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Columbia River Basin Fish and Wildlife Program 2014

DRAFT 2020
Addendum

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2020 Addendum to the 2014 Columbia River Basin Fish and Wildlife Program

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Introduction

The Northwest Power and Conservation Council is amending its 2014 Columbia River Basin Fish and Wildlife Program by adopting and adding this 2020 Addendum. The 2020 Addendum is part of the fish and wildlife program while the 2014 fish and wildlife program also remains in effect. The two documents should be read together to understand the full details of the program's strategies and other provisions.

Nothing in the 2020 Addendum replaces or supersedes the provisions of the 2014 program, although in some situations the addendum supplements or reorganizes material in the 2014 program.

This most recent set of program amendment recommendations focus on two aspects of the Council's program: how it is implemented and how we assess and report on program performance. After nearly 40 years of program development and implementation, much has been accomplished to protect and mitigate the harmful effects of the hydrosystem. Currently, the program requirements are mostly about refining how the program is implemented; defining near-term and evolving priorities for implementation; evaluating program performance; and using what we learn about performance to improve implementation in a cost-effective manner. That is the purpose of this addendum.

Part I describes how the Council and others will assess the program's performance and improve program implementation using an adaptive management approach. Part I includes a reorganization and elaboration of the program's goals, objectives, and performance indicators as needed for this task. Part II identifies near-term priorities for implementation and funding, as well as program guidance on project implementation.

Accompanying the addendum is the "findings" document that describes how the Council used the program amendment recommendations in developing the addendum but not amending the program text. This document also responds to the comments submitted to the Council throughout the amendment process.

Accomplishments from implementation of the 2014 fish and wildlife program include the following:

- Improved 309,281 acres of habitat from 2014-2018 through stream restoration, planting, removing invasive species, restoring wetlands and floodplains, and other habitat restoration actions.¹
- Improved 8,221 acres of habitat in the lower Columbia and estuary from 2014-2018 through stream restoration, planting, removing invasive species, restoring wetlands and floodplains, and other habitat restoration actions.²
- Protected 387 miles of riparian habitat with land purchases or leases from 2014-2018.³

- Provided access to 1,553 miles of habitat by improving instream passage for fish from 2014-2018.⁴
- Protected fish through screening 93,534 acre-feet of diverted water from 2014-2018.⁵
- Supported conservation hatchery activities that are protecting endangered sockeye in the Snake River and threatened spring Chinook in the Upper Grande Ronde, the Lostine River, and Catherine Creek.
- Developed an asset management strategic plan to ensure the longevity and integrity of the program's past investments.
- Improved water management, flow, and passage to protect and increase species survival through the mainstem and in the storage reservoirs. This includes a regional collaborative agreement on an innovative "flexible-spill" operation intended to benefit both fish and the power system.
- Engaged in a regional collaborative effort to support federal pinniped legislation to enhance local efforts to protect adult salmon returning to the river.
- Supported continuing management efforts to reduce avian and northern pikeminnow predation on juvenile salmon in the lower Columbia River, as well as Northern pike predation in the upper Columbia River.
- Engaged in a regional collaborative effort to investigate the feasibility of reintroducing salmon and steelhead above Chief Joseph and Grand Coulee dams.
- Established new settlement agreements with the State of Idaho for wildlife mitigation and to improve riparian and floodplain habitat.
- Continued implementation of the Protected Areas strategy to protect high-quality fish and wildlife resources in river reaches throughout the Northwest.
- Supported a regional approach to establish a defensive perimeter to keep invasive mussels out of the Columbia River Basin.
- Protected 841,665-acre feet of water instream through temporary and permanent water transactions from 2014-2018 to help restore flow to flow-limited tributaries.
- Realized \$3.36 million in savings through a cost-savings workgroup sponsored by the Council and Bonneville and utilized \$2.48 million of the savings to fund new or expanded mitigation initiatives.

Program challenges remain as well. Highlighted in the recommendations and in this program addendum is the overarching challenge of implementing a program to improve environmental conditions for fish and wildlife while climate change is redefining those very same environmental characteristics.

I. Program Performance and Adaptive Management

This part of the addendum describes what the Council and others will do over the next few years to evaluate the program's performance and apply that evaluation to improve program implementation. Section A includes a reorganization and elaboration of the program's goals, objectives, and strategy performance indicators (indicators) as needed for this task. It also includes a discussion of how the Council intends to use these goals, objectives, and indicators to assess program performance and improve implementation. Finally, section B identifies certain activities, particularly monitoring and data management, that need to be adequately supported for this effort to be successful. Figure 1 provides an updated version of the program framework to reflect the refinements in this addendum.

A. Program Goals, Objectives, and Performance Indicators

In this addendum, the goals, objectives, and indicators stated in [Part Three III](#) and [Appendix D](#) of the 2014 program, and the description of adaptive management in [Part IV](#), have been reorganized, reformulated, and supplemented to enable the Council and others to evaluate program performance in an effective way.

All the program's goals should be understood in terms of protecting fish and wildlife and mitigating for the adverse effects of the development and operation of the Columbia River hydroelectric facilities, consistent with the Northwest Power Act. Where hydrosystem losses have been quantitatively assessed, such as with anadromous salmon and steelhead and certain aspects of the wildlife and resident fish impacts, the program goal is explicitly described in terms of those hydrosystem losses. Where hydrosystem losses have not been specifically identified, such as with sturgeon, lamprey, and resident species, this is recognized in the program goal statement.

Objectives are a means of achieving or contributing to the program's goals. In certain cases that are identified in the text or supporting documentation, objectives may be broader than, or derived from a source other than hydrosystem impacts. Based in part on careful consideration of the program amendment recommendations, the Council has decided to use these targets as objectives when they meet the following criteria: 1) they have been well developed by others in the region; 2) they clearly relate to the program goals; 3) implementing the program's measures will clearly be necessary to contribute to meeting these targets; and 4) the targets are relatively easy to understand and track. Achieving these objectives is not the same as achieving the program's goals, but the program's contribution toward meeting these objectives also demonstrates progress toward achieving the program's goals.

For example, a multi-year collaboration among federal, state, tribal and non-governmental entities, known as the NOAA Marine Fisheries Advisory Committee's Columbia Basin Partnership Task Force, recently developed a provisional set of rebuilding targets for salmon and steelhead populations in the Columbia River Basin. The collaborative group working to develop these target abundance numbers did not

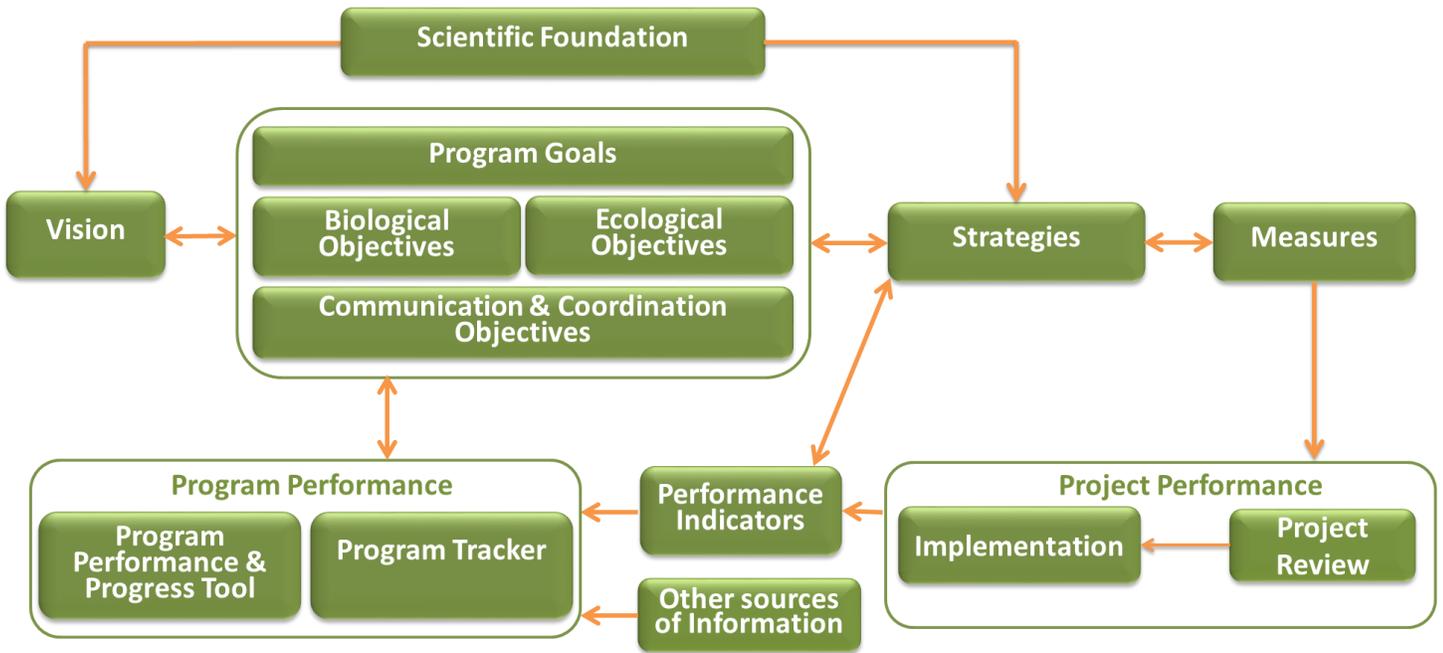
identify responsibility for achieving the targets, but the Columbia River Basin hydrosystem's protection and mitigation program under the Northwest Power Act will contribute significantly toward achieving these targets. At the same time, the work indicated that the program's salmon and steelhead goal, specifically framed within the context of hydrosystem loss assessments, is within the range of expected outcomes in the Columbia River Basin. Based in part on program amendment recommendations urging the Council to make use of this work, the Council identifies some of these numbers as provisional objectives and strategy performance indicators for the purposes of tracking and reporting. Concurrently, the Columbia Basin Partnership Task Force has begun phase II discussions, which may include refining their provisional rebuilding targets.

All the program's substantive strategies in [Part Three, IV](#) of the program contribute to achieving the program's goals and objectives. This includes the Ecosystem Function Strategy and its various sub-strategies (most notably the Habitat and Mainstem Hydrosystem sub-strategies), and the Wild Fish and Artificial Propagation strategies. The wildlife goal is an exception; a more limited set of strategies is relied upon to achieve that goal. The Council needs an effective way to measure progress in implementing these strategies.

This addendum identifies a set of strategy performance indicators that can be used to assess progress in implementing the program strategies and improve the ecological and population conditions of the focal species. While a set of strategy performance indicators are identified in this addendum, the Council does not intend these to be formally part of the addendum. The Council, in collaboration with others, will develop and use the indicators as tracking tools that can be refined and changed outside of an amendment process, as better numbers or better indicators become available. The Council intends to continue working with the state and federal fish and wildlife agencies, the region's Indian tribes, and others to refine the program's objectives and strategy performance indicators.

The Council consulted numerous sources to develop the strategy performance indicators. These include the recommendations and text of the 2014 program; all of the objectives and indicators previously compiled by staff (available on the Council's website in its [Fish Objectives mapping tool](#)); the recommendations and comments in the program amendment process resulting in this addendum; and external sources of information about Columbia River Basin fish and wildlife.

Figure 1. An updated version of the program framework.



Anadromous Salmon and Steelhead (S)

Goal

Increase total adult salmon and steelhead runs returning annually to the Columbia River mouth, including ocean-harvested fish, to a 10-year rolling average of five million.⁶

Increasing the total salmon and steelhead runs to five million began as an interim program goal in 1987 to “double the runs.” This total abundance target is lower than the Council’s estimates of the losses of anadromous fish due to the development and operation of the Columbia River hydroelectric facilities. See the program’s [Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin](#) and Numerical Estimates of [Hydropower-Related Losses](#). The program aims to achieve this goal in a manner that emphasizes populations that originate above Bonneville Dam, supports tribal and non-tribal harvest, and encourages biological diversity. While the program has always assumed artificial production will be one of the strategies used to achieve this goal, the proportion of hatchery fish contributing to this goal should decrease as natural production increases.

The program provides a flexible approach to mitigation for loss of anadromous fish in blocked areas that historically had runs of anadromous fish, including passage and habitat improvements, reintroduction of anadromous fish where feasible, and/or the provision of increased harvest opportunities through fish propagation, and by enhancing other species. See the Anadromous Fish Mitigation in Blocked Areas Strategy, Part Four IV(C)(2) of the 2014 program.

Biological Objectives

- S1 – Contribute to achieving the following near-term provisional goals for salmon and steelhead adults originating from the following areas of the basin and returning to the Columbia River mouth, as well as harvested in the ocean (hatchery and natural origin), calculated on a 10-year rolling average. The following includes delisting values for ESA and non-ESA populations, but we expect that some populations, in particular healthy and non-listed populations, will regularly exceed these values.⁷
- (1) Lower Columbia: achieve or exceed 790,700;
 - (2) Mid-Columbia: achieve or exceed 344,300;
 - (3) Upper Columbia: achieve or exceed 636,800;
 - (4) Snake River: achieve or exceed 463,570;
 - (5) Willamette River: achieve or exceed 160,000.
- S2 - Contribute to achieving a smolt-to-adult return ratio (SAR) in the 2-6 percent range (minimum 2-percent; average 4-percent) for listed Snake River and upper Columbia salmon and steelhead, as well as for non-listed populations. The beginning point (smolt) and the ending point (adult) used in calculating SARs are determined by fisheries managers.⁸

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by program strategy, that contribute to achieving the S1 and S2 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, S1-1 refers to objective S1 and indicator number 1. These indicators are not adopted into the program.

Mainstem Hydrosystem Flow and Passage Strategy Indicators		
Annual juvenile fish dam passage survival for spring Chinook and steelhead (spring migrants) and Snake River fall Chinook subyearling (summer migrants) at each Snake River and lower Columbia River dam. ⁹ Compare to the following performance standards: (S2-1)		
ESU	Juvenile Performance Standard	
Spring Chinook and steelhead (spring migrants)	Achieve at least 96% dam passage survival	
Snake river fall Chinook subyearling (summer migrants)	Achieve at least 93% dam passage survival	
Power house encounter rates are compiled when available. ¹⁰ (S2-3)		
Annual adult salmon and steelhead survival for the Bonneville Dam to Lower Granite Dam reach and the Bonneville Dam to McNary Dam reach. ¹¹ Compared to the following performance standards: (S2-2)		
ESU	Adult Performance Standard	Reach
Snake River fall Chinook	81.2%	BON to LGR
Snake River spring-summer Chinook	91.0%	BON to LGR
Snake River sockeye	Use Snake River spring/summer chinook salmon and steelhead as surrogate until a standard is developed	BON to LGR
Snake River steelhead	90.1%	BON to LGR
Upper Columbia River spring Chinook	90.1%	BON to MCN
Upper Columbia River steelhead	84.5%	BON to MCN
Middle Columbia River steelhead	Use Snake River steelhead as surrogate until a standard is developed	Variable
Columbia River chum	None; assume survival is adequate if Snake River chinook BON to LGR standard is met	None
Lower Columbia River Chinook	None; assume survival is adequate if Snake River spring/summer chinook and Snake River fall chinook standards are met	None

Lower Columbia River coho	None; assume survival is adequate if Snake River fall chinook standards are met	None
Lower Columbia River steelhead	None; assume survival is adequate if Snake River steelhead standards are met	None
Upper Willamette River Chinook	None	None
Upper Willamette River steelhead	None	None

Fish Propagation Including Hatchery Programs Strategy Indicators

All program-funded hatcheries have a final management plan and a reviewed and approved master plan, with specific objectives to track performance.¹² (S1-1)

Progress toward the regionally agreed-upon provisional goal for hatchery-origin fish releases and the hatchery-origin adult fish (HOF) returns for the 22 groups of populations, based on interim regionally agreed-upon provisional goals as calculated at the Columbia River mouth. The program recognizes the provisional mid-term and long-term hatchery goals developed through the collaborative regional effort but focuses, in the interim, on contributing to the following near-term hatchery fish target calculated as a 10-year average:¹³ (S1-2)

Group	Current Hatchery Production	Future Total Hatchery Production	HOF return to the mouth near-term 10-year average	HOF return to the mouth mid-term 10-year average	HOF return Long-term 10-year average
Lower Columbia Chum group (note that return goals include hatchery and natural origin fish combined)	473,000	750,000	21,000	51,000	102,000
Lower Columbia Coho group	11,108,600	10,969,000	374,000	374,000	374,000
Lower Columbia Fall Chinook (tules) group	41,441,500	37,441,500	163,000	151,000	139,000
Lower Columbia Late Fall Chinook (bright) group	0	0	0	0	0
Lower Columbia Spring Chinook group	7,056,000	9,650,000	17,000	21,000	25,000
Lower Columbia Steelhead group	3,205,000	3,396,000	77,000	77,000	77,000

Mid-Columbia (upriver) Coho group	8,750,000	7.20-8.45 million	374,000	374,000	374,000
Mid-Columbia Sockeye group	Limited releases, no value provided	Limited releases, no value provided	none provided	none provided	none provided
Mid-Columbia Spring Chinook group	3,540,000	4,060,000	47,200	49,700	52,200
Mid-Columbia Steelhead group	1,535,000	865,000	58,000	45,300	32,700
Mid-Columbia Summer/Fall Chinook group	21,400,000	22,400,000	none provided	none provided	none provided
Snake River Fall Chinook group	5,500,000	5,500,000	49,200	49,200	49,200
Snake River Sockeye group	700,000	1,000,000	1,170	0	0
Snake River Spring/Summer Chinook group	15,340,500	18,115,500	85,500	98,000	110,000
Snake River Summer Steelhead group	10,328,000	10,328,000	203,400	203,400	203,400
Upper Columbia Fall Chinook group	13,210,000	24.5-29.6 million	118,100	118,100	241,800
Upper Columbia Sockeye group	4,500,000	14,100,000	45,000	45,000	141,000
Upper Columbia Spring Chinook group	3,094,000	3.8-16.6 million	19,400	23,900	104,200
Upper Columbia Summer Chinook group	4,495,000	5.4-22.5 million	47,000	96,000	146,000
Upper Columbia Summer Steelhead group	1,005,300	1.0-4.1 million	21,000	40,000	58,000
Willamette River Spring Chinook group	5,241,000	5,817,000	48,000	51,000	53,000
Willamette River Winter Steelhead group	600,000	550,000	0	0	0

Wild Fish Strategy Indicators

Progress toward the target 10-year geometric mean of natural origin spawner (NOS) escapement abundance for the 22 groups of populations, based on interim regionally agreed-upon provisional goals. The table includes delisting values for ESA and non-ESA populations, but we expect that some populations, in particular healthy and non-listed populations, will regularly exceed these values. The program recognizes the provisional medium and high escapement abundances developed through the collaborative regional effort but focuses, in the interim, on contributing to the following low natural-origin spawner escapement target:¹⁴ (S1-3)

Group	NOS Escapement Low, 10-year geometric mean	NOS Escapement Mid, 10-year geometric mean	NOS Escapement High, 10-year geometric mean
Lower Columbia Spring Chinook group	9,800	21,550	33,300
Lower Columbia Chum group	16,500	33,000	49,500
Lower Columbia Coho group	60,925	122,550	184,400
Lower Columbia Fall Chinook (tules) group	28,050	54,100	82,000
Lower Columbia Late Fall Chinook (bright) group	11,100	16,700	22,200
Lower Columbia Steelhead group	25,570	35,650	45,050
Mid-Columbia (upriver) Coho group	24,000	57,800	96,900
Mid-Columbia Sockeye group	2,500	5,000	7,500
Mid-Columbia Spring Chinook	15,750	26,875	38,000
Mid-Columbia Steelhead group	21,250	43,350	69,150
Mid-Columbia Summer/Fall Chinook group	4,000	13,000	16,000
Snake River Fall Chinook group	4,200	9,280	14,360
Snake River Sockeye group	2,500	5,750	9,000
Snake River Spring/Summer Chinook group	31,750	79,375	127,000
Snake River Summer Steelhead group	21,000	63,000	105,000
Upper Columbia Fall Chinook group	9,200	62,215	87,835
Upper Columbia Sockeye group	49,000	620,000	2,235,000
Upper Columbia Spring Chinook group	11,500	19,842	30,138
Upper Columbia Summer Chinook group	9,000	78,350	131,300

Upper Columbia Summer Steelhead group	7,500	31,000	47,000
Willamette River Spring Chinook group	28,891	47,832	66,773
Willamette River Winter Steelhead group	16,292	27,809	39,325

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators

The ecological objectives and related strategy performance indicators (pages 22-25) and the communication, assessment and coordination objectives and related strategy performance indicators (pages 25-27) also apply to this goal.

White Sturgeon (WS)

Goal

Protect and mitigate for the adverse effects of the hydrosystem on white sturgeon and endangered Kootenai River white sturgeon.¹⁵

Biological Objectives

WS1 – For Lower Columbia River sturgeon, contribute to maintaining a stable healthy population and support sustainable fisheries. For the other seven sturgeon population management units, halt declining trends and make progress toward healthy populations to support sustainable fisheries.¹⁶ Healthy populations are defined as abundant, productive, genetically diverse, and spatially distributed in areas of historic sturgeon range within the Columbia River Basin.¹⁷

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by Program strategy that contribute to achieving the WS1 objective. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, W1-1 refers to objective W1 and indicator number 1. These indicators are not adopted into the program.

White Sturgeon Strategy Indicators	
White sturgeon population abundance. ¹⁸ Compare abundance to the following targets: (WS1-1)	
Management Unit	Target
	Maintain and/or exceed a rolling three-year average abundance of 300,000 sub-adult (>38 inches and < 54 inches fork length) and eventually exceed 368,000 sub-adult white sturgeon.
Lower Columbia Management Unit	Maintain and/or exceed a rolling three-year average abundance of 6,250 adult white sturgeon and eventually exceed 16,250 adult white sturgeon
Upper and Lower Mid-Columbia Management Unit	Increase abundance of white sturgeon, contributing to restoration of viable populations and fisheries.
Transboundary Upper Columbia Management Unit	Ensure interim adult populations of 2,000 in the Canadian Transboundary Reach and 5,000 in the US Transboundary Reach.
Kootenai Management Unit	Increase the adult population size to 2,500 with a target adult population size of 8,000-10,000 (for delisting).
Lower Snake Management Unit	Abundance of white sturgeon is maintained or increasing, contributing to restoration of viable populations and fisheries for

	white sturgeon in mid-Columbia River reservoirs between Bonneville and Priest Rapids dams.
Middle Snake Management Unit	Maintain natural, stable aged-structure population with a minimum of 2,500 adult fish from Lower Granite to Hells Canyon.
Upper Snake Management Unit	Provide stable to increasing trends in sturgeon abundances (greater than 23.6 inches (60 cm)) for the following reach abundance targets: Bliss to CJ Strike, 2,900 fish; CJ Strike to Swan Falls, 1,340 fish; Lower Salmon Falls to Bliss, 630 fish; Swan Falls to Brownlee, 7,100 fish; Upper Salmon Falls to Lower Salmon Falls, 340 fish.
Sturgeon hatchery objectives are tracked and compared to the hatchery management plan and a reviewed and approved master plan. ¹⁹ (WS1-2)	

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators

The ecological objectives and related strategy performance indicators (pages 22-25) and the communication, assessment and coordination objectives and related strategy performance indicators (pages 25-27) also apply to this goal.

Pacific Lamprey (L)

Goal

Protect and mitigate for the adverse effects of the hydrosystem on Pacific lamprey.²⁰

Biological Objectives

L1 - Increase abundance throughout the historic range, in numbers that contribute to ecological integrity and sustainable tribal harvest of Pacific lamprey.²¹

L2 - Improve passage for juvenile and adult Pacific lamprey through structural and operational changes at federal and FERC-licensed hydropower facilities.²²

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by Program strategy, that contribute to achieving the L1 and L2 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, L1-1 refers to objective L1 and indicator number 1. These indicators are not adopted into the program.

<p>Mainstem Hydrosystem Flow and Passage Strategy Indicators</p>
<p>Annual passage for adult Pacific lamprey trends. Compare to the interim standard of 80%.²³ (L2-1)</p>
<p>The Use of Hatcheries for Reintroduction Strategy Indicator</p>
<p>Abundance and distribution of Pacific lamprey throughout their native range in the Columbia River Basin.²⁴ Compare trend to determine if the numbers and range are increasing over time. (L1-1)</p>
<p>Pacific Lamprey Strategy Indicator</p>
<p>Adult Pacific lamprey Bonneville Dam count. Compare to the three-year rolling average of 200,000 in near-term progressing toward 1,000,000.²⁵ (L1-2)</p>

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators

The ecological objectives and related strategy performance indicators (pages 22-25) and the communication, assessment and coordination objectives and related strategy performance indicators (pages 25-27) also apply to this goal.

Resident Salmonids (R)

Goal

Protect and mitigate for the adverse effects of the hydrosystem on native focal resident salmonids. These resident salmonids include bull trout, cutthroat trout, kokanee, and redband trout.²⁶

Biological Objectives

When mitigating for hydrosystem impacts on native focal resident salmonids, the program relies on a diversity of strategies to address those losses, including habitat mitigation, hatcheries, and modifying hydrosystem operations. Information other than population abundance estimates are frequently employed by fisheries managers to assess progress in mitigating impacts on these native focal resident salmonids.

R1 - For bull trout, contribute to achieving geographically widespread and interacting groups of fish across their native range, providing for genetic exchange, with stable and/or increasing fish populations in each of the five recovery units capable of sustaining harvest.²⁷

R2 - For cutthroat trout, contribute to achieving self-sustaining persistence of each cutthroat trout subspecies distributed across their native ranges, capable of sustaining harvest.²⁸

R3 - For kokanee, contribute to maintaining a stable and increasing population trend for kokanee in the 11 subbasins and capable of sustaining harvest where they are identified as a focal species.²⁹

R4 - For redband trout, contribute to their continued existence, by protecting genetic integrity and life history diversity, enhancing productivity and abundance, and supporting harvest throughout their native range.³⁰

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by program strategy, that contribute to achieving the R1, R2, R3, and R4 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, R1-1 refers to objective R1 and indicator number 1. These indicators are not adopted into the program.

Fish Propagation Including Hatchery Programs Strategy Indicators
Cutthroat trout hatchery objectives are tracked and compared to the management plan and a reviewed and approved master plan. ³¹ (R2-1)

Kokanee hatchery objectives are tracked and compared to the management plan and a reviewed and approved master plan.³² (R3-1)

Resident Fish Mitigation Strategy Indicators

Bull trout populations abundance.³³ Compare to the following targets for the five recovery units in the Columbia River Basin: (R1-1)

Recovery Unit	Target
St Marys Recovery Unit	A stable or increasing trend for at least 2 generations.
Columbia Headwaters Recovery Unit	Exceed a 10-year rolling average adult abundance of 8,500
Mid-Columbia Recovery Unit	Exceed a 10-year rolling average adult abundance of 46,454
Snake River Recovery Unit	Exceed a 10-year rolling average adult abundance of 27,350
Coastal Recovery Unit	Exceed a 10-year rolling average adult abundance of 2,900

Cutthroat trout populations' genetic integrity is protected by program-funded actions by contributing to maintaining isolation from invasive trout and enhancing occupancy across its historical range, including but not limited to, maintaining physical barriers between species.³⁴ (R2-2)

Redband trout populations' genetic integrity is protected from non-native hatchery trout by program-funded hatchery actions.³⁵ (R4-1)

Redband trout distribution within their native range in the basin.³⁶ Compare to the following historical occupancies within each of the five geographic management units: (R4-2)

GMU	Stream length miles (km) historical	Lake Area acres (ha) historical
Deschutes River Redband GMU	2,650.1 (4,265)	30,767 (12,451)
Kootenai Redband GMU	1,184.9 (1,907)	879.7 (356)
Snake River Redband GMU	22,503.6 (36,216)	2.5 (1)
Clearwater Redband GMU	712.7 (1,147)	1,924.9 (779)
Upper Columbia-Spokane Redband GMU	5,987.5 (9,636)	9,128.1 (3,694)

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators

The ecological objectives and related strategy performance indicators (pages 22-25) and the communication, assessment and coordination objectives and related strategy performance indicators (pages 25-27) also apply to this goal.

Native Aquatic Focal Species (NF)

Goal

Protect and mitigate for the adverse effects of the hydrosystem on native aquatic focal species including eulachon, burbot, freshwater mussels, and other native aquatic focal species.³⁷

Biological Objectives

Information other than population abundance estimates are frequently employed by managers to assess progress in mitigating impacts on these native aquatic focal species in the Columbia River Basin.

NF1 - Contribute to maintaining a stable and increasing population trend for eulachon, burbot, freshwater mussels, and other native aquatic focal species.³⁸

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by program strategy, that contribute to achieving the NF1 objective. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, NF1-1 refers to objective NF1 and indicator number 1. These indicators are not adopted into the program.

<p>Fish Propagation Including Hatchery Programs Strategy Indicator</p>
<p>Burbot hatchery objectives are tracked and compared to the management plan and a reviewed and approved master plan.³⁹ (NF1-1)</p>
<p>Eulachon Strategy Indicator</p>
<p>Spawning stock biomass of Columbia River eulachon. Evaluate to determine if biomass is stable and/or increasing.⁴⁰ (NF1-2)</p>

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators

The ecological objectives and related strategy performance indicators (pages 22-25) and the communication, assessment and coordination objectives and related strategy performance indicators (pages 25-27) also apply to this goal.

Ecological, Communication, Assessment and Coordination Objectives and Strategy Performance Indicators for Fish and Aquatic Species

The following objectives and related indicators apply to the five goals:

Anadromous Salmon and Steelhead, White Sturgeon, Pacific Lamprey, Resident Salmonids, and Native Aquatic Focal Species.

Ecological Objectives (E)

E1 - Contribute to maintaining and improving habitat quantity, quality, and connectivity.⁴¹

E2 - to maintaining and improving water quantity and quality.⁴²

E3 - Contribute to managing non-native species, invasive species, or predators such as quagga/zebra mussels, Northern pikeminnow, Northern pike, sea lions, double-crested cormorants, and Caspian terns that negatively impact the habitat and populations of focal fish species.⁴³

E4 – Provide flows through the hydrosystem of sufficient quality and quantity to improve production, migration, and survival of fish.⁴⁴

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by program strategy, that contribute to achieving the E1, E2, E3, and E4 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, E1-1 refers to objective E1 and indicator number 1. These indicators are not adopted into the program.

Habitat Strategy Indicators
Amount of protected and restored aquatic, riparian, and wetland habitat utilized by target focal fish species, including, but not limited to, miles of increased channel complexity, quantity of water acquired or progress toward instream flow target, and acres of functioning floodplain protected and/or restored. ⁴⁵ (E1-1)
Increase in habitat access and longitudinal/lateral connectivity for anadromous and resident focal fish species. Quantity includes, but is not limited to, number of barriers removed, miles of fish habitat made accessible, and acres of additional available habitat. ⁴⁶ (E1-2)
Program-funded benefits to streamflow and groundwater, including, but not limited to, quantity of water acquired, progress toward instream flow targets, or changes in groundwater levels. ⁴⁷ (E2-1)

Non-Native and Invasive Strategy Indicators
Number of watercraft inspected and decontaminated for zebra/quagga mussels. ⁴⁸ (E3-1)
Ratio of positive detections of zebra/quagga mussels to number of inspected watercraft. ⁴⁹ (E3-2)
Predator Management Strategy Indicators
The number of breeding pairs of Caspian terns and availability of suitable nesting habitat on East Sand Island. ⁵⁰ Compare the breeding pairs to the target range of 3,125 to 4,375, and the suitable nesting habitat to the target of one acre. (E3-3)
Exploitation rate on Northern pikeminnow measuring nine inches or greater in total length (228 mm fork length). ⁵¹ Compare the exploitation rate to the 10-20 percent annual target. (E3-4)
Emigration, spatial distribution, and abundance of non-native Northern Pike in the Columbia River Basin. ⁵² Evaluate trend to determine if the numbers and range are reducing over time. (E3-5)
Counts of sea lions observed in the lower Columbia River and estuary. Proportion of the adult salmon and steelhead run consumed by sea lions in the lower Columbia River and estuary, with emphasis on upper Columbia spring Chinook and wild winter steelhead. Number of adult salmon and steelhead, white sturgeon, and Pacific lamprey consumed by sea lions in the lower Columbia and estuary. ⁵³ Compare trend to determine if the impacts are decreasing over time. (E3-6)
Water Quality Strategy Indicators
Water temperature conditions for program-funded habitat projects with a focus on water quality. Determine if actions are contributing to meeting water quality standards. ⁵⁴ (E2-2)
Number of days above lethal fish temperatures for each species at fixed monitoring sites in the mainstem. ⁵⁵ (E2-3)
Percent exceedance of state and tribal water quality temperature standards at fixed monitoring sites in the mainstem. ⁵⁶ (E2-7)
Potential impacts of toxic contaminants on focal fish species are considered in project development and implementation. ⁵⁷ (E2-4)
Total dissolved gas (TDG) levels during spill events at Dworshak, Libby, Grand Coulee, Hungry Horse, Albeni Falls, and at Columbia River and Snake River dams. ⁵⁸ Compare to the following standards: (E2-5)

Projects	TDG Standard
Dworshak	110% as set by Idaho State
Libby	110% as set by Montana State
Grand Coulee	Operate to minimize TDG production
Hungry Horse	110% as set by Montana State
Albeni Falls	110% as set by Idaho State
Columbia River and Snake River Dams	TDG levels as described in the 2019-2021 Spill Operation Agreement

Climate Change Strategy Indicators

Project managers are using available information, including stream temperatures, changes in stream flow, and location of cold-water sources, in developing restoration projects to account for climate change impacts, and are describing and documenting how climate change information is refining restoration prioritization and implementation.⁵⁹ (E1-3, E2-6)

Mainstem Hydrosystem Flow and Passage Strategy Indicators

Seasonal flows at specified Columbia and Snake River dams. The flow objectives come from the Action Agencies’ proposed action analyzed and recognized in the Columbia River System biological opinion, with limitations and adjustments on meeting these targets as described by the Action Agencies. Compare to the following flow objectives:⁶⁰ (E4-1)

Location	Spring		Summer	
	Dates	Objective (kcfs)	Dates	Objective (kcfs)
Snake River at Lower Granite Dam	4/03 to 6/20	85 to 100 ⁽¹⁾	6/21 to 8/31	55 to 55 ⁽¹⁾
Columbia River at McNary Dam	4/10 to 6/30	220 to 260 ⁽¹⁾	7/01 to 8/31	200
Columbia River at Priest Rapids	4/10 to 6/30	135	N/A	N/A
Columbia River at Bonneville Dam	11/1 to emergence	125 to 160 ⁽²⁾	N/A	N/A

(1) the kcfs objective varies according to value forecasts.
 (2) the kcfs objective varies based on actual and forecasted water conditions.
 Kcfs: thousand cubic feet per second

Estuary Strategy Indicator

Acres of estuary floodplain protected or restored. Compare to target of no net loss of native habitats and recovery of 40 percent of historic extent for priority habitats.⁶¹ (E1-4)

Resident Fish Mitigation Strategy Indicators

Hungry Horse Dam impacts on westslope cutthroat and bull trout are partially mitigated.⁶² Compared to the following targets: (E1-5)

- protecting or restoring 77.7 miles (125 km) of suitable stream habitat in Flathead River by 2024

Libby Dam impacts on westslope cutthroat and bull trout are partially mitigated.⁶³ Compared to the following targets: (E1-6)

- protecting or restoring 600 acres of suitable stream or reservoir habitat in the Kootenai River Basin by 2028,
- making accessible 60 miles or more of previously blocked suitable streams by 2028.

Communication, Assessment, and Coordination Objectives (C)

C1 - Annually report on progress toward program objectives, program strategy performance indicators, and addressing research critical uncertainties.⁶⁴

C2 - Review progress toward objectives and strategy performance indicators and refine program objectives and program strategy performance indicators as needed.⁶⁵

C3 - Track FERC hydroelectric project applications with respect to the program's protected areas.⁶⁶

C4 - Improve the understanding of the distribution and status of native aquatic focal species.⁶⁷

C5 - Improve access to information to inform decisions about program investments, operation and maintenance, and factors that affect program activities and success.⁶⁸

C6 - Advance efforts to complete remaining loss assessments.⁶⁹

C7 - Complete the analysis required for the phased approach to investigating the reintroduction of anadromous fish above Chief Joseph and Grand Coulee dams, including juvenile and adult passage at the dams.⁷⁰

Strategy Performance Indicators

The following table contains the strategy performance indicators (indicators), organized by program strategy, that contribute to achieving the C1, C2, C3, C4, C5, C6, and C7 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, C1-1 refers to objective C1 and indicator number 1. These indicators are not adopted into the program.

<p>Protected Areas and Hydroelectric Development and Licensing Strategy Indicator</p>
<p>Number of preliminary permits issued by FERC in protected areas; draft license applications submitted to FERC for hydroelectric projects in protected areas; licenses granted by FERC in protected areas; proposed exclusions from protected areas; and exclusions granted by the Council.⁷¹ (C3-1)</p>
<p>Climate Change Strategy Indicators</p>
<p>Climate change information, data and models that support development and implementation of restoration projects are organized and accessible through regional information services such as StreamNet Regional Library and StreamNet.⁷² (C5-3)</p>
<p>Council and project managers work together to advance efforts to incorporate climate change impacts in decision making in anticipation of emerging state and tribal policies.⁷³ (C5-6)</p>
<p>Plume and Nearshore Ocean Strategy Indicator</p>
<p>NOAA's stop light indicator chart of ocean conditions is accessible on the Program Tracker.⁷⁴ (C5-5)</p>
<p>Fish Propagation Including Hatchery Programs Strategy Indicator</p>
<p>Maintenance needs for program-funded artificial production facilities and fish screens are addressed as recommended in the Asset Management Strategic Plan.⁷⁵ (C5-4)</p>
<p>Anadromous Fish Mitigation in Blocked Areas Strategy Indicator</p>
<p>Information regarding fish passage, fish reintroduction approaches, upstream/downstream passage options and costs, and habitat suitability is completed and available on the Council's website.⁷⁶ (C7-1)</p>
<p>Resident Fish Mitigation Strategy Indicators</p>
<p>Status and trend of burbot, Oregon chub, kokanee and native freshwater mussels.⁷⁷ (C4-1)</p>
<p>Distribution of native freshwater mussels.⁷⁸ (C4-2)</p>
<p>Discussions with fish managers are undertaken to evaluate and identify the best approach to assess remaining native focal fish losses.⁷⁹ (C6-1)</p>

Public Engagement Strategy Indicators

Progress toward program objectives and strategy performance indicators, along with the Council's HLLs and contextual information such as ocean conditions and existing strongholds, is reported annually on the Council's Program Tracker and Program Performance & Progress site. Information accessibility is supported through existing collaborative regional information exchange groups and databases, especially program-supported efforts. Examples are: The Coordinated Assessment effort, StreamNet – Coordinated Information System, Fish Passage Center, CRITFC Inter-Tribal Monitoring Data, StreamNet Regional Library, and the Intermountain Province Subbasin Data Management Project.⁸⁰ (C1-1)

Progress toward addressing research plan critical uncertainties is reported in the Council's 2017 Research Plan Uncertainties Database.⁸¹ (C1-2)

The information presented on the Council's Program Tracker and Program Performance & Progress sites are reviewed by representatives of tribal, state, and federal managers.⁸² (C1-3)

The Council's tracking document for Operation and Maintenance (O&M) needs for hatcheries, fish screens and lands and fish objectives and associated mappers are annually updated.⁸³ (C5-1)

Financial and/or in-kind support are provided to existing regional forums contributing to the program's progress, such as the Fish Screen Oversight Committee, lamprey Technical Work Group and Conservation Team, collaborative white sturgeon workshop, Lake Roosevelt Forum, Washington Salmon Recovery Conference, American Fisheries Society local meetings, The Columbia Basin Transboundary Conference, and Council science-policy exchanges.⁸⁴ (C5-2)

All Strategies Indicators

Program objectives and program strategy performance indicators are refined, as needed, with tribal, state, and federal managers and other experts using the best available information.⁸⁵ (C2-1)

Progress toward program objectives and strategy performance indicators is reviewed with managers prior to program amendment during the Regional Coordination Forum.⁸⁶ (C2-2)

Wildlife (W)

Goal

Mitigate for wildlife losses caused by the development and operation of hydropower dams.⁸⁷

Ecological Objectives

Mitigation for wildlife losses under the program has been expressed and implemented in terms of habitat area and not species numbers; the only objectives identified for the wildlife goal are ecological objectives and coordination/communication objectives.

W1 - Mitigate for dam construction and inundation losses as identified in the program's wildlife loss assessments by acquiring the following habitat units (HUs) and/or acreage (acres) amounts:⁸⁸

Willamette projects	25,537 Acres
Bonneville Dam	21,411 HUs
The Dalles Dam	2,442 HUs
John Day Dam	36,555 HUs
McNary Dam	23,545 HUs
Lower Snake projects	26,774 HUs
Dworshak Dam	70,000 Acres
Upper Snake projects (IDFG)	16,655 Acres
Anderson Ranch (Shoshone Paiute and Shoshone Bannock)	9,619 HUs
Black Canyon (Shoshone Paiute and Shoshone Bannock)	2,238 HUs
Deadwood (Shoshone Paiute and Shoshone Bannock)	7,413 HUs
Minidoka (Shoshone Bannock)	7,604 HUs
Palisades (Shoshone Bannock)	32,857 HUs
Chief Joseph Dam	8,833 HUs
Grand Coulee Dam	147,143 HUs
Albeni Falls Dam (Kalispel Tribe)	12,794 HUs
Albeni Falls (KTOI and CDA Tribe)	20,046 HUs
Albeni Falls Dam (IDFG)	4,225 Acres
Libby and Hungry Horse Dams	56,700 Acres

W2 - Mitigate for the assessed operational losses of wildlife associated with the ongoing operations of Hungry Horse Dam by acquiring 26,321 acres and Libby Dam by acquiring 35,571 acres.⁸⁹

W3 - In the interim, until other assessments are complete, mitigate for operational losses as identified in settlement agreements as follows: the Willamette Projects, 1,000 acres; Deadwood, 655 acres; Albeni Falls, 2,002 acres.⁹⁰

W4 - Contribute to maintaining and improving habitat quality on land purchased to mitigate for hydrosystem impacts on wildlife by developing and using approved land management plans for all parcels purchased under the program.⁹¹

Strategy Performance Indicators

The following table contains the strategy performance indicators, organized by program strategy, that contribute to achieving the W1, W2, W3, and W4 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, W1-1 refers to objective W1 and indicator number 1. These indicators are not adopted into the program.

Wildlife Mitigation Strategy Indicators		
Annual contribution toward unmitigated target wildlife construction and inundation losses. ⁹² The total mitigation responsibilities are in W1. Compare progress to the remaining unmitigated targets in the following table: (W1-1)		
Dam	Unmitigated Loss in HU	Unmitigated Loss in Acres
Bonneville	18,187	
The Dalles	24	
John Day	0	
McNary	0	
Libby		0
Hungry Horse		0
Dworshak		2,424
Willamette Dams (Detroit, Big Cliff, Cougar, Foster, Green Peter, Lookout Point, Dexter, Hills Creek)		7,554
Lower Snake (Ice Harbor, Lower Monumental, Little Goose, Lower Granite)	0	
Anderson Ranch (Shoshone Paiute and Shoshone Bannock)	6,133	
Black Canyon (Shoshone Paiute and Shoshone Bannock)	2,238	
Deadwood (Shoshone Paiute and Shoshone Bannock)	7,413	
Minidoka (Shoshone Bannock)	4,479	
Palisades (Shoshone Bannock)	24,507	
Upper Snake (IDFG) (Anderson Ranch, Black Canyon, Minidoka, Palisades)		7,173

Chief Joseph	0	
Grand Coulee	45,385	
Albeni Falls (Kalispel Tribe)	1,463	
Albeni Falls (IDFG)		0
Albeni Falls (KTOI and CDA Tribe)	13,655	
Annual contribution toward wildlife operational losses for Libby and Hungry Horse dams. ⁹³ Compare to targets in loss assessments: (W2-1)		
Dam	Mitigation Responsibilities in HU	Mitigation Responsibilities in Acres
Libby		35,571
Hungry Horse		26,321
Annual contribution toward wildlife operational losses for Willamette dams, Deadwood dam, and Albeni Falls dam. ⁹⁴ Compare to targets in settlement agreements: (W3-1)		
Dam	Mitigation Responsibilities in HU	Mitigation Responsibilities in Acres
Deadwood (IDFG)		655
Willamette Dams (Detroit, Big Cliff, Cougar, Foster, Green Peter, Lookout Point, Dexter, Hills Creek)		1,000
Albeni Falls (IDFG)		1,378
All program funded land parcels have an updated stewardship agreement that are evaluated on a five-year cycle to verify that they are being managed as required by the applicable agreement. ⁹⁵ (W4-1)		

Coordination, Assessment, and Communication Objectives

W5 - Coordinate with managers to complete remaining operational loss assessments.⁹⁶

W6 - Improve access to information to inform decisions about program wildlife land investments, operation and maintenance, and factors that affect program activities and success.⁹⁷

W7 - Annually report on progress toward program objectives and program strategy performance indicators, and progress toward addressing research critical uncertainties.⁹⁸

W8 - Review progress toward objectives and strategy performance indicators and refine program objectives and program strategy performance indicators as needed.⁹⁹

W9 - Track FERC hydroelectric project applications with respect to the program's protected areas.¹⁰⁰

Strategy Performance Indicators

The following table contains the strategy performance indicators, organized by program strategy, that contribute to achieving the W5, W6, W7, W8, and W9 objectives. The code in parenthesis at the end of each indicator statement identifies the linkage between the objective and the indicator number; for example, W5-1 refers to objective W5 and indicator number 1. These indicators are not adopted into the program.

<p>Protected Areas and Hydroelectric Development and Licensing Strategy Indicator</p>
<p>Number of preliminary permits issued by FERC in protected areas; draft license applications submitted to FERC for hydroelectric projects in protected areas; licenses granted by FERC in protected areas; proposed exclusions from protected areas; and exclusions granted by the Council.¹⁰¹ (W9-1)</p>
<p>Wildlife Mitigation Strategy Indicators</p>
<p>Options for addressing remaining wildlife losses are discussed and evaluated with managers to determine whether a settlement, agreement, or loss assessment is the best approach.¹⁰² (W5-1)</p>
<p>Maintenance needs for program-funded wildlife lands are addressed annually as supported by the Asset Management Strategic Plan.¹⁰³ (W6-1)</p>
<p>Public Engagement Strategy</p>
<p>Progress toward program objectives and strategy performance indicators, along with the Council's HLIs and contextual information is reported annually on the Council's Program Tracker and Program Performance & Progress sites.¹⁰⁴ (W7-1)</p>
<p>Progress toward addressing research plan critical uncertainties is reported in the Council's 2017 research plan uncertainties database.¹⁰⁵ (W7-2)</p>
<p>The information presented on the Council's Program Tracker and Program Performance & Progress site are reviewed by representatives of tribal, state, and federal managers.¹⁰⁶ (W7-3)</p>
<p>The Council's tracking document for operation and maintenance (O&M) needs for hatcheries, fish screens and lands and fish objectives and associated mappers are annually updated.¹⁰⁷ (W6-2)</p>
<p>Financial and/or in-kind support are provided to existing regional forums contributing to the program's progress, such as the Fish Screen Oversight Committee, lamprey technical work group and conservation team, collaborative white sturgeon workshop, Lake Roosevelt Forum, Washington Salmon Recovery Conference, American</p>

Fisheries Society local meetings, The Columbia Basin Transboundary Conference, and Council science-policy exchanges.¹⁰⁸ (W6-3)

Program objectives and program strategy performance indicators are refined, as needed, with tribal, state, and federal managers and other experts using the best available information.¹⁰⁹ (W8-1)

B. Assessing, Monitoring and Reporting

The goals, objectives and strategy performance indicators described in Part I provide the key components for assessing program performance. The Council will use its Program Tracker and Program Performance & Progress tools to track how the program strategies are contributing to achieving the objectives and program goals, and to report on program performance. Annually, the Council will update the Tracker to report detailed information on the objectives and strategy performance indicators, along with relevant contextual information, such as climatic or ocean conditions. The Council will use the detailed information from the Tracker to update the infographics on the Program Performance and Progress tool. The Tracker will be updated to align with the reorganization of the program's goals, objectives, and strategy performance indicators and to report on the Council's high-level indicators.

The Council will begin reporting annually on aspects of program performance. Prior to beginning the next Program amendment process the Council will produce a comprehensive program performance report that assesses and summarizes progress toward the objectives and strategy performance indicators and describes areas where additional implementation efforts are needed. The report will identify information gaps that limit the Council's ability to assess strategy performance indicators and will describe the data and information required to close the gaps. As needed, performance indicators will be refined over time to improve tracking of the program strategies.

Monitoring and evaluation are essential for assessing program performance and implementing adaptive management. The Council is committed to developing basinwide research, monitoring, and evaluation (RM&E) that demonstrates the effectiveness of actions at multiple scales. The Council will work with Bonneville, the National Marine Fisheries Service and the region's fish and wildlife managers, to develop a Columbia River Basin Research and Monitoring Framework, which includes specific guidance for habitat, hydrosystem operations, hatchery and other components of the fish and wildlife program. The framework will create a coordinated approach to RM&E but will be flexible enough to accommodate the biological and ecological variation across the basin. It will build on previous basinwide efforts as well as current regional approaches. The focus of this framework will be to address key management questions, provide data for evaluating project and program performance, and inform future actions. For habitat RM&E, the approach will include direction for implementation, effectiveness, and status and trend monitoring. It will also provide guidance for future research related to habitat restoration and species response.

Program performance depends on implementing projects that address the program's strategies and measures, resolve critical uncertainties, and provide information to track objectives and strategy performance indicators. The objectives and strategy performance indicators described in this addendum will inform project reviews, assess how well Council-recommended projects are implementing the program, and identify needed changes in program priorities or strategy implementation. The Council will

continuously adjust the project review process to assist in providing information for evaluating program performance.

To adequately assess the program, it is critical that current information-gathering and data-management capabilities are retained. At a minimum, the following activities must continue to be adequately supported:

- Public access to Bonneville-funded project implementation information through an interactive website that uses standardized fields to facilitate data access and data downloads (e.g., database queries). Adjustments are needed to improve the delivery of information that the Council uses to assess and report on program performance.
 - Needed adjustments to the existing Bonneville database to improve information delivery include: (a) adding a standardized list of the program goals, objectives, and strategy performance indicators; (b) connecting these elements to projects/contracts as appropriate; and (c) providing Excel reports with data in the required format for Council staff.
- Maintenance of historical and current and supporting program data and products (e.g., tools, models, GIS-layers, documents) in a structured manner that facilitates public access in a searchable format.
 - Includes the program's Protected Areas database, mapper and files; habitat evaluation procedures (HEP) data and documentation; Council documents; ISG/ISAB/ISRP documents; past and current subbasin plans; "grey" literature such as technical reports, consultants' reports, and state government/non-profit organizations' reports; Bonneville annual project reports; program investments such as hatcheries, fish screens, and analytical models; and data documentation.
- Proper documentation and management of program data and metadata is necessary. Refinements are needed about what and how metadata is compiled and to address the range of data types.
- Public access to compiled and analyzed data required for reporting on program goals, objectives, strategy performance indicators, and other supporting information. The region relies on collaborative, transparent, standardized approaches to share data. Analyzed data and indicators need to be provided through a publicly accessible centralized database.
 - Needed improvements include collaborative development and use of agreed-upon data exchange standards for other fish species and topics to improve access to analyzed data (for example, hatchery metrics and cutthroat trout indicators); and delivery of these data to the appropriate centralized database.

II. Program Implementation

In Part II the Council identifies a set of near-term priorities for implementation and funding.

As noted in the 2014 program, Bonneville and the other federal agencies have been funding and implementing a multitude of protection and mitigation projects and system operations consistent with the measures in the Council's program. Many of these actions have explicit multi-year funding and implementation commitments for the foreseeable future. Even for those that do not, many have been and will continue to be implemented as ongoing, multi-year mitigation and protection activities that are important to the program.

In the 2014 program, the Council also identified a set of recommended work areas as "emerging" priorities for the program and called on Bonneville to integrate these emerging priorities into the implementation of the program. Progress has been mixed so far, but most have had some degree of implementation, and some are substantially integrated. These emerging priorities remain, and implementation should continue.

Based on the Council's and others' experiences with implementation following the 2014 program, and on the recommendations for program amendments, the Council identified key issues about program implementation that need more attention and emphasis. One issue is the need to improve on how *program* performance (as compared to *project* performance) is assessed, reported on, and used to adaptively manage program implementation. That topic is addressed in Part I. What remains are a few implementation needs identified in Part II under the relevant program strategy.

Nothing that follows replaces or supersedes the provisions of the 2014 program, including the program's statements about priorities. Instead, the following is intended to reinforce those priorities with specific directions for implementation that might not occur otherwise.

The fact that the addendum focuses on a relatively small set of issues is an indication that for the most part the ongoing effort by Bonneville and others to implement program measures and priorities has been highly successful. Specific accomplishments from implementation of the 2014 program have been highlighted in the introduction along with the overarching challenge of climate change.

Climate Change

Council and others: Consider the implications of climate change in all aspects of the program – program planning, project development, and project and program implementation and assessments. The Council will establish a standing science-policy forum on climate change to help the Council and others better understand the implications of climate change and better inform regional power and fish and wildlife decisions.

The recommendations highlight, in particular, the overarching challenge involved in implementing a program to improve environmental conditions for fish and wildlife while climate change is redefining those very same environmental characteristics. The Council has included indicators in Part I intended to track how climate change is affecting the environment and affecting the chances for success in program implementation in the face of environmental change.

With regard to program and project implementation, there is no one specific action to focus on to address climate change impacts. The need instead is to work across all aspects of the program to understand the implications of climate change and how to make the most effective decisions for fish and wildlife in that context. Following the program amendment process, the Council will consult with others about how best to establish and operate this standing science-policy forum on climate change.

Mitigation in Blocked Areas

Bonneville: Implement a broad suite of actions to mitigate for the complete loss of anadromous fish and the losses to other fish and wildlife species in the Lake Roosevelt and Spokane River areas above Grand Coulee and Chief Joseph dams, as well as ongoing operational impacts. Increase significantly the level of mitigation for these losses without compromising the substantive protection and mitigation activities elsewhere in the basin.

This part of the basin has suffered the loss of anadromous fish and other fish and wildlife species directly due to hydropower development at a scale at least comparable to, and in most cases greater than, other areas in the basin. These losses have been severely under-addressed and under-mitigated through the Northwest Power Act, especially when compared with other areas and other entities in the basin.

Bonneville should begin a comprehensive effort over the next five years to intensify, expand, and then sustain the mitigation effort for this part of the basin. In developing this comprehensive effort, Bonneville should work with the Spokane Tribe of Indians and the tribe's list of mitigation [measures](#) recommended to the Council. Bonneville and the Spokane Tribe of Indians should consult with the Confederated Tribes of the Colville Reservation and Washington Department of Fish and Wildlife and coordinate with their ongoing work in the Lake Roosevelt area. The Council expects annual reports from

Bonneville and the Spokane Tribe of Indians detailing progress made in this mitigation effort.

Bonneville and others: Continue to make progress on the program’s phased approach to evaluate the possibility of reintroducing anadromous fish above Grand Coulee and Chief Joseph dams.

Continuing to assess the feasibility of reintroducing anadromous fish is one measure in the suite of mitigation measures recommended by the Spokane Tribe of Indians (see previous measure). Continuing to make progress on this measure received substantial support in the amendment process from many governmental and non-governmental entities.

Ocean

Bonneville: Restore and sustain the funding and implementation of ocean research at the level recommended by the Council and supported by the ISRP.

Understanding how annual variations in ocean conditions affect Columbia River salmon and steelhead has been important to the program since the late 1990s, consistent with the science review amendment to the Northwest Power Act and the completion of the first comprehensive science reviews. In recent years, the annual information delivered by the program’s ocean strategy and ocean research effort has become especially important, with unusual ocean conditions resulting in increased ocean temperatures, changes in food sources, changing predator-prey relationships, and subsequent reductions in survival for many stocks. The connection between the data produced annually through trend monitoring and through addressing critical uncertainties provides the opportunity to further our understanding of the effect of ocean conditions on program performance. A further indication of the importance of this work is the growing interest and participation in the Council’s Ocean Forum, in which information and ideas are shared between the ocean researchers and the fisheries management entities.

Monitoring and research actions that generate a basic, important level of information about the ocean are thus a core part of the program and need to be preserved. Over the last decade Bonneville has significantly reduced support for the ocean research program, resulting in a more than sixty percent reduction since 2011. The Council supports restoring funding for this element of the program to the level needed to address the following existing and new monitoring and research components, identified as critical by the Independent Scientific Review Panel in recent reviews and as discussed by the Ocean Forum:

- Continue to develop, use, and improve indicators for ocean conditions.
- Investigate and assess the correlations between salmon, their survival, and the ocean environment.
- Continue to develop forecasts of survival.

- Continue to investigate links between freshwater actions and conditions to responses by salmon in the ocean.
- Continue to investigate predator and prey relationships for salmon in the ocean.

Estuary

Corps of Engineers: Repeat research implemented in 2016 and 2017 that sampled juvenile out-migrating salmon at several sites in the Lower Columbia River and estuary to assess benefits of estuarine use by interior salmon stocks.

Those initial years of study ([see link](#)) yielded important information regarding the benefits of estuary habitat restoration and habitat use by stock and variations in size and growth rate. This information is critical to connecting how salmon use the lower river and estuary to how salmon use the plume and nearshore ocean and has provided important growth and survival information that was previously unknown.

Mainstem Hydrosystem Flow and Passage Operations

Corps of Engineers and Bureau of Reclamation: Implement the refinements in operations at Libby and Hungry Horse dams recommended by Montana Fish Wildlife and Parks (FW&P).

In the 2014 program, the Council supported continued investigations into possible refinements of the operations at Libby and Hungry Horse dams to further improve conditions for fish and wildlife. Based on a decade of monitoring and analysis by Montana FW&P, working with the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho, Montana FW&P and its partners identified specific minor changes in the operations that will increase benefits for resident fish, wildlife, and ecological processes in the reservoirs and rivers downstream from Libby and Hungry Horse. These changes are not expected to adversely affect conditions for fish in the lower river. See [2018 Montana FW&P recommendations](#) and [2017 report on operations at Libby and Hungry Horse Dams](#).

Based on this information, the Corps of Engineers and Bureau of Reclamation should continue to work with the State of Montana, Salish and Kootenai Tribes, and Kootenai Tribe of Idaho to implement where feasible these refinements in operations to benefit fish and wildlife. These improvements include, but are not limited to, those found in the 2017 report as well as the following from Montana's recommendations:

- Adjust summer draft targets more gradually when inflow forecasts are close to the driest 20-percentile threshold to smooth transitions as inflow forecasts vary.
- Use project-specific inflow forecasts to set draft and refill targets, rather than water supply forecasts for the mainstem Columbia River at The Dalles Dam.

- Adjust Storage Reservoir Diagrams to decrease reservoir drawdowns during dry water years.
- At Libby Dam mesh VarQ flood management with the White Sturgeon tiered-flow strategy.
- At Libby replace the variable end-of-December draft target with a fixed draft point (2420) every year.
- Investigate opportunities to use VarQ-like operations at other storage projects to help accommodate water variability among subbasins, improve the region's ability to monitor changing trends in snowpack, and better manage unforeseen rain storms and drought.

Predator Management

Predator management is requiring more program resources and efforts year by year. Everyone involved in the program, including the Council, Bonneville, the Corps of Engineers, the fish and wildlife agencies and tribes, and others, must work together to continue developing a more effective systemwide, ecosystem-based approach for assessing and addressing the impacts of fish, avian, and pinniped predation on salmon and steelhead and other fish species important to the program. It is imperative to scientifically advance the understanding of predation impacts. It is important to understand which predator management actions have the greatest effect on adult returns and SARs and retarget efforts on those actions for cost-effective predation management. In the interim, the Council has identified three predation management implementation issues that need particular attention:

Bonneville and others: Increase and sustain the effort recently begun to assess and remove Northern Pike from the Lake Roosevelt area and other parts of the basin and prevent the spread of Northern Pike.

The Spokane Tribe of Indians, Confederated Tribes of the Colville Reservation, and Washington Department of Fish and Wildlife have developed a comprehensive Northern pike removal proposal that has been reviewed by the ISRP and recommended for implementation by the Council. Bonneville should fund and implement a Northern pike removal effort based on that proposal, while also working with the relevant state agencies and tribes on a strategy to solicit and obtain contributions to this effort from other affected entities as this is an issue broader than a federal hydrosystem responsibility.

Bonneville, the U.S. Army Corps of Engineers, NOAA Fisheries, and other federal agencies: Provide adequate support to the states and tribes to ensure that implementation of the new federal pinniped legislation realizes the full opportunity of reducing pinniped predation on ESA-listed salmon and steelhead.

Pinniped predation continues to have a significant impact on Columbia basin salmon and steelhead. Recent federal legislation provides the opportunity for state and tribal

managers to more effectively reduce predation by lethally removing sea lions in the Columbia River and tributaries that have returning adult ESA-listed salmon and steelhead. The federal agencies must reinforce and strengthen their cooperative partnerships with the states and tribes in support of this effort.

Bonneville, the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and others: Sustain efforts and provide adequate support to reduce avian predation to the extent possible.

Predation by double-crested cormorants, Caspian terns, and several other bird species continues to have a significant impact on ESA-listed juvenile salmon and steelhead in the Columbia and Snake rivers. A recent trend has been reduced support for this effort. The action agencies working with state and tribal partners, should continue to fund and implement activities, both in the estuary and inland, to reduce avian predators that prey on listed juvenile salmon and steelhead.

Sturgeon

Corps of Engineers and Bonneville: Continue to make progress in developing the program's comprehensive approach to white sturgeon in the Columbia River Basin by assessing the factors limiting the recruitment and productivity of sturgeon and developing and implementing measures to address those factors.

The Council expects the federal agencies to continue to support the existing array of sturgeon work, including in the lower Columbia, the upper Columbia (part of the expanded mitigation effort in this area called for in the Mitigation in Blocked Areas section), and the Kootenai River. Two elements of the work that need particular attention or they may not occur:

- Evaluate whether alternative flow regimes might increase sturgeon productivity and recruitment in the lower Columbia below McNary Dam and if so, whether and how operations could be altered to provide those flow regimes without compromising protection for salmon and steelhead and lamprey.
- Increase sturgeon population monitoring between McNary and Priest Rapids dams and in the lower Snake River so that stock status is regularly reported for each area and pool.

How the Program Is Implemented

Bonneville: Implement the program through projects and manage the fish and wildlife program budget with due consideration to the following points. With these points, the Council intends to protect fish and wildlife even as Bonneville carefully manages its costs.

The Council understands Bonneville’s need to strengthen its financial health and manage costs carefully. In its 2018-2023 Strategic Plan, Bonneville focused on objectives to “[p]rioritize fish and wildlife investments based on biological effectiveness and mitigation for FCRPS impacts” and to, “manage fish and wildlife program costs at or below inflation, inclusive of new obligations and commitments.”

The Council, and all participants in the program, are committed to ensuring that projects deliver cost-effective benefits to fish and wildlife, and places increasing emphasis in this addendum toward assessing program performance to this end (see Part I). The Council and Bonneville have also been working with project sponsors since 2014 on an asset management strategy to preserve the benefits to fish and wildlife realized by program investments. The Council intends to continue this work and expects Bonneville will continue to be a committed partner in that effort. The next step is to develop and implement a long-term funding strategy to protect those assets.

The Council and others also share, and generally support, Bonneville’s second objective about carefully managing its fish and wildlife program costs. At the same time, the Council provides the following six points for Bonneville intended to preserve the work of the program required under the Act:

- **Implement emerging priorities.** The Council continues to expect Bonneville to implement the emerging priorities described in the 2014 program, including as sharpened in Part II of this addendum. The Council also maintains its perspective from the 2014 program that Bonneville will fund any new activities required to implement these priorities from program savings if possible, without compromising productive projects that address other needs and priorities identified in the program, and then with additional expenditures as necessary. The Council is confident that most, if not all, of the additional needs identified in the 2014 program, and reflected in this addendum, may be met within an overall program-management and cost-management approach that prevents program costs from rising above the rate of inflation. The one likely exception may be the need for additional expenditures to fill the obvious gap in program implementation related to mitigation for losses above Grand Coulee Dam, for the reasons discussed in the mitigation in blocked areas section. Those additional expenditures can be balanced over time by judicious management of their ramp-up and finding further program efficiencies that do not affect substantive work.
- **Protect productive work during budgetary processes.** The Council understands that a great deal of Bonneville’s responsibility to implement the

program occurs outside of the Council and public's view. However, there are aspects of this effort that require greater Council involvement. Bonneville's internal efforts to manage program costs over the last few years have been aimed at reducing costs by finding program efficiencies without affecting substantive work. Program efficiency and cost containment are laudable objectives, but they can have policy implications that warrant Council participation, particularly when reductions result in projects that are implemented in a manner that no longer reflect the original proposal that underwent science and project review and received a Council funding recommendation based on that review. In the future, the Council, Bonneville and others will work to ensure that reductions in program expenditures are aimed at finding efficiencies without sacrificing productive work. Bonneville should report prospectively to the Council when Bonneville proposes to decrease or increase individual budgets by five percent or more from the prior year, as noted in the start-of-year budget or to decrease or increase by five percent or more within the fiscal year (reviewed quarterly). Bonneville should report after-the-fact in instances when individual project budgets change by less than five percent.

The Council will develop background information and assess and report the reasons for the proposed budget changes and may use the Budget Oversight Group for assistance. Using this information, the Council will review the changes, with an emphasis on changes in excess of the five percent threshold and determine whether ISRP review is warranted. The Council may, within two months, recommend to Bonneville how to proceed.

- **Protect productive work even if using stable project budgets to help control the growth of program expenditures.** Fish and wildlife managers and project sponsors have raised concerns with the Council over cost management techniques that hold certain projects at flat budgets for years, even though some of the costs of implementation rise over that time. This fiscal discipline can remove inefficiencies in spending and is a legitimate tool for Bonneville to apply. However, over time, persisting with flat budgets begins to force project sponsors to make cuts that undermine the ability to perform the substantive work and meet project and program objectives. Bonneville should work with the Council and project sponsors to identify when project budgets need to increase to reflect the effects of inflation and preserve the substantive work.
- **Share the cost management efforts as equitably as possible over the entire program.** Bonneville's efforts to manage or reduce program costs can, at times, be imposed on a small proportion of the total range of projects funded to implement the program. The Council understands the value of the commitments made in the Columbia Basin Fish Accords and to that portion of the program that addresses the needs of ESA-listed fish. On the other hand, all the program's core protection and mitigation activities are of equal priority under the Northwest Power Act and need to be treated in program management equitably, especially

if proposed funding cuts begin to threaten the substantive work and ability to meet project objectives. Bonneville must work diligently with the Council and the project sponsors to equitably share cost management efforts throughout the program.

- **Develop an improved public process to find cost savings in the existing budget.** The Council and Bonneville should work together on this effort. The Council expects that at least most of the savings will be reinvested in the program in a manner subject to Council recommendations.
- **Plan future implementation of the Fish and Wildlife Program.** The Council will work with the state and federal fish and wildlife agencies and tribes to consider initiating a process to plan future implementation of the fish and wildlife program.

References

¹ The value for this implementation accomplishment is based on the summation of values provided from Bonneville's project implementation database www.cbfish.org.

² The value for this accomplishment is based on the summation of values provided from Bonneville's project implementation database www.cbfish.org.

³ The value for this accomplishment is based on the summation of values provided from Bonneville's project implementation database www.cbfish.org.

⁴ The value for this accomplishment is based on the summation of values provided from Bonneville's project implementation database www.cbfish.org.

⁵ The value for this accomplishment is based on the summation of values provided from Bonneville's project implementation database www.cbfish.org.

⁶ The Anadromous Salmon and Steelhead Goal is based on the following sources of information: (a) 1987 Fish and Wildlife Program, section 203; (b) 1994/1995 Fish and Wildlife Program section 4.1; (c) 2000 Fish and Wildlife Program section on Objectives for Biological Performance; (d) 2014 Fish and Wildlife Program section III. Goals and Objectives – the changes we want to achieve; and, (e) 2014 Fish and Wildlife Program Appendix D, Theme 2, objective 2.a.

⁷ The values for Objective S1 are derived by combining the MAFAC-Columbia Basin Partnership Task Force Phase 1 Report's [Appendix A](#) values for the fish stocks found in the 5 groups: Lower Columbia, Mid-Columbia, Upper Columbia, Snake River, and Willamette. The values summed to derive these near-term provisional goals for salmon and steelhead adults returning to the Columbia River mouth are based on the delisting abundance for ESA-listed populations. For consistency, a delisting abundance was determined for non-ESA-listed populations, such as the populations in the Upper Columbia fall chinook group; however, it is expected that the abundance of non-listed healthy populations, as well as some listed populations (such as Snake River fall Chinook), will regularly exceed this delisting abundance value. See the annotated Appendix A document for specific major population groups and populations that are combined within these 5 groups <https://nwcouncil.box.com/s/v6nt23o7vl1zi9xa4d766q64asqpbtxi> .

⁸ The values for Objective S2 are based on the 2014 Fish and Wildlife Program, Appendix D, Theme 2, objective 2d. This value was first adopted into the 2013 Mainstem Program Amendment, section Mitigation/Passage Conditions for Anadromous Fish as recommended by the Columbia River Inter-Tribal Fish Commission, IDFG, and ODFW. This value is also part of the Council's HLIs ([view HLI table](#)).

⁹ The Performance Indicator S2-1 is from the 2014 Fish and Wildlife Program Appendix D, Theme 2, objective #5b. It originates from the 2009 NOAA Fisheries FCRPS Biological Opinion the Reasonable and Prudent Alternative No. 52 - Hydrosystem

Research, Monitoring and Evaluation Strategy 2 of the NOAA Fisheries 2008 FCRPS Biological Opinion, including Table 7 (see details: <https://nwcouncil.box.com/s/j5jpgzb1hpp64w0zb12z91ydc724p73y>), and is included in the Council's HLIs.

¹⁰ The Performance Indicator S2-3 is based on the recommendations submitted by ODFW, WDFW, and Nez Perce Tribe, for the 2018-2019 Fish and Wildlife Program amendment process and the 2019-2021 Spill Operation Agreement.

¹¹ The Performance Indicator S2-2 is from the 2014 Fish and Wildlife Program Appendix D, Theme 2, objective #5b. It originates from the 2009 NOAA Fisheries FCRPS Biological Opinion the Reasonable and Prudent Alternative No. 52 - Hydrosystem Research, Monitoring and Evaluation Strategy 2 of the NOAA Fisheries 2008 FCRPS Biological Opinion, including Table 7 (see details: <https://nwcouncil.box.com/s/j5jpgzb1hpp64w0zb12z91ydc724p73y>), and is included in the Council's HLIs.

¹² The Performance Indicator S1-1 is based on the content of (a) 2014 Fish and Wildlife Program's Fish Propagation Including Hatchery Programs Strategy; and, (b) the revised Three-Step Review Process (January 12, 2015) available: <https://nwcouncil.app.box.com/file/41663249718>

¹³ The Performance Indicator S1-2 is derived by combining the values from the MAFAC-Columbia Basin Partnership Task Force Phase 1 report, [Appendix A](#) for these 22 groups of fish. For details about the values and the locations and artificial production programs assigned to these 22 groups view the annotated Appendix A <https://nwcouncil.box.com/s/v6nt23o7vl1zi9xa4d766q64asgpbtxi> .

¹⁴ The Performance Indicator S1-3 is derived by combining the values from the MAFAC-Columbia Basin Partnership Task Force Phase 1 report, [Appendix A](#) for these 22 groups of fish. Please note, that the values for the low natural origin spawner escapement (10-year geometric mean) are based on the delisting abundance for ESA-listed populations. For consistency, a delisting abundance value was determined for non-ESA-listed populations, such as the populations in the Upper Columbia fall chinook group and Snake River fall chinook group; however, the abundance of these healthy populations is expected to regularly exceeds this delisting abundance value. For details about the values view the annotated Appendix A <https://nwcouncil.box.com/s/v6nt23o7vl1zi9xa4d766q64asgpbtxi>

¹⁵ The White Sturgeon Goal WS is based on the 2014 Fish and Wildlife Appendix D, Theme 2, Goal #1, objective 1m, objective 1p, goal 2, goal 3, objective 3a, goal 4, and objective 4d.

¹⁶ The Objective WS1 is based on the following sources of information compiled in the Council's Fish Objective mapping tool: (a) 2011 Lower Columbia River and Oregon Coast White Sturgeon Conservation Plan; (b) CBFWA Fish and Wildlife Program

Recommendation;(c) 2004 Draft Lower Mid-Columbia Mainstem Subbasin Plan Includes Rock Creek, Washington; (d) 2004 Columbia Gorge Mainstem Subbasin Plan; (e) Upper Columbia White Sturgeon Recovery Initiative Operational Plan 2013-2017; (f) Upper Columbia White Sturgeon Recovery Plan - 2012 Revision; (g) 2013 Columbia Basin White Sturgeon Planning Framework; (h) 2010 Pres River Native Fish Conservation Aquaculture Program Master Plan; (i) 1995 Wy-Kan-Ush-Mi Wah-Kish-Wit; (j) 2005 White Sturgeon Management Plan in the Snake River between Lower Granite and Hells Canyon Dams; and, (k) 2004 Middle Snake Subbasin Management Plan.

¹⁷ The definition of the term ‘healthy’ comes from the 2014 Program, Appendix D, Goal 13, footnote #10 which states that: healthy is defined as having abundance, productive, diverse and spatially distributed populations.

¹⁸ The values for the 7 management units included in the Performance Indicator WS1-2 are based on the following sources of information compiled in the Council’s Fish Objective mapping tool: (a) Lower Columbia Management Unit: 2011 Lower Columbia River and Oregon Coast White Sturgeon Conservation Plan; (b) Upper and Lower Mid-Columbia Management Unit: CFWA Fish and Wildlife Program Recommendation, 2004 Draft Lower Mid-Columbia Mainstem Subbasin Plan Includes Rock Creek, Washington, and, 2004 Columbia Gorge Mainstem Subbasin Plan; (c) Transboundary Upper Columbia Management Unit: Upper Columbia White Sturgeon Recovery Initiative Operational Plan 2013-2017, Upper Columbia White Sturgeon Recovery Plan - 2012 Revision, and, 2013 Columbia Basin White Sturgeon Planning Framework; (d) Kootenai Management Unit: 2010 Kootenai River Native Fish Conservation Aquaculture Program Master Plan; (e) Lower Snake Management Unit: 1995 Wy-Kan-Ush-Mi Wah-Kish-Wit; (f) Middle Snake Management Unit: 2005 White Sturgeon Management Plan in the Snake River between Lower Granite and Hells Canyon Dams; and, (g) Upper Snake Management Unit: 2004 Middle Snake Subbasin Management Plan.

¹⁹ The Performance Indicator WS1-2 is based on the (a) 2014 Fish and Wildlife Program’s Fish Propagation Including Hatchery Programs Strategy, and (b) Three-Step Review Process (January 12, 2015) available <https://nwcouncil.app.box.com/file/41663249718>

²⁰ The Pacific Lamprey Goal, L, is based on the (a) 2014 Fish and Wildlife Program Appendix D, Theme 2 goal 1, objective 1j, goal 2, goal 3, objective 3a, and Theme 3, goal: 1; (b) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; and (c) documents compiled in the Fish Objectives mapping tool including the 2012 Conservation Agreement for Pacific Lamprey (*Entosphenus Tridentatus*) in the States of Alaska, Washington, Oregon, Idaho and California.

²¹ The Objective L1 is based on the (a) 2014 Fish and Wildlife Program Appendix D, Theme 2 goal 1, objective 1j, goal 2, goal 3, objective 3a, and Theme 3, goal: 1; (b) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; and (c) documents compiled in the Fish Objectives mapping tool including the 2012

Conservation Agreement for Pacific Lamprey (*Entosphenus Tridentatus*) in the States of Alaska, Washington, Oregon, Idaho and California.

²² The Objective L2 is based on (a) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; and, (b) recommendation submitted for the 2014 Program amendment process by BPT, CRITFC, CTGR, CTUIR, Cowlitz, NPT, USRTF, USFWS.

²³ The Performance Indicator L2-1 is based on (a) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; and, (b) recommendation submitted for the 2014 Program amendment process by BPT, CRITFC, CTGR, CTUIR, Cowlitz, NPT, USRTF, USFWS.

²⁴ The Performance Indicator L1-1 is based (a) 2014 Fish and Wildlife Program's The Use of Hatcheries for Reintroduction Strategy; (b) 2014 Fish and Wildlife Program Appendix D, Theme 2 goal 1, objective 1j, goal 2, goal 3, objective 3a, and Theme 3, goal: 1; (c) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; and (d) documents compiled in the Fish Objectives mapping tool including the 2012 Conservation Agreement for Pacific Lamprey (*Entosphenus Tridentatus*) in the States of Alaska, Washington, Oregon, Idaho and California.

²⁵ The Performance Indicator L1-2 is based on the 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin.

²⁶ The Resident Salmonids Goal, R, is based on the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1m, Objective 1p, Goal 2, Goal 3, Objective 3a, Goal 4, and Objective 4d.

²⁷ The Objective R1 is based on the (a) the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1m, Objective 1p, Goal 2, Goal 3, Objective 3a, Goal 4, and Objective 4d; and, (b) documents compiled in the Fish Objectives mapping tool including: the 2002 USFWS Bull Trout Draft Recovery Plan.

²⁸ The Objective R2 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, and Objective 3a.

²⁹ The Objective R3 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, Objective 3a; and (b) documents compiled in the Fish Objectives mapping tool including: Montana Statewide Fish Management Plan 2013-2018, IDFG Fisheries Management Plan 2013-2018, 2012 Coeur d'Alene Tribe Integrated Resource Management Plan, 2000 Draft Pend Oreille Subbasin Summary, 2000 Draft SanPoil River Subbasin Summary, 2004 Spokane Subbasin Plan, 2000 Kootenai River Subbasin Management Plan, and MFWP/CSKT Flathead Lake and River Fisheries Co-Management Plan 2001-2010.

³⁰ The Objective R4 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, Objective 3a; and, (b) documents compiled in the Fish Objectives mapping tool including: 2016 Conservation Strategy for

Interior Redband (*Oncorhynchus mykiss* subsp.) in the states of California, Idaho, Montana, Nevada, Oregon and Washington, 2000 Fifteenmile Subbasin Summary, 2009 Lake Roosevelt Fisheries Guiding Document, IDFG Fisheries Management Plan 2013-2018, 2014 Rangelwide Conservation Agreement for the Conservation and Management of Interior Redband Trout, Montana Statewide Fisheries Management Plan 2013-2018, and 2004 Intermountain Province Subbasin Plan.

³¹ The Performance Indicator R2-1 is based on the (a) 2014 Fish and Wildlife Program's Fish Propagation Including Hatchery Programs Strategy, and (b) Three-Step Review Process (January 12, 2015) available <https://nwcouncil.app.box.com/file/41663249718>

³² The Performance Indicator R3-1 is based on the (a) 2014 Fish and Wildlife Program's Fish Propagation Including Hatchery Programs Strategy, and (b) Three-Step Review Process (January 12, 2015) available <https://nwcouncil.app.box.com/file/41663249718>

³³ The Performance Indicator R1-1 is derived from documents compiled on the Council's Fish Objective mapping tool, specifically the 2002 USFWS Draft Bull Trout Recovery Plan and the CBFWA Fish and Wildlife Program Recommendation 2009 Amendment. The values are derived by summing the adult abundance targets for individual cores located within a recovery unit. The designation of the core and recovery units are based on the 2002 USFWS draft Bull Trout Recovery Plan. No values were found for the St Mary Recovery Unit and thus a generic trend informed by the Fish Objective mapper bull trout content was derived as a performance indicator target.

³⁴ The Performance Indicator R2-2 is based on documents compiled in the Fish Objectives mapping tool including: Montana Statewide Fish Management Plan 2013-2018; CBFWA Fish and Wildlife Program Recommendation 2009 Amendment; 2007 Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana; and 2000 Fifteenmile Creek Subbasin Summary.

³⁵ The Performance Indicator R4-1 is based on documents compiled in the Fish Objectives mapping tool including: 2016.Conservation Strategy for Interior Redband (*Oncorhynchus mykiss* subsp.) in the states of California, Idaho, Montana, Nevada, Oregon and Washington; 2000.Fifteenmile Subbasin Summary; 2009.Lake Roosevelt Fisheries Guiding Document; IDFG Fisheries Management Plan 2013-2018; 2014.Rangelwide Conservation Agreement for the Conservation and Management of Interior Redband Trout; Montana Statewide Fish Management Plan 2013-2018; and, 2004.Intermountain Province Subbasin Plan.

³⁶ The values for the R4-2 performance indicator are derived from the Council's Fish Objective mapper tool for redband trout by summing the historical length and area occupied by redband trout in the subbasins within each of the 5 geographic management units (GMUs) identified in the 2016 Conservation Strategy (*Oncorhynchus*

mykiss subsp.) in the states of California, Idaho, Montana, Nevada, Oregon and Washington.

³⁷ The Native Aquatic Focal Species Goal, NF, is based on the (a) 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, and Objective 3a; (b) 2016 Draft Eulachon Recovery Plan October 2016 Endangered Species Act Recovery Plan for the Southern Distinct Population Segment of Eulachon (*Thaleichthys pacificus*); (c) the 2017 Endangered Species Act Recovery Plan for the Southern Distinct Population Segment of Eulachon (*Thaleichthys pacificus*); (d) 2013 Federal Recovery Outline Pacific Eulachon Southern Distinct Population Segment ; (e) WDFW/ODFW 2001 . Washington and Oregon Eulachon Management Plan; (f) 2004 Lower Columbia Salmon Recovery And Fish & Wildlife Subbasin Plan Volume II – Subbasin Plan Chapter A – Lower Columbia Mainstem and Estuary; (g) 2015 Eulachon: State of the Science and Science to Policy Forum available <https://nwcouncil.box.com/s/9smx3zqt6y8ym5ipw45g10fihillpsme> .

³⁸ The Objective NF1 is based on the (a) 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, and Objective 3a; (b) 2016 Draft Eulachon Recovery Plan October 2016 Endangered Species Act Recovery Plan for the Southern Distinct Population Segment of Eulachon (*Thaleichthys pacificus*); (c) the 2017 Endangered Species Act Recovery Plan for the Southern Distinct Population Segment of Eulachon (*Thaleichthys pacificus*); (d) 2013 Federal Recovery Outline Pacific Eulachon Southern Distinct Population Segment ; (e) WDFW/ODFW 2001 . Washington and Oregon Eulachon Management Plan; (f) 2004 Lower Columbia Salmon Recovery And Fish & Wildlife Subbasin Plan Volume II – Subbasin Plan Chapter A – Lower Columbia Mainstem and Estuary; (g) 2015 Eulachon: State of the Science and Science to Policy Forum available <https://nwcouncil.box.com/s/9smx3zqt6y8ym5ipw45g10fihillpsme>

³⁹ The Performance Indicator NF1-1 is based on the (a) 2014 Fish and Wildlife Program’s Fish Propagation Including Hatchery Programs Strategy, and (b) Three-Step Review Process (January 12, 2015) available <https://nwcouncil.app.box.com/file/41663249718>

⁴⁰ The Performance Indicators NF1-2 is based on 2019 Briefing on Columbia River Eulachon by Laura Heironimus (Washington Department of Fish and Wildlife) presented to NPCC Fish and Wildlife Committee on 11 May 2019, available https://www.nwcouncil.org/sites/default/files/2019_0409_4.pdf

⁴¹ The Objective E1 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 1, Goal 2, Goal 3, Goal 7, Objective 7a, Goal 8, Goal 9, and Goal 10.

⁴² The Objective E2 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 3, Goal 4, Goal 5, and Goal 11.

⁴³ The Objective E3 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 1; and, (b) the 2014 program Non-Native and Invasive Species strategy.

⁴⁴ The Objective E4 is based on (a) the 2019 CRS Biological Opinion, (b) 2018 Consultation Package related to the 2019 CRS Biological Opinion (c) the 2008 FCRPS BiOP, and (d) 2007 Biological Assessment for Effects of Federal Columbia River Power System and Mainstem Effects of Other Tributary Actions on Anadromous Salmonid Species Listed Under the Endangered Species Act.

⁴⁵ The Performance Indicator E1-1 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 1, Goal 2, 3, Goal 4, Goal 5, Goal 7, Objective 7a, Goal 10, and Goal 11.

⁴⁶ The Performance Indicator E1-2 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 7, Objective 7a, Goal 8, Goal 9, and Goal 10.

⁴⁷ The Performance Indicator E2-1 is based on the 2014 Fish and Wildlife Program - Appendix D, Theme 1, Goal 1, Goal 2, 3, Goal 4, Goal 5, Goal 7, Objective 7a, Goal 10, and Goal 11.

⁴⁸ The Performance Indicator E3-1 is based on the 2014 Fish and Wildlife Program Non-Native and Invasive Species Strategy.

⁴⁹ The Performance Indicator E3-2 is based on the 2014 Fish and Wildlife Program Non-Native and Invasive Species Strategy.

⁵⁰ The Performance Indicator E3-3 is based on (a) the 2014 Fish and Wildlife Program Predator Management Strategy; (b) USFWS 2005 Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, Final Environmental Impact Statement; (c) USACE 2014 Inland Avian Predation Management Plan Environmental Assessment; and, (d) Roby D.D. et al. 2015 Avian Predation on Juvenile Salmonids: Evaluation of the Caspian Tern Management Plan in the Columbia River Estuary. 2015 Bonneville Annual Project Report, Project No. 1997-024-00.

⁵¹ The Performance Indicator E3-4 is based on (a) the 2014 Fish and Wildlife Program Predator Management Strategy; and, (b) Williams, S.E. et al. 2017 Report on the predation index, predator control fisheries, and program evaluation for the Columbia River Basin Northern pikeminnow sport reward program, 2017 Bonneville Annual Project Report, Project No. 1990-077-00.

⁵² The Performance Indicator E3-5 is based on (a) from the 2014 Fish and Wildlife Program Predator Management Strategy; and, (b) Northern Pike Suppression and Monitoring, Bonneville Project No. 2017-004-00, implemented by the Colville Confederated Tribes, Spokane Tribes, and WDFW.

⁵³ The Performance Indicator E3-6 is based on (a) the 2014 Fish and Wildlife Program Predator Management Strategy; (b) 2011 Tribal Pacific Lamprey Restoration Plan for the Columbia River Basin; (c) Hatch D.R. et al. 2018. Sea Lion Monitoring and Non-Lethal Hazing. 1/1/2017 – 12/31/2017 Bonneville Annual Project Report, Project No. 2008-004-00; and, (d) Tidwell K.S. et al. 2018. Evaluation of Pinniped Predation on Adult Salmonids and other Fish in the Bonneville Dam Tailrace, 2018. USACE Portland District, Fisheries Field Unit. Cascade Locks, Oregon, available <http://pweb.crohms.org/tmt/documents/FPOM/2010/Task%20Groups/Task%20Group%20Pinnipeds/2018%20Pinniped%20Annual%20Report.pdf>

⁵⁴ The Performance Indicator E2-2 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 1, and Goal 3.

⁵⁵ The Performance Indicator E2-3 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 1, and Goal 3.

⁵⁶ The Performance Indicator E2-7 consists of the standards promulgated or adopted by the five governments with jurisdictions over the Columbia, Lower Columbia and Lower Snake Rivers listed in the February 5, 2018 [draft document](#) for Temperature Water Quality Standards for the Columbia, Lower Columbia, and Lower Snake Rivers prepared by U.S. EPA Region 10. This performance indicator relates to the general measures to address temperature under the 2014 program's Water Quality sub-strategy.

⁵⁷ The Performance Indicator E2-4 is based on the 2014 Fish and Wildlife Program Water Quality Strategy.

⁵⁸ The Performance Indicator E2-5 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 1 objective #4 a, and, (b) the Kalispel Tribe of Indians 2018/2019 program amendment recommendation to add the Albeni Falls Dam total dissolved gas standard of 110%.

⁵⁹ The Performance Indicators E1-3 & E2-6 are based on the 2014 Fish and Wildlife Program Climate Change Strategy.

⁶⁰ The Performance Indicator E4-1 table of values is from the ESA Section 7(a)(2) Initiation of Formal Consultation for the Operations and Maintenance of the Columbia River System on NOAA Fisheries Listed Species and Designated Critical Habitat. Bonneville Power Administration, Bureau of Reclamation, U.S. Army Corps of Engineers, November 2, 2018, available <https://www.salmonrecovery.gov/doc/default-source/default-document-library/proposedaction2019crs.pdf?status=Temp&sfvrsn=0.29652687684318046>. These values are also included in Appendix B.2. - Operations to Benefit Listed Fish (Table B.2.1-1) in the Biological Assessment for Effects of Federal Columbia River Power System and Mainstem Effects of Other Tributary Actions on Anadromous Salmonid Species Listed Under the Endangered Species Act. Bonneville Power Administration,

Bureau of Reclamation, U.S. Army Corps of Engineers, August 2007, available <https://www.salmonrecovery.gov/Files/BiologicalOpinions/Appendix.pdf>

⁶¹ The Performance Indicator E1-4 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 1, Goal 2, Goal 7 and objective 7a; and, (b) Corbett, C. et al. in preparation (Lower Columbia Estuary Partnership) that contains the specific percentage stated in E1-4.

⁶² The Performance Indicator E1-5 is based on the Hungry Horse Mitigation Plan; Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam, Bonneville Project No. 1990-2003, Technical Report, Project No. 199301904, available <https://nwcouncil.box.com/s/fqjl4sdeqg6i9mad6bu8j2hfo4wa25pr>

⁶³ The Performance Indicator E1-6 is based on the Fisheries Mitigation and Implementation Plan for Losses Attributable to the Construction and Operation of Libby Dam, Bonneville Project No. 1995-00400, available <https://nwcouncil.box.com/s/aye1lypekqusy550bnuxf7yn9k7ij6bq>

⁶⁴ The Objective C1 builds on the 2014 program's commitment to adaptive management.

⁶⁵ The Objective C2 builds on the 2014 program's commitment to adaptive management.

⁶⁶ The Objective C3 is based on the 2014 program Protected Areas and Hydroelectric Development and Licensing strategy.

⁶⁷ The objective C4 is based on the 2014 program's (a) section V. Tracking the Status of the Basin's Fish and Wildlife Resources; (b) Public Engagement Strategy; and, (c) Part Four: Adaptive Management.

⁶⁸ The objective C5 is based on the 2014 program's (a) section V. Tracking the Status of the Basin's Fish and Wildlife Resources; (b) Public Engagement Strategy; and, (c) Part Four: Adaptive Management.

⁶⁹ The objective C6 is based on the 2014 program's (a) Appendix D, Theme Two, Goal 1, and Goal 3; and, (b) Resident Fish Mitigation Strategy.

⁷⁰ The objective C7 is based on the 2014 program's (a) Appendix D, Theme 3, Goal 2; and, (b) Anadromous Fish Mitigation in Blocked Areas Strategy.

⁷¹ The Performance Indicator C3-1 is based on the 2014 program's Protected Areas and Hydroelectric Development and Licensing Strategy.

⁷² The Performance Indicator C5-3 is based on the 2014 program's Climate Change Strategy.

⁷³ The Performance Indicator C5-6 is based on the 2014 program's Climate Change sub-strategy.

⁷⁴ The Performance Indicator C5-5 is based on the 2014 program's (a) Appendix D, Theme 1, Goal 7; and, (b) Plume and Nearshore Ocean Strategy.

⁷⁵ The Performance Indicator C5-4 is based on the 2014 Program Appendix P. Maintenance of Fish and Wildlife Program Investments.

⁷⁶ The Performance Indicator C7-1 is based on the 2014 program Anadromous Fish Mitigation in Blocked Areas Strategy.

⁷⁷ The Performance Indicator C4-1 is based on the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, and Objective 3a.

⁷⁸ The Performance Indicator C4-2 is based on (a) the 2014 Fish and Wildlife Program Appendix D, Theme 2, Goal: 1, Objective 1p, Goal 2, Goal 3, and Objective 3a; and, (b) The Confederated Tribes of Grande Ronde 2018 F&W Program Recommendations.

⁷⁹ The Performance Indicator C6-1 is based on the 2014 program's Resident Fish Mitigation Strategy.

⁸⁰ The Performance Indicator C1-1 is based on the 2014 program Public Engagement Strategy.

⁸¹ The Performance Indicator C1-2 is based on the 2014 program Part 4 Adaptive Management.

⁸² The Performance Indicator C1-3 is based on the 2014 program Public Engagement Strategy.

⁸³ The Performance Indicator C5-1 is based on the 2014 program Public Engagement Strategy.

⁸⁴ The Performance Indicator C5-2 is based on the 2014 program Public Engagement Strategy.

⁸⁵ The Performance Indicator C2-1 builds on the 2014 program's commitment to adaptive management.

⁸⁶ The Performance Indicator C2-2 builds on the 2014 program's commitment to adaptive management.

⁸⁷ The Wildlife Goal, W, is based on the 2014 Fish and Wildlife Program Appendix D, Theme 1 Goal 12, and Objective 12a.

⁸⁸ The values for the Objective W1 are derived by taking the habitat unit (HU) loss identified in the 2014 Program Appendix C, with mitigation done prior to FY2002 being addressed at a 1:1 ratio, and mitigation from FY2002 on being addressed by doubling

the identified remaining HU. If a portion of HUs were addressed through a settlement agreement, the HUs addressed by the agreement are translated into the agreed upon acres and the total HUs adjusted accordingly. These values are described in the Wildlife Strategy Program Mitigation and Remaining Loss Ledger presentation to the Fish and Wildlife Committee February 2019. Available

<https://nwcouncil.box.com/s/cmqs19d88xi652tjulnt7v69j5ebwo2h>

Supporting documents include: (a) Wildlife Mitigation Agreement for Dworshak Dam, Bonneville Power Administration, State of Idaho and Nez Perce Tribe, available <https://nwcouncil.box.com/s/ymah6ng5qe15fvi3r78akzhkfr0m8qwz>; (b) Idaho and Bonneville Stewardship and Restoration Agreement for Albeni Falls Dam, Final Talking Points, November 7, 2017, available

<https://nwcouncil.box.com/s/xsdcuazlh36sevfj22wc4v8va1t3eby6>; (c) Wildlife Mitigation Agreement for Libby and Hungry Horse Dams between the Bonneville Power Administration and the State of Montana (1992). Available

<https://nwcouncil.box.com/s/dw1qxvvlb3eqz67q6rqs1i2kqzv0gl4>; (d) Willamette River Basin Memorandum of Agreement Regarding Wildlife Habitat Protection and Enhancement between the State of Oregon and the Bonneville Power Administration, October 22, 2010, available

<https://nwcouncil.box.com/s/hzef29x39pn3kqe04oxjo7jluf4595dg>; and, (e) Bonneville Power Administration, Administrators' Record of Decision and Response to Comments Southern Idaho Wildlife Mitigation Memorandum of Agreement, September 2014, Available <https://nwcouncil.box.com/s/kmxmwt8t0rbwkyr0mjhxbferu6ju6nh3>

⁸⁹ The values for Objective W2 are described in the Wildlife Strategy Program Mitigation and Remaining Loss Ledger presentation to the Fish and Wildlife Committee February 2019. Available <https://nwcouncil.box.com/s/cmqs19d88xi652tjulnt7v69j5ebwo2h>

Supporting documents includes 2018 recommendations and comments on the 2014 F&W Program received from Montana Fish, Wildlife & Parks, Confederated Salish & Kootenai Tribes, and Kootenai Tribe of Idaho.

⁹⁰ The values for Objective W3 are described in the Wildlife Strategy Program Mitigation and Remaining Loss Ledger presentation to the Fish and Wildlife Committee February 2019. Available <https://nwcouncil.box.com/s/cmqs19d88xi652tjulnt7v69j5ebwo2h>

Supporting documents include: (a) Idaho and Bonneville Stewardship and Restoration Agreement for Albeni Falls Dam, Final Talking Points, November 7, 2017, available <https://nwcouncil.box.com/s/xsdcuazlh36sevfj22wc4v8va1t3eby6>; (b) Willamette River Basin Memorandum of Agreement Regarding Wildlife Habitat Protection and Enhancement between the State of Oregon and the Bonneville Power Administration, October 22, 2010, available

<https://nwcouncil.box.com/s/hzef29x39pn3kqe04oxjo7jluf4595dg>; and, (c) Bonneville Power Administration, Administrators' Record of Decision and Response to Comments

Southern Idaho Wildlife Mitigation Memorandum of Agreement, September 2014,
Available <https://nwcouncil.box.com/s/kmxmwt8t0rbwkyr0mjhxbferu6ju6nh3>

⁹¹ The Objective W4 is based on the 2014 Fish and Wildlife Program Wildlife Mitigation Strategy.

⁹² The Performance Indicator W1-1 see endnote for Objective W1.

⁹³ The Performance Indicator W2-1 see endnote for Objective W2.

⁹⁴ The Performance Indicator W3-1 see endnote for Objective W3.

⁹⁵ The Performance Indicator W4-1 is based on the 2014 program Wildlife Mitigation Strategy.

⁹⁶ The Objective W5 is based on the 2014 Fish and Wildlife Program Wildlife Mitigation Strategy.

⁹⁷ The Objective W6 is based on the 2014 Fish and Wildlife Program's (a) Wildlife Mitigation Strategy; and, (b) Appendix P. Maintenance of Fish and Wildlife Program Investments; (c) section V. Tracking the Status of the Basin's Fish and Wildlife Resources; (d) Public Engagement Strategy; and, (e) Part Four: Adaptive Management.

⁹⁸ The Objective W7 builds on the 2014 program's commitment to adaptive management.

⁹⁹ The Objective W8 builds on the 2014 program's commitment to adaptive management.

¹⁰⁰ The Objective W9 is based on the 2014 program Protected Areas and Hydroelectric Development and Licensing Strategy.

¹⁰¹ The Performance Indicator W9-1 is based on the 2014 program's Protected Areas and Hydroelectric Development and Licensing Strategy.

¹⁰² The Performance Indicator W5-1 is based on the 2014 program Wildlife Mitigation Strategy.

¹⁰³ The Performance Indicator W6-1 is based on the 2014 program Wildlife Mitigation Strategy.

¹⁰⁴ The Performance Indicator W7-1 is based on the 2014 program Public Engagement Strategy

¹⁰⁵ The Performance Indicator W7-2 is based on the 2014 program Part 4 Adaptive Management.

¹⁰⁶ The Performance Indicator W7-3 is based on the 2014 program Public Engagement Strategy.

¹⁰⁷ The Performance Indicator W6-2 is based on the 2014 program Public Engagement Strategy.

¹⁰⁸ The Performance Indicator W6-3 is based on the 2014 program Public Engagement Strategy.

¹⁰⁹ The Performance Indicator W8-1 builds on the 2014 program's commitment to adaptive management.