

# STRATEGIC ASSET MANAGEMENT PLAN

As part of BPA's fish and wildlife mitigation obligations, the Environment, Fish & Wildlife (EF&W) organization provides funding for fish screens. This SAMP describes EF&W's activities and considerations in assuring the ongoing management of fish screens in which BPA has an interest.

*For EF&W Fish  
Screens*

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## 1.0 EXECUTIVE SUMMARY

BPA manages the largest fish and wildlife protection program in the nation. In fact, 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 fish screens program is an important part of this effort.

The purpose of this Strategic Asset Management Plan is to define the actions, roles, and responsibilities for the long-term construction, operation, and maintenance of fish screens funded through BPA's Fish and Wildlife program. It was also developed in alignment with the following objectives from the agency's strategic plan: objective 1a, to improve cost management discipline, objective 2a, to administer an industry-leading asset management program, and objective 3c, to prioritize fish and wildlife investments based on biological effectiveness and mitigation for FCRPS impacts; and manage fish and wildlife program costs at or below inflation, inclusive of new obligations and commitments.

Fish Screens play a vital role in significantly reducing mortality of all life stages of salmon, steelhead, and other fish species that are diverted into irrigation diversions. It assures safe fish passage in and through spawning and rearing areas as well as migratory corridors for federally endangered species and non-listed resident and anadromous fish. The goal of the Fish Screen program is to screen all irrigation ditches and maintain all screens that impact anadromous fish while maintaining a flat budget. In alignment with the agency's strategic plan, out year budgets for fish screens will remain flat or under the rate of inflation for the next 5, potentially 10, years. The fish screen program is also expected to maintain its current processes and existing O&M activities.

The following sustainment strategy is expected for the major fish screen sponsors:

1. The Washington Department of Fish and Wildlife does not expect to construct or add any new fish screens to their inventory over the next 5 years. Funding will be used only for O&M on existing fish screens.
2. The Idaho Department of Fish and Game plans to add a small amount of new screens each year, but a majority of their funding will be used for O&M. IDFG also plans to consolidate screens when possible to reduce their number of assets.
3. The Oregon Department of Fish and Wildlife plans to use funding to add new fish screens, operate and maintain existing fish screens, and consolidate multiple fish screens where possible.

In order to maintain current O&M while budgets are flat, sponsors are:

1. Reducing the number of screens required through irrigation ditch consolidation.
2. Identifying less expensive options or new technology for both construction and maintenance of screens e.g. pump screens.

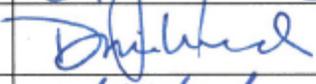
The Fish Screen program expects to use expense funding to construct and replace aging screens. The priority list for future replacement screens, or non-recurring maintenance, is under development by the sponsors, BPA staff, and Council staff and will be updated annually.

The actions of the fish screen program help satisfy BPA's legal obligations under the Northwest Power Act, Endangered Species Act, and other laws to protect, mitigate, and enhance fish and wildlife. In fact, fish and wildlife mitigation and environmental compliance are essential parts of BPA's business as the environmental cost of large hydro assets and reflect the agency's core values of trustworthy stewardship and operational excellence.

## 2.0 ACKNOWLEDGEMENTS

### 2.1 Senior Ownership

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

Crystal Ball, Executive Manager, Fish and Wildlife		Date: 3/5/20
Dorie Welch, Deputy Vice President, Environment, Fish and Wildlife		Date: 3/5/2020
Scott Armentrout, Executive Vice President, Environment, Fish and Wildlife		Date: 3/10/2020

### 2.2 Strategy Development Approach

#### 2.2.1 Key Contributors

EF&W’s asset management team facilitated the development of this plan, with primary input from policy staff (who also function as subject matter experts), and with support from Business Operations (EWB). The scope of this SAMP focuses on irrigation diversion fish screens only and not those associated with passage or power generation projects, therefore other action agencies did not contribute to the development of this plan.

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 significantly influences BPA’s strategy.

#### 2.2.2 Key Activities

- Document the Fish Screen program and processes for asset management
- Develop SAMP goals and objectives in alignment with the Agency’s Strategic Plan
- Evaluate risks to Fish Screen program with program SMEs
- Identify expense budget forecasts based on expected key projects in future fiscal years
- Perform final EW management review and signoff

### 3.0 STRATEGIC BUSINESS CONTEXT

#### 3.1 Alignment of SAMP with Agency Strategic Plan

The purpose of this Strategic Asset Management Plan is to define the longtime management and maintenance needs required to sustain BPA’s investments in fish screens. This helps satisfy BPA’s mitigation 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 SAMP supports BPA’s strategic plan objectives 1a, to improve cost-management discipline and 2a, to administer an industry-leading asset management program. The Fish and Wildlife program plans to increase project performance and cost-effectiveness, while discontinuing funding for projects with insufficient mitigation value. This asset strategy will outline how the organization will identify asset funding needs for fish screens that optimize BPA’s mitigation value.

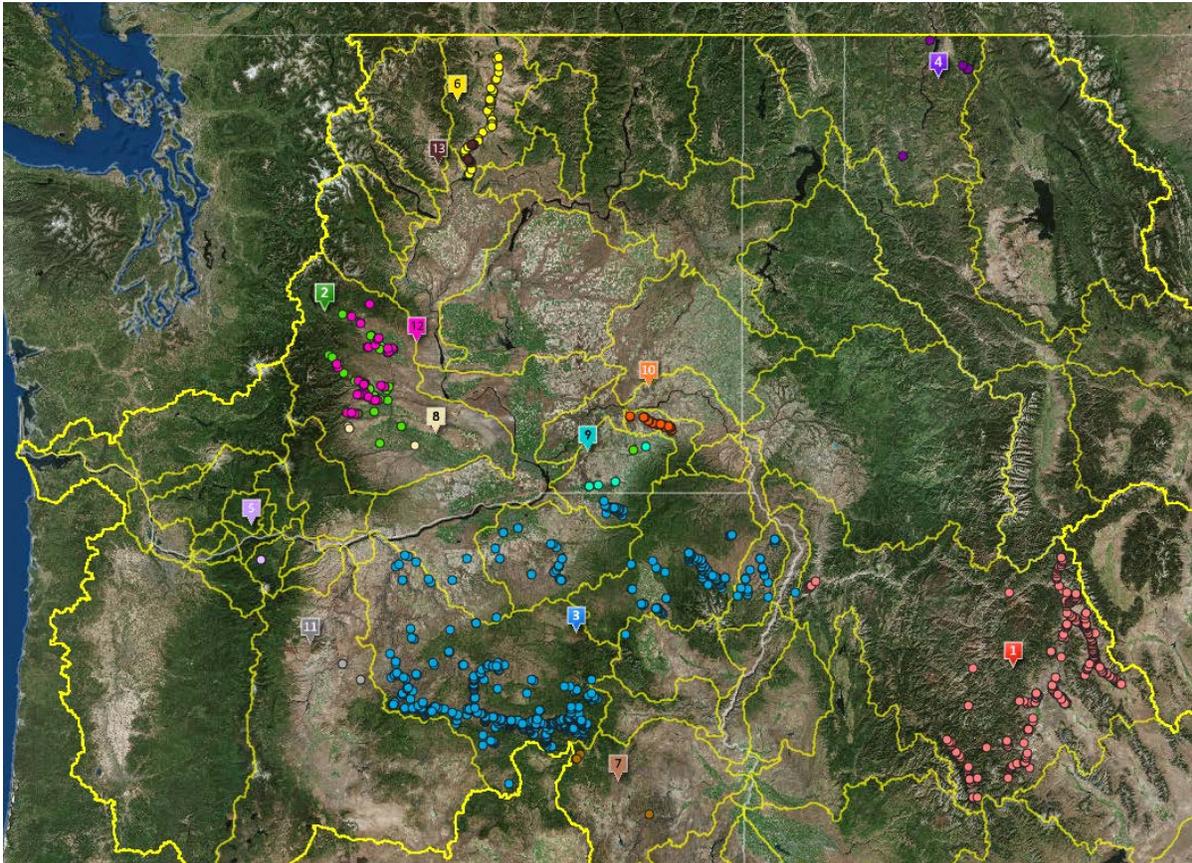
#### 3.2 Scope

This Strategic Asset Management Plan covers irrigation diversion screens and associated infrastructure that BPA is committed to funding through the Fish and Wildlife Program and various obligations such as ESA and Tribal Trust responsibilities. The majority of fish screens funded by BPA are operated and maintained by 4 state fish and wildlife programs – Oregon, Washington, Idaho, and Montana – and are This plan will not cover fish screens at generating projects. Table 3.2-1 lists the specific fish screen assets that will be covered under this plan.

*Table 3.2-1, Fish Screens Funded by BPA as of 2018*

Sponsor	State	Number of Screens
Idaho Department of Fish and Game (1)	ID	261
Washington Department of Fish and Wildlife (2)	WA	32
Oregon Department of Fish and Wildlife (3)	OR	653
Montana Fish, Wildlife, and Parks (4)	MT	5
Colville Confederated Tribes (6)	WA	99
Burns-Paiute Tribes (7)	OR	4
Yakama Confederated Tribes (8)	WA	3
Umatilla Confederated Tribes (CTUIR) (9)	WA	11
Columbia Conservation District (10)	WA	25
Jefferson Soil and Water Conservation District (11)	OR	2
South Central Washington Resource Conservation Development (12)	WA	42
Upper Columbia Salmon Recovery Board (13)	WA	12
<b>Total</b>		<b>1149</b>

Figure 3.2-2 displays the location of the assets throughout the Columbia River Basin and the area in which BPA’s funds are used for fish screens throughout the region.



*Figure 3.2-2, Asset Locations*

### 3.3 Asset Description and Delivered Services

Fish screens installed by states, tribes, and other regional sponsors help ensure safe passage of juvenile and adult fish by preventing fish from being stranded in irrigation channels or canals when water is diverted or pumped from streams. These screens are built to meet criteria that have been developed by the National Marine Fisheries Service to help maintain water velocities evenly across the screen surface, preventing higher velocity points from impinging fish to the screen. To protect all life stages of these fish, these criteria were developed around the sustained swimming abilities of juvenile anadromous salmonids. Additionally, when maintained in good working order, these fish screens will prevent fish from physically contacting the screen material and passively guide fish to the bypass to move the fish away from the screen and back to the stream, thus minimizing migration delays.

The Screen Program provides a vital role in significantly reducing mortality of all life stages of salmon, steelhead, and other fish species that are diverted into irrigation diversions. Fish screens that are (partially or wholly) funded by BPA help satisfy fish and wildlife mitigation obligations. BPA has also committed to providing funds to operate and maintain the fish screens. BPA, however, does not own these screens, engage in direct management, or take on responsibilities or liabilities associated with ownership of the fish screens.

### 3.4 Demand Forecast for Services

Fish screens are used as a part of the BPA’s fish and wildlife program to meet its mitigation obligations. Over the next 5 – 10 years, BPA plans to fund the operation and maintenance (including non-recurring maintenance) as well as the construction and installation of new fish screens as part of a strategy to improve fish passage in the Columbia River basin based on the sponsors’ identification of O&M priorities.

### 3.5 Strategy Duration

The duration of this strategy is 10 years except as it may be impacted by future legislation, judicial decisions, or initiatives of the Northwest Power and Conservation Council. The strategy will be reviewed annually and published every 2 years unless there is a significant change in strategy. If there is a significant change, the strategy will be updated at the annual review.

## 4.0 STAKEHOLDERS

### 4.1 Asset Owner and Operators

Due to the enormity of BPA’s service area, the Fish and Wildlife program partners with regional organizations, also known as sponsors, to implement projects in the field. A project sponsor proposes and performs the duties of constructing, operating, and maintaining a fish screen for the Fish and Wildlife Program. Each sponsor manages its fish screen assets through a program that designs, fabricates, installs, operates, and maintains its fish screens. BPA’s role is to mitigate for the impacts to fish and wildlife resources resulting from the construction and operation of the Federal Columbia River Power System. Therefore, it is the primary funding entity, but also provides limited technical reviews of the projects to ensure that it cost effectively funds high quality projects in the appropriate locations that provide the largest benefits to fish and wildlife.

### 4.2 Stakeholders and Expectations

*Table 4.2-1, Stakeholders*

Stakeholders	Expectations	Current Data Sources	Measures
States	Collaboration	Project Manager Contracting Officer’s Representative	Annual Reports
	Project/Contract Management	Pisces Work Elements Project Documents	Milestones Status Reports Annual Reports
	Funding	Pisces Web Asset Suite Contract Modules Line Item Budgets SOY Process	Invoices Due Diligence
	Communications	Project Manager Contracting Officer’s Representative Site Visits	Pisces WE Milestones WE Reports Project Manager
Tribes	Collaboration	BPA tribal Affairs Organization Project Manager Contracting Officer’s Representative	Survey Results Annual Reports (Engagements)
	Project/Contract Management	Pisces Work Elements Project Documents	Milestones
	Funding	Pisces Web Asset Suite Contracts Modules	Invoices Due Diligence

		Line Item Budgets SOY Process	
	Communications	Project manager Site visits	Pisces WE Milestones WE Reports Project Manager
Other Sponsors	Collaboration	Project Manager Contracting Officer's Representative	Annual Reports
	Project/Contract Management	Pisces Work Elements Project Documents	Milestones Status Reports Annual Reports
	Funding	Pisces Web Asset Suite Contracts Module Line Item Budgets SOY Process	Invoices Due Diligence
	Communications	Project Manager Site Visits	Pisces WE Milestones WE Reports Project Manager
Northwest Power and Conservation Council	Collaboration	Council Meetings and Agendas Sub-committees	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	Pisces Web Council Financial Statements	Annual Financial Reports BPA Financial Reports
Landowners/ Irrigation Districts	Collaboration	Project Manager Contracting Officer's Representative	Mutual Understandings Written Permissions Legal Documents

## 5.0 EXTERNAL AND INTERNAL INFLUENCES

*Table 5.0-1, External and Internal Influences*

<b>External Influences</b>	<b>Affects and Actions</b>
Federal laws/regulations specific to BPA	<p>The 1937 Bonneville Project Act and other specific laws, executive orders, and Federal energy regulations (FERC) directly govern BPA’s actions and obligations. The 1980 Northwest Power Act specifies the strategic role of the Northwest Power and Conservation Council and the obligation of BPA to fund fish and wildlife mitigation programs.</p> <p>Long-term program strategies, funding levels, project planning and analyses are all subject to periodic evaluation and adjustment as an inherent aspect of the relationship between BPA and the Council.</p>
Federal environmental laws	<p>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.</p> <p>Actions by BPA are primarily focused on ongoing implementation of applicable environmental laws, executive orders, and departmental directives. The EC (Environmental Planning and Analysis) organization will continue to provide regulatory expertise and site analysis for the installation and maintenance of fish screens.</p>
Climate change	<p>Effects are uncertain, particularly at specific localities; in general, however, it is anticipated that environmental changes will result in changes to existing habitats (including acquired lands) and will stress the ability of fish and wildlife to adapt.</p>
Non-Recurring Operating and Maintenance Costs	<p>Unexpected maintenance costs (e.g. due to natural events) can affect existing and future construction and O&amp;M budgets for fish screen programs potentially impacting the ability for BPA to meet its mitigation obligations.</p> <p>Scheduled preventative maintenance programs for fish screens reduce unexpected operating and maintenance costs and provide greater reliability of the fish screen assets and predictability of program costs.</p>
<b>Internal Influences</b>	<b>Affects and Actions</b>
Finance, budget and cost management	<p>Finance takes the lead role in defining the budget development cycle, budgeting rules, and financial policy. Finance also leads agency efforts to control costs and build budget forecasts.</p> <p>Fish and Wildlife (EWB) compile fish screen budgets in coordination with the Finance budget cycle. Cost management initiatives are increasing the need for F&amp;W to provide comprehensive forecasts of fish screen spending.</p>
FTE resource availability and skills	<p>Workforce staffing shortages, FTE hiring constraints, long lead-times, and increasing retirement rates all negatively impact the ability to implement the program and provide proper oversight. Fish and Wildlife will continue to prioritize critical activities, defer lower priorities, look for process efficiencies, and employ IT tools where available and appropriate.</p>
Support resources and skills (Engineering & Design, EC)	<p>F&amp;W will continue to employ standardized processes, documentation, and automation tools as appropriate to meet engineering criteria and environmental compliance.</p>

## 5.1 SWOT Analysis

Table 5.1-1, SWOT

Favorable	Unfavorable
<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• <b>Inventory:</b> Fish screen assets have been defined and inventoried by each sponsor.</li> <li>• <b>Regional Collaboration:</b> Engaged and collaborative regional stakeholders and sponsors that help with planning, coordination, and implementation of projects.</li> <li>• <b>Program Maturity:</b> BPA has an established fish screen program that has long-standing and effective procedures for completing work.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Council Collaboration:</b> Increased coordination is needed between Council and BPA on strategic asset management plan development.</li> <li>• <b>Process Documentation:</b> Weak documentation of program’s existing asset management processes potentially leads to non-standardized work, re-work, and confusion.</li> <li>• <b>Asset Ownership:</b> BPA is the funding entity, but lacks ownership and maintenance responsibility over the physical asset. BPA has limited tactical control of how assets are operated and maintained.</li> <li>• <b>Mitigation Plans:</b> Lack of clear mitigation plans for external and internal influences could increase financial or compliance risk to the program</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• <b>Stakeholder Collaboration:</b> Align priorities and strategies with Council and sponsors to improve asset management program.</li> <li>• <b>Technology:</b> Identify new technology or methods that could improve fish screening in important waterways.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>External influences:</b> e.g. climate change, political decisions, regulatory oversight can impact fish screen asset management plans</li> <li>• <b>Financial:</b> BPA’s overall Fish and Wildlife budget is tight and as the sponsors continue to build new screens, the ability to maintain them with finite financial resources could be an issue to the asset.</li> </ul>

## 6.0 ASSET MANAGEMENT CAPABILITIES AND SYSTEM

Using the IAM maturity model, Fish and Wildlife staff evaluated the maturity of the Hatchery Asset Management program in six different categories. While sponsors share involvement in the asset management of fish screens, this maturity survey was completed from a BPA perspective. The following section identifies strengths and weaknesses of the program to achieve these objectives.

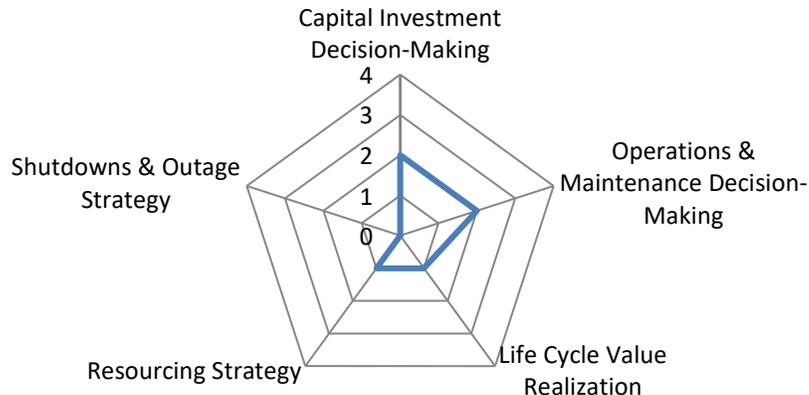
### 6.1 Current Maturity Level

Based on the results of the maturity model and the associated survey, the current maturity level of the Fish Screens Asset Management program is immature, but developing. Understandably there are weaknesses in some areas, but staff has used the results of this survey to develop potential improvements.

*Table 6.1-1, Current Program Maturity*

Subject Area	Maturity Level
<p><b>Strategy &amp; Planning</b></p>	<div style="text-align: center;"> </div> <p><b>Strength:</b> BPA’s Fish Screen program provides necessary oversight and highlights the regional, collaborative effort between BPA, the Council, and sponsors to construct, operate, and maintain fish screens to reduce mortality of all life stages of salmon, steelhead, and other fish species that are diverted into irrigation diversions.</p> <p><b>Weakness:</b> The current state of strategy and planning of the Fish Screen program asset management is reactive. Funds are prioritized within each contract based on the most critical needs in the system, sometimes after equipment is already in need of repair or replacement. With stable or declining budgets, it is difficult for sponsors to maintain the level of maintenance that is desired to maximize the life span of the fish screens. This can result in higher costs resulting from earlier than planned replacement of the fish screen infrastructure.</p> <p>Throughout much of the basin, fish screening is a voluntary program dependent upon landowner/irrigator permission.</p>

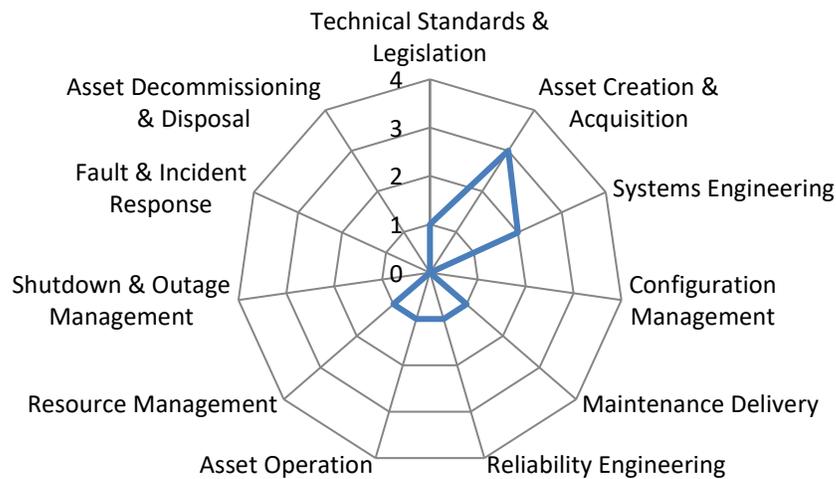
**Decision Making**



**Strength:** Decisions are made with the intention of being consistent with 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).

**Weakness:** Although BPA provides funding for fish screens, each sponsor is responsible for prioritizing their own fish screen work. Sponsors develop their own prioritization criteria for O&M funds, location and placement of screens, and maintenance schedules. Throughout much of the basin, fish screening is a voluntary program dependent upon landowner/irrigator permission.

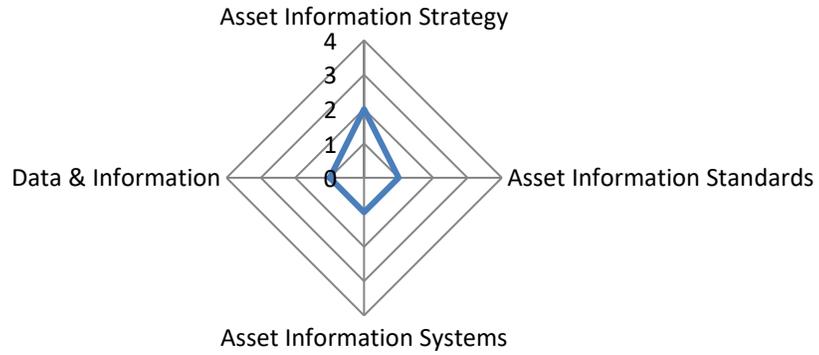
**Lifecycle Delivery**



**Strength:** With proper operation and maintenance, the life of a fish screen can be 20 - 25 years. Regularly scheduled O&M can greatly improve the expected functional life of a fish screen. BPA provides funds for routine maintenance to be conducted by sponsors to maximize the life of the fish screens.

**Weakness:** BPA is dependent upon the sponsors for the screens inventories and status of individual screens. A limited understanding of fish screen inventories can limit BPA’s ability to strategize the repair and replacement of aging assets that directly impacts the lifecycle of fish screen assets.

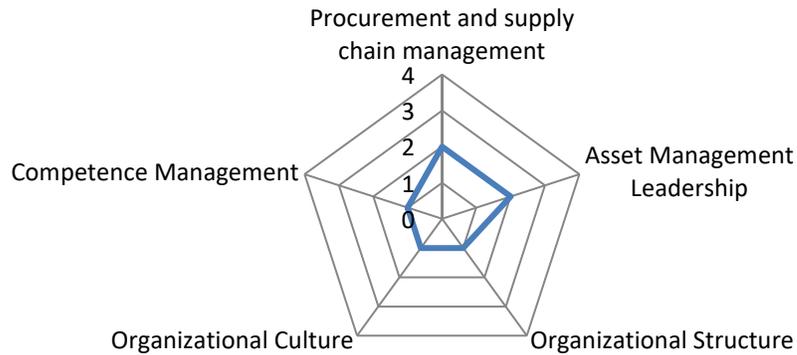
**Asset Information**



**Strength:** The Council and BPA have worked with sponsors to capture asset inventories of fish screens throughout the basin and develop an online map of locations.

**Weakness:** Asset data is captured and maintained by sponsors, potentially limiting access to data for BPA staff and hindering their ability to develop coordinated strategies that maximize benefits to fish across sub-basins.

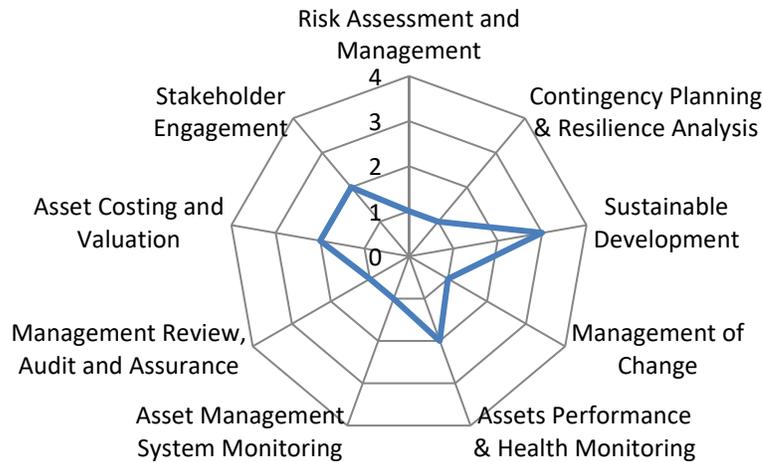
**Organization & People**



**Strength:** BPA works closely with states, tribes, and regional sponsors to plan and implement projects that are effective at providing safe passage and reducing the mortality rate of all life stages of fish.

**Weakness:** Currently, there is no formalized Fish Screen team within BPA’s Fish and Wildlife organization, reducing effective basin-wide coordination and communication of the program.

**Risk & Review**



**Strength:** BPA works closely with sponsors to identify and prioritize screen funding.

**Weakness:** Installation and maintenance of screens is dependent upon landowner permission.

### 6.2 Long Term Objectives

The following long term objectives are meant to improve the transparency, responsiveness, and accountability of the Fish Screen 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. Create a single, internal inventory that includes age, condition, life expectancy, and replacement costs for all fish screens funded by the EFW program by FY 2021.
2. Develop a more comprehensive long-term strategic asset management plan that will address maintenance needs of *all* program fish screens by FY 2022.
3. Evaluate the feasibility of preventative maintenance requirements for program fish screens by FY 2022.
4. Develop performance metrics and implement practices that will inform this strategy through FY 2030.
5. Maintain flat O&M fish screen budgets in accordance with the Agency Strategic Plan for the duration of this plan.
6. Evaluate and identify cost efficiencies in the Fish Screen Program through new technology and consolidation of screens over the duration of this strategy.
7. Improve asset management competencies of 1 fish screen staff member through IAM training in FY 2020.

### 6.3 Current Strategies and Initiatives

Council and BPA staff has been working with the sponsors and the Fish Screen Oversight Committee (FSOC) over the past five years in the development of a screens inventory and assessment. The inventory received in 2015 from FSOC was cross checked and confirmed by BPA through the Program projects’ inventory and includes a prioritization of the structures needed repairs and/or non-recurring maintenance.

To better understand non-recurring screen maintenance needs, roles, and responsibilities, and possible future impacts associated with new screen criteria, staff developed a Fish Screen Asset Management and Strategic Planning template to solicit additional feedback and detail regarding the priorities of the fish screen managers. BPA may use these templates to develop Memorandums of Agreement (MOAs) with the larger screen-operating entities to help plan for asset management strategies of both BPA and the Council Program.

Fish screen needs associated with non-recurring maintenance will be updated, tracked, and confirmed on an annual basis through the managers, sponsors, Council staff and the FSOC.

At five-year intervals, Council and BPA staff, along with sponsors, will re-assess and update their fish screen inventories to ensure the lists are up-to-date (e.g., add or remove screens, and re-prioritize needs). This assessment will be coordinated through the Fish Screen Oversight Committee (FSOC) and guided by the appropriate MOA and project reviews.

The following annual process is intended to direct needs for the screen categories to ensure funds can be directed to the project(s) to inform their incoming start-of-year budget(s).

- January – The Council’s Asset Management Subcommittee will request priorities from sponsors, and managers based on assessments and priority needs for hatcheries and MOAs for screens.
- February to April – The Subcommittee, with assistance from BPA and Council staff, will review priorities received and conduct the following: review relationship and capacity to annual project and/or portfolio budgets; confirm to total costs, determine if permitting and environmental review is needed.
- April – Subcommittee discussion and confirmation of priorities to be recommended for implementation, based on available funds.
- May – Fish and Wildlife Committee discussion and recommendation to Council.
- June – Council decision and recommendation to BPA.

## **Key Initiatives**

### *Council's Asset Management Strategic Plan*

BPA has been working with the Northwest Power and Conservation Council’s Asset Management Subcommittee to (1) implement annual funding commitments for priority non-recurring maintenance needs, which have now been identified and funded using cost savings, and (2) develop a long-term Asset Management Strategic Plan and MOA to address non-recurring maintenance needs. This plan is intended to define and provide a strategy to achieve a long-term maintenance, rehabilitation, and replacement process for Program investments associated with fish screens. This includes developing a prioritized assessment for non-recurring maintenance and securing a monetary mechanism for implementation. The Council’s plan is also complementary to this strategic asset management plan.

### *Regularly Scheduled Assessments of Asset Inventories*

At five year intervals, Council and BPA staff, with the sponsors and managers, will re-assess and update fish screen inventories to ensure the lists are up to date and reprioritize needs. This assessment will be coordinated through the Fish Screening Oversight Committee (FSOC), an advisory and coordinating body for NPCC’s Fish and Wildlife Program comprised of fish and wildlife managers from across the Columbia Basin, and guided by the appropriate MOA and project reviews.

BPA is working closely with the Council, sponsors, and the FSOC to prioritize fish screen funds in order to improve decision making. Decisions regarding strategy and planning are shaped by an intention to be consistent with the Council's program, and through compliance with the rule-making processes defined by federal environmental laws (i.e., Endangered Species Act, NEPA) as well as by where fish screens will provide the greatest benefit to fish.

#### *Design Standards*

The National Marine Fisheries Service, a BPA partner in fish screen funding through the Mitchell Act, has developed screen design criteria that sponsors comply with when constructing new fish screens.

#### *Fish Screen Asset Management and Strategic Planning Initiative*

BPA is working with the states to develop asset management strategies to address the life cycle delivery of fish screens and associated O&M programs and costs. The average age of a fish screen is 20-25 years depending on maintenance practices. Roughly 25% of the fish screen inventory in use are over 20 years old and will need to be replaced in the near future.

#### *Asset Inventories*

Detailed data for fish screens are maintained by each state's Fish Screen Program in coordination with BPA's Fish and Wildlife staff. Each state's database contains detailed information on each fish screen as well as records of easements with landowners for the fish screens. Location and metric data is also entered into BPA's Pisces project system as a part of the quarterly and annual reporting requirements. BPA has worked with sponsors and managers and the FSOC over the past five years in the development of a screens inventory and assessment. The inventory received in 2015 from FSOC was cross checked and confirmed by BPA through the Program projects' inventory and includes a prioritization of the structures needing repairs and/or non-recurring maintenance. There is a coordinated effort between the Council, BPA staff, and sponsors to keep the inventory up to date with accurate asset data and funding needs.

#### *Informal Fish Screen Team*

There is currently no formalized fish screen team, however, the CORs and PMs that handle the majority of the fish screen contracts meet and communicate regularly to ensure collaboration and coordination of fish screen projects, planning, and strategy. The group is actively working to streamline screening work elements for irrigation infrastructure to improve the contract management and project implementation. A staff member will also participate in the IAM training being held in FY20.

## 7.0 ASSET CRITICALITY

### 7.1 Criteria

In prioritizing new fish screen construction, BPA is most focused on tributary fish screens benefiting multiple ESA listed fish species. The primary criteria used to prioritize new fish screen needs are:

1. Location (mainstem versus tributary)
2. Size (percent of the river flow diverted)
3. Number of ESA listed species and total numbers encountered

These criteria are not listed in priority order. They are used collectively to determine the priority of the screens.

The primary criteria used to prioritize non-recurring maintenance for existing screens are:

1. Condition
2. Number of ESA listed species and total numbers encountered
3. Location (mainstem versus tributary)
4. Size (percent of the river flow diverted)

These criteria are not listed in priority order. They are used collectively to determine the O&M priority of the screens.

Almost all mainstem fish screens can entrain three, if not four, ESA-listed salmonids and other species. Mainstem river fish screens, and larger screens, that divert a high percentage of flows in the spring and the fall have the highest rates of entrainment at key times for fish. Therefore, having all the mainstem river diversions screened is paramount to the recovery of these listed fish populations and protection of all fish species.

### 7.2 Usage of Criticality Model

The above criteria are used to evaluate and prioritize fish screen funding. The non-recurring maintenance is part of an annual review conducted between BPA Fish and Wildlife staff, Council staff, state sponsors, and the Fish Screen Oversight Committee. The annual process is intended to identify needs for the screens to ensure funds can be directed to the project(s) to inform their upcoming start-of-year budget(s).

At 5-year intervals, Council and Bonneville staff, with the sponsors and managers, will re-assess and update their fish screen inventories to ensure the lists are up-to-date (e.g. add or remove screens, and re-prioritize needs). This assessment will be coordinated through FSOC and guided by the appropriate MOA and project reviews.

## 8.0 CURRENT STATE

### 8.1 Historical Costs

Starting in fiscal year 2016, the Fish and Wildlife program began eliminating capital funds for fish screens. Any new fish screen funding will be covered by the expense budget as an identified priority for ongoing operation and maintenance. The expense budget for the Fish Screen program was increased starting in the same year to accommodate for these costs.

The following charts provide historical costs for the fish screen asset category in Fish and Wildlife. Capital spending on irrigation diversion fish screens remained fairly constant between 2010 and 2016 when it dropped significantly then stopped entirely in 2017. While not in the scope of this SAMP, capital expenses in FY20 and FY21 were associated with passage projects at power generation facilities. BPA’s Fish and Wildlife program currently allocates only expense funds for irrigation diversion fish screen O&M, including the construction of new screens.

Fish Screen spending makes up roughly 4% of all annual expense spending in the Fish and Wildlife program and has held constant over the last 5 years. BPA, Council Staff, and sponsors have worked together to evaluate and prioritize budgets for replacement or repair of non-recurring maintenance needs. Funds have been secured from the Budget Oversight Group (BOG) and cost savings from Program projects to address these additional O&M needs of this aging asset category.

*Table 8.1-1 Fish and Wildlife Historical Expenditures*

Program	Historical Spend (in thousands) With Current Rate Case						
Capital (CapEx)	2015	2016	2017	2018	2019	2020	2021
Hatchery	\$681	(\$178)	\$1,311	\$4,840	\$10,868	\$20,500	\$14,607
Lands	\$12,649	\$14,628	\$5,039	\$18,439	\$10,236	\$14,000	\$17,159
Fish Screens*	\$8,044	\$1,580	(\$948)	\$20	\$1,209	\$7,500	\$15,500
Water Rights	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Capital</b>	<b>\$21,374</b>	<b>\$16,030</b>	<b>\$5,402</b>	<b>\$23,299</b>	<b>\$22,313</b>	<b>\$42,000</b>	<b>\$47,226</b>
Expense (OpEx)							
Hatchery	\$31,931	\$31,662	\$34,996	\$35,846	\$32,118	\$34,320	\$34,320
Lands	\$23,981	\$15,426	\$14,460	\$11,184	\$12,885	\$12,843	\$12,843
Fish Screens	\$2,063	\$4,045	\$4,081	\$4,288	\$4,480	\$4,283	\$4,283
Water Rights	\$5,712	\$4,212	\$4,789	\$5,761	\$4,642	\$5,064	\$5,064
<b>Total Expense</b>	<b>\$63,687</b>	<b>\$55,345</b>	<b>\$58,326</b>	<b>\$57,079</b>	<b>\$54,125</b>	<b>\$56,510</b>	<b>\$56,510</b>

\*Includes passage projects

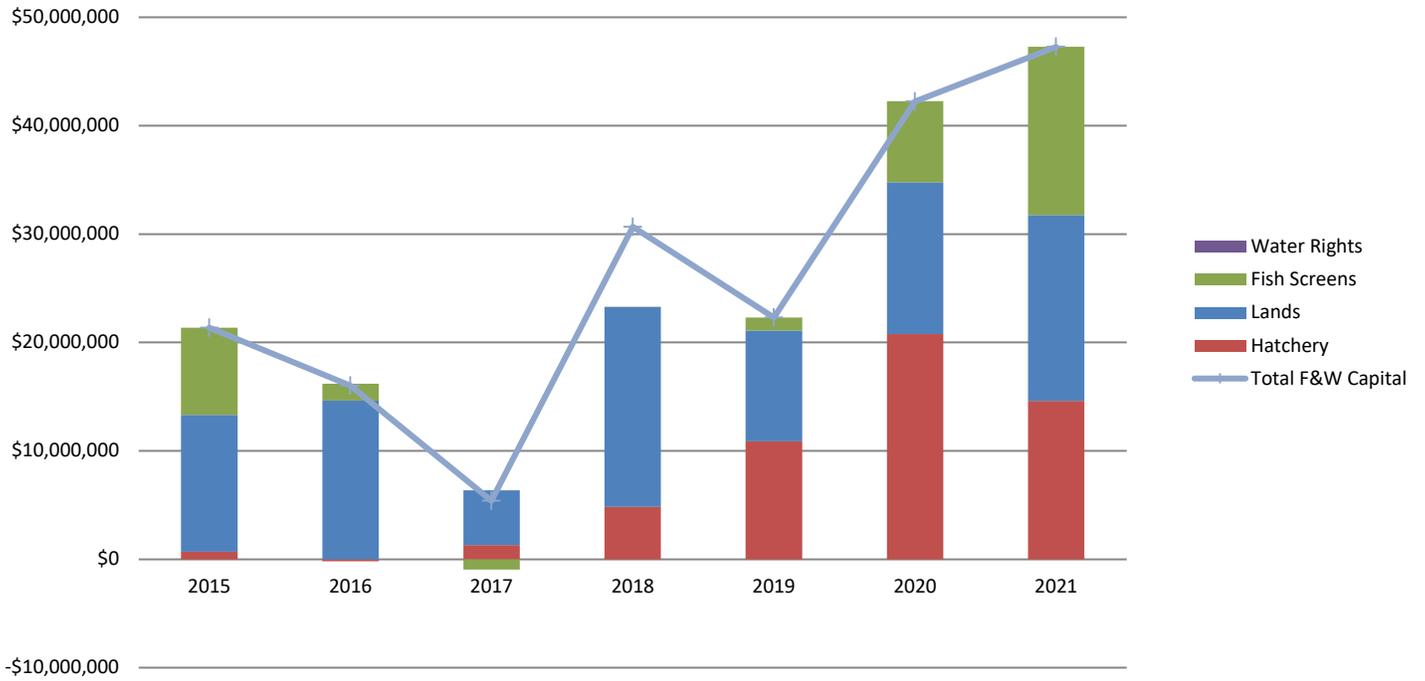


Figure 8.1-1 Historical Capital Expenditures

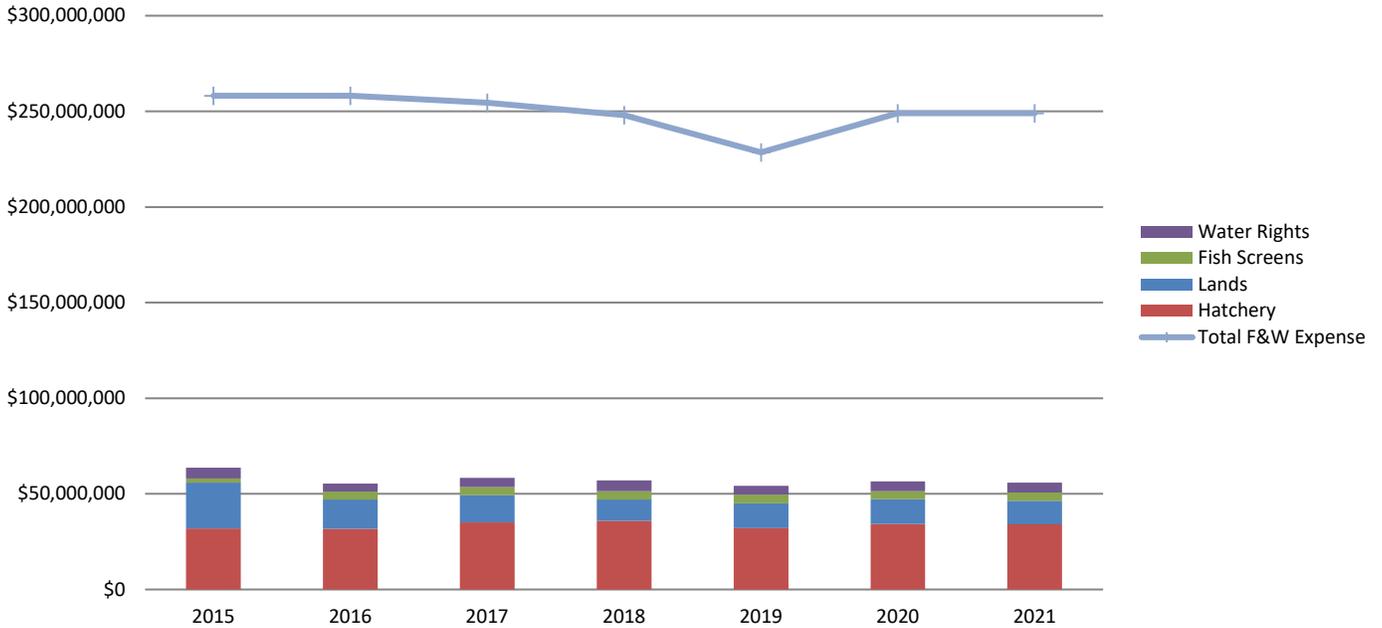


Figure 8.1-2 Historical Expense Expenditures

## 8.2 Asset Condition and Trends

Fish screen operating entities perform condition assessments of the assets, prioritize the immediate and longer term maintenance needs, and share assessments with BPA and the FSOC in order to obtain funding. While age is only one of the measures used to evaluate the condition of a screen, other physical condition factors are inspected by the operating sponsor and managed through their O&M program. BPA works with sponsors to identify and address critical condition fish screen needs on an annual basis.

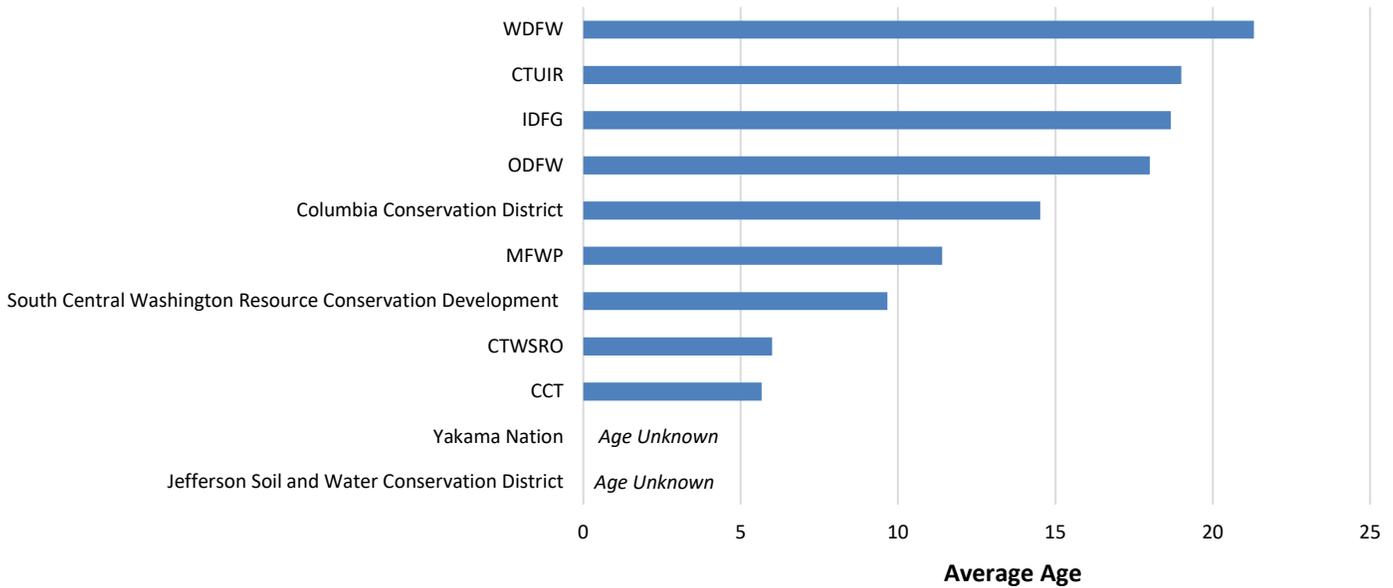


Figure 8.2-1, Average Age of Current Fish Screen Assets by Sponsor

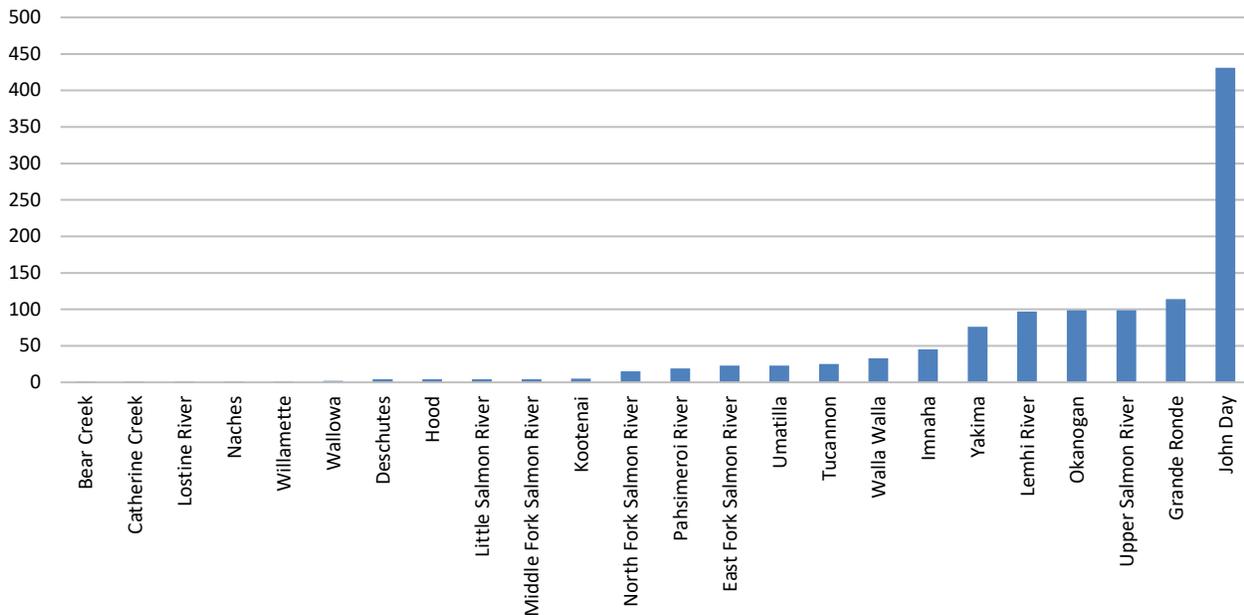


Figure 8.2-2, Current Fish Screen Assets by Sub-basin

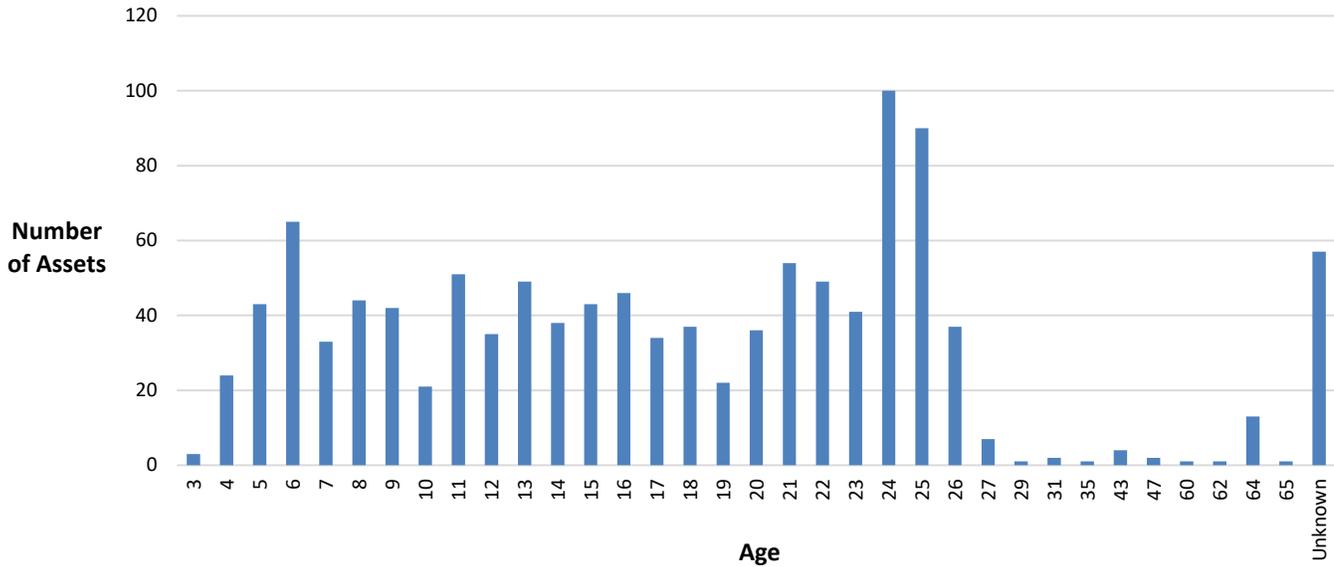


Figure 8.2-3, Current Fish Screen Assets by Age

### 8.3 Asset Performance

Asset performance for fish screens has been tied to age and lifecycle expectations. Most fish screens are on a condition based maintenance schedule, allowing screens to operate until they fail. BPA attempts to fund fish screens that meet design standards developed by the National marine Fisheries Service through the Mitchell Act and prioritizes funding O&M programs that help to increase the reliability of screens. Sponsors make their best effort to time the replacement of fish screens as optimally as possible, but due to the large amount of screens, distances between screens, and limited maintenance resources, it is not always possible to replace a screen before it fails. Sub-basins and assets are prioritized to manage maintenance needs. Shown in the table below is an example of a performance metric the fish screen program could track to demonstrate improvement in age of assets. Other possible performance metrics will be evaluated during the development of the asset plan based on data availability and incorporated into the next SAMP review cycle.

Table 8.3-1, Historical Asset Performance Summary

Strategic Goal	Objective	Measure	Units	Year -5	Year - 4	Year - 3	Year - 2	Year - 1
Modernize assets	Screen Reliability	Asset Age	% under 15 years	30%	45%	55%	65%	70%

## 8.4 Performance and Practices Benchmarking

Due to the unique nature of the fish screen asset, it is difficult to benchmark performance against industry standards. Project sponsors are responsible for designing and constructing fish screens in accordance with specifications developed by the National Marine Fisheries Service.

Over the last few years, sponsors have begun installing equipment to monitor fish passage at screens to better understand screen performance. PIT Tag readers have been installed in bypass pipes to measure the amount of fish that are diverted from irrigation ditches back to the stream by the fish screen. Preliminary data taken by IDFG in the Salmon River and its tributaries estimates roughly 50% - 90% of fish would be lost without screens in place. As more data is gathered, performance metrics and benchmarks will be refined and incorporated more intentionally into this strategy.

## 9.0 RISK ASSESSMENT

Risk Category	Risk Name: Risk Description, Mitigation	Probability	Impact
Safety	<b>Liability:</b> As the majority of constructed fish screens are not in BPA ownership, liability associated with personal safety remains the responsibility of the property owner, not BPA. However, BPA owns approximately 32-40 screens in Washington in which the liability would fall on BPA.	Low	High
Reliability	<b>Equipment Failure:</b> The possibility of equipment failure of a physical asset is always a risk to the reliability of the system. A fish screen and its associated support equipment are always at risk of failing and needing repair and/or replacement.	Moderate	High
Financial	<b>Costs:</b> Financial risks associated with fish screens are represented by the initial investment and by commitments to long-term O&M funding. These risks are mitigated by BPA policies and procedures that require prioritization of fish screens based on greatest benefit to listed species.	Low	Low
Environment/Stewardship	<b>Environment Hazards:</b> Environmental risks include the possibility of insufficient water instream to provide adequate passage for fish upstream and downstream, and the loss of fish down irrigation diversions.	Low	Low
Compliance	<b>Regulatory Assets:</b> Fish screens 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.	Low	Moderate

Due to the range of fish screens, each asset may have its own risk profile. For this plan, Fish and Wildlife evaluated the risk of lands as a whole on its program.

Safety Consequence Risk Map						
<b>Probability</b>	<b>Almost Certain</b> This event could occur within the next 2 years.					
	<b>Likely</b> This event could occur within the next 5 years.					
	<b>Possible</b> This event could occur within the next 13 years.					
	<b>Unlikely</b> This event could occur within the next 50 years.				Fish Screens Hatcheries	
	<b>Rare</b> This event could occur within the next 100 years.	Lands Water Rights				
		Insignificant	Minor	Moderate	Major	Extreme
<b>Consequence</b>						

Figure 9.0-1, Risk Assessment, Safety

Reliability Consequence Risk Map						
<b>Probability</b>	<b>Almost Certain</b> This event could occur within the next 2 years.					
	<b>Likely</b> This event could occur within the next 5 years.					
	<b>Possible</b> This event could occur within the next 13 years.				Fish Screens Hatcheries	
	<b>Unlikely</b> This event could occur within the next 50 years.		Lands			
	<b>Rare</b> This event could occur within the next 100 years.	Water Rights				
		Insignificant	Minor	Moderate	Major	Extreme
<b>Consequence</b>						

Figure 9.0-2, Risk Assessment, Reliability

Financial Consequence Risk Map						
<b>Probability</b>	<b>Almost Certain</b> This event could occur within the next 2 years.					
	<b>Likely</b> This event could occur within the next 5 years.					
	<b>Possible</b> This event could occur within the next 13 years.					
	<b>Unlikely</b> This event could occur within the next 50 years.		Fish Screens Water Rights Hatcheries	Lands		
	<b>Rare</b> This event could occur within the next 100 years.					
		Insignificant	Minor	Moderate	Major	Extreme
<b>Consequence</b>						

Figure 9.0-3, Risk Assessment, Financial

Environment Consequence Risk Map						
<b>Probability</b>	<b>Almost Certain</b> This event could occur within the next 2 years.					
	<b>Likely</b> This event could occur within the next 5 years.					
	<b>Possible</b> This event could occur within the next 13 years.					
	<b>Unlikely</b> This event could occur within the next 50 years.		Fish Screens Hatcheries	Water Rights	Lands	
	<b>Rare</b> This event could occur within the next 100 years.					
		Insignificant	Minor	Moderate	Major	Extreme
<b>Consequence</b>						

Figure 9.0-4, Risk Assessment, Environment/Trustworthy/Stewardship

Compliance Consequence Risk Map						
<b>Probability</b>	<b>Almost Certain</b> This event could occur within the next 2 years.					
	<b>Likely</b> This event could occur within the next 5 years.					
	<b>Possible</b> This event could occur within the next 13 years.					
	<b>Unlikely</b> This event could occur within the next 50 years.			Fish Screens Water Rights Lands Hatcheries		
	<b>Rare</b> This event could occur within the next 100 years.					
		Insignificant	Minor	Moderate	Major	Extreme
<b>Consequence</b>						

*Figure 9.0-5, Risk Assessment, Compliance*

## 10.0 STRATEGY AND FUTURE STATE

Fish Screens play a vital role in significantly reducing mortality of all life stages of salmon, steelhead, and other fish species that are diverted into irrigation diversions. It assures safe fish passage in and through spawning and rearing areas as well as migratory corridors for federally endangered species and non-listed resident and anadromous fish. The goal of the Fish Screen program is to screen all irrigation ditches and maintain all screens that impact anadromous fish while maintaining a flat budget.

### 10.1 Future State Asset Performance

With regular maintenance, the assets are expected to have a lifespan of 20-25 years.

*Table 10.1-1 Future Asset Performance Objectives*

Objective	This Year	Year +1	+2	+3	+4	+5	+6	+7	+8	+9	+10
System Reliability – Age of Fish Screen <20 Years	59%	65%	70%	75%	80%	80%	80%	80%	80%	80%	80%

### 10.2 Strategy

In alignment with the agency’s strategic plan, out year budgets for fish screens will remain flat or under the rate of inflation for the next 5, potentially 10, years. The fish screen program is also expected to maintain its current processes and existing O&M activities.

#### 10.2.1 Sustainment Strategy

The following sustainment strategy is expected for the major fish screen sponsors:

1. The Washington Department of Fish and Wildlife does not expect to construct or add any new fish screens to their inventory over the next 5 years. Funding will be used only for O&M on existing fish screens.
2. The Idaho Department of Fish and Game plans to add a small amount of new screens each year, but a majority of their funding will be used for O&M. IDFG also plans to consolidate screens when possible to reduce their number of assets.
3. The Oregon Department of Fish and Wildlife plans to use funding to add new fish screens, operate and maintain existing fish screens, and consolidate multiple fish screens where possible.

In order to maintain current O&M while budgets are flat, sponsors are:

1. Reducing the number of screens required through irrigation ditch consolidation.
2. Identifying less expensive options or new technology for both construction and maintenance of screens e.g. pump screens.

#### 10.2.2 Growth (Expand) Strategy

The Fish Screen program expects to use expense funding to construct and replace aging screens. The priority list for future replacement screens, or non-recurring maintenance, is under development by the sponsors, BPA staff, and Council staff and will be updated annually.

### 10.2.3 Strategy for Managing Technological Change and Resiliency

Screen technology and design are driven by biological need, for example if Lamprey get listed then entirely new screen technology may be needed to accommodate for the change.

### 10.3 Planned Future Investments/Spend Levels

The Fish Screens program is expected to maintain a flat budget for the next 5 years, using expense dollars to provide ongoing funding to sponsors for the construction, operation, and maintenance of new and existing fish screens. The capital budget for fish screens are made up of only passage projects. While not in the scope of this current SAMP, passage projects will be included in the next revision of the Fish Screens SAMP.

*Table 10.3-1, Future Fish and Wildlife Expenditures (in thousands)*

Program	Rate Case FYs		Future Fiscal Years							
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Capital (CapEx)</b>										
Hatchery	\$18,000	\$21,000	\$10,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Lands	\$19,000	\$20,000	\$18,000	\$15,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Fish Screens*	\$6,000	\$2,000	\$2,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Water Rights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Capital</b>	<b>\$43,000</b>	<b>\$43,000</b>	<b>\$30,000</b>	<b>\$25,000</b>	<b>\$15,000</b>	<b>\$15,000</b>	<b>\$15,000</b>	<b>\$15,000</b>	<b>\$15,000</b>	<b>\$15,000</b>
<b>Expense (OpEx)</b>										
Hatchery	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320	\$34,320
Lands	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843	\$12,843
Fish Screens	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283	\$4,283
Water Rights	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064	\$5,064
<b>Total Expense</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>	<b>\$56,510</b>

\*Includes passage projects

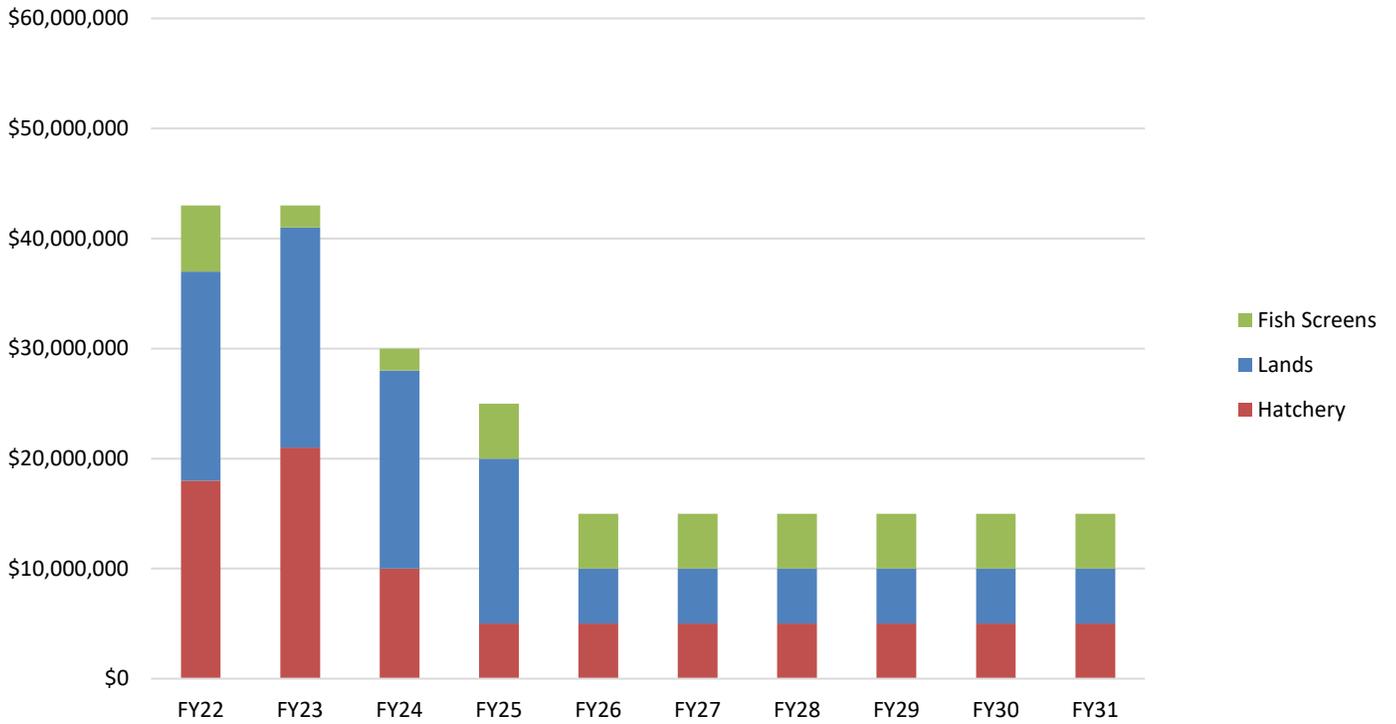


Figure 10.3-1, Future Fish and Wildlife Capital Budgets

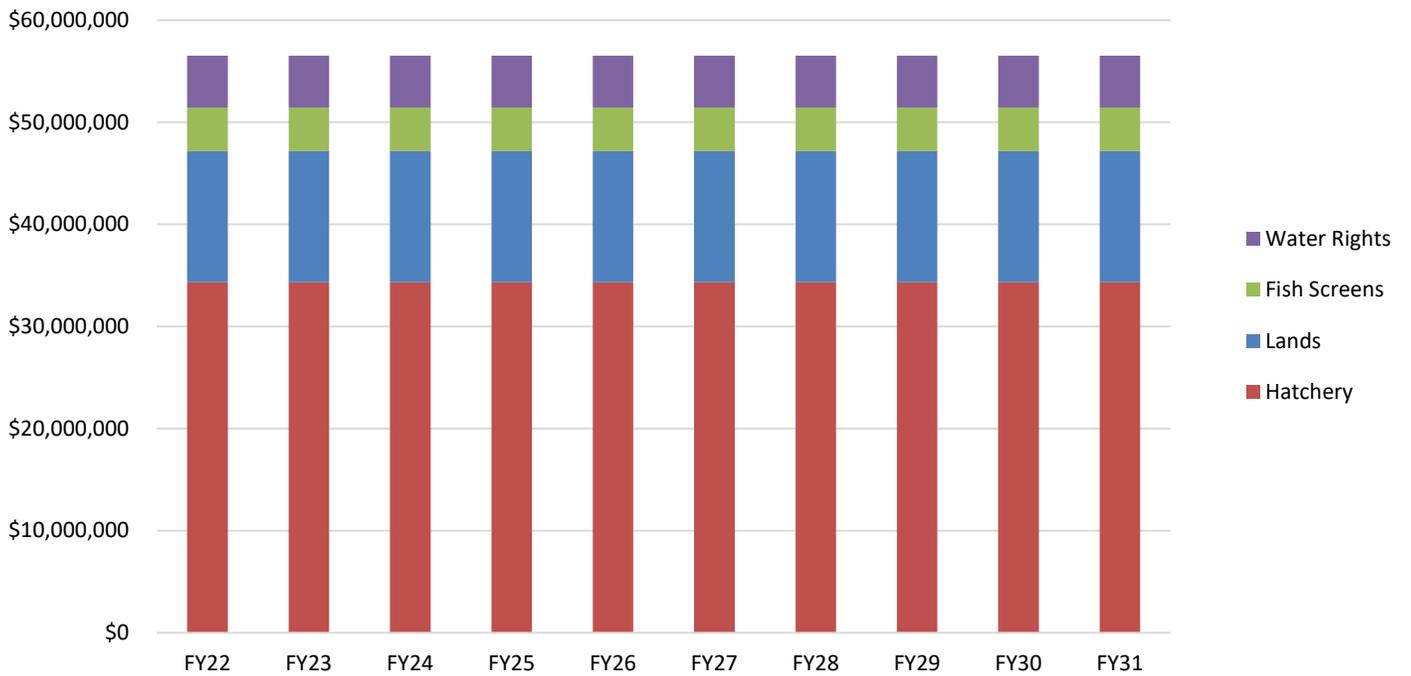


Figure 10.3-2, Future Fish and Wildlife Expense Budgets

## 10.4 Implementation Risks

*Table 10.4-1, Implementation Risk*

<b>Risk</b>	<b>Impact</b>	<b>Mitigation Plan</b>
Factors beyond BPA’s control, e.g. climate change or natural disasters	High	Flooding can pose a high risk of damage to screens. Developing appropriate maintenance practices and procedures in case of emergencies will help to mitigate for the loss of any fish screens.
Staff turnover, resource limitations	Moderate	Better alignment of project workloads to spread knowledge and experience of the program across various resources.
Uncertainty regarding long-term financial obligations	Moderate	Continue to maintain budgets at or below inflation and identify cost savings in projects through improved technology or combining fish screen diversion points when possible.
Third party maintenance	High	Minimize maintenance requirements for the third party or require the state or federal agencies to perform maintenance work.
Species listed to (or removed from) ESA	Moderate	Construct and install fish screens that can be used by the

## 10.5 Asset Condition and Trends

As aging fish screen assets are replaced with new screens or consolidated with other screens, the average condition and age of assets will improve. A 10 year target for the fish screen program is to improve overall asset age by improving the percent of screens 20 years and younger to 80%. As a part of this strategy, the fish screen program will work with sponsors to capture age and condition data to demonstrate asset trends.

## 10.6 Performance and Risk Impact

With the implementation of this strategy, it is expected that the probability and consequence of fish screen risks will decrease. As older fish screens are repaired or replaced, age and condition will improve, therefore reducing the likelihood of a risk actually occurring. Fish screen consequences are already rather minor, so reducing probability through asset repair or replacement will help to mitigate risks.

## 11.0 ADDRESSING BARRIERS TO ACHIEVING OPTIMAL PERFORMANCE

### **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 fish screen 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. Fish screens 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.

### **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. 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 resources**

Budget constraints on the Fish and Wildlife program could limit adequate resourcing 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.

## 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)**<sup>1</sup>: 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 constructing, 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.

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<sup>1</sup> <https://www.nwcouncil.org>

**APPENDIX A – Oregon Department of Fish and Wildlife Fish Screen Maintenance Activities**

Table 1. Summary of O&M Activities and ESA Coverage Options					
Activity	Description	Location	Timing	Potential for take?	“Construction” or “O&M”
Lubricate moving parts	Lubricate bearings, some may be underwater but most points above water.	Ditch or stream	Year-round	No	O&M
Manually clean screen material, bypass pipes, and trash racks	Activities include using hand tools to clean screens, bypass pipes and trash racks. Accumulated debris can restrict the open area of the screen, causing high velocities at the screen surface if not removed. It can also clog the bypass. Both of these situations create a dangerous condition for fish.	Ditch or stream	Year-round	Yes	O&M
Ensure safe landing area at bypass outfall in waterway and minimize false attraction	Bypass outfalls typically terminate in a fish bearing stream at a location with sufficient water and clear of boulders/logs to provide a safe landing area. Activities include excavating or removing accumulated debris	Stream	Year-round	Yes	O&M
Remove material from bypass pipe to maintain safe fish return to waterway.	Bypass pipe terminates in a fish bearing stream. Pipe must remain clear of debris to function properly for fish protection. Activities include removing accumulated debris.	Stream	Year-round	Yes	O&M
Inspect and replace screen seal material	Seals prevent gaps around the screen that fish can slip through. Seals do wear over time and must be replaced	Ditch or stream	Year-round	No	O&M
Adjust weir boards and/or bypass orifice to maintain proper water levels for screens submergence and debris removal	Adjustments made within a screen box.	Ditch or stream	Year-round	No	O&M

Replace screen material, bypass pipe, gear boxes, u-joints, bearings, and other worn out parts	All screen components are subject to a harsh work environment experiencing extreme cold, heat, water, sediment, and other damaging factors. Inspection and maintenance/replacement of these components is necessary to continue providing a good project for fish protection and a reliable use of water for the operator.	Ditch or stream	Year-round	Yes/No	O&M
Adjust cleaning arms, carriages, cable, pulleys, and brushes to maintain good contact with screen for debris removal	Adjustment of screen parts.	Ditch or stream	Year-round	No	O&M
Remove accumulated sediment and debris	Use hand tools or heavy equipment to remove accumulated sediment and debris within structures and within several feet above and below structure. Construction/replacement/maintenance actions on streambank screens are closer to a fish bearing waterway resulting in greater risk to waterway than working in an off channel ditch.	Ditch or stream	Year-round	Yes	Construction
Trim or apply herbicide to vegetation that prevents fish screens from operating properly	Herbicide is only applied by licensed applicators in a manner consistent with each product's label. Herbicide application in general is not a frequent activity. Herbicide, if used, is not for aquatic plants. Label instructions are adhered to.	Ditch, adjacent area	Year-round	Yes	O&M
Replace batteries and other components of solar power systems	Replace batteries and components of solar power systems	Ditch/land	Year-round	No	O&M
Repair paddlewheels and other components of paddlewheel driven power systems	Use hand tools to repair paddlewheels and other components of those systems	Ditch	Year-round	No	O&M

Remove sediment and debris and/or adjust fish passage conditions in fishways	Debris removal may be by hand or with heavy equipment.	Stream	Year-round	Yes	O&M
Assess and repair concrete or steel support structures	Use heavy equipment to repair concrete or steel support structures	Ditch or stream	Year-round	Yes	Construction
Repair or replace screen due to damage from extreme weather event	Use heavy equipment to repair or replace screen	Ditch or stream	Year-round	Yes	Construction
Annual installation or removal of fish screen and components	Activities involve using hand tools to install screens and components	Ditch or stream	Year-round	Yes	O&M
Screen adjustments	Use hand tools to adjust screens to maintain appropriate clearance and operation	Ditch or stream	Year-round	No	O&M
Fish salvage	Conduct fish salvage due to entrainment after a high water event; necessary to return fish to waterway	Ditch	Year-round	Yes	O&M
Electricity	Electricity to operate screens.	Ditch, stream, or adjacent area	Year-round	No	O&M
Walkways and handrails	Install or replace walkway and/or handrails to allow for safe operation and maintenance of the system.	Ditch or stream	Year-round	No	O&M