2022 HATCHERIES STRATEGIC ASSET MANAGEMENT PLAN

For "EFW Hatcheries"

This Strategic Asset Management Plan for EFW Fish Hatcheries provides alignment between the Agency strategy, stakeholder requirements, and organizational objectives and resulting asset management objectives to ensure assets are managed and satisfy BPA's fish and wildlife mitigation obligations.

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1.0 EXECUTIVE SUMMARY

Hatcheries and associated facilities (e.g. weirs, traps, acclimation facilities, etc.) funded by BPA's Fish & Wildlife Direct Program are covered under the scope of this plan. This funding helps satisfy BPA's legal obligations under the Northwest Power Act, Endangered Species Act, and other laws to protect, mitigate, and enhance fish and wildlife affected by the construction and operation of the federal dams.

This Strategic Asset Management Plan covers 18 safety net, conservation and supplementation hatchery facilities and associated satellite facilities throughout the Columbia River Basin. While BPA does not own and operate these assets, BPA helps preserve and rebuild genetic resources to reduce short-term extinction risk and promote ESA listed species by funding artificial production at basin hatcheries.

The hatchery sub-program has maintained solid, collaborative relationships with regional operators, and has regular coordination with the Northwest Power and Conservation Council (Council) on strategic asset management plans. Improving out-year planning for O&M funding is an identified opportunity, especially when costs for operations and maintenance of the existing and aging fleet of hatcheries is increasing in most recent years. In addition, new hatcheries being built as per BPA commitments add further expense budget requirements amidst an environment where BPA is focused on disciplined cost management.

The maturity of the program is developing and slightly improved since the last plan. While prioritized funding of mission critical non-recurring maintenance needs have been a priority for BPA and the Council, the average age of the hatchery facilities portfolio is ~24 years old, and the most recent conditions assessments call for more dedicated funding to maintain the health of critical assets. The team continues to work on long-term objectives to improve asset condition by eliminating 80% of the mission critical non-recurring maintenance needs by 2027.

Future capital funding levels are expected to be in line with present levels at ~$20M for capital in FY23 and declining in out years as hatchery construction projects are complete and current obligations are met. Future expense funding levels are expected to be above present levels at ~$49M as new assets are built, and existing fleet continues to age. Some of the main risks that affect the strategy execution is the fact that labor and material construction costs continue to increase throughout the region, which may limit BPA's ability to fund newly proposed hatchery projects at current funding levels. Delayed construction projects due to water quality, permitting and supply chain issues may impact fiscal year execution of IPR capital budgets.

Fish and wildlife mitigation and environmental compliance are essential parts of our business and reflect the agency's core values of trustworthy stewardship and operational excellence. BPA's hatchery program is an important part of this effort.

2.0 ACKNOWLEDGEMENTS

2.1 Senior ownership

The responsibility for operational ownership, coordination, and updating of this strategy is assigned by the Environment, Fish and Wildlife (EFW) Executive Manager.

Jason Sweet, Acting Executive Manager, Fish and Wildlife	JASON SWEET Digitally signed by JASON SWEET Date: 2022.02.16 09:44:08 -08'00'
Dorie Welch, Deputy Vice President, Environment, Fish and Wildlife	DOROTHY WELCH Digitally signed by DOROTHY WELCH Date: 2022.02.16 09:51:42 -08'00'
Scott Armentrout, Vice President, Environment, Fish and Wildlife	SCOTT ARMENTROUT Digitally signed by SCOTT ARMENTROUT Date: 2022.02.16 09:57:16 -08'00'

2.2 Strategy Development Approach

2.2.1 Key Contributors

EFW's asset management team facilitated the development of this plan, with primary input from policy and implementation staff (who also function as subject matter experts), and with support from Business Operations (EWB). EWB represents EFW within BPA's Asset Management Council (AMC) and provides coordination support to the asset management effort, and analytical support to the hatchery sub-program.

BPA intends this plan to be complementary to, and compliant with the purposes, mandates, and directives found in the 1980 Northwest Power Act, applicable biological opinions, and various judicial rulings.

Per the terms of the Northwest Power Act, the Northwest Power and Conservation Council's current Columbia River Basin Fish and Wildlife Program provides ongoing and comprehensive guidance for regional fish and wildlife mitigation objective and initiatives, and supplements BPA's strategy.

2.2.2 Key Activities

Activity	Description
Asset Management Maturity Assessment	• Conduct Asset Management maturity assessment by surveying EFW employees of various disciplines
Develop SAMP	• Update the new 2022 Hatcheries SAMP version with new program and process information • Review and Update Goals, Objectives and Initiatives with reviews by SMEs and leadership, incorporating results from the maturity assessment • Update SWOT analysis • Review criteria for asset criticality, and assess asset condition and trends • Produce charts, tables and analysis describing historical and future program costs • Perform risk assessment to Hatcheries program with program SME input • Develop strategy and planned future investments and spend levels

Review SAMP	• Review SAMP with SMEs, EFW front office and OGC • Communicate SAMP updates to NPCC
Publish SAMP	• Incorporate changes from peer reviews and finalize document • Provide SAMP to Asset Planning team for input into Asset Plan

3.0 STRATEGIC BUSINESS CONTEXT

3.1 Alignment of SAMP with Agency Strategic Plan

The EFW program, including this hatchery-specific strategic asset management plan, aligns with BPA's strategic objective 1a, to improve cost management discipline, and objective 2a, to administer an industry-leading asset management program. It also meets objective 3c, to prioritize fish and wildlife investments based on biological effectiveness and mitigation for CRS impacts; and manage fish and wildlife program costs at or below inflation, inclusive of new obligations and commitments.

3.2 Scope

BPA funds several different types of hatchery and artificial production programs. Hatchery programs funded through a Direct Funding Agreement (DFA) are managed by the partner agency. As such, BPA does not actively manage assets for those programs. DFAs are currently in place with the U.S. Army Corps of Engineers, the U. S. Bureau of Reclamation, and for the Lower Snake River Compensation Plan administered by the U.S. Fish and Wildlife Service. Hatchery assets existing under those programs are not within the scope of this plan.

Other hatchery and artificial production programs are funded directly through BPA's EFW Program. These include a wide range of brick and mortar facilities, seasonal installations, and supporting resources. Most of these locations and their assets are owned and operated by other entities. In some cases, BPA funding plays a relatively minor role in a facility's function and fish production. In these cases, BPA funds routine asset maintenance but does not manage the assets and therefore those facilities are not within the scope of this plan.

Assets are actively managed at locations where BPA either purchased, built or otherwise made a capital investment at an artificial production facility. These facilities were often purchased or built as a component of the Columbia Basin Fish Accords, thus ownership of the facility was conveyed to the corresponding tribal or state Accord partner after purchase or construction was complete. This creates a unique situation where BPA is monitoring and managing assets that are owned and operated by other entities. Nevertheless, BPA intends to protect past investments, which in turn, help ensure mitigation obligations are met. The only exception to this classification is where BPA committed to fund the construction of a new facility but is not committed to the operations and maintenance (O&M) funding once construction is complete. In those cases, asset management responsibility will fall to the long-term O&M funding source. The primary hatchery facilities where BPA is actively managing assets, which are within the scope of this plan, are presented in Table 3.3-1.

3.3 Asset Description and Delivered Services

BPA-managed hatchery assets are presented in Table 3.3-1. Many of the hatcheries listed are associated with smaller adult fish traps or juvenile acclimation sites. Only the primary hatchery is listed as the smaller sites are considered satellite facilities under the larger hatchery complex. The hatchery operator in nearly all cases is also the facility owner. At a program-level scale, each hatchery complex is considered an asset. Within each hatchery complex,

assets are further subdivided and tracked at the equipment level (e.g. a bank of raceways, diesel generator, and pollution abatement pond).

In general, the hatchery assets provide services that continue to support BPA's mitigation obligations. These obligations are captured under the Northwest Power Act, Endangered Species Act, and other laws to protect, mitigate and enhance fish and wildlife affected by the construction and operation of the federal dams in the Columbia River Basin.

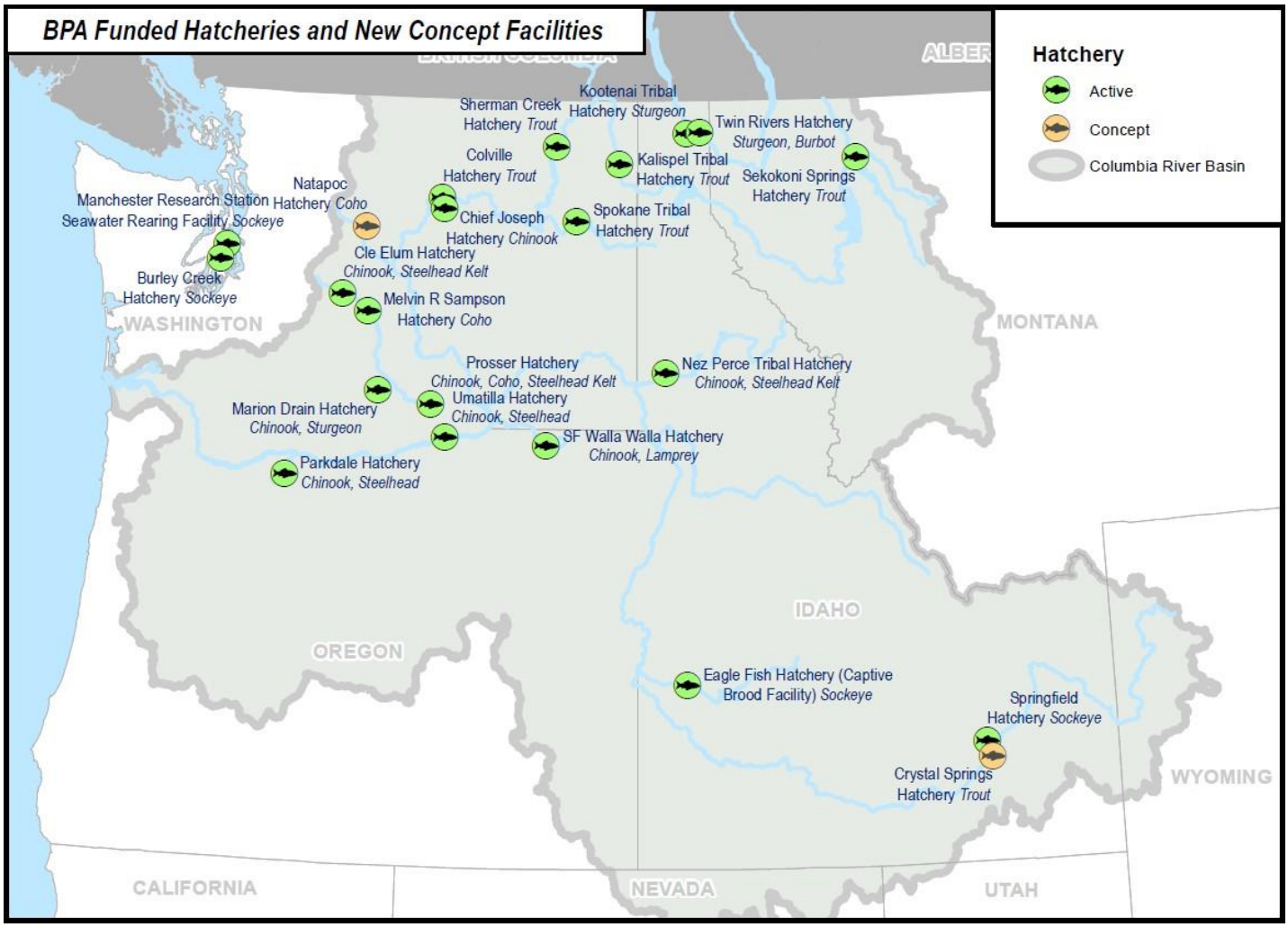
3.3.1 Table 3.3-1, BPA EFW Hatchery Assets

Hatchery Complex	Operator	Focal Species	Hatchery Program Type
Nez Perce Tribal Hatchery	Nez Perce Tribe	Snake River Spring/Summer Chinook (not listed); Snake River Fall Chinook (Threatened)	Conservation/ Supplementation and Safety Net hatchery programs
Colville Hatchery	Colville Tribe	Triploid Rainbow Trout	Supplementation
Parkdale Hatchery	Warm Springs Tribe	LCR Spring Chinook (Threatened); LCR Steelhead (Threatened)	Conservation/ Supplementation
Kootenai Tribal Hatchery	Kootenai Tribe	White Sturgeon (Endangered)	Conservation
Twin Rivers Hatchery	Kootenai Tribe	White Sturgeon (Endangered); Burbot	Conservation
Umatilla Hatchery	ODFW	MCR Spring Chinook; Snake River Fall Chinook; MCR Steelhead (Threatened)	Conservation/Supplementation
Sekokini Springs Hatchery	MT Dept. FW & Parks	Westslope Cutthroat	Conservation/Supplementation
Sherman Creek Hatchery	WDFW	Triploid Rainbow Trout	Supplementation
Spokane Tribal Hatchery	Spokane Tribe	Triploid Rainbow Trout; Triploid Kokanee Salmon	Supplementation
Kalispel Tribal Hatchery	Kalispel Tribe	Triploid Rainbow Trout	Supplementation
Cle Elum Hatchery	Yakama Tribe	MCR Spring Chinook	Conservation/Supplementation
Mel R Sampson (MRS) Coho	Yakama Tribe	Coho (unspecified population);	Conservation/Supplementation
Chief Joseph Hatchery	Colville Tribe	UCR Spring Chinook (Endangered); UCR Summer/Fall Chinook; Spring Chinook experimental population	Conservation/Supplementation

Hatchery Complex	Operator	Focal Species	Hatchery Program Type
Springfield Hatchery	IDFG	Snake River Sockeye Salmon	Safety Net
Eagle Fish Hatchery	IDFG	Snake River Sockeye Salmon	Safety Net
Manchester Research Station Seawater Rearing Facility	NOAA	Snake River Sockeye Salmon	Safety Net
Burley Creek Hatchery	NOAA	Snake River Sockeye Salmon	Safety Net
Walla Walla Hatchery	Umatilla Tribe	MCR Spring Chinook	Conservation/Supplementation

Figure 3.3-2, Asset Locations

This figure includes placeholder location markers for two concept facilities where capital investments may occur (Natapoc and Crystal Springs). Additionally, Prosser Hatchery and Marion Drain Hatchery are also shown on the figure. These facilities are currently operational and receive O&M funding but have yet to receive a capital investment. Future capital investments are proposed for both Prosser and Marion Drain and if these investments occur, these assets may be incorporated into future management plans.



3.4 Demand Forecast for Services

Hatchery assets provide services that support BPA's mitigation obligations arising from the construction and operation of federal dams in the Columbia River Basin. In 2020, a new Biological Opinion was issued, which outlines BPA's commitments to mitigation in the region. The Biological Opinion helps to shape the demand and strategy of hatchery facilities in the EFW Program.

3.5 Strategy Duration

The duration of this strategy is expected to be 10 years except as it may be impacted by future legislation, judicial decisions, or other BPA initiatives. The strategy will be reviewed annually and published every 2 years unless there is a significant change in strategy at the annual review. New hatcheries will be included within the scope of the SAMP as BPA makes

additional capital investments. The newly constructed MRS Coho Hatchery and upgraded South Fork Walla Walla Hatchery, which both became operational in 2021, are included in this updated version.

4.0 STAKEHOLDERS

4.1 Asset Owner and Operators

BPA does not own or operate hatchery assets; they are typically owned by the entity that operates the facility. BPA coordinates and contracts with tribes, states, and other regional organizations, both public and private, to fund the operation and maintenance of hatchery facilities throughout the Columbia River Basin. BPA coordinates management, condition assessments, prioritization, and funding of asset maintenance or replacement, while the asset operators typically perform the required work at a facility. If large-scale asset replacement is required and the work exceeds the hatchery operator's expertise or ability, BPA will solicit and hold the contract with private industry firms to complete the work.

4.2 Stakeholders and Expectations

Table 4.2-1, Stakeholders

Stakeholders	Expectations	Current Data Sources	Measures
Sponsors (Tribes, States, other federal agencies)	Collaboration	BPA Tribal Affairs Organization Project Manager Contracting Officer's Representative (COR)	Annual Reports
	Project/Contract Management	CB Fish Work Elements Project Documents	Milestones Status Reports
	Funding	CB Fish (web-based contract management tool)Asset Suite Contracts Module Line Item Budgets SOY Process	Invoices Due Diligence
	Communications	Project Manager COR	CB Fish WE Milestones WE Reports Project Manager
	Compliance Monitoring	On-site Visits	Periodic Reporting Annual Report
Northwest Power and Conservation Council	Collaboration	Council Meetings and Agendas Sub-Committees BPA Staff	F&W Program Reports Council Reports and Categorical Reviews of F&W Program Sub-committee Participation Analyses and Recommendations
	Program Implementation	Council Meetings, Agendas, and Reports BPA F&W Reports	Periodic Reports Program Metrics
	Funding	CB Fish, Council Financial Statements	Annual Financial Reports BPA Financial Reports (4h10c)
Regulators	Safety	Industry Regulations and Standards	Incident Report Statistics and Non-compliances
Staff	Safety	Public Safety Management System	Non-conformance Records
Public	Safety	Public Safety Management System	Non-conformance Records

5.0 EXTERNAL AND INTERNAL INFLUENCES

Increased costs for operations and maintenance of the existing and aging fleet of hatcheries are further impacted by supply chain impacts in recent years. In addition, new hatcheries being built as per BPA commitments add further expense budget requirements amidst an environment where BPA is focused on disciplined cost management. In addition, access to capital can also affect how the EFW Program executes outstanding agreements for the building of new hatcheries. Prioritization of EFW Program expense and capital budgets will be a required action in order to operate within the current budget levels.

Table 5.0-1, External and Internal Influences on Hatchery Assets

External Influences	Affects and Actions
Federal laws/regulations specific to BPA	The 1937 Bonneville Project Act and other specific laws, executive orders, govern BPA's actions and obligations. The 1980 Northwest Power Act specifies the role of the Northwest Power and Conservation Council (Council) and the obligation of BPA to fund fish and wildlife mitigation.
Federal environmental laws	The effects of general environmental laws (e.g., Endangered Species Act, Clean Water Act, NEPA, etc.) Are to place specific requirements on BPA's actions, accountability, and procedural compliance. Federal environmental laws have existed for many decades. The processes that are used to implement programs required by these laws have not changed. The priorities outlined in the executive orders reflect more recent developments (see climate change below). Actions by BPA are primarily focused on ongoing implementation of applicable environmental laws, executive orders, and departmental directives. BPA's Environmental Planning and Analysis organization will continue to provide regulatory expertise and site analysis for the hatchery process.
Climate change	Climate change effects are uncertain, particularly at specific localities. In general, it is anticipated that environmental changes will result in changes to existing habitats and will stress the ability of fish and wildlife to adapt. Hatchery infrastructure and operations will likely need to adapt in order to continue to raise fish successfully. For example, hatchery water supplies may continue to warm as rivers, lakes and reservoirs rise in temperature. In order to achieve sufficient water quality standards necessary for raising salmonids, hatcheries across the region may require additional water chilling infrastructure in the future. Or, if chilling infrastructure is already in place, climactic change may necessitate operating that infrastructure for longer time periods. Actions to address the impacts of climate change may include changes to the strategic plan for constructing hatcheries throughout the region; or redirection of hatchery development to support newly threatened species, etc. Such actions might be considered, as necessary, in attempting to maintain the mitigation value of the hatchery program.

Construction and project delivery costs	As land and construction costs continue to increase throughout the region, this may limit BPA's ability to fund newly proposed hatchery projects. Identifying cost efficiencies and savings will become more critical to ensure BPA can continue to fund the construction and O&M of new and existing hatcheries.
Operations and maintenance costs	It is critical that annual operation and maintenance budgets for hatchery projects continue to receive an appropriate level of funding to ensure that important maintenance activities are completed on schedule to reduce the likelihood of emergency maintenance needs in the future. Scheduled preventative maintenance programs for hatcheries reduce unexpected operating and maintenance costs and provide greater reliability of hatchery assets and predictability of program costs. Fish and Wildlife will continue to work with the Council and hatchery operators to strategize and plan for future O&M funding needs. As proposed facilities become operational, O&M costs will increase.

5.1 SWOT Analysis

The following table outlines current strengths, weaknesses, opportunities and threats for the hatchery asset management program. Although asset management for EFW hatcheries is still developing, many favorable conditions exist which position future efforts to gain a more comprehensive and proactive approach to asset management.

Table 5.1-1: Strengths, Weaknesses, Opportunities and Threats for the Hatchery Asset Management Program

Favorable	Unfavorable
Strengths	**Weaknesses**
• The program maintains solid, collaborative relationships with hatchery operators • Regular coordination between Council and BPA on strategic asset management plans • In 2017, an asset condition assessment was conducted by outside engineering firm which resulted in an inventory of assets in need of maintenance or replacement and an itemized range and criticality of deferred maintenance needs. The next asset condition update is planned for 2022 • BPA EFW program maintains a Hatchery Sub-Program which includes a team lead position for Policy, Construction and O&M. The team leads actively work with BPA project managers, hatchery operators, Council and BPA leadership.	• BPA is the funding entity and lacks ownership and direct maintenance responsibility over physical assets • Lack of centralized database of hatchery assets with real-time view into the criticality and health of each individual asset • Inability to directly develop or manage asset maintenance programs • Lack of dedicated asset manager or business analyst to solely support the hatchery program and its portfolio as a whole

Opportunities	Threats
• Room to improve out-year planning of O&M funding • Chance to provide input on preventative maintenance standards or programs for assets to gain more • Improved coordination with the Council, hatchery operators, and stakeholders in developing an asset management strategy for hatcheries	• External influences e.g. climate change, political decisions, regulatory oversight • Aging infrastructure of facilities • Litigation • Full subscription of EFW program funding will increasingly require more strategic prioritization and sequencing of hatchery maintenance work. • Lagging execution for construction projects due to water quality, permitting, supply chain and/or any other contributing factors that impact single fiscal year or IPR budget period capital availability

6.0 ASSET MANAGEMENT CAPABILITIES AND SYSTEM

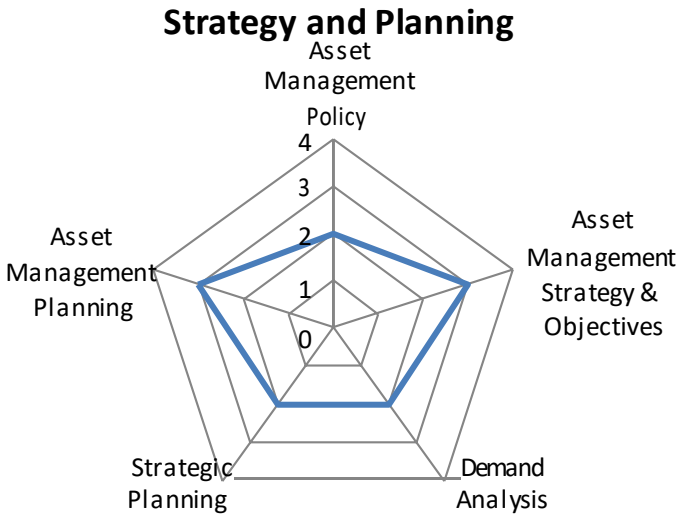
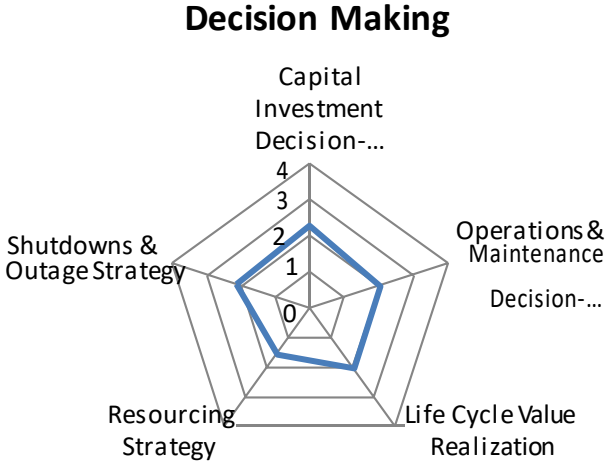
Using the Institute of Asset Management maturity model, EFW staff evaluated the maturity of the Hatchery Asset Management program in six different categories. On average, the maturity level across all categories (Strategy and Planning, Decision Making, Life Cycle Delivery, Asset Information, Organization and People and Risk and Review) is 1.8 on a scale of 0 - 4. For the most part, the program has identified the means of systematically and consistently achieving competency in this subject, and can demonstrate that these are being progressed with credible and resourced plans. However, processes are often done in a reactive mode though able to achieve expected results on a repeatable basis. Moreover, the processes are insufficiently integrated, with limited consistency or coordination across the organization.

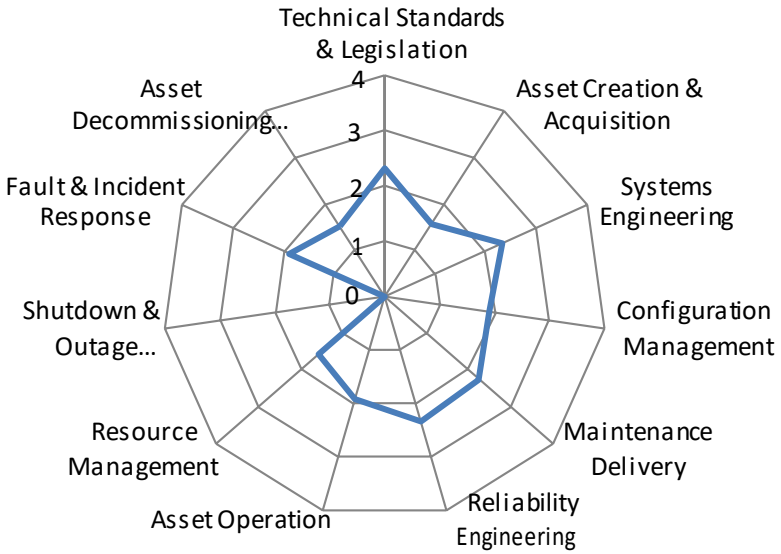
While hatchery operators share involvement in the asset management of hatcheries, this maturity survey was completed from a BPA perspective. The following section identifies strengths and weaknesses of the program.

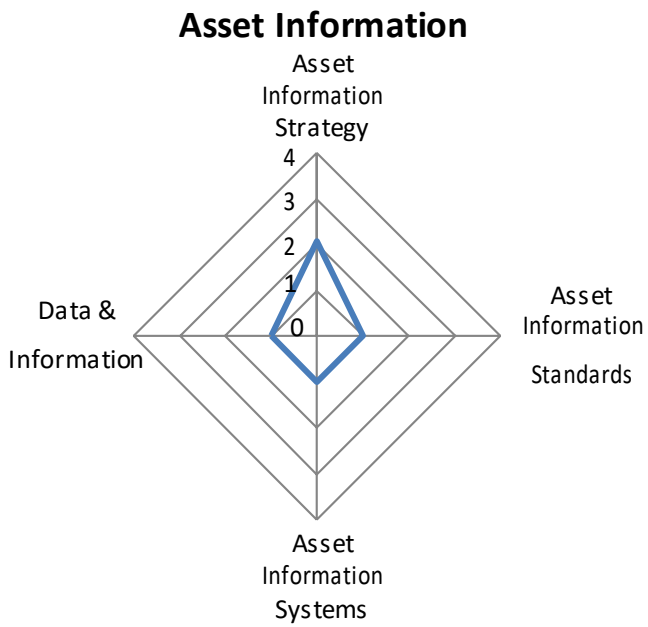
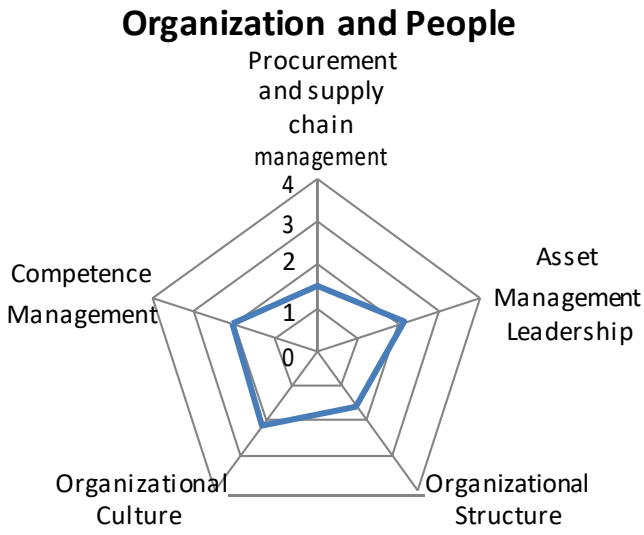
6.1 Current Maturity level

Based on the results of the maturity model and the associated survey, the current maturity level of the Hatchery Asset Management program is still in the development phase. While there are weaknesses in the areas analyzed, staff have identified areas of improvement.

Table 6.1-1 Maturity Level

Subject Area	Maturity Level
Strategy & Planning	 **Strength:** BPA staff has worked collaboratively with Council and hatchery operators to develop and implement a hatchery O&M strategy that will address overdue maintenance through a structured plan to evaluate O&M priority issues and funding. **Weakness:** The operator of the hatchery is responsible for their own maintenance programs, thus limiting BPA's ability to optimize planning efforts for preventative maintenance or asset management.
Decision Making	 **Strength:** Decisions regarding strategy and planning are made with consideration for the Council's fish and wildlife program, and through compliance with the rule-making processes defined by federal environmental laws (i.e., Endangered Species Act, NEPA). BPA works closely with hatchery operators to identify asset O&M budget needs to ensure asset management of the hatchery and its equipment are properly funded.

Subject Area	Maturity Level
	Weakness: O&M funded contracts include specific work elements, milestones, and deliverables for hatchery maintenance. However, prioritization of critical maintenance needs is done by operators of the hatchery.
Life Cycle Delivery	 **Strength:** BPA works closely with hatchery operators to identify appropriate O&M budgets to ensure hatcheries can continue to meet production goals. **Weakness:** BPA is partially dependent upon the hatchery operators for the hatchery asset inventories and condition of assets. A limited understanding of the health and criticality of hatchery assets in real-time can limit BPA's ability to strategize the O&M of aging assets, which directly impact the lifecycle of hatcheries.

Subject Area	Maturity Level
Asset Information	 **Strength:** BPA and the Council contracted an engineering firm, HDR, to perform an assessment of facilities where BPA actively manages assets. HDR developed an inventory of critical assets that are in need of essential maintenance/improvement. **Weakness:** Most asset data is captured and maintained by hatchery operators, potentially limiting access to data contained within a single centralized system for BPA staff and hindering the ability to develop coordinated strategies that maximize benefits to fish across sub-basins.
Organization & People	 **Strength:** The hatchery sub-program is managed by three EFW team leads – policy, O&M and Design & Construction. These leads are responsible for providing leadership and coordination of hatchery activities via project managers and regular meetings of the Hatchery Team. **Weakness:** The co-leads help direct the hatchery sub-program operations and also manage projects. Turnover, leave, and details stretch available resources. Not all CORs

Subject Area	Maturity Level
	assigned to hatchery O&M projects have a deep level of expertise in hatchery maintenance and require new training, mentoring and coverage.
Risk & Review	 **Strength:** BPA works closely with hatchery operators and stakeholders to identify risks and develop mitigation plans for hatchery projects. **Weakness:** The processes and systems put in place to ensure continuity of operations of assets to deliver the required level of service are not standardized and centrally located throughout the entire portfolio since assets are managed by different operators independently.

6.2 Long Term Objectives

The following long term objectives are meant to improve the transparency, responsiveness, and accountability of the Hatchery program so it can strategically manage its assets, effectively and efficiently mitigate for the hydro system, and provide biological benefits to fish and wildlife throughout the region. Through this plan, the goal is to ensure the longevity and integrity of BPA's and the Council's Fish and Wildlife Programs' past investments made for the benefit of fish and wildlife.

1. **Asset Condition**
    - Improve asset condition by eliminating 100% of the mission critical non-recurring maintenance needs by 2027, and addressing all essential maintenance improvements with less than 0 years of life expectancy by 2027.
2. **Asset Performance**
    - Develop performance metrics that can help establish asset performance goals to support the portfolio level objectives by 2027.
    - Identify areas for cost savings and efficiencies through preventative maintenance requirements for program hatcheries by 2027.
3. **Asset Benchmarking**

- Engage with a third party vendor to benchmark and assess portfolio performance and unit cost by 2027.

6.3 Current Strategies and Initiatives

Asset Information

Asset Condition Assessments Inventories: In 2017, BPA contracted with an engineering firm, HDR, to conduct condition assessments at facilities where BPA is actively managing assets. Prior to this assessment, sparse and discontinuous data was available for asset condition. HDR delivered reports for each hatchery asset, which included a list of all major equipment and infrastructure. Each individual asset was assigned a criticality category, and the reports document install date, life expectancy, remaining useful life estimates and replacement cost. This information allows for out year planning and prioritization among all hatchery assets within the program. These assessments will be formally updated every 5 years with the assistance of a third party engineering firm to track asset condition and function. The first condition assessment update is scheduled for 2022. Two new hatchery assets recently constructed will be included in this assessment and updates to formally assessed facilities will be completed. Some individual assets are known to be functioning beyond their expected lifespan due to low usage loads and/or timely maintenance. Other assets are failing sooner than expected due to lack of maintenance or high usage. The 5-year condition assessments will continue to provide critical data needed for decision making and prioritization of available funding.

Implementation

Asset Maintenance Funding: Routine asset maintenance funding is provided through annual contracts with individual hatchery operators. This funding is designated for maintenance activities that are considered routine, that is, activities that are preventative or cyclical in nature and are part of the ongoing care and upkeep of the asset.

Non-routine maintenance includes activities conducted every 5-10 years or replacement of the entire asset or major components. Bonneville has historically addressed funding for non-routine and urgent maintenance needs through placeholder funds allocated for these types of costs, and available as appropriate.

Life Cycle Delivery

Work Element Review and Contract Management: EFW staff perform an annual review of the work elements that govern contracted work performed by EFW hatchery operators. Updating work elements that require operators to develop preventative maintenance programs or schedules and making it a requirement of the contract is an opportunity to improve the maintenance of assets and reduce the amount of unexpected costs associated with delayed maintenance.

Some maintenance being performed under Emergency and/or non-routine maintenance funding should or could be a part of the annual O&M maintenance budget at the hatchery facilities. Tying asset management to contract requirements may

provide a way for BPA to influence O&M programs without having to directly develop and implement them. This initiative is ongoing and expected to be completed by Q2 of FY23.

6.4 Resource Requirements

The hatcheries sub-program currently operates with the following BPA resource requirements:

- Lead Manager Sponsor & BPA EFW Asset Management Committee Lead
- Policy Lead, O&M Lead and Design & Construction Lead, RME Implementation Lead, EC Lead
- Engineering and Technical Services Lead
- SharePoint, administrative and meeting coordination support

The current expense budget levels are not sufficient to address all sub-program needs. New hatcheries recently built (Walla Walla and MRS Coho) will require ongoing O&M funding. In addition, mission critical and essential maintenance requirements identified by the HDR assessment for existing hatcheries that are either beyond their life expectancy or expected to reach life expectancy within the next 2 years require additional funding.

Capital funding and availability will also need to increase to account for hatcheries not yet built, specifically identified under 2008 the Columbia Basin Fish Accords.

7.0 ASSET CRITICALITY

7.1 Criteria

Hatchery programs can be subdivided into program types. Program types often overlap and many hatcheries serve multiple purposes with their programs. Although all hatchery program types serve important purposes, the following program types are listed in the generally accepted criticality order:

1. **Safety Net** – A program that prevents extinction and preserves the unique genetics of a population using captive broodstock to increase the abundance of the species at risk.
2. **Conservation** – A program that rebuilds and enhances the naturally reproducing fish population in their native habitats using locally adapted broodstock, while maintaining genetic and ecological integrity and supporting harvest where and when consistent with conservation objectives.
3. **Supplementation**- Artificial propagation to maintain or increase natural abundance while maintaining the long-term productivity of the target population. Supplementation program objectives may include rearing fish for conservation and/or harvest purposes.

Note: Many programs inherently have multiple purposes. Some programs may shift, depending upon demographics (e.g., a Safety Net action may be triggered by low returns in a conservation program).

At the asset level, the process to evaluate conditions of critical hatchery assets is outsourced to an external contractor in collaboration with the Council and hatchery operators, and defined into the following criticality:

1. **Mission Critical Elements** – These are items that have either already failed, or failure is considered to be imminent and the failure has a direct negative effect on the ability of the facility to perform its mission.

2. **Essential Maintenance/Improvements** – These items are considered essential for the facility to continue to perform the mission that was originally identified as the purpose for the facility relative to the relevant BPA Program, but the need is less immediate than mission critical elements.

3. **Non- Essential Maintenance/Improvements** – These items are considered non-essential for the facility to continue to perform the mission that was originally identified.

4. **Beneficial Maintenance/Improvements** – These items provide incremental benefit, but do not compromise the operations of the asset.

7.2 Usage of Criticality Model

In 2017, an outside engineering contractor, HDR, in collaboration with the Council and hatchery operators, completed a condition assessment at all the hatcheries where BPA actively manages assets. This condition assessment is formally updated every 5 years. The asset inventory includes the condition and criticality of the component and associated O&M costs. Examples of components include tanks, pumps, generators, screens, compressors, and hoses. See Appendix A for the full component inventory of the Hatchery Program. The criticality categories are used to prioritize funding for maintenance items. At current available funding levels, only assets that fall into the mission critical category are considered for funding.

8.0 CURRENT STATE

8.1 Historical Costs

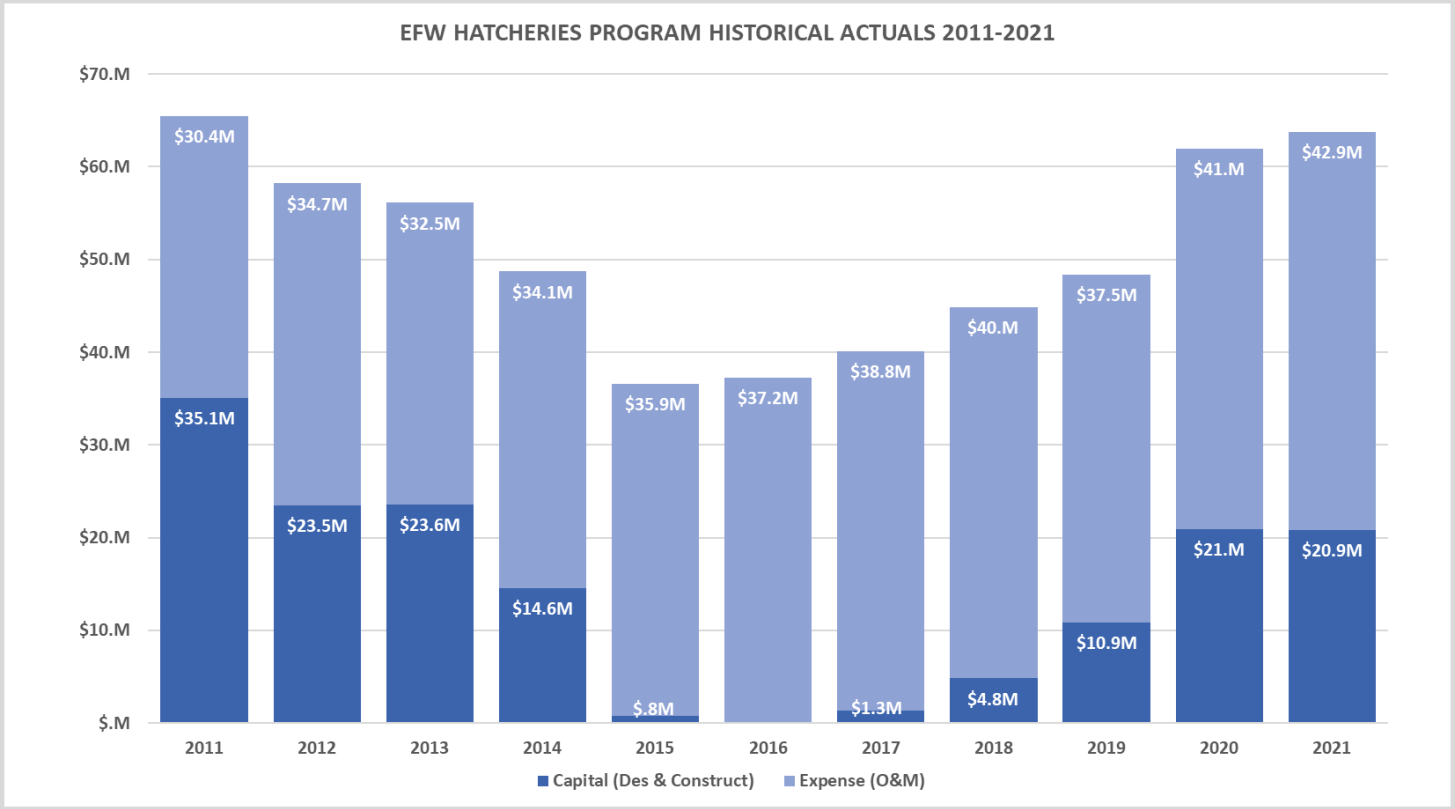
Table 8.1-1 Historical Spend

Program	Historical Spend (in thousands) With Current Rate Case						
Capital Expand (CapEx)	2017	2018	2019	2020	2021	2022	2023
Hatcheries	$1,311	$4,840	$10,868	$20,959	$20,860	$3,000	$25,540
Total Capital Expand	**$1,311**	**$4,840**	**$10,868**	**$20,959**	**$20,860**	**$3,000**	**$25,540**
Expense (OpEx)	2017	2018	2019	2020	2021	2022	2023
O&M	$38,819	$40,013	$37,543	$41,030	$42,900	$48,967	$48,967
Total Expense	**$38,819**	**$40,013**	**$37,543**	**$41,030**	**$42,900**	**$48,967**	**$48,967**

Table 8.1-1 Historical Expenditures shows how Fish and Wildlife asset capital and expense funds were spent over the last 5 years. The increase in capital expenditures over the last 2 years is a result of new hatchery construction agreements (MRS Coho Facility & Walla Walla Hatchery Final Design/Construction). The increase in expense budgets reflected in FY22/23 are

primarily related to changes in budget levels for Accord partners, more specifically Yakama Confederated Tribes, Idaho Department of Fish and Game and Colville Confederated tribes.

Figure 8.1-2 Historical Expenditures



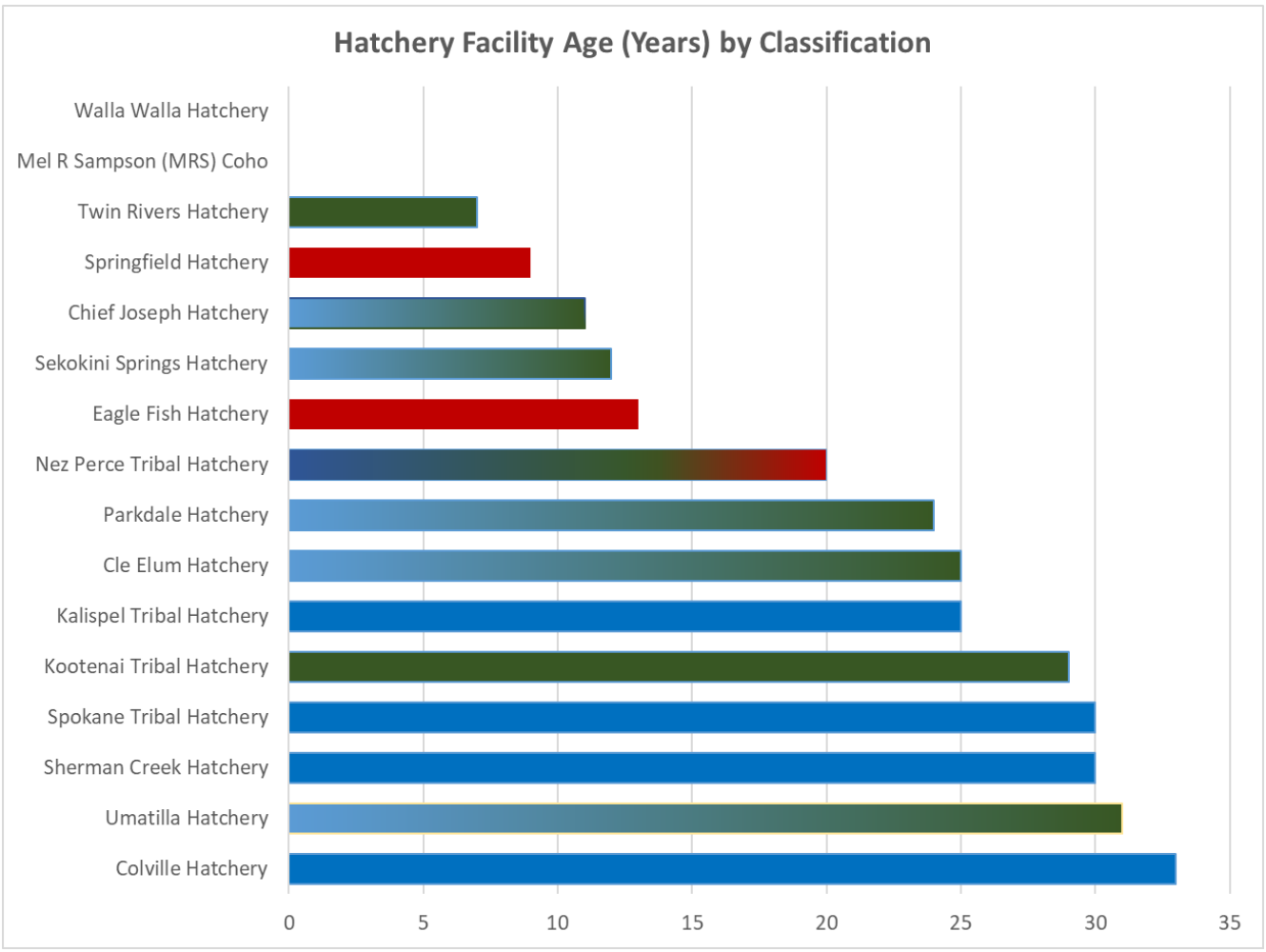
- Capital funding increases in the last 4 years have been primarily due to the design and construction of Walla Walla Hatchery and MRS Coho, both of which fulfill Columbia Basin Fish Accord commitments.
- Expenditures for Hatcheries expense program have also increased in the last 5 years. These include a portfolio of 35 projects tracked annually in CB Fish, an online contract management tool.

8.2 Asset Condition and Trends

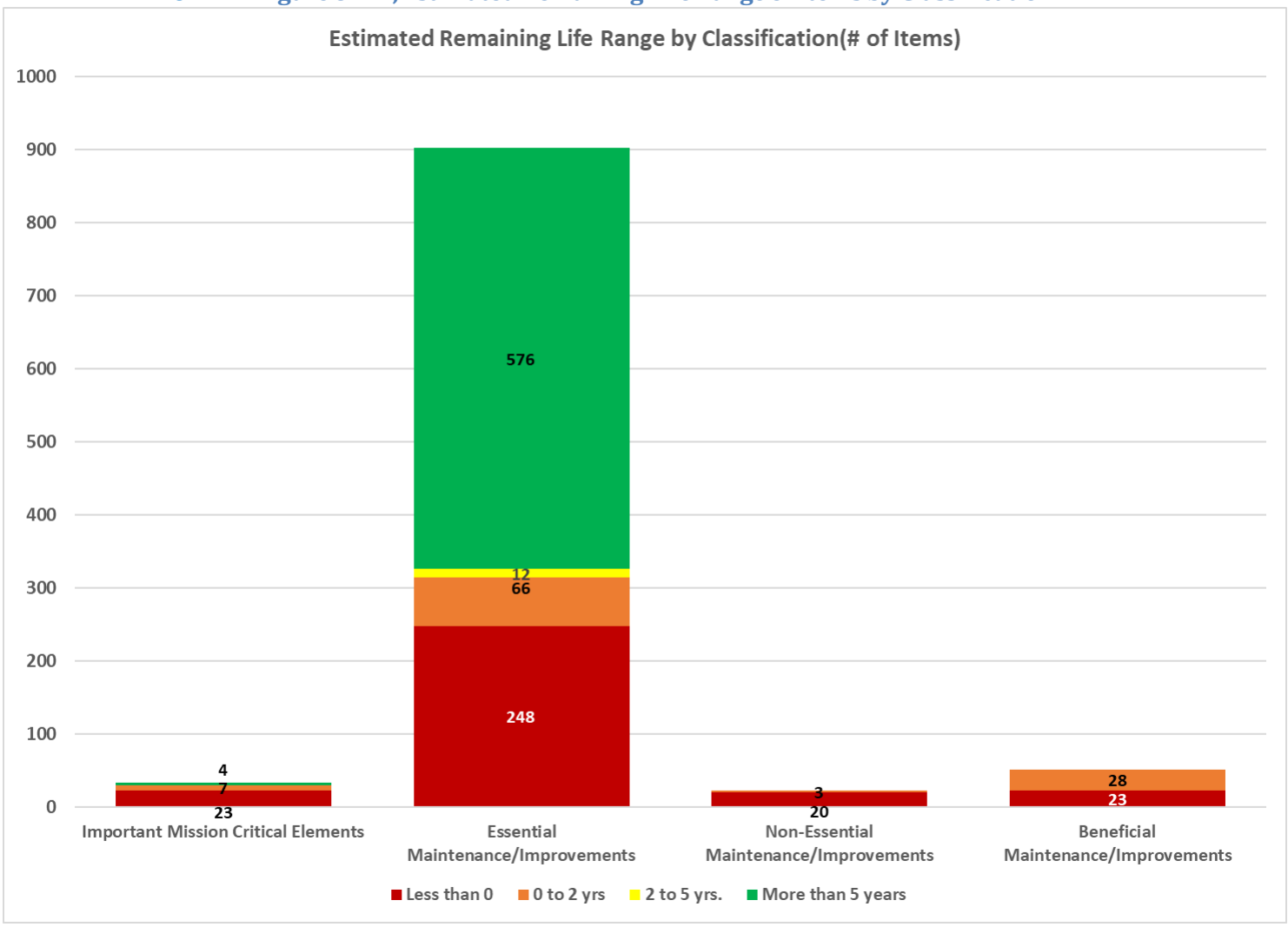
Not counting the more recent hatcheries built in the last 10 years, the average age of the hatchery facilities portfolio is ~24 years old, with the first ones being built as far back as the 1980's. In 2016 HDR, an engineering firm hired by BPA, performed condition assessments on 14 Fish and Wildlife Program Hatcheries included in the scope of this SAMP. A condition assessment report for each hatchery can be found on the Council's artificial production programs website. These assessments were then used to develop an estimate of costs to address outstanding mission critical elements from FY 2017 and essential non-recurring maintenance needs and improvements for FY 2018, 2019, 2020 for 9 of the 14 hatcheries (Appendix A).

The assessments for these 14 hatcheries will be updated starting in Q3 of FY22 to incorporate needs and inform prioritization and planning associated with the facilities, program, and out year budgets. Currently, the Council is reaching out to the project sponsors and managers requesting priorities needs for EFW hatcheries through Fiscal Year 2023.

8.2.1 Figure 8.2-1, Current Hatchery Age by Classification

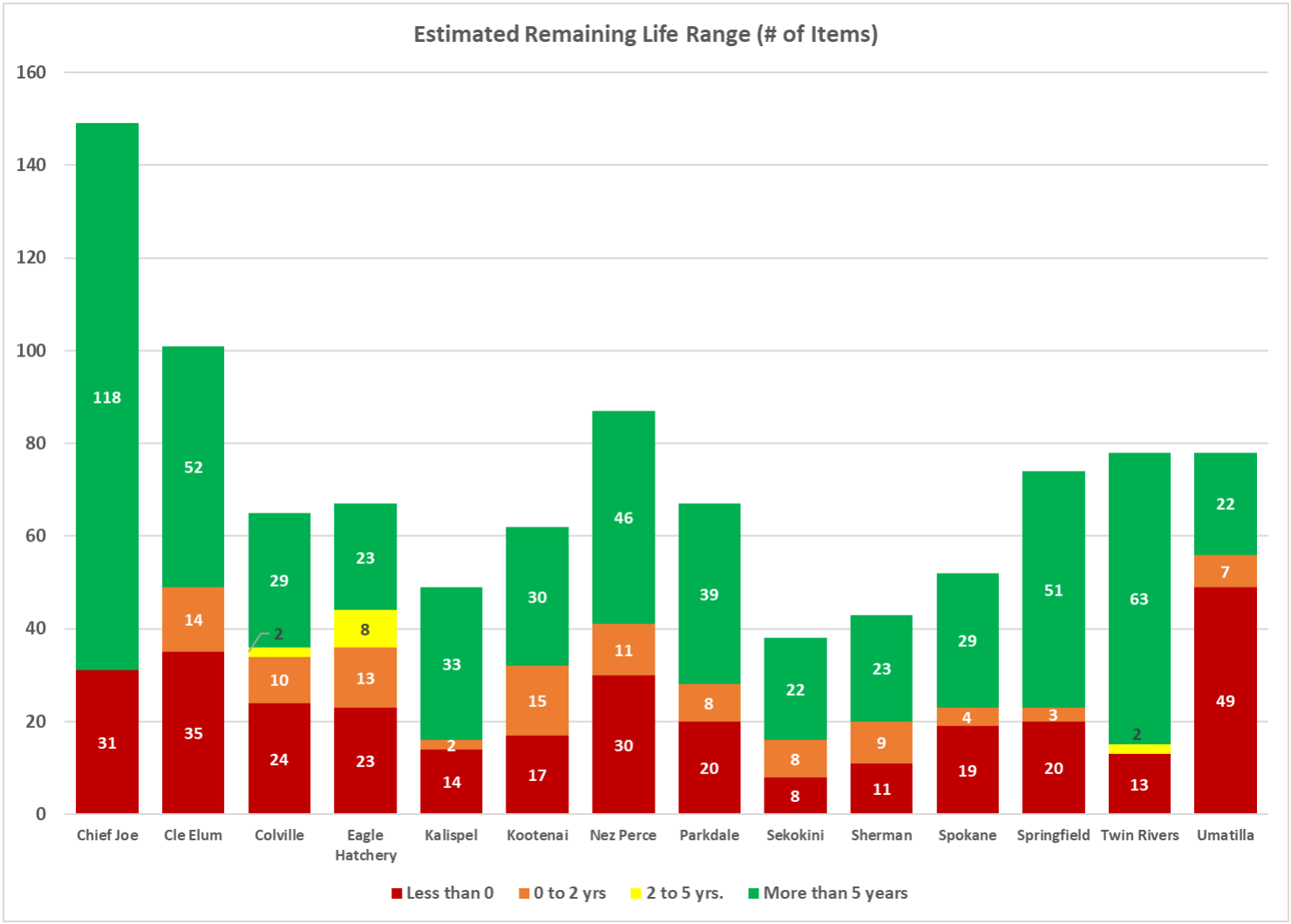


8.2.2 Figure 8.2-2, Estimated Remaining Life Range of Items by Classification



In this context, "Items" are individual assets at the equipment level (chiller, bank of raceways, building roof, etc.).

8.2.3 Figure 8.2-3, Asset Level Estimated Remaining Life Range by Item



In this context, "Items" are individual assets at the equipment level (chiller, bank of raceways, building roof, etc.).

8.3 Asset Performance

Hatchery programs are managed to achieve a variety of objectives including contribution to tribal treaty and non-treaty fisheries, mitigation for lost habitat and reduced population sizes, and to assist in the conservation of endangered and threatened salmon and steelhead populations. Specific performance measures/standards for each program are defined in the program's Biological Opinion issued by NOAA, and are consistent with the goals, objectives and strategies of the sub-basin plans if available. Performance standards in the Biological Opinion and/or sub-basin plans are designed to achieve the program's goals and objectives and are generally measurable, realistic, and time specific. Hatchery assets meet state and federal compliance requirements.

Specific Biological Opinions for each hatchery can be found in the individual hatchery project files. The project files are maintained by BPA's Environmental Compliance Division. One example of a possible performance measure that could be included (shown in the table below) in a future version of the SAMP is tracking the % of non-routine maintenance work completed at program hatcheries based on the condition assessments. As this strategy matures,

the team will continue to evaluate sensible performance measures for hatchery assets.

8.3.1 Table 8.3-1, Historical Asset Financial Performance Summary

EFW tracks expenditure rates on its expense programs relative to Start of Year budgets (SOY). Performance for the last 5 years is shown below:

Strategic Goal	Objective	Measure	Units
Cost Management	Financial	Expense expenditure rate	%

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
97%	106%	91%	89%	96%	89%	97%	99%	90%	80%

8.4 Performance and Practices Benchmarking

Due to the unique nature of hatcheries, it is difficult to benchmark against other hatchery programs in the industry. Hatchery programs are operated to meet performance and compliance guidelines established in the Biological Opinion and approved by NOAA. One of the program's long term objectives within the next 5 years is to engage with a third party vendor to benchmark and assess portfolio performance and unit cost.

9.0 RISK ASSESSMENT

9.1 Risk Identification

Risk Category	Risk Name, Description and Assessment	Likelihood	Impact
Safety	As hatcheries are not under BPA ownership, liability associated with personal safety remains the responsibility of the property owner and operator, not BPA.	Low	Low
Reliability	**Equipment Failure:** The possibility of equipment failure of a physical asset is always a risk to the reliability of the system. A hatchery's operating equipment is always at risk of failing and needing repair and/or replacement. Failed equipment has resulted in loss of artificial production that has affected the ability to reach mitigation targets for fish populations.	Moderate	High
Financial	**Costs:** The possibility of increased costs due to equipment failure. These risks are mitigated by BPA policies and procedures that require prioritization, but are subject to unplanned events or design issues that could result in increased and unforeseen costs.	Likely	Major
Environment/ Stewardship	**Environment Hazards:** Environmental risks include unexpected or unintended impacts to the surrounding ecosystem from the operations and maintenance of hatcheries, such as oil spills or emergency release of diseased fish, etc.	Unlikely	Minor
Compliance	**Regulatory Assets:** Hatcheries are an integral part of BPA's Fish and Wildlife program that meet the legal obligation of BPA (Endangered Species Act, Northwest Power Act) to mitigate for the impacts of the Federal Columbia River Power System.	Unlikely	Moderate

Due to the range of hatcheries, each asset may have its own risk profile. For this plan, EFW evaluated the risk of hatcheries as a whole on its program.

9.2 Risk Score

SCORE	PROBABILITY	IMPACT
5	Almost Certain	Extreme
4	Likely	Major
3	Possible	Moderate
2	Unlikely	Minor
1	Rare	Insignificant

Probability

Risk Event Probability Scoring	Rare = .05	Unlikely = .10	Possible = .20	Likely = .40	Almost Certain = .80
Occurrence	0 - 10% Very unlikely to occur This event could occur within the next 100 years	11 – 40% Unlikely to occur This event could occur within the next 50 years	41 - 60% May occur about half of the time This event could occur within the next 13 years	61 - 90% Likely to occur This event could occur within the next 5 years	91 - 100% Very likely to occur This event could occur within the next 2 years

Impact

Risk Event Impact Scoring	Insignificant = .05	Minor = .10	Moderate = .20	Major = .40	Extreme = .80
Safety The potential impact of a risk event and liability with worker safety issue	No injuries or illness	Minor injuries or illness to few employees, public members or contractors requiring first aid	Minor injuries or illness to several employees, public members or contractors requiring first aid	Serious injuries or illness to few employees, public members or contractors hospitalization, disability or loss of work	Fatality, permanent disability, serious injuries or illness to many employees, public members or requiring hospitalization, disability or loss of work
Reliability The potential impact of a risk event due to equipment failure	No equipment failure or inconsequential equipment failure	Equipment failure that can be fixed or resolved in 1 hour or less, no outage or impact to ancillary systems	Equipment failure that can be fixed or resolved in 1 day or less, no outage, but potential impact to ancillary systems	Equipment failure that cannot be fixed or resolved in 1 day, potential outage, with impact to ancillary systems	Equipment failure that cannot be fixed or resolved in 1 week, outages with significant impact to ancillary systems
Financial The potential risk event resulting financial costs to program measured in incremental dollar impact	Impact of less than S30k in costs; consider costs to customers, shareholders, and third parties.	Impact between S30k - $300k in costs; consider costs to customers, shareholders, and third parties.	Impact between S300k - $1M in costs; consider costs to customers, shareholders, and third parties.	Impact between $1M-$5M in costs; consider costs to customers, shareholders, and third parties.	Impact above $5M in costs; consider costs to customers, shareholders, and third parties.
Environmental The potential impact on natural resources such as air, soil, water, plant or animal life	Resulting in negligible or no damage	Immediately correctible damage to surrounding environment	Resulting in moderate short term damage of a few months, reversible damage to surrounding environment with no secondary consequences	Resulting in significant medium term damage greater than a few months, damage to surrounding environment	Irreversible and immediate damage to surrounding environment (e.g. extinction of species)
Compliance The potential impact of noncompliance with federal, state, local, industrial or operational standards or requirements	No compliance impact up to an administrative impact	Noncompliance impact: self-reported or regulator identified violations	Violations that result in minor changes to operations/administration without additional oversight from regulators	Significant new and updated regulations are enacted as a result of an event, with changes to operations/administration and increased oversight from regulators	Regulators force the shutdown of critical assets and demand changes to operations/administration, cease and desist orders, and potential closure of site/facility

Risk Score Matrix

Probability	IMPACT				
(5) = .90	0.05	0.09	0.18	0.36	0.72
(4) = .70	0.04	0.07	0.14	0.28	0.56
(3) = .50	0.03	0.05	0.10	0.20	0.40
(2) = .30	0.02	0.03	0.06	0.12	0.24
(1) = .10	0.01	0.01	0.02	0.04	0.08
	(1) = .05	(2) = .10	(3) = .20	(4) = .40	(5) = .80

Low Risk Balanced High Risk

Risk Assessment

Probability	IMPACT				
(5) = .90					
(4) = .70				Financial	
(3) = .50			Compliance	Reliability	
(2) = .30		Environmental			
(1) = .10		Safety			
	(1) = .05	(2) = .10	(3) = .20	(4) = .40	(5) = .80

Risk Ranking and Response

Identified Risks	Probability	Impact	Quantitative Score	Priority	Rank	Risk Response
1) SAFETY: Failure of hatchery operator to maintain safety standards within facility	1	2	.01		5	Ongoing monitoring
2) RELIABILITY: Failure of hatchery operator to prevent equipment failure of hatchery operating equipment with impact to species.	3	4	.20		2	Near-term planning
3) FINANCIAL: Failure to maintain Fish and Wildlife 1085 Program expenditures within capital and expense budgets.	4	4	.28		1	Immediate attention
4) ENVIRONMENTAL HAZARD: Failure to prevent environmental hazards to the surrounding ecosystems caused by the construction and operation of hatcheries	2	2	.03		4	Ongoing monitoring
3) COMPLIANCE: Failure to meet the legal obligation of BPA (Endangered Species Act, Northwest Power Act) to mitigate for the impacts of the Federal Columbia River Power System.	2	3	.06		3	Mid-term monitoring

10.0 STRATEGY AND FUTURE STATE

EFW Asset Management continues to mature and is currently working to refine its ability to accurately plan, track and forecast design, construction, operation and maintenance costs for hatchery projects. According to our risk analysis, EFW believes the reliability and financial impact of hatchery assets drive our strategy and future state. EFW assumes future expenses will need to increase in comparison to present levels and then return to an inflation adjusted average. This is to account for increased O&M costs for new hatcheries built (Walla Walla and MRS Coho), and to account for mission critical and essential maintenance requirements identified by the HDR assessment for existing hatcheries that are either beyond their life expectancy or expected to reach life expectancy within the next 2 years.

Present funding levels in the expense program does not allow Bonneville to address all assets needs or degrading condition levels at once. Consequently, the current environment dictates that EFW prioritize investments according to criticality and reliability of assets, and for the organization to continue identifying opportunities for greater program efficiency, increased resources, and cost reductions.

The Fish and Wildlife Hatchery Program plans to utilize project implementation support to inform and educate its strategy through lessons learned, information sharing, and best practices to achieve improved management of its assets and long term sustainability.

10.1 Future State Asset Performance

In general, the performance of BPA's hatchery program is closely related to individual asset performance. As assets are compromised or reach failure, they directly influence a hatchery's ability to raise healthy, well-performing fish that meet size, weight and maturation targets. Although many factors influence a hatchery's overall performance, including a multitude of environmental factors beyond human control, the importance of functioning and maintained assets plays a significant role.

In addition to financial asset performance goals, a larger effort within EFW is evaluating possible performance metrics for the program as a whole. This would include any performance metrics within biological opinions that can help establish asset performance goals to support the portfolio level objectives.

Future asset performance goals will support the implementation of hatchery programs to ensure the programs meet mitigation objectives and provide other benefits including contribution to tribal treaty and non-treaty fisheries, mitigation for lost habitat and reduced population sizes, and to assist in the conservation of endangered and threatened salmon and steelhead populations.

10.2 Strategy

The EFW long term strategy for the hatchery sub-program is to make mission critical, essential maintenance and investment decisions that maximize the value of hatchery assets by mitigating risk, improving efficiency and/or producing incremental value of reliability. A cornerstone of the strategy is decision making that is informed by updated condition assessments that evaluate asset condition, life expectancy and the impacts to each of the assets within the inventory managed. BPA Hatchery program assumes fulfillment of all Memorandum of Agreements (MOA) signed by BPA, including the Columbia Basin Fish Accords.

10.2.1 Sustainment Strategy

The EFW Hatchery Sub-Program will continue to provide leadership and coordination of hatchery activities via project managers and regular meetings of the Hatchery Team. This program will continue to be managed by the hatchery sub-program team and led three Fish and Wildlife leads – Policy, O&M and Design & Construction and appropriately coordinated with the Council's asset management sub-committee and regional sponsors.

10.2.1.1 Expense Strategy:

- Review the complete list of assets and satellite facilities that are in scope for this SAMP
- Track and monitor the operations and maintenance annual costs for assets in scope, and ensure they are managed within established program budget levels.
- Refresh the original HDR condition assessment every 5 years
- Continue working with the Council's Asset Management Subcommittee to implement annual funding commitments for priority maintenance needs identified in the 2017 HDR condition assessment.
- Identify the level of investment required to reduce or eliminate 100% of the mission critical non-recurring maintenance needs and address all essential maintenance improvements with less than 0 years of life expectancy.
- Establish asset performance goals to support the portfolio level objectives based on performance metrics within biological opinions

10.2.2 Growth (Expand) Strategy

10.2.2.1 Capital Investment Strategy:

- Work closely with our tribal and state partners within the Accords portfolio to plan, design and construct hatcheries within planned schedules
- Identify and refine the level of investment associated with hatchery construction and adjust capital forecasts accordingly
- Reserve a portion of the capital budget for major capital upgrades for within scope hatcheries in accordance with FW capitalization policy.

10.2.3 Strategy for Managing Technological Change and Resiliency

EFW is proactively partnering with the Council to implement regular condition assessments to prioritize and address critical components to operating existing hatchery programs. We are leveraging in basin lessons learned from past projects. For example, the EFW contracting process includes a project team approach to early project planning and development.

The hatchery subprogram is a manager sponsored team that includes subject matter experts in operations & maintenance, design & construction, research, monitoring & evaluation, engineering technical services, environmental compliance, and policy. The subprogram keeps informed on emerging hatchery technology and management.

10.3 Planned Future Investments/Spend Levels

Capital funding and availability will need to increase in the next 5 years to account for hatcheries not yet built, specifically identified under 2008 the Columbia Basin Fish Accords:

10.3.1 Hatchery Capital Future Investments (in thousands)

Accords Program	Hatchery Capital Future Planned Investments				
Capital Expand (CapEx)	2023	2024	2025	2026	2027
Klickitat River Design and Construction-Yakima/Klickitat Fisheries Project (YKFP) – Yakama Nation	$10,540	$2,635			
Crystal Springs Hatchery Construction – Shoshone-Bannock Tribes	$4,000	$1,500	$5,500	$2,300	
CRITFC White Sturgeon Hatchery - Columbia River Tribal Fish Commission (CRITFC)	$500	$6,000	$500		
John Day Mitigation - Columbia River Tribal Fish Commission (CRITFC)	$4,500				
Kelt Reconditioning and Reproductive Success Evaluation Research - Columbia River Inter-Tribal Fish Commission (CRITFC)	$1,000				
Natapoc Hatchery - Yakama Nation		$2,000	$3,100		
Colville Trout Hatchery - Colville Tribes (CTCR)		$3,500	$3,500		
Chief Joe Hatchery - Colville Tribes (CTCR)		$2,000	$5,000	$3,000	
Hatchery Capital Upgrades (FY23/24 Umatilla + NPTH chillers, etc.)	$5,000	$5,000	$5,000	$3,000	$5,000
Total Capital Expand	**$25,540**	**$22,635**	**$22,600**	**$10,300**	**$5,000**

Hatchery capital budgets are dependent upon estimated project schedules which may move due to unexpected circumstances outside of BPA's control within planning, design, permitting and constructions phases. In those cases, forecasted budgets may need to be adjusted to align with the revised schedules.

10.3.2 Expense future investments

EFW hatchery expense program funds the operations and maintenance of the assets listed under Table 3.3-1. These include safety net, conservation and supplementation hatcheries operated by 12 different sponsors throughout the Columbia River Basin for a multitude of endangered and threatened species as well as resident focal species.

EF&W assumes future expenses will need to increase in comparison to present levels and then return to an inflation adjusted average. This is to account for increased O&M costs for new hatcheries built (Walla Walla and MRS Coho), and to account for mission critical and essential maintenance requirements identified by the hatchery condition assessments for existing hatcheries that are either beyond their life expectancy or expected to reach life expectancy within the next 2 years.

Table 10.3-1 Future Expenditures (in thousands)

Program	Rate Case FY's		Future Fiscal Years							
Capital Expand (CapEx)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Hatcheries	$22,635	$22,600	$10,300	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Land Acquisition	$13,700	$13,700	$13,700	$5,700	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Fish Passage	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Total Capital Expand	**$41,335**	**$41,300**	**$29,000**	**$15,700**	**$15,000**	**$15,000**	**$15,000**	**$15,000**	**$15,000**	**$15,000**
Expense (OpEx)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Hatcheries O&M	$48,967	$50,436	$51,949	$53,507	$55,112	$56,766	$58,469	$60,223	$62,030	$63,890
Land Acquisition EXP	$4,200	$4,200	$4,200	$4,200	$4,200	$4,200	$1,000	$0	$0	$0
Land O&M	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500	$12,500
Fish Screens	$4,677	$4,677	$4,677	$4,677	$4,677	$4,677	$4,677	$4,677	$4,677	$4,677
Total Expense	**$70,344**	**$70,344**	**$70,344**	**$70,344**	**$70,344**	**$70,344**	**$67,144**	**$66,144**	**$66,144**	**$66,144**

10.4 Implementation Risks

Table 10.4-1, Implementation Risks

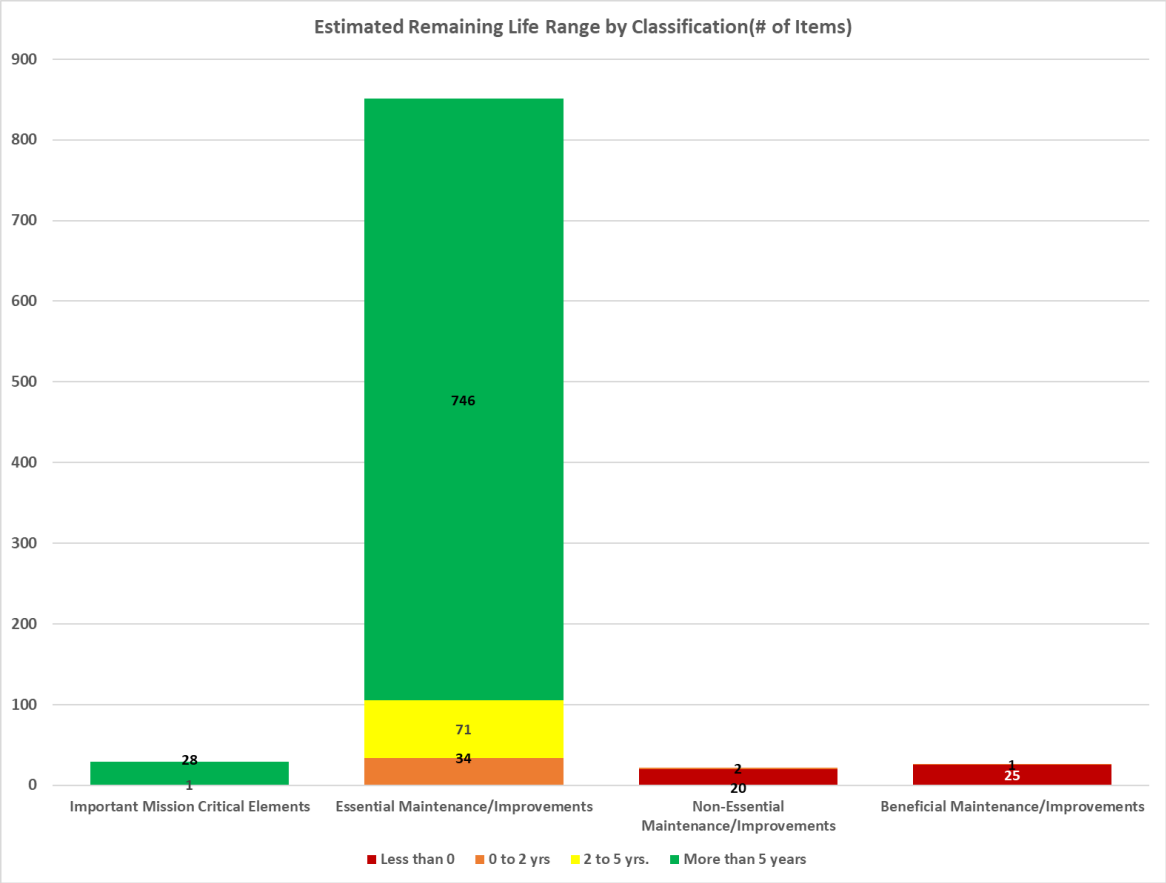
Risk	Impact	Mitigation Plan
Global supply chain constraints, labor shortages and material cost increases lead to project delays and project cost increases	Moderate - The on-going impacts of the pandemic on supply chain, labor shortages and material costs result in an extended period of project costs increases and delays in project execution.	At present, project cost increases are being absorbed within existing program levels and budgets are re-optimized.
Lack of adequate O&M funding for non-recurring maintenance needs	Potentially High - Delayed and deferred maintenance on critical hatchery assets which could impact hatchery performance objectives	Explore opportunities to strategically prioritize and sequence maintenance work to ensure that the most critical needs are addressed first.
Optimistic project schedules result in under-execution of capital budget	Projects could take longer to execute than expected due to as-found conditions, design challenges, project complexity, environmental compliance permitting issues contractor performance, or other factors. Without "shelf-ready" projects that resources can be shifted to, budget execution will be impacted.	Close coordination with regional and tribal partners to understand barriers to schedule and project execution, and continuous adjustment of schedules including revised capital forecasts. Although this captures some risk for near term budgets, a mitigation strategy still needs to be developed for the long-term portfolio.
Unforeseen natural events (e.g. flood, fires, icing, earthquakes, etc.)	Potentially High - Impacts could range depending on event, but there is potential for large damage to facilities that could pose a financial risk to the program and biological risk to fish. Hatcheries are particularly vulnerable to the ancillary effects of precipitation events because their infrastructure is so often located in or near rivers and streams.	Utilize the Budget Oversight Group (BOG) to address needs as they arise, anticipate the effect of these events during project planning to incorporate design solutions for mitigation.
Climate change	Potentially High - Impacts to hatchery performance and ability of hatchery programs to achieve desired production goals	Anticipate the effect of these events during project planning to incorporate design solutions for mitigation.

10.5 Asset Conditions and Trends

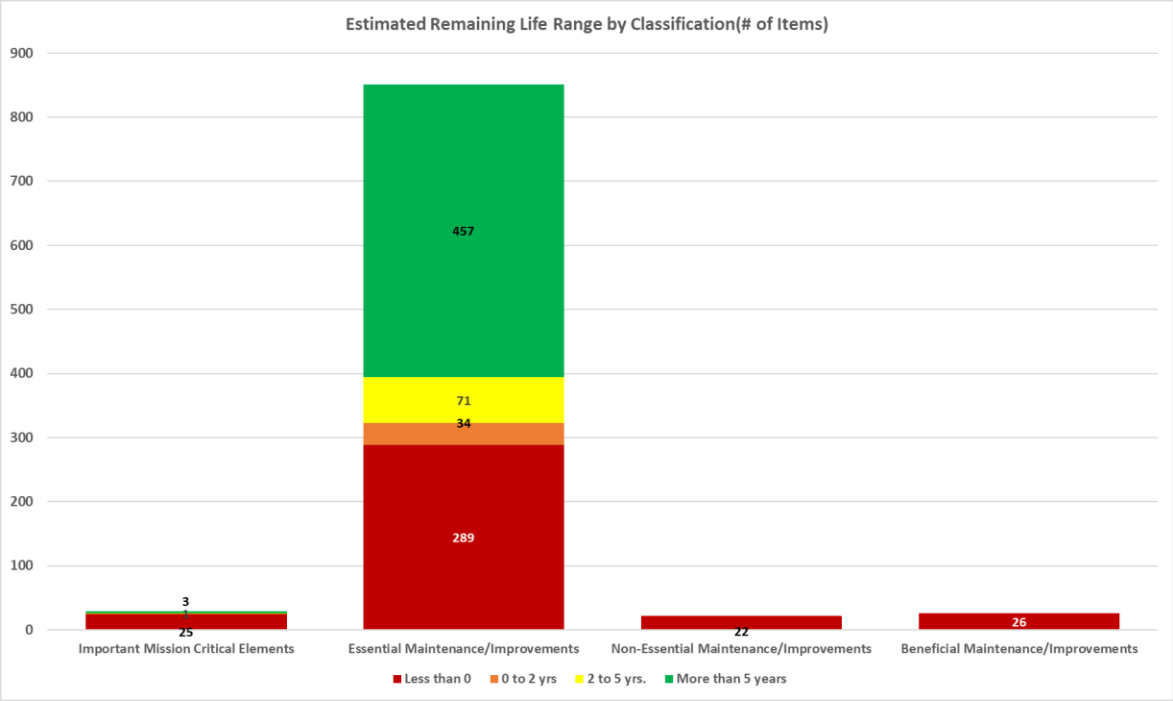
Aging facilities have components that deteriorate which will require replacement. The hatchery condition assessment is repeated every 5 years to identify expected remaining life on assets. These are prioritized annually and asset replacement and/or repairs are addressed on an annual basis through BPA and Council funding mechanisms.

Expected changes to condition of the assets have been categorized by the maintenance requirements criteria established at the asset level within section 7.1. The recommended strategy would be for prioritization of investment to meet the long term objectives described in section 6.2. Specifically, to improve asset conditions by eliminating 100% of the mission critical non-recurring maintenance needs by 2027, and addressing all essential maintenance improvements with less than 0 years of life expectancy by 2027.

Recommended Strategy - Condition in 2027



No Investment – Condition in 2027



10.6 Performance and Risk Impact

Over time, the recommended plan will reduce the number of mission critical elements and essential maintenance improvements required to replace items that have either already failed, or failure is considered to be imminent with direct negative effect on the ability of the facility to perform its mission.

Through investment of approximately $8.6 million (in 2017 dollars) within the next 5 years, a total of 314 items identified as mission critical and essential maintenance improvements throughout 14 hatcheries would be addressed. While these would increase financial risks to BPA or stability of FW program budgets, they would conversely reduce the reliability, environmental and compliance risk at the portfolio level.

Recommended Strategy – Risks in 5 years

Probability	IMPACT				
(5) = .90					Financial
(4) = .70					
(3) = .50					
(2) = .30			Environmental	Reliability	
(1) = .10		Safety	Compliance		
	(1) = .05	(2) = .10	(3) = .20	(4) = .40	(5) = .80

No increased investment – Risks in 5 years

Probability	IMPACT				
(5) = .90					
(4) = .70				Financial	
(3) = .50			Environmental	Reliability	
(2) = .30			Compliance		
(1) = .10		Safety			
	(1) = .05	(2) = .10	(3) = .20	(4) = .40	(5) = .80

11.0 Addressing Barriers to Achieving Optimal Performance

Program resources

Budget constraints on the Fish and Wildlife program could require creative new strategies for prioritization or sequencing of mitigation work to optimally implement this asset management strategy. Fish and Wildlife plans to improve asset management competencies across its staff by encouraging staff to take the IAM training offered by the agency. This will improve the confidence of its employees to adopt and continually improve their strategic asset management plans. In addition, the EFW Asset Management function resides with the office of the Budget and Systems Manager (EWB) and is not currently staffed. The lack of dedicated asset manager or business analyst to solely support the hatchery program and its portfolio as a whole is an identified weakness.

Internal/external relationships

A critical element of achieving optimal performance of this strategy is establishing and maintaining strong internal and external relationships. The Fish and Wildlife program works closely with other agency organizations as well as external entities throughout the region including the NPCC, tribes and states. Developing and maintaining trust, shared learning efforts, and approaches towards common goals will help to gather consensus around this strategy and improve the likelihood it will be implemented successfully.

Program alignment with broader Fish and Wildlife program

Optimal performance of this asset is contingent on its alignment with the broader BPA Fish and Wildlife program, including any future Biological Opinions. A change in hatchery strategy away from the current/status quo approach would need to be considered in terms of this broader program, and a modification of the broader program may modify the approach to this asset. Hatcheries are one component of many that address the broader mitigation requirements BPA addresses.

Data management and sharing

In terms of the management actions that will support sustaining the asset, the near-term emphasis will be on updating and standardizing the inventory and associated data, including the ability to efficiently produce desired metrics and reports, as well as cost forecasts under various program scenarios. Actions should be identified that will potentially enhance the current information management and other areas where efficiencies in reporting might be evaluated. The lack of centralized database of hatchery assets with real-time view into the criticality and health of each individual asset is an identified weakness.

12.0 DEFINITIONS

Reference BPA Policy 240-2 and BPA Procedure 240-2-1 for standard definitions. Definitions specific to this asset category, if any, are listed below:

Northwest Power and Conservation Council (NPCC) [2]**:** An eight-member council, established by the Pacific Northwest Electric Power Planning and Conservation Act, comprised of two voting members from the four northwestern states: Washington, Oregon, Idaho, and Montana. Helps guide BPA and the region with planning for conservation and generation resources and for protection, mitigation, and enhancement of fish and wildlife

in the Columbia River Basin.

Project Sponsor: The entity proposing and performing the duties of operating and maintaining a hatchery for the Fish and Wildlife Program.

Biological Opinion: A document that is the product of formal consultation, stating the opinion of the Service on whether or not a Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

12.1.1.1 Appendix A – Hatchery Condition Assessment, NPCC Asset Management Strategic Plan

List of artificial production projects in the Program including all sites and facilities associated with specific Program hatcheries

The following table was developed for the Asset Management Strategic Plan (Plan) to reflect the inventory of programs associated with artificial production in the Fish and Wildlife Program (Program). The assessment identified the facilities/program and associated projects that were constructed through the Program and other hatchery programs that were supported but are dependent on facilities that were not constructed with Program funds. The facilities/programs being addressed in the assessment associated with the Plan are bricks and mortar capital type investments, not the associated facilities/programs that were provided non-capital support for the artificial production (i.e., non-Program hatcheries).

Of the 42 projects listed, 14 existing facility/programs[3] (involving 24 projects) are currently considered "Program Hatcheries" for the Plan (shaded boxes in the following table). There are seven existing facility/programs (involving seven projects) that do not warrant an assessment due to the lack of capital investment by the Program. In addition, eight proposals (involving 11 projects) are for new facility/programs and are in step review that will need to be tracked and incorporated at the appropriate time into the Plan.

Direct F&W Program (capital investment)				Associated Facilities (non-Program) and Comments
Facility/Program	Project #	Assess-ment	Facilities	
Nez Perce Tribal Hatchery	1983-350-00	X	2 rearing sites (NPTH and Sweetwater Springs) and 5 acclimation sites (Cedar Flats, Luke's Gulch, North Lapwai Valley, Newsome Creek, and Yoosa Creek)	
Colville Hatchery	1985-038-00 2008-117-00	X	Colville Tribal hatchery	Project #2008-117-00 (Rufus Woods net pens) is being combined with #1985-038-00
Hood River Production	1988-053-07 1988-053-08	X, and in Step review	2 rearing sites (Parkdale Fish Hatchery and Moving Falls Fish Facility)	MOU with Oak Springs Hatchery (ODFW), Pelton Ladder and Round Butte Hatchery (PGE/CTWSRO). Neal Creek Acclimation is equipment only.
Kootenai River Native Fish Conservation Aquaculture	1988-064-00	X	2 rearing sites (Tribal Sturgeon Hatchery and Twin Rivers Hatchery)	Twin Rivers just came on line and upgrades made to sturgeon hatchery
Umatilla Hatchery	1989-035-00 1983-435-00 1983-436-00	X	Umatilla Hatchery, 5 acclimation sites (Bonifer, Minthorn, Imeques C-mem-ini-kem, Thornhollow Satellite Facility, and Pendleton) and 3 adult holding sites	Adult holding and eggs taken and transferred from Walla Walla

[3] Note that there are four existing facility/programs that are in step review for increase production.

Direct F&W Program (capital investment)				Associated Facilities (non-Program) and Comments
Facility/Program	Project #	Assess-ment	Facilities	
			(Minthorn, Three Mile Dam and South Fork Walla Walla) and Westland Irrigation District Sampling Facility	
	1988-022-00	NA		Equipment only
Sekokini Springs Westslope Cutthroat Trout Isolation Facility	1991-019-03	X		Continues to be constructed
Lake Roosevelt Resident	1991-046-00	X	Spokane and Sherman hatcheries. Spokane Hatchery audit is complete.	
	1991-047-00			
	2001-029-00	NA		MOU Ford Hatchery (WDFW)
	1995-009-00	NA		Equipment only – 8 Lake Roosevelt net pens
Select Area Fisheries Enhancement	1993-060-00	NA		*MOU, Gnat, Greys and Kaskanine hatcheries.* Equipment only. 5 net pen sites (Deep River, Blind Slough, Tongue Point, Youngs Bay).
Kalispel Tribal Fish Hatchery	1995-001-00	X, and In Step review		This program has been proposed to phase out of LMB to native trout recovery.
Nez Perce Trout Ponds stocking	1995-013-00	NA		Equipment only. Stocking 3 ponds (Mud Creek, Talmaks and Tunnel)
Duck Valley Reservation Fish Stocking	1995-015-00	NA		Equipment only. Stocking 3 reservoirs (Mountain View, Sheep Creek and Lake Billy Shaw)
Lake Roosevelt Sturgeon Recovery	1995-027-00	In Step review		
Mid-Columbia Coho Reintroduction Feasibility Study	1996-040-00	In Step review		
Johnson Creek Artificial Propagation	1996-043-00	NA		MOU, McCall Hatchery (LSRCP). Equipment only.
Cle Elum Supplementation and Research Facility	1997-013-25,	X, and In Step review	3 acclimation sites (Clack Flat, Easton and Jack Creek) and Prosser hatchery and Marion Drain Fish Facility.	Project is comprehensive. Other species are being dealt with in this project and/or other projects (e.g., sturgeon, kelts). Coho in Step review (Holmes Ranch). Prosser Fish Facility and Marion Drain Fish Facility (kelts, sturgeon and fall Chinook). In addition, some activities are mixed with non-Program efforts. Nelson Springs mobile acclimation equipment only. *Roza Adult Trapping Facility (BOR owned--MOA between BOR, WDFW, BPA).*
	1988-115-25			
Klickitat River Operations and Maintenance (O&M)	1988-115-35	X, and in Step review	Castile Falls trap, Lyle Falls trap. Proposed – Wahkiacus acclimation.	MOU, Klickitat Hatchery (Mitchell Act). In Step review.
Grande Ronde Supplementation	1998-007-02	X	Lostine River – weir and acclimation	*MOU, Lookingglass NFH (LSRCP)*, Bonneville Hatchery Captive Brood Facility (ODFW).
	1998-007-03		Catherine Creek and Upper GR Rivers - weir and acclimation	

Direct F&W Program (capital investment)				Associated Facilities (non-Program) and Comments
Facility/Program	Project #	Assess-ment	Facilities	
Fall Chinook Acclimation Facilities	1998-010-05	X	3 sites (Captain John Rapids, Pittsburg Landing, Big Canyon)	MOU, Lyons Ferry NFH (LSRCP)
Walla Walla Spring Chinook	2000-038-00	In Step review		Current relation with the Umatilla Hatchery program (see above)
Chief Joseph Hatchery	2003-023-00	X	4 acclimation sites (Oroville-Tonasket Irrigation District irrigation ponds, one tribe-owned and two new ponds will be modified and/or constructed)	MOU, Oroville-Tonasket Irrigation District irrigation ponds
Lower Granite Dam Adult Trap	2005-002-00	NA		Used for RME & hatchery practices in Snake River. US Army Corps of Engineers
Okanogan Basin Locally Adapted Steelhead Broodstock Step 1 and 2 (Cassimer Bar)	2007-212-00	NA		No activity, in Step review
Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin	2007-155-00 (and 2008-455-00)	In Step review		Marion Drain Fish Facility and 1 other site (Ringold, MaNary and Bonneville). Addressed under CRITFC (Objectives 2 and 3) and YN (Objective 1).
Kelt Reconditioning and Reproductive Success Evaluation Research	2007-401-00	In Step review		Merged from Project #2000-017-00 and 2003-062-00. In evaluation stage in the Columbia plateau and lower Snake.
Snake River Sockeye Propagation	2007-402-00	X	2 sites (Springfield and Eagle)	MOU, 2 sites (Manchester and Burley Creek)
Lamprey - implement an experimental safety-net lamprey artificial production facility for the conservation of the species	2008-524-00 (2008-470-00, and 1994-026-00)	In Step review	proposed	Addressed under CRITFC (Objective 6) and YN (Objective 8)
Chum Salmon Restoration in the tributaries below Bonneville Dam	2008-710-00	In Step review		Merged from Project #2001-053-00. Also associated with Project #1999-003-00.
Crystal Springs Planning and Operations/Maintenance	2008-906-00,	In Step review	Crystal Springs Hatchery and 2 sites (Yankee Fork and Panther Creek)	Activities link to LSRCP
Upper Columbia Spring Chinook & Steelhead Acclimation	2009-001-00	NA		MOU, acclimation sites in the Wenatchee and Methow PUD's. Equipment only.

Table 2: Actions taken by the Asset Management Subcommittee to address priority maintenance elements for the Program's hatcheries.

The following list of elements (mission-critical and essential) * were identified through the hatchery assessments and the managers/sponsors for Fiscal Year 2017, 2018, 2019 and 2020. Also listed are outstanding mission-critical (italic) elements from FY 2017. Recommended actions for FY 2019 and 2020 are dependent on review (i.e., engineering) and confirmation (e.g., environmental compliance) by Bonneville by the end of March 2018 and 2019, respectively. Shaded cells reflect elements that are dependent on further evaluations and discussion (e.g., outstanding mission-critical elements from FY 2017).

Site - Manager	Element	Estimated Cost by Fiscal Year				Description
		2017	2018	2019	2020	
Sekokini - MFWP	Generator	$5,000				
	Spring #2 Infiltration Gallery		$15,000			Implemented - in contracting. Spring 2 infiltration gallery needs maintenance to capture flow that is currently diverted away from the cistern. Large snowpack and runoff this spring have led to even more of the flow being routed past the cistern, reducing flow to the hatchery building.
	French Drain			$5,000		French drain is needed in front of the isolation building to redirect seepage behind the retaining wall and prevent ice formation in front of the entry way.
	Roof				$12,000	Metal roof replacement on the original hatchery building (not the expansion building).
	Settle Pond Drain				$7,000	The concrete outflow structure that controls the elevation of the hatchery's effluent settling pond is crumbling and needs to be replaced.
Lake Roosevelt Resident**						
Spokane - STOI	NA					Utilizing BIA O&M funds.
Sherman - WDFW	Sanitary Lift Station Pumps	$20,000				
	Emergency Generator	$40,000				
	Lake Water Pumps		$30,000			Move pumps and extend to deeper water to maintain flow during reservoir drawdown. Total costs include pumps, piping, and ancillary equipment. Subject to engineering and permitting before purchase of equipment.
	Net Pens			TBD	TBD	Additional evaluation needed, TBD. Reservoir drawdown causing early release of fish and the effect on program goals, current location does not function during reservoir drawdown.
Umatilla**						
Umatilla - District	Leaking pipe, adult trap					$20,000 Covered by accord funds. Westland Irrigation District (District)
ODFW	Well System		$20,000	TBD	TBD	Efforts to initiate a comprehensive review of well systems (ranney well system (pumps #1 throuh #4) and wells #1 through #4 (pumps #5 through#8)) is ongoing. All essential needs (listed below) are linked to this review. Determination of path to address needs will

Site - Manager	Element	Estimated Cost by Fiscal Year				Description
		2017	2018	2019	2020	
						be defined by end of calendar year. If emergencies arise, action will be addressed through BOG. Bonneville working with ODFW and CTUIR on urgent electrical issues. $20,000 allocated to assist in comprehensive review for specialized engineering services. Total cost unknown until a complete evaluation is completed - Well system provides a fraction of the flow the facility was designed for. In the interim and to ensure the production at the hatchery is protected an urgent BOG request, in the first quarter of FY 2018, was approved by the Council and Bonneville to recondition the wells #1 - #4 and correctly size the pumps at $150,000.
ODFW	Pumps #1 -#4					Initiate a comprehensive review of ranney well system is ongoing. *See Mission Critical item above.*
ODFW	Productiuon Well #1, 15HP Submersible					Completed. Wells 1-4 and Pumps #5-#8 were all refurbished and the pumps were rightsized in the fall of 2017. *See Mission Critical item above*.
ODFW	Production Well #2, 50 HP Submersible					Completed. Wells 1-4 and Pumps #5-#8 were all refurbished and the pumps were rightsized in the fall of 2017. *See Mission Critical item above*.
ODFW	Production Well #3, 25 HP Submersible					Estimate at $25,000. Wells 1-4 and Pumps #5-#8 were all refurbished and the pumps were rightsized in the fall of 2017. *See Mission Critical item above*.
ODFW	Production Well #4, 60 HP Submersible					Estimate at $25,000. Wells 1-4 and Pumps #5-#8 were all refurbished and the pumps were rightsized in the fall of 2017. *See Mission Critical item above*.
ODFW	Chillers (4) 50 ton					Estimate at $194,000. Efforts to initiate a comprehensive review of well system is ongoing. Chillers are 25 years old and walls are thin from sand scour. Chillers need to be replaced. *See Mission Critical item above*.
ODFW	Incubation/Aeration Tower Submersible Pumps (2), 15 HP					Estimate at $30,000. Efforts to initiate a comprehensive review of well system is ongoing. Rewire pump. *See Mission Critical item above*.
CTUIR	Eight Sites (acclimation, trapping and adult holding)					In the near future, the CTUIR annual budgets are sufficient to take care of required O&M as identified in the hatchery assessments.
Kootenai - KTOI	NA					At this time KTOI is utilizing BIA Hatchery Cyclical Maintenance Grant.
Snake River Sockeye Propagation - IDFG**						
Springfield	Chiller system		$75,000	$75,000	TBD	Engineering services contracted to develop design and specifications for chilled water delivery system upgrade at Springfield Hatchery (estimated at $75,000 for 2018 and possibly 2019. In 2019 determination on use of accord funds being discussed). Estimate based on hatchery assessment report and then includes an estimate on installation.

Site - Manager	Element	Estimated Cost by Fiscal Year				Description
		2017	2018	2019	2020	
	Concrete Clarifier			$109,250		Additional needs are deferred until current assessment is completed. Undersized waste removal system necessitates modifications (estimated at $109,250) - upsize early rearing trough effluent piping to larger size & increase size of effluent clarifier system.
	Early rearing trough effluent piping				$195,000	Additional needs are deferred until current assessment is completed. Undersized waste removal system necessitates removal of only 1 cleaning standpipe at a time. Modification by increasing the diameter of tough effluent piping (estimated at $195,000). This in conjunction with increasing the size of effluent clarifier system will allow 500 gpm influent rate. This will also allow inside vat cleaning to be more efficient and will enhance bio-security in the early rearing building and eliminate the multiple removal of sludge from the clarifier on an annual basis. Estimate reflects estimate of modify troughs with large diameter piping and not replacement of troughs.
Eagle	2 Fiberglass Transportation Tanks (250 gallon)		$16,500			Fiberglass transport tank for hauling sockeye adults from the RFLC trap to Eagle or in some years from Lower Granite Dam to Eagle are at the end of their life expectancy. These tanks have be en rebuilt and re-fiberglassed a number of times and continue to leak water. Water is also damaging the internal wooden framework as water is trapped within fiberglassed shell. Price quotes to replace this tank have been requested from JetCo at an estimated cost of $8,250 each.
	Well #3: VFD Unit		$11,500			Due to the age of this critical unit, replacement is necessary.
	Well #1: 50 HP submersible pump			$9,000		Pump is 5 years old, due to be replaced and refurbished for backup.
	Well #1 & #2 Degassing Tower Water Level Sensor.			$120,000		Aeration column needs minor modification to improve flow through dispersion plate. This unit has failed in cold damp winter conditions and is bypassed for this reason. *(Discussions with an electrician to move this unit into the Well #2 building have been initiated, but no cost estimate at this time)*
	Chiller (100 TON)				$84,500	Adult holding chiller needs to be replaced, old R-22 refrigerant filled chiller. Conversion needed to Freon or replace with new unit, whichever is deemed appropriate.
Colville - CCT	Generator					$75,000 Covered by accord funds
	Chiller (15 TON APPROX)					Accord Funded @ $42,000 in 2018. Leaks Freon, needs to be replaced
	Aluminum Troughs (14), 21' X 2.75'			$74,200		Inside rearing troughs are corroding and pinhole leaks observed, need to be replaced
	Aluminum Troughs (6), 16' X 1.3'				$15,000	Inside rearing troughs are corroding and pinhole leaks observed, need to be replaced

Site - Manager	Element	Estimated Cost by Fiscal Year				Description
		2017	2018	2019	2020	
Nez Perce Tribal Hatchery - NPT**						
NPTH	River water pumps (2)	$50,000				
	River water filtration system			TBD	TBD	Additional evaluation needed - Relationship of this high priority item, in association to the Snake River Basin Steelhead Kelt Reconditioning Facility Master Plan (Project #2007 -401-00). Kelt decision anticipated in 2018.
	heat exchanger			TBD	TBD	Additional evaluation needed, TBD - Relationship of this high priority item, in association to the Snake River Basin Steelhead Kelt Reconditioning Facility Master Plan (Project #2007 -401-00). Kelt decision anticipated in 2018.
	UV Disinfection System			$92,000		Treatment effectiveness is affected by fine sediment. Estimated @ $92,000. *Link to mission critical element (surface water filtration element)*
Yoosa Creek	Yoosa Creek Intake Bypass Flow			TBD	TBD	The dam structure that impounds water for the intake leaks significantly enough to reduce intake flow. NPT are evaluating the cost benefit of this need as part of hatchery evaluation, TBD.
Lukes Gulch	Paint 20' diameter Aluminum Circular Tanks (16)			$20,000		Paint is worn through on interior surfaces and faded.
Grande Ronde Supplementation						
Lostine - NPT	Alarm System, Flow Detection		$8,315			Has been partially damaged by erosion. Needs to be repaired.
Catherine Creek - CTUIR	NA					In the near term, the CTUIR annual budgets are sufficient to take care required O&M as identified in the hatchery assessments.
Upper Grande Ronde - CTUIR	Mission Critical - Raceway liners. NA					$15,000 Covered by accord funds. In the near term, the CTUIR annual budgets are sufficient to take care of required O&M as identified in the hatchery assessments.
Fall Chinook Acclimation Facilities - NPT***						
Pittsburg	Water Supply and Drain Hoses			$27,750		Hoses are getting brittle. Estimate @ $27,750
	Feed Storage Building				$5,625	Estimated at $5,625
	Resident 1, Camp Trailer				$25,500	21 years old, due for replacement. Estimated @ $25,500
Big Canyon	Flexible Hoses for Water Supply/Drains			$27,250		Hoses are getting brittle. Estimated @ $27,250
	Residence 1, Park Model Trailer				$25,500	19 years old, due for replacement. Estimated @ $25,500
Captain John Rapids	Alarm System, Low Water Level and No Flow Detection			$20,000		Estimated @ $20,000
	Electrical System Improvements				$5,000	Generator currently feeds through main breaker, no power to pumps if breaker fails. Estimated @ $5,000
	Supplemental Oxygen System				$10,000	Estimated @ $10,000

Site - Manager	Element	Estimated Cost by Fiscal Year				Description
		2017	2018	2019	2020	
Kalispel** - KT	Mission Critical - Alarm system					Additional evaluation needed, TBD - Estimated cost @ $50,000. Original System is non-functional and no longer supported. Activities at the hatchery are dependent on a future review. This item may be funded as part of the ongoing cold-water conversion program upgrades. This program has phased out of LMB and raising triploid trout for put-and-take.
Total		$115,00	$176,315	$228,200	$118,500	
Variation Expected (+35%) with cost confirmation and installation costs.		NA	$238,025	$308,070	$159,975	
Outstanding mission critical and essential elements that are dependent on further evaluations and discussions.				$351,250	$241,125	Totals do not include costs associated with Umatilla, NPTH (heat exchanger, filter and Yoosa Creek Intake Bypass) and Sherman (net pens). In addition, does not include Variance.
*Mission Critical Elements -- These are items that have either already failed, or failure is considered to be imminent and the failure has a direct negative effect on the ability of the facility to perform its mission.						
*Essential Maintenance/Improvements --These items are considered essential for the facility to continue to perform the mission that was originally identified as the purpose for the facility relative to the relevant BPA Program, but the need is less immediate than mission critical elements.						
** Hatchery facilities that have unresolved Mission Critical Elements that need to be addressed						
*** BPA and Lower Snake River Compensation Plan staff are currently working on determining project overlap, items listed under these facilities will be addressed once that exercise is complete.						