111,284**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$561,902			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$561,902**	**1.2372**	**$695,186**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$252,449			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$252,449**	**1.2968**	**$327,376**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$44,454			
Other				
Insert Row Here				
Sub TOTAL	**$44,454**	**1.2968**	**$57,649**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,155,805**		**$1,445,121**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways	$3,543,000			
Circular Tanks	$0			
Water Supply	$1,764,000			
PRAS	$0			
Effluent Management	$305,000			
Sub TOTAL	**$6,070,000**	**1.2968**	**$7,871,576**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$6,070,000**		**$7,871,576**	

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7) Construction Contingency				
Allowance for Change Orders	$242,800			
Other				
Insert Row Here				
Sub TOTAL	**$242,800**	**1.2968**	**$314,864**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2968**	**$0**	
Sales Tax				
Sub TOTAL	**$536,588**		**$695,848**	
CONSTRUCTION CONTRACTS TOTAL	**$6,849,388**		**$8,882,288**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$664,706				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$664,706**		**1.2968**	**$861,991**	

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Humptulips Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Humptulips Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.65%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$10,674,605**	Total Project Escalated	**$15,017,701**
		Rounded Escalated Total	**$15,018,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Humptulips Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$114,000		
A/E Basic Design Services	$684,908		
Extra Services	$205,000		
Other Services	$307,712		
Design Services Contingency	$52,465		
Consultant Services Subtotal	**$1,364,085**	**Consultant Services Subtotal Escalated**	**$1,752,071**

Construction			
Construction Contingencies	$301,800	Construction Contingencies Escalated	$430,005
Maximum Allowable Construction Cost (MACC)	$7,545,000	Maximum Allowable Construction Cost (MACC) Escalated	$10,750,116
Sales Tax	$666,978	Sales Tax Escalated	$950,311
Construction Subtotal	**$8,513,778**	**Construction Subtotal Escalated**	**$12,130,432**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$796,742		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$796,742**	**Project Administation Subtotal Escalated**	**$1,135,198**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$10,674,605**	Total Project Escalated	**$15,017,701**
		Rounded Escalated Total	**$15,018,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$114,000			
Other				
Insert Row Here				
Sub TOTAL	**$114,000**	**1.2096**	**$137,895**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$684,908			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$684,908**	**1.2372**	**$847,369**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$307,712			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$307,712**	**1.4248**	**$438,429**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$52,465			
Other				
Insert Row Here				
Sub TOTAL	**$52,465**	**1.4248**	**$74,752**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,364,085**		**$1,752,071**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways	$3,543,000			
Circular Tanks	$0			
Water Supply	$2,282,000			
PRAS	$0			
Effluent Management	$1,262,000			
Sub TOTAL	**$7,545,000**	**1.4248**	**$10,750,116**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$7,545,000**		**$10,750,116**	

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7) Construction Contingency				
Allowance for Change Orders	$301,800			
Other				
Insert Row Here				
Sub TOTAL	**$301,800**	**1.4248**	**$430,005**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$666,978**		**$950,311**	
CONSTRUCTION CONTRACTS TOTAL	**$8,513,778**		**$12,130,432**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$796,742				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$796,742**		**1.4248**	**$1,135,198**	

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Hupp Springs Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife	
Project Name	SRKW - Hupp Hatchery Expansion	
OFM Project Number		

Contact Information		
Name	Kristen Kuykendall	
Phone Number	360-269-6433	
Email	kristen.kuykendall@dfw.wa.gov	

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.20%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$6,774,543**	Total Project Escalated	**$9,515,435**
		Rounded Escalated Total	**$9,515,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Hupp Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$71,000		
A/E Basic Design Services	$443,494		
Extra Services	$205,000		
Other Services	$199,251		
Design Services Contingency	$36,750		
Consultant Services Subtotal	**$955,495**	**Consultant Services Subtotal Escalated**	**$1,224,454**

Construction			
Construction Contingencies	$187,280	Construction Contingencies Escalated	$266,837
Maximum Allowable Construction Cost (MACC)	$4,682,000	Maximum Allowable Construction Cost (MACC) Escalated	$6,670,914
Sales Tax	$413,889	Sales Tax Escalated	$589,709
Construction Subtotal	**$5,283,169**	**Construction Subtotal Escalated**	**$7,527,460**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$535,879		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$535,879**	**Project Administation Subtotal Escalated**	**$763,521**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$6,774,543**	Total Project Escalated	**$9,515,435**
		Rounded Escalated Total	**$9,515,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$71,000			
Other				
Insert Row Here				
Sub TOTAL	**$71,000**	**1.2096**	**$85,882**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$443,494			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$443,494**	**1.2372**	**$548,691**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$199,251			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$199,251**	**1.4248**	**$283,893**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$36,750			
Other				
Insert Row Here				
Sub TOTAL	**$36,750**	**1.4248**	**$52,362**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$955,495**		**$1,224,454**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$275,000			
Raceways	$0			
Circular Tanks	$1,365,000			
Water Supply	$1,011,000			
PRAS	$1,190,000			
Effluent Management	$319,000			
1800 sq ft Residence	$522,000			
Sub TOTAL	**$4,682,000**	**1.4248**	**$6,670,914**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$4,682,000**		**$6,670,914**	

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7) Construction Contingency				
Allowance for Change Orders	$187,280			
Other				
Insert Row Here				
Sub TOTAL	**$187,280**	**1.4248**	**$266,837**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$413,889**		**$589,709**	
CONSTRUCTION CONTRACTS TOTAL	**$5,283,169**		**$7,527,460**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$535,879				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$535,879**		**1.4248**	**$763,521**	

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Kendall Creek Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Kendall Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.92%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-21	Predesign End	December-22
Design Start	January-21	Design End	December-22
Construction Start	January-21	Construction End	December-22
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$3,567,740**	Total Project Escalated	**$3,656,223**
		Rounded Escalated Total	**$3,656,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Kendall Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$0		
A/E Basic Design Services	$238,337		
Extra Services	$205,000		
Other Services	$107,079		
Design Services Contingency	$22,017		
Consultant Services Subtotal	**$572,433**	**Consultant Services Subtotal Escalated**	**$586,631**

Construction			
Construction Contingencies	$95,440	Construction Contingencies Escalated	$97,807
Maximum Allowable Construction Cost (MACC)	$2,386,000	Maximum Allowable Construction Cost (MACC) Escalated	$2,445,173
Sales Tax	$210,922	Sales Tax Escalated	$216,154
Construction Subtotal	**$2,692,362**	**Construction Subtotal Escalated**	**$2,759,134**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$302,944		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$302,944**	**Project Administation Subtotal Escalated**	**$310,458**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$3,567,740**	Total Project Escalated	**$3,656,223**
		Rounded Escalated Total	**$3,656,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0020**	**$0**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$238,337			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$238,337**	**1.0248**	**$244,249**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.0248**	**$210,084**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$107,079			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$107,079**	**1.0248**	**$109,735**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$22,017			
Other				
Insert Row Here				
Sub TOTAL	**$22,017**	**1.0248**	**$22,563**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$572,433**		**$586,631**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0020**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0020**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$110,000			
Raceways	$1,064,000			
Circular Tanks	$0			
Water Supply	$907,000			
PRAS	$0			
Effluent Management	$305,000			
Sub TOTAL	**$2,386,000**	**1.0248**	**$2,445,173**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$2,386,000**		**$2,445,173**	

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7) Construction Contingency				
Allowance for Change Orders	$95,440			
Other				
Insert Row Here				
Sub TOTAL	**$95,440**	**1.0248**	**$97,807**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0248**	**$0**	
Sales Tax				
Sub TOTAL	**$210,922**		**$216,154**	
CONSTRUCTION CONTRACTS TOTAL	**$2,692,362**		**$2,759,134**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$302,944				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$302,944**		**1.0248**	**$310,458**	

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Lyon's Ferry Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Lyon's Ferry Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.06%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$16,786,041**	Total Project Escalated	**$23,642,345**
		Rounded Escalated Total	**$23,642,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Lyon's Ferry Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$185,000		
A/E Basic Design Services	$1,045,521		
Extra Services	$205,000		
Other Services	$469,727		
Design Services Contingency	$76,210		
Consultant Services Subtotal	**$1,981,457**	**Consultant Services Subtotal Escalated**	**$2,548,772**

Construction			
Construction Contingencies	$483,240	Construction Contingencies Escalated	$688,521
Maximum Allowable Construction Cost (MACC)	$12,081,000	Maximum Allowable Construction Cost (MACC) Escalated	$17,213,009
Sales Tax	$1,067,960	Sales Tax Escalated	$1,521,631
Construction Subtotal	**$13,632,200**	**Construction Subtotal Escalated**	**$19,423,161**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$1,172,383		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$1,172,383**	**Project Administation Subtotal Escalated**	**$1,670,412**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$16,786,041**	Total Project Escalated	**$23,642,345**
		Rounded Escalated Total	**$23,642,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$185,000			
Other				
Insert Row Here				
Sub TOTAL	**$185,000**	**1.2096**	**$223,776**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$1,045,521			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$1,045,521**	**1.2372**	**$1,293,519**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$469,727			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$469,727**	**1.4248**	**$669,267**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$76,210			
Other				
Insert Row Here				
Sub TOTAL	**$76,210**	**1.4248**	**$108,584**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,981,457**		**$2,548,772**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways	$8,858,000			
Circular Tanks	$0			
Water Supply	$2,460,000			
Re-Use System	$0			
Effluent Management	$305,000			
Sub TOTAL	**$12,081,000**	**1.4248**	**$17,213,009**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$12,081,000**		**$17,213,009**	

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7) Construction Contingency				
Allowance for Change Orders	$483,240			
Other				
Insert Row Here				
Sub TOTAL	**$483,240**	**1.4248**	**$688,521**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$1,067,960**		**$1,521,631**	
CONSTRUCTION CONTRACTS TOTAL	**$13,632,200**		**$19,423,161**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$1,172,383				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$1,172,383**		**1.4248**	**$1,670,412**	

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Marblemount Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Marblemount Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.90%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-25	Predesign End	December-26
Design Start	January-29	Design End	December-30
Construction Start	January-31	Construction End	December-34
Construction Duration	47 Months		

Green cells must be filled in by user

Project Cost Estimate

Total Project	**$8,679,509**	Total Project Escalated	**$11,443,460**
		Rounded Escalated Total	**$11,443,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Marblemount Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$92,000		
A/E Basic Design Services	$562,550		
Extra Services	$205,000		
Other Services	$252,740		
Design Services Contingency	$44,492		
Consultant Services Subtotal	**$1,156,782**	**Consultant Services Subtotal Escalated**	**$1,455,533**

Construction			
Construction Contingencies	$243,080	Construction Contingencies Escalated	$322,738
Maximum Allowable Construction Cost (MACC)	$6,077,000	Maximum Allowable Construction Cost (MACC) Escalated	$8,068,433
Sales Tax	$537,207	Sales Tax Escalated	$713,250
Construction Subtotal	**$6,857,287**	**Construction Subtotal Escalated**	**$9,104,421**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$665,441		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$665,441**	**Project Administation Subtotal Escalated**	**$883,506**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$8,679,509**	Total Project Escalated	**$11,443,460**
		Rounded Escalated Total	**$11,443,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$92,000			
Other				
Insert Row Here				
Sub TOTAL	**$92,000**	**1.2096**	**$111,284**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$562,550			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$562,550**	**1.2372**	**$695,988**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$252,740			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$252,740**	**1.3277**	**$335,563**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$44,492			
Other				
Insert Row Here				
Sub TOTAL	**$44,492**	**1.3277**	**$59,072**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,156,782**		**$1,455,533**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways	$3,544,000			
Circular Tanks	$0			
Water Supply	$1,770,000			
PRAS	$0			
Effluent Management	$305,000			
Sub TOTAL	**$6,077,000**	**1.3277**	**$8,068,433**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$6,077,000**		**$8,068,433**	

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7) Construction Contingency				
Allowance for Change Orders	$243,080			
Other				
Insert Row Here				
Sub TOTAL	**$243,080**	**1.3277**	**$322,738**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3277**	**$0**	
Sales Tax				
Sub TOTAL	**$537,207**		**$713,250**	
CONSTRUCTION CONTRACTS TOTAL	**$6,857,287**		**$9,104,421**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$665,441				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$665,441**		**1.3277**	**$883,506**	

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McKernan Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - McKernan Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.86%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-21	Predesign End	December-22
Design Start	January-29	Design End	December-30
Construction Start	January-31	Construction End	December-32
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$3,770,760**	Total Project Escalated	**$4,862,686**
		Rounded Escalated Total	**$4,863,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - McKernan Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$0		
A/E Basic Design Services	$252,030		
Extra Services	$205,000		
Other Services	$113,231		
Design Services Contingency	$22,810		
Consultant Services Subtotal	**$593,071**	**Consultant Services Subtotal Escalated**	**$741,857**

Construction			
Construction Contingencies	$101,360	Construction Contingencies Escalated	$131,444
Maximum Allowable Construction Cost (MACC)	$2,534,000	Maximum Allowable Construction Cost (MACC) Escalated	$3,286,092
Sales Tax	$224,006	Sales Tax Escalated	$290,491
Construction Subtotal	**$2,859,366**	**Construction Subtotal Escalated**	**$3,708,027**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$318,323		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$318,323**	**Project Administation Subtotal Escalated**	**$412,802**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate			
Total Project	**$3,770,760**	Total Project Escalated	**$4,862,686**
		Rounded Escalated Total	**$4,863,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2096**	**$0**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$252,030			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$252,030**	**1.2372**	**$311,812**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$113,231			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$113,231**	**1.2968**	**$146,838**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$22,810			
Other				
Insert Row Here				
Sub TOTAL	**$22,810**	**1.2968**	**$29,581**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$593,071**		**$741,857**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2679**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Hatchery Building	$215,000			
Raceways	$1,064,000			
Water Supply	$950,000			
Effluent Management	$305,000			
Insert Row Here				
Sub TOTAL	**$2,534,000**	**1.2968**	**$3,286,092**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$2,534,000**		**$3,286,092**	

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7) Construction Contingency				
Allowance for Change Orders	$101,360			
Other				
Insert Row Here				
Sub TOTAL	**$101,360**	**1.2968**	**$131,444**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.2968**	**$0**	
Sales Tax				
Sub TOTAL	**$224,006**		**$290,491**	
CONSTRUCTION CONTRACTS TOTAL	**$2,859,366**		**$3,708,027**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$318,323				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$318,323**		**1.2968**	**$412,802**	

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Naselle Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Naselle Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	12.71%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-23	Predesign End	December-25
Design Start	January-25	Design End	December-26
Construction Start	January-27	Construction End	December-28
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$10,173,720**	Total Project Escalated	**$11,952,800**
		Rounded Escalated Total	**$11,953,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Naselle Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$108,000		
A/E Basic Design Services	$654,501		
Extra Services	$205,000		
Other Services	$294,051		
Design Services Contingency	$50,462		
Consultant Services Subtotal	**$1,312,014**	**Consultant Services Subtotal Escalated**	**$1,493,327**

Construction			
Construction Contingencies	$287,040	Construction Contingencies Escalated	$338,794
Maximum Allowable Construction Cost (MACC)	$7,176,000	Maximum Allowable Construction Cost (MACC) Escalated	$8,469,833
Sales Tax	$634,358	Sales Tax Escalated	$748,734
Construction Subtotal	**$8,097,398**	**Construction Subtotal Escalated**	**$9,557,361**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$764,307		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$764,307**	**Project Administation Subtotal Escalated**	**$902,112**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$10,173,720**	Total Project Escalated	**$11,952,800**
		Rounded Escalated Total	**$11,953,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$108,000			
Other				
Insert Row Here				
Sub TOTAL	**$108,000**	**1.1009**	**$118,898**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$654,501			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$654,501**	**1.1260**	**$736,969**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.1260**	**$230,830**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$294,051			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$294,051**	**1.1803**	**$347,069**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$50,462			
Other				
Insert Row Here				
Sub TOTAL	**$50,462**	**1.1803**	**$59,561**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,312,014**		**$1,493,327**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$458,000			
Raceways	$0			
Circular Tanks	$3,412,000			
Water Supply	$1,186,000			
PRAS	$1,815,000			
Effluent Management	$305,000			
Sub TOTAL	**$7,176,000**	**1.1803**	**$8,469,833**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$7,176,000**		**$8,469,833**	

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7) Construction Contingency				
Allowance for Change Orders	$287,040			
Other				
Insert Row Here				
Sub TOTAL	**$287,040**	**1.1803**	**$338,794**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1803**	**$0**	
Sales Tax				
Sub TOTAL	**$634,358**		**$748,734**	
CONSTRUCTION CONTRACTS TOTAL	**$8,097,398**		**$9,557,361**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$764,307				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$764,307**		**1.1803**	**$902,112**	

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Nemah Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Nemah Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.21%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-25	Predesign End	December-26
Design Start	January-29	Design End	December-30
Construction Start	January-33	Construction End	December-34
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$6,727,615**	Total Project Escalated	**$9,055,543**
		Rounded Escalated Total	**$9,056,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Nemah Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$70,000		
A/E Basic Design Services	$440,607		
Extra Services	$205,000		
Other Services	$197,954		
Design Services Contingency	$36,542		
Consultant Services Subtotal	**$950,103**	**Consultant Services Subtotal Escalated**	**$1,202,169**

Construction			
Construction Contingencies	$185,920	Construction Contingencies Escalated	$252,722
Maximum Allowable Construction Cost (MACC)	$4,648,000	Maximum Allowable Construction Cost (MACC) Escalated	$6,318,027
Sales Tax	$410,883	Sales Tax Escalated	$558,514
Construction Subtotal	**$5,244,803**	**Construction Subtotal Escalated**	**$7,129,263**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$532,709		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$532,709**	**Project Administation Subtotal Escalated**	**$724,111**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$6,727,615**	Total Project Escalated	**$9,055,543**
		Rounded Escalated Total	**$9,056,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$70,000			
Other				
Insert Row Here				
Sub TOTAL	**$70,000**	**1.2096**	**$84,672**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$440,607			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$440,607**	**1.2372**	**$545,119**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$197,954			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$197,954**	**1.3593**	**$269,079**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$36,542			
Other				
Insert Row Here				
Sub TOTAL	**$36,542**	**1.3593**	**$49,673**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$950,103**		**$1,202,169**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3290**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3290**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$300,000			
Raceways	$0			
Circular Tanks	$1,910,000			
Water Supply	$942,000			
PRAS	$1,191,000			
Effluent Management	$305,000			
Sub TOTAL	**$4,648,000**	**1.3593**	**$6,318,027**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$4,648,000**		**$6,318,027**	

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7) Construction Contingency				
Allowance for Change Orders	$185,920			
Other				
Insert Row Here				
Sub TOTAL	**$185,920**	**1.3593**	**$252,722**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3593**	**$0**	
Sales Tax				
Sub TOTAL	**$410,883**		**$558,514**	
CONSTRUCTION CONTRACTS TOTAL	**$5,244,803**		**$7,129,263**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$532,709				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$532,709**		**1.3593**	**$724,111**	

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Palmer Ponds Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Palmer Ponds Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.79%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-23	Predesign End	December-24
Design Start	January-25	Design End	December-26
Construction Start	January-27	Construction End	December-28
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$4,086,427**	Total Project Escalated	**$4,794,156**
		Rounded Escalated Total	**$4,794,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Palmer Ponds Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$41,000		
A/E Basic Design Services	$270,153		
Extra Services	$205,000		
Other Services	$121,373		
Design Services Contingency	$25,501		
Consultant Services Subtotal	**$663,027**	**Consultant Services Subtotal Escalated**	**$753,515**

Construction			
Construction Contingencies	$109,200	Construction Contingencies Escalated	$128,889
Maximum Allowable Construction Cost (MACC)	$2,730,000	Maximum Allowable Construction Cost (MACC) Escalated	$3,222,219
Sales Tax	$241,332	Sales Tax Escalated	$284,845
Construction Subtotal	**$3,080,532**	**Construction Subtotal Escalated**	**$3,635,953**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$342,868		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$342,868**	**Project Administation Subtotal Escalated**	**$404,688**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$4,086,427**	Total Project Escalated	**$4,794,156**
		Rounded Escalated Total	**$4,794,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$41,000			
Other				
Insert Row Here				
Sub TOTAL	**$41,000**	**1.1009**	**$45,137**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$270,153			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$270,153**	**1.1260**	**$304,192**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.1260**	**$230,830**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$121,373			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$121,373**	**1.1803**	**$143,257**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$25,501			
Other				
Insert Row Here				
Sub TOTAL	**$25,501**	**1.1803**	**$30,099**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$663,027**		**$753,515**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$237,000			
Raceways	$1,064,000			
Circular Tanks	$0			
Water Supply	$1,124,000			
PRAS	$0			
Effluent Management	$305,000			
Sub TOTAL	**$2,730,000**	**1.1803**	**$3,222,219**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$2,730,000**		**$3,222,219**	

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7) Construction Contingency				
Allowance for Change Orders	$109,200			
Other				
Insert Row Here				
Sub TOTAL	**$109,200**	**1.1803**	**$128,889**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1803**	**$0**	
Sales Tax				
Sub TOTAL	**$241,332**		**$284,845**	
CONSTRUCTION CONTRACTS TOTAL	**$3,080,532**		**$3,635,953**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$342,868				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$342,868**		**1.1803**	**$404,688**	

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Puyallup Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Puyallup Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.54%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-23	Predesign End	December-24
Design Start	January-25	Design End	December-26
Construction Start	January-27	Construction End	December-28
Construction Duration	23 Months		

Green cells must be filled in by user

Project Cost Estimate

Total Project	**$5,099,547**	Total Project Escalated	**$5,985,468**
		Rounded Escalated Total	**$5,985,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Puyallup Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$52,000		
A/E Basic Design Services	$336,476		
Extra Services	$205,000		
Other Services	$151,170		
Design Services Contingency	$29,786		
Consultant Services Subtotal	**$774,432**	**Consultant Services Subtotal Escalated**	**$880,533**

Construction			
Construction Contingencies	$138,520	Construction Contingencies Escalated	$163,496
Maximum Allowable Construction Cost (MACC)	$3,463,000	Maximum Allowable Construction Cost (MACC) Escalated	$4,087,379
Sales Tax	$306,129	Sales Tax Escalated	$361,325
Construction Subtotal	**$3,907,649**	**Construction Subtotal Escalated**	**$4,612,200**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$417,466		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$417,466**	**Project Administation Subtotal Escalated**	**$492,735**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$5,099,547**	Total Project Escalated	**$5,985,468**
		Rounded Escalated Total	**$5,985,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$52,000			
Other				
Insert Row Here				
Sub TOTAL	**$52,000**	**1.1009**	**$57,247**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$336,476			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$336,476**	**1.1260**	**$378,872**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.1260**	**$230,830**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$151,170			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$151,170**	**1.1803**	**$178,427**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$29,786			
Other				
Insert Row Here				
Sub TOTAL	**$29,786**	**1.1803**	**$35,157**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$774,432**		**$880,533**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$178,000			
Raceways	$1,063,000			
Circular Tanks	$0			
Water Supply	$726,000			
PRAS	$1,191,000			
Effluent Management	$305,000			
Sub TOTAL	**$3,463,000**	**1.1803**	**$4,087,379**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$3,463,000**		**$4,087,379**	

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7) Construction Contingency				
Allowance for Change Orders	$138,520			
Other				
Insert Row Here				
Sub TOTAL	**$138,520**	**1.1803**	**$163,496**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1803**	**$0**	
Sales Tax				
Sub TOTAL	**$306,129**		**$361,325**	
CONSTRUCTION CONTRACTS TOTAL	**$3,907,649**		**$4,612,200**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$417,466				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$417,466**		**1.1803**	**$492,735**	

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Samish Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Samish Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.00%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-23	Predesign End	December-24
Design Start	January-25	Design End	December-26
Construction Start	January-27	Construction End	December-28
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$8,035,716**	Total Project Escalated	**$9,438,293**
		Rounded Escalated Total	**$9,438,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Samish Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$85,000		
A/E Basic Design Services	$522,786		
Extra Services	$205,000		
Other Services	$234,875		
Design Services Contingency	$41,906		
Consultant Services Subtotal	**$1,089,567**	**Consultant Services Subtotal Escalated**	**$1,239,750**

Construction			
Construction Contingencies	$224,160	Construction Contingencies Escalated	$264,577
Maximum Allowable Construction Cost (MACC)	$5,604,000	Maximum Allowable Construction Cost (MACC) Escalated	$6,614,402
Sales Tax	$495,394	Sales Tax Escalated	$584,714
Construction Subtotal	**$6,323,554**	**Construction Subtotal Escalated**	**$7,463,693**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$622,595		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$622,595**	**Project Administation Subtotal Escalated**	**$734,850**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$8,035,716**	Total Project Escalated	**$9,438,293**
		Rounded Escalated Total	**$9,438,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$85,000			
Other				
Insert Row Here				
Sub TOTAL	**$85,000**	**1.1009**	**$93,577**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$522,786			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$522,786**	**1.1260**	**$588,657**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.1260**	**$230,830**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$234,875			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$234,875**	**1.1803**	**$277,223**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$41,906			
Other				
Insert Row Here				
Sub TOTAL	**$41,906**	**1.1803**	**$49,463**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,089,567**		**$1,239,750**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$300,000			
Raceways	$799,000			
Circular Tanks	$0			
Water Supply	$907,000			
PRAS	$1,815,000			
Effluent Management	$1,261,000			
1800 sq ft Residence	$522,000			
Sub TOTAL	**$5,604,000**	**1.1803**	**$6,614,402**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$5,604,000**		**$6,614,402**	

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7) Construction Contingency				
Allowance for Change Orders	$224,160			
Other				
Insert Row Here				
Sub TOTAL	**$224,160**	**1.1803**	**$264,577**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1803**	**$0**	
Sales Tax				
Sub TOTAL	**$495,394**		**$584,714**	
CONSTRUCTION CONTRACTS TOTAL	**$6,323,554**		**$7,463,693**	

Green cells must be filled in by user

Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$622,595				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$622,595**		**1.1803**	**$734,850**	

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Sol Duc Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Sol Duc Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.03%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-21	Predesign End	December-22
Design Start	January-23	Design End	December-24
Construction Start	January-27	Construction End	December-28
Construction Duration	23 Months		

Green cells must be filled in by user

Project Cost Estimate

Total Project	**$7,813,465**	Total Project Escalated	**$9,135,839**
		Rounded Escalated Total	**$9,136,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Sol Duc Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$82,000		
A/E Basic Design Services	$508,845		
Extra Services	$205,000		
Other Services	$228,611		
Design Services Contingency	$40,978		
Consultant Services Subtotal	**$1,065,435**	**Consultant Services Subtotal Escalated**	**$1,171,136**

Construction			
Construction Contingencies	$217,680	Construction Contingencies Escalated	$256,928
Maximum Allowable Construction Cost (MACC)	$5,442,000	Maximum Allowable Construction Cost (MACC) Escalated	$6,423,193
Sales Tax	$481,073	Sales Tax Escalated	$567,811
Construction Subtotal	**$6,140,753**	**Construction Subtotal Escalated**	**$7,247,932**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$607,278		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$607,278**	**Project Administation Subtotal Escalated**	**$716,771**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$7,813,465**	Total Project Escalated	**$9,135,839**
		Rounded Escalated Total	**$9,136,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$82,000			
Other				
Insert Row Here				
Sub TOTAL	**$82,000**	**1.0503**	**$86,125**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$508,845			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$508,845**	**1.0742**	**$546,602**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.0742**	**$220,211**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$228,611			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$228,611**	**1.1803**	**$269,831**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$40,978			
Other				
Insert Row Here				
Sub TOTAL	**$40,978**	**1.1803**	**$48,367**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,065,435**		**$1,171,136**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1539**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$300,000			
Raceways	$0			
Circular Tanks	$1,775,000			
Water Supply	$914,000			
PRAS	$1,191,000			
Effluent Management	$1,262,000			
Sub TOTAL	**$5,442,000**	**1.1803**	**$6,423,193**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$5,442,000**		**$6,423,193**	

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7) Construction Contingency				
Allowance for Change Orders	$217,680			
Other				
Insert Row Here				
Sub TOTAL	**$217,680**	**1.1803**	**$256,928**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.1803**	**$0**	
Sales Tax				
Sub TOTAL	**$481,073**		**$567,811**	
CONSTRUCTION CONTRACTS TOTAL	**$6,140,753**		**$7,247,932**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$607,278				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$607,278**		**1.1803**	**$716,771**	

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Voights Creek Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Voight's Creek Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.19%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-21	Predesign End	December-22
Design Start	January-21	Design End	December-22
Construction Start	January-22	Construction End	December-23
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$6,838,256**	Total Project Escalated	**$7,155,427**
		Rounded Escalated Total	**$7,155,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Voight's Creek Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$71,000		
A/E Basic Design Services	$447,607		
Extra Services	$205,000		
Other Services	$201,099		
Design Services Contingency	$36,988		
Consultant Services Subtotal	**$961,694**	**Consultant Services Subtotal Escalated**	**$989,736**

Construction			
Construction Contingencies	$189,160	Construction Contingencies Escalated	$198,467
Maximum Allowable Construction Cost (MACC)	$4,729,000	Maximum Allowable Construction Cost (MACC) Escalated	$4,961,667
Sales Tax	$418,044	Sales Tax Escalated	$438,612
Construction Subtotal	**$5,336,204**	**Construction Subtotal Escalated**	**$5,598,746**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$540,359		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$540,359**	**Project Administation Subtotal Escalated**	**$566,945**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$6,838,256**	Total Project Escalated	**$7,155,427**
		Rounded Escalated Total	**$7,155,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$71,000			
Other				
Insert Row Here				
Sub TOTAL	**$71,000**	**1.0020**	**$71,142**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$447,607			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$447,607**	**1.0248**	**$458,708**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.0248**	**$210,084**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$201,099			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$201,099**	**1.0492**	**$210,993**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$36,988			
Other				
Insert Row Here				
Sub TOTAL	**$36,988**	**1.0492**	**$38,809**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$961,694**		**$989,736**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0258**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0258**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$394,000			
Raceways	$0			
Circular Tanks	$1,911,000			
Water Supply	$928,000			
PRAS	$1,191,000			
Effluent Management	$305,000			
Sub TOTAL	**$4,729,000**	**1.0492**	**$4,961,667**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$4,729,000**		**$4,961,667**	

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7) Construction Contingency				
Allowance for Change Orders	$189,160			
Other				
Insert Row Here				
Sub TOTAL	**$189,160**	**1.0492**	**$198,467**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.0492**	**$0**	
Sales Tax				
Sub TOTAL	**$418,044**		**$438,612**	
CONSTRUCTION CONTRACTS TOTAL	**$5,336,204**		**$5,598,746**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$540,359				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$540,359**		**1.0492**	**$566,945**	

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Wallace River Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Wallace River Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.25%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$6,497,817**	Total Project Escalated	**$9,125,090**
		Rounded Escalated Total	**$9,125,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Wallace River Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$68,000		
A/E Basic Design Services	$425,967		
Extra Services	$205,000		
Other Services	$191,377		
Design Services Contingency	$35,614		
Consultant Services Subtotal	**$925,958**	**Consultant Services Subtotal Escalated**	**$1,186,303**

Construction			
Construction Contingencies	$179,200	Construction Contingencies Escalated	$255,325
Maximum Allowable Construction Cost (MACC)	$4,480,000	Maximum Allowable Construction Cost (MACC) Escalated	$6,383,104
Sales Tax	$396,032	Sales Tax Escalated	$564,267
Construction Subtotal	**$5,055,232**	**Construction Subtotal Escalated**	**$7,202,696**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$516,627		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$516,627**	**Project Administation Subtotal Escalated**	**$736,091**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$6,497,817**	Total Project Escalated	**$9,125,090**
		Rounded Escalated Total	**$9,125,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$68,000			
Other				
Insert Row Here				
Sub TOTAL	**$68,000**	**1.2096**	**$82,253**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$425,967			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$425,967**	**1.2372**	**$527,007**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$191,377			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$191,377**	**1.4248**	**$272,674**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$35,614			
Other				
Insert Row Here				
Sub TOTAL	**$35,614**	**1.4248**	**$50,743**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$925,958**		**$1,186,303**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$446,000			
Raceways	$0			
Circular Tanks	$1,638,000			
Water Supply	$900,000			
PRAS	$1,191,000			
Effluent Management	$305,000			
Sub TOTAL	**$4,480,000**	**1.4248**	**$6,383,104**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$4,480,000**		**$6,383,104**	

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7) Construction Contingency				
Allowance for Change Orders	$179,200			
Other				
Insert Row Here				
Sub TOTAL	**$179,200**	**1.4248**	**$255,325**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$396,032**		**$564,267**	
CONSTRUCTION CONTRACTS TOTAL	**$5,055,232**		**$7,202,696**	

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Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$516,627				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$516,627**		**1.4248**	**$736,091**	

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Whitehorse Hatchery
C-100 Cost Forms

STATE OF WASHINGTON
AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Whitehorse Hatchery Expansion
OFM Project Number	

Contact Information	
Name	Kristen Kuykendall
Phone Number	360-269-6433
Email	kristen.kuykendall@dfw.wa.gov

Statistics			
Gross Square Feet		MACC per Square Foot	
Usable Square Feet		Escalated MACC per Square Foot	
Space Efficiency		A/E Fee Class	A
Construction Type	Fish hatcheries	A/E Fee Percentage	13.09%
Remodel		Projected Life of Asset (Years)	
Additional Project Details			
Alternative Public Works Project		Art Requirement Applies	No
Inflation Rate	2.38%	Higher Ed Institution	No
Sales Tax Rate %	8.50%	Location Used for Tax Rate	
Contingency Rate	4%		
Base Month	December-20	OFM UFI# (from FPMT, if available)	
Project Administered By	Agency		

Schedule			
Predesign Start	January-29	Predesign End	December-30
Design Start	January-29	Design End	December-30
Construction Start	January-35	Construction End	December-36
Construction Duration	23 Months		

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Project Cost Estimate

Total Project	**$7,433,901**	Total Project Escalated	**$10,445,582**
		Rounded Escalated Total	**$10,446,000**

STATE OF WASHINGTON

AGENCY / INSTITUTION PROJECT COST SUMMARY

Updated June 2020

Agency	Washington Department of Fish and Wildlife
Project Name	SRKW - Whitehorse Hatchery Expansion
OFM Project Number	

Cost Estimate Summary

Acquisition			
Acquisition Subtotal	**$0**	**Acquisition Subtotal Escalated**	**$0**

Consultant Services			
Predesign Services	$78,000		
A/E Basic Design Services	$485,074		
Extra Services	$205,000		
Other Services	$217,932		
Design Services Contingency	$39,440		
Consultant Services Subtotal	**$1,025,447**	**Consultant Services Subtotal Escalated**	**$1,314,814**

Construction			
Construction Contingencies	$206,560	Construction Contingencies Escalated	$294,307
Maximum Allowable Construction Cost (MACC)	$5,164,000	Maximum Allowable Construction Cost (MACC) Escalated	$7,357,668
Sales Tax	$456,498	Sales Tax Escalated	$650,418
Construction Subtotal	**$5,827,058**	**Construction Subtotal Escalated**	**$8,302,393**

Equipment			
Equipment	$0		
Sales Tax	$0		
Non-Taxable Items	$0		
Equipment Subtotal	**$0**	**Equipment Subtotal Escalated**	**$0**

Artwork			
Artwork Subtotal	**$0**	**Artwork Subtotal Escalated**	**$0**

Agency Project Administration			
Agency Project Administration Subtotal	$581,397		
DES Additional Services Subtotal	$0		
Other Project Admin Costs	$0		
Project Administration Subtotal	**$581,397**	**Project Administation Subtotal Escalated**	**$828,375**

Other Costs			
Other Costs Subtotal	**$0**	**Other Costs Subtotal Escalated**	**$0**

Project Cost Estimate

Total Project	**$7,433,901**	Total Project Escalated	**$10,445,582**
		Rounded Escalated Total	**$10,446,000**

Cost Estimate Details

Consultant Services				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Pre-Schematic Design Services				
Programming/Site Analysis				
Environmental Analysis				
Predesign Study	$78,000			
Other				
Insert Row Here				
Sub TOTAL	**$78,000**	**1.2096**	**$94,349**	Escalated to Design Start
2) Construction Documents				
A/E Basic Design Services	$485,074			69% of A/E Basic Services
Other				
Insert Row Here				
Sub TOTAL	**$485,074**	**1.2372**	**$600,134**	Escalated to Mid-Design
3) Extra Services				
Civil Design (Above Basic Svcs)				
Geotechnical Investigation	$15,000			
Commissioning				
Site Survey	$15,000			
Testing				
LEED Services				
Voice/Data Consultant				
Value Engineering				
Constructability Review				
Environmental Mitigation (EIS)				
Landscape Consultant				
Permitting	$150,000			
Wetland Study	$25,000			
Insert Row Here				
Sub TOTAL	**$205,000**	**1.2372**	**$253,626**	Escalated to Mid-Design
4) Other Services				
Bid/Construction/Closeout	$217,932			31% of A/E Basic Services
HVAC Balancing				
Staffing				
Other				
Insert Row Here				
Sub TOTAL	**$217,932**	**1.4248**	**$310,510**	Escalated to Mid-Const.
5) Design Services Contingency				
Design Services Contingency	$39,440			
Other				
Insert Row Here				
Sub TOTAL	**$39,440**	**1.4248**	**$56,195**	Escalated to Mid-Const.
CONSULTANT SERVICES TOTAL	**$1,025,447**		**$1,314,814**	

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Cost Estimate Details

Construction Contracts				
Item	**Base Amount**	**Escalation Factor**	**Escalated Cost**	**Notes**
1) Site Work				
G10 - Site Preparation				
G20 - Site Improvements				
G30 - Site Mechanical Utilities				
G40 - Site Electrical Utilities				
G60 - Other Site Construction				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
2) Related Project Costs				
Offsite Improvements				
City Utilities Relocation				
Parking Mitigation				
Stormwater Retention/Detention				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.3930**	**$0**	
3) Facility Construction				
A10 - Foundations				
A20 - Basement Construction				
B10 - Superstructure				
B20 - Exterior Closure				
B30 - Roofing				
C10 - Interior Construction				
C20 - Stairs				
C30 - Interior Finishes				
D10 - Conveying				
D20 - Plumbing Systems				
D30 - HVAC Systems				
D40 - Fire Protection Systems				
D50 - Electrical Systems				
F10 - Special Construction				
F20 - Selective Demolition				
General Conditions				
Other				
Hatchery Bldg (Incubation)	$281,000			
Raceways	$0			
Circular Tanks	$1,638,000			
Water Supply	$1,227,000			
PRAS	$1,191,000			
Effluent Management	$305,000			
1800 sq ft Residence	$522,000			
Sub TOTAL	**$5,164,000**	**1.4248**	**$7,357,668**	
4) Maximum Allowable Construction Cost				
MACC Sub TOTAL	**$5,164,000**		**$7,357,668**	

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7) Construction Contingency				
Allowance for Change Orders	$206,560			
Other				
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Sub TOTAL	**$206,560**	**1.4248**	**$294,307**	
8) Non-Taxable Items				
Other				
Insert Row Here				
Sub TOTAL	**$0**	**1.4248**	**$0**	
Sales Tax				
Sub TOTAL	**$456,498**		**$650,418**	
CONSTRUCTION CONTRACTS TOTAL	**$5,827,058**		**$8,302,393**	

Green cells must be filled in by user

Cost Estimate Details

Project Management					
Item	**Base Amount**		**Escalation Factor**	**Escalated Cost**	**Notes**
Agency Project Management	$581,397				
Additional Services					
Other					
Insert Row Here					
PROJECT MANAGEMENT TOTAL	**$581,397**		**1.4248**	**$828,375**	

Green cells must be filled in by user

Appendix F. Maximum Allowable Construction Cost Tables

Beaver Creek Hatchery

Bogachiel Hatchery

Coulter Creek Hatchery

Dungeness Hatchery

Elwha Hatchery

Humptulips Hatchery

Hupp Springs Hatchery

Kendall Creek Hatchery

Lyon's Ferry Hatchery

Marblemount Hatchery

McKernan Hatchery

Naselle Hatchery

Nemah Hatchery

Palmer Ponds Hatchery

Puyallup Hatchery

Samish Hatchery

Sol Duc Hatchery

Voights Creek Hatchery

Wallace River Hatchery

Whitehorse Hatchery

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Beaver Creek Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Beaver Creek Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	920	$	263,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	8			$	1,629,000
Water Supply Modifications Incubation & Rearing					$	893,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (Pollution Abatement)					$	725,000
				Subtotal	**$**	**3,510,000**
				Contingency (40%)	$	1,404,000
				Mobilization (5%)	$	176,000
				General Conditions (10%)	$	351,000
				Bond (2%)	$	71,000
				Temporary Facilities/ Offices (2%)	$	71,000
				General Contractors Overhead & Profit (15%)	$	527,000
				MACC	**$**	**6,110,000**

Beaver Creek Budgetary Pricing for Hatchery Modifications

Item Description	Cost	WDFW Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	8	**$ 1,629,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 893,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	13.2	$ 528,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Beaver Creek Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**725,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
PA pond	$ 550,000	EA	1	$	550,000
			SUBTOTAL	**$**	**3,510,000**
			CONTINGENCY (40%)	**$**	**1,404,000**
			MOBILIZATION (5%)	**$**	**176,000**
			GENERAL CONDITIONS (10%)	**$**	**351,000**
			BOND (2%)	**$**	**71,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**71,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**527,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**6,110,000**

Bogachiel Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Bogachiel Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	920	$	263,000
20' Dia Circulars	Qty.	31			$	2,431,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	749,000
PRAS System for New Rearing Units					$	1,043,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**4,661,000**
				Contingency (40%)	$	1,865,000
				Mobilization (5%)	$	234,000
				General Conditions (10%)	$	467,000
				Bond (2%)	$	94,000
				Temporary Facilities/ Offices (2%)	$	94,000
				General Contractors Overhead & Profit (15%)	$	700,000
				MACC	**$**	**8,115,000**

Bogachiel Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	31	**$ 2,431,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 749,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	9.6	$ 384,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Bogachiel Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**1,042,500**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**1**	**$**	**1,042,500**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**4,660,500**
			CONTINGENCY (40%)	**$**	**1,865,000**
			MOBILIZATION (5%)	**$**	**234,000**
			GENERAL CONDITIONS (10%)	**$**	**467,000**
			BOND (2%)	**$**	**94,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**94,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**700,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**8,114,500**

Coulter Creek Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Coulter Creek Hatchery

Item Description						Total Cost	
Incubation	Full Stacks:	0	Bldg. SF:	0	$	-
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	2			$	408,000
Water Supply Modifications Incubation & Rearing					$	521,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (Pollution Abatement)					$	175,000
				Subtotal	**$**	**1,104,000**
				Contingency (40%)	$	442,000
				Mobilization (5%)	$	56,000
				General Conditions (10%)	$	111,000
				Bond (2%)	$	23,000
				Temporary Facilities/ Offices (2%)	$	23,000
				General Contractors Overhead & Profit (15%)	$	166,000
				MACC	**$**	**1,925,000**

Coulter Creek Budgetary Pricing for Hatchery Modifications

Item Description	Cost	WDFW Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ -**	
Prefabricated Metal Building	$ 125	SF	0	$ -	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	0	$ -	
Power/Electrical	$ -	LS	0	$ -	Lighting, alarms general outlets
Process Piping	$ -	LS	0	$ -	
Incubation Stacks (full stack)	$ 3,000	EA	0	$ -	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	0	$ -	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	2	**$ 408,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 521,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	3.9	$ 156,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Coulter Creek Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
PA pond	$ 550,000	EA	0	$	-
			SUBTOTAL	**$**	**1,104,000**
			CONTINGENCY (40%)	**$**	**442,000**
			MOBILIZATION (5%)	**$**	**56,000**
			GENERAL CONDITIONS (10%)	**$**	**111,000**
			BOND (2%)	**$**	**23,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**23,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**166,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**1,925,000**

Dungeness Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Dungeness Hatchery

Item Description					Total Cost	
Incubation	Full Stacks:	16	Bldg. SF:	500	$	182,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	20			$	4,072,000
Water Supply Modifications Incubation & Rearing					$	1,881,000
PRAS System for New Rearing Units (Optional)					$	1,043,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**7,353,000**
				Contingency (40%)	$	2,942,000
				Mobilization (5%)	$	368,000
				General Conditions (10%)	$	736,000
				Bond (2%)	$	148,000
				Temporary Facilities/ Offices (2%)	$	148,000
				General Contractors Overhead & Profit (15%)	$	1,103,000
				MACC	**$**	**12,798,000**

Dungeness Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 182,000**	
Prefabricated Metal Building	$ 125	SF	0	$ -	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	0	$ -	
Power/Electrical	$ -	LS	1	$ -	Lighting, alarms general outlets
Process Piping	$ -	LS	1	$ -	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
90% PRAS w/ Heating	$ 29,500	LS	2	$ 59,000	
10ft x 100ft Raceway	**$ 203,588**	**EA**	20	**$ 4,072,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 1,881,000**	
Piping Infrustructure Repair	$500,000	CFS	1	$ 500,000	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	8.9	$ 356,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	0	$ -	
VFD	$ 15,000	EA	0	$ -	
Power Hook up	$ 50,000	LS	0	$ -	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	3	$ 300,000	Complete rehabilitation

Dungeness Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Surface Water Filter, inculding bldg, for Parasites (Cryptobia)	$ 500,000	LS	1	$	500,000
Partial Recirculating Aquaculture System				**$**	**1,042,500**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System (Optional)	**$ 1,042,500**	LS	**1**	**$**	**1,042,500**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**7,353,000**
			CONTINGENCY (40%)	**$**	**2,942,000**
			MOBILIZATION (5%)	**$**	**368,000**
			GENERAL CONDITIONS (10%)	**$**	**736,000**
			BOND (2%)	**$**	**148,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**148,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**1,103,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**12,798,000**

Elwha Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Elwha Hatchery

Item Description				Total Cost
Incubation	Full Stacks: 31	Bldg. SF: 913.333	$	263,000
20' Dia Circulars	Qty. 0		$	-
10' x 100' Raceways	Qty. 10		$	2,036,000
Water Supply Modifications Incubation & Rearing			$	1,013,000
PRAS System for New Rearing Units			$	-
Effluent Water Management (effluent piping only)			$	175,000
		Subtotal	**$**	**3,487,000**
		Contingency (40%)	$	1,395,000
		Mobilization (5%)	$	175,000
		General Conditions (10%)	$	349,000
		Bond (2%)	$	70,000
		Temporary Facilities/ Offices (2%)	$	70,000
		General Contractors Overhead & Profit (15%)	$	524,000
		MACC	**$**	**6,070,000**

Elwha Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	10	**$ 2,036,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 1,013,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	16.2	$ 648,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells new/ rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Elwha Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
Filter bldg & Reuse Pumps					
16' x 16' Wood Framed Building with Fiberclass Clad interior wall	$ 50	SF	256	$	12,800
Precast 16x16x7' deep sump delivered for drumfilter & foundation	$ 18,000	EA	2	$	36,000
Metal Stairs & Railing	$ 1,500	LS	2	$	3,000
Bldg HVAC	$ 4,250	LS	1	$	4,250
Alarms and Controls	$ 13,000	LS	1	$	13,000
Interstitial Piping to and from Filter Building	$ 52,250	LS	1	$	52,250
54 um Rotating Drumfilter w/tub 15 ppm TSS	$ 50,000	EA	2	$	100,000
Drumfilter Interstitial Piping	$ 25,000	LS	1	$	25,000
Precast Manhole 8' dia. 10' deep	$ 12,500	EA	1	$	12,500
Lineshaft Turbine pump VFD motor	$ 10,000	EA	2	$	20,000
Interstitial Piping	$ 50,000	LS	1	$	50,000
Bldg Electrical	$ 11,500	LS	1	$	11,500
Motor Controls	$ 20,000	LS	1	$	20,000
UV					
UV Matl.,	$ 100,000	EA	2	$	200,000
Flow Meters	$ 4,500	EA	2	$	9,000
Interstitial Piping	$ 12,000	LS	1	$	12,000
UV Electrical	$ 6,500	LS	1	$	6,500
Dissolved Gas Management					
Fence and Concrete Pad for mini-bulk LOX tank	$ 6,500	EA	1	$	6,500
CO_2 Stripping Tower & LHO	$ 27,000	EA	2	$	54,000
Interstitial Piping	$ 25,000	LS	1	$	25,000
Dissolved Gas Electrical	$ 10,000	LS	1	$	10,000
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
Filter bldg & Reuse Pumps					
20' x 16' Wood Framed Building with Fiberclass Clad interior wall	$ 50	SF	320	$	16,000
Precast 10x16x7' deep sump delivered for drumfilter & foundation	$ 25,000	EA	2	$	50,000
Metal Stairs & Railing	$ 2,500	LS	2	$	5,000
Bldg HVAC	$ 6,500	LS	1	$	6,500
Alarms and Controls	$ 20,000	LS	1	$	20,000
Interstitial Piping to and from Filter Building	$ 80,000	LS	1	$	80,000
54 um Rotating Drumfilter w/tub 15 ppm TSS	$ 75,000	EA	2	$	150,000
Drumfilter Interstitial Piping	$ 40,000	LS	1	$	40,000
Precast Manhole 8' dia. 10' deep	$ 12,500	EA	2	$	25,000
Lineshaft Turbine pump VFD motor	$ 10,000	EA	4	$	40,000
Interstitial Piping	$ 75,000	LS	1	$	75,000
Bldg Electrical	$ 17,000	LS	1	$	17,000
Motor Controls	$ 27,500	LS	1	$	27,500
UV					
UV Matl.,	$ 100,000	EA	3	$	300,000
Flow Meters	$ 4,500	EA	3	$	13,500
Interstitial Piping	$ 15,000	LS	1	$	15,000
UV Electrical	$ 10,000	LS	1	$	10,000
Dissolved Gas Management					
Fence and Concrete Pad for mini-bulk LOX tank	$ 10,000	EA	1	$	10,000

Startup, 60 mJ/cm2 Unvalidated, 90%, UVT, 8 kW, Amalagam

Elwha Hatchery Budgetary Pricing for Hatchery Modifications

		WDFW			
CO_2 Stripping Tower & LHO	$ 30,000	EA	3	$	90,000
Interstitial Piping	$ 40,000	LS	1	$	40,000
Dissolved Gas Electrical	$ 12,000	LS	1	$	12,000
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Filter bldg & Reuse Pumps					
20' x 20' Wood Framed Building with Fiberclass Clad interior wall	$ 50	SF	400	$	20,000
Precast 10x20x7' deep sump delivered for drumfilter & foundation	$ 35,000	EA	2	$	70,000
Metal Stairs & Railing	$ 3,500	LS	2	$	7,000
Bldg HVAC	$ 8,750	LS	1	$	8,750
Alarms and Controls	$ 27,500	LS	1	$	27,500
Interstitial Piping to and from Filter Building	$ 105,000	LS	1	$	105,000
54 um Rotating Drumfilter w/tub 15 ppm TSS	$ 100,000	EA	2	$	200,000
Drumfilter Interstitial Piping	$ 52,500	LS	1	$	52,500
Precast Manhole 10'x16'x10' deep	$ 25,000	EA	1	$	25,000
Lineshaft Turbine pump VFD motor	$ 18,000	EA	4	$	72,000
Interstitial Piping	$ 100,000	LS	1	$	100,000
Bldg Electrical	$ 23,750	LS	1	$	23,750
Motor Controls	$ 36,750	LS	1	$	36,750
UV					
UV Matl.,	$ 100,000	EA	4	$	400,000
Flow Meters	$ 4,500	EA	4	$	18,000
Interstitial Piping	$ 20,000	LS	1	$	20,000
UV Electrical	$ 15,000	LS	1	$	15,000
Dissolved Gas Management					
Fence and Concrete Pad for mini-bulk LOX tank	$ 12,500	EA	1	$	12,500
CO_2 Stripping Tower & LHO	$ 30,000	EA	4	$	120,000
Interstitial Piping	$ 55,000	LS	1	$	55,000
Dissolved Gas Electrical	$ 18,000	LS	1	$	18,000
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000

Startup, 60 mJ/cm2 Unvalidated, 90%, UVT, 8 kW, Amalagam

SUBTOTAL	**$ 3,487,000**
CONTINGENCY (40%)	**$ 1,395,000**
MOBILIZATION (5%)	**$ 175,000**
GENERAL CONDITIONS (10%)	**$ 349,000**
BOND (2%)	**$ 70,000**
TEMPORARY FACILITIES / OFFICES (2%)	**$ 70,000**
GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$ 524,000**
TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$ 6,070,000**

Humptulips Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Humptulips Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	913	$	263,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	10			$	2,036,000
Water Supply Modifications Incubation & Rearing					$	1,311,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (Pollution Abatement)					$	725,000
				Subtotal	**$**	**4,335,000**
				Contingency (40%)	$	1,734,000
				Mobilization (5%)	$	217,000
				General Conditions (10%)	$	434,000
				Bond (2%)	$	87,000
				Temporary Facilities/ Offices (2%)	$	87,000
				General Contractors Overhead & Profit (15%)	$	651,000
				MACC	**$**	**7,545,000**

Humptulips Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	10	**$ 2,036,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 1,311,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	17.8	$ 712,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation
Lift Station - Precast Manhole 10'x16'x10' deep	$ 25,000	EA	1	$ 25,000	

Humptulips Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Lineshaft Turbine pump VFD motor	$ 18,000	EA	4	$	72,000
Interstitial Piping	$ 100,000	LS	1	$	100,000
Motor Controls	$ 36,750	LS	1	$	36,750
Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**725,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
PA pond	$ 550,000	EA	1	$	550,000
			SUBTOTAL	**$**	**4,335,000**
			CONTINGENCY (40%)	**$**	**1,734,000**
			MOBILIZATION (5%)	**$**	**217,000**
			GENERAL CONDITIONS (10%)	**$**	**434,000**
			BOND (2%)	**$**	**87,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**87,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**651,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**7,545,000**

Hupp Springs Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Hupp Hatchery

Item Description						Total Cost	
Incubation	Full Stacks:	10	Bldg. SF:	790	$	158,000
20' Dia Circulars	Qty.	10			$	784,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	581,000
PRAS System for New Rearing Units					$	684,000
1800 sq ft Residence					$	300,000
Effluent Water Management (effluent piping only)					$	183,000
				Subtotal	**$**	**2,690,000**
				Contingency (40%)	$	1,076,000
				Mobilization (5%)	$	135,000
				General Conditions (10%)	$	269,000
				Bond (2%)	$	54,000
				Temporary Facilities/ Offices (2%)	$	54,000
				General Contractors Overhead & Profit (15%)	$	404,000
				MACC	**$**	**4,682,000**

Hupp Springs Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 158,000**	
Prefabricated Metal Building	$ 125	SF	133.3333	$ 16,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	133.3333	$ 6,667	
Power/Electrical	$ 3,500	LS	1	$ 3,500	Lighting, alarms general outlets
Process Piping	$ 3,500	LS	1	$ 3,500	
Incubation Stacks (full stack)	$ 3,000	EA	10	$ 30,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	650	$ 97,500	Support items for Rearing, added 150 sq ft to feed storage
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	10	**$ 784,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 581,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	2.9	$ 116,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells new/rehab	$ 100,000	LS	1	$ 100,000	Complete rehabilitation

Hupp Springs Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System					**$ 683,300**
1-5cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)					**$ 183,000**
Precast Manhole 4' dia. 10' deep	$ 8,000	EA	1	$	8,000
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
1800 sq ft Residence					**$ 300,000**

SUBTOTAL	**$**	**2,689,300**
CONTINGENCY (40%)	**$**	**1,076,000**
MOBILIZATION (5%)	**$**	**135,000**
GENERAL CONDITIONS (10%)	**$**	**269,000**
BOND (2%)	**$**	**54,000**
TEMPORARY FACILITIES / OFFICES (2%)	**$**	**54,000**
GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**404,000**
TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**4,681,300**

Kendall Creek Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Kendall Hatchery

Item Description					Total Cost	
Incubation	Full Stacks:	11	Bldg. SF:	0	$	63,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	3			$	611,000
Water Supply Modifications Incubation & Rearing					$	521,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**1,370,000**
				Contingency (40%)	$	548,000
				Mobilization (5%)	$	69,000
				General Conditions (10%)	$	137,000
				Bond (2%)	$	28,000
				Temporary Facilities/ Offices (2%)	$	28,000
				General Contractors Overhead & Profit (15%)	$	206,000
				MACC	**$**	**2,386,000**

Kendall Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 63,000**	
Prefabricated Metal Building	$ 125	SF	0	$ -	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	0	$ -	
Power/Electrical	$ -	LS	0	$ -	Lighting, alarms general outlets
Process Piping	$ 30,000	LS	1	$ 30,000	stack cost doubled for piping
Incubation Stacks (full stack)	$ 3,000	EA	11	$ 33,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	0	$ -	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	3	**$ 611,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 521,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	2.4	$ 96,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	0	$ -	
VFD	$ 15,000	EA	0	$ -	
Power Hook up	$ 50,000	LS	0	$ -	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells new /rehab	$ 100,000	LS	2	$ 200,000	Complete rehabilitation

Kendall Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**1,370,000**
			CONTINGENCY (40%)	**$**	**548,000**
			MOBILIZATION (5%)	**$**	**69,000**
			GENERAL CONDITIONS (10%)	**$**	**137,000**
			BOND (2%)	**$**	**28,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**28,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**206,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**2,386,000**

Lyon's Ferry Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Lyon's Ferry Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	920	$	263,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	25			$	5,090,000
Water Supply Modifications Incubation & Rearing					$	1,413,000
Re-Use System for New Rearing Units					$	-
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**6,941,000**
				Contingency (40%)	$	2,777,000
				Mobilization (5%)	$	348,000
				General Conditions (10%)	$	695,000
				Bond (2%)	$	139,000
				Temporary Facilities/ Offices (2%)	$	139,000
				General Contractors Overhead & Profit (15%)	$	1,042,000
				MACC	**$**	**12,081,000**

Lyon's Ferry Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	25	**$ 5,090,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 1,413,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	23.2	$ 928,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	0	$ -	
VFD	$ 15,000	EA	0	$ -	
Power Hook up	$ 50,000	LS	0	$ -	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab /new	$ 100,000	LS	2	$ 200,000	Complete rehabilitation
LHO's for Reuse	$ 5,000	EA	12	$ 60,000	

Lyon's Ferry Hatchery Budgetary Pricing for Hatchery Modifications
WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**6,941,000**
			CONTINGENCY (40%)	**$**	**2,777,000**
			MOBILIZATION (5%)	**$**	**348,000**
			GENERAL CONDITIONS (10%)	**$**	**695,000**
			BOND (2%)	**$**	**139,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**139,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**1,042,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**12,081,000**

Marblemount Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Marblemount Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	920	$	263,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	10			$	2,036,000
Water Supply Modifications Incubation & Rearing					$	1,017,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**3,491,000**
				Contingency (40%)	$	1,397,000
				Mobilization (5%)	$	175,000
				General Conditions (10%)	$	350,000
				Bond (2%)	$	70,000
				Temporary Facilities/ Offices (2%)	$	70,000
				General Contractors Overhead & Profit (15%)	$	524,000
				MACC	**$**	**6,077,000**

Marblemount Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	10	**$ 2,036,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 1,017,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	16.3	$ 652,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Marblemount Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**3,491,000**
			CONTINGENCY (40%)	**$**	**1,397,000**
			MOBILIZATION (5%)	**$**	**175,000**
			GENERAL CONDITIONS (10%)	**$**	**350,000**
			BOND (2%)	**$**	**70,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**70,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**524,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**6,077,000**

McKernan Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
McKernan Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	8	Bldg. SF:	0	$	123,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	3			$	611,000
Water Supply Modifications Incubation & Rearing					$	545,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (Pollution Abatement)					$	175,000
				Subtotal	**$**	**1,454,000**
				Contingency (40%)	$	582,000
				Mobilization (5%)	$	73,000
				General Conditions (10%)	$	146,000
				Bond (2%)	$	30,000
				Temporary Facilities/ Offices (2%)	$	30,000
				General Contractors Overhead & Profit (15%)	$	219,000
				MACC	**$**	**2,534,000**

McKernan Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 123,000**	
Prefabricated Metal Building	$ 125	SF	0	$ -	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	0	$ -	
Power/Electrical	$ -	LS	0	$ -	Lighting, alarms general outlets
Process Piping	$ 3,000	LS	8	$ 24,000	doubled stack price for piping
Incubation Stacks (full stack)	$ 3,000	EA	8	$ 24,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
90% PRAS w/ Heating	$ 29,500	LS	0	$ -	
10ft x 100ft Raceway	**$ 203,588**	**EA**	3	**$ 611,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 545,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	4.5	$ 180,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

McKernan Hatchery Budgetary Pricing for Hatchery Modifications
WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
Precast Manhole 4' dia. 10' deep	$ 8,000	EA	0	$	-
PA pond	$ 550,000	EA	0	$	-
			SUBTOTAL	**$**	**1,454,000**
			CONTINGENCY (40%)	**$**	**581,600**
			MOBILIZATION (5%)	**$**	**73,000**
			GENERAL CONDITIONS (10%)	**$**	**146,000**
			BOND (2%)	**$**	**30,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**30,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**219,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**2,534,000**

Naselle Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Naselle Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	31	Bldg. SF:	920	$	263,000
20' Dia Circulars	Qty.	25			$	1,960,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	681,000
PRAS System for New Rearing Units					$	1,043,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**4,122,000**
				Contingency (40%)	$	1,649,000
				Mobilization (5%)	$	207,000
				General Conditions (10%)	$	413,000
				Bond (2%)	$	83,000
				Temporary Facilities/ Offices (2%)	$	83,000
				General Contractors Overhead & Profit (15%)	$	619,000
				MACC	**$**	**7,176,000**

Naselle Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 263,000**	
Prefabricated Metal Building	$ 125	SF	413	$ 51,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	413	$ 20,667	
Power/Electrical	$ 10,850	LS	1	$ 10,850	Lighting, alarms general outlets
Process Piping	$ 10,850	LS	1	$ 10,850	
Incubation Stacks (full stack)	$ 3,000	EA	31	$ 93,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	25	**$ 1,960,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 681,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	7.9	$ 316,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Naselle Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System					**$ 1,042,500**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**1**	**$**	**1,042,500**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)					**$ 175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**4,121,500**
			CONTINGENCY (40%)	**$**	**1,649,000**
			MOBILIZATION (5%)	**$**	**207,000**
			GENERAL CONDITIONS (10%)	**$**	**413,000**
			BOND (2%)	**$**	**83,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**83,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**619,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**7,175,500**

Nemah Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Nemah Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	16	Bldg. SF:	713	$	172,000
20' Dia Circulars	Qty.	14			$	1,098,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	541,000
PRAS System for New Rearing Units					$	684,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**2,670,000**
				Contingency (40%)	$	1,068,000
				Mobilization (5%)	$	134,000
				General Conditions (10%)	$	267,000
				Bond (2%)	$	54,000
				Temporary Facilities/ Offices (2%)	$	54,000
				General Contractors Overhead & Profit (15%)	$	401,000
				MACC	**$**	**4,648,000**

Nemah Hatchery Budgetary Pricing for Hatchery Modifications

Item Description	Cost	WDFW Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 172,000**	
Prefabricated Metal Building	$ 125	SF	213	$ 26,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	213	$ 10,667	
Power/Electrical	$ 5,600	LS	1	$ 5,600	Lighting, alarms general outlets
Process Piping	$ 5,600	LS	1	$ 5,600	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	14	**$ 1,098,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 541,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	4.4	$ 176,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Nemah Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System					**$ 683,300**
1-5cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)					**$ 175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**2,669,300**
			CONTINGENCY (40%)	**$**	**1,068,000**
			MOBILIZATION (5%)	**$**	**134,000**
			GENERAL CONDITIONS (10%)	**$**	**267,000**
			BOND (2%)	**$**	**54,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**54,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**401,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**4,647,300**

Palmer Ponds Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Palmer Ponds Hatchery

Item Description					Total Cost	
Incubation	Full Stacks:	10	Bldg. SF:	640	$	136,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	3			$	611,000
Water Supply Modifications Incubation & Rearing					$	645,000
PRAS System for New Rearing Units					$	-
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**1,567,000**
				Contingency (40%)	$	627,000
				Mobilization (5%)	$	79,000
				General Conditions (10%)	$	157,000
				Bond (2%)	$	32,000
				Temporary Facilities/ Offices (2%)	$	32,000
				General Contractors Overhead & Profit (15%)	$	236,000
				MACC	**$**	**2,730,000**

Palmer Ponds Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 136,000**	
Prefabricated Metal Building	$ 125	SF	133	$ 16,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	133	$ 6,667	
Power/Electrical	$ 3,500	LS	1	$ 3,500	Lighting, alarms general outlets
Process Piping	$ 3,500	LS	1	$ 3,500	
Incubation Stacks (full stack)	$ 3,000	EA	10	$ 30,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	3	**$ 611,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 645,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	7	$ 280,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Palmer Ponds Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**-**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**1,567,000**
			CONTINGENCY (40%)	**$**	**627,000**
			MOBILIZATION (5%)	**$**	**79,000**
			GENERAL CONDITIONS (10%)	**$**	**157,000**
			BOND (2%)	**$**	**32,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**32,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**236,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**2,730,000**

Puyallup Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Puyallup Hatchery

Item Description						Total Cost	
Incubation	Full Stacks:	9	Bldg. SF:	500	$	102,000
20' Dia Circulars	Qty.	0			$	-
10' x 100' Raceways	Qty.	3			$	611,000
Water Supply Modifications Incubation & Rearing					$	417,000
PRAS System for New Rearing Units					$	684,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**1,989,000**
				Contingency (40%)	$	796,000
				Mobilization (5%)	$	100,000
				General Conditions (10%)	$	199,000
				Bond (2%)	$	40,000
				Temporary Facilities/ Offices (2%)	$	40,000
				General Contractors Overhead & Profit (15%)	$	299,000
				MACC	**$**	**3,463,000**

Puyallup Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 102,000**	
Prefabricated Metal Building	$ 125	SF	0	$ -	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	0	$ -	
Power/Electrical	$ -	LS	1	$ -	Lighting, alarms general outlets
Process Piping	$ -	LS	1	$ -	
Incubation Stacks (full stack)	$ 3,000	EA	9	$ 27,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	3	**$ 611,000**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 417,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	1.3	$ 52,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Puyallup Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System					**$ 683,300**
1-5cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)					**$ 175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
			SUBTOTAL	**$**	**1,988,300**
			CONTINGENCY (40%)	**$**	**796,000**
			MOBILIZATION (5%)	**$**	**100,000**
			GENERAL CONDITIONS (10%)	**$**	**199,000**
			BOND (2%)	**$**	**40,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**40,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**299,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**3,462,300**

Samish Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Samish Hatchery

Item Description						Total Cost
Incubation	Full Stacks:	16	Bldg. SF:	710	$	172,000
20' Dia Circulars	Qty.	0			$	-
20' x 180' Super Race	Qty.	1			$	459,000
Water Supply Modifications Incubation & Rearing					$	521,000
PRAS System for New Rearing Units					$	1,043,000
1800 sq ft Residence					$	300,000
Effluent Water Management (effluent piping only)					$	725,000
				Subtotal	**$**	**3,220,000**
				Contingency (40%)	$	1,288,000
				Mobilization (5%)	$	161,000
				General Conditions (10%)	$	322,000
				Bond (2%)	$	65,000
				Temporary Facilities/ Offices (2%)	$	65,000
				General Contractors Overhead & Profit (15%)	$	483,000
				MACC	**$**	**5,604,000**

Samish Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 172,000**	
Prefabricated Metal Building	$ 125	SF	213	$ 26,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	213	$ 10,667	
Power/Electrical	$ 5,600	LS	1	$ 5,600	Lighting, alarms general outlets
Process Piping	$ 5,600	LS	1	$ 5,600	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
20ft x 180ft Super Raceway	**$ 458,553**	**EA**	1	**$ 459,000**	
Clear Grub	$ 1	SF	16800	$ 16,800	adjusted square footage
Excavation	$ 22	CYD	572	$ 12,581	1.8 times 10' X 100' raceway
Structural Fill	$ 55	CYD	114	$ 6,290	1.8 times 10' X 100' raceway
Concrete Slab	$ 1,100	CYD	167	$ 183,466	3.5 times 10' X 100' raceway
Concrete Wall	$ 1,500	CYD	79	$ 118,917	1.8 times 10' X 100' raceway
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	180	$ 18,000	1.8 times 10' X 100' raceway
Screens	$ 1,500	LS	4	$ 6,000	increased to 4
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	2	$ 7,000	increased to 2
Hand railing	$ 80	LF	400	$ 32,000	
Avian Predation	$ 25,000	LS	2	$ 50,000	increased to 2
20 ft diameter Circulars	**$ 78,400**	EA	0	**$ -**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 521,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	2.4	$ 96,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	0	$ -	
VFD	$ 15,000	EA	0	$ -	
Power Hook up	$ 50,000	LS	0	$ -	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells new/ rehab	$ 100,000	LS	2	$ 200,000	Complete rehabilitation

Samish Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**1,042,500**
1-5cfs System	**$ 683,300**	LS	**0**	**$**	**-**
6-10cfs System	**$ 1,042,500**	LS	**1**	**$**	**1,042,500**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**725,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
Precast Manhole 4' dia. 10' deep	$ 8,000	EA	0	$	-
PA pond	$ 550,000	EA	1	$	550,000
1800 sq ft Residence				**$**	**300,000**
			SUBTOTAL	**$**	**3,219,500**
			CONTINGENCY (40%)	**$**	**1,288,000**
			MOBILIZATION (5%)	**$**	**161,000**
			GENERAL CONDITIONS (10%)	**$**	**322,000**
			BOND (2%)	**$**	**65,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**65,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**483,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**5,603,500**

Sol Duc Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Sol Duc Hatchery

Item Description						Total Cost	
Incubation	Full Stacks:	16	Bldg. SF:	720	$	172,000
20' Dia Circulars	Qty.	13			$	1,020,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	525,000
PRAS System for New Rearing Units					$	684,000
Effluent Water Management (effluent piping only)					$	725,000
				Subtotal	**$**	**3,126,000**
				Contingency (40%)	$	1,251,000
				Mobilization (5%)	$	157,000
				General Conditions (10%)	$	313,000
				Bond (2%)	$	63,000
				Temporary Facilities/ Offices (2%)	$	63,000
				General Contractors Overhead & Profit (15%)	$	469,000
				MACC	**$**	**5,442,000**

Sol Duc Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 172,000**	
Prefabricated Metal Building	$ 125	SF	213.3333	$ 26,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	213.3333	$ 10,667	
Power/Electrical	$ 5,600	LS	1	$ 5,600	Lighting, alarms general outlets
Process Piping	$ 5,600	LS	1	$ 5,600	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	13	**$ 1,020,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 525,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	4	$ 160,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Sol Duc Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System				**$**	**683,300**
1-5cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**725,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
Precast Manhole 4' dia. 10' deep	$ 8,000	EA	0	$	-
PA pond	$ 550,000	EA	1	$	550,000
			SUBTOTAL	**$**	**3,125,300**
			CONTINGENCY (40%)	**$**	**1,251,000**
			MOBILIZATION (5%)	**$**	**157,000**
			GENERAL CONDITIONS (10%)	**$**	**313,000**
			BOND (2%)	**$**	**63,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**63,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**469,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**5,441,300**

Voights Creek Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Voights Creek Hatchery

Item Description						Total Cost
Incubation w/ PRAS	Full Stacks:	16	Bldg. SF:	820	$	226,000
20' Dia Circulars	Qty.	14			$	1,098,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	533,000
PRAS System for New Rearing Units					$	684,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**2,716,000**
				Contingency (40%)	$	1,087,000
				Mobilization (5%)	$	136,000
				General Conditions (10%)	$	272,000
				Bond (2%)	$	55,000
				Temporary Facilities/ Offices (2%)	$	55,000
				General Contractors Overhead & Profit (15%)	$	408,000
				MACC	**$**	**4,729,000**

Voights Creek Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 226,000**	
Prefabricated Metal Building	$ 125	SF	320	$ 40,000	Area based on requirement for 30 full stacks, plus 100sf for RAS
Building Foundation	$ 50.00	SF	320	$ 16,000	
Power/Electrical	$ 8,400	LS	1	$ 8,400	Lighting, alarms general outlets
Process Piping	$ 8,400	LS	1	$ 8,400	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	Support items for Rearing
90% PRAS w/ Cooling	$ 29,500	LS	1	$ 29,500	
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	14	**$ 1,098,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 533,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	4.2	$ 168,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation

Voights Creek Hatchery Budgetary Pricing for Hatchery Modifications
WDFW

Partial Recirculating Aquaculture System				**$**	**683,300**
1-5 cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10 cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15 cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000

SUBTOTAL	**$**	**2,715,300**
CONTINGENCY (40%)	**$**	**1,087,000**
MOBILIZATION (5%)	**$**	**136,000**
GENERAL CONDITIONS (10%)	**$**	**272,000**
BOND (2%)	**$**	**55,000**
TEMPORARY FACILITIES / OFFICES (2%)	**$**	**55,000**
GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**408,000**
TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**4,728,300**

Wallace River Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Wallace River Hatchery

Item Description						Total Cost	
Incubation w/ PRAS	Full Stacks:	16	Bldg. SF:	720	$	256,000
20' Dia Circulars	Qty.	12			$	941,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	517,000
PRAS System for New Rearing Units					$	684,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**2,573,000**
				Contingency (40%)	$	1,030,000
				Mobilization (5%)	$	129,000
				General Conditions (10%)	$	258,000
				Bond (2%)	$	52,000
				Temporary Facilities/ Offices (2%)	$	52,000
				General Contractors Overhead & Profit (15%)	$	386,000
				MACC	**$**	**4,480,000**

Wallace River Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 256,000**	
Prefabricated Metal Building	$ 125	SF	220	$ 27,500	Half of Incubation to be included at existing hatchery bldg
Building Foundation	$ 50.00	SF	220	$ 11,000	
Power/Electrical	$ 5,775	LS	1	$ 5,775	Lighting, alarms general outlets
Process Piping	$ 5,775	LS	1	$ 5,775	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	**30 full stacks for 2,000,000 fish - hatchery has room for another 1,000,000**
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	500	$ 75,000	1/2 Incubation to be included at existing hatchery bldg
90% PRAS w/ Heating	$ 41,300	LS	2	$ 82,600	**increased cost by 40% for retrofit**
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	12	**$ 940,800**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 517,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	3.8	$ 152,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid

Wallace River Hatchery Budgetary Pricing for Hatchery Modifications

			WDFW		
GW wells rehab	$ 100,000	LS	0	$ -	Complete rehabilitation
Partial Recirculating Aquaculture System				**$ 683,300**	
1-5cfs System	**$ 683,300**	LS	**1**	**$ 683,300**	
6-10cfs System	**$ 1,042,500**	LS	**0**	**$ -**	
11-15cfs System	**$ 1,406,750**	LS	**0**	**$ -**	
Effluent Water Mgt (assumes 10 10x100 ponds)				**$ 175,000**	
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$ 175,000	

SUBTOTAL	**$ 2,572,100**
CONTINGENCY (40%)	**$ 1,029,000**
MOBILIZATION (5%)	**$ 129,000**
GENERAL CONDITIONS (10%)	**$ 258,000**
BOND (2%)	**$ 52,000**
TEMPORARY FACILITIES / OFFICES (2%)	**$ 52,000**
GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$ 386,000**
TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$ 4,478,100**

Whitehorse Hatchery
Budgetary Maximum Allowable Construction Cost for Proposed Hatchery Modifications

Budgetary MACC for Proposed Hatchery Modifications
Whitehorse Hatchery

Item Description						Total Cost	
Incubation	Full Stacks:	16	Bldg. SF:	640	$	161,000
20' Dia Circulars	Qty.	12			$	941,000
10' x 100' Raceways	Qty.	0			$	-
Water Supply Modifications Incubation & Rearing					$	705,000
PRAS System for New Rearing Units					$	684,000
1800 sq ft Residence					$	300,000
Effluent Water Management (effluent piping only)					$	175,000
				Subtotal	**$**	**2,966,000**
				Contingency (40%)	$	1,187,000
				Mobilization (5%)	$	149,000
				General Conditions (10%)	$	297,000
				Bond (2%)	$	60,000
				Temporary Facilities/ Offices (2%)	$	60,000
				General Contractors Overhead & Profit (15%)	$	445,000
				MACC	**$**	**5,164,000**

Whitehorse Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Item Description	Cost	Unit	# Units	Total Cost	Comments
General site improvements					
Incubation (No early rearing; Chinook directly to RW or Circ.)				**$ 161,000**	
Prefabricated Metal Building	$ 125	SF	213	$ 26,667	Area based on requirement for 30 full stacks
Building Foundation	$ 50.00	SF	213	$ 10,667	
Power/Electrical	$ 5,600	LS	1	$ 5,600	Lighting, alarms general outlets
Process Piping	$ 5,600	LS	1	$ 5,600	
Incubation Stacks (full stack)	$ 3,000	EA	16	$ 48,000	30 full stacks for 2,000,000 fish
Formalin, storage, Wash Sinks, Feed Storage	$ 150	SF	425	$ 63,750	Support items for Rearing - Subtracted 75 SF Feed Storage since the hatchery has space
10ft x 100ft Raceway	**$ 203,588**	**EA**	0	**$ -**	
Clear Grub	$ 1	SF	9600	$ 9,600	
Excavation	$ 22	CYD	318	$ 6,989	
Structural Fill	$ 55	CYD	64	$ 3,495	
Concrete Slab	$ 1,100	CYD	48	$ 52,419	
Concrete Wall	$ 1,500	CYD	44	$ 66,065	
Header	$ 5,000	LS	1	$ 5,000	
Grating	$ 100	SF	50	$ 5,000	
Screens	$ 1,500	LS	3	$ 4,500	
Tilting Stand Pipe	$ 2,500	LS	1	$ 2,500	
Stop Logs	$ 3,500	LS	1	$ 3,500	
Hand railing	$ 80	LF	244	$ 19,520	
Avian Predation	$ 25,000	LS	1	$ 25,000	
20 ft diameter Circulars	**$ 78,400**	EA	12	**$ 941,000**	
Clear Grub	$ 900	EA	1	$ 900	30 ft x ft / tank
Excavation / structural fill / finish compaction	$ 7,500	EA	1	$ 7,500	tank ex, piping & electrical
20 ft diameter x 6 ft deep Fiber Glass circular tanks	$ 25,000	EA	1	$ 25,000	
Screens (side screens, tank screens)	$ 3,500	EA	1	$ 3,500	side box, center drain, sane screen
Piping (supply, drains, fish pipe)	$ 15,000	EA	1	$ 15,000	
Stop Logs (side boxes)	$ 1,500	EA	1	$ 1,500	
Utilities (electrical, sensors, flow meter, etc)	$ 15,000	EA	1	$ 15,000	
Avian Predation	$ 5,000	EA	1	$ 5,000	
Complexity factor (based on number of total tanks)	$ 5,000	EA	1	$ 5,000	to account for complexity of multiple tanks
Water supply modification for additional rearing and incubation				**$ 705,000**	
New Surface Water Intake	$ 25,000	CFS	0	$ -	$25000/cfs includes new intake and controls
Aeration, packed column, Junction Box	$ 40,000	CFS	3.5	$ 140,000	Control/Distribution Box
Yard Piping 8" to rearing units, 24" main	$ 350	LF	500	$ 175,000	includes gates/valves (PVC with ductile valves)
Pump (6000 gpm @ 50ft TDH)	$ 75,000	EA	1	$ 75,000	
VFD	$ 15,000	EA	1	$ 15,000	
Power Hook up	$ 50,000	LS	1	$ 50,000	
100 kW Back up Generator	$ 50,000	LS	1	$ 50,000	Diesel Generator on skid
GW wells rehab/new	$ 100,000	LS	2	$ 200,000	Complete rehabilitation

Whitehorse Hatchery Budgetary Pricing for Hatchery Modifications

WDFW

Partial Recirculating Aquaculture System					**$ 683,300**
1-5cfs System	**$ 683,300**	LS	**1**	**$**	**683,300**
6-10cfs System	**$ 1,042,500**	LS	**0**	**$**	**-**
11-15cfs System	**$ 1,406,750**	LS	**0**	**$**	**-**
Effluent Water Mgt (assumes 10 10x100 ponds)				**$**	**175,000**
Yard Piping 8" from raceways, 24" main	$ 350	LF	500	$	175,000
1800 sq ft Residence				**$**	**300,000**
			SUBTOTAL	**$**	**2,965,300**
			CONTINGENCY (40%)	**$**	**1,187,000**
			MOBILIZATION (5%)	**$**	**149,000**
			GENERAL CONDITIONS (10%)	**$**	**297,000**
			BOND (2%)	**$**	**60,000**
			TEMPORARY FACILITIES / OFFICES (2%)	**$**	**60,000**
			GENERAL CONTRACTORS OVERHEAD AND PROFIT (15%)	**$**	**445,000**
			TOTAL BASE FACILITY WITH CONTINGENCY (MACC)	**$**	**5,163,300**

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Appendix G. Operation and Maintenance Costs

Beaver Creek Hatchery

Bogachiel Hatchery

Coulter Creek Hatchery

Deschutes River Hatchery

Dungeness Hatchery

Elwha Hatchery

Humptulips Hatchery

Hupp Springs Hatchery

Kendall Creek Hatchery

Lyon's Ferry Hatchery

Marblemount Hatchery

McKernan Hatchery

Minter Creek Hatchery

Naselle Hatchery

Nemah Hatchery

Palmer Ponds Hatchery

Puyallup Hatchery

Samish Hatchery

Sol Duc Hatchery

Speelyai Hatchery

Voights Creek Hatchery

Wallace River Hatchery

Whitehorse Hatchery

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Beaver Creek Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
BEAVER CREEK HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 159,746
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	24667	Lb	$ 1.2	$ 29,600	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (5914 gpm @ 50ft TDH)	579638	kW	$ 0.150	$ 86,946	
Item				Subtotal	$ 159,746
Other Costs (assume 25% of the total O&M Cost)					$ 53,249

Total Yearly O&M Cost **$ 212,995**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	18687	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	5914	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	74.7				

Bogachiel Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
BOGACHIEL HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 83,157
Facility Technician	7.00	Month	$ 5,400	$ 37,800	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	37785	Lb	$ 1.2	$ 45,342

Item	Quantity		Cost / lb	Amount
Power				
Pump (7864 gpm @ 50ft TDH)	99	kW	$ 0.150	$ 15

Item					
				Subtotal	$ 83,157
Other Costs (assume 25% of the total O&M Cost)					$ 27,719

Total Yearly O&M Cost **$ 110,876**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	28625	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	7864	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	99.3				

Coulter Creek Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
COULTER CREEK HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 78,521
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	7994	Lb	$ 1.2	$ 9,593

Item	Quantity		Cost / lb	Amount
Power				
Pump (1750 gpm @ 50ft TDH)	171519.527	kW	$ 0.150	$ 25,728

Item					
				Subtotal	$ 78,521
Other Costs (assume 25% of the total O&M Cost)					$ 26,174

Total Yearly O&M Cost **$ 104,694**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	6056	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	1750	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	22.1				

Deschutes River Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
DESCHUTES HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 260,163
Facility Technician	12.00	Month	$ 5,400	$ 64,800	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	54120	Lb	$ 1.2	$ 64,944	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (5914 gpm @ 50ft TDH)	869457	kW	$ 0.150	$ 130,419	
Item				Subtotal	$ 260,163
Other Costs (assume 25% of the total O&M Cost)					$ 86,721

Total Yearly O&M Cost $ 346,883

Assumptions	Yellow are input values				
Time line	12	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out (Estimated lbs of feed from HMP)	41000	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	22	cfs	to	5914	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	74.7				

Dungeness Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
DUNGENESS HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 303,659
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	28243	Lb	$ 1.2	$ 33,891

Item	Quantity		Cost / lb	Amount
Power				
Pump (15411 gpm @ 50ft TDH)	1510450	kW	$ 0.150	$ 226,567

Item					
				Subtotal	$ 303,659
Other Costs (assume 25% of the total O&M Cost)					$ 101,220

Total Yearly O&M Cost **$ 404,878**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	21396	Lb			
Feed conversion	1.2	--			
		OR			
Power					
water supply to aeration tower	--	cfs	to	15411	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	194.6				

Elwha Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
ELWHA HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 207,294
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	**Quantity**		**Cost / lb**	**Amount**	
Feed/Production					
Feed (add 10% for uncertainty)	47874	Lb	$ 1.2	$ 57,449	
Item	**Quantity**		**Cost / lb**	**Amount**	
Power					
Pump (7254 gpm @ 50ft TDH)	710973	kW	$ 0.150	$ 106,646	
Item				Subtotal	$ 207,294
Other Costs (assume 25% of the total O&M Cost)					$ 69,098
				Total Yearly O&M Cost	**$ 276,393**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	36268	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	7254	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	91.6				

Humptulips Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
HUMPTULIPS HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 207,900
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	38969	Lb	$ 1.2	$ 46,763	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (8022 gpm @ 50ft TDH)	786246	kW	$ 0.150	$ 117,937	
Item				Subtotal	$ 207,900
Other Costs (assume 25% of the total O&M Cost)					$ 69,300

Total Yearly O&M Cost **$ 277,200**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	29522	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	8022	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	101.3				

Hupp Springs Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
HUPP SPRINGS HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 96,438
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	12548	Lb	$ 1.2	$ 15,058	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (2597 gpm @ 50ft TDH)	254535	kW	$ 0.150	$ 38,180	
Item				Subtotal	$ 96,438
Other Costs (assume 25% of the total O&M Cost)					$ 32,146

Total Yearly O&M Cost **$ 128,584**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	9506	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	2597	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	32.8				

Kendall Creek Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
KENDALL CREEK HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 76,763
Facility Technician	7.00	Month	$ 5,400	$ 37,800	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	9239	Lb	$ 1.2	$ 11,086

Item	Quantity		Cost / lb	Amount
Power				
Pump (2167 gpm @ 50ft TDH)	185841	kW	$ 0.150	$ 27,876

Item					
				Subtotal	$ 76,763
Other Costs (assume 25% of the total O&M Cost)					$ 25,588

Total Yearly O&M Cost **$ 102,350**

Assumptions	Yellow are input values				
Time line	7	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	6999	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	2167	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	27.4				

Lyon's Ferry Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
LYON'S FERRY HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 163,721
Facility Technician	6.00	Month	$ 5,400	$ 32,400	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	37506	Lb	$ 1.2	$ 45,008

Item	Quantity		Cost / lb	Amount
Power				
Pump (7828 gpm @ 50ft TDH)	575424	kW	$ 0.150	$ 86,314

Item				Subtotal	$ 163,721
Other Costs (assume 25% of the total O&M Cost)					$ 54,574

Total Yearly O&M Cost **$ 218,295**

Assumptions	Yellow are input values				
Time line	6	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	28414	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	--	cfs	to	7828	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	98.8				

Marblemount Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
MARBLEMOUNT HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 196,464
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	37917	Lb	$ 1.2	$ 45,500

Item	Quantity		Cost / lb	Amount
Power				
Pump (7330 gpm @ 50ft TDH)	718422	kW	$ 0.150	$ 107,763

Item					
				Subtotal	$ 196,464
Other Costs (assume 25% of the total O&M Cost)					$ 65,488

Total Yearly O&M Cost **$ 261,952**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	28725	Lb			
Feed conversion	1.2	--			
		OR			
Power					
Well water supply to aeration tower and PRAS	--	cfs	to	7330	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	92.6				

McKernan Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
MCKERNAN HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 75,349
Facility Technician	7.00	Month	$ 5,400	$ 37,800	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	9701	Lb	$ 1.2	$ 11,641

Item	Quantity		Cost / lb	Amount
Power				
Pump (2014 gpm @ 50ft TDH)	172720	kW	$ 0.150	$ 25,908

Item					
				Subtotal	$ 75,349
Other Costs (assume 25% of the total O&M Cost)					$ 25,116

Total Yearly O&M Cost **$ 100,465**

Assumptions	Yellow are input values				
Time line	7	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Incubation ONLY	7349	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower and PRAS	--	cfs	to	2014	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	25.4				

Minter Creek Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
MINTER CREEK HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 1,588
Facility Technician	4.00	Month	$ -	$ -	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	0	Lb	$ 1.2	$ -

Item	Quantity		Cost / lb	Amount
Power				
Pump (216 gpm @ 50ft TDH)	10585	kW	$ 0.150	$ 1,588

Item					
				Subtotal	$ 1,588
Other Costs (assume 25% of the total O&M Cost)					$ 529
			Total Yearly O&M Cost		**$ 2,117**

Assumptions	Yellow are input values				
Time line	4	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	0	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Incubation ONLY	0	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower and PRAS	--	cfs	to	216	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	2.7				

Naselle Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
NASELLE HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 186,012
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	32319	Lb	$ 1.2	$ 38,783

Item	Quantity		Cost / lb	Amount
Power				
Pump (7076 gpm @ 50ft TDH)	693527	kW	$ 0.150	$ 104,029

Item					
				Subtotal	$ 186,012
Other Costs (assume 25% of the total O&M Cost)					$ 62,004

Total Yearly O&M Cost **$ 248,016**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	24484	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower	--	cfs	to	7076	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	89.3				

Nemah Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
NEMAH HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 124,500
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	**Quantity**		**Cost / lb**	**Amount**	
Feed/Production					
Feed (add 10% for uncertainty)	19161	Lb	$ 1.2	$ 22,993	
Item	**Quantity**		**Cost / lb**	**Amount**	
Power					
Pump (3966 gpm @ 50ft TDH)	388712	kW	$ 0.150	$ 58,307	
Item				Subtotal	$ 124,500
Other Costs (assume 25% of the total O&M Cost)					$ 41,500
				Total Yearly O&M Cost	**$ 166,000**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	14516	Lb			
Feed conversion	1.2	--			
		OR			
Power					
Surface water supply to aeration tower	--	cfs	to	3966	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	50.1				

Palmer Ponds Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PALMER PONDS HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 113,488
Facility Technician	7.00	Month	$ 5,400	$ 37,800	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	37785	Lb	$ 1.2	$ 45,342

Item	Quantity		Cost / lb	Amount
Power				
Pump (2359 gpm @ 50ft TDH)	202307	kW	$ 0.150	$ 30,346

Item					
				Subtotal	$ 113,488
Other Costs (assume 25% of the total O&M Cost)					$ 37,829

Total Yearly O&M Cost **$ 151,317**

Assumptions	Yellow are input values				
Time line	7	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	28625	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower and PRAS	--	cfs	to	2359	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	29.8				

Puyallup Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PUYALLUP HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 72,568
Facility Technician	7.00	Month	$ 5,400	$ 37,800	
Item	**Quantity**		**Cost / lb**	**Amount**	
Feed/Production					
Feed (add 10% for uncertainty)	8498	Lb	$ 1.2	$ 10,198	
Item	**Quantity**		**Cost / lb**	**Amount**	
Power					
Pump (1910 gpm @ 50ft TDH)	163801	kW	$ 0.150	$ 24,570	
Item				Subtotal	$ 72,568
Other Costs (assume 25% of the total O&M Cost)					$ 24,189
				Total Yearly O&M Cost	**$ 96,757**

Assumptions	Yellow are input values				
Time line	7	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	6438	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower and PRAS	--	cfs	to	1910	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	24.1				

Samish Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
SAMISH HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 105,041
Facility Technician	7.00	Month	$ 5,400	$ 37,800	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	16842	Lb	$ 1.2	$ 20,210	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (3656 gpm @ 50ft TDH)	313538	kW	$ 0.150	$ 47,031	
Item				Subtotal	$ 105,041
Other Costs (assume 25% of the total O&M Cost)					$ 35,014

Total Yearly O&M Cost **$ 140,055**

Assumptions	Yellow are input values				
Time line	7	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	12759	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Well water supply to aeration tower and PRAS	--	cfs	to	3656	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	46.2				

Sol Duc Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
SOL DUC HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 116,251
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	16636	Lb	$ 1.2	$ 19,963

Item	Quantity		Cost / lb	Amount
Power				
Pump (3611 gpm @ 50ft TDH)	353918	kW	$ 0.150	$ 53,088

Item					
				Subtotal	$ 116,251
Other Costs (assume 25% of the total O&M Cost)					$ 38,750

Total Yearly O&M Cost **$ 155,001**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	12603	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Surface water supply to aeration tower and PRAS	--	cfs	to	3611	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	45.6				

Speelyai Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
SPEELYAI HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 117,379
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	16963	Lb	$ 1.2	$ 20,356

Item	Quantity		Cost / lb	Amount
Power				
Pump (3661 gpm @ 50ft TDH)	358819	kW	$ 0.150	$ 53,823

Item					
				Subtotal	$ 117,379
Other Costs (assume 25% of the total O&M Cost)					$ 39,126

Total Yearly O&M Cost **$ 156,505**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	12851	Lb			
Feed conversion	1.2	--			
Power		**OR**			
Well water supply to aeration tower and PRAS	--	cfs	to	3661	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	46.2				

Voights Creek Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
VOIGHTS CREEK HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 120,614
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	17993	Lb	$ 1.2	$ 21,592

Item	Quantity		Cost / lb	Amount
Power				
Pump (3797 gpm @ 50ft TDH)	372148	kW	$ 0.150	$ 55,822

Item					
				Subtotal	$ 120,614
Other Costs (assume 25% of the total O&M Cost)					$ 40,205

Total Yearly O&M Cost **$ 160,818**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish), 1 FTE for PRAS	1.0	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	13631	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	8.46	cfs	to	3797	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	47.9				

Wallace River Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
WALLACE RIVER HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 128,546
Facility Technician	8.00	Month	$ 5,400	$ 43,200	
Item	Quantity		Cost / lb	Amount	
Feed/Production					
Feed (add 10% for uncertainty)	29969	Lb	$ 1.2	$ 35,963	
Item	Quantity		Cost / lb	Amount	
Power					
Pump (3359 gpm @ 50ft TDH)	329219	kW	$ 0.150	$ 49,383	
Item				Subtotal	$ 128,546
Other Costs (assume 25% of the total O&M Cost)					$ 42,849
				Total Yearly O&M Cost	**$ 171,395**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1.0	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	22704	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	7.48	cfs	to	3359	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	42.4				

Whitehorse Hatchery
Operations and Maintenance Details

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
WHITEHORSE HATCHERY DEVELOPMENT
OPERATIONS AND MAINTENANCE DETAILS

Item	Yearly % Quantity	Unit	Yearly Cost	Amount	Total
Labor					$ 105,685
Facility Technician	8.00	Month	$ 5,400	$ 43,200	

Item	Quantity		Cost / lb	Amount
Feed/Production				
Feed (add 10% for uncertainty)	13504	Lb	$ 1.2	$ 16,204

Item	Quantity		Cost / lb	Amount
Power				
Pump (3148 gpm @ 50ft TDH)	308539	kW	$ 0.150	$ 46,281

Item					
				Subtotal	$ 105,685
Other Costs (assume 25% of the total O&M Cost)					$ 35,228

Total Yearly O&M Cost **$ 140,914**

Assumptions	Yellow are input values				
Time line	8	Month			
Number of Temp FTEs (assume 1 person /2,000,000 fish)	1.0	Each			
temp FTE cost assumed at $33.75/hr w/o benefits					
Feed					
Raceway lbs of Fish out	10230	Lb			
Feed conversion	1.2	--			
Power		**OR**			
water supply to aeration tower	7.01	cfs	to	3148	gpm
Flow obtained from bio summary					
Calculated HP (WHP = QH/3960)	39.7				

Appendix H. Prioritization Scores

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Table H-1. SRKW pathway costs, fish production, and cost per fish.

			Criteria	Lyons Ferry	Kendall Creek	Marblemount	Palmer Ponds	Samish	Wallace River	Whitehorse	Beaver Creek	Speelyai	Bogachiel	Dungeness	Elwha	Humptulips	Hupp Springs	Coulter	McKernan	Naselle	Nemah	Puyallup	Voights Creek	Sol Duc	Carlson Ponds	Scatter Creek
			Stock	Lower Snake Fall Chinook	NF-MF Nooksack Spring Chinook (Kendall Cr Hatchery Integrated)	Upper Skagit Spring Chinook	Green River Fall Chinook	Samish Hatchery Fall Chinook	Skykomish Summer Chinook (Wallace Hatchery Integrated)	N.F. Stillaguamish Summer Chinook (Whitehorse/Harvey Integrated)	Elochoman Fall Chinook	Lewis River Spring Chinook	Bogachiel Fall Chinook	Dungeness Spring Chinook (Dungeness Hatchery Integrated)	Elwha River Summer/Fall Chinook	Humptulips Fall Chinook (Humptulips Hatchery Integrated)	Minter Creek Hatchery Fall Chinook	Minter Creek Hatchery Fall Chinook or Tumwater Falls Hatchery Fall Chinook	Skokomish Fall Chinook	Naselle River Fall Chinook	Nemah River Fall Chinook	Puyallup River Fall Chinook	Puyallup River Fall Chinook	Sol Duc River Summer Chinook	Puget Sound Fall Chinook	Puget Sound Fall Chinook
			Broodsource	Lyons Ferry Hatchery	Kendall Creek Hatchery	Skagit Spring Chinook	Soos Creek Hatchery	Samish Hatchery	Wallace River Hatchery	TBD	Beaver Creek Hatchery	Lewis River Natural, no program currently exists	TBD	Dungeness Hatchery	Elwha River	TBD	Minter Creek Hatchery	Minter Creek Hatchery or Tumwater Falls Hatchery	George Adams Hatchery	Naselle River Hatchery	Nemah River Hatchery	Puyallup River Hatchery	Voights Creek Hatchery	Sol Duc Hatchery	Unknown	Unknown
			Broodsource Program Type	Integrated	Integrated	Segregated	Integrated	Segregated	Integrated	Integrated	Integrated			Integrated	Integrated	Integrated	Segregated	Segregated	Integrated	Integrated	Segregated	Integrated	Integrated	Integrated	Segregated	Segregated
			Future Brood 2021 Planned Release	1,150,000	1,300,000		2,000,000	5,200,000								500,000	0/Current program is White River Spring Chin	0 release	100,000	5,000,000	3,300,000			790,000		
			Release Location	Lyons Ferry Hatchery	Kendall Creek Hatchery	Marblemount	Palmer Ponds	Samish Hatchery	Wallace River Hatchery	TBD	Deep River Net Pens			Dungeness Hatchery	Elwha River or Morse Creek	Humptulips Hatchery	Hupp Springs	Coulter Creek Hatchery	McKernan Hatchery	Naselle River Hatchery	Nemah River Hatchery	Puyallup River Hatchery	Voights Creek Hatchery	Sol Duc Hatchery	PS Net Pens	PS Net Pens
			ESU	Lower Snake Fall Chinook	Puget Sound Chinook		Puget Sound Chinook	Puget Sound Chinook	Puget Sound Chinook	Puget Sound Chinook	Lower Columbia Chinook	Lower Columbia Chinook	Washington Coast Chinook	Puget Sound Chinook	Puget Sound Chinook	Washington Coast Chinook	Puget Sound Chinook	Puget Sound Chinook	Puget Sound Chinook	Washington Coast Chinook	Washington Coast Chinook	Puget Sound Chinook	Puget Sound Chinook	Washington Coast Chinook	Puget Sound Chinook	Puget Sound Chinook
			Watershed	Lower Snake River	Nooksack River	Skagit River	Green River	Samish River	Skykomish River	TBD	Lower Columbia Net Pen	Lewis River	Bogachiel River	Dungness River	Elwha River	Humptulips River	Minter Creek	Coulter Creek	Skokomish River	Naselle River	Nemah River	Puyallup River	Puyallup River	Sol duc River		
			Region Release and adult return	Lower Snake River	North Puget Sound	North Puget Sound	South Puget Sound	North Puget Sound	North Puget Sound	North Puget Sound	Lower Columbia River	Lower Columbia River	Washington Coast	North Puget Sound	North Puget Sound	Washington Coast	South Puget Sound	South Puget Sound	Hood Canal	Washington Coast	Washington Coast	South Puget Sound	South Puget Sound	Washington Coast	Puget Sound	Puget Sound
			WDFW provided SAR	0.51%	0.67%		0.44%	0.77%	0.30%	0.28%	0.21% Deep River Net Pen	No Data	No Data	0.05%; yearling program	0.10%	0.53%	0.44%	0.19%	0.66%, George Adams	0.43%	0.28%	0.82%	0.82%	0.41%	No Data	No Data
SRKW Prey Availability	In Right Location		WDFW 2018 Score (may round to nearest whole number)	4.25	3.88	3.88	5.00	5.00	5.00	5.00	4.63	4.25	3.69	3.88	5.00	3.69	5.00	5.00	5.00	3.69	3.69	5.00	5.00	3.69	5.00	5.00
			Comments on score			Assumes Fall Chinook			Aassume score also applies to summers	Aassume score also applies to summers					Aassume score also applies to summers					Assumed to be part of WA Coast					Aassume score also applies to summers		
SRKW Prey Availability	Ranked list by stock		Rank value based on all stock groups identified iin 2018 Priority Stock list	4	5		1	1	1	1	2	2	6	5	1	6	1	1	1	6		1	1	6		
SRKW Prey Availability	Ranked pathways		Rank value based on pathways (ranks scores based on stocks with pathways) Rank 5 - highest prey score Rank 1 - Lowest prey score	3	2	2	5	5	5	5	4	3	1	2	5	1	5	5	5	1	1	5	5	1	5	5
SRKW Prey Availability	Returning adults		Release to Adult Survival Rate 1 = Low (<0.4% survival to adult) 3 = Typical (0.4% to 0.6% subyearling release) 5 = High (>0.6% survival to adult)	3	5	3	3	5	3	1	1	3	3	1	1	3	3	1	5	3	1	5	5	3	3	3
			SAR comments			0.38% BY 2000-2011 Summeer Chinook subs; Fall Chinook Subs 0.36% (BY 2000-2008); did not get SAR for springs, assume similar to fall Chinook						Assumed mid-range for a Spring Chinook release from Speelyai	No existing program, assumed md-range						Used George Adams SAR						No existing program, assumed md-range	No existing program, assumed md-range
CoManager Consultation	CoManager Consultation		1 - Co-managers are less aligned with to existing watershed basin strategies 5 - Co-managers are more aligned with existing watershed basin strategies	3	5	3	5	5	3	1	5	5	1	3	1	1	3	3	3	5	5	5	5	3	2	2
			Comanager Consultation comments	Columbia River Treaty Tribes	Puget Sound Tribes	Current production Summer Chinook, integrated with natural population in Skagit, WDFW discussing spring Chinook	Release revised to 600,000 per NMFS permit	10 yr plan has schedule for additional production	Puget Sound Tribes	Confirm, Stillaguamish Tribe said no additional production	Lower Columbia, no apparent co-manager issues	Lower Columbia, no apparent co-manager issues	WA Coast Tribes, A decision has been made to no release Chinook in Bogachiel	Puget Sound Tribes	Puget Sound Tribes	WA Coast Tribes, Quinault have said a smaller SRKW release	Puget Sound Tribes	Puget Sound Tribes	Puget Sound Tribes	WA state management area, no comanager	WA state management area, no comanager	Puget Sound Tribes	Puget Sound Tribes	WA Coast Tribes	Puget Sound Tribes, possible additional issues depending on net pen location	Puget Sound Tribes, possible additional issues depending on net pen location
ESA Issues – NOAA Fisheries, Scientific Review	ESA Issues – NOAA Fisheries, Scientific Review		1 -Take permit has already been issued; would require re-inititiaton of consultation 3 - Draft HGMP has been submitted to NMFS, will require revision and re-submittal 5 - Draft HGMP has been submitted to NMFS with proposed increase for SRKW, or Take permit has been issued with additional production for SRKW	3	3	3	5	5	3	3	3	3	5	3	3	5	4	4	3	5	5	3	3	5	2	2
			Comments ESA	General Snake River Fall Chinook ESA issues	General PS Chinook ESA issues		FEIS/ROD January 2020, permitted for additional 600,000, not full 2.0 million	Need to confirm this is in review and NMFS is in agreement	General PS Chinook ESA issues	General PS Chinook ESA issues	General Lower Columbia Chinook ESA issues	General Lower Columbia Chinook ESA issues	No listed salmon or steelhead	General PS Chinook ESA issues	General PS Chinook ESA issues	No listed salmon or steelhead	Minor ESA issues, no nearby Chinook populations essential for recovery	Minor ESA issues, no nearby Chinook populations essential for recovery	General PS Chinook ESA issues	No listed salmon or steelhead	No listed salmon or steelhead	General PS Chinook ESA issues	General PS Chinook ESA issues	No listed salmon or steelhead	Location net pens will requre additional consultation	Location net pens will requre additional consultation
Constructability and Water Availability	Speed of Implementation		1 - Numerous approvals and permits; minor expansion 5 - Minimal permits and approvals; major expansion	3	4	3	3	2	3	3	2	4	2	3	3	4	3	4	3	3	1	4	4	4	5	5
Constructability and Water Availability	Water is Available		1 -Water availability is uncertain 5 - Water is available	3	3	3	3	3	3	2	2	4	2	3	4	4	3	3	3	4	3	3	4	3	4	5
Cost Effectiveness Ratio	Cost per fish produced			0.39	0.32	0.28	0.48	0.41	0.39	0.39	0.25	0.31	0.25	1.00	0.28	0.32	0.55	0.41	0.45	0.29	0.39	0.46	0.39	0.42	0.18	0.18
Cost Effectiveness Ratio	Cost per fish produced		1 - > $0.39 per fish 3 - Between $0.31 and $0.39 per fish 5 - < $0.31 per fish	3	3	5	1	1	3	3	5	3	5	1	5	3	1	1	1	5	3	1	3	1	5	5

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Table H-2. SRKW pathway prioritization criteria and contributing scores.

Criterion	Weight	Score Range	Lyons Ferry	Kendall Creek	Marblemount	Palmer Ponds	Samish	Wallace River	Whitehorse	Beaver Creek	Speelyai	Bogachiel	Dungeness	Elwha	Humptulips	Hupp Springs	Coulter	McKernan	Naselle	Nemah	Puyallup	Voights Creek	Sol Duc	Carlson Ponds	Scatter Creek
SRKW Prey Availability	35%	5 - 35%	24	25	21	30	35	30	26	22	24	18	16	26	18	30	26	35	14	7	35	35	18	30	30
CoManager Consultation	20%	4 - 20%	12	20	12	20	20	12	4	20	20	4	12	4	4	12	12	12	20	20	20	20	12	8	8
ESA Issues – NOAA Fisheries, Scientific Review	20%	4 - 20%	12	12	12	20	20	12	12	12	12	20	12	12	20	16	16	12	20	20	12	12	20	8	8
Constructability and Water Availability	15%	3 - 15%	9	11	9	9	8	9	8	6	12	6	9	11	12	9	11	9	11	6	11	12	11	14	15
Cost Effectiveness Ratio	10%	1 - 10%	6	6	10	2	2	6	6	10	6	10	2	10	6	2	2	2	10	6	2	6	2	10	10
Total			**63**	**74**	**64**	**81**	**85**	**69**	**55**	**70**	**74**	**58**	**51**	**62**	**60**	**69**	**66**	**70**	**75**	**59**	**80**	**85**	**62**	**70**	**71**

Table H-3. SRKW pathway prioritization index scores.

WDFW Region	Pathway Name	Project Management	Pre-Design Capital Cost	Design Capital Cost	MACC Cost	MACC Cost With Tax & Contingency	Annual O&M Cost	Total Capital Cost	Annual Production Quantity	Cost/Fish
4	Samish	$623,000	$85,000	$1,005,000	$5,604,000	$6,324,000	$141,000	$8,037,000	1,000,000	$0.41
6	Voights Creek	$541,000	$71,000	$891,000	$4,729,000	$5,337,000	$161,000	$6,840,000	1,000,000	$0.39
4	Palmer Ponds	$390,000	$41,000	$623,000	$2,730,000	$3,081,000	$152,000	$4,135,000	600,000	$0.48
6	Puyallup	$418,000	$52,000	$723,000	$3,463,000	$3,908,000	$97,000	$5,101,000	575,000	$0.46
6	Naselle	$765,000	$108,000	$1,205,000	$7,176,000	$8,098,000	$249,000	$10,176,000	2,000,000	$0.29
5	Speelyai						$157,000	$0	500,000	$0.31
4	Kendall Creek	$303,000		$573,000	$2,386,000	$2,693,000	$103,000	$3,569,000	700,000	$0.32
6	Scatter Creek						$254,800	$0	1,400,000	$0.18
5	Beaver Creek	$669,000	$92,000	$1,070,000	$6,110,000	$6,895,000	$213,000	$8,726,000	2,000,000	$0.25
6	McKernan	$319,000		$594,000	$2,534,000	$2,860,000	$101,000	$3,773,000	500,000	$0.45
6	Carlson Ponds						$136,500	$0	750,000	$0.18
4	Wallace River	$517,000	$68,000	$858,000	$4,480,000	$5,056,000	$172,000	$6,499,000	1,000,000	$0.39
6	Hupp Springs	$536,000	$71,000	$885,000	$4,682,000	$5,284,000	$129,000	$6,776,000	650,000	$0.55
6	Coulter Creek	$255,000		$508,000	$1,924,000	$2,172,000	$105,000	$2,935,000	500,000	$0.41
4	Marblemount	$666,000	$92,000	$1,065,000	$6,077,000	$6,858,000	$262,000	$8,681,000	2,000,000	$0.28
1	Lyons Ferry	$1,173,000	$185,000	$1,797,000	$12,081,000	$13,633,000	$219,000	$16,788,000	2,000,000	$0.39
6	Sol Duc	$608,000	$82,000	$984,000	$5,442,000	$6,141,000	$155,000	$7,815,000	1,000,000	$0.42
6	Elwha	$666,000	$92,000	$1,113,000	$6,070,000	$6,850,000	$277,000	$8,721,000	2,000,000	$0.28
6	Humptulips	$797,000	$114,000	$1,251,000	$7,545,000	$8,514,000	$278,000	$10,676,000	2,000,000	$0.32
6	Nemah	$533,000	$70,000	$881,000	$4,648,000	$5,245,000	$166,000	$6,729,000	1,000,000	$0.39
6	Bogachiel	$846,000	$122,000	$1,321,000	$8,115,000	$9,157,000	$111,000	$11,446,000	2,000,000	$0.25
4	Whitehorse	$582,000	$78,000	$948,000	$5,164,000	$5,828,000	$141,000	$7,436,000	1,000,000	$0.39
6	Dungeness	$1,230,000	$192,000	$1,881,000	$12,798,000	$14,442,000	$405,000	$17,745,000	1,000,000	$1.00

Appendix I. Cost-Loaded Schedule for Implementation Plan

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Recommended Implementation Plan, by Cost Center, within Budget Constraint for SRKW Project and Existing 10-Year CP

Table I-1 presents the full recommended implementation plan of SRKW projects, within the approximate budget constraints identified by WDFW. The projects are broken into cost centers (predesign, design, and construction). The existing 10-year capital plan is included, as well.

Recommended Implementation Plan, Grouped by Project, within Budget Constraint for SRKW Project and Existing 10-Year CP

Table I-2 presents the full recommended implementation plan of SRKW projects, within the approximate budget constraints identified by WDFW. In this table, costs are presented at the project level. The existing 10-year capital plan is included as well.

Optional 10-Year Implementation Plan, By Cost Center, with Existing 10-Year CP

Table I-3 presents an alternative implementation plan in which all SRKW projects are accomplished within the next 10-years. This requires additional budget beyond the current estimated constraint. Projects in this table are presented in unescalated, 2020 dollars. The existing 10-year capital plan is included, as well.

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Table I-1. Recommended Implementation Plan, by Cost Center, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
1	85.00	Voights Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ 38,632	$ 38,632	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Design	SRKW Pathway	$ 498,820	$ 498,820	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Construction	SRKW Pathway	$ 2,476,096	$ -	$ 3,604,427	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 50,739	$ 50,739	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 621,473	$ 621,473	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,046,934	$ 4,046,934	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 24,649	$ 24,649	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 386,844	$ 386,844	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,985,585	$ 1,985,585	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 31,191	$ 31,191	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 448,570	$ 448,570	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,512,973	$ 2,512,973	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 64,302	$ 64,302	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 743,315	$ 743,315	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,168,783	$ 5,168,783	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Design	SRKW Pathway	$ 320,533	$ 320,533	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Construction	SRKW Pathway	$ 1,507,579	$ 2,168,356	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 54,888	$ 54,888	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 670,559	$ 670,559	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,622,609	$ 4,622,609	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 405,338	$ 405,338	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,026,005	$ 2,026,005	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 44,735	$ 44,735	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 600,462	$ 600,462
9	69.33	Wallace River SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 46,687	$ 46,687	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 618,951	$ 618,951	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Costruction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ 60,297	$ 60,297	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 728,358	$ 728,358	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,466,537	$ 2,466,537	$ 2,466,537	$ 2,466,537	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 120,394	$ 120,394	$ -	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250,877	$ 1,250,877	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,224,951	$ 5,224,951
14	62.44	Sol Duc SRKW Expansion Project- Predesign	SRKW Pathway	$ 46,729	$ 46,729	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project- Design	SRKW Pathway	$ 585,474	$ 296,069	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,228,340	$ 3,932,498	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ 60,286	$ 60,286	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 722,584	$ 722,584	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,811,830	$ 4,811,830	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 74,585	$ 74,585	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ 46,016	$ 46,016	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 607,311	$ 607,311	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,874,445	$ 3,874,445	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Preservation	Capital Project	$ 21,956,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Programmatic	Capital Project	$ 3,228,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wallace river- replace intake and ponds	Capital Project	$ 13,000,000	$ -	$ 12,333,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	SRKW- New Cowlitz Hatchery	Capital Project	$ 300,000	$ -	$ 4,500,000	$ -	$ 20,000,000	$ -	$ 13,986,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Soos Creek Hatchery Renovation	Capital Project	$ 1,702,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Spokane Hatchery Renovation	Capital Project	$ 2,800,000	$ -	$ 10,000,000	$ -	$ 8,735,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hazard Fuel Reductions, Focus Health and Ecosystem Improvements	Capital Project	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Toutle River Fish Collection Facility-Match	Capital Project	$ 14,239,000	$ -	$ 4,312,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naselle Hatchery Renovation	Capital Project	$ 20,000,000	$ -	$ 9,753,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wiley Slough Dike Raising	Capital Project	$ 5,481,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hurd Creek Relocate Facilities Out of Floodplain	Capital Project	$ 11,894,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Forks Creek Hatchery- Renovate Intake and Diversion	Capital Project	$ 511,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kalama Falls Hatchery Replace Raceways and PA System	Capital Project	$ 8,288,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fish and Wildlife Health and BioSecurity Facility	Capital Project	$ 6,692,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wooten Wildlife Area Improve Flood Plain	Capital Project	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 5,006,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Beaver Creek Hatchery Renovation	Capital Project	$ 2,000,000	$ -	$ 9,500,000	$ -	$ 9,498,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Eels Springs Hatchery Renovation	Capital Project	$ 12,652,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fallert Creek Hatchery Renovation	Capital Project	$ 1,650,000	$ -	$ 14,937,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 1 Office Construct Secure Storage	Capital Project	$ 7,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Snow Creek Reconstruct Facility	Capital Project	$ 900,000	$ -	$ 7,060,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Cooperate Elk Damage Fencing	Capital Project	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Deschutes Watershed Center	Capital Project	$ 2,200,000	$ -	$ 22,000,000	$ -	$ 12,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Marblemount Hatchery Renovation	Capital Project	$ 120,000	$ -	$ 12,000,000	$ -	$ 11,072,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kendall Creek Hatchery- Replace Intake	Capital Project	$ 120,000	$ -	$ 1,100,000	$ -	$ 8,165,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Friday Creek Intake and Fish Passage	Capital Project	$ -	$ -	$ 550,000	$ -	$ 6,938,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Nemah Hatchery Bridge Replacement	Capital Project	$ -	$ -	$ 1,608,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	North Toutle Hatchery Rebuild	Capital Project	$ -	$ -	$ 2,750,000	$ -	$ 12,500,000	$ -	$ 14,599,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Sekiu Boat Ramp Acquisition and Development	Capital Project	$ -	$ -	$ 1,684,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Mayr Brothes Hatchery - Intake Replacement	Capital Project	$ -	$ -	$ 600,000	$ -	$ 1,973,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Elochoman hatchery Demolition and Restoration	Capital Project	$ -	$ -	$ 3,816,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Milltown Island Restoration	Capital Project	$ -	$ -	$ 7,233,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Table I-1. Recommended Implementation Plan, by Cost Center, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
1	85.00	Voights Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project- Construction	SRKW Pathway	$ 3,917,348	$ 3,917,348	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project- Costruction	SRKW Pathway	$ -	$ -	$ 4,092,080	$ 4,092,080	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Design	SRKW Pathway	$ 355,172	$ 355,172	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ 1,696,321	$ 1,696,321	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project- Construction	SRKW Pathway	$ 5,224,951	$ 5,224,951	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Design	SRKW Pathway	$ 873,085	$ 873,085	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ 6,561,180	$ 6,561,180	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 79,754	$ 79,754	$ -	$ -	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 921,874	$ 921,874	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,525,546	$ 3,525,546	$ 3,525,546	$ 3,525,546
19	55.17	Whitehorse SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 51,238	$ 51,238	$ -	$ -	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 662,795	$ 662,795	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,508,758	$ 4,508,758	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Predesign	SRKW Pathway	$ -	$ -	$ 124,871	$ 124,871	$ -	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Design	SRKW Pathway	$ -	$ -	$ -	$ -	$ 1,308,914	$ 1,308,914	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project- Construction	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,531,541	$ 5,531,541	$ 5,531,541	$ 5,531,541
N/A	0.00	Minor Works Preservation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Programmatic	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wallace river- replace intake and ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	SRKW- New Cowlitz Hatchery	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Soos Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Spokane Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hazard Fuel Reductions, Focus Health and Ecosystem Improvements	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Toutle River Fish Collection Facility-Match	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naselle Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wiley Slough Dike Raising	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hurd Creek Relocate Facilities Out of Floodplain	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Forks Creek Hatchery- Renovate Intake and Diversion	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kalama Falls Hatchery Replace Raceways and PA System	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fish and Wildlife Health and BioSecurity Facility	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wooten Wildlife Area Improve Flood Plain	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Beaver Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Eels Springs Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fallert Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 1 Office Construct Secure Storage	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Snow Creek Reconstruct Facility	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Cooperate Elk Damage Fencing	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Deschutes Watershed Center	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Marblemount Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kendall Creek Hatchery- Replace Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Friday Creek Intake and Fish Passage	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Nemah Hatchery Bridge Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	North Toutle Hatchery Rebuild	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Sekiu Boat Ramp Acquisition and Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Mayr Brothes Hatchery - Intake Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Elochoman hatchery Demolition and Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Milltown Island Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Table I-1. Recommended Implementation Plan, by Cost Center, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
N/A	0.00	Region 4 Headquarters Consolidation	Capital Project	$ -	$ -	$ 5,000,000	$ -	$ 10,451,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Ringold Hatchery Replace Ponds	Capital Project	$ -	$ -	$ 3,641,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	George Adams Hatchery - Replace Ponds and Raceways	Capital Project	$ -	$ -	$ 1,200,000	$ -	$ 10,960,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Issaquah Hatchery Replace Gravity Pipeline	Capital Project	$ -	$ -	$ 2,737,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Adult Pond	Capital Project	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 7,921,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naches Hatchery - Water Supply Development	Capital Project	$ -	$ -	$ 3,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Washougal Hatchery - Rehab Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ 6,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Reiter Ponds Hatchery - Replace Intake and Piping	Capital Project	$ -	$ -	$ 1,848,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Tokul Creek Hatchery - Replace Raceway, Water Supply, Drains	Capital Project	$ -	$ -	$ -	$ -	$ 140,000	$ -	$ 975,000	$ -	$ 6,925,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	1.00	Hoodsport Hatchery Renovate Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 850,000	$ -	$ 5,886,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	2.00	Capitol Way Renovations	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,501,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	3.00	Nemah Hatchery - Intake and Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,800,000	$ -	$ 14,014,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	4.00	Elwah Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 11,967,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	5.00	Goldendale Hatchery Expansion and Modernization	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,800,000	$ -	$ 12,943,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	6.00	Wenas WLA - Facility Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,360,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	7.00	Ford Creek Hatchery - Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,250,000	$ -	$ 25,315,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	8.00	Forks Creek Hatchery- Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,428,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	9.00	Bingham Creek - Replace 5 Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,790,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	10.00	Columbia Basin Hatchery - Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,750,000	$ -	$ 13,758,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	11.00	Goldendale Hatchery Pipeline and Raceway Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,193,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	12.00	Skamania Hatchery - Renovate Adult Trapping and Spawning Facilities	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 650,000	$ -	$ 4,829,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	13.00	Alrington Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,300,000	$ -	$ 11,153,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	14.00	Chambers (Garrison) Creek - Fishway repairs	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,613,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	15.00	Chelan Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,700,000	$ -	$ 13,195,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	16.00	Washougal Hatchery - Pond Replacement	Capital Project	$ -	$ -	$ -	$ -	$ 1,600,000	$ -	$ 12,674,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	17.00	Sol Duc Hatchery - Ponds Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,869,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	18.00	Voights Creek Hatchery Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,410,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	19.00	Humptulips Hatchery Renovate Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,296,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	20.00	Dungeness Hatchery - Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900,000	$ -	$ 13,871,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	21.00	Lathrop Road Compound - Covered Storage for Equipment	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,603,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	22.00	Mudflow Unit Toutle River Restoration and Habitat Enhancement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	23.00	Hoodsport Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,438,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	24.00	McKernan Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,987,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	25.00	Fish Habitat and Wildlife Replacement Lands - Land Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	26.00	Evergreen Jobs Grants Program	Capital Project	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	27.00	Mitigation Projects	Capital Project	$ 13,500,000	$ -	$ 13,500,000	$ -	$ 13,500,000	$ -	$ 18,000,000	$ -	$ 18,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	28.00	PSNERP Match	Capital Project	$ 94,290,000	$ -	$ 27,664,000	$ -	$ 138,878,000	$ -	$ 700,000	$ -	$ 264,672,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	29.00	Migratory Waterfowl Habitat	Capital Project	$ 600,000	$ -	$ 600,000	$ -	$ 600,000	$ -	$ 600,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	30.00	Nelson Dam Replacement	Capital Project	$ 8,500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	31.00	Dungeness Hatchery Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ 2,002,000	$ -	$ 12,150,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL				**$ 278,750,862**	**$ 3,189,138**	**$ 208,612,197**	**$ 225,770**	**$ 297,103,360**	**$ 3,037,360**	**$ 146,057,974**	**$ 18,375,132**	**$ 491,857,461**	**$ 8,991,461**	**$ 9,349,107**	**$ 9,349,107**	**$ 5,818,858**	**$ 5,818,858**	**$ 5,825,413**	**$ 5,825,413**

Table I-1. Recommended Implementation Plan, by Cost Center, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
N/A	0.00	Region 4 Headquarters Consolidation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Ringold Hatchery Replace Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	George Adams Hatchery - Replace Ponds and Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Issaquah Hatchery Replace Gravity Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Adult Pond	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naches Hatchery - Water Supply Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Washougal Hatchery - Rehab Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Reiter Ponds Hatchery - Replace Intake and Piping	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Tokul Creek Hatchery - Replace Raceway, Water Supply, Drains	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	1.00	Hoodsport Hatchery Renovate Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	2.00	Capitol Way Renovations	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	3.00	Nemah Hatchery - Intake and Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	4.00	Elwah Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	5.00	Goldendale Hatchery Expansion and Modernization	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	6.00	Wenas WLA - Facility Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	7.00	Ford Creek Hatchery - Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	8.00	Forks Creek Hatchery- Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	9.00	Bingham Creek - Replace 5 Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	10.00	Columbia Basin Hatchery - Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	11.00	Goldendale Hatchery Pipeline and Raceway Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	12.00	Skamania Hatchery - Renovate Adult Trapping and Spawning Facilities	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	13.00	Alrington Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	14.00	Chambers (Garrison) Creek - Fishway repairs	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	15.00	Chelan Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	16.00	Washougal Hatchery - Pond Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	17.00	Sol Duc Hatchery - Ponds Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	18.00	Voights Creek Hatchery Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	19.00	Humptulips Hatchery Renovate Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	20.00	Dungeness Hatchery - Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	21.00	Lathrop Road Compound - Covered Storage for Equipment	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	22.00	Mudflow Unit Toutle River Restoration and Habitat Enhancement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	23.00	Hoodsport Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	24.00	McKernan Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	25.00	Fish Habitat and Wildlife Replacement Lands - Land Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	26.00	Evergreen Jobs Grants Program	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	27.00	Mitigation Projects	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	28.00	PSNERP Match	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	29.00	Migratory Waterfowl Habitat	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	30.00	Nelson Dam Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	31.00	Dungeness Hatchery Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL				**$ 10,370,555**	**$ 10,370,555**	**$ 10,909,123**	**$ 10,909,123**	**$ 4,589,903**	**$ 4,589,903**	**$ 13,565,846**	**$ 13,565,846**	**$ 9,057,087**	**$ 9,057,087**

Table I-2. Recommended Implementation Plan, Grouped by Project, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1	85.00	Voights Creek SRKW Expansion Project	SRKW Pathway	$ 3,013,548	$ 537,452	$ 3,604,427	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ 50,739	$ 50,739	$ 621,473	$ 621,473	$ 4,046,934	$ 4,046,934	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ 24,649	$ 24,649	$ 386,844	$ 386,844	$ 1,985,585	$ 1,985,585	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ 31,191	$ 31,191	$ 448,570	$ 448,570	$ 2,512,973	$ 2,512,973	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ 64,302	$ 64,302	$ 743,315	$ 743,315	$ 5,168,783	$ 5,168,783	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project	SRKW Pathway	$ 1,828,112	$ 2,488,889	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ 54,888	$ 54,888	$ 670,559	$ 670,559	$ -	$ -	$ 4,622,609	$ 4,622,609	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 405,338	$ 405,338	$ 2,026,005	$ 2,026,005	$ -	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 44,735	$ 44,735	$ -	$ -	$ 600,462	$ 600,462	$ 3,917,348
10	69.33	Hupp Springs SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 46,687	$ 46,687	$ -	$ -	$ 618,951	$ 618,951	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 355,172
12	63.72	Marblemount SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ 60,297	$ 60,297	$ 728,358	$ 728,358	$ 2,466,537	$ 2,466,537	$ 2,466,537	$ 2,466,537	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 120,394	$ 120,394	$ -	$ -	$ 1,250,877	$ 1,250,877	$ 5,224,951	$ 5,224,951	$ 5,224,951
14	62.44	Sol Duc SRKW Expansion Project	SRKW Pathway	$ 632,203	$ 342,797	$ -	$ -	$ -	$ -	$ 4,228,340	$ 3,932,498	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ 60,286	$ 60,286	$ 722,584	$ 722,584	$ 4,811,830	$ 4,811,830	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 74,585	$ 74,585	$ -	$ -	$ 873,085
17	59.00	Nemah SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ 46,016	$ 46,016	$ -	$ -	$ 607,311	$ 607,311	$ -	$ -	$ 3,874,445	$ 3,874,445	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Preservation	Capital Project	$ 21,956,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Programmatic	Capital Project	$ 3,228,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wallace river- replace intake and ponds	Capital Project	$ 13,000,000	$ -	$ 12,333,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	SRKW- New Cowlitz Hatchery	Capital Project	$ 300,000	$ -	$ 4,500,000	$ -	$ 20,000,000	$ -	$ 13,986,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Soos Creek Hatchery Renovation	Capital Project	$ 1,702,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Spokane Hatchery Renovation	Capital Project	$ 2,800,000	$ -	$ 10,000,000	$ -	$ 8,735,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hazard Fuel Reductions, Focus Health and Ecosystem Improvements	Capital Project	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Toutle River Fish Collection Facility-Match	Capital Project	$ 14,239,000	$ -	$ 4,312,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naselle Hatchery Renovation	Capital Project	$ 20,000,000	$ -	$ 9,753,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wiley Slough Dike Raising	Capital Project	$ 5,481,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hurd Creek Relocate Facilities Out of Floodplain	Capital Project	$ 11,894,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Forks Creek Hatchery- Renovate Intake and Diversion	Capital Project	$ 511,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kalama Falls Hatchery Replace Raceways and PA System	Capital Project	$ 8,288,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fish and Wildlife Health and BioSecurity Facility	Capital Project	$ 6,692,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wooten Wildlife Area Improve Flood Plain	Capital Project	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 5,006,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Beaver Creek Hatchery Renovation	Capital Project	$ 2,000,000	$ -	$ 9,500,000	$ -	$ 9,498,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Eels Springs Hatchery Renovation	Capital Project	$ 12,652,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fallert Creek Hatchery Renovation	Capital Project	$ 1,650,000	$ -	$ 14,937,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 1 Office Construct Secure Storage	Capital Project	$ 7,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Snow Creek Reconstruct Facility	Capital Project	$ 900,000	$ -	$ 7,060,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Cooperate Elk Damage Fencing	Capital Project	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Deschutes Watershed Center	Capital Project	$ 2,200,000	$ -	$ 22,000,000	$ -	$ 12,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Marblemount Hatchery Renovation	Capital Project	$ 120,000	$ -	$ 12,000,000	$ -	$ 11,072,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kendall Creek Hatchery- Replace Intake	Capital Project	$ 120,000	$ -	$ 1,100,000	$ -	$ 8,165,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Friday Creek Intake and Fish Passage	Capital Project	$ -	$ -	$ 550,000	$ -	$ 6,938,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Nemah Hatchery Bridge Replacement	Capital Project	$ -	$ -	$ 1,608,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	North Toutle Hatchery Rebuild	Capital Project	$ -	$ -	$ 2,750,000	$ -	$ 12,500,000	$ -	$ 14,599,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Sekiu Boat Ramp Acquisition and Development	Capital Project	$ -	$ -	$ 1,684,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Mayr Brothes Hatchery - Intake Replacement	Capital Project	$ -	$ -	$ 600,000	$ -	$ 1,973,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Elochoman hatchery Demolition and Restoration	Capital Project	$ -	$ -	$ 3,816,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Milltown Island Restoration	Capital Project	$ -	$ -	$ 7,233,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 4 Headquarters Consolidation	Capital Project	$ -	$ -	$ 5,000,000	$ -	$ 10,451,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Ringold Hatchery Replace Ponds	Capital Project	$ -	$ -	$ 3,641,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	George Adams Hatchery - Replace Ponds and Raceways	Capital Project	$ -	$ -	$ 1,200,000	$ -	$ 10,960,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Issaquah Hatchery Replace Gravity Pipeline	Capital Project	$ -	$ -	$ 2,737,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Adult Pond	Capital Project	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 7,921,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naches Hatchery - Water Supply Development	Capital Project	$ -	$ -	$ 3,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Washougal Hatchery - Rehab Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ 6,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Reiter Ponds Hatchery - Replace Intake and Piping	Capital Project	$ -	$ -	$ 1,848,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Tokul Creek Hatchery - Replace Raceway, Water Supply, Drains	Capital Project	$ -	$ -	$ -	$ -	$ 140,000	$ -	$ 975,000	$ -	$ 6,925,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	1.00	Hoodsport Hatchery Renovate Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 850,000	$ -	$ 5,886,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	2.00	Capitol Way Renovations	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,501,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	3.00	Nemah Hatchery - Intake and Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,800,000	$ -	$ 14,014,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	4.00	Elwah Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 11,967,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	5.00	Goldendale Hatchery Expansion and Modernization	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,800,000	$ -	$ 12,943,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	6.00	Wenas WLA - Facility Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,360,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	7.00	Ford Creek Hatchery - Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,250,000	$ -	$ 25,315,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	8.00	Forks Creek Hatchery- Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,428,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	9.00	Bingham Creek - Replace 5 Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,790,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	10.00	Columbia Basin Hatchery - Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,750,000	$ -	$ 13,758,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	11.00	Goldendale Hatchery Pipeline and Raceway Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,193,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	12.00	Skamania Hatchery - Renovate Adult Trapping and Spawning Facilities	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 650,000	$ -	$ 4,829,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	13.00	Alrington Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,300,000	$ -	$ 11,153,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	14.00	Chambers (Garrison) Creek - Fishway repairs	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,613,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	15.00	Chelan Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,700,000	$ -	$ 13,195,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	16.00	Washougal Hatchery - Pond Replacement	Capital Project	$ -	$ -	$ -	$ -	$ 1,600,000	$ -	$ 12,674,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	17.00	Sol Duc Hatchery - Ponds Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,869,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	18.00	Voights Creek Hatchery Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,410,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	19.00	Humptulips Hatchery Renovate Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,296,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	20.00	Dungeness Hatchery - Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900,000	$ -	$ 13,871,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	21.00	Lathrop Road Compound - Covered Storage for Equipment	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,603,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	22.00	Mudflow Unit Toutle River Restoration and Habitat Enhancement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	23.00	Hoodsport Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,438,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	24.00	McKernan Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,987,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	25.00	Fish Habitat and Wildlife Replacement Lands - Land Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,868,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	26.00	Evergreen Jobs Grants Program	Capital Project	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ 6,254,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	27.00	Mitigation Projects	Capital Project	$ 13,500,000	$ -	$ 13,500,000	$ -	$ 13,500,000	$ -	$ 18,000,000	$ -	$ 18,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	28.00	PSNERP Match	Capital Project	$ 94,290,000	$ -	$ 27,664,000	$ -	$ 138,878,000	$ -	$ 700,000	$ -	$ 264,672,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	29.00	Migratory Waterfowl Habitat	Capital Project	$ 600,000	$ -	$ 600,000	$ -	$ 600,000	$ -	$ 600,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	30.00	Nelson Dam Replacement	Capital Project	$ 8,500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	31.00	Dungeness Hatchery Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ 2,002,000	$ -	$ 12,150,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL				**$ 278,757,953**	**$ 3,362,047**	**$ 208,632,609**	**$ 225,770**	**$ 297,087,585**	**$ 3,021,585**	**$ 146,123,133**	**$ 18,446,727**	**$ 491,876,882**	**$ 9,010,882**	**$ 9,389,584**	**$ 9,389,584**	**$ 5,826,419**	**$ 5,826,419**	**$ 5,837,283**	**$ 5,837,283**	**$ 10,392,737**

Table I-2. Recommended Implementation Plan, Grouped by Project, within Budget Constraint for SRKW Project and Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	85.00	Voights Creek SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	70.47	Beaver Creek SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.00	McKernan SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	69.33	Wallace River SRKW Expansion Project	SRKW Pathway	$ 3,917,348	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.33	Hupp Springs SRKW Expansion Project	SRKW Pathway	$ -	$ 4,092,080	$ 4,092,080	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	66.17	Coulter Creek SRKW Expansion Project	SRKW Pathway	$ 355,172	$ -	$ -	$ 1,696,321	$ 1,696,321	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	63.72	Marblemount SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	62.92	Lyons Ferry SRKW Expansion Project	SRKW Pathway	$ 5,224,951	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	62.44	Sol Duc SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.17	Elwha SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	59.94	Humptulips SRKW Expansion Project	SRKW Pathway	$ 873,085	$ 6,561,180	$ 6,561,180	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	59.00	Nemah SRKW Expansion Project	SRKW Pathway	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	57.94	Bogachiel SRKW Expansion Project	SRKW Pathway	$ -	$ 79,754	$ 79,754	$ 921,874	$ 921,874	$ 3,525,546	$ 3,525,546	$ 3,525,546	$ 3,525,546	$ -	$ -	$ -
19	55.17	Whitehorse SRKW Expansion Project	SRKW Pathway	$ -	$ 51,238	$ 51,238	$ 662,795	$ 662,795	$ 4,508,758	$ 4,508,758	$ -	$ -	$ -	$ -	$ -
20	51.05	Dungeness SRKW Expansion Project	SRKW Pathway	$ -	$ 124,871	$ 124,871	$ 1,308,914	$ 1,308,914	$ 5,531,541	$ 5,531,541	$ 5,531,541	$ 5,531,541	$ -	$ -	$ -
N/A	0.00	Minor Works Preservation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Programmatic	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wallace river- replace intake and ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	SRKW- New Cowlitz Hatchery	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Soos Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Spokane Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hazard Fuel Reductions, Focus Health and Ecosystem Improvements	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Toutle River Fish Collection Facility-Match	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naselle Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wiley Slough Dike Raising	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hurd Creek Relocate Facilities Out of Floodplain	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Forks Creek Hatchery- Renovate Intake and Diversion	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kalama Falls Hatchery Replace Raceways and PA System	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fish and Wildlife Health and BioSecurity Facility	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wooten Wildlife Area Improve Flood Plain	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Beaver Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Eels Springs Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fallert Creek Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 1 Office Construct Secure Storage	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Snow Creek Reconstruct Facility	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Cooperate Elk Damage Fencing	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Deschutes Watershed Center	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Marblemount Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kendall Creek Hatchery- Replace Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Friday Creek Intake and Fish Passage	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Nemah Hatchery Bridge Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	North Toutle Hatchery Rebuild	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Sekiu Boat Ramp Acquisition and Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Mayr Brothes Hatchery - Intake Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Elochoman hatchery Demolition and Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Milltown Island Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 4 Headquarters Consolidation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Ringold Hatchery Replace Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	George Adams Hatchery - Replace Ponds and Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Issaquah Hatchery Replace Gravity Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Adult Pond	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naches Hatchery - Water Supply Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Washougal Hatchery - Rehab Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Reiter Ponds Hatchery - Replace Intake and Piping	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Tokul Creek Hatchery - Replace Raceway, Water Supply, Drains	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	1.00	Hoodsport Hatchery Renovate Intake	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	2.00	Capitol Way Renovations	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	3.00	Nemah Hatchery - Intake and Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	4.00	Elwah Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	5.00	Goldendale Hatchery Expansion and Modernization	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	6.00	Wenas WLA - Facility Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	7.00	Ford Creek Hatchery - Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	8.00	Forks Creek Hatchery- Raceway Replacement and Supply Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	9.00	Bingham Creek - Replace 5 Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	10.00	Columbia Basin Hatchery - Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	11.00	Goldendale Hatchery Pipeline and Raceway Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	12.00	Skamania Hatchery - Renovate Adult Trapping and Spawning Facilities	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	13.00	Alrington Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	14.00	Chambers (Garrison) Creek - Fishway repairs	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	15.00	Chelan Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	16.00	Washougal Hatchery - Pond Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	17.00	Sol Duc Hatchery - Ponds Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	18.00	Voights Creek Hatchery Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	19.00	Humptulips Hatchery Renovate Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	20.00	Dungeness Hatchery - Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	21.00	Lathrop Road Compound - Covered Storage for Equipment	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	22.00	Mudflow Unit Toutle River Restoration and Habitat Enhancement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	23.00	Hoodsport Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	24.00	McKernan Hatchery Renovate Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	25.00	Fish Habitat and Wildlife Replacement Lands - Land Acquisition	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	26.00	Evergreen Jobs Grants Program	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	27.00	Mitigation Projects	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	28.00	PSNERP Match	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	29.00	Migratory Waterfowl Habitat	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	30.00	Nelson Dam Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
N/A	31.00	Dungeness Hatchery Pond Renovation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
TOTAL				**$ 10,392,737**	**$ 10,947,102**	**$ 10,947,102**	**$ 4,582,961**	**$ 4,582,961**	**$ 13,606,839**	**$ 13,606,839**	**$ 9,082,975**	**$ 9,082,975**			

Table I-3. Optional 10-Year Implementation Plan, By Cost Center, with Existing 10-Year CP

Priority #	Priority Score	Project Name	Expense Type	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
1	85.00	Voights Creek SRKW Expansion Project- Predesign	SRKW Project	$ 38,549	$ 38,549	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Design	SRKW Project	$ 483,763	$ 483,763	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	85.00	Voights Creek SRKW Expansion Project- Construction	SRKW Project	$ -	$ 2,897,689	$ 2,897,689	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Predesign	SRKW Project	$ 46,071	$ 46,071	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 544,725	$ 544,725	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	84.50	Samish SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 3,427,704	$ 3,427,704	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Predesign	SRKW Project	$ 22,635	$ 22,635	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 343,939	$ 343,939	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	81.33	Palmer Ponds SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 1,700,926	$ 1,700,926	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Predesign	SRKW Project	$ 28,321	$ 28,321	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 393,767	$ 393,767	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	79.50	Puyallup SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 2,128,412	$ 2,128,412	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Predesign	SRKW Project	$ 58,390	$ 58,390	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 651,476	$ 651,476	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	74.50	Naselle SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 4,378,135	$ 4,378,135	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Design	SRKW Project	$ 313,080	$ 313,080	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6	73.89	Kendall Creek SRKW Expansion Project- Construction	SRKW Project	$ 1,471,420	$ 1,471,420	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	71.33	Scatter Creek SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	71.33	Scatter Creek SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	71.33	Scatter Creek SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.47	Beaver Creek SRKW Expansion Project- Predesign	SRKW Project	$ 49,820	$ 49,820	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.47	Beaver Creek SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 579,423	$ 579,423	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	70.47	Beaver Creek SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 3,733,758	$ 3,733,758	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	70.00	McKernan SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	70.00	McKernan SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 324,430	$ 324,430	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	70.00	McKernan SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,562,070	$ 1,562,070	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.83	Carlson Ponds SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.83	Carlson Ponds SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
10	69.83	Carlson Ponds SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	69.33	Wallace River SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ 36,938	$ 36,938	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	69.33	Wallace River SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ 466,077	$ 466,077	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	69.33	Wallace River SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,746,485	$ 2,746,485	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	69.33	Hupp Springs SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ 38,549	$ 38,549	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	69.33	Hupp Springs SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ 480,510	$ 480,510	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
12	69.33	Hupp Springs SRKW Expansion Project- Costruction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,868,941	$ 2,868,941	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	66.17	Coulter Creek SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	66.17	Coulter Creek SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 278,168	$ 278,168	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
13	66.17	Coulter Creek SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,189,332	$ 1,189,332	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	63.72	Marblemount SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ 49,822	$ 49,822	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	63.72	Marblemount SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 576,748	$ 576,748	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
14	63.72	Marblemount SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,856,965	$ 1,856,965	$ 1,856,965	$ 1,856,965	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.92	Lyons Ferry SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ 99,449	$ 99,449	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.92	Lyons Ferry SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 965,995	$ 965,995	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
15	62.92	Lyons Ferry SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,664,278	$ 3,664,278	$ 3,664,278	$ 3,664,278	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	62.44	Sol Duc SRKW Expansion Project- Predesign	SRKW Project	$ 44,459	$ 44,459	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	62.44	Sol Duc SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 533,506	$ 533,506	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
16	62.44	Sol Duc SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,329,535	$ 3,329,535	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	62.17	Elwha SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ 49,803	$ 49,803	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	62.17	Elwha SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 602,512	$ 602,512	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	62.17	Elwha SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,708,184	$ 3,708,184	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	59.94	Humptulips SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ -	$ -	$ 61,599	$ 61,599	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	59.94	Humptulips SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 675,963	$ 675,963	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
18	59.94	Humptulips SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,600,439	$ 4,600,439	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	59.00	Nemah SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ 38,011	$ 38,011	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	59.00	Nemah SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ 478,393	$ 478,393	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
19	59.00	Nemah SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,848,096	$ 2,848,096	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	57.94	Bogachiel SRKW Expansion Project- Predesign	SRKW Project	$ 65,868	$ 65,868	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	57.94	Bogachiel SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 713,215	$ 713,215	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	57.94	Bogachiel SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 2,471,958	$ 2,471,958	$ 2,471,958	$ 2,471,958	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
21	55.17	Whitehorse SRKW Expansion Project- Predesign	SRKW Project	$ -	$ -	$ 42,312	$ 42,312	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
21	55.17	Whitehorse SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ -	$ -	$ 514,249	$ 514,249	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
21	55.17	Whitehorse SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,161,439	$ 3,161,439	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	51.05	Dungeness SRKW Expansion Project- Predesign	SRKW Project	$ 103,150	$ 103,150	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	51.05	Dungeness SRKW Expansion Project- Design	SRKW Project	$ -	$ -	$ 1,010,546	$ 1,010,546	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	51.05	Dungeness SRKW Expansion Project- Construction	SRKW Project	$ -	$ -	$ -	$ -	$ 3,879,402	$ 3,879,402	$ 3,879,402	$ 3,879,402	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Preservation	Capital Project	$ 21,956,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Minor Works Programmatic	Capital Project	$ 3,228,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wallace river- replace intake and ponds	Capital Project	$ 13,000,000	$ -	$ 12,333,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	SRKW- New Cowlitz Hatchery	Capital Project	$ 300,000	$ -	$ 4,500,000	$ -	$ 20,000,000	$ -	$ 13,896,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Soos Creek Hatchery Renovation	Capital Project	$ 1,702,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Spokane Hatchery Renovation	Capital Project	$ 2,800,000	$ -	$ 10,000,000	$ -	$ 8,735,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hazard Fuel Reductions, Focus Health and Ecosystem Improvements	Capital Project	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Toutle River Fish Collection Facility-Match	Capital Project	$ 14,239,000	$ -	$ 4,312,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naselle Hatchery Renovation	Capital Project	$ 20,000,000	$ -	$ 9,753,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wiley Slough Dike Raising	Capital Project	$ 5,481,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Hurd Creek Relocate Facilities Out of Floodplain	Capital Project	$ 11,894,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Forks Creek Hatchery- Renovate Intake and Diversion	Capital Project	$ 511,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kalama Falls Hatchery Replace Raceways and PA System	Capital Project	$ 8,288,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fish and Wildlife Health and BioSecurity Facility	Capital Project	$ -	$ -	$ 6,692,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Wooten Wildlife Area Improve Flood Plain	Capital Project	$ -	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 6,000,000	$ -	$ 5,006,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Beaver Creek Hatchery Renovation	Capital Project	$ -	$ -	$ 2,000,000	$ -	$ 9,500,000	$ -	$ 9,498,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Eels Springs Hatchery Renovation	Capital Project	$ -	$ -	$ 12,652,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Fallert Creek Hatchery Renovation	Capital Project	$ -	$ -	$ 1,650,000	$ -	$ 14,937,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 1 Office Construct Secure Storage	Capital Project	$ -	$ -	$ 7,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Snow Creek Reconstruct Facility	Capital Project	$ -	$ -	$ 900,000	$ -	$ 7,060,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Cooperate Elk Damage Fencing	Capital Project	$ -	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ 1,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Deschutes Watershed Center	Capital Project	$ -	$ -	$ 2,200,000	$ -	$ 22,000,000	$ -	$ 1,200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Marblemount Hatchery Renovation	Capital Project	$ -	$ -	$ -	$ -	$ 120,000	$ -	$ 12,000,000	$ -	$ 11,072,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Kendall Creek Hatchery- Replace Intake	Capital Project	$ -	$ -	$ -	$ -	$ 120,000	$ -	$ 1,100,000	$ -	$ 8,165,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Friday Creek Intake and Fish Passage	Capital Project	$ -	$ -	$ -	$ -	$ 550,000	$ -	$ 6,938,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Nemah Hatchery Bridge Replacement	Capital Project	$ -	$ -	$ -	$ -	$ 1,608,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	North Toutle Hatchery Rebuild	Capital Project	$ -	$ -	$ -	$ -	$ 2,750,000	$ -	$ 12,500,000	$ -	$ 14,599,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Sekiu Boat Ramp Acquisition and Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,684,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Mayr Brothes Hatchery - Intake Replacement	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 600,000	$ -	$ 1,973,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Elochoman hatchery Demolition and Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,816,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Milltown Island Restoration	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,233,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Region 4 Headquarters Consolidation	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000,000	$ -	$ 10,451,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Ringold Hatchery Replace Ponds	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,641,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	George Adams Hatchery - Replace Ponds and Raceways	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 10,960,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Issaquah Hatchery Replace Gravity Pipeline	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,737,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Samish Hatchery - Adult Pond	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ 7,921,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Naches Hatchery - Water Supply Development	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Washougal Hatchery - Rehab Adult Handling	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,402,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Reiter Ponds Hatchery - Replace Intake and Piping	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,848,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A	0.00	Tokul Creek Hatchery - Replace Raceway, Water Supply, Drains	Capital Project	$ -	$ -	$ -	$ -	$ -	$ -	$ 140,000	$ -	$ 975,000	$ -	$ 6,925,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
N/A				**$ 112,124,525**	**$ 5,623,213**	**$ 95,216,097**	**$ 4,926,409**	**$ 124,500,195**	**$ 23,920,195**	**$ 128,665,978**	**$ 21,278,978**	**$ 98,639,892**	**$ 18,469,892**	**$ 14,008,313**	**$ 7,083,313**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

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Appendix J. Anticipated Federal, State, and Local Permitting Needs for Facility Upgrades or New Construction

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Environmental authorizations required for prioritized actions in the SRKW Master Plan will be site-specific and will depend upon the nature and location of work proposed at each site. A description of anticipated federal, state, and local authorizations for projects that require significant development, including in-water work, is presented below.

Federal Permits/Approvals

Clean Water Act

The Corps Section 404 Permit covers ground-disturbing activities below the ordinary high water mark (OHWM) of waters of the United States, including special aquatic sites such as wetlands. That portion of the proposed project associated with constructing a flood control facility below the OHWM would require a Section 404 permit.

For individual site development components of the Master Plan, a Clean Water Act (CWA) Section 404 discharge authorization would be required for any work in Waters of the United States. The Corps has different types of Section 404 permits that can be issued, such as Nationwide, individual, and general permits. It is most likely that an individual permit would be required, which may take approximately 1 to 3 years to obtain.

In addition, consistency must be demonstrated with Section 401 of the Federal Water Pollution Control Act (Clean Water Act). The authority to review the programs for consistency with Section 401 is the responsibility of the Washington State Department of Ecology (Ecology).

Section 10 Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States. Federal navigability status should be investigated for each waterbody subject to any alteration to determine if this authorization is required. The USACE maintains a list of navigable waters of the United States in the Washington (USACE 2012).

Endangered Species Act Compliance

Under the Master Plan, any elements that have a federal nexus (e.g., funding or USACE permit under the CWA) must comply with the Endangered Species Act (ESA) of 1973, as amended (Federal Register Vol. 64, No. 56, March 24, 1999). The ESA requires that federal agencies ensure that actions they authorize, fund or conduct are not likely to jeopardize the continued existence of any ESA proposed or listed species or their designated critical habitat. Therefore, any site development that has a federal nexus will be subject to ESA review and compliance. Section 7(c) of the ESA requires that federal agencies contact the USFWS and/or NOAA Fisheries (the Services) before beginning any construction activity to determine if federally listed threatened and endangered species or designated critical habitat may be present in the vicinity of a proposed project. A Biological Evaluation/Assessment (BE/BA) must be prepared if actions by a federal agency or permits issued by a federal agency will result in construction (i.e., actual action on the ground) and if the Services determine that threatened and endangered species may occur in the vicinity of a proposed project. The Services use this document as the basis of a Biological Opinion that will outline criteria to ensure the project does not further jeopardize an endangered species.

In addition to ESA Section 7 compliance, Section 6 of the ESA establishes cooperation between states and the Services relative to the administration and management of any area established for the conservation of endangered species or threatened species. Therefore, regardless of federal nexus, WDFW must adhere to hatchery release limits and protocols established by NOAA Fisheries in their Mitchell Act Biological Opinion (NOAA Fisheries 2017).

Magnuson-Stevens Act

The Magnuson-Stevens Act (MSA) requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect essential fish habitat (EFH). EFH is defined in the MSA as those waters and substrate necessary to fish for spawning, breeding, feeding, or growing to maturity. EFH for Pacific Salmonids, including Chinook, Coho, and Pink Salmon, exists downstream of natural fish barriers and is applicable to most projects and activities within most freshwater systems. A federal action agency, or its official designee, must determine whether its actions may adversely affect EFH. If the agency determines that an action may adversely affect EFH, the action agency must prepare an EFH Assessment. If the action would not adversely affect EFH, then the agency should document this determination in its record.

Consideration of impacts on EFH must be made for any project that involves work in waters of the state that are currently or were historically accessible to Pacific Coast Salmonids (Chinook, Coho, and Pink Salmon).

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 established a comprehensive program to preserve historical and cultural sites. When a federal permit, license, or approval is needed for a project, Section 106 review is needed in order for the federal agency to consider the effect of the permitting decision on historic properties. The Corps would also need to comply with Section 106 of the NHPA before any permit is issued by consulting with the Washington State Department of Archaeology and Historic Preservation and affected tribes (the Chehalis and Quinault Tribes) to determine if any archaeological or historic sites would be affected by the proposed development. In addition, it is likely to require the submittal of a Cultural Resources and Historic Properties Survey.

Any elements of the Master Plan that require a CWA Section 404 discharge authorization from the USACE will trigger review under Section 106 of the National Historic Preservation Act (NHPA). A cultural and historic resources survey and concurrence on findings from the DAHP will be required for any ground-disturbing activities. Tribal concurrence on findings will also be required.

FEMA Flood Level Rise Analysis

Under Federal regulations, FEMA must review any construction within a mapped Floodway to ensure that the work will not increase flood levels. The specific requirement is as follows:

44 CFR Section 60.3(d)(3) (The community shall) prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed

encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;

Any actions taken within a designated Floodway area require a "rise analysis," with review and approval by FEMA. This includes any new development or addition of impervious surface. The rise analysis will determine whether the proposed actions, such as raceway expansion, would increase the flood height within the floodway. Any increase would have to be approved of and may require compensatory storage or other actions to mitigate the increased flood height. The rise analysis is also needed so that cumulative impacts of projects in the area also do not increase the flood height beyond acceptable limits.

State Permits/Approvals

State authorizations may be required for elements of the Master Plan that require new land development or increased hatchery production and associated effluent discharge modifications at existing facilities.

Washington State Hatchery and Fishery Reform Policy

As stated in Section 2.3, the Washington State Hatchery and Fishery Reform Policy (C-3619) is currently under review and an update is in development with a possible new policy in 2021. Although specifics for the update are not yet available or incorporated into this Master Plan, WDFW acknowledges that updates to the policy are in development and that production pathways proposed herein must be evaluated for consistency with this policy.

Ecology Section 401 Water Quality Certification

The need for a Section 404 permit from the USACE triggers a Section 401 water quality certification, issued by Ecology. The 401 Certification covers the construction, operation, and facilities located within the OHWM of a waterbody, and each project would need to comply with the state water quality standards. CWA regulations require that only the state or authorized tribe where the discharge originates has the authority to directly condition or prevent issuance of a federal permit or license. Ecology has up to 1 year from the Corps public notice to certify, deny, or waive a 401 certification request. The 401 Certification becomes part of the federal permit or license.

Ecology Water Rights Permitting

As discussed in Section 9.3, Ecology manages the water resources of the state, and issues the right to use surface and groundwater. Under the Master Plan, facilities proposed for expanded production, including new facilities, may require new or adjusted water rights to meet incubation and rearing objectives. Depending on the watershed, adjacent users, existing water quality, and instream flows, any modification to existing, or request for new water rights will require extensive coordination with Ecology to ensure the long-term protection of the resource. Obtaining a water right through Ecology can often take years to process. Ecology recommends a Pre-Application Consultation Meeting in order to review the proposed project and to verify availability of water.

Ecology NPDES Construction Stormwater Permit

This permit is required for any clearing, grading, and excavating activities with a disturbed area of 1 acre or more and discharge of stormwater to surface waters of the

state. Operators of regulated construction sites are required to develop stormwater pollution prevention plans and implement sediment, erosion, and pollution prevention control measures. The fees for this permit are codified in WAC 173-224-040(4). The fees for construction activities covered under the Construction Stormwater General Permit range from $543 to $2,023 depending on the amount of disturbed area (less than 5 acres to greater than 20 acres).

Ecology Coastal Zone Management Program Consistency

If site development or net pen use is proposed under any element of the Master Plan, subject activities taking place in one of the 15 coastal counties in the state of Washington must comply with state's Coastal Zone Management (CZM) Program (Ecology 2020).

Department of Archaeology and Historic Preservation – Executive Order 05-05

For projects without a federal nexus, Executive Order 05-05 requires all state agencies implementing or assisting capital projects using funds appropriated in the State's biennial Capital Budget to consider how future proposed projects may impact significant cultural and historic places. Agencies are required to notify the DAHP, the Governor's Office of Indian Affairs (GOIA), and concerned tribes to review and provide comments about potential project impacts.

Projects that do not disturb the ground and do not alter buildings that are 45 years of age or older are exempt from this review. Also, projects with a federal nexus (such as federal funding, license, or permit) undergo environmental review by DAHP and tribal governments by the responsible federal agency in accord with Section106 of the NHPA (see Section 0.0.-2083559312).

Washington Department of Fish and Wildlife – Hydraulic Project Approval

A Hydraulic Project Approval (HPA) from WDFW covers work that occurs below the OHWM of water bodies of the state and any project that uses waters of the state. State waters include all marine waters and fresh waters, except those watercourses that are entirely artificial, such as irrigation ditches, canals, stormwater runoff devices, or other artificial watercourses, except where they exist in a natural watercourse that has been altered by man (RCW 77.55.011[1]). Any work performed below the OHWM would trigger the HPA. WDFW has 45 days to issue a HPA once a complete application has been submitted and Washington State Environmental Policy Act (SEPA), if required, is complete.

A complete application package for an HPA must include a JARPA form, general plans for the overall project, complete plans and specifications of the proposed work within the ordinary high water line in fresh waters of the state, complete plans and specifications for the proper protection of fish life, and payment of the $150 application fee. A notice of compliance must be provided with any applicable requirements of the SEPA.

Informal and formal appeal processes are available to the applicant or other aggrieved parties, but must be filed within 30 days of notice of receipt of issuance or denial of an HPA (WAC 220-110-340 or WAC 220-110-350).

Department of Natural Resources Aquatic Use Authorization

An Aquatic Use Authorization is required from the Washington State Department of Natural Resources (WDNR) for use of state aquatic lands. It is Attachment E to the

JARPA and requires a $25 nonrefundable processing fee. WDNR may also require surveys or a legal description of the property, a plan of development and operations, bonds, and insurance. SEPA approval and the HPA need to be completed prior to WDNR issuing the Aquatic Use Authorization. Review time generally takes between 6 months to 1 year after DNR receives a complete application.

The WDNR Aquatic District Office will send the application to the project site Land Manager for review. The Land Manager will review the proposed uses for proposed project and will confirm if land is available to lease. If the Land Manager approves the application, a draft of the use authorization will be received and the Land Manager may schedule a meeting to negotiate the terms of the agreement. Once the agreement is final, WDNR will send a signature packet to complete and return. There is no appeal process for the authorization, but WDNR staff will work with the applicant to help find either an agreement type that will work for the proposed project or recommend modifications to make it compatible with DNR's stewardship mandate.

At least one elements of the Master Plan, the new Cowlitz River Hatchery, is proposed to be located in state lands that are currently managed by DNR. Depending on the site layout selected for advancement into predesign, an interagency land swap or land use agreement (e.g., easement) would be required for access and/or construction of a Cowlitz River intake or outfall structure. Although WDFW and DNR coordinate on similar easements with frequency, the process is not always guaranteed. For the purposes of this analysis, HDR assumes that an easement is obtainable. However, the use of DNR lands is contingent upon securing an easement, which will be required to carry the concept into predesign.

Department of Natural Resources Forest Practices Permit

Any elements of the Master Plan that require the removal of trees exceeding 5,000 board feet would trigger review under the Washington State Forest Practices Rules (Title 222 WAC). A Forest Practices Application/Notification (FPA/N) would be required to authorize tree removal. In addition, projects taking place on or over state-owned aquatic lands require an authorization from DNR. Coordination with DNR's Land Manager for the River District will be necessary to determine the state-navigable status of waterbodies that may be impacted by projects under the Master Plan.

NEPA/SEPA Compliance

Depending on the presence of a federal nexus, individual projects proposed under this Master Plan may require review and compliance under the National Environmental Policy Act (NEPA). In the absence of a federal nexus, NEPA is not required. However, compliance under the State Environmental Policy Act (SEPA) is an anticipated requirement for all development projects considered in this Master Plan.

National Environmental Policy Act

Should any federal nexus exist for individual projects proposed under this Master Plan, NEPA compliance will be required. This act requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. The NEPA compliance pathway would be determined by the lead federal agency. Potential pathways include development of an Environmental Impact Statement

(EIS), an Environmental Assessment (EA), or use of an applicable Categorical Exclusion (CE).

An EIS is a detailed analysis that serves to insure that the policies and goals defined in NEPA are infused into the ongoing programs and actions of the federal agency. EISs are generally prepared for projects that the proposing agency views as having significant prospective environmental impacts. The EIS should provide a discussion of significant environmental impacts and reasonable alternatives (including a No Action alternative) which would avoid or minimize adverse impacts or enhance the quality of the human environment. Draft and final EISs are subject to public comment periods.

In lieu of an EIS, an EA might be prepared to address NEPA requirements. When the significance of impacts of a project proposal are unlikely or uncertain, an EA is prepared to assist in making this determination. If it is found that significant impacts will result, the preparation of an EIS should commence immediately. If a finding of no significant impact (FONSI) is upheld in the EA review process, no EIS is required.

Categorical Exclusions are a class of actions that a Federal agency has determined, after review by CEQ, do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an EIS nor an EA is normally required. Each federal agency maintains a list of its own CEs. If multiple federal agencies are involved, a combination of CEs may be appropriate; however, if one agency applies a CE and another has no applicable CE coverage, an EA or EIS may be required.

State Environmental Policy Act

Upon finalization, and as determined by the SEPA lead agency (i.e., WDFW), the Master Plan would be subject to review under the State Environmental Policy Act (SEPA). WDFW's SEPA coordinator would determine the most appropriate SEPA compliance pathway and determine if the Master Plan would be subject to SEPA review. Alternatively, individual projects conducted as part of the Master Plan may be subject to project-specific SEPA analysis. In either case, WDFW is the assumed SEPA lead for all actions proposed under the Master Plan.

Local Permits

Depending on the nature, scope, and location of proposed activities, local land use and building permits may be required. Specific requirements would be determined during predesign, and, unless exempt, each project would need to consider impacts on sensitive resources (e.g., wetlands, shorelines), as applicable. For those projects proposing development in proximity to waterbodies, the following permits are likely to apply (note this list is not comprehensive):

City/County Shoreline Permit

Compliance with Critical Areas Ordinance

City/County Floodplain Development Permit

City/County Fill/Grading Permit

City/County Building Permit

Appendix K. Feasibility Study for Potential New Cowlitz River State Salmon Hatchery

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New Cowlitz River State Hatchery Feasibility Study

Southern Resident Killer Whale Master Planning
Washington Department of Fish & Wildlife

Lewis County, WA

January 1, 2021

Prepared for

Washington Department of Fish and Wildlife
Capital and Asset Management Program
600 Capitol Way NW
Olympia, WA 98501

Prepared by

HDR, Engineering, Inc.
with contributions from GeoEngineers

Executive Summary

In 2018, Governor Jay Inslee established Executive Order (EO) 18-02 directing a state initiative to reverse the decline of Southern Resident Killer Whales (SRKWs; *Orcinus orca*). Established by EO 18-02, the Southern Resident Orca Task Force was directed to identify immediate and long-term actions to benefit SRKWs. One of the three key threats advanced by the Governor's Task Force to explain the recent decline of endangered SRKWs was a lack of their primary prey, Chinook Salmon (*Oncorhynchus tshawytscha*).

In 2018, the Orca Task Force developed 16 recommendations that addressed threats to SRKW persistence and recovery. Of these, Recommendation #6 includes a significant increase in hatchery production to benefit SRKWs in a manner consistent with existing state and federal policies. The increased hatchery production goal, from 2018 levels, is 50 million smolts. To meet this goal, beginning in 2018, the Washington Department of Fish and Wildlife (WDFW), as well as several tribes and one utility, have increased hatchery production of Chinook Salmon, Coho Salmon (*O. kisutch*), and Chum Salmon (*O. keta*) through modifications of operations and maximizing the use of existing facilities, in an effort to increase prey abundance for the endangered SRKW.

In concert with these on-going releases and in further response to Recommendation #6 of the Orca Task Force, legislative direction and funding from the general state appropriation for fiscal year 2021 was provided for WDFW to conduct a master planning process. Specifically, the SRKW Infrastructure Proviso states:

> *$500,000 of the general fund—state appropriation for fiscal year 2021 is provided solely for the department to conduct a master planning process, to result in a plan, to assess and prioritize hatchery improvements based on the recommendations of the southern resident killer whale task force, including prioritization given for a new Cowlitz river salmon hatchery. The plan must include prioritized capital budget projects. The plan shall be submitted to the fiscal committees of the legislature by January 15, 2021.*

A new salmon hatchery on the Cowlitz River would be intended to support SRKW prey enhancement objectives. If advanced, the new hatchery could support adult collection, egg incubation, and juvenile rearing of Chinook Salmon, and other salmonid species.

This document presents an initial feasibility assessment for the potential development of a new state-owned hatchery facility on the Cowlitz River in Lewis County, Washington. A summary of this assessment will be included in the overall master plan document currently under development.

Prior to the selection of a preferred site for development of a potential new state salmon hatchery, WDFW considered several potential sites for development. The selected site, the subject of this feasibility study, is assessed herein. The selected site is located on the left bank of the Cowlitz River, approximately 2.2 river miles downstream of Mayfield Dam, and across the river from the existing Cowlitz River Salmon Hatchery, which is owned and operated by Tacoma Public Utilities (TPU). The site is composed of portions of two parcels, one privately owned, and one owned by the state and managed by the Department of Natural Resources (DNR).

Based on the hatchery production goals defined by WDFW for Chinook Salmon production, HDR developed a bioprogram to determine rearing capacity requirements, including land, groundwater, and surface water needs. Using that information, HDR assessed existing site conditions to determine if the selected site had adequate development potential to meet production goals. Of critical importance are conditions related to geotechnical and hydrogeologic site characteristics to determine site and groundwater development potential. Available water sources are also critical as sufficient quantities and quality of surface and groundwater are required to meet hatchery production objectives.

Using information on existing site conditions and water availability, a conceptual design for a potential new hatchery was developed, with a Class 4 cost estimate. The basis of design for a potential new hatchery is the facility bioprogram for Chinook Salmon production, which was modeled using WDFW's desired production targets for fall Chinook (4,100,000) and spring Chinook (1,250,000). Based on these targets and estimated water rearing needs, a conceptual design for Chinook Salmon production could include ten 10 x 100-foot raceways and fifteen 20 x 175-foot super raceways. Adult holding could be accomplished using six 20 x 120-foot ponds. Additional design options and associated costs were developed for optional Coho Salmon (1,000,000) and steelhead (250,000) production at the site.

Based on the findings of this report, and development of a conceptual site plan, it appears that the site could have adequate development potential. However, further investigation is required to determine if sufficient ground and surface water is available to support desired production goals for Chinook Salmon, and optional Coho Salmon and steelhead production. The next steps toward development of a potential hatchery would include additional study of the selected site. If advanced, further evaluation and information gathering for the two subject parcels would focus on landowner outreach, a site visit, and recommendations presented as "next steps" in Section 7 of this report. Further evaluation of the subject parcels may determine that site geomorphology, hydrology, land ownership and acquisition, or environmental compliance may prove challenging for site development and use.

As part of this feasibility study, WDFW explored an additional purpose to determine if site acquisition could address recreational fishing needs in the basin. Currently, recreational fishers have limited access to the Cowlitz River downstream of Barrier Dam, which is across the river from the potential hatchery development site. Portions of the subject site downstream of the dam could provide expanded access opportunities for recreational anglers. Thus, property acquisition could serve the dual purposes of hatchery development for SRKW prey enhancement, and improved recreational fishing opportunities in the basin.

Contents

Tables

Figures

Appendices

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1 Introduction

In 2018, Governor Jay Inslee established Executive Order (EO) 18-02[1] directing a state initiative to reverse the decline of Southern Resident Killer Whales (SRKWs; *Orcinus orca*). Established by EO 18-02, the Southern Resident Orca Task Force was directed to identify immediate and long-term actions to benefit SRKWs (*Orcinus orca*). One of the three key threats advanced by the Governor's Task Force to explain the recent decline of endangered SRKWs was a lack of their primary prey, Chinook salmon (*Oncorhynchus tshawytscha*). This lack of prey abundance is believed to contribute to poor SRKW health and reproductive failure.

In 2018, the Orca Task Force developed 16 recommendations that addressed threats to SRKW persistence and recovery. Of these, Recommendation #6 includes a significant increase in hatchery production to benefit SRKWs in a manner consistent with existing state and federal policies. The increased hatchery production goal, from 2018 levels, is 50 million smolts. To meet this goal, beginning in 2018, the Washington Department of Fish and Wildlife (WDFW), as well as several tribes and one utility, have increased hatchery production of Chinook Salmon, Coho Salmon (*O. kisutch*), and Chum Salmon (*O. keta*) through modifications of operations and maximizing the use of existing facilities, in an effort to increase prey abundance for the endangered SRKW.

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This document presents an initial feasibility assessment for the potential development of a new state-owned hatchery facility on the Cowlitz River in Lewis County, Washington. A summary of the findings of this report will be included in the overall master planning document.

[1] The full Executive Order can be found at https://www.governor.wa.gov/sites/default/files/exe_order/eo_18-02_1.pdf; the key tasking to the Washington Department of Fish and Wildlife relative to this proposal was: "*Identify the highest priority areas and watersheds for Southern Resident prey to focus or adjust, as needed, …hatcheries…policies and programs."*

Prior to selection of a preferred alternative site for potential development of a new state salmon hatchery on the Cowlitz River, WDFW conducted an initial site screening analysis to identify sites that could accommodate a facility. Based on the minimum site criteria identified and ranked in the initial site screening analysis (HDR 2020), WDFW selected a preferred site to carry forth into an assessment of development feasibility. The selected site combines portions of two existing parcels on the left (south) bank of the Cowlitz River near river mile (RM) 49.6, just downstream from Mayfield Dam and across the river from the existing Cowlitz River Salmon Hatchery, owned and operated by Tacoma Public Utilities (TPU) (Figure 1-1).

The selected sites include portions of privately managed designated forest owned by Jorgenson Timber LLC, and portions of state-owned land currently managed by the Department of Natural Resources (DNR). Because the subject parcels are relatively large, if development advances, WDFW could propose to acquire or lease only the northernmost 80 acres of the Jorgenson Timber parcel (Parcel No. 028082000000; 179.05 acres in total). WDFW could propose to lease or acquire an easement or management of approximately 40 acres of the DNR parcel (Parcel No. 028105000000; 251.40 total acres) (Figure 1-2). An interagency land exchange or easement agreement likely would be required between DNR and WDFW.

FIGURE 1-1

Cowlitz Hatchery Siting Study
Candidate Sites for Initial Screening

11/17/2020

DATA SOURCE: Basemap - ESRI; Water, roads - WSDNR.

1.1 Project Purpose

This feasibility study has been prepared in response to recommendations from the Orca Task Force and a legislative directive to investigate the feasibility of successfully developing a new hatchery on the Cowlitz River for SRKW prey enhancement. A summary of study findings will be incorporated in the SRKW Hatchery Improvement Master Plan.

Acquisition of parcels considered for potential development of a new Cowlitz River State Salmon Hatchery could serve dual purposes, one primary and one secondary. The primary, fundamental, and essential purpose of the feasibility study is to investigate the potential to develop a salmon hatchery to rear, imprint, and release Chinook Salmon into the Cowlitz River watershed to increase prey for the federally endangered SRKW. The secondary purpose is to acquire WDFW-managed land to increase recreational fishing opportunities on the Cowlitz River downstream of TPU's existing Barrier Dam, located at RM 49.6. Recreational access to the Cowlitz River for fishing is currently limited in this reach.

1.2 Feasibility Study Scope and Document Organization

This report presents the results of a desktop review of existing, publicly available data to determine if identified sites might be suitable for potential hatchery development. This report describes water availability and water quality based on currently available information and provides a preliminary assessment of potential permitting needs (Section 2). Considering baseline conditions at the site and desired production goals identified by WDFW, a bioprogram (Appendix A) was developed for the production of spring and fall Chinook Salmon, with options for Coho Salmon and steelhead production (Section 3). Using the Chinook Salmon bioprogram as the basis of design, HDR developed a conceptual design (Section 4) and identified potential recreational access opportunities at the site (Section 5). A Class 4 opinion of probable construction costs (OPCC, Section 6) was developed based on the conceptual design for Chinook Salmon production only. Appendix B presents a breakdown of infrastructure to support Chinook Salmon production. Additional costs for optional Coho Salmon and steelhead production, and related infrastructure, are presented in Appendix C. Conclusions and recommended next steps are presented in Section 7.

■ Existing Facility

Lewis County Parcel

New Cowlitz Hatchery Candidate Site

0 200 400 Feet

FIGURE 1-2

New Cowlitz Hatchery Candidate Site Vicinity Map

11/13/2020

DATA SOURCE: Basemap - ESRI; Parcels - Lewis Co.

1.3 Unknowns and Challenges

Several unknowns and challenges to potential hatchery development at the subject parcels have been identified during development of this study. These include:

- The success of negotiations between WDFW and DNR for land lease or acquisition.
- Continued landowner negotiations with Jorgenson Timber LLC.
- The lack of water quality and flow data for Brights Creek and hatchery water use potential.
- Long-term pathogen concerns and treatment options, particularly with potential climate-related increases in stream temperature, may be challenging.
- Groundwater development potential and ability to obtain enough water quantity for production goals.
- Pathogen-free groundwater potential. In the absence of pathogen-free groundwater, additional surface water would be needed to support incubation and early rearing.
- Location of the channel migration zone, if any, for development avoidance.
- Location of other critical areas (e.g., wetlands) for development avoidance and permitting.
- Geologic compatibility with hatchery site development.
- Road and utility access.

1.4 Evaluated Feasibility Criteria

In this document, HDR provides a desktop review of the northernmost 80 acres of a parcel owned by Jorgenson Timber LLC (Parcel No. 028082000000), and an adjacent 40-acre portion of a larger parcel owned by the state and managed by DNR (Parcel No. 028105000000). Based on HDR's Task 1000 scope and discussions with WDFW, the following elements are assessed to determine the feasibility of the sites to support hatchery development and recreational fishing opportunities:

- Geotechnical hazards
- Hydrogeology and Groundwater Development Potential
- Surface Water Quantity
    - Cowlitz River
    - Brights Creek
- Surface Water Quality
    - Cowlitz River
    - Brights Creek
- Permitting Summary and Potential
    - Land use, zoning and regulatory compliance
    - Critical Areas and Buffers
    - Potential for Channel Migration Zone avoidance

2 Existing Conditions and Development Feasibility

2.1 Location and Ownership

The parcels subject to development feasibility review are located on portions of two parcels on the left (south) bank of the Cowlitz River near RM 49.6, just downstream from Mayfield Dam and across the river from the existing Cowlitz River Salmon Hatchery, owned and operated by TPU. One of the two selected parcels for potential hatchery development is owned by Jorgenson Timber LLC, and the other is state-owned and managed by the DNR. Due to the relatively large size of the two selected parcels, WDFW could propose to acquire or lease only portions of the parcels for hatchery development.

The Jorgensen Timber site is in Section 23 of Township 17N, Range 1W in Lewis County, Washington. The site is owned by Jorgenson Timber LLC and is located on Lewis County Parcel Number 028082000000. Per the Lewis County Assessor's Office, the total parcel is 179.05 acres. For feasibility review, it is assumed that WDFW could consider acquisition or leasing the northernmost 80 acres of the parcel for the hatchery development.

The second parcel is owned by the state and managed by DNR. It is adjacent to the Jorgenson Timber site to the east. The DNR parcel is located on Lewis County Parcel Number 028105000000 in Section 23, Township 17N, Range 1W in Lewis County. Per the Lewis County Assessor's Office, the total parcel is 251.40 acres. For hatchery development, WDFW could propose to lease, acquire an easement for, or request land management of an approximately 40-acre portion of the DNR site.

2.2 Site Description

2.2.1 Jorgenson Timber Site

The Jorgenson Timber site is undeveloped and dominated by evergreen and deciduous trees. This site is used for forestry operations and is located at an elevation ranging from approximately 220 to 310 feet above mean sea level (amsl). The Cowlitz River borders the site to the north and west. A segment of Brights Creek, a left bank tributary to the Cowlitz River, traverses the southern portion of the 80-acre subject area. A review of the Lewis County GIS Web Map shows that topographic relief is relatively minor across the northernmost portion of the parcel, with steep slopes along the Cowlitz River and Brights Creek (Lewis County 2020). The Cowlitz River generally flows east to west in this area. At this location, the river channel appears unarmored; a site visit is required to confirm conditions.

2.2.2 DNR Site

The DNR site is also undeveloped with evergreen and deciduous trees as the dominant vegetation. The site is also used for forestry activities and is located at an elevation ranging from approximately 240 to 420 feet amsl. A review of the Lewis County GIS Web

Map shows that topographic relief is relatively minor at the site, with a steeper slope bisecting the site from east to west, and as well as steeper slopes the Cowlitz River (Lewis County 2020). The Cowlitz River generally flows south to north in this area. At this location, the river channel is unarmored. Unpaved logging roads traverse the site.

2.3 Geotechnical Conditions

As part of this feasibility study, GeoEngineers evaluated geotechnical conditions on the subject parcels (i.e., "the site"). Most of the site is located on a broad alluvial plain that is generally flat to gently sloping. Steep slope areas, bordered by flat upland terraces, are located southeast and southwest of the project site. These features are likely remnant river terraces that may have formed during the last period of regional glaciation. The slopes range from about 20 to about 80 feet in vertical height.

Most of the site is mapped as Alluvium (Qal) (USGS 1987). This unit is described as a loose mixture of silt, sand, gravel and occasional peat that was deposited by the Cowlitz River. Soils in the terrace areas, including the slopes, are mapped as Terrace Deposits (Qt) and Hayden Creek Drift (Qoh). These materials are described as glacial outwash, sand, and gravel.

Geologic hazard areas that likely apply to the site, as defined in the Lewis County Code, Chapter 17.38, include:

- Erosion Hazards
- Landslide Hazards
- Seismic Hazards

Landslide and erosion hazard areas are generally coincident. It appears the steep slopes in the southeast part of the site meet the technical criteria for Landslide and Erosion Hazard Areas.

Seismic Hazard Areas are defined as areas subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, surface faulting, settlement or soil liquefaction. Areas with underlying soils comprising alluvium are considered seismic hazard areas. Most of the subject parcels are likely classified as a Seismic Hazard Areas because of interpreted soil types (alluvium and outwash) and an anticipated shallow groundwater table.

Hatchery site development could occur within the flat to gently sloping portion of the site on the Jorgenson Timber parcel. This area is underlain by alluvium, with soils that are usually in a loose to medium dense condition. Soft, settlement-sensitive materials (peat and silt) can also be present within alluvial materials. Because of this, shallow and deep foundation systems would likely be required for any new development, and dewatering would likely be required for construction. If advanced, these factors should be considered in facility predesign.

Groundwater levels within the alluvial soils are anticipated to be relatively shallow across the site. Groundwater levels within the terrace soils in the southeastern part of the site should be deeper.

Landslide and Erosion Hazard Areas would likely not be limiting factors for potential site development, provided any potential facility is located away from steep slopes in the

southeast portion of the subject parcels. All lands would likely be considered Seismic Hazard Areas. If site development is proposed, a geotechnical design study would be required to further address foundation, dewatering, and critical area issues.

2.4 Hydrogeology and Groundwater Development Potential

As part of this feasibility study, GeoEngineers evaluated surface geology at the subject parcels and nearby areas by reviewing the following documents:

- "Geology and Coal Resources of the Toledo - Castle Rock District, Cowlitz and Lewis Counties, Washington" (Roberts 1958)
- Geologic map of the Centralia quadrangle, Washington (USGS 1987)

2.4.1 Site Conditions

The subject parcels are located within the Cowlitz River Valley. The valley is incised into a relatively flat to gently sloping upland area that extends north, west, and southwest from the parcels. Uplands are bordered by foothills to the southwest, southeast, and south. The uplands north of the Cowlitz River Valley are part of the Lacamas Prairie, and uplands south are part of the Lawton Prairie (Roberts 1958).

Most of the subject parcels appear to be located on an alluvial plain that is generally flat to gently sloping. The alluvial plain appears to exist west and north of the Cowlitz River in the study area, though the southeast part of the site area is comprised of steep slopes and river terraces. The TPU's Cowlitz Salmon Hatchery east of the parcels appears to be located within the alluvial plain.

Surface materials over most of the site area are comprised of Alluvium (Qal). This deposit is also mapped, on both sides of the river, within the river valley southwest and northeast of the site. Alluvium is described as a loose mixture of silt, sand, gravel, and occasional peat that was deposited by the Cowlitz River. Soils in the upland areas, including the slopes, are mapped as glacial outwash. These materials are described as sand and gravel. Wilkes formation sedimentary rocks are mapped in the upland areas southeast and south of the site (USGS 1987).

2.4.2 Ecology Well Log Review

GeoEngineers reviewed the Ecology Water Well Log database to determine the presence of wells located at and near the subject parcels. No well logs were associated with the property, though well logs were identified on properties southwest and west of the site, across the Cowlitz River. These wells appear to have encountered a productive sand and gravel aquifer at depths of about 30 feet below ground surface. Other wells northeast and east of the subject parcels appear to have encountered fine grained soils and/or bedrock at shallow to deep depths. Logs for wells at TPU's Cowlitz River Salmon Hatchery were not contained within the Ecology database.

No data were located to describe aquifer conditions at the site or on nearby areas; however, it is possible that such reports exist for TPU's Cowlitz River Salmon Hatchery.

2.4.3 Discussion and Conclusions

Based on a review of available information, the surface geology at the subject parcels appears favorable for near-surface groundwater development. Water wells located within the alluvial valley west of the site, across the Cowlitz River, appear to have encountered a productive sand and gravel aquifer at a depth of about 30 feet. It is unknown whether aquifer materials encountered in these wells are alluvial or glacial in origin.

Glacial outwash soils mapped in upland areas can be favorable for groundwater development. Outwash underlies the southeast part of the site and may also underlie alluvial materials mapped on the parcels.

Based on well log review, sedimentary bedrock was encountered in some wells in proximity to the parcels. Bedrock is mapped in foothill areas south and southeast of the site. If such rock is present in areas with potential for hatchery well development, conditions would likely not provide adequate groundwater sources for the facility.

In conclusion, the mapped site geology appears favorable for shallow groundwater development, either through wells or through exfiltration trench systems. Deeper groundwater supplies could exist within outwash sand and gravel, should these materials exist beneath the mapped alluvium. A subsurface exploration program, including testing and analyses of aquifers encountered, would be required to accurately assess groundwater availability at the site. Regardless of availability, further evaluation is required to determine if sufficient quantities of groundwater exists on the subject parcels, within the current study area, to support a hatchery bioprogram (see Section 3.1.3.2).

2.5 Surface Water Quantity

2.5.1 Cowlitz River

The subject site is adjacent to the Cowlitz River, approximately 2.2 river miles downstream from Mayfield Dam. Surface flows downstream of the dam are regulated, and are lowest in August and greatest in December (Table 2-1).

Table 2-1. Mean Monthly Flow for USGS 4238000 Cowlitz River Below Mayfield Dam, Water years 1934-2020

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
8,980	8,210	6,600	6,650	7,290	6,990	4,280	2,710	2,620	3,760	7,440	9,750

2.5.2 Brights Creek

Brights Creek is a small, left bank tributary to the Cowlitz River that flows through the northern half of the Jorgenson Timber parcel. Brights Creek has an approximate drainage area of 2.42 square miles, with mean annual precipitation of 51.4 inches (StreamStats 2020). Although published monthly flow data was not available for Brights Creek, mean monthly flow can be estimated with data from similar watersheds using modeling methods to compare a site to other low-flow streams in western Washington (Curran et al. 2012). Using these methods, the Brights Creek watershed can be compared to others in the local area (Table 2-2).

Table 2-2. Watershed Data for Similar Basins in Lewis County, Washington

Watershed	sq mi	Headwater Elevation (ft.)	Percent of drainage
Brights Creek Drainage area	2.42	340	unknown
Winston Creek near Silver Lake	37.8	470	6
Cinnabar Creek near Cinebar	4.55	940	53
Mill Creek near Salkum	20.9	320	12

Source: StreamStats (2020)

Using these data and applying the methods of Curran et al. (2012), the estimated mean monthly flow for Brights Creek is predicted to range from a low of 1.8 cubic feet per second (cfs) in August to a high of 18.3 cfs in December (Table 2-3). The estimated 2-year peak flood is 90.4 cfs, and the 100-year flood is 351 cfs, based on Mastin et al (2016).

Table 2-3. Estimated Mean Monthly Flow for Brights Creek (cfs) Based on Similar Basins

Comparison Watershed	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Winston Creek	16.0	14.0	10.8	9.3	5.2	3.1	1.3	0.7	0.9	3.5	10.5	14.7
Cinnabar Creek	24.5	24.5	19.1	20.2	14.4	8.5	5.1	4.0	5.9	10.1	24.5	24.5
Mill Creek	13.8	12.0	12.3	7.8	3.4	2.1	1.1	0.6	0.5	3.4	10.4	15.9
Estimated Flows for Brights Creek	**18.1**	**16.8**	**14.1**	**12.4**	**7.6**	**4.6**	**2.5**	**1.8**	**2.4**	**5.7**	**15.1**	**18.3**

2.6 Surface Water Quality

Hatcheries rely on surface and groundwater sources to support production goals, and an evaluation of water quality is essential to determine use and treatment needs.

2.6.1 Cowlitz River

2.6.1.1 Surface Water Quality Standards

Water quality standards for surface waters are codified under Washington Administrative Code (WAC) 173-201A. For this portion of the Cowlitz River, the designated aquatic use is core summer salmonid habitat (Ecology 2020a). Water quality standards for this designated use include the parameters shown in Table 2-4 for freshwater.

Table 2-4. Washington State Surface Freshwater Quality Standards – Aquatic Life Use

Water Quality Parameter	Aquatic Life Use	
	Core Summer Salmonid Habitat	Salmonid Spawning, Rearing, and Migration
Temperature[1]	16°C (60.8°F)	17.5°C (63.5°F)
Dissolved Oxygen (mg/L)[2]	9.5	8.0
Turbidity (NTU)	Turbidity shall not exceed: 5 NTU over background when the background is 50 NTU or less; or A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.	Turbidity shall not exceed: 5 NTU over background when the background is 50 NTU or less; or A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Total dissolved gas	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.	Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.
pH	pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.	pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

Source: WAC 173-201A-200

1. Highest 7-day average of the daily maximum temperature

2. Lowest 1-day minimum

Ecology uses the water quality standards above (Table 2-4) to periodically assess the status of water quality in state waterbodies. The waterbodies are then placed into one of five categories based on the assessment. Category 1 waterbodies meet all standards, while Category 5 waterbodies are considered impaired. Category 5 waterbodies are traditionally known as 303d list of polluted waters. TMDLs or other approved water quality improvement projects are required for Category 5 waterbodies. Per Ecology's Water Quality Atlas, the Cowlitz River is not included in any Ecology's five categories, including Category 5 – 303d listing for impaired waterbodies near the project site (Ecology 2020a).

2.6.1.2 Water Quality Data Summary

As part of its relicensing effort for the Cowlitz River Project, TPU developed and conducted studies to evaluate its facilities' effects on water quality and water temperature. In one publicly available study, water quality sampling was conducted between December 1996 and January 2000 (TPU 2005), and included monthly in situ measurements of water temperature, DO, pH, specific conductance, and TDG. The study also collected and analyzed samples for turbidity, total suspended solids (TSS), nutrients (nitrate plus nitrite, ammonia, total phosphorus, and ortho-phosphorus), chlorophyll-a, phytoplankton, and zooplankton. Results of these studies showed that the water quality in the Cowlitz River downstream of Mayfield Dam routinely satisfied the applicable Washington State standards for a Class A waterbody.

Two water quality parameters were found to occasionally exceed their corresponding applicable criteria in this reach of the river. Total dissolved gas was found to exceed the 110-percent criterion and mercury exceeded the allowable mercury concentrations to protect fishes from chronic exposure to contaminants (TPU 2005).

Historical data compiled by TPU (2005) showed that the water temperature supplied at both the salmon and trout hatcheries was 16˚C or less during the entire assessment period (i.e., year-round from 1991 through 1995; TPU 2005).

2.6.2 Brights Creek

2.6.2.1 Department of Ecology Water Quality Standards

Per WAC 173-201-600, as a tributary to the Cowlitz River, Brights Creek must be protected for the designated use of core summer salmonid habitat and meet the water quality standards listed in Table 2-4. Per Ecology's Water Quality Atlas, Brights Creek is not included in the Category 5 – 303d listing for impaired waterbodies.

2.6.2.2 Water Quality Data Summary

Surface water quality data was unavailable for the portion of Brights Creek near the project site. However, data from one sampling event conducted in 2014 was available In Ecology's Environmental Information Management database for a tributary to Brights Creek, upstream of the project site (Ecology 2020b). Results from that sampling event are included below (Table 2-5).

Table 2-5. Summary of Brights Creek Water Quality Data (Ecology 2020b)

Parameter	Results[1] -	
Turbidity	13.5 NTU	--
Flow	0.1 cfs	--
pH	6.95 pH	6.93
Temperature, Water	16.3°C	17.8
Dissolved Oxygen	9.2 mg/L	8.94
Conductivity	42.1 uS/cm	41.1
pH	6.93 pH	6.95
Dissolved Oxygen	8.94 mg/L	9.2
Conductivity	41.1 uS/cm	42.1
Total Suspended Solids	19 mg/L	--
Chloride	3.07 mg/L	--
Total Persulfate Nitrogen	0.199 mg/L	--
Total Phosphorus	0.0396 mg/L	--

[1] Some parameters were sampled two times on the same date.

Although water quality data is not available for Brights Creek near the subject site, Brights Creek was included in WDFW's Cowlitz River Evaluation Program Annual Report from the confluence of the creek with the Cowlitz River to the waterfall barrier (WDFW 2010). Brights Creek was included for Coho Salmon spawning surveys. The presence of

Coho Salmon in Brights Creek implies that surface water temperatures in Brights Creek may be seasonally suitable for hatchery production; however, the presence of Coho also implies the potential presence of fish pathogens.

2.7 Permitting Summary and Natural Resource Considerations for Development

The following sections describe anticipated permitting requirements for construction and operation of a potential new hatchery, and a brief summary of existing natural resource conditions on the subject parcels.

2.7.1 Land Use, Zoning and Regulatory Compliance

If the Jorgenson Timber and DNR sites were selected for development of a new state hatchery, WDFW would apply for state, local, and federal permits. Anticipated permits (Table 2-6) are discussed in more detail below. The list of permits is subject to change and additional authorizations might be required following a more in-depth analysis of the subject sites.

Table 2-6. Anticipated Permits for Regulatory Compliance

Jurisdiction	Permit
Lewis County	• Critical Areas Review • Shoreline Conditional Use Permit • Construction Permit SA-014 for clearing, grading, and excavation activities • Building permit • Flood Hazard Zone Permit[1]
Washington State Department of Ecology	• NPDES Construction Stormwater General Permit • Clean Water Act Section 401 Water Quality Certification • NPDES Upland Finfish Hatching & Rearing General Permit (or Individual Permit, TBD) • Surface and ground water right permits
WDFW	• State Environmental Policy Act (SEPA) compliance • Hydraulic Project Approval (HPA)
Washington Department of Natural Resources	• Forest Practices Permit
U.S. Army Corps of Engineers (USACE)[2, 3]	• Clean Water Act (CWA) Section 404 Discharge Authorization for Streams and Wetlands
U.S. Fish and Wildlife Service	• Endangered Species Act (ESA) Section 7 compliance (required for USACE permit)

Jurisdiction	Permit
National Marine Fisheries Service	• Endangered Species Act (ESA) Section 7 compliance (required for USACE permit) • Magnuson Stevens Act Essential Fish Habitat Assessment
Washington State Department of Archaeology and Historic Preservation (DAHP)	• National Historic Preservation Act (NHPA) Section 106 Compliance
DNR	• Aquatic Lands Authorization (pre-statehood navigability is assumed) • Land Use Agreement (exchange or easement) • Forest Practices Application/Notification (FPA/N)4

[1] Per Lewis County code (LCC): A development permit entitled flood hazard zone permit shall be obtained before construction or development begins within any area of special flood hazard established in LCC 15.35.060. The permit shall be for all structures including manufactured homes, as set forth in LCC 15.35.040, and for all other development including fill and other activities, also as set forth in LCC 15.35.040.

[2] Development of a hatchery at this location would not require a Section 10 Rivers and Harbors Act permit because the intake would be located just upstream of TPU's Barrier Dam at RM 49.6 (American Whitewater 2020). Per the USACE navigable waters list for Washington (USACE 2008), the Cowlitz River is considered navigable to RM 35.5, with only the first 5 miles maintained. Therefore, the facility would be located upstream of the delineated navigable reach.

[3] For the purposes of this evaluation, potential development of a new facility is assumed to be covered under the nationwide permit (NWP) program for CWA Section 404 Discharge Authorization. Coverage under the NWP also assumes coverage for each verified NWP activity under the National Environmental Policy Act (NEPA). Under these assumptions, an individual (project specific) NEPA analysis would not be required. If the USACE requires an Individual Permit, or if federal funding is used for any development, project specific NEPA analyses may be required.

[4] Coordination with DNR would be required to determine FPA/N requirements and delineation of the Riparian Management Zone on both parcels.

2.7.1.1 Lewis County

The Jorgenson Timber and DNR sites are zoned as forest resource lands by Lewis County. Per Lewis County Code (LCC) 17.30.450 and 17.10, agriculture uses, including upland finfish hatcheries, are a primary use within the forest resource lands designation. Per LCC 17.30.490, the minimum area of a lot subdivision is 80 acres for forest resource lands, except for parcels that are utilized for a primary use, including agriculture. However, the code does not specify the minimum parcel size if the sub-parcel is used for a primary use. Discussions with the county are recommended to confirm minimum lot size and code compliance.

Portions of the subject parcels are located within Lewis County's Shoreline Management Program (SMP) jurisdiction. Those portions located within the SMP jurisdiction are designated as Rural Conservancy. Per Table 5-1 of Section 5.03 of the Lewis County SMP, all types of aquaculture (including fish hatcheries) are a conditional use within the Rural Conservancy designation, provided the operation is consistent with the policies and regulations of the SMP. Water-dependent portions of aquaculture facilities may be located waterward of the OHWM. Water dependent structures include water intakes and discharge structures, water and power conveyances, and fish collection and discharge

structures (SMP Section 5.06.02). The SMP notes that all other elements of an aquaculture facility should be located outside of the 150-foot shoreline buffer, unless those elements are considered water-related and must be sited near the water-dependent elements to implement the project. If considered water-related, these elements require a 75-foot buffer (SMP Section 5.06.02). Based on conceptual design presented in Section 4.1, the intake, adult fish ladder, outfall and juvenile release pipe, and portions of the water conveyance pipelines would be located within the shoreline jurisdiction of the Cowlitz River. If the site is developed, every reasonable attempt should be made to locate other hatchery facilities outside of required shoreline buffers. Further site investigation and design would be required to confirm the location of water-related and non-water dependent structures.

2.7.1.2 Ecology

Because potential development of a new hatchery would disturb greater than 1.0 acre of land, a NPDES Construction Stormwater General Permit, administered by the Washington State Department of Ecology (Ecology), would be required. A CWA Section 401 Water Quality Certification would be required for construction within the ordinary high water mark (OHWM) of the Cowlitz River or Brights Creek, or work in jurisdictional wetlands. Based on preliminary production goals (see Section 3), hatchery effluent discharge would trigger compliance and coverage under the NPDES general permit for upland finfish hatching and rearing. Any withdrawal and use of surface and/or groundwater for hatchery production would require water right permits from Ecology, and a review of impacts on senior users and instream flow requirements.

Lewis County is not one of the 15 coastal counties in the state of Washington (Ecology 2020c). Therefore, compliance with Washington's Coastal Zone Management (CZM) Program would not be required for construction or operation of the facility.

2.7.1.3 Washington Department of Fish and Wildlife

Development of the subject sites would trigger compliance with the State Environmental Policy Act (SEPA). WDFW is the assumed SEPA lead for compliance; however, WDFW is recommended to coordinate with Lewis County for confirmation of SEPA lead status. In addition, any work within the OHWM of the Cowlitz River or Brights Creek would require compliance with the state Hydraulic Code, via a Hydraulic Project Approval from WDFW.

2.7.1.4 Department of Natural Resources

Hatchery development as considered in this analysis, in full or part, likely would encroach upon state lands that are currently managed by DNR. Depending on the site layout selected for advancement into predesign, an interagency land exchange or land use agreement (e.g., easement) would be required for access and/or construction of a Cowlitz River intake, outfall, and fish ladder infrastructure. Although WDFW and DNR coordinate on similar easements with frequency, the process is not always guaranteed. For the purposes of this analysis, HDR assumes that an easement could be obtained. However, the use of DNR lands is contingent upon securing an easement, which would be required to carry the concept into predesign.

Potential hatchery construction could require the removal of trees exceeding 5,000 board feet. Any such removal would trigger review under the Washington State Forest

Practices Rules (Title 222 WAC); a Forest Practices Application/Notification (FPA/N) would be required to authorize tree removal. Depending on the proximity of tree removal to the riparian management zones (RMZ) of the Cowlitz River or Brights Creek, the FPA/N would likely need to consider riparian restoration to minimize functional loss (e.g., shading, large wood contributions) from tree removal in the RMZ.

Projects taking place on or over state-owned aquatic lands typically require an authorization from DNR. Coordination with DNR's Land Manager for the River District would be required to determine the state-navigable status of the Cowlitz River at the subject location. American Whitewater (2020) reports that, prior to the construction of Mayfield Dam, tribes used this reach of the river for navigation by canoe. If the subject reach is considered state-navigable, based on the condition of the river at the time of statehood, an Aquatic Lands Use Authorization would be required for construction and use of an intake, fish ladder, and outfall on the Cowlitz River. It is unlikely that Brights Creek would be considered navigable; however, confirmation on the state-navigable status of Brights Creek would be recommended during permitting.

2.7.1.5 U.S. Army Corps of Engineers (Clean Water Act, Section 404)

For the purposes of this evaluation, the USACE is assumed as the federal lead action agency for any future federal permitting. If federal funding or technical participation is proposed under future agreements, the federal lead agency, and federal permitting requirements, may change. A CWA Section 404 discharge authorization would be required for any work in Waters of the United States, including construction of a surface water intake, fish ladder, and outfall structure on the Cowlitz River, or any work in Brights Creek.

2.7.1.6 U.S. Fish and Wildlife Service and National Marine Fisheries Service (Endangered Species Act)

A CWA Section 404 discharge authorization would trigger Section 7 ESA compliance and authorization from USFWS and NMFS. In addition, hatchery operations must be consistent with native Chinook Salmon recovery under the ESA. To that end, and as applicable, existing terms and conditions of ESA policies (e.g., the Mitchell Act Biological Opinion; NMFS 2017) must be considered to ensure compliance with artificial production parameters related to viability, productivity, diversity, and abundance goals for ESA-listed fish in the basin.

It is important to note that any work on DNR lands may require compliance with conditions of existing programmatic ESA consultations for the agency, unless the conditions are waived or voided through a change in ownership. Conditions may include limitations on the quantity of trees that may be removed from riparian areas or in suitable nesting habitat for ESA-listed species. Additional conditions may include limited operating procedures during sensitive life history periods for ESA-listed species, if suitable habitat is identified in the area impacted by hatchery construction.

2.7.1.7 Department of Archeology and Historic Preservation (National Historic Preservation Act)

A CWA Section 404 discharge authorization from the USACE would also trigger review under Section 106 of the National Historic Preservation Act (NHPA). A cultural and historic resources survey and concurrence on findings from the DAHP would be required

for any ground-disturbing activities. Tribal concurrence on findings would also be required.

2.7.2 Critical Areas and Buffers

2.7.2.1 Wetlands and Waters

Jorgenson Timber Site

The Jorgenson Timber site consists of undeveloped forestland. The Cowlitz River is located along the north and west property edge. Brights Creek is located along the south portion of the site, generally flowing east to west. The USFWS National Wetland Inventory (NWI) online mapper (Figure 2-1, USFWS 2020) depicts forested, scrub/shrub wetlands associated with the Cowlitz River, along a portion of the north and the west side of the site (Figure 2-1). Brights Creek is mapped as a riverine habitat that is permanently flooded, and no wetlands are mapped by Lewis County or NWI. Google Earth aerials provide no evidence of surface ponding on the site.

According to Lewis County maps, wetlands associated with the Cowlitz River are located along the north and west property line, similar to the USFWS and Washington DNR Forest Practices Application Review System (FPARS) maps (Figure 2-1, Lewis County 2020). Hydric soils are mapped at the same location of the wetlands on the northern portion of the site mapped within the vicinity of the site (Figure 2-1; Lewis County 2020). No wetlands or hydric soils are mapped by Lewis County along Brights Creek.

Although a formal wetland delineation would be required prior to site development, based on wetland data summarized above and applying the preliminary site plan developed for the project, it appears that this site can accommodate a hatchery with minimal wetland impacts. If wetlands are identified on site during formal delineations and impacts to those wetlands are unavoidable, it appears sufficient space is available for on-site mitigation.

The FPARS map depicts the Cowlitz River as a shoreline of the state waterbody, and Brights Creek as a Type F waterbody (Figure 2-1, DNR 2020a). There are no known wetlands of high conservation value on or adjacent to the Project site, and hydric soils are mapped on the north edge of the site (Figure 2-1, DNR 2020b).

The Brights Creek OHWM has not been delineated in this location, but for the purposes of this analysis it is assumed to be top of bank. Future investigation may determine that the OHWM may extend further landward. The riparian habitat varies along the Cowlitz River from sparse shrubs to denser evergreen and deciduous trees. The riparian habitat along Brights Creek is dominated by evergreen and deciduous trees.

DNR Site

The DNR site is also undeveloped forestland with the Cowlitz River bordering the site to the east. Brights Creek traverses the southwest corner of the site. A small portion of the northwest corner of the site is mapped as hydric soils. There are no mapped wetlands of high conservation value on or adjacent to the Project site (Figure 2-1, DNR 2020b).

According to Lewis County maps, wetlands associated with Cowlitz River are located along the east property line.

2.7.2.2 Riparian Habitat Areas and Zones

The Cowlitz River is classified as a shoreline of statewide significance. Lewis County regulates shorelines of the state entirely under its Shoreline Master Program (LCC 17.38.470). For shorelines, like the Cowlitz River, shorelands typically extend landward for 200 feet in all directions as measured on a horizontal plane from the OHWM; however, as discussed in Section 2.7.1, buffers for aquaculture uses are reduced. There are no restrictions to water-dependent structures like intakes and outfalls; water-related structures have a 75 feet setback from the OHWM, and non-water dependent structures and uses for aquaculture extend 150 feet from the OHWM (Lewis County 2017).

Other riparian habitat areas (RHAs) fall under the jurisdiction of Article IV of the County's Critical Areas Ordinance (LCC 17.38). Per LCC 17.38.420, the RHA would extend landward 150 feet from the OHWM of Brights Creek. Every reasonable attempt should be made to locate hatchery facilities in a manner that limits or avoids RHA encroachment to the extent practicable. If encroachment and impacts to the RHA is unavoidable, a mitigation plan may be required per LCC 17.38.510.

Based on aerial review of the subject parcels, a seasonal drainage appears to flow south from the Jorgenson Timber parcel, traversing the DNR parcel where it discharges into the Cowlitz River. The drainage is not mapped by DNR, the County, or USFWS NWI. No data is available for this drainage. The presence and characteristics of this feature should be verified in the next phases. Depending on the nature of this feature (e.g., perennial or ephemeral), and habitat suitability for fish, additional stream buffers may be applied, which may require compliance with Lewis County critical areas ordinances.

2.7.2.3 Flood Hazards

Per 15.35.140, a flood hazard zone development permit is required before construction begins within any area of special flood hazard. The north and west portions of the Jorgenson Timber Site are located within a Zone A 100-year floodplain under the regulatory purview of FEMA (Figure 2-1) (Flood Insurance Rate Map [FIRM] 5301020460, effective 12/15/1981). The northeast corner of the DNR parcel is also located within Zone A of the 100-year floodplain. Zone A is an area inundated by 1 percent annual chance flooding (i.e., 100-year floodplain), for which base flood elevations have not been determined. No portion of the site is mapped by Lewis County as being located within the regulatory floodway or flood fringe.

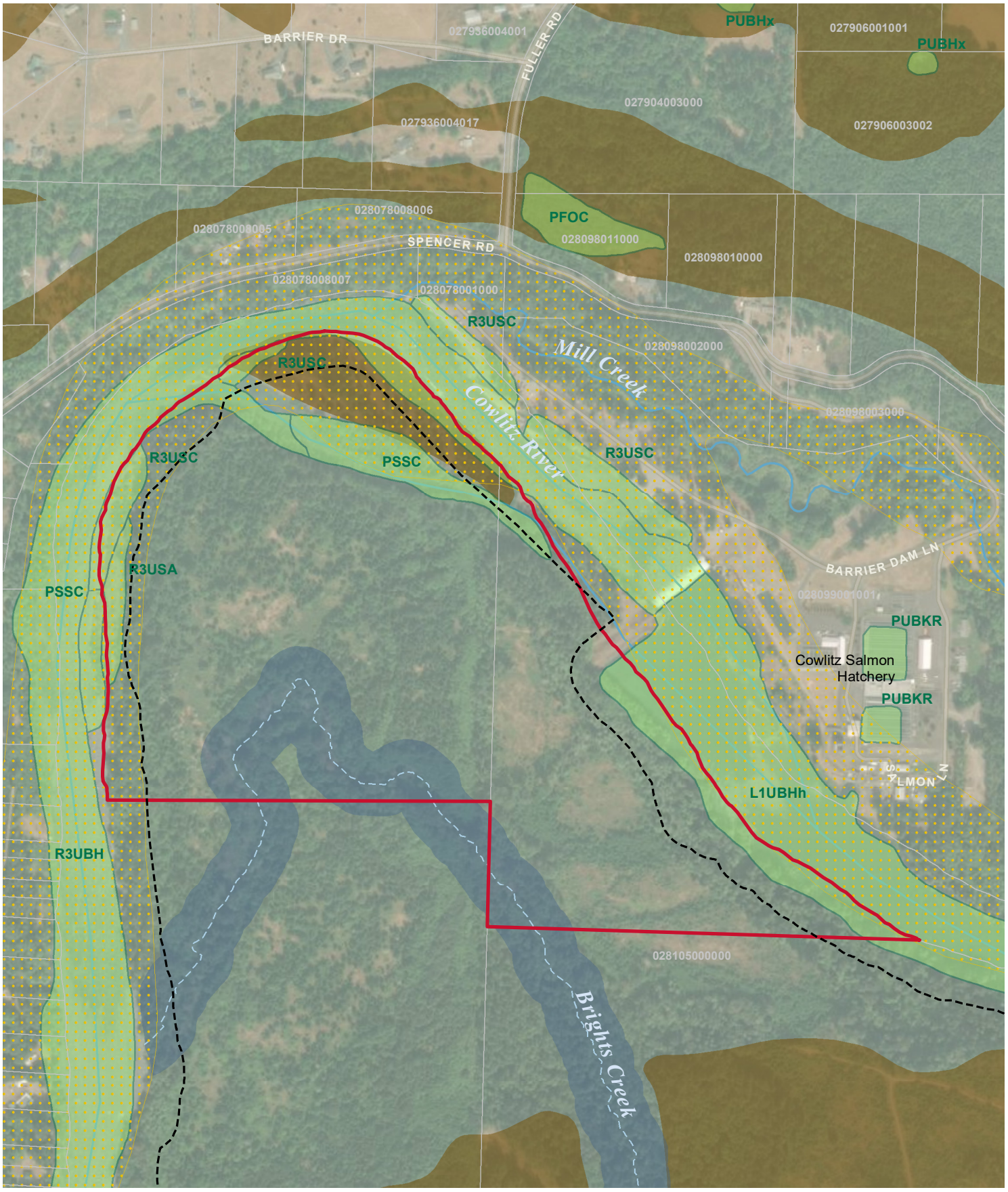
Per LCC 15.35.190, any placement of fill or encroachments must minimize the net increase in flood levels to less than or equal to the federal standard of 1-foot increase in flood levels from the cumulative effect of the proposed development when combined with all other existing and anticipated development during the occurrence of the base flood discharge. The code appears to require compensatory storage under the floodway and zone AO only. Zone AO is the flood insurance rate zone that corresponds to the areas of 1-percent shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. Discussions should take place with Lewis County to confirm requirements should site development be proposed.

Based on the flood hazard data summarized above, it appears that this site can accommodate a hatchery with primary development outside of the 100-year floodplain. Surface water intake, fish ladder, outfall facilities, and portions of surface water

conveyance pipelines would, by necessity, be sited within the 100-year floodplain. However, these facilities would have relatively minor footprints that require minimal fill.

2.7.3 Channel Migration Zone

Channel migration zones (CMZs) are areas in a floodplain where a stream or river channel can be expected to move naturally over time in response to flows, gravity, and topography. Lewis County has not delineated the CMZ along portions of the Cowlitz River within the study area, and it is therefore unknown if the site is located within or near a designated CMZ. Completion of CMZ analyses is recommended. Any new development should be located outside of any mapped and/or interpreted CMZ areas and their associated buffers/setbacks.



Lewis County Parcel
FEMA Floodplain
100 Year Floodplain
RMZ

Water Courses (WA DNR)
Type S
Type F
NWI Wetlands

SSURGO Mapped Hydric Soil
Shoreline Buffer (150 ft)

0 225 450 Feet

** Wetland buffers not depicted – buffers determined based on wetland rating, which requires onsite delineation and functional assessment.*

FIGURE 2-1

New Cowlitz Hatchery Candidate Site Natural Resource Areas and Buffers

11/13/2020

DATA SOURCE: Basemap - ESRI; Parcels, Floodplain - Lewis Co; Streams - DNR; Soils - USDA; Wetlands - USFWS.

3 Program Requirements

3.1 Biological Programming

Fish hatchery bioprogramming is a tool utilized to estimate the fish rearing environment (e.g., space and water) necessary to meet the established production goals. The process references fish culture specifications obtained from recognized fish culture manuals as well as established fish rearing facilities and fish production managers. Site specific assumptions and proponent preferences contribute to creating a model of anticipated growth, desired rearing space, and required inflow to produce healthy fish.

A bioprogram for a potential new state hatchery on the Cowlitz River was developed based on input from WDFW staff, calculations from HDR staff based on similar hatchery bioprograms for focus species, and background literature (e.g., Piper et al. and WDFW Fish Health Unit 2010). The “base” bioprogram considers only fall and spring Chinook Salmon production. Additional bioprogramming considers optional production programs that may be phased in over time or as funding allows, for Coho Salmon and winter steelhead. Bioprogramming details for all species are presented in Appendix A.

3.1.1 Program, Species, and Numbers

For the purposes of bioprogramming, HDR assumes that the primary, or base, production at a potential new Cowlitz River State Salmon Hatchery would focus on fall Chinook and spring Chinook Salmon. Optional production of Coho Salmon and steelhead could be phased in, over time, as funding allows. Production program goals for all four stocks, including base Chinook Salmon production and optional Coho Salmon and steelhead production, were provided by WDFW (Table 3-1). If a facility were developed at this location, WDFW could rear up to 4,100,000 fall Chinook Salmon and 1,250,000 spring Chinook Salmon. For the purposes of bioprogramming, if Coho Salmon and steelhead production were implemented over time, WDFW could rear 1,000,000 Coho Salmon and 250,000 steelhead. Chinook and Coho salmon production would contribute toward SRKW prey enhancement objectives directed under EO 18-02 and established by the Orca Task Force.

For each fish species considered for potential production, WDFW provided information on desired flow indices, density indices, program goals, sizes at release (fpp), median spawn dates, and release dates (Table 3-1). WDFW also provided information on preferred rearing unit styles and timing of fish transfers between production phases based on water temperatures and preferred marking/tagging sizes (see Appendix A for more information). In addition, species-specific condition factors, annual water temperature profiles (e.g., surface and ground), growth rates, mortality rates, and initial weights and lengths provided by biomodeling components were used to formulate the anticipated growth models for each species.

Table 3-1. New Cowlitz State Salmon Hatchery Program Goals

Species	Flow Index[1]	Density Index[2]	Program	Spawn Date	Size at release (fpp[3])	Release Date	Total Pounds	Sample Production Period (months)
Base Facility – Chinook Salmon Production Only								
Fall Chinook	1.0	0.2	4,100,000	Oct 15	80	May 30	51,250	10/15/2020 through 5/30/2021
Spring Chinook	0.6	0.1	1,250,000	Sep 19	5	Mar 1	250,000	9/19/2020 through 3/1/2022
Optional Coho Salmon and Steelhead Production								
Coho	1.0	0.3	1,000,000	Nov 1 and Dec 1	15	May 1	66,667	11/15/2020 through 5/1/2022
Steelhead	1.0	0.3	250,000	Apr 8	7	May 7	35,714	4/8/2020 through 5/7/2021
Total			**6,600,000**				**403,631**	

[1] Flow Index = lbs/gpm/inch
[2] Density Index = lbs/ft3/inch
[3] fpp = fish per pound
Source: WDFW (2020)

The bioprogram model for a potential new hatchery was developed by conducting several iterations of a typical production cycle to meet WDFW's preferences and production goals. Constraints to accomplishing these goals included annual water temperature profiles (e.g., surface and ground), disease treatment and prevention, biosecurity logistics, and the timing of fish releases. To meet the production objectives with these constraints, it was necessary to incorporate the following conditions:

- Limit the use of surface water >51°F to limit disease issues; this assumes that a groundwater source would be available.
- Utilize a partial recirculation aquaculture system (PRAS) to modify water temperatures to limit disease issues, increase/decrease growth rates to match WDFW release date and size at release preferences, as well as reduce overall water consumption.
- Modify species-specific growth rate estimates to match WDFW release date and size at release preferences.

Bioprogram modeling for this potential facility uses exact numbers and conditions, which vary, as hatchery managers will attest. It is quite probable that conditions in the facility can be slightly altered and still achieve target goals. This can be accomplished with minor adjustments to the rearing temperature and/or increasing the final densities several weeks before release. Minor adjustments to the rearing conditions by staff may achieve desired increases in target size of the smaller release groups.

3.1.2 Bioprogram and Findings Summary

Bioprogramming results were based on the desired production scenario for the facility and are discussed by individual species below.

3.1.2.1 Base Program – Chinook Salmon Only

The base bioprogram for a potential new hatchery focuses on fall and spring Chinook Salmon and is summarized below. Details are presented in Appendix A.

Fall Chinook

The WDFW could rear 4,100,000 fall Chinook Salmon subyearlings with spawning in October and release in late May (8-month production period). As a result of accommodating the assumptions associated with the bioprogram, fall Chinook could be reared in 63 full stack incubation trays and then transferred to three 175-foot raceways for final growout (Table 3-2). Incubation is supplied by groundwater to take advantage of preferred water temperatures. Growout is supplied by surface water due to potential limitations of groundwater availability. Maximum water consumption for groundwater and surface water is presented in Table 3-3.

Spring Chinook

The WDFW could rear 1,250,000 spring Chinook Salmon yearlings with spawning in September and release in early March (19-month production period). As a result of accommodating the assumptions associated with the bioprogram, spring Chinook would be reared in 20 full stack incubation trays, transferred to ten 100-foot raceways for intermediate growout, and then to thirteen 175-foot raceways for final growout (Table 3-2). The site is developed with twelve 175-foot raceways designated for spring Chinook. A thirteenth 175-foot raceway would be provided by an unused fall Chinook raceway in February-March. Incubation and intermediate rearing are supplied by groundwater to take advantage of preferred water temperatures. Final growout in the 175-foot raceways is supplied by surface water due to potential limitations of groundwater availability. A PRAS (70%) is proposed for the final growout period to reduce overall water consumption. With PRAS, the maximum water consumption for groundwater and surface water is presented in Table 3-3.

3.1.2.2 Optional Programs

If the production of additional species is achievable through future phasing or funding, WDFW could rear Coho Salmon and/or steelhead at a new facility. Bioprogramming summaries for each species are provided below and details are presented in Appendix A.

Coho

The WDFW could rear 1,000,000 Coho Salmon yearlings with spawning in November-December and release in early May (19-month production period). The Coho bioprogram was based on staggered spawn dates of November 1 and December 1 to incorporate multiple egg takes that could span from September to February. As a result of accommodating the assumptions associated with the bioprogram, Coho would be reared in 16 full stack incubation trays, three 100-foot raceways for intermediate growout, and two 175-foot raceways for final growout (Table 3-2). Incubation is supplied by groundwater to take advantage of preferred water temperatures. Intermediate and final

growout, in the 100- and 175-foot raceways, is supplied by surface water due to potential limitations of groundwater availability. A PRAS (90%) is proposed for the incubation period to reduce water temperatures to time the different spawn dates to enter the raceways at approximately the same date. Maximum water consumption for groundwater and surface water is presented in Table 3-3.

Steelhead

The WDFW proposes to rear 250,000 winter steelhead with spawning in April and release in early May (14-month production period). As a result of accommodating the assumptions associated with the bioprogram steelhead would be reared in 4 full stack incubation trays, transferred to 16 8-foot-diameter circular tanks for intermediate growout, and then to 6 30-foot-diameter circular tanks for final growout (Table 3-2). For each of the growout phases, one extra tank has been added for managing fish culture operations. The water source would be groundwater for the entire rearing period for steelhead (April - May). Maximum water consumption for groundwater and surface water is presented in Table 3-3.

Table 3-2. Rearing Unit Requirements for New Cowlitz River State Salmon Hatchery

Species	Full stacks	100-foot Raceways	175-foot Raceways	8-foot-diameter circulars	30-foot-diameter circulars
Fall Chinook	63		3		
Spring Chinook	20	10	13[1]		
Coho	16	3	2		
Winter Steelhead	4			15[2]	5[2]

[1]The site plan (see Figure 4-1) includes 12 175-foot raceways for spring Chinook. The 13th 175-foot raceway would be provided by an unused fall Chinook raceway in February-March (capturing multi-use purpose).

[2] The site plan (see Figure 4-1) includes 16, 8-foot circulars and 6, 30-foot circulars for steelhead. The extra tanks depicted on the site plan are for fish culture purposes for grading/marking, and not for rearing.

3.1.3 Water Supply

The bioprogram developed for the new Cowlitz River State Salmon Hatchery would require both surface and groundwater to meet production goals (Table 3-3).

Three possible water supply sources have been identified: 1) the Cowlitz River (surface water), 2) Bright's Creek (surface water), and 3) shallow wells/exfiltration trench systems (groundwater).

Table 3-3. Surface and Groundwater Requirements for base Chinook Salmon (fall and spring) programs and optional Coho Salmon and winter steelhead programs

Species	Water Source	Maximum Monthly Water Consumption (cfs)											
		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Chinook Species	Ground	0.00	0.52	2.19	2.15	5.16	7.80	9.51	13.48	0.00	0.00	0.00	0.00
	Surface	16.59	19.93	23.98	27.23	29.97	38.54	44.02	49.52	27.98	40.50	9.99	12.81
Coho	Ground	0.00	0.00	0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00
	Surface	9.73	12.43	15.11	18.54	20.92	23.28	25.24	27.71	32.40	34.80	4.71	6.79
Steelhead	Ground	1.57	2.24	3.24	4.17	5.47	6.55	7.71	8.96	10.74	11.09	0.54	0.98
	Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.1.3.1 Surface Water Options

As described in Section 1, a screened intake is proposed on the Cowlitz River to withdraw surface water for hatchery production needs. The intake would be located along the left bank of the river, upstream of TPU's existing Barrier Dam to avoid withdrawal of effluent from TPU's Cowlitz Salmon hatchery downstream of the dam. Surface water from the Cowlitz River would be treated. Based upon monthly flow estimates (Section 2.5.1), the Cowlitz River appears to have sufficient flow to support hatchery production needs established in the bioprogram.

If water temperatures, water quality, and volumes are appropriate, Brights Creek could be used to supplement Cowlitz River surface water. The presence of fish pathogens should also be determined considering apparent former use of the tributary by spawning Coho (see Section 2.6.2). Brights Creek hydrology was estimated based on similar systems in the vicinity (Section 2.5.1). At the current time, however, sufficient information is not available to confirm water availability and use of Brights Creek as an ancillary surface water supply. Development potential of a Brights Creek surface water supply is recommended in subsequent study phases. Use of Brights Creek water may facilitate homing and adult collection at the facility and should be further investigated.

3.1.3.2 Groundwater Options

Pathogen-free groundwater is most desirable for incubation and early rearing, and, as depicted in Table 3-3, a significant quantity of groundwater is estimated to be required for the bioprogram. Based on a review of the available information (see Section 2.4), the surface geology at the site appears favorable for near-surface groundwater development. Water wells located within the alluvial valley west of the site, across the Cowlitz River, appear to have encountered a productive sand and gravel aquifer at a depth of about 30 feet.

As discussed in Section 2.4, although the mapped site geology appears favorable for shallow groundwater development, either through wells or through exfiltration trench systems, additional study is required to validate these assumptions and estimate available quantities. Deeper groundwater supplies could exist within outwash sand and gravel, should these materials exist beneath the mapped alluvium. A subsurface exploration program, with testing and analyses of aquifers encountered, is required to accurately assess groundwater availability at the site.

3.1.3.3 RAS/PRAS

Partially recirculated aquaculture systems can be utilized to regulate water temperatures and reduce overall water consumption. Use of a PRAS is proposed for some of the bioprograms of the new Cowlitz hatchery. For spring Chinook, a PRAS is proposed for the final growout phase to reduce overall water consumption. For Coho, a PRAS is proposed for the incubation growout phases to time the different spawn date groupings to enter the raceways at the approximately the same date.

3.2 Biosecurity

3.2.1 General Approach to Biosecurity

Biosecurity has profound effects on the design and operation of fish hatcheries. The term biosecurity is used to address design and operational strategies to minimize the likelihood that pathogens will be introduced to, or transferred among or within, a hatchery population through the water supply, other fish, humans, equipment, or other potential vectors. The following issues should guide the approach to biosecurity and should be addressed in detail during the design phase:

- Prevention of eggs and/or fish from unintentional access or exposure to rearing units outside of their biosecure zone.
- Contamination of the facility through the delivery of off-station water supplies would be addressed by disinfection prior to use within the facility; precautions would be made to contain incoming water from contamination with other programs.
- For outdoor rearing facilities, predation from birds and small mammals can have major impacts to production and can stress the fish. This added stress can result in poor feed conversion and can increase the risk of disease. Functional yet cost effective protection for minimizing predation would be employed.
- Vehicle restrictions, disinfection stations for vehicles, a visitor containment area, fencing, and site drainage would be used to minimize fish pathogens or invasive species from entering or leaving the site.
- A disinfection station to separate and potentially treat eggs brought on-site from outside the facility is necessary. Consideration would be given to its location within the hatchery facilities.
- The effluent from disinfection requires control of any pathogens, therapeutics, and escapement of eggs.
- Handling of mortalities would require a disposal plan to prevent any fish pathogens from reaching other portions of the site or the Cowlitz River.
- Prevention of Aquatic Nuisance Species and invasive species would be part of the treatment of any water entering or leaving the site.
- Disinfection stations for personnel, equipment, and gear would be strategically located throughout the site.
- Management of personnel and visitors would be addressed during design to minimize inadvertent transmission of fish pathogens to fish rearing units.

Biosecurity techniques deployed throughout the site would enhance the ability for hatchery staff to better control disease outbreak or transmission and offer opportunity for greater isolation should it become a problem within the flow of the rearing systems.

3.2.2 Salmonid *Ceratomyxosis*

The Cowlitz River has documented health issues with a variety of diseases at the Cowlitz Trout Hatchery and Cowlitz Salmon Hatchery operated by TPU. The pathogens reported at these facilities are presented in Table 3-4.

Table 3-4. Health issues reported at TPU's Cowlitz Trout Hatchery

Health Issue	Causative Agent
Bacterial Coldwater Disease (BCWD)	*Flavobacterium psychrophilum*
Bacterial Gill Disease (BGD)	*Flavobacterium branchiophilum*
External Bacterial Coldwater Disease (EX-BCWD)	
Furunculosis	*Aeromonas salmonicida*
Columnaris	*Flavobacterium columnare*
Trichodinosis	*Trichodina* Protozoan
Infectious Haematopoietic Necrosis (IHN)	Virus
Diegenetic Trematodes, Fluke	
Costia	Protozoan
Ceratomyxosis	*Ceratomyxa shasta*

While the pathogens listed in the table above are all of concern for the new Cowlitz River Hatchery, emphasis is placed on Ceratomyxosis (*C. shasta*). To address this issue, the design approach presented below would have a positive impact on health issues of other pathogens. Natural infections of *C. shasta* occur in all three species of salmonids being considered for this facility (Chinook Salmon, Coho Salmon and steelhead trout). It has been reported that Chinook and steelhead are most susceptible while Coho have exhibited more resilience to infection (personal communication, Jed Varney, WDFW). This parasite, found in the Cowlitz River system, has a complex life cycle. A fresh water polychaete worm (*Manayunkia speciose*) is the host to the actinospore stage of *C. shasta* which attaches to the fish gill and penetrates the gill epithelium. Mortality in a hatchery system generally occurs when the surface water temperature exceeds 50°F.

Management of *C. shasta* epizootics for a potential new Cowlitz River Hatchery would be based upon operations at the two above-mentioned facilities operated by TPU, strategic use of surface water supplies and use of pathogen free water. The Cowlitz Trout Hatchery (operated by TPU) utilizes ozone for treatment of the *C. shasta* parasite on its incoming water supply up to 20 cfs. While this system is effective and has the advantage of dose alteration and efficacy in dirty water, it has safety issues associated with its use.

The conceptual design of this new facility would be to avoid the use of ozone or other disinfectants (such as UV, chlorine, etc.) assuming that pathogen free water would be available. It is assumed that the groundwater source (shallow wells/exfiltration trench system) and Bright's Creek is pathogen free of *C. shasta*. The use of these water supplies as first pass use and/or in a PRAS should prevent *C. shasta* outbreaks. Cowlitz River water is typically utilized from November through March when water temperatures are below 50 degrees Fahrenheit. Should future water quality studies demonstrate that pathogen-free ground or surface water is not available, UV filtration would be the next recommended pathway to treat pathogens, followed by ozone.

Biological modeling (bioprograms) have been developed for fall Chinook subyearling, spring Chinook yearlings, Coho yearlings and winter late run steelhead yearlings. Under the bioprogram, incubation for all four groups of fish would utilize groundwater. Water source use and application of PRAS is indicated by species below (Table 3-5).

Table 3-5. Source of Water by Species for Rearing at Potential Cowlitz River State Salmon Hatchery

Species	Intermediate Rearing	Growout Rearing
Base Chinook Salmon Production		
Fall Chinook (subs)		Surface water (January through May) until release
Spring Chinook (yearlings)	Groundwater (January through March)	Surface water (April through March) until release 70% PRAS
Optional Coho Salmon and Steelhead Production		
Coho Salmon (yearlings)	Surface water (April through July)	Surface water (August through May) until release
Winter (late run) steelhead	Groundwater (June through August)	Groundwater (September through May) until release

Future water rights obtained for these water sources would determine what adjustments may need to occur regarding use of PRAS, percentage of Bright's Creek usage and priority of water use by species.

4 Concept Design

For hatchery siting, HDR assumes that acquisition of an easement or land exchange with DNR is achievable. The design and use of DNR lands would be contingent upon securing such an agreement between DNR and WDFW.

The conceptual design discussed below includes the following facilities on DNR lands: screened surface water intake, buried water conveyance lines, and a hatchery access road. All other hatchery-related facilities would be located on the Jorgenson Timber parcel.

4.1 Site Layout Concept

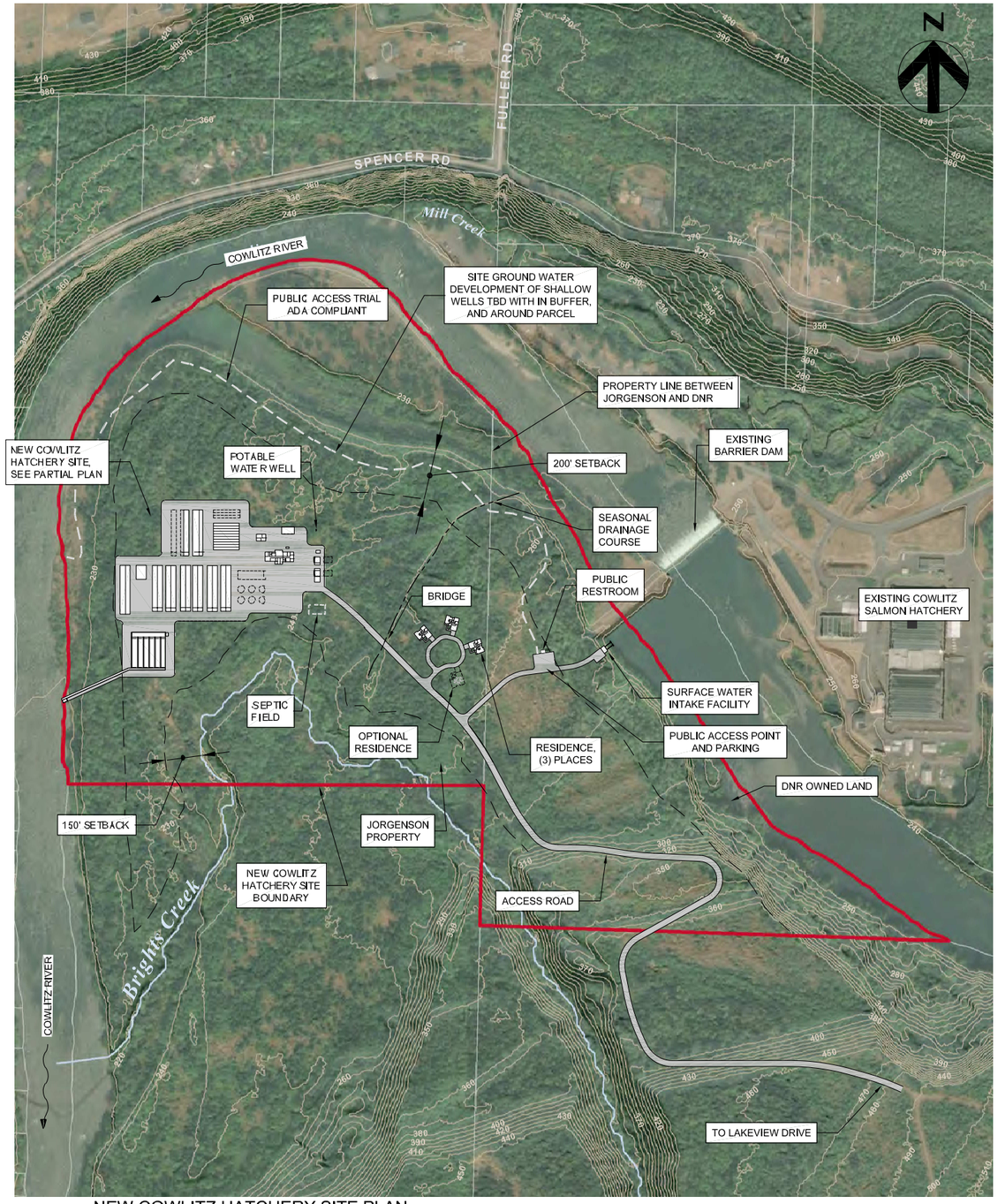
Based on WDFW's desired production program and subsequent bioprogramming developed for the new hatchery, HDR developed a conceptual layout of major process facilities and ancillary support facilities including (Figure 4-1):

- Surface water intake and screening facility
- Surface water head tank and groundwater headtank
- Backup power generators
- Groundwater development
- Groundwater treatment
- Incubation and administration building; chillers
- Circular tank buildings
- Shop and feed storage buildings
- Rearing raceways
- Adult fish ladder, trap and sorting facility
- Adult holding ponds
- Pollution abatement
- Facility outfall and juvenile release pipe
- PRAS stations
- Facility access road and utilities

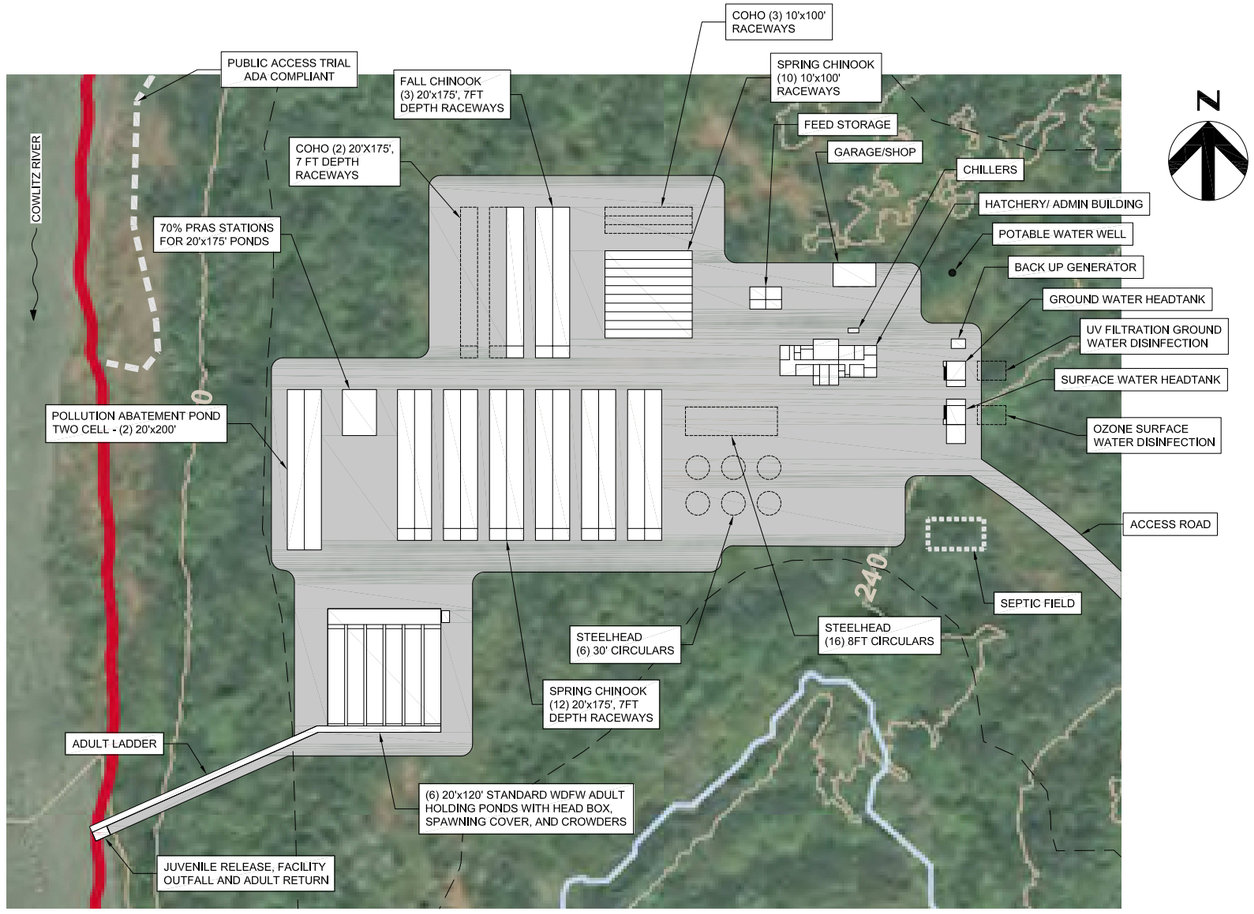
Optional UV and ozone disinfection facilities are depicted on the site plan (Figure 4-1). The fisheries components of the above list should be further vetted with WDFW for biosecurity, the ability to meet program goals now and into the future, availability of new surface water rights and groundwater rights, operational flexibility, maintenance, reliability, and fisheries monitoring and evaluation.

The conceptual site plan presented herein was developed by combining all available and known information, including required regulatory setbacks for known critical resources located within the subject parcels, such as shorelines and stream buffers. Additional regulatory considerations may further restrict site development potential (e.g., channel migration zone, well development). The conceptual site plan described below is considered the best configuration that addressed the specific site, operational, and

maintenance elements for development of a large-scale production hatchery on the subject parcels. In the subsections below, facility elements are summarized at this conceptual level of design.



NEW COWLITZ HATCHERY SITE PLAN



NEW COWLITZ HATCHERY PARTIAL PLAN

FIGURE 4-1

New Cowlitz Hatchery Candidate Site Plan

12/18/2020

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4.2 Base Facilities

4.2.1 Surface Water Intake

The bioprogram developed for this conceptual facility indicates that the maximum base surface water requirement for fall and spring Chinook production only is approximately 50 cfs (Table 3-3). To accommodate this capacity and provide enough water supply for adult collection, adult holding, and juvenile rearing, a left bank surface water intake is proposed on the Cowlitz River. The intake would be located directly upstream of TPU's existing Barrier Dam, along the left bank where it is stable and does not appear subject to channel migration. A T-screen intake is proposed, which would meet state and federal screening criteria requirements. The intake would be equipped with an air backwash cleaning system and a brush cleaning system directly attached to the rotating drums of the T--screen. The T-screen assemblies would be attached to intake pipes that are connected to a pump sump located on the bank. The T-screens would be retractable on an inclined track for yearly maintenance between rearing cycles. It is recommended that two T--screens, each capable of screening 25 cfs, are utilized so that one can be off-line during low surface water use for inspection and maintenance.

The pump sump would be a vertical concrete structure excavated below the invert of the screen inverts to receive the connecting pipes between the T-screens and the pump sump. Within the pump sump, multiple bays would be placed for pumps with an additional redundant bay so one pump can be taken off-line for maintenance without disrupting water demand during peak demand.

A complete building would be placed over the sump to house the pumps, pump controls, variable speed drives/controls, air back wash systems, electrical controls and feeders, automatic switches for backup power and general lighting, HVAC, and storage.

A backup generator would accompany the intake facility as a standalone asset with contained fuel storage outside the facility. The generator would support continued power supply to the screen cleaning operations, pumping operations, controls, alarms and station general power during an outage.

For this feasibility level study, it has been assumed that a T-screen assembly would be the most cost-effective screen element in place of inclined flat plate screen. Key reasons for this approach include reduction of the facility footprint within the OHWM; ease of extraction for maintenance; lower impact to environment; prefabricated system moderately easier to install then inclined flat plate; and potentially less expensive to construct.

The intake would be designed to provide safe access for inspection and annual maintenance of the screens. A sheer log or debris boom would be incorporated into the intake design. Flow meters and variable frequency drives would also be incorporated to control the withdrawal rate to the intended program, to conserve power, and to provide efficiencies and minimize over-pumping.

The intake facility would pump surface water through buried pipelines to a head tank facility located landward of the shoreline buffer on the hatchery grounds. The head tank would be sized to handle the full capacity of raw surface water required for production

and would be enclosed to provide biosecurity. Future design may recommend a surface water disinfection system.

Although Brights Creek may be available for some surface water withdrawal, further investigation into this system is required to determine development potential to augment Cowlitz River water supplies.

4.2.2 Groundwater Development

The bioprogramming completed for the base Chinook Salmon production program indicates a maximum groundwater need of 14 cfs (Table 3-3). Although preliminary, desktop geotechnical and hydrogeologic analyses indicate that shallow well development might be possible at this site. Possible potable water well is identified on the conceptual site plan; however, this location is speculative at this time. If additional study determines that groundwater development is feasible, well types and locations would be determined during future development phases.

Looking forward, the hatchery would require a biosecure groundwater source for incubation and early rearing because this is paramount for a successful hatchery program. A path forward should start with a comprehensive groundwater hydrogeologic assessment to evaluate baseline conditions and provide a level of certainty on how to develop and maintain the groundwater rights for the hatchery.

For this study, HDR included a head tank facility for groundwater alone bifurcated from the surface water system. In addition, a water treatment facility is developed as an option should the groundwater evaluation prior to or during operations determine that the supply is not pathogen free. See Appendix C for design options and associated costs. Groundwater treatment options consists of mechanical filtration, UV disinfection, and aeration if shallow groundwater wells or infiltration systems are relied upon. Final sizing of the groundwater treatment, holding, and distribution system would be based on a comprehensive groundwater hydrogeologic assessment.

If enough groundwater is not available to meet the bioprogramming requirements, the surface water intake capacity could be increased to meet production needs.

4.2.3 Incubation and Administration Building

Hatchery incubation and administration services would be housed in a building located just west of the surface and groundwater head tanks. The building would be located outside of the shoreline and stream buffers for the Cowlitz River and Brights Creek. The building would contain office/workspace, restrooms, meeting room, kitchen/break room storage, IT room, mechanical room, water quality room, formalin room, egg preparation room, and incubation for fall Chinook, spring Chinook, Coho, and steelhead. A single chiller system would be sited adjacent to the water quality treatment area, just outside of the building to service incubation only.

Isolation rooms would be provided for each species' incubation. It is recommended that biosecure water be provided to the building for normal operation and emergency supply. The floor would be sloped to provide drainage to keep the working surface as dry as possible, and drains would be provided out of troughs through the floors. These design

features would provide incubation flexibility to match the bioprogramming needs, provide greater biosecurity, and minimize maintenance.

4.2.4 Shop and Feed Storage

Heated storage facilities would be provided for a shop and feed storage. Both buildings would be located landward of the shoreline and stream buffers for the Cowlitz River and Brights Creek, respectively, on the Jorgenson Timber parcel. The shop would be located near the hatchery building and accommodate equipment storage such as boats, trucks, and portable fish transfer equipment. The design of this building may consider a pre-engineered metal building, insulated and ventilated, equipped with heat, lighting, welding outlets, three vehicle bays, and a shop area. Vehicle bays would have roll up doors and up to two access doors would be accommodated

The feed storage design may consider a pre-engineered metal building, insulated and ventilated, equipped with heat, and lighting. The building may be divided into four distinct rooms with roll up doors for access to each room to place pallets of food.

4.2.5 Rearing Raceways

To accommodate the desired production and match the resulting bioprogramming requirements, several banks of raceways would be required for rearing of fall Chinook and spring Chinook. Additional raceways would be required for optional Coho salmon production. All raceways would be located landward of the shoreline and stream buffers for the Cowlitz River and Brights Creek, respectively, on the Jorgenson Timber parcel.

A southern bank of raceways (Figure 4-1) would consist of 12 “super raceways,” each 20 feet wide and 175 feet long for spring Chinook. The bioprogram indicates the need for 13 of these raceways. One additional super raceway is available from the fall Chinook program to cover the extra raceway. In addition, ten 10 x 100-foot raceways located just northeast of the spring Chinook super raceways would also be used for early rearing of spring Chinook. North of the spring Chinook raceways will be three super raceways each 20 feet wide and 175 feet long for fall Chinook. Optional Coho raceways could include three 10-foot x 100-foot raceways just north of the spring Chinook 10 x 100-foot raceways and two super raceways just west of the fall Chinook raceways.

All raceways would be covered with a predation netting system. Each raceway would have an outlet structure (tilting standpipe) and stop logs and screens capable of regulating the pond water surface level. Each raceway would be hydraulically separated from all others, meaning raceway water surface and effluent would not back up into an adjacent raceway during release, draining or normal operation. The benefits of this approach include providing more efficient fish-rearing operations that are in line with the current means and methods commonly used at other facilities, better disease control, allowance for more efficient cleaning, simplified maintenance and feeding procedures, and improved monitoring of performance including fish mortality and health. All rearing units will have both groundwater and surface water supply capabilities in case of fish culture, temperature or emergency needs.

4.2.6 Adult Fish Ladder, Trap and Sorting Facility

Returning adults would enter the facility via a new ladder located adjacent to the facility outfall (see Figure 4-1). Water from the outfall would be used as attractant flow for adult returns. Adults would ascend a fish ladder to one of six holding ponds. A common outfall channel could provide access for incoming adults with turn style gates to shunt fish into desired ponds. Once fish are in the ponds, a mechanical crowder would crowd the fish to the inflow end of the ponds where staff can sort to adjacent tanks for holding until ripe. Once fish are ready for spawning, the fish would be crowded to the inflow end where staff would collect and spawn them under a shelter equipped with brails for transfer.

A total of six adult holding ponds are proposed. Each pond would be 20-feet wide and 120-feet long. Each pond would have an automatic crowder, brail, transfer portals between adjacent ponds, spray bars, screens, tilting standpipes for possible future rearing space fish release, stop log water surface control and turn style gates in the entrance channel for adult return control. The adult water supply system would have a distribution box to serve as water surface control as necessary based overall facility hydraulic design. The spawning area would be covered by a pre-engineered building with no sides, have a concrete floor with trench drains to capture and direct spawning water and bio excrements to a sump with a grinder pump to discharge in the pollution abatement pond. The covered area would have lighting and electrical receptors that extend from the ceiling and are located around the area for ease of equipment hook up.

4.2.7 Pollution Abatement

All effluent discharge from each rearing facility would require treatment prior to discharge back to the Cowlitz River. All waste drains from the optional circulars (for steelhead production, see Section 4.3.2) and incubation rooms would be directed to a two-celled pollution abatement pond via gravity flow. The 10 x 100-foot and the 20 x 175-foot rearing raceways would require manual vacuuming; waste lines would be directed to the two-celled pollution abatement pond. The two-cell system would have a ramp into the ponds for ease of sediment removal once dried.

The pollution abatement system would be designed using WDFW standards and considering NPDES water quality permitting requirements per the Ecology. Effluent treatment would consider the most efficient operational strategies that align with the current means and methods commonly used at other facilities accepted by Ecology.

4.2.8 Facility Outfall and Juvenile Release Pipe

Outflow from rearing units would be directed to the facility outfall along with any overflow form the surface water or groundwater head tank. The hatchery outfall would be located immediately downstream of the proposed adult collection ladder. For future design consideration, water from the outfall may be utilized as part of the attraction flow in the ladder entrance for adults. At times of the year when adult attraction is not necessary and juvenile release is targeted, a separate release facility may be used that incorporates key deterrents from predatory fish and avian species. Ideally, PRAS flow would be released separately from fish release pipelines. Details on release and outflow water conveyance lines should be vetted during the pre-design process, if the facility is advanced to pre-design.

Fish release from the 10 x 100-foot or the 20 x 175-foot raceways would begin with tilting standpipes turned down in outflow for each bank. Steelhead released from the optional 30-foot diameter circulars would be conveyed through an additional side box to a conveyance line that is tied into the outflow of the facility. Juveniles would be directed down the overflow lines to the outfall. Flow conditions would need to be designed to prevent hydraulic jumps within the fish release route.

4.2.9 Facility Access Road and Utilities

The Jorgenson Timber parcel is currently accessible through the DNR parcel and the DNR parcel is accessible from Lakeview Drive. It is anticipated that the road to and from the hatchery would be a rural gravel road that would require little maintenance.

The main road design route would traverse the DNR land to the Jorgenson Timber parcel. The total distance from Lakeview Drive to the proposed hatchery site is 2.5 to 3.0 miles. Approximately 1.0 mile of new road would need to be constructed through the DNR land to the proposed hatchery site.

Utilities for the site would consist of potable water, sewer, power, phone, and fiber optic (if possible). Potable water would be sought from a groundwater well and treated on site. Sewer would rely on a septic tank and leach field. Primary power would be either brought in from Lakeview Drive or potentially aerial over the Cowlitz River from the North. Phone and fiber optic may follow the same path of power. Other options may be sought for data transfer system other than fiber optic.

4.2.10 Hatchery Residences

Considering the relatively remote nature of the subject parcels, HDR assumes that up to three on-site residences, with the option for a fourth, would be required for hatchery staff. Each residence would be designed to current WDFW standards.

4.3 Optional Facilities

Optional facilities include those related to surface and groundwater treatment, and infrastructure required for Coho Salmon and steelhead rearing. Optional Coho Salmon rearing unit descriptions are subsumed in the base facility discussion of raceways in the preceding sections (Section 4.2.5). Juvenile release and pollution abatement for optional rearing would be incorporated into the base facility design. Additional surface and groundwater requirements for Coho Salmon and steelhead rearing could be considered in the base design. Costs associated with optional facility components, including a fourth residence, are provided in Appendix C.

4.3.1 Optional Surface and Groundwater Potential Treatment

Should pathogen-free ground and/or surface water be unavailable, water sources would be treated using either UV filtration systems (preferred) or ozone. Further design would inform these treatment facilities; however, if an ozone plant is required, design options may include multiple ozone generators housed in a masonry building, a concrete contact basin, fiberglass degassing tanks, degassing blowers, pumping equipment, a backup electrical generator, and a liquid oxygen storage and distribution system.

If UV and mechanical filtration is utilized for treatment for *C. shasta*, a bank of mechanical filtration, pumps, and UV units with controls would constitute the key mechanical components. A pre-engineered metal building would be constructed to house the equipment adjacent to a head tank for distribution.

Based on the hatchery bioprogramming for base production of Chinook Salmon only, up to 50 cfs of surface water would be needed, and up to 14 cfs groundwater. Additional water would be required for optional Coho Salmon and steelhead production (Table 3-3). It is paramount that the early rearing life stages have a biosecure water source. While it may be practicable to disinfect 14 cfs of early rearing water, a portion of this water may be disinfected with the incorporation of a PRAS system to make up the balance. The current base design for Chinook utilizes 50 cfs with a 70 percent PRAS system incorporated for the spring Chinook in the 175-foot raceways.

Overall, biosecure water must be delivered to the facility with either groundwater wells that are biosecure, or groundwater that is treated with UV filtration systems or ozone or treated surface water. In any case, a combination of treatments could be used along with PRAS to reduce the overall cost of a large-scale water disinfection system.

4.3.2 Optional Circular Tank Buildings

Based on bioprogramming for the optional steelhead program, 6, 30-foot diameter dual drain circular tanks with dome predation covers would be required for steelhead rearing. In addition, one un-insulated building would accommodate 16 8-foot diameter fiberglass circular tanks. These rearing units would be located landward of the shoreline and stream buffers for the Cowlitz River and Brights Creek, respectively, on the Jorgenson Timber parcel.

The circular tanks would provide biosecurity and isolation capabilities and would be self-cleaning to reduce fish handling and related stress. Fish flow would be from the hatchery to the 8-foot circular tank building. Fish from the 8-foot circulars would be transferred to the bank of 6 30-foot diameter tanks for final grow out. The building would be equipped with roll up access doors on the sides so that fish can be placed into the tanks and can be transferred from the tanks. Additional ingress and egress doors will be placed for access when not transferring fish.

4.4 Climate Change Considerations

The Cowlitz River, like many rivers that flow westward from the Cascade Range, attributes its flow to a mix of rain and snow within the basin. Climate change is expected to impact three major aspects of future flow within the Cowlitz River. While the severity of these impacts is expected to vary depending on which future emissions scenario evolves, changes in air temperature, both annual and daily maximum and minimum, are expected to have far-reaching consequences.

The first and, perhaps, foremost impact of climate change on the Cowlitz River will be a change in the timing and volume of runoff as a result of the anticipated increase in air temperatures. A 2015 report (Lee et al.) by the University of Washington (UW) Climate Impacts Group (CIG) provided projections for the Cowlitz River for the middle of the road emissions scenario (Representative Concentration Pathway (RCP) 4.5), and the high

emissions scenario (RCP 8.5). These projections indicated that the historical daily average temperature in May would increase 2.3ºF for RCP 4.5 and 2.8ºF for RCP 8.5 by the mid-2030s. This would result in the snowmelt driven runoff within the basin occurring earlier than previous years and would likely produce a greater instantaneous volume than in previous years. Thus, the average annual peak runoff may occur 1 to 2 weeks sooner in spring and may be driven by 2 to 3-day warm periods that produce a more rapid runoff.

Second, these same potential increases in air temperature would result in increased water temperatures, which have been shown to impact water quality, as well as producing unacceptable fish species survivability levels within the mainstem and tributaries of the Cowlitz River. This would be particularly true during the low flow summer months, where the UW CIG (2015) study projects that August daily average temperatures would rise 3.7ºF and 4.3ºF, respectively to RCP 4.5 and RCP 8.5 by the mid-2030s.

Lastly, it is a basic tenet of climate science that as atmospheric temperatures increase, so does the atmosphere's ability to hold moisture. Therefore, there is a correlation between increasing air temperatures and the likelihood of increasing precipitation intensities. In a recent study on behalf of the Washington State Department of Energy Dam Safety Office (McMahon 2019), HDR found that 24-hour precipitation intensities have been increasing (approximately 25 percent) west of the Cascade Divide throughout the period of record 1941-2020. Additionally, a recent study (Mauger et al. 2018) by the UW CIG shows that precipitation intensities are projected to continue to increase throughout the remainder of this century. This increase in precipitation intensities is expected result in an increased risk of flooding and high flows within the Cowlitz River.

5 Recreational Access Opportunities

Recreational fishers currently have limited access to the Cowlitz River downstream of Barrier Dam. The only nearby public access is a small boat launch on the right bank of the river, just downstream of Barrier Dam. If acquired by WDFW, the northern portion of the Jorgenson Timber parcel could provide expanded access for recreational anglers to the river. Thus, property acquisition would serve the dual purposes of hatchery development for SRKW prey enhancement, and improved recreational fishing opportunities in the basin. Acquisition of the northernmost 80 acres of the Jorgenson Timber parcel would include approximately 3,800 feet of riverfront for access, which represents a significant increase over existing access near this location. Any exceptions to this quantity from fishery closure zones are not captured in this estimate. Considering the fish closure zone downstream of the dam, the actual gain of shoreline access is likely closer to 1,500 linear feet.

As illustrated in Figure 4-1, ample space appears available to accommodate an ADA-accessible trail on the Jorgenson Timber parcel with parking and a restroom on the DNR parcel. As with the conceptual hatchery design, the availability of land for recreational access and parking areas may change upon further site investigation and the identification of additional regulatory setbacks, buffers, or design challenges.

The conceptual design does not currently define methods to bifurcate the facility from public access (e.g., fencing); however, this element would be added in pre-design. Public access areas must consider public safety and biosecurity concerns at the new hatchery. HDR recommends that the public have no direct access to the hatchery, except for regulated tour hours. The site would include physical barriers and signage to secure the facility and direct the public to recreational access and vehicle parking areas. Considerations for ADA-compliant parking areas and restrooms have not been fully vetted for this feasibility level review and should be coordinated with WDFW.

6 Opinion of Probable Costs

6.1 Construction, Design, Permitting

A Class 4 planning level cost for development of a potential new hatchery to support spring and fall Chinook Salmon production is presented below (Table 6-1). The reader is reminded that the estimated costs presented below consider development of a new facility at a relatively remote, undeveloped location that lacks access, utilities, water, and broodstock collection facilities. Further, as noted, the planning level estimate does not include costs associated with acquisition of portions of the Jorgenson Timber LLC parcel as property acquisition is not a capital cost. Interagency arrangements for acquisition, leasing, or land exchanges between DNR and WDFW must meet mandates for both agencies. Future negotiations with private and state landowners/managers will be critical next steps should the proposal to consider hatchery development at this location advance to the pre-design phase.

A breakdown of estimated costs by facility component, for base production (i.e., Chinook Salmon production only), is presented in Appendix B. Appendix C contains costs for "add-ons" or optional infrastructure, including facilities that could support Coho Salmon and steelhead production, additional surface and groundwater requirements, and water disinfection systems.

If development of a new hatchery at the subject parcels is advanced beyond this feasibility assessment, the Class 4 planning level cost presented above will be refined in pre-design.

6.2 Operations & Maintenance

Costs associated with facility O&M are not currently scoped for development in this feasibility study. Such costs would be developed during predesign phases, in coordination with WDFW.

Table 6-1. Class 4 Cost Estimate for Development of a New Cowlitz River State Salmon Hatchery, with Assumptions

CLASS 4 ESTIMATE L=15%;H=30%	ITEM	(-) 15%	SUBTOTAL	(+) 30%
	Component Cost	$43,961,044	$51,718,875	$67,234,538
	Mobilization	$2,637,662.63	$3,103,133	$4,034,072.25
	Taxes	$3,956,493.94	$4,654,699	$6,051,108.38
	B&O Taxes	$879,220.88	$1,034,378	$1,344,690.75
	Escalation	-	-	-
	MACC	**$51,434,421**	**$60,511,084**	**$78,664,409**
	Pre-Design	$514,344	$605,111	$786,644
	Design (Engr/Arch) Basic Fee	$3,575,676	$4,206,678	$5,468,681
	Site Investigations	$514,344	$605,111	$786,644
	Permitting Local/Federal	$514,344	$605,111	$786,644
	Construction Field Oversite	$1,543,033	$1,815,333	$2,359,932
	WDFW Mgt And Support	$1,543,033	$1,815,333	$2,359,932
	Total	$59,639,195	$70,163,759	$91,212,887

MACC = Maximum Allowable Construction Cost (including MOB, taxes, and B&O taxes)
This estimate does not include Property Procurement
This estimate is based on past projects and lump sum values for major equipment
This estimate is not based on RS Means
This estimate does not have vender quotes to support values
All values in this estimate need to be verified through the Pre-Design Process following OFM format
This estimate is a Class 4 Planning level estimate and does not include escalation.
This estimate is reflective of the detailed information noted in the Master Plan "Cowlitz Hatchery Feasibility Study."
While the costs shown are greater than the original hatchery request of $38M, these costs will be vetted in greater detail during the Pre-Design Phase.

7 Conclusions and Next Steps

Considering the production goals defined by WDFW and the preliminary feasibility review discussed herein, HDR concludes that if enough groundwater is available for development and use at the subject site, the desired base goals for Chinook Salmon production may be achievable at this location. However, many uncertainties exist, and further evaluation of the selected site may determine that the site cannot accommodate desired production. Additionally, further investigation may reveal unknown regulatory hurdles or land acquisition challenges. Recommended next steps include:

- Site visits to confirm on-site characteristics, including presence of critical areas and conditions of Cowlitz Riverbank and Brights Creek
- Studies to determine groundwater development feasibility
- Hydrologic and water quality studies for Brights Creek to determine potential for development
- WDFW-led discussions with Jorgenson Timber and DNR to discuss land lease or acquisition pathways

In summary, based on the findings of this report, HDR recommends that the next steps toward development of a hatchery on the Cowlitz River for SRKW prey enhancement include additional study of the selected site. Additional evaluation and information gathering would focus on landowner outreach and recommendations bulleted in the list above that are achievable within the bounds of future funding as part of the SRKW master planning process.

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Appendix A. New Cowlitz River State Salmon Hatchery Bioprogramming Information

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Cowlitz River Hatchery
Subyearling Fall Chinook OPTION 2
4,100,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	# Double Stacks	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
15-Oct	Trays	50.0		4,783,333		5,500	870	125	63	0	0%	750
22-Oct	Trays	50.0	144	4,759,895	0.5%	5,500	866	124	62	0	0%	744
29-Oct	Trays	50.0	270	4,736,572	0.5%	5,500	862	124	62	0	0%	744
5-Nov	Trays	50.0	396	4,713,362	0.5%	5,500	857	123	62	0	0%	738
12-Nov	Trays	50.0	522	4,690,267	0.5%	5,500	853	122	61	0	0%	732
19-Nov	Trays	50.0	648	4,667,285	0.5%	5,500	849	122	61	0	0%	732
26-Nov	Trays	50.0	774	4,650,949	0.3%	5,500	846	121	61	0	0%	726
3-Dec	Trays	50.0	900	4,634,671	0.3%	5,500	843	121	61	0	0%	726
10-Dec	Trays	50.0	1026	4,618,449	0.3%	5,500	840	120	60	0	0%	720
17-Dec	Trays	50.0	1152	4,602,285	0.3%	5,500	837	120	60	0	0%	720
24-Dec	Trays	50.0	1278	4,586,177	0.3%	5,500	834	120	60	0	0%	720
31-Dec	Trays	50.0	1404	4,570,125	0.3%	5,500	831	119	60	0	0%	714
7-Jan	Trays	49.0	1523	4,554,130	0.4%	5,500	829	119	60	0	0%	714
14-Jan	Trays	49.0	1642	4,538,190	0.3%	5,500	826	118	59	0	0%	708
21-Jan	Trays	49.0	1761	4,522,307	0.3%	5,500	823	118	59	0	0%	708
28-Jan	Trays	49.0	1880	4,506,479	0.3%	5,500	820	118	59	0	0%	708

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
29-Jan	175' Raceways	49.0	1.41	35.79	0.38	1205.6	4,504,225		3,736	13,249	0.5	2,650	0	0%	2,650	5.90
5-Feb	175' Raceways	44.0	1.50	38.12	0.45	997.1	4,479,002	0.6%	4,492	14,952	0.6	2,990	0	0%	2,990	6.66
12-Feb	175' Raceways	44.0	1.59	40.46	0.54	834.1	4,453,919	0.6%	5,340	16,747	0.7	3,349	0	0%	3,349	7.46
19-Feb	175' Raceways	44.0	1.69	42.80	0.64	704.8	4,428,977	0.6%	6,284	18,634	0.8	3,727	0	0%	3,727	8.30
26-Feb	175' Raceways	44.0	1.78	45.14	0.75	600.8	4,404,175	0.6%	7,330	20,609	0.8	4,122	0	0%	4,122	9.18
5-Mar	175' Raceways	46.0	1.89	47.94	0.90	501.4	4,379,512	0.6%	8,734	23,120	0.9	4,624	0	0%	4,624	10.30
12-Mar	175' Raceways	46.0	2.00	50.75	1.07	422.8	4,354,986	0.6%	10,301	25,759	1.1	5,152	0	0%	5,152	11.47
19-Mar	175' Raceways	46.0	2.11	53.55	1.26	359.8	4,330,598	0.6%	12,038	28,525	1.2	5,705	0	0%	5,705	12.71
26-Mar	175' Raceways	46.0	2.22	56.36	1.47	308.7	4,306,347	0.6%	13,952	31,415	1.3	6,283	0	0%	6,283	13.99
2-Apr	175' Raceways	48.0	2.35	59.63	1.74	260.6	4,282,232	0.6%	16,433	34,972	1.4	6,994	0	0%	6,994	15.58
9-Apr	175' Raceways	48.0	2.48	62.90	2.04	222.0	4,258,251	0.6%	19,182	38,699	1.6	7,740	0	0%	7,740	17.24
16-Apr	175' Raceways	48.0	2.61	66.18	2.38	190.7	4,234,405	0.6%	22,210	42,590	1.7	8,518	0	0%	8,518	18.97
23-Apr	175' Raceways	48.0	2.74	69.45	2.75	165.0	4,210,692	0.6%	25,527	46,645	1.9	9,329	0	0%	9,329	20.78
30-Apr	175' Raceways	48.0	2.87	72.72	3.16	143.7	4,187,112	0.6%	29,144	50,858	2.1	10,172	0	0%	10,172	22.65
7-May	175' Raceways	51.0	3.02	76.70	3.70	122.5	4,163,664	0.6%	33,997	56,252	2.3	11,250	0	0%	11,250	25.06
14-May	175' Raceways	51.0	3.18	80.67	4.31	105.2	4,140,348	0.6%	39,338	61,883	2.5	12,377	0	0%	12,377	27.57
21-May	175' Raceways	51.0	3.34	84.64	4.98	91.1	4,117,162	0.6%	45,189	67,749	2.8	13,550	0	0%	13,550	30.18
28-May	175' Raceways	51.0	3.49	88.62	5.71	79.4	4,094,106	0.6%	51,567	73,844	3.0	14,769	0	0%	14,769	32.89
Stocking							**4,094,106**	**10%**	**51,567**							

Cowlitz River Hatchery
Spring Chinook OPTION 2
1,250,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	# Double Stacks	GPM	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
9/19/2020	Trays	50.0		1,479,167		5,500	269	39	20	234	0	0%	234
9/26/2020	Trays	50.0	144	1,471,919	0.5%	5,500	268	39	20	234	0	0%	234
10/3/2020	Trays	50.0	270	1,464,706	0.5%	5,500	267	39	19	234	0	0%	234
10/10/2020	Trays	50.0	396	1,457,529	0.5%	5,500	266	38	19	228	0	0%	228
10/17/2020	Trays	50.0	522	1,450,387	0.5%	5,500	264	38	19	228	0	0%	228
10/24/2020	Trays	50.0	648	1,443,280	0.5%	5,500	263	38	19	228	0	0%	228
10/31/2020	Trays	50.0	774	1,438,229	0.4%	5,500	262	38	19	228	0	0%	228
11/7/2020	Trays	50.0	900	1,433,195	0.4%	5,500	261	38	19	228	0	0%	228
11/14/2020	Trays	50.0	1026	1,428,179	0.3%	5,500	260	38	19	228	0	0%	228
11/21/2020	Trays	50.0	1152	1,423,180	0.3%	5,500	259	37	19	222	0	0%	222
11/28/2020	Trays	50.0	1278	1,418,199	0.3%	5,500	258	37	19	222	0	0%	222
12/5/2020	Trays	50.0	1404	1,413,236	0.3%	5,500	257	37	19	222	0	0%	222
12/12/2020	Trays	50.0	1530	1,408,289	0.3%	5,500	257	37	19	222	0	0%	222
12/19/2020	Trays	50.0	1656	1,403,360	0.3%	5,500	256	37	19	222	0	0%	222
12/26/2020	Trays	50.0	1782	1,398,448	0.4%	5,500	255	37	0	222	0	0%	222

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	DI	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
12/27/2020	100' Raceway	50.0	1.41	35.79	0.38	1205.6	1,397,749		1,159	0.10	8,223	2.1	1,370	0	0%	1,370	3.05
1/3/2021	100' Raceway	49.0	1.53	38.89	0.48	939.7	1,395,303	0.2%	1,485	0.10	9,691	2.4	1,615	0	0%	1,615	3.60
1/10/2021	100' Raceway	49.0	1.65	41.98	0.61	746.6	1,392,861	0.2%	1,866	0.10	11,278	2.8	1,880	0	0%	1,880	4.19
1/17/2021	100' Raceway	49.0	1.78	45.08	0.75	603.0	1,390,424	0.2%	2,306	0.10	12,981	3.2	2,164	0	0%	2,164	4.82
1/24/2021	100' Raceway	49.0	1.90	48.18	0.92	494.0	1,387,991	0.2%	2,810	0.10	14,801	3.7	2,467	0	0%	2,467	5.49
1/31/2021	100' Raceway	49.0	2.02	51.28	1.11	409.7	1,385,562	0.2%	3,382	0.10	16,737	4.2	2,789	0	0%	2,789	6.21
2/7/2021	100' Raceway	49.0	2.14	54.38	1.32	343.6	1,383,137	0.2%	4,025	0.10	18,788	4.7	3,131	0	0%	3,131	6.97
2/14/2021	100' Raceway	49.0	2.26	57.48	1.56	291.0	1,380,716	0.2%	4,745	0.10	20,953	5.2	3,492	0	0%	3,492	7.78
2/21/2021	100' Raceway	49.0	2.39	60.58	1.82	248.6	1,378,300	0.2%	5,545	0.10	23,233	5.8	3,872	0	0%	3,872	8.62
2/28/2021	100' Raceway	49.0	2.51	63.68	2.12	214.0	1,375,888	0.2%	6,429	0.10	25,626	6.4	4,271	0	0%	4,271	9.51
3/7/2021	100' Raceway	49.0	2.63	66.77	2.44	185.6	1,373,480	0.2%	7,401	0.10	28,131	7.0	4,689	0	0%	4,689	10.44
3/14/2021	100' Raceway	49.0	2.75	69.87	2.80	162.0	1,371,077	0.2%	8,465	0.10	30,749	7.7	5,125	0	0%	5,125	11.41
3/21/2021	100' Raceway	49.0	2.88	72.97	3.19	142.2	1,368,677	0.2%	9,625	0.10	33,478	8.4	5,580	0	0%	5,580	12.43
3/28/2021	100' Raceway	49.0	3.00	76.07	3.61	125.5	1,366,282	0.2%	10,885	0.10	36,318	9.1	6,053	0	0%	6,053	13.48
4/4/2021	175' Super Raceway	48.0	3.11	78.96	4.04	112.2	1,363,891	0.2%	12,153	0.10	39,063	1.6	6,511	4,557	70%	1,953	4.35
4/11/2021	175' Super Raceway	48.0	3.23	81.86	4.50	100.7	1,361,504	0.2%	13,515	0.10	41,904	1.7	6,984	4,889	70%	2,095	4.67
4/18/2021	175' Super Raceway	48.0	3.34	84.75	5.00	90.8	1,359,122	0.2%	14,972	0.10	44,839	1.8	7,473	5,231	70%	2,242	4.99
4/25/2021	175' Super Raceway	48.0	3.45	87.64	5.53	82.1	1,356,743	0.2%	16,529	0.10	47,868	2.0	7,978	5,585	70%	2,393	5.33
5/2/2021	175' Super Raceway	51.0	3.59	91.15	6.22	73.0	1,354,369	0.2%	18,564	0.10	51,690	2.1	8,615	6,031	70%	2,585	5.76
5/9/2021	175' Super Raceway	51.0	3.73	94.66	6.96	65.1	1,351,999	0.2%	20,757	0.10	55,653	2.3	9,275	6,493	70%	2,783	6.20
5/16/2021	175' Super Raceway	51.0	3.87	98.18	7.77	58.4	1,349,633	0.2%	23,114	0.10	59,754	2.4	9,959	6,971	70%	2,988	6.65
5/23/2021	175' Super Raceway	51.0	4.01	101.69	8.63	52.5	1,347,271	0.2%	25,639	0.10	63,993	2.6	10,666	7,466	70%	3,200	7.13
5/30/2021	175' Super Raceway	51.0	4.14	105.20	9.56	47.5	1,344,913	0.2%	28,338	0.10	68,370	2.8	11,395	7,976	70%	3,418	7.61
6/6/2021	175' Super Raceway	53.0	4.30	109.13	10.67	42.5	1,342,560	0.2%	31,575	0.10	73,438	3.0	12,240	8,568	70%	3,672	8.18
6/13/2021	175' Super Raceway	53.0	4.45	113.05	11.86	38.2	1,340,210	0.2%	35,045	0.10	78,678	3.2	13,113	9,179	70%	3,934	8.76
6/20/2021	175' Super Raceway	53.0	4.61	116.98	13.14	34.5	1,337,865	0.2%	38,755	0.10	84,089	3.4	14,015	9,810	70%	4,204	9.36
6/27/2021	175' Super Raceway	53.0	4.76	120.90	14.51	31.3	1,335,524	0.2%	42,714	0.10	89,670	3.7	14,945	10,461	70%	4,483	9.99
7/4/2021	175' Super Raceway	54.0	4.93	125.03	16.05	28.3	1,333,186	0.2%	47,162	0.10	95,736	3.9	15,956	11,169	70%	4,787	10.66
7/11/2021	175' Super Raceway	54.0	5.09	129.16	17.69	25.6	1,330,853	0.2%	51,903	0.10	101,989	4.2	16,998	11,899	70%	5,099	11.36
7/18/2021	175' Super Raceway	54.0	5.25	133.30	19.44	23.3	1,328,524	0.2%	56,945	0.10	108,428	4.4	18,071	12,650	70%	5,421	12.07
7/25/2021	175' Super Raceway	54.0	5.41	137.43	21.31	21.3	1,326,199	0.2%	62,297	0.10	115,052	4.7	19,175	13,423	70%	5,753	12.81
8/1/2021	175' Super Raceway	53.0	5.57	141.35	23.19	19.6	1,323,879	0.2%	67,670	0.10	121,505	5.0	20,251	14,176	70%	6,075	13.53
8/8/2021	175' Super Raceway	53.0	5.72	145.28	25.17	18.0	1,321,562	0.2%	73,337	0.10	128,122	5.2	21,354	14,948	70%	6,406	14.27
8/15/2021	175' Super Raceway	53.0	5.88	149.20	27.27	16.6	1,319,249	0.2%	79,304	0.10	134,903	5.5	22,484	15,739	70%	6,745	15.02
8/22/2021	175' Super Raceway	53.0	6.03	153.13	29.48	15.4	1,316,940	0.2%	85,579	0.10	141,845	5.8	23,641	16,549	70%	7,092	15.80
8/29/2021	175' Super Raceway	53.0	6.19	157.05	31.80	14.3	1,314,636	0.2%	92,168	0.10	148,949	6.1	24,825	17,377	70%	7,447	16.59
9/5/2021	175' Super Raceway	53.0	6.34	160.98	34.25	13.2	1,312,335	0.2%	99,079	0.10	156,214	6.4	26,036	18,225	70%	7,811	17.40
9/12/2021	175' Super Raceway	53.0	6.50	164.90	36.81	12.3	1,310,039	0.2%	106,319	0.10	163,637	6.7	27,273	19,091	70%	8,182	18.22
9/19/2021	175' Super Raceway	53.0	6.65	168.83	39.50	11.5	1,307,746	0.2%	113,893	0.10	171,220	7.0	28,537	19,976	70%	8,561	19.07
9/26/2021	175' Super Raceway	53.0	6.81	172.75	42.32	10.7	1,305,457	0.2%	121,810	0.10	178,960	7.3	29,827	20,879	70%	8,948	19.93
10/3/2021	175' Super Raceway	51.0	6.94	176.27	44.96	10.1	1,303,173	0.2%	129,164	0.10	185,985	7.6	30,997	21,698	70%	9,299	20.71
10/10/2021	175' Super Raceway	51.0	7.08	179.78	47.70	9.5	1,300,892	0.2%	136,800	0.10	193,131	7.9	32,189	22,532	70%	9,657	21.51
10/17/2021	175' Super Raceway	51.0	7.22	183.29	50.55	9.0	1,298,616	0.2%	144,721	0.10	200,399	8.2	33,400	23,380	70%	10,020	22.32
10/24/2021	175' Super Raceway	51.0	7.36	186.80	53.51	8.5	1,296,343	0.2%	152,932	0.10	207,788	8.5	34,631	24,242	70%	10,389	23.14
10/31/2021	175' Super Raceway	51.0	7.50	190.31	56.59	8.0	1,294,075	0.2%	161,438	0.10	215,297	8.8	35,883	25,118	70%	10,765	23.98
11/7/2021	175' Super Raceway	50.0	7.63	193.62	59.59	7.6	1,291,810	0.2%	169,699	0.10	222,451	9.1	37,075	25,953	70%	11,123	24.77
11/14/2021	175' Super Raceway	50.0	7.76	196.92	62.69	7.2	1,289,549	0.2%	178,227	0.10	229,708	9.4	38,285	26,799	70%	11,485	25.58
11/21/2021	175' Super Raceway	50.0	7.89	200.23	65.90	6.9	1,287,293	0.2%	187,025	0.10	237,068	9.7	39,511	27,658	70%	11,853	26.40
11/28/2021	175' Super Raceway	50.0	8.02	203.54	69.22	6.6	1,285,040	0.2%	196,097	0.10	244,531	10.0	40,755	28,529	70%	12,227	27.23
12/5/2021	175' Super Raceway	47.0	8.13	206.22	71.99	6.3	1,282,791	0.2%	203,606	0.10	250,588	10.2	41,765	29,235	70%	12,529	27.91
12/12/2021	175' Super Raceway	47.0	8.23	208.91	74.84	6.1	1,280,546	0.2%	211,294	0.10	256,707	10.5	42,785	29,949	70%	12,835	28.59
12/19/2021	175' Super Raceway	47.0	8.34	211.59	77.77	5.8	1,278,305	0.2%	219,164	0.10	262,889	10.7	43,815	30,670	70%	13,144	29.27
12/26/2021	175' Super Raceway	47.0	8.44	214.28	80.77	5.6	1,276,068	0.2%	227,217	0.10	269,133	11.0	44,855	31,399	70%	13,457	29.97
1/2/2022	175' Super Raceway	44.0	8.52	216.34	83.13	5.5	1,273,835	0.2%	233,443	0.10	273,867	11.2	45,645	31,951	70%	13,693	30.50
1/9/2022	175' Super Raceway	44.0	8.61	218.41	85.53	5.3	1,271,606	0.2%	239,774	0.10	278,634	11.4	46,439	32,507	70%	13,932	31.03
1/16/2022	175' Super Raceway	44.0	8.69	220.48	87.98	5.2	1,269,380	0.2%	246,211	0.10	283,433	11.6	47,239	33,067	70%	14,172	31.56
1/23/2022	175' Super Raceway	44.0	8.77	222.54	90.48	5.0	1,267,159	0.2%	252,754	0.10	288,264	11.8	48,044	33,631	70%	14,413	32.10
1/30/2022	175' Super Raceway	44.0	8.85	224.61	93.02	4.9	1,264,942	0.2%	259,404	0.10	293,127	12.0	48,855	34,198	70%	14,656	32.64
2/6/2022	175' Super Raceway	44.0	8.93	226.67	95.61	4.7	1,262,728	0.2%	266,161	0.10	298,022	12.2	49,670	34,769	70%	14,901	33.19
2/13/2022	175' Super Raceway	44.0	9.01	228.74	98.25	4.6	1,260,518	0.2%	273,026	0.10	302,948	12.4	50,491	35,344	70%	15,147	33.74
2/20/2022	175' Super Raceway	44.0	9.09	230.81	100.93	4.5	1,258,312	0.2%	280,000	0.10	307,905	12.6	51,317	35,922	70%	15,395	34.29
2/27/2022	175' Super Raceway	44.0	9.18	232.87	103.67	4.4	1,256,110	0.2%	287,083	0.10	312,893	12.8	52,149	36,504	70%	15,645	34.84
3/6/2022	175' Super Raceway	46.0	9.27	235.35	107.01	4.2	1,253,912	0.2%	295,831	0.10	319,031	13.0	53,172	37,220	70%	15,952	35.53
Stocking							**1,253,912**	**11%**	**295,831**								

Cowlitz River Hatchery
Coho Salmon
500,000 **1-Nov**

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	# Double Stacks	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
1-Nov	Trays	40.0		608,333		5,500	111	16	8.0	86	90%	10
8-Nov	Trays	40.0	64	605,353	0.5%	5,500	111	16	8.0	86	90%	10
15-Nov	Trays	40.0	120	602,386	0.5%	5,500	110	16	8.0	86	90%	10
22-Nov	Trays	40.0	176	599,435	0.5%	5,500	109	16	8.0	86	90%	10
29-Nov	Trays	40.0	232	596,497	0.5%	5,500	109	16	8.0	86	90%	10
6-Dec	Trays	40.0	288	593,575	0.5%	5,500	108	16	8.0	86	90%	10
13-Dec	Trays	40.0	344	591,497	0.3%	5,500	108	16	8.0	86	90%	10
20-Dec	Trays	40.0	400	589,427	0.4%	5,500	108	16	8.0	86	90%	10
27-Dec	Trays	40.0	456	587,364	0.3%	5,500	107	16	8.0	86	90%	10
3-Jan	Trays	40.0	512	585,308	0.3%	5,500	107	16	8.0	86	90%	10
10-Jan	Trays	40.0	568	583,259	0.3%	5,500	107	16	8.0	86	90%	10
17-Jan	Trays	40.0	624	581,218	0.3%	5,500	106	16	8.0	86	90%	10
24-Jan	Trays	40.0	680	579,184	0.3%	5,500	106	16	8.0	86	90%	10
31-Jan	Trays	40.0	736	577,157	0.4%	5,500	105	15	7.5	81	90%	9
7-Feb	Trays	40.0	792	575,137	0.4%	5,500	105	15	7.5	81	90%	9
14-Feb	Trays	40.0	848	573,124	0.4%	5,500	105	15	7.5	81	90%	9
21-Feb	Trays	40.0	904	571,118	0.3%	5,500	104	15	7.5	81	90%	9
28-Feb	Trays	40.0	960	569,119	0.3%	5,500	104	15	7.5	81	90%	9
7-Mar	Trays	42.0	1030	567,127	0.3%	5,500	104	15	7.5	81	90%	9
14-Mar	Trays	42.0	1100	565,142	0.4%	5,500	103	15	7.5	81	90%	9
21-Mar	Trays	42.0	1170	563,164	0.3%	5,500	103	15	7.5	81	90%	9
28-Mar	Trays	42.0	1240	561,193	0.3%	5,500	103	15	7.5	81	90%	9
4-Apr	Trays	44.0	1324	559,229	0.4%	5,500	102	15	7.5	81	90%	9
11-Apr	Trays	44.0	1408	557,271	0.4%	5,500	102	15	7.5	81	90%	9

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	GPM @ Fixed Exchange	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
12-Apr	100' Raceway	44.0	1.22	30.96	0.31	1473.7	556,993		378	1,033	0.3	310	155	0	0%	310	0.69
19-Apr	100' Raceway	44.0	1.28	32.45	0.35	1281.0	556,018	0.2%	434	1,132	0.3	340	170	0	0%	340	0.76
26-Apr	100' Raceway	44.0	1.34	33.93	0.40	1120.5	555,045	0.2%	495	1,235	0.3	371	185	0	0%	371	0.83
3-May	100' Raceway	51.0	1.44	36.44	0.50	904.0	554,074	0.2%	613	1,423	0.4	427	213	0	0%	427	0.95
10-May	100' Raceway	51.0	1.54	38.96	0.61	739.9	553,104	0.2%	748	1,623	0.4	487	244	0	0%	487	1.08
17-May	100' Raceway	51.0	1.63	41.48	0.74	613.2	552,136	0.2%	900	1,837	0.5	551	276	0	0%	551	1.23
24-May	100' Raceway	51.0	1.73	43.99	0.88	513.8	551,170	0.2%	1,073	2,063	0.5	619	309	0	0%	619	1.38
31-May	100' Raceway	51.0	1.83	46.51	1.04	434.9	550,205	0.2%	1,265	2,302	0.6	690	345	0	0%	690	1.54
7-Jun	100' Raceway	53.0	1.94	49.32	1.24	364.6	549,242	0.2%	1,506	2,584	0.6	775	388	0	0%	775	1.73
14-Jun	100' Raceway	53.0	2.05	52.14	1.47	308.7	548,281	0.2%	1,776	2,882	0.7	865	432	0	0%	865	1.93
21-Jun	100' Raceway	53.0	2.17	54.95	1.72	263.7	547,322	0.2%	2,076	3,196	0.8	959	479	0	0%	959	2.14
28-Jun	100' Raceway	53.0	2.28	57.76	2.00	227.0	546,364	0.2%	2,407	3,525	0.9	1,058	529	0	0%	1,058	2.36
5-Jul	100' Raceway	54.0	2.39	60.72	2.32	195.4	545,408	0.2%	2,791	3,889	1.0	1,167	583	0	0%	1,167	2.60
12-Jul	100' Raceway	54.0	2.51	63.68	2.68	169.4	544,453	0.2%	3,214	4,270	1.1	1,281	640	0	0%	1,281	2.85
19-Jul	100' Raceway	54.0	2.63	66.65	3.07	147.8	543,501	0.2%	3,677	4,668	1.2	1,400	700	0	0%	1,400	3.12
26-Jul	100' Raceway	54.0	2.74	69.61	3.50	129.7	542,549	0.2%	4,182	5,083	1.3	1,525	762	0	0%	1,525	3.40
2-Aug	175' Raceway	53.0	2.85	72.42	3.94	115.2	541,600	0.2%	4,702	5,493	0.2	1,648	1,370	0	0%	1,648	3.67
9-Aug	175' Raceway	53.0	2.96	75.23	4.41	102.7	540,652	0.2%	5,262	5,917	0.2	1,775	1,475	0	0%	1,775	3.95
16-Aug	175' Raceway	53.0	3.08	78.05	4.93	92.0	539,706	0.2%	5,864	6,357	0.3	1,907	1,585	0	0%	1,907	4.25
23-Aug	175' Raceway	53.0	3.19	80.86	5.48	82.8	538,762	0.2%	6,510	6,812	0.3	2,043	1,698	0	0%	2,043	4.55
30-Aug	175' Raceway	53.0	3.30	83.67	6.07	74.7	537,819	0.2%	7,201	7,281	0.3	2,184	1,815	0	0%	2,184	4.86
6-Sep	175' Raceway	53.0	3.41	86.48	6.71	67.6	536,877	0.2%	7,938	7,765	0.3	2,330	1,936	0	0%	2,330	5.19
13-Sep	175' Raceway	53.0	3.52	89.30	7.38	61.4	535,938	0.2%	8,723	8,264	0.3	2,479	2,061	0	0%	2,479	5.52
20-Sep	175' Raceway	53.0	3.63	92.11	8.10	56.0	535,000	0.2%	9,556	8,777	0.4	2,633	2,189	0	0%	2,633	5.86
27-Sep	175' Raceway	53.0	3.74	94.92	8.87	51.2	534,064	0.2%	10,441	9,305	0.4	2,792	2,320	0	0%	2,792	6.22
4-Oct	175' Raceway	51.0	3.84	97.44	9.59	47.3	533,129	0.2%	11,274	9,788	0.4	2,936	2,441	0	0%	2,936	6.54
11-Oct	175' Raceway	51.0	3.94	99.96	10.35	43.8	532,196	0.2%	12,149	10,282	0.4	3,085	2,564	0	0%	3,085	6.87
18-Oct	175' Raceway	51.0	4.04	102.47	11.16	40.7	531,265	0.2%	13,067	10,788	0.4	3,236	2,690	0	0%	3,236	7.21
25-Oct	175' Raceway	51.0	4.14	104.99	12.00	37.8	530,335	0.2%	14,029	11,305	0.5	3,391	2,819	0	0%	3,391	7.55
1-Nov	175' Raceway	50.0	4.23	107.36	12.83	35.4	529,407	0.2%	14,974	11,800	0.5	3,540	2,942	0	0%	3,540	7.88
8-Nov	175' Raceway	50.0	4.32	109.73	13.70	33.1	528,481	0.2%	15,959	12,305	0.5	3,691	3,068	0	0%	3,691	8.22
15-Nov	175' Raceway	50.0	4.42	112.10	14.60	31.1	527,556	0.2%	16,985	12,819	0.5	3,846	3,196	0	0%	3,846	8.57
22-Nov	175' Raceway	50.0	4.51	114.47	15.55	29.2	526,633	0.2%	18,053	13,343	0.5	4,003	3,327	0	0%	4,003	8.92
29-Nov	175' Raceway	50.0	4.60	116.84	16.54	27.4	525,711	0.2%	19,164	13,877	0.6	4,163	3,460	0	0%	4,163	9.27
6-Dec	175' Raceway	47.0	4.68	118.76	17.37	26.1	524,791	0.2%	20,092	14,313	0.6	4,294	3,569	0	0%	4,294	9.56
13-Dec	175' Raceway	47.0	4.76	120.69	18.22	24.9	523,873	0.2%	21,047	14,755	0.6	4,426	3,679	0	0%	4,426	9.86
20-Dec	175' Raceway	47.0	4.83	122.61	19.11	23.7	522,956	0.2%	22,032	15,202	0.6	4,561	3,791	0	0%	4,561	10.16
27-Dec	175' Raceway	47.0	4.91	124.53	20.02	22.7	522,041	0.2%	23,046	15,656	0.6	4,697	3,904	0	0%	4,697	10.46
3-Jan	175' Raceway	44.0	4.97	126.02	20.75	21.9	521,127	0.2%	23,836	16,002	0.7	4,801	3,990	0	0%	4,801	10.69
10-Jan	175' Raceway	44.0	5.02	127.50	21.49	21.1	520,215	0.2%	24,642	16,352	0.7	4,906	4,077	0	0%	4,906	10.93
17-Jan	175' Raceway	44.0	5.08	128.98	22.24	20.4	519,305	0.2%	25,466	16,705	0.7	5,011	4,165	0	0%	5,011	11.16
24-Jan	175' Raceway	44.0	5.14	130.46	23.02	19.7	518,396	0.2%	26,307	17,060	0.7	5,118	4,254	0	0%	5,118	11.40
31-Jan	175' Raceway	44.0	5.20	131.94	23.81	19.0	517,489	0.2%	27,165	17,419	0.7	5,226	4,343	0	0%	5,226	11.64
7-Feb	175' Raceway	44.0	5.26	133.42	24.62	18.4	516,583	0.2%	28,041	17,781	0.7	5,334	4,434	0	0%	5,334	11.88
14-Feb	175' Raceway	44.0	5.32	134.90	25.45	17.8	515,679	0.2%	28,934	18,146	0.7	5,444	4,525	0	0%	5,444	12.12
21-Feb	175' Raceway	44.0	5.37	136.38	26.30	17.2	514,777	0.2%	29,845	18,514	0.8	5,554	4,616	0	0%	5,554	12.37
28-Feb	175' Raceway	44.0	5.43	137.86	27.16	16.7	513,876	0.2%	30,774	18,885	0.8	5,666	4,709	0	0%	5,666	12.62
7-Mar	175' Raceway	46.0	5.50	139.64	28.23	16.1	512,977	0.2%	31,923	19,341	0.8	5,802	4,823	0	0%	5,802	12.92
14-Mar	175' Raceway	46.0	5.57	141.41	29.32	15.5	512,079	0.2%	33,099	19,802	0.8	5,941	4,938	0	0%	5,941	13.23
21-Mar	175' Raceway	46.0	5.64	143.19	30.44	14.9	511,183	0.2%	34,302	20,267	0.8	6,080	5,054	0	0%	6,080	13.54
28-Mar	175' Raceway	46.0	5.71	144.97	31.58	14.4	510,288	0.2%	35,533	20,737	0.8	6,221	5,171	0	0%	6,221	13.86
4-Apr	175' Raceway	48.0	5.79	147.04	32.96	13.8	509,395	0.2%	37,014	21,297	0.9	6,389	5,310	0	0%	6,389	14.23
11-Apr	175' Raceway	48.0	5.88	149.11	34.37	13.2	508,504	0.2%	38,534	21,863	0.9	6,559	5,451	0	0%	6,559	14.61
18-Apr	175' Raceway	48.0	5.96	151.18	35.83	12.7	507,614	0.2%	40,093	22,436	0.9	6,731	5,594	0	0%	6,731	14.99
25-Apr	175' Raceway	48.0	6.04	153.26	37.32	12.2	506,725	0.2%	41,691	23,015	0.9	6,904	5,739	0	0%	6,904	15.38
2-May	175' Raceway	51.0	6.14	155.77	39.19	11.6	505,839	0.2%	43,703	23,735	1.0	7,121	5,918	0	0%	7,121	15.86
Stocking							**505,839**	**10%**	**43,703**								

Cowlitz River Hatchery
Coho Salmon
500,000 **1-Dec**

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	# Double Stacks	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
1-Dec	Trays	43.0		600,000		5,500	110	16	8.0	86	90%	10	0.02
8-Dec	Trays	43.0	88	597,060	0.5%	5,500	109	16	8.0	86	90%	10	0.02
15-Dec	Trays	43.0	165	594,134	0.5%	5,500	109	16	8.0	86	90%	10	0.02
22-Dec	Trays	43.0	242	591,223	0.5%	5,500	108	16	8.0	86	90%	10	0.02
29-Dec	Trays	43.0	319	588,326	0.5%	5,500	107	16	8.0	86	90%	10	0.02
5-Jan	Trays	43.0	396	585,443	0.5%	5,500	107	16	8.0	86	90%	10	0.02
12-Jan	Trays	43.0	473	583,394	0.4%	5,500	107	16	8.0	86	90%	10	0.02
19-Jan	Trays	43.0	550	581,352	0.3%	5,500	106	16	8.0	86	90%	10	0.02
26-Jan	Trays	43.0	627	579,318	0.3%	5,500	106	16	8.0	86	90%	10	0.02
2-Feb	Trays	43.0	704	577,290	0.4%	5,500	105	15	7.5	81	90%	9	0.02
9-Feb	Trays	43.0	781	575,270	0.3%	5,500	105	15	7.5	81	90%	9	0.02
16-Feb	Trays	43.0	858	573,256	0.4%	5,500	105	15	7.5	81	90%	9	0.02
23-Feb	Trays	43.0	935	571,250	0.3%	5,500	104	15	7.5	81	90%	9	0.02
2-Mar	Trays	43.0	1012	569,250	0.3%	5,500	104	15	7.5	81	90%	9	0.02
9-Mar	Trays	43.0	1089	567,258	0.3%	5,500	104	15	7.5	81	90%	9	0.02
16-Mar	Trays	43.0	1166	565,273	0.3%	5,500	103	15	7.5	81	90%	9	0.02
23-Mar	Trays	43.0	1243	563,294	0.4%	5,500	103	15	7.5	81	90%	9	0.02
30-Mar	Trays	43.0	1320	561,323	0.3%	5,500	103	15	7.5	81	90%	9	0.02
6-Apr	Trays	44.0	1404	559,358	0.3%	5,500	102	15	7.5	81	90%	9	0.02
13-Apr	Trays	44.0	1488	557,400	0.3%	5,500	102	15	7.5	81	90%	9	0.02

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	Flow Index	GPM @ Fixed Exchange	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
14-Apr	100' Raceway	44.0	1.22	30.96	0.31	1473.7	557,122		378	1,033	0.3	310	1.00	155	0	0%	310	0.69
21-Apr	100' Raceway	44.0	1.28	32.45	0.35	1281.0	556,147	0.2%	434	1,132	0.3	340	1.00	170	0	0%	340	0.76
28-Apr	100' Raceway	44.0	1.34	33.93	0.40	1120.5	555,173	0.2%	495	1,236	0.3	371	1.00	185	0	0%	371	0.83
5-May	100' Raceway	51.0	1.44	36.44	0.50	904.0	554,202	0.2%	613	1,423	0.4	427	1.00	213	0	0%	427	0.95
12-May	100' Raceway	51.0	1.54	38.96	0.61	739.9	553,232	0.2%	748	1,624	0.4	487	1.00	244	0	0%	487	1.08
19-May	100' Raceway	51.0	1.63	41.48	0.74	613.2	552,264	0.2%	901	1,837	0.5	551	1.00	276	0	0%	551	1.23
26-May	100' Raceway	51.0	1.73	43.99	0.88	513.8	551,297	0.2%	1,073	2,063	0.5	619	1.00	309	0	0%	619	1.38
2-Jun	100' Raceway	53.0	1.84	46.81	1.06	426.7	550,332	0.2%	1,290	2,331	0.6	699	1.00	350	0	0%	699	1.56
9-Jun	100' Raceway	53.0	1.96	49.62	1.27	358.1	549,369	0.2%	1,534	2,616	0.7	785	1.00	392	0	0%	785	1.75
16-Jun	100' Raceway	53.0	2.07	52.43	1.49	303.5	548,408	0.2%	1,807	2,915	0.7	875	1.00	437	0	0%	875	1.95
23-Jun	100' Raceway	53.0	2.18	55.25	1.75	259.5	547,448	0.2%	2,110	3,231	0.8	969	1.00	485	0	0%	969	2.16
30-Jun	100' Raceway	53.0	2.29	58.06	2.03	223.6	546,490	0.2%	2,444	3,562	0.9	1,069	1.00	534	0	0%	1,069	2.38
7-Jul	100' Raceway	54.0	2.40	61.02	2.36	192.6	545,534	0.2%	2,833	3,928	1.0	1,178	1.00	589	0	0%	1,178	2.62
14-Jul	100' Raceway	54.0	2.52	63.98	2.72	167.0	544,579	0.2%	3,260	4,311	1.1	1,293	1.00	647	0	0%	1,293	2.88
21-Jul	100' Raceway	54.0	2.64	66.94	3.11	145.8	543,626	0.2%	3,727	4,711	1.2	1,413	1.00	707	0	0%	1,413	3.15
28-Jul	100' Raceway	54.0	2.75	69.90	3.54	128.1	542,675	0.2%	4,237	5,128	1.3	1,538	1.00	769	0	0%	1,538	3.43
4-Aug	175' Raceway	53.0	2.87	72.72	3.99	113.8	541,725	0.2%	4,761	5,539	0.2	1,662	1.00	1,381	0	0%	1,662	3.70
11-Aug	175' Raceway	53.0	2.98	75.53	4.47	101.5	540,777	0.2%	5,326	5,965	0.2	1,790	1.00	1,487	0	0%	1,790	3.99
18-Aug	175' Raceway	53.0	3.09	78.34	4.98	91.0	539,831	0.2%	5,933	6,407	0.3	1,922	1.00	1,598	0	0%	1,922	4.28
25-Aug	175' Raceway	53.0	3.20	81.15	5.54	81.9	538,886	0.2%	6,583	6,863	0.3	2,059	1.00	1,711	0	0%	2,059	4.59
1-Sep	175' Raceway	53.0	3.31	83.97	6.14	73.9	537,943	0.2%	7,279	7,334	0.3	2,200	1.00	1,829	0	0%	2,200	4.90
8-Sep	175' Raceway	53.0	3.42	86.78	6.78	66.9	537,002	0.2%	8,022	7,820	0.3	2,346	1.00	1,950	0	0%	2,346	5.23
15-Sep	175' Raceway	53.0	3.53	89.59	7.46	60.8	536,062	0.2%	8,812	8,321	0.3	2,496	1.00	2,075	0	0%	2,496	5.56
22-Sep	175' Raceway	53.0	3.64	92.41	8.18	55.4	535,124	0.2%	9,651	8,836	0.4	2,651	1.00	2,203	0	0%	2,651	5.90
29-Sep	175' Raceway	53.0	3.75	95.22	8.95	50.7	534,187	0.2%	10,541	9,366	0.4	2,810	1.00	2,335	0	0%	2,810	6.26
6-Oct	175' Raceway	51.0	3.85	97.74	9.68	46.9	533,252	0.2%	11,379	9,850	0.4	2,955	1.00	2,456	0	0%	2,955	6.58
13-Oct	175' Raceway	51.0	3.95	100.25	10.45	43.4	532,319	0.2%	12,260	10,346	0.4	3,104	1.00	2,580	0	0%	3,104	6.91
20-Oct	175' Raceway	51.0	4.05	102.77	11.25	40.3	531,388	0.2%	13,184	10,853	0.4	3,256	1.00	2,706	0	0%	3,256	7.25
27-Oct	175' Raceway	51.0	4.15	105.29	12.10	37.5	530,458	0.2%	14,151	11,371	0.5	3,411	1.00	2,835	0	0%	3,411	7.60
3-Nov	175' Raceway	50.0	4.24	107.66	12.94	35.1	529,530	0.2%	15,102	11,868	0.5	3,560	1.00	2,959	0	0%	3,560	7.93
10-Nov	175' Raceway	50.0	4.34	110.03	13.81	32.8	528,603	0.2%	16,092	12,374	0.5	3,712	1.00	3,085	0	0%	3,712	8.27
17-Nov	175' Raceway	50.0	4.43	112.39	14.72	30.8	527,678	0.2%	17,124	12,890	0.5	3,867	1.00	3,214	0	0%	3,867	8.61
24-Nov	175' Raceway	50.0	4.52	114.76	15.67	28.9	526,754	0.2%	18,198	13,416	0.5	4,025	1.00	3,345	0	0%	4,025	8.96
1-Dec	175' Raceway	47.0	4.60	116.69	16.47	27.5	525,833	0.2%	19,096	13,845	0.6	4,153	1.00	3,452	0	0%	4,153	9.25
8-Dec	175' Raceway	47.0	4.67	118.61	17.30	26.2	524,912	0.2%	20,021	14,280	0.6	4,284	1.00	3,561	0	0%	4,284	9.54
15-Dec	175' Raceway	47.0	4.75	120.54	18.16	25.0	523,994	0.2%	20,975	14,722	0.6	4,417	1.00	3,671	0	0%	4,417	9.84
22-Dec	175' Raceway	47.0	4.83	122.46	19.04	23.8	523,077	0.2%	21,957	15,169	0.6	4,551	1.00	3,782	0	0%	4,551	10.14
29-Dec	175' Raceway	47.0	4.90	124.39	19.95	22.7	522,161	0.2%	22,969	15,622	0.6	4,687	1.00	3,895	0	0%	4,687	10.44
5-Jan	175' Raceway	44.0	4.96	125.87	20.67	21.9	521,248	0.2%	23,757	15,968	0.7	4,791	1.00	3,982	0	0%	4,791	10.67
12-Jan	175' Raceway	44.0	5.02	127.35	21.41	21.2	520,335	0.2%	24,562	16,318	0.7	4,895	1.00	4,069	0	0%	4,895	10.90
19-Jan	175' Raceway	44.0	5.08	128.83	22.17	20.5	519,425	0.2%	25,384	16,670	0.7	5,001	1.00	4,157	0	0%	5,001	11.14
26-Jan	175' Raceway	44.0	5.13	130.31	22.94	19.8	518,516	0.2%	26,224	17,026	0.7	5,108	1.00	4,245	0	0%	5,108	11.38
2-Feb	175' Raceway	44.0	5.19	131.79	23.73	19.1	517,608	0.2%	27,080	17,384	0.7	5,215	1.00	4,335	0	0%	5,215	11.62
9-Feb	175' Raceway	44.0	5.25	133.27	24.54	18.5	516,703	0.2%	27,954	17,746	0.7	5,324	1.00	4,425	0	0%	5,324	11.86
16-Feb	175' Raceway	44.0	5.31	134.75	25.37	17.9	515,798	0.2%	28,846	18,111	0.7	5,433	1.00	4,516	0	0%	5,433	12.10
23-Feb	175' Raceway	44.0	5.37	136.23	26.21	17.3	514,896	0.2%	29,755	18,478	0.8	5,544	1.00	4,608	0	0%	5,544	12.35
2-Mar	175' Raceway	46.0	5.44	138.01	27.25	16.6	513,995	0.2%	30,880	18,930	0.8	5,679	1.00	4,720	0	0%	5,679	12.65
9-Mar	175' Raceway	46.0	5.51	139.78	28.32	16.0	513,095	0.2%	32,032	19,387	0.8	5,816	1.00	4,834	0	0%	5,816	12.95
16-Mar	175' Raceway	46.0	5.58	141.56	29.41	15.4	512,197	0.2%	33,211	19,848	0.8	5,954	1.00	4,949	0	0%	5,954	13.26
23-Mar	175' Raceway	46.0	5.65	143.34	30.53	14.9	511,301	0.2%	34,417	20,314	0.8	6,094	1.00	5,065	0	0%	6,094	13.57
30-Mar	175' Raceway	46.0	5.72	145.11	31.68	14.3	510,406	0.2%	35,650	20,784	0.8	6,235	1.00	5,182	0	0%	6,235	13.89
6-Apr	175' Raceway	48.0	5.80	147.19	33.06	13.7	509,513	0.2%	37,134	21,345	0.9	6,403	1.00	5,322	0	0%	6,403	14.26
13-Apr	175' Raceway	48.0	5.88	149.26	34.48	13.2	508,621	0.2%	38,658	21,912	0.9	6,573	1.00	5,464	0	0%	6,573	14.64
20-Apr	175' Raceway	48.0	5.96	151.33	35.93	12.6	507,731	0.2%	40,220	22,485	0.9	6,745	1.00	5,607	0	0%	6,745	15.02
27-Apr	175' Raceway	48.0	6.04	153.41	37.43	12.1	506,843	0.2%	41,822	23,065	0.9	6,919	1.00	5,751	0	0%	6,919	15.41
4-May	175' Raceway	51.0	6.14	155.92	39.30	11.5	505,956	0.2%	43,838	23,786	1.0	7,136	1.00	5,931	0	0%	7,136	15.89
Stocking							**505,956**	**10%**	**43,838**									

Cowlitz River Hatchery
Winter late run steelhead
250,000

Incubation

Date	Location	Temp °F	Cumulative TU	Required Eggs	Mortality	Eggs per Tray	# Trays	# Single Stacks	# Double Stacks	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)
8-Apr	Trays	49.0		291,667		5,500	54	8	4	0	0%	48
15-Apr	Trays	49.0	136	290,238	0.5%	5,500	53	8	4	0	0%	48
22-Apr	Trays	49.0	255	288,815	0.5%	5,500	53	8	4	0	0%	48
29-Apr	Trays	49.0	374	287,400	0.5%	5,500	53	8	4	0	0%	48
6-May	Trays	49.0	493	285,992	0.5%	5,500	52	8	4	0	0%	48
13-May	Trays	49.0	612	284,591	0.5%	5,500	52	8	4	0	0%	48
20-May	Trays	49.0	731	283,594	0.4%	5,500	52	8	4	0	0%	48
27-May	Trays	49.0	850	282,602	0.3%	5,500	52	8	4	0	0%	48
3-Jun	Trays	50.0	976	281,613	0.3%	5,500	52	8	4	0	0%	48
10-Jun	Trays	50.0	1102	280,627	0.3%	5,500	52	8	4	0	0%	48
17-Jun	Trays	50.0	1228	279,645	0.3%	5,500	51	8	4	0	0%	48
24-Jun	Trays	50.0	1354	278,666	0.3%	5,500	51	8	4	0	0%	48

Rearing

Date	Location	Temp °F	Length (in)	Length (mm)	Weight (g)	Fish Per Pound	# Fish	Mortality	Weight (lbs)	Rearing Volume Req. (CF)	Units Required	GPM @ Flow Index	GPM @ Fixed Exchange	PRAS Flow (gpm)	PRAS %	Makeup Water (gpm)	Makeup Water (cfs)
25-Jun	8' Circular Tank	50.0	1.41	35.79	0.45	1007.7	278,527		276	653.41	3.71	196.02	163.35	0.00	0.00	196.02	0.44
2-Jul	8' Circular Tank	51.0	1.55	39.45	0.60	752.4	277,747	0.3%	369	791.71	4.50	237.51	197.93	0.00	0.00	237.51	0.53
9-Jul	8' Circular Tank	51.0	1.70	43.11	0.79	576.5	276,969	0.3%	480	942.84	5.36	282.85	235.71	0.00	0.00	282.85	0.63
16-Jul	8' Circular Tank	51.0	1.84	46.77	1.00	451.5	276,194	0.3%	612	1106.67	6.29	332.00	276.67	0.00	0.00	332.00	0.74
23-Jul	8' Circular Tank	51.0	1.99	50.43	1.26	360.1	275,420	0.3%	765	1283.10	7.29	384.93	320.78	0.00	0.00	384.93	0.86
30-Jul	8' Circular Tank	51.0	2.13	54.09	1.55	291.8	274,649	0.3%	941	1472.02	8.36	441.61	368.01	0.00	0.00	441.61	0.98
6-Aug	8' Circular Tank	51.0	2.28	57.75	1.89	239.8	273,880	0.3%	1,142	1673.32	9.51	502.00	418.33	0.00	0.00	502.00	1.12
13-Aug	8' Circular Tank	51.0	2.42	61.41	2.27	199.4	273,113	0.3%	1,370	1886.89	10.72	566.07	471.72	0.00	0.00	566.07	1.26
20-Aug	8' Circular Tank	51.0	2.56	65.07	2.71	167.6	272,349	0.3%	1,625	2112.63	12.00	633.79	528.16	0.00	0.00	633.79	1.41
27-Aug	8' Circular Tank	51.0	2.71	68.74	3.19	142.2	271,586	0.3%	1,910	2350.42	13.35	705.13	587.60	0.00	0.00	705.13	1.57
3-Sep	8' Circular Tank	50.0	2.84	72.18	3.69	122.8	270,826	0.3%	2,205	2584.71	14.69	775.41	646.18	0.00	0.00	775.41	1.73
10-Sep	30' Circular Tank	50.0	2.98	75.63	4.25	106.8	270,257	0.2%	2,531	2831.41	0.80	849.42	635.70	0.00	0.00	849.42	1.89
17-Sep	30' Circular Tank	50.0	3.12	79.07	4.86	93.4	269,689	0.2%	2,887	3088.79	0.87	926.64	693.49	0.00	0.00	926.64	2.06
24-Sep	30' Circular Tank	50.0	3.25	82.52	5.52	82.2	269,123	0.2%	3,274	3356.78	0.95	1007.04	753.66	0.00	0.00	1007.04	2.24
1-Oct	30' Circular Tank	50.0	3.39	85.96	6.24	72.7	268,558	0.2%	3,694	3635.32	1.03	1090.60	816.20	0.00	0.00	1090.60	2.43
8-Oct	30' Circular Tank	50.0	3.52	89.41	7.02	64.6	267,994	0.2%	4,147	3924.32	1.11	1177.30	881.08	0.00	0.00	1177.30	2.62
15-Oct	30' Circular Tank	50.0	3.66	92.85	7.86	57.7	267,431	0.2%	4,636	4223.73	1.20	1267.12	948.31	0.00	0.00	1267.12	2.82
22-Oct	30' Circular Tank	50.0	3.79	96.30	8.77	51.7	266,869	0.2%	5,160	4533.47	1.28	1360.04	1017.85	0.00	0.00	1360.04	3.03
29-Oct	30' Circular Tank	50.0	3.93	99.75	9.75	46.5	266,309	0.2%	5,722	4853.48	1.37	1456.04	1089.70	0.00	0.00	1456.04	3.24
5-Nov	30' Circular Tank	50.0	4.07	103.19	10.79	42.0	265,750	0.2%	6,323	5183.68	1.47	1555.10	1163.83	0.00	0.00	1555.10	3.46
12-Nov	30' Circular Tank	50.0	4.20	106.64	11.91	38.1	265,192	0.2%	6,963	5524.00	1.56	1657.20	1240.24	0.00	0.00	1657.20	3.69
19-Nov	30' Circular Tank	50.0	4.34	110.08	13.10	34.6	264,635	0.2%	7,644	5874.39	1.66	1762.32	1318.91	0.00	0.00	1762.32	3.92
26-Nov	30' Circular Tank	50.0	4.47	113.53	14.37	31.6	264,079	0.2%	8,366	6234.76	1.77	1870.43	1399.82	0.00	0.00	1870.43	4.17
3-Dec	30' Circular Tank	50.0	4.61	116.97	15.72	28.9	263,525	0.2%	9,132	6605.06	1.87	1981.52	1482.96	0.00	0.00	1981.52	4.41
10-Dec	30' Circular Tank	50.0	4.74	120.42	17.15	26.4	262,971	0.2%	9,942	6985.21	1.98	2095.56	1568.31	0.00	0.00	2095.56	4.67
17-Dec	30' Circular Tank	50.0	4.88	123.87	18.66	24.3	262,419	0.2%	10,798	7375.15	2.09	2212.54	1655.86	0.00	0.00	2212.54	4.93
24-Dec	30' Circular Tank	50.0	5.02	127.31	20.27	22.4	261,868	0.2%	11,700	7774.81	2.20	2332.44	1745.59	0.00	0.00	2332.44	5.19
31-Dec	30' Circular Tank	50.0	5.15	130.76	21.96	20.7	261,318	0.2%	12,649	8184.12	2.32	2455.24	1837.49	0.00	0.00	2455.24	5.47
7-Jan	30' Circular Tank	49.0	5.28	133.99	23.62	19.2	260,769	0.2%	13,581	8575.44	2.43	2572.63	1925.35	0.00	0.00	2572.63	5.73
14-Jan	30' Circular Tank	49.0	5.41	137.22	25.37	17.9	260,221	0.2%	14,557	8975.03	2.54	2692.51	2015.06	0.00	0.00	2692.51	6.00
21-Jan	30' Circular Tank	49.0	5.53	140.45	27.21	16.7	259,675	0.2%	15,576	9382.82	2.66	2814.85	2106.62	0.00	0.00	2814.85	6.27
28-Jan	30' Circular Tank	49.0	5.66	143.68	29.13	15.6	259,130	0.2%	16,641	9798.77	2.77	2939.63	2200.01	0.00	0.00	2939.63	6.55
4-Feb	30' Circular Tank	49.0	5.79	146.91	31.14	14.6	258,586	0.2%	17,751	10222.82	2.89	3066.85	2295.21	0.00	0.00	3066.85	6.83
11-Feb	30' Circular Tank	49.0	5.92	150.14	33.24	13.6	258,043	0.2%	18,909	10654.90	3.02	3196.47	2392.22	0.00	0.00	3196.47	7.12
18-Feb	30' Circular Tank	49.0	6.04	153.37	35.43	12.8	257,501	0.2%	20,113	11094.97	3.14	3328.49	2491.03	0.00	0.00	3328.49	7.41
25-Feb	30' Circular Tank	49.0	6.17	156.60	37.72	12.0	256,960	0.2%	21,366	11542.97	3.27	3462.89	2591.61	0.00	0.00	3462.89	7.71
4-Mar	30' Circular Tank	49.0	6.30	159.83	40.10	11.3	256,420	0.2%	22,668	11998.84	3.40	3599.65	2693.96	0.00	0.00	3599.65	8.02
11-Mar	30' Circular Tank	49.0	6.42	163.06	42.58	10.7	255,882	0.2%	24,020	12462.53	3.53	3738.76	2798.07	0.00	0.00	3738.76	8.33
18-Mar	30' Circular Tank	49.0	6.55	166.29	45.16	10.0	255,344	0.2%	25,422	12933.98	3.66	3880.19	2903.92	0.00	0.00	3880.19	8.64
25-Mar	30' Circular Tank	49.0	6.68	169.52	47.84	9.5	254,808	0.2%	26,876	13413.13	3.80	4023.94	3011.50	0.00	0.00	4023.94	8.96
1-Apr	30' Circular Tank	49.0	6.81	172.75	50.63	9.0	254,273	0.2%	28,382	13899.93	3.94	4169.98	3120.79	0.00	0.00	4169.98	9.29
8-Apr	30' Circular Tank	49.0	6.93	175.98	53.52	8.5	253,739	0.2%	29,942	14394.33	4.08	4318.30	3231.80	0.00	0.00	4318.30	9.62
15-Apr	30' Circular Tank	49.0	7.06	179.21	56.53	8.0	253,206	0.2%	31,554	14896.28	4.22	4468.88	3344.49	0.00	0.00	4468.88	9.95
22-Apr	30' Circular Tank	49.0	7.19	182.44	59.64	7.6	252,675	0.2%	33,222	15405.71	4.36	4621.71	3458.87	0.00	0.00	4621.71	10.29
29-Apr	30' Circular Tank	49.0	7.32	185.67	62.86	7.2	252,144	0.2%	34,944	15922.57	4.51	4776.77	3574.91	0.00	0.00	4776.77	10.64
6-May	30' Circular Tank	49.0	7.44	188.90	66.20	6.9	251,614	0.2%	36,723	16446.81	4.66	4934.04	3692.62	0.00	0.00	4934.04	10.99
Stocking							**251,614**	**10%**	**36,723**								

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Appendix B. Class 4 Cost Estimate for a Potential New Cowlitz River State Salmon Hatchery including Components, Mobilization, and Taxes

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Class 4 Cost Estimate for a Potential New Cowlitz River State Salmon Hatchery including Components, Mobilization, and Taxes

COMPONENTS	COMPONENT COST	MOBILIZATION 6%	TAXES/B&O 11%	SUBTOTAL
Hatchery Building (Approx 5,400 SF)	$3,548,000.00	$212,880.00	$390,280.00	$4,151,160.00
Chiller (Incubation Only)	$200,000.00	$12,000.00	$22,000.00	$234,000.00
Back Up Hatchery Facility Power Generator	$3,000,000.00	$180,000.00	$330,000.00	$3,510,000.00
Fire Suppression	$1,000,000.00	$60,000.00	$110,000.00	$1,170,000.00
Septic System (Hatchery)	$150,000.00	$9,000.00	$16,500.00	$175,500.00
Potable Water System (Hatchery And Residences)	$100,000.00	$6,000.00	$11,000.00	$117,000.00
Site Civil	$4,250,000.00	$255,000.00	$467,500.00	$4,972,500.00
Site Electrical	$4,000,000.00	$240,000.00	$440,000.00	$4,680,000.00
Site Process Piping	$5,000,000.00	$300,000.00	$550,000.00	$5,850,000.00
Surface Water Intake (50 cfs Intake)	$3,300,000.00	$198,000.00	$363,000.00	$3,861,000.00
PRAS 70% Spring Chinook (35.5 cfs)	$3,516,875.00	$211,012.50	$386,856.25	$4,114,743.75
Ground Water Well Supply System (14 cfs)	$5,250,000.00	$315,000.00	$577,500.00	$6,142,500.00
Surface Water Head Tank	$1,825,000.00	$109,500.00	$200,750.00	$2,135,250.00
Ground Water Head Tank	$1,323,000.00	$79,380.00	$145,530.00	$1,547,910.00
Feed Storage (Approx 1200 SF)	$224,000.00	$13,440.00	$24,640.00	$262,080.00
Utility/Shop Building (Approx 1700 SF)	$446,000.00	$26,760.00	$49,060.00	$521,820.00
10 X 100 Rearing Units (10 sch)	$1,665,000.00	$99,900.00	$183,150.00	$1,948,050.00
20 X 175 Rearing Units (12 sch, 3 fch)	$4,791,000.00	$287,460.00	$527,010.00	$5,605,470.00
Adult Holding (6 Ponds, WDFW Std)	$5,450,000.00	$327,000.00	$599,500.00	$6,376,500.00
Facility Outfall	$500,000.00	$30,000.00	$55,000.00	$585,000.00
2-Cell PA Pond (WDFW Std)	$600,000.00	$36,000.00	$66,000.00	$702,000.00
Recreation And Public Access	$230,000.00	$13,800.00	$25,300.00	$269,100.00
Residences (3) Total (2,400 SF)	$1,350,000.00	$81,000.00	$148,500.00	$1,579,500.00
COMPONENT TOTAL COST	$51,718,875.00			
MOBILIZATION		$3,103,132.50		
CONTRACTOR TAXES/B&O			$5,689,076.25	
PROJECT SUBTOTAL				$60,511,083.75

Assumptions:

- Component Cost break downs are from the tabs associated with this spread sheet
- Mobilization assumed at 6% to include General Contractors OH
- Taxes (9%)/B&O(2%) is the taxes the contractor will pay and the Washington State Business and Operation taxes
- Subtotal (columns D+F+G)

	Low (-15%)	Projected	High (30%)
This cost estimate is a Class 4 estimate with a Low of 15% and a High of 30%	$51,434,421.19	$60,511,083.75	$78,664,408.88

Over all summary broken down in different ways	**Subtotals**
Column D	$51,718,875.00
Column E + F	$8,792,208.75
Column D + E + F	$60,511,083.75

Appendix C. Cost Estimate for Optional Infrastructure at a Potential Cowlitz River State Salmon Hatchery including Components, Mobilization, and Taxes

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Cost Estimate for Optional Infrastructure at a Potential Cowlitz River State Salmon Hatchery including Components, Mobilization, and Taxes

COMPONENTS	COMPONENT COST	MOBILIZATION 6%	TAXES/B&O 11%	SUBTOTAL
SW INTAKE (35 CFS) COHO	$750,000.00	$45,000.00	$82,500.00	$877,500.00
GROUND WATER (11 CFS) STEELHEAD	$4,500,000.00	$270,000.00	$495,000.00	$5,265,000.00
SW DISINFECTION (50 CFS) SCH AND FCH	$11,354,000.00	$681,240.00	$1,248,940.00	$13,284,180.00
SW DISINFECTION (35 CFS) COHO	$6,813,000.00	$408,780.00	$749,430.00	$7,971,210.00
14 CFS GRD DISINFECTION SCH AND FCH	$3,162,000.00	$189,720.00	$347,820.00	$3,699,540.00
11 CFS GRD DISINFECTION STEELHEAD	$2,408,000.00	$144,480.00	$264,880.00	$2,817,360.00
COHO REARING (2)-20X175, (3)-10x100	$1,139,000.00	$68,340.00	$125,290.00	$1,332,630.00
30FT CIRCULARS (6 TOTAL) STEELHEAD	$1,875,000.00	$112,500.00	$206,250.00	$2,193,750.00
8FT CIRCULARS (16 TOTAL) STEELHEAD	$1,106,880.00	$66,412.80	$121,756.80	$1,295,049.60
OPTIONAL RESIDENCE	$450,000.00	$27,000.00	$49,500.00	$526,500.00
COMPONENT TOTAL COST	$33,557,880.00			
MOBILIZATION		$2,013,472.80		
CONTRACTOR TAXES/B&O			$3,691,366.80	
PROJECT SUBTOTAL				$39,262,719.60