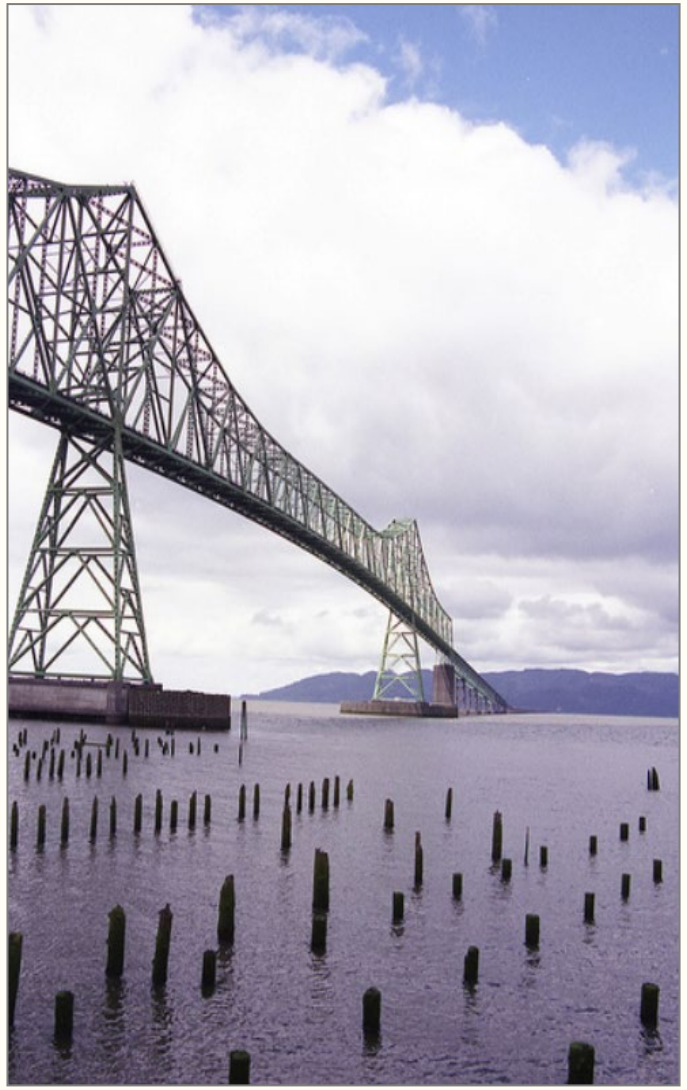
Staff briefing on Part Three of the 2014 Fish and Wildlife Program

Fish and Wildlife division staff

Northwest **Power** and **Conservation** Council



Part One: Overview

I. The Columbia River Basin

II. The Northwest Power and Conservation Council and the Columbia River Basin Fish and Wildlife Program

Part Two: Introduction

I. The program framework

A. Geographic structure

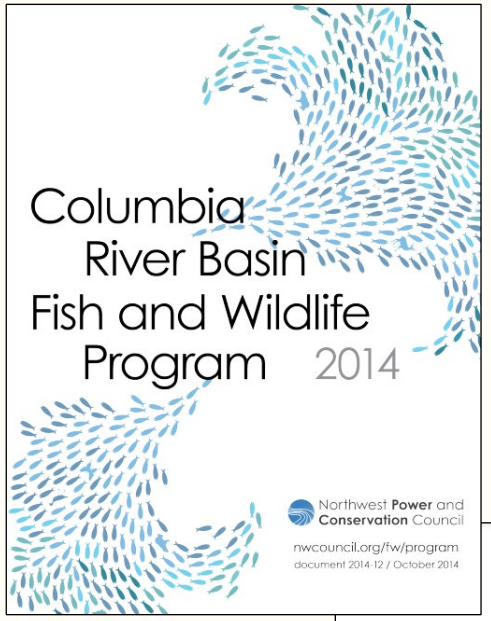
II. Legal and social context of the program

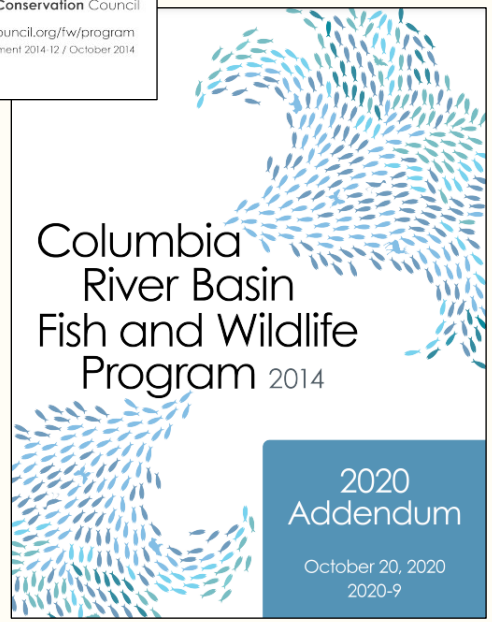
III. Assuring the Pacific Northwest an adequate, efficient, economic and reliable power supply

IV. Program progress

A. Program successes

B. Program challenges



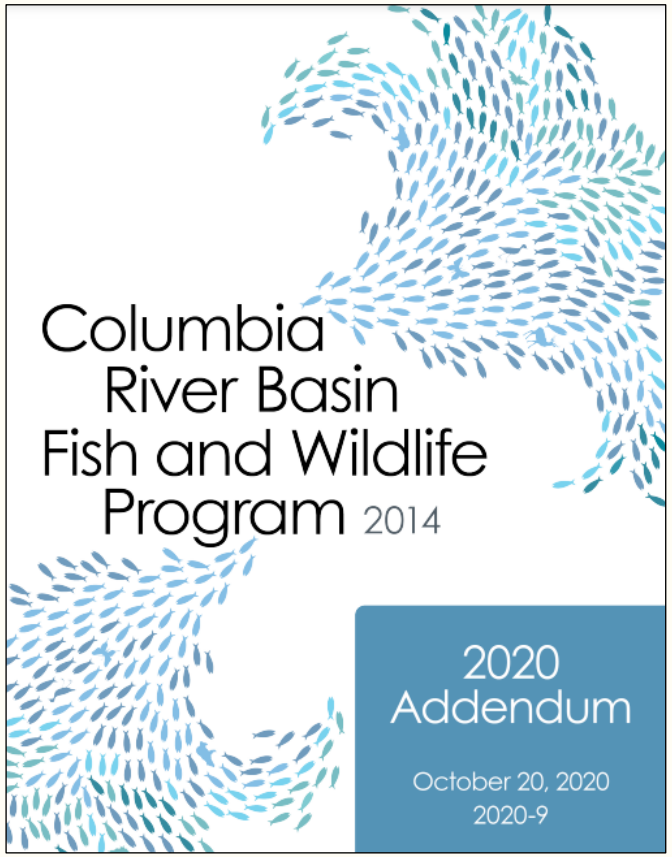


Part Three: Basinwide Vision, Scientific Foundation, Goals, Objectives, and Strategies

I. Vision for the Columbia River Basin
II. Scientific foundation and principles of the program
III. Goals and Objectives - the changes we want to achieve
    A. Program goals and quantitative objectives
        1. Refining program goals and quantitative objectives
IV. Strategies – how the program will achieve the changes
    A. Ecosystem function
        1. Habitat
        2. Strongholds
        3. Non-native and invasive species
        4. Predator management
        5. Protected areas and hydroelectric development and licensing
        6. Water quality
        7. Climate change
        8. Mainstem hydrosystem flow and passage operations
        9. Estuary
        10. Plume and nearshore ocean
        11. Wildlife mitigation

2020 Addendum to the 2014 Program

- Part I. Program performance and adaptive management
  - Goals, objectives and performance indicators, organized by biological category
  - Assessing, monitoring and reporting
- Part II. Program Implementation
  - Near term priorities
  - How the Program is implemented



Part Three: Basinwide Vision, Scientific Foundation, Goals, Objectives, and Strategies

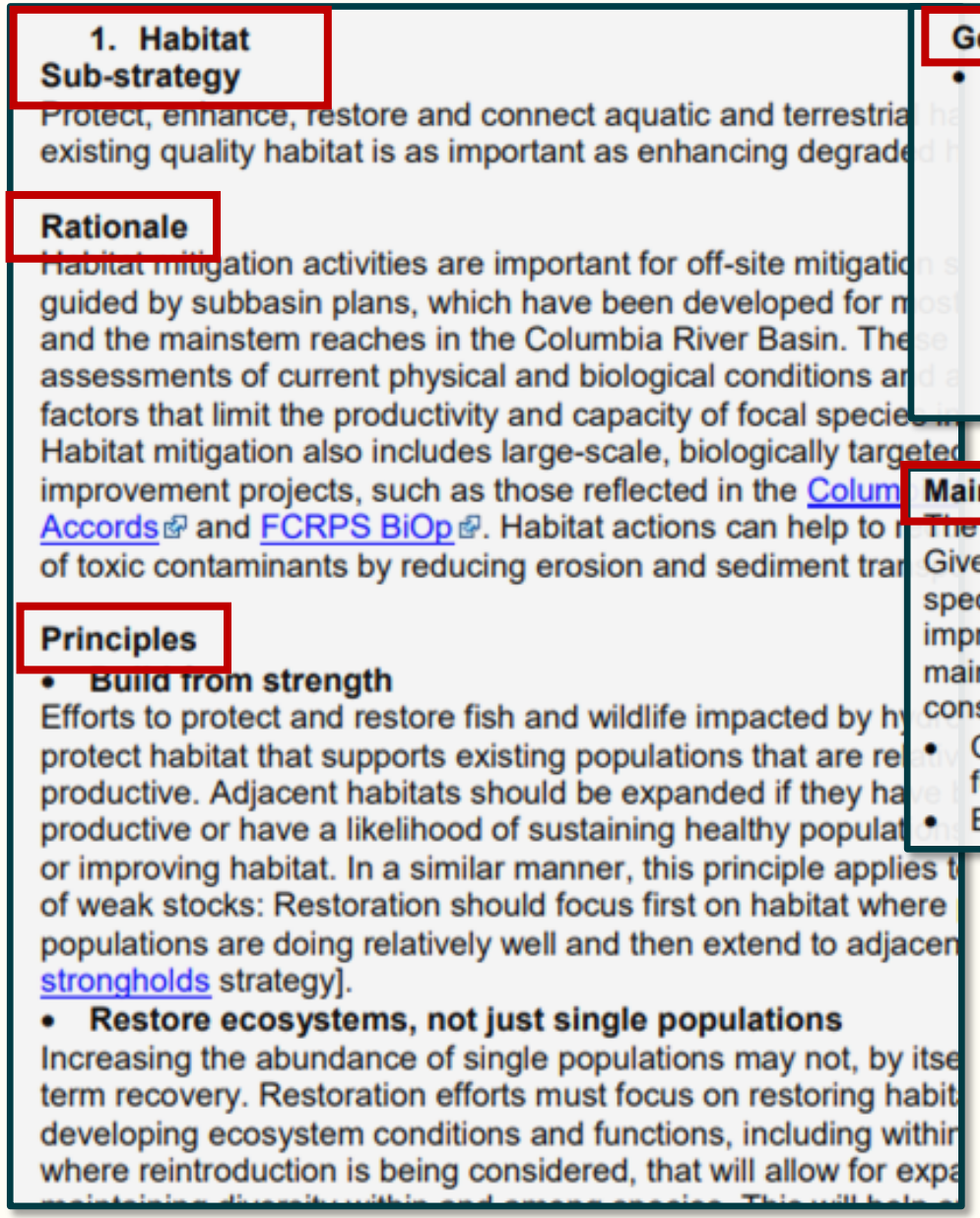
IV. Strategies – How the program will achieve the changes

A. Ecosystem function
   1. Habitat
   2. Strongholds
   3. Non-native and invasive species
   4. Predator management
   5. Protected areas and hydroelectric development and licensing
   6. Water quality
   7. Climate change
   8. Mainstem hydrosystem flow and passage operations
   9. Estuary
   10. Plume and nearshore ocean
   11. Wildlife mitigation

B. Fish Propagation Including Hatchery Programs

C. Other strategies
   1. Wild fish
   2. The use of hatcheries for reintroduction
   3. Anadromous fish mitigation in blocked areas
   4. Resident fish mitigation
   5. Sturgeon
   6. Lamprey
   7. Eulachon
   8. Public engagement

1. Text
2. Rationale
3. Principles
4. General Measures
5. Specific Measures
6. Link to Subbasin Plans
7. Links to other strategies in the Program



1. Habitat Sub-strategy

Protect, enhance, restore and connect aquatic and terrestria
existing quality habitat is as important as enhancing degrade

Rationale

Habitat mitigation activities are important for off-site mitigatio
guided by subbasin plans, which have been developed for m
and the mainstem reaches in the Columbia River Basin. The
assessments of current physical and biological conditions a
factors that limit the productivity and capacity of focal specie
Habitat mitigation also includes large-scale, biologically target
improvement projects, such as those reflected in the Colum
Accords and FCRPS BiOp. Habitat actions can help to
of toxic contaminants by reducing erosion and sediment tra

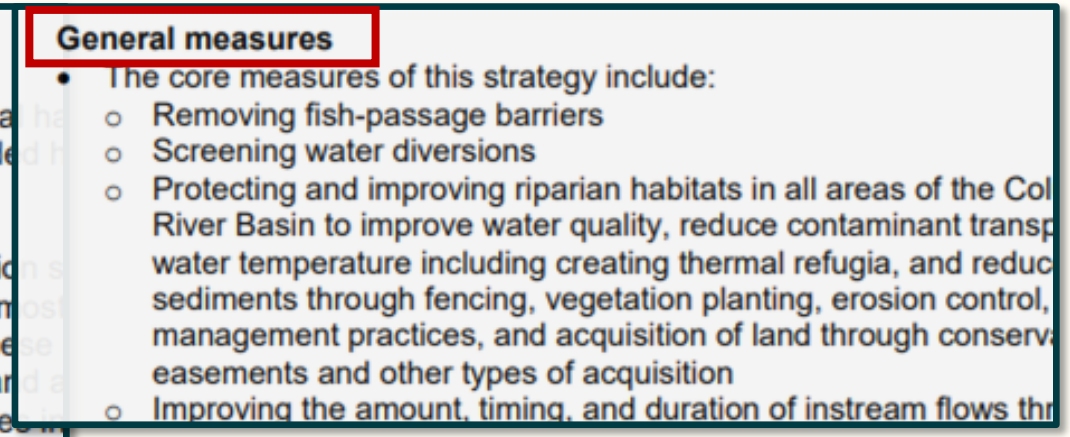
Principles

- **Build from strength**

Efforts to protect and restore fish and wildlife impacted by h
protect habitat that supports existing populations that are re
productive. Adjacent habitats should be expanded if they ha
productive or have a likelihood of sustaining healthy popula
or improving habitat. In a similar manner, this principle applies
of weak stocks: Restoration should focus first on habitat where
populations are doing relatively well and then extend to adjacen
strongholds strategy].

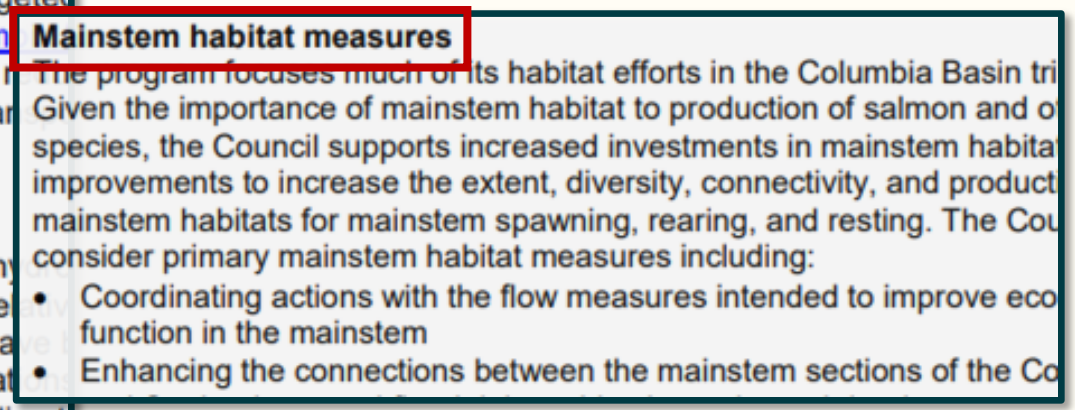
- **Restore ecosystems, not just single populations**

Increasing the abundance of single populations may not, by itse
term recovery. Restoration efforts must focus on restoring habi
developing ecosystem conditions and functions, including withi
where reintroduction is being considered, that will allow for exp



General measures

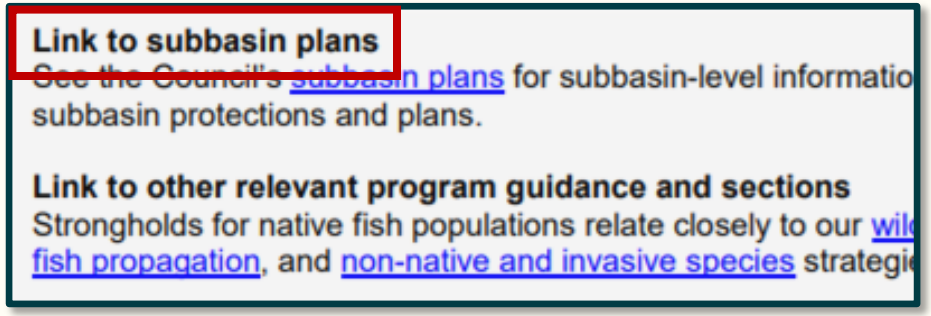
- The core measures of this strategy include:
  - Removing fish-passage barriers
  - Screening water diversions
  - Protecting and improving riparian habitats in all areas of the Col River Basin to improve water quality, reduce contaminant transp water temperature including creating thermal refugia, and reduc sediments through fencing, vegetation planting, erosion control, management practices, and acquisition of land through conserv easements and other types of acquisition
  - Improving the amount, timing, and duration of instream flows thr



Mainstem habitat measures

The program focuses much of its habitat efforts in the Columbia Basin tri
Given the importance of mainstem habitat to production of salmon and o
species, the Council supports increased investments in mainstem habita
improvements to increase the extent, diversity, connectivity, and product
mainstem habitats for mainstem spawning, rearing, and resting. The Cou
consider primary mainstem habitat measures including:

- Coordinating actions with the flow measures intended to improve eco function in the mainstem
- Enhancing the connections between the mainstem sections of the Co



Link to subbasin plans

See the Council's subbasin plans for subbasin-level informatio
subbasin protections and plans.

Link to other relevant program guidance and sections

Strongholds for native fish populations relate closely to our wil
fish propagation, and non-native and invasive species strategi

Ecosystem Function (page 38)

Text of strategy:

- Protect and restore natural ecosystem functions, habitats, and biological diversity wherever feasible consistent with biological objectives in the program.

Ecosystem Function

Summary of measures:

- Habitat:
  - Identify productive habitat areas and restore habitat connected to these areas
  - Restore ecological functions across mainstem, tributary, riparian, upland, wetland habitats, emphasizing connectivity, complexity, and biological diversity
  - Restoration also includes water quantity and quality
- Hydro:
  - Provide flows to promote productive populations of resident and anadromous fish
  - Use stored water to address temperature disparities
  - Identify and address how flow regimes affect ecosystem function in estuary, plume, and near-shore ocean
- Adaptive management:
  - Develop metrics of juvenile Recruits/ spawner to evaluate habitat restoration effectiveness

Ecosystem Function

Key issues:

- Physical, chemical, and biological conditions of the basin are not static
- Human populations continue to increase in the basin, including infrastructure
- How much ecosystem function can and needs to be restored to mitigate for hydrosystem effects on fish, wildlife, habitat?
- There is a need to restore natural processes, functioning floodplains, riparian vegetation, and instream habitat complexity. These are often large and complex projects.

Habitat (page 41)

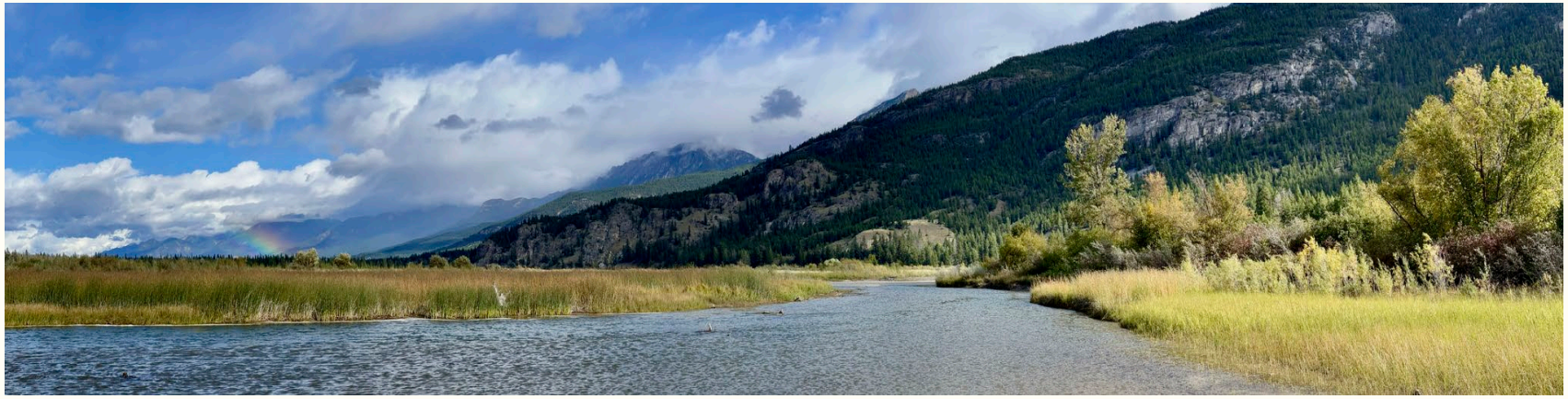
Text of strategy:

- Protect, enhance, restore and connect aquatic and terrestrial habitat. Protecting existing quality habitat is as important as enhancing degraded habitats.

Summary of principles:

- Build from strength
- Restore ecosystems, not just single populations
- Use native species whenever feasible
- Address transboundary species

Habitat



Summary of measures:

- Basin-wide – general measures and specific mainstem habitat measures
- Implemented through general principles regarding habitat quantity and quality and water quantity and quality
- Floodplain connections, side channels, and riparian habitats
- Thermal refuge habitats
- Resident and anadromous and part of wildlife mitigation
- Meant to be ecosystem focused

Appendix O: planning documents listed by subbasin

Habitat

Key Issues:

- Better coordination and methods to assess the benefits of habitat improvements, taking into account that some of the benefits take a long time to achieve
  - The need for better coordination/collaboration so that larger-scale or more complex projects can be implemented throughout the basin
  - The need to engage with other federal land management agencies to align priorities (i.e. USFS, BLM)
- Given challenges of limited data availability and reporting, how can we better identify current and future habitat restoration needs?
  - Should the Program include specific restoration targets at different spatial and temporal scales?
- Mainstem habitat restoration – dredging and implication on upstream/downstream migrants

Strongholds (page 44)

Text of strategy:

- Acknowledge and encourage efforts to designate and conserve stronghold habitats and their populations of native, wild, and natural-origin fish, as well as areas managed for wild fish.

Icicle River, photo by Peter Jensen

Strongholds

Summary of measures:

- Request states to identify stronghold areas
- Recognize those designated areas in accordance with state law
- Develop maps
- Inventory actions that have occurred
- Support continued habitat improvement actions in strongholds
- Eradicate non-native and invasive species from strongholds

Strongholds

Key issues:

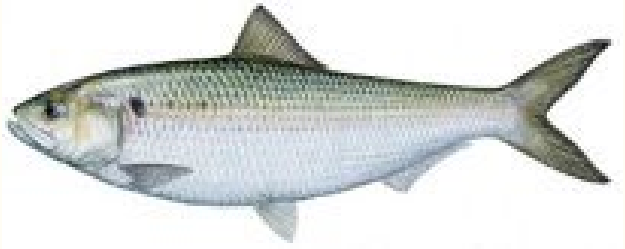
- Good idea,
  but challenges with implementation as written
- Probably being done in an ad-hoc way across the basin
- Would need to collaborate with county, state, federal and tribal entities for long term support and management

Non-native and invasive species (page 46)

Text of strategy:

- Prevent the introduction of non-native and invasive species in the Columbia River Basin and suppress or eradicate non-native and invasive species.

Non-native and invasive species



Summary of measures:

- Evaluate potential adverse impacts
- Prevent establishment
- Monitor and control non-native species introduction and dispersal
- Reduce competition
- Removal and eradication of non-native species
- Regional coordination
- Educate the public

Non-native and invasive species

Key issues:

- What about species that are not currently managed?
  - Carp, invasive vegetation, non-native clams and snails, tiger muskie, rusty crayfish, etc.
- Concerning and growing threat to investments/economic risk
- Not all hydro responsibility – BPA prefers a coordinated approach
- More research and coordination are needed for active population management in some cases (i.e. American shad)
- Competition with native species


Credit: Bob McNamara


Credit: iNaturalist


Credit: ODFW

Predator management (page 49)

Text of strategy:

- Improve the survival of salmon and steelhead and other native focal fish species by managing and controlling predation rates.


Northern Pikeminnow


California Sea Lion

Stellar Sea Lion

Predator management

Summary of measures:

- Manage predator fish, birds, seals, and sea lions
- Convene technical workgroup
- Monitor predation
- Model the effects of predator removal
- Identify lethal and non-lethal control methods
- Reduce population sizes
- Manage listed and wild fish impacts
- Support adaptive management programs

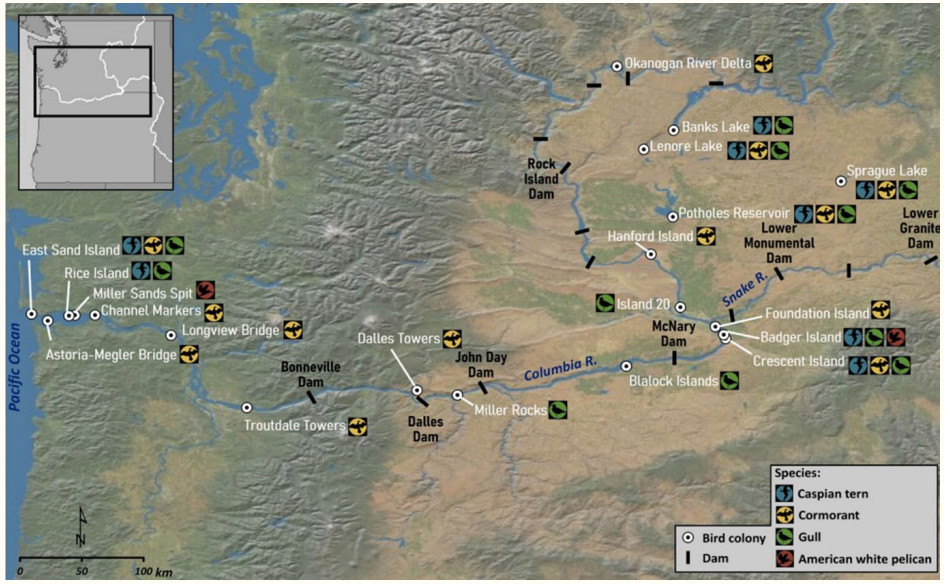
Photo: A W (Tony) Grover, flickr


Darian Pakootas
Spokane Tribe fisheries technician

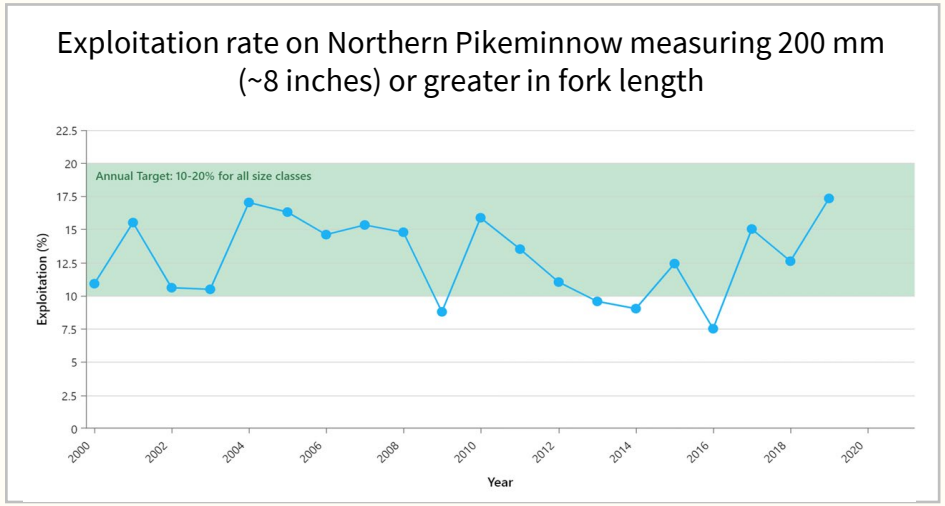
Predator management

Key issues:

- Other predators that should be managed?
- Spatial connection in managing – whack-a-mole
- Relieving one type of predation can invite other types to fill that niche
- Sustained funding needs
- Unified action plans across state lines and jurisdictions require complex coordination
- Incentive programs can lead to public engagement
- Need for continued prioritization in a changing system



Credit: Allen Evans, RTR, presentation to Council August 2024.
Bird Research Northwest 2023 Annual Report



Protected areas and hydroelectric development and licensing (page 52)

Text of strategy:

- Protect fish and wildlife from the adverse effects of future hydroelectric project construction and operations.
- As part of this strategy, the Council supports protecting streams and wildlife habitats from any hydroelectric development where the Council believes such development would have unacceptable risks to fish and wildlife.
- **Appendix F:** Future hydropower electric development and licensing, and protected areas

Protected areas and hydroelectric development and licensing

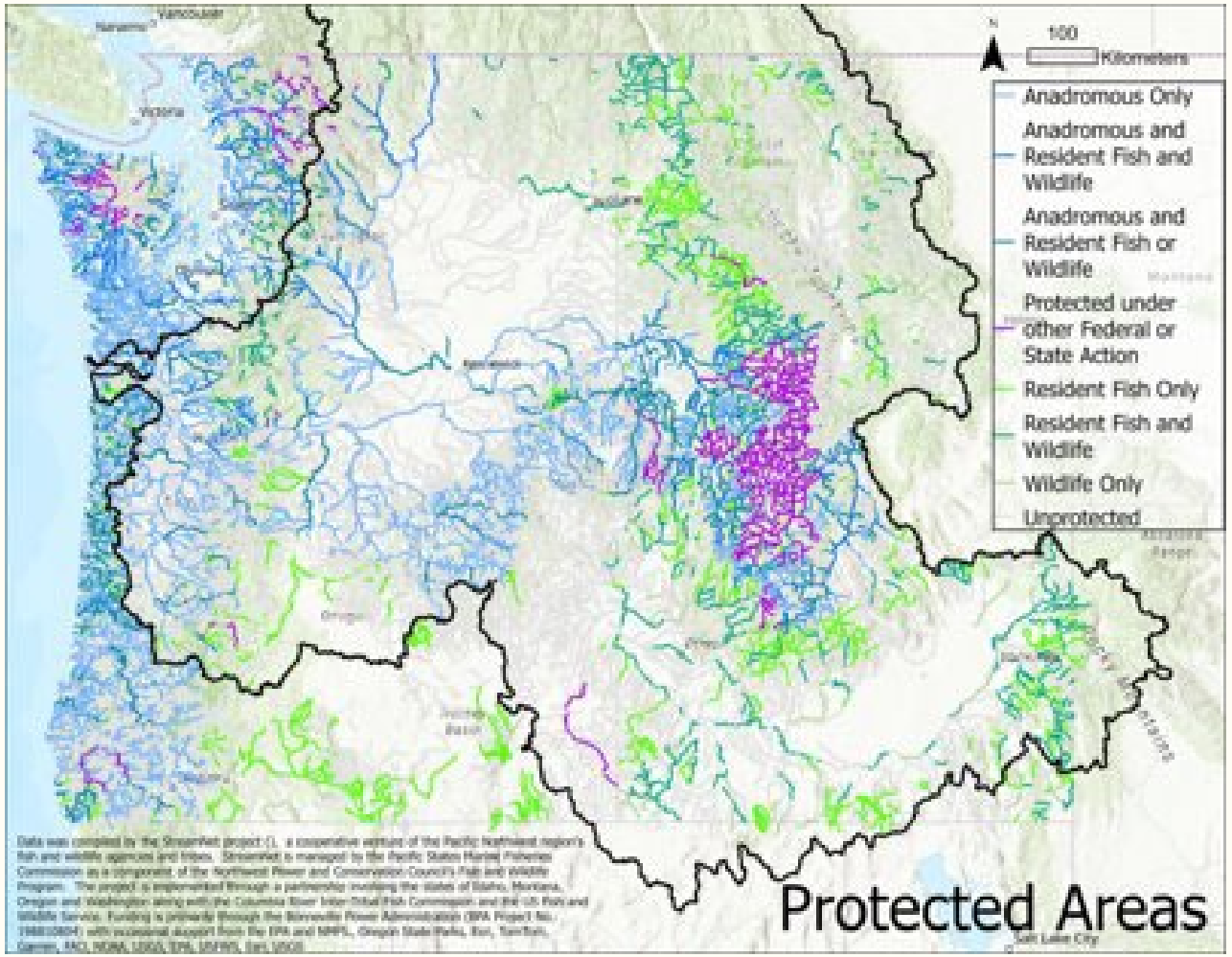
Summary of measures:

1. Future Hydroelectric Development and Licensing: fish and wildlife protection standards for FERC, BPA, and other agencies to apply to development and licensing of hydroelectric facilities outside of protected areas
2. Protected areas: river reaches to be protected are those reaches or portions of reaches listed on the “protected areas list” adopted by the Council in 1988, and subsequently amended.
   – Exemptions, amendments and exceptions: Set of criteria
3. Council expects FERC, in exercise of its licensing authority, to take Council’s hydroelectric development standards and protected areas designations into account to fullest extent practicable
4. Council expects BPA to acquire power / provide transmission support consistent with protected areas

Protected areas and hydroelectric development and licensing

Key issues:

- Protected Areas Rules have been very successful – jointly developed by utilities and managers
- Challenges in tracking permit or license applications



Water quality (page 54)

Text of strategy:

- Provide flows and habitat conditions of adequate quality and quantity for improved survival of anadromous and native resident fish populations on the mainstem Columbia and Snake rivers, as well as improving water quality in Basin tributaries, to promote healthy and productive populations of anadromous and native resident fish and wildlife.

Summary of principles:

- Public awareness
- Monitoring, assessment and reduction actions

Water quality

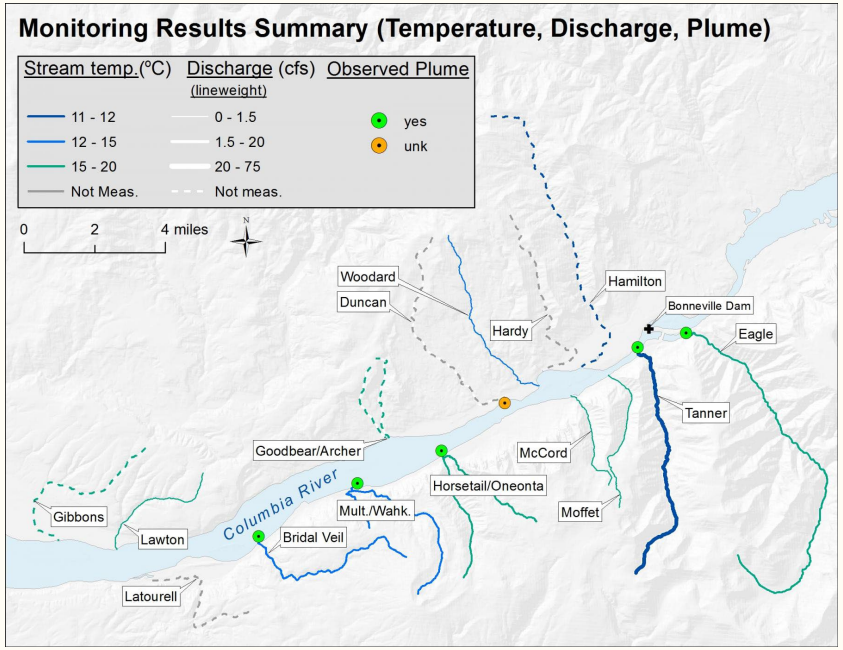
Summary of measures:

- Hydro:
  - TDG control and modeling
  - Flow management for temperature
  - Selective withdrawal
- Habitat:
  - Restoration to restore riparian vegetation/ reconnect floodplain/ reduce erosion
  - Improve existing cold water refugia
  - Monitor and map toxic contaminants

Water quality

Key issues:

- Temperature TMDL
- Cold water refugia
- Climate change impacts happening faster than solutions are implemented



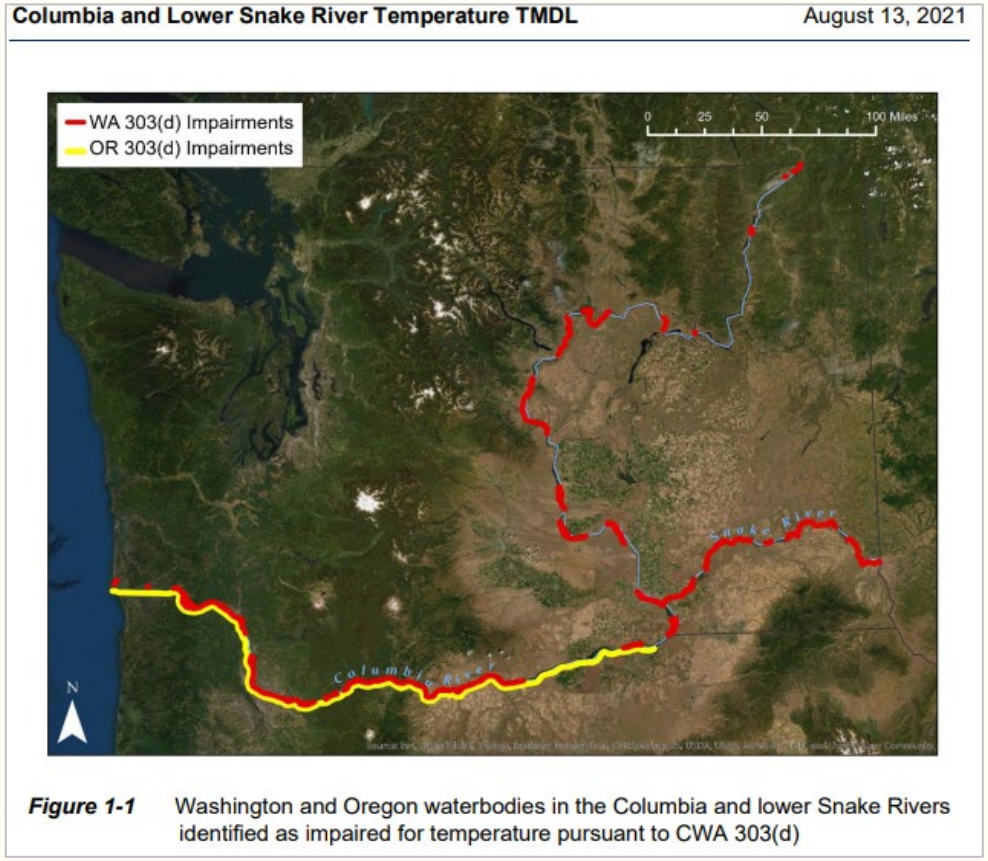


Figure 1-1 Washington and Oregon waterbodies in the Columbia and lower Snake Rivers identified as impaired for temperature pursuant to CWA 303(d)

Climate change (page 57)

Text of strategy:

- Better understand how the effects of climate change may impact fish and wildlife populations and mitigation and restoration efforts implemented under the Columbia River Basin Fish and Wildlife Program.
- Evaluate fish and wildlife investments and their ability to perform in the face of future climate conditions.
- **Appendix G:** Climate change impacts in the Columbia River Basin

Climate change

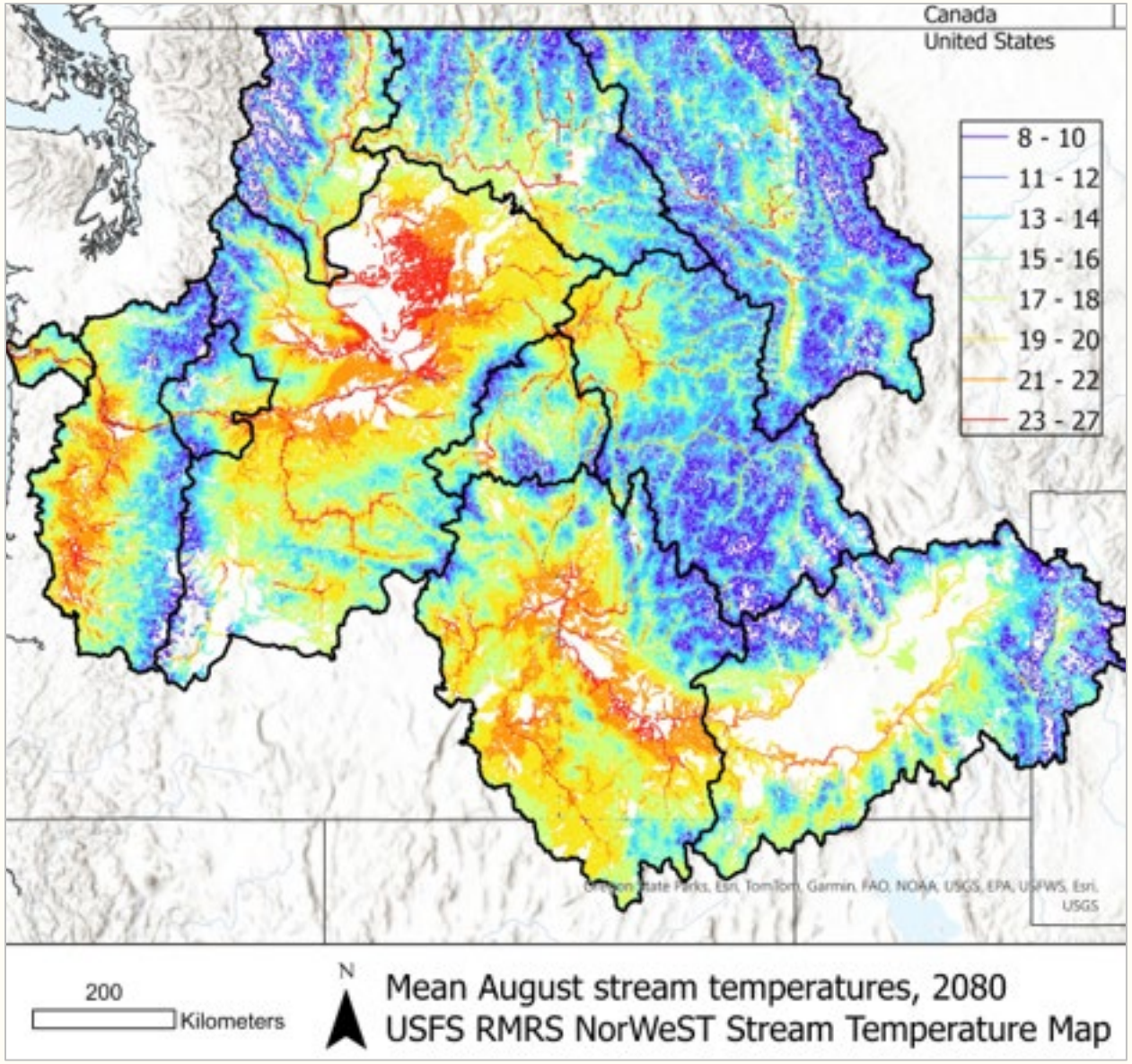
Summary of measures:

- Hydro: improve run-off forecasts; opportunities for flow/ selective withdrawal to reduce temps
- Habitat: Implement long term protections
- RM&E: Identify factors affecting survival in near-ocean and plume
- Outreach: encourage, monitor, promote public awareness of climate change and assess how it affects mitigation efforts; science-policy workshops
- Project sponsors: plan for climate change scenarios that could affect projects
- **2014 Emerging priority** – take into account the effects of climate change
- **2020 Near-term priority** – consider implications of climate change in all aspects of Program

Climate change

Key issues:

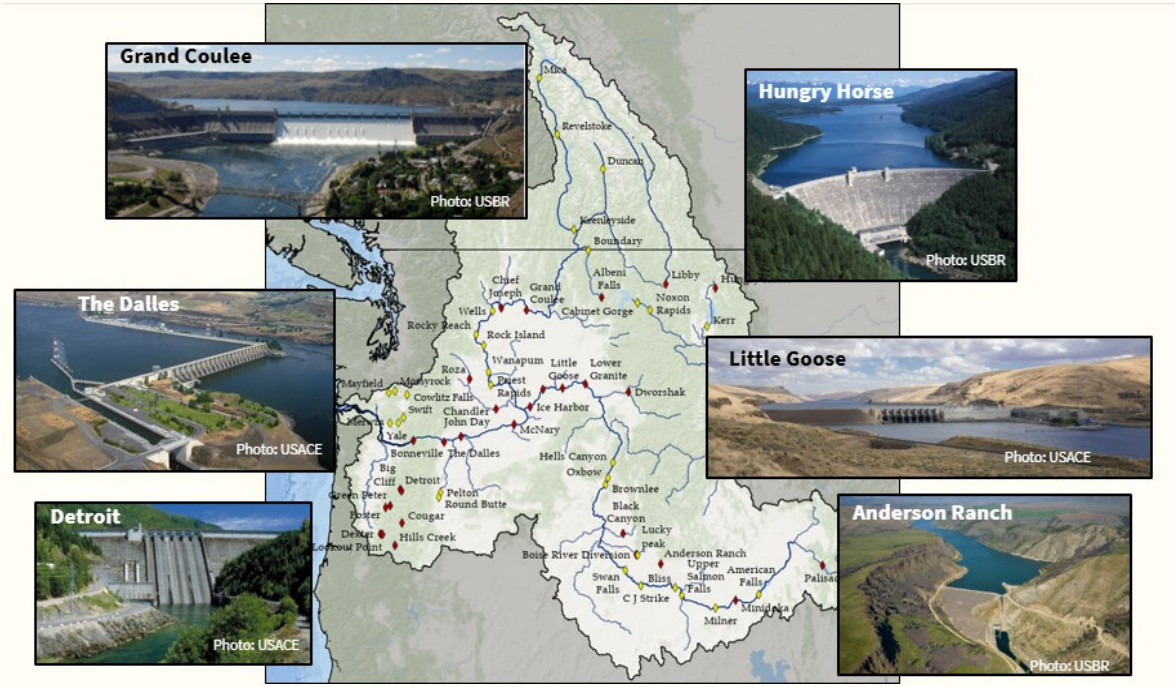
- Changing temperature and precipitation patterns affect all aspects of mitigation
- Opportunities to identify actions to improve resiliency of current and past mitigation investments?
  - Prioritization of habitat or other actions?
  - Are certain flow operations more or less vulnerable to a changing climate?
- Ongoing research questions to inform adaptive management



Mainstem hydrosystem flow and passage (page 60)

Text of strategy:

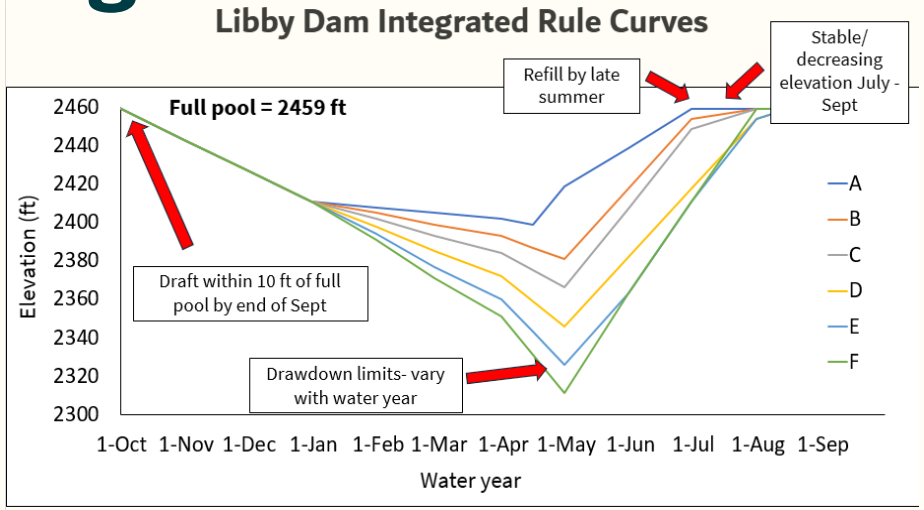
- Manage dams and reservoir operations to protect and restore ecosystem function and habitat, and to improve fish passage and survival through the hydrosystem.
- Analyze the power system effects of operations for fish and recommend adaptations to the power system so that these operations may be delivered in a reliable manner while the region continues to have an adequate, economic and reliable power supply.
- **Appendix H:** Fish Passage Center
- **Appendix I:** Alternative ops at Grand Coulee

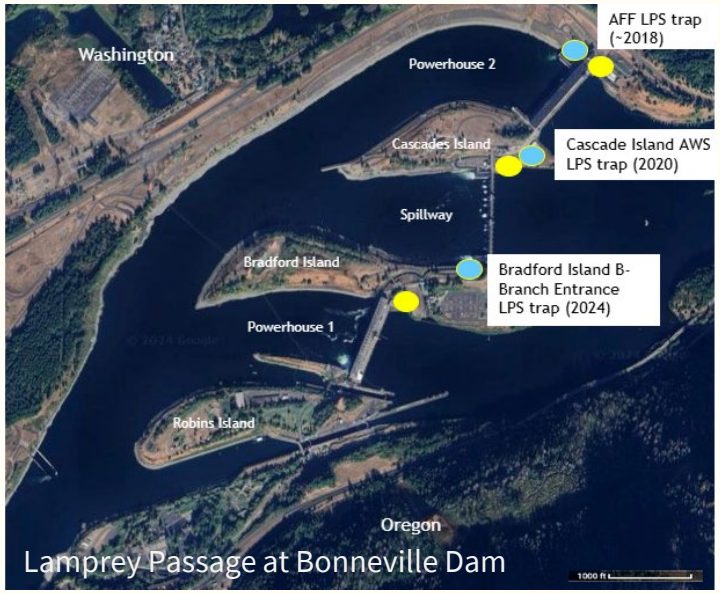


Mainstem hydrosystem flow and passage

Summary of measures:

- General measures for listed (consistent with BiOp) and unlisted species
- Specific measures:
  - Hanford Reach, Libby, Hungry Horse, Albeni Falls, Grand Coulee, Hells Canyon, estuary and plume
  - Improve juvenile and adult passage for resident and anadromous fish
  - Improve spill, flow, total dissolved gas (TDG), ecosystem function and connectivity, toxics monitoring, predation monitoring, etc.
- Power system considerations – balance hydrosystem operations for anadromous and resident fish





Lamprey Passage at Bonneville Dam

Mainstem hydrosystem flow and passage

Key issues:

- Differences in priorities throughout the basin
- Stressors on the system – Power demand, aging infrastructure, human population growth, etc.
- Changes in drawdown impacts due to Columbia River Treaty, climate change, etc.
- Develop more Integrated Rule Curves?
- How do we incorporate changing demands and operation of system?
  - Hydro flexibility and ramp rates; Columbia Basin Restoration Initiative, BiOPs, etc.
- Increased climate and forecasting challenges.
- Continue to seek opportunities to provide beneficial flows, including:
  - increase spring and summer flows
  - reduce flow fluctuations during spawning
  - spill where feasible
- Provide support for migration (upstream and downstream), rearing, and spawning of all species, not just salmonids
  - i.e., sturgeon, lamprey, bull trout, sea run cutthroat, eulachon, and others

Estuary (page 68)

Text of strategy:

- Restore ecosystem function to protect and enhance critical habitat and spawning and rearing grounds in the estuary and lower Columbia River.

Estuary

Summary of measures:

- BiOp measures are included in Program
- Habitat: floodplain reconnection
- RM&E: Effectiveness monitoring of restoration; status and trend monitoring of salmon, steelhead, lamprey; effects of flow regulation, dredging, water quality on estuary habitat and food webs
- Summary report on above measures from BPA and Corps

- **2020 near term priority** – repeat estuary sampling from 2016/2017 on benefits of estuarine use by migrating juvenile salmon

Estuary

Key issues:

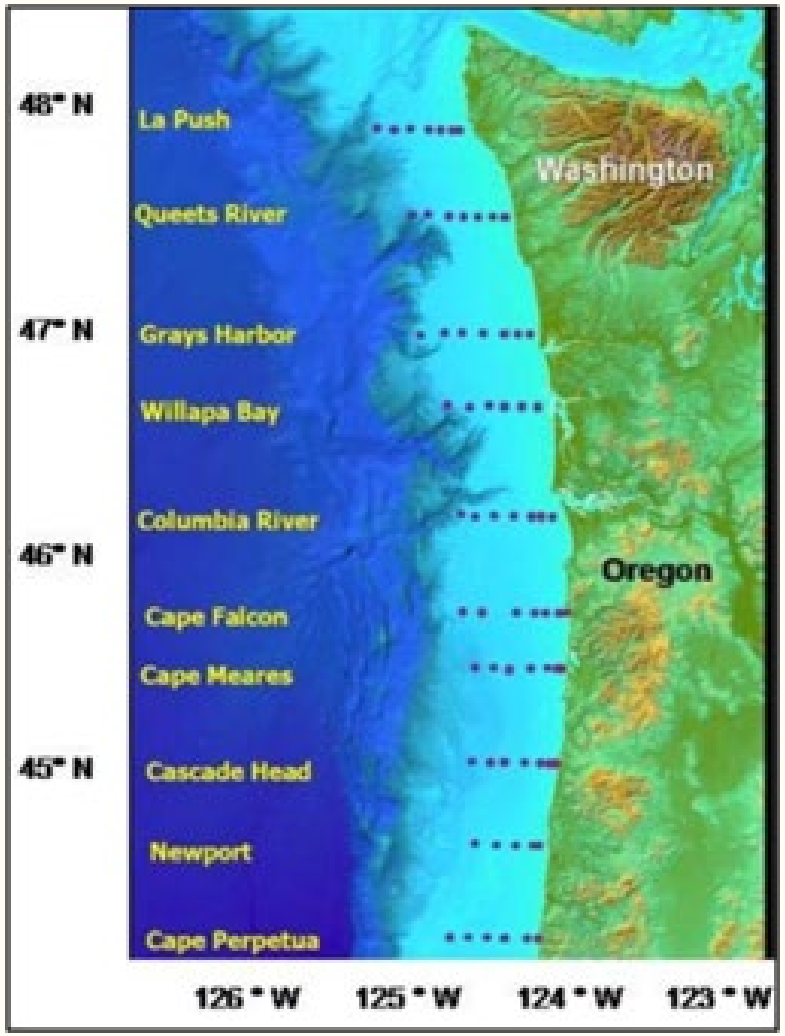
- Hydrosystem affects the physical and biological characteristics of estuary
- Balance multiple uses in the environment
  - Dredging/ transportation (e.g., rail)
- Substantial effort to restore habitat and increase habitat connectivity
- Ongoing need to understand how fish use and move through the estuary
- Need to consider needs of multiple species, not just listed, and multiple life stages – not just juvenile migrants
- **Note:** predation addressed in predator management strategy

Plume and nearshore ocean (page 70)

Text of strategy:

- Monitor ocean conditions and related salmon survival and endorses mitigation and management actions that improve the survival, growth, and viability of Columbia River fish in varying ocean conditions.

- Northwest Power Act:
  - *In making its recommendations to BPA, the Council shall consider the impact of ocean conditions on fish and wildlife populations…***839b(h)10(D)(vi)**



Plume and nearshore ocean

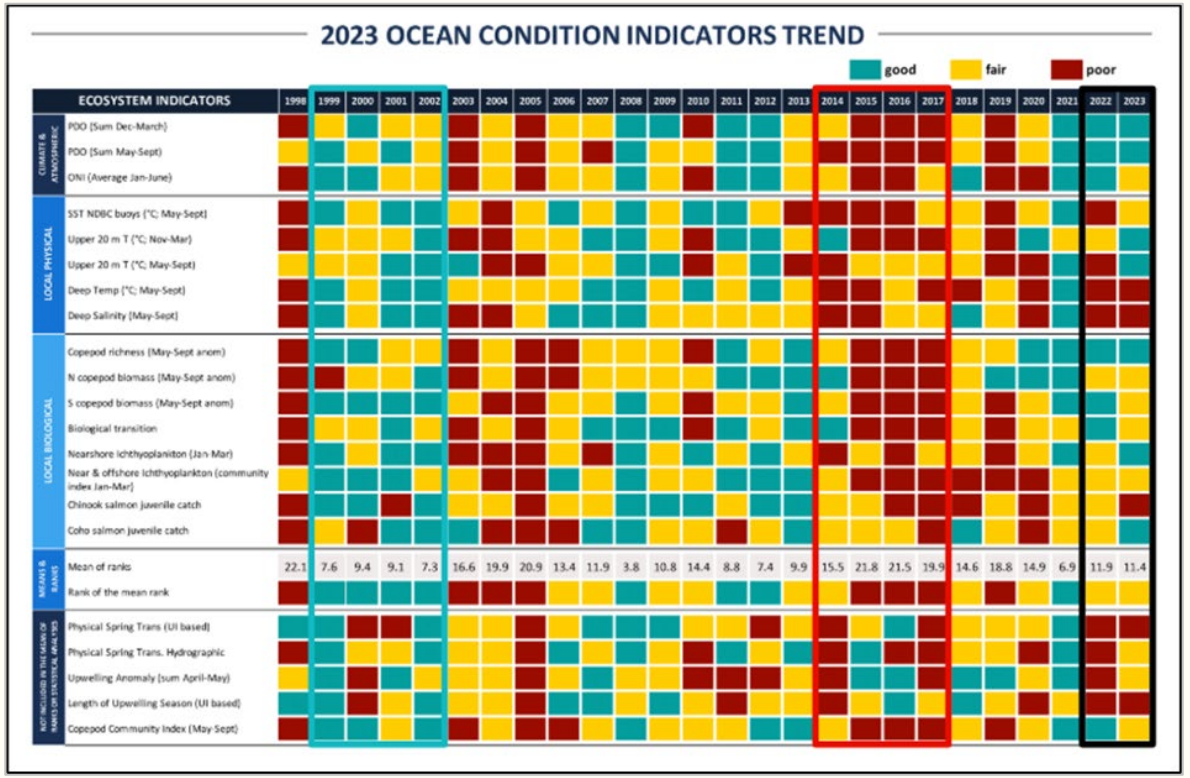
Summary of measures:

- RM&E: monitor plume and nearshore ocean conditions and in-river restoration to determine actions of greatest benefit and separate ocean-related mortality from that occurring in freshwater
- RM&E: effects of flow regulation on plume and salmon/steelhead productivity and abundance, diversity
- RM&E: monitor conditions in plume and nearshore ocean and assess impacts on salmonid survival – contributes to predicting returns
- Coordination: Ocean and Plume Science and Management Forum for ocean scientists and managers to share information and management needs
- RM&E: encourage development of annual index of ocean survival
- **2020 Near-term priority** – restore and sustain funding and implementation of ocean research at level recommended by Council and supported by ISRP

Plume and nearshore ocean

Key issues:

- Funding
- Rapid changes in conditions affect how well historical models predict current survival- need for continued investment in RM&E to understand trends in survival and conditions
- What is role of predation in plume?



Wildlife (page 72)

Text of strategy:

- Mitigate wildlife losses caused by the development and operation of hydropower dams in the Columbia River Basin.
- **Appendix C:** Wildlife mitigation priorities, construction and inundation loss assessments, and dam licensing considerations
- **Appendix J:** Wildlife crediting forum

Wildlife

Summary of measures:

- Complete operational loss assessments and mitigation
- Monitor and evaluate habitat and species response to mitigation
- Complete mitigation agreements for at least remaining construction and inundation losses by 2016 and develop management plans
- Several measures regarding habitat units and habitat evaluation procedure
- Long term agreements whenever possible
- Wildlife advisory committee- examine options and alternatives to mitigate for wildlife operational losses and provide recommendation to Council by 2015

Wildlife

Key issues:

- Complete settlement agreements for construction and inundation losses
- Assess and settle operational losses
- Ensure agreements include all entities with role in mitigation
- Sufficient funding for stewardship
- Complete land management plans and address any identified issues
- Track information on wildlife mitigation in one database
- Determine how climate change, invasive species, continued human development affect integrity of existing wildlife mitigation

Part Three: Basinwide Vision, Scientific Foundation, Goals, Objectives, and Strategies

IV. Strategies – How the program will achieve the changes

A. Ecosystem function
   1. Habitat
   2. Strongholds
   3. Non-native and invasive species
   4. Predator management
   5. Protected areas and hydroelectric development and licensing
   6. Water quality
   7. Climate change
   8. Mainstem hydrosystem flow and passage operations
   9. Estuary
   10. Plume and nearshore ocean
   11. Wildlife mitigation

B. Fish Propagation Including Hatchery Programs

C. Other strategies
   1. Wild fish
   2. The use of hatcheries for reintroduction
   3. Anadromous fish mitigation in blocked areas
   4. Resident fish mitigation
   5. Sturgeon
   6. Lamprey
   7. Eulachon
   8. Public engagement

Fish propagation including hatchery programs (page 76)

Text of strategy:

- Use hatchery programs as tools to help meet the mitigation requirements of the Northwest Power Act.
- **Appendix P**: Maintenance of Fish and Wildlife Program Investments

Fish propagation including hatchery programs

Summary of measures (15):

- All propagation actions should complement the management activities of the region's agencies and tribes, including habitat improvements.
- Comprehensive research, monitoring, assessment to guide adaptive management and improve programs.
- Report on implementation, performance, and effectiveness in meeting intended goals.
- **2014 Emerging priority** – Fund long-term maintenance of assets created by prior program investments

Fish propagation including hatchery programs

Key issues:

- Adequacy and continuity of funding for facilities and hatchery programs
  - Plans to address non-recurring maintenance needs
  - Annual Operations & Maintenance
- Hatchery effectiveness and reporting
  - Progress toward meeting mitigation objectives?
    - Which data to prioritize and standardize?
  - What is the comprehensive Program's contribution toward achieving regionally developed targets?
- Continue to improve understanding and adaptive management of natural- and hatchery-origin fish interactions

Wild fish (page 80)

Text of strategy:

- Native wild fish and the ecosystems they rely on must be protected, mitigated, enhanced, and recovered, as they constitute an important, genetically diverse, biological resource for the Basin (in the context of the Council's mitigation responsibility). Wild fish also provide important opportunities to rebuild and reintroduce populations where donor populations may support this. The Council also recognizes that hatcheries are an important tool for mitigating the hydrosystem's impact on wild fish and to assist in the rebuilding of certain wild fish populations.

Wild fish

Summary of measures (2):

- Council to consider needs of wild fish in all facets of the Program including: hydrosystem passage, fish propagation facilities, climate change, predation, strongholds, research, carrying capacity, and habitat actions.

- Council will collect, organize, and review biological objectives for wild fish.

Wild fish

Key issues:

- 2020 addendum – substantial progress in identifying objectives and SPIs
  - Data assembled on sturgeon, bull trout, cutthroat trout, and other resident species (not all datasets distinguish between origin of fish)
- Continue improving ability to track progress toward regional abundance goals for natural-origin Salmon and Steelhead
  - Challenging to roll up status and trend information at various levels and scales across multiple implementation partners

The use of hatcheries for reintroduction (page 82)

Text of strategy:

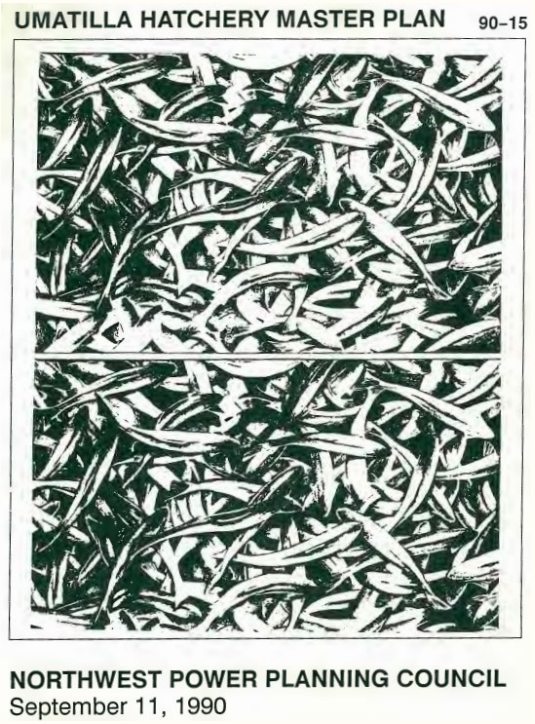
- The purpose of reintroduction is to return lost salmon and steelhead into blocked areas, or to re-establish populations in watersheds accessible for anadromy but where the native population had been extirpated or the risk of extirpation is very high. A successful reintroduction approach would result over time in anadromous fish that are viable in areas where they were previously located and that meet harvest and habitat goals and objectives identified by the agencies and tribes.

The use of hatcheries for reintroduction

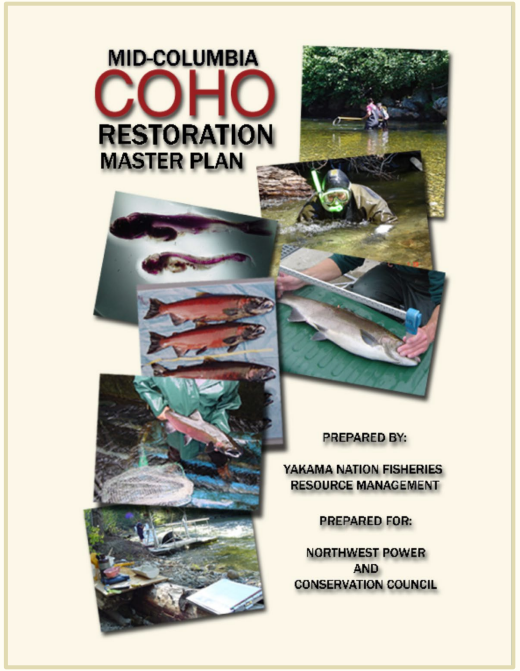
Summary of measures (2):

- Bonneville shall locate and operate hatcheries to re-establish salmon and steelhead where they have been extirpated, and substitute for extirpated salmon and steelhead in blocked areas.

- Goals, objectives, timelines, benchmarks and experimental framework for reintroduced populations will be developed by the agencies and tribes and submitted to the Council.




Butcher Creek acclimation site



The use of hatcheries for reintroduction

Key issues:

- Implementation occurs in:
  - Currently accessible areas – 8 anadromous salmon programs
  - Blocked areas – 9 resident fish programs provide interim fisheries as alternative source of harvest
- Continued support for mitigation and protection measures in blocked areas of the basin, including reintroduction of anadromous salmon and steelhead

Anadromous fish mitigation in blocked areas (page 83)

Text of strategy:

- Mitigate through implementation of a variety of actions that may include passage investigation, reintroduction of anadromous fish, habitat improvements, and harvest opportunities for the loss of salmon and in blocked areas of the Columbia Basin that historically had runs of anadromous fish. Flexibility in approach is needed to develop a program that addresses anadromous fish losses.

Anadromous fish mitigation in blocked areas

Summary of measures (18):

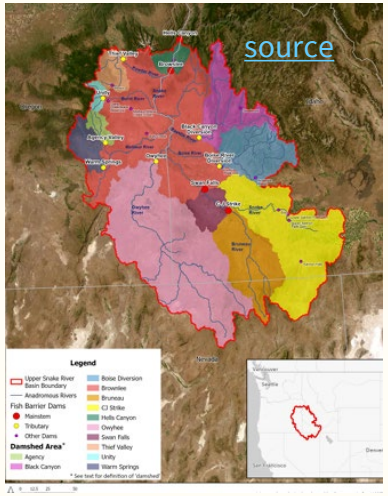
- In all blocked areas:
  - Action agencies to fund mitigation of anadromous fish losses
  - Implement through variety of actions:
    - Reintroduction of anadromous fish
    - Enhance abundance of resident fish and wildlife
    - Harvest opportunities, passage investigation, habitat improvements
- Phased approach to reintroduction of anadromous fish in the area above Grand Coulee and Chief Joseph dams
- **2014 Emerging priority** – Investigate blocked area mitigation
- **2020 Near-term priority** – Significantly increase level of mitigation in area above Chief Joseph & Grand Coulee dams


Source: 1991-046-00

Anadromous fish mitigation in blocked areas

Key issues:

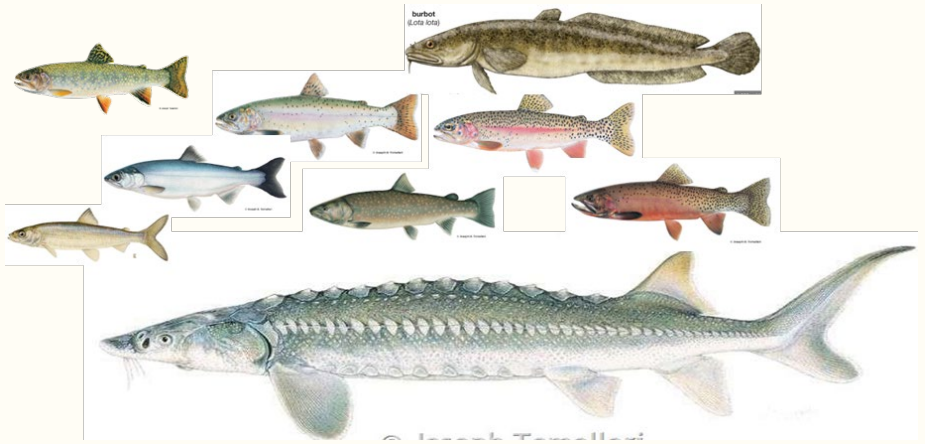
- Funding agreement to support Phase 2 Implementation Plan (P2IP) to study feasibility of reintroducing anadromous fish above Grand Coulee dam.
- Anticipating new projects and hatchery facility retrofit and/or construction to support P2IP.
- Continued development of loss assessments and evaluations for reintroducing anadromous Salmon and Steelhead in other blocked areas (e.g., Upper Snake Basin).



Resident fish mitigation (page 87)

Text of strategy:

- For resident fish and other aquatic species impacted by the hydrosystem, protect and mitigate freshwater and associated terrestrial habitat, and native fish populations.
- **Appendix K:** Resident fish mitigation settlements



Resident fish mitigation

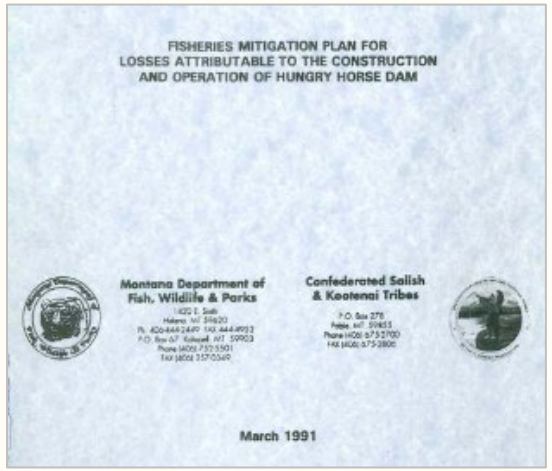
Summary of measures (9):

- Diversified approach to mitigating losses and addressing limiting factors affecting resident fish and other native aquatic species.
  - Management of non-native species and predators
  - Hydrosystem operations
  - Hatcheries to support interim fisheries where native fisheries have been lost
  - Restoration & protection of habitat
  - Restore passage (including at Albeni Falls Dam)
  - Research, monitoring, and evaluation
- Emphasis on development of resident fish habitat loss assessments, and once completed, encouraging Bonneville to negotiate settlement agreements as described in Appendix K.
- **2020 Near-term priority** – Mitigation in blocked areas: …*losses to other fish and wildlife species in the Lake Roosevelt and Spokane River areas above Grand Coulee and Chief Joseph dams…*

Resident fish mitigation

Key issues:

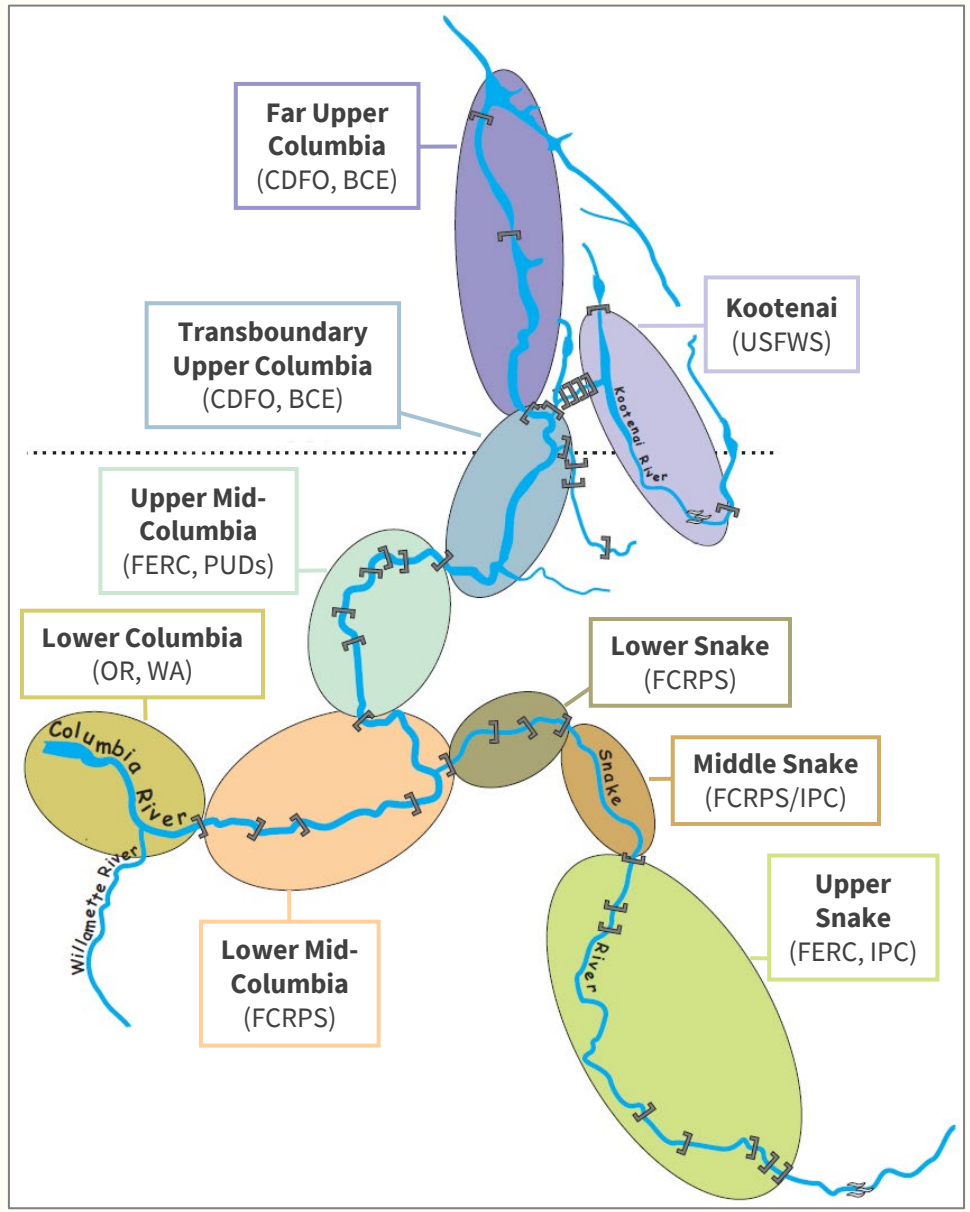
- Resident fish habitat losses have not been determined for most of the Basin (exception for Flathead and Kootenai subbasins due to construction of Libby and Hungry Horse dams).
- Adequacy of funding for long-term maintenance of land acquisitions (**2014 Emerging priority** – Fund long-term maintenance of assets created by prior program investments)



Sturgeon (page 90)

Text of strategy:

- Implement actions that result in increased abundance and survival for Columbia River Basin green and white sturgeon, including habitat actions, dam operations and passage, hatchery considerations, monitoring populations, and research to improve understanding of how the development and operation of the Federal Columbia River Power System affect survival and growth of sturgeon.
- **Part 6.II**: **Emerging program priorities, 5**. Implement additional sturgeon and lamprey measures (passage and research)
- **2020 Addendum, Part II near term priorities Sturgeon:**



Sturgeon

Summary of measures:

- Hydro: Beneficial mainstem flows and operations consistent to needs (balance anadromous and resident), several related to passage, entrainment and the isolation that dams cause.
  - *2020 Addendum*: Council expects federal agencies to evaluate alternative flow regimes beneficial to sturgeon below McNary Dam and consider those operations without compromising protection for salmon, steelhead and lamprey.
- Habitat: Investigations and restoration of habitat needs across life stages, overlaps with hydrosystem operations. Minimize dredging mortality
- Predation: Management predator seals and sea lions (Predator Management Strategy (Page 49))
- Research: Research associated with above measures (Part Four: Adaptive Management (Page 101)
- Monitoring: Coordination with agencies and tribes monitoring actions and populations status. Develop and model spawning and rearing in conjunction to hydro operations.
  - *2020 Addendum*: increase monitoring population between McNary Dam and Priest Rapids and lower Snake River
- Hatchery: Hatcheries for supplementation, including continued support for Kootenai white sturgeon
- Upper-Columbia specific: Continue baseline monitoring and interim hatchery support

Sturgeon

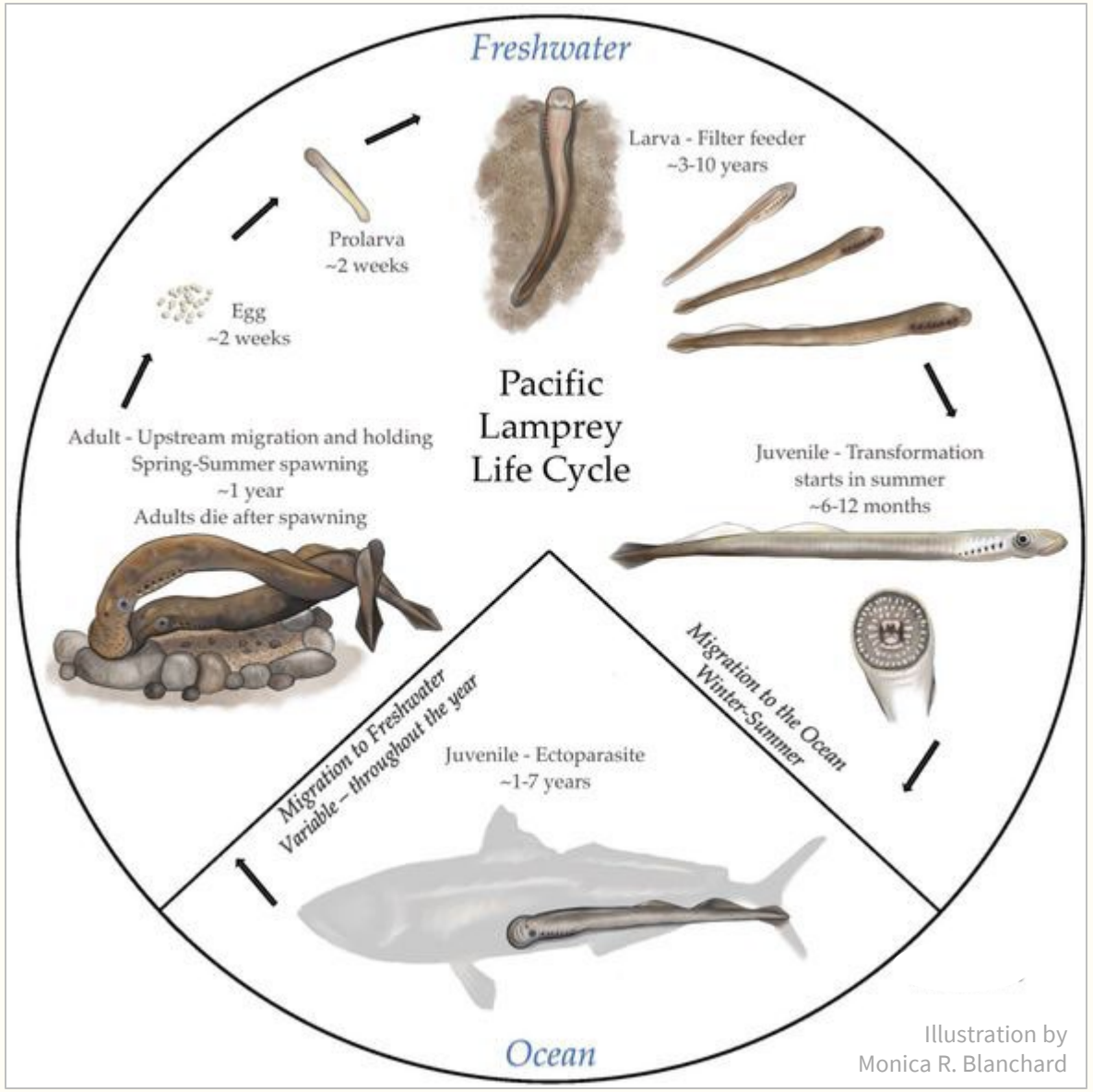
Key issues:

- Loss of habitat from the construction and operation of the hydropower system has isolated populations and limited access to food and suitable spawning and rearing habitat.
- Challenging to manage these fragmented populations due to the low productivity of the altered mainstem.
- Work in the lower mid-Columbia is focused on monitoring and evaluation of the isolated group and is currently studying the possibility of artificial production to restore these populations
- In the mid-Columbia where recruitment failure is severe, managers are relying on artificial production to help maintain and restore populations. This work is being led primarily by state agencies, tribes and PUD's
- Sturgeon work in the Kootenai includes habitat restoration, research, and hatchery production.
- Continuity of support lacking to address challenges that sturgeon need to persist

Lamprey (page 94)

Text of strategy:

- Implement actions that result in increased abundance and survival for lamprey, including habitat actions, dam operations and passage, monitoring populations, and research to improve understanding of how the development and operation of the Federal Columbia River Power System affect migration success, survival and growth of lamprey.
- **Part 6.II**: **Emerging program priorities, 5**. Implement additional sturgeon and lamprey measures (passage and research)



Lamprey

Summary of measures:

- Hydro: determine effects of operations and reservoir fluctuations on adult and juvenile, monitor passage and establish passage standards, monitor predation, and assess dredging impacts.
- Habitat: Identify, protect, and restore habitat that benefit all life stages and implement habitat projects that minimizes mortality. Install appropriate screens on water diversions
- Predation: Management predator seals and sea lions (Predator Management Strategy (Page 49))
- Research: Research associated with above measures (Part Four: Adaptive Management (Page 101)
- Monitoring: develop strategy to monitor and report on passage at dams and in tributaries and framework to report status including distribution
- Propagation: Evaluate potential role of lamprey propagation and translocation when passage and habitat improvements alone are insufficient
- Other: complete a loss assessment and determine effects of climate change, vulnerability to toxins

Lamprey

Key issues:

- Though much progress has been made regarding Program measures, the activities have only been making progress over the last 15 years. Continued support and implementation of current activities are warranted.
- Collaborative efforts have made progress in gathering and understanding the current status and needs of lamprey in the Columbia River Basin in recent years.
- Efforts to improve mainstem adult passage involving the Corps of Engineers and others is progressing
- Other efforts associated with effectively monitor out-migrating larval lamprey; developing and implementing genetic monitoring approaches; estimating abundance and escapement at Willamette Falls; and continuing to research lamprey supplementation strategies are being developed.

Eulachon (page 97)

Text of strategy:

- Increase understanding, protection, and required restoration of eulachon for the Columbia Basin, estuary, and ocean ecosystems. Better understand how the development and operation of the Federal Columbia River Power System (FCRPS) affects eulachon spawning, survival of eggs and larvae, and migration patterns.

Eulachon

Summary of measures:

- When recovery plan complete (2014 Supplemental FCRPS BiOP), Council will incorporate elements in the program and consider developing objectives and M&E
  - *NOAA's Eulachon Recovery Plan which was approved by NMFS in September 2017*
  - *In the 2014 and 2019 FCRPS/CSRO biological opinions, to promote eulachon conservation and address uncertainties – productivity and abundance, and larval and juvenile survival in the estuary, plume and ocean*
- Potentially include any habitat actions identified by NOAA to be considered for Program proposals
- Hold a science-policy forum to address biological requirements of Eulachon
  - *The Columbia River Eulachon (smelt) State of the Science and Science to Policy Forum was held in August 2015*
- Research: how biological requirements are affected by flow and hydro operations, importance of ocean and estuary environments to Eulachon

Eulachon

Key issues:

- Listed as threatened and managed by NOAA Fisheries – isolated geographically in the basin to below Bonneville Dam and spawn primarily in the Grays, Cowlitz, and Sandy Rivers
- Continued and additional efforts needed to understand the extent to which Eulachon are affected by the hydrosystem and what restoration actions can be taken to improve productivity and survival
- Support needed for monitoring abundance, understanding life stage requirements in the estuary and plume; understanding the causal mechanisms (shifts, timing, magnitude, and duration) of the hydrograph of the Columbia River; and identifying migration/ behavior characteristics affecting survival in the estuary-plume-ocean environment

Public engagement strategy and measures

Strategy:

- On an ongoing basis, the Council will educate and involve Northwest citizens to develop, implement, and improve understanding of the fish and wildlife program and the Council, and to promote successful ecosystem management.

Measures:

- Inform and involve the public
- Publicly recognize good examples of partnerships (w/Bonneville and other interested parties)
- Monitor outcomes of outreach and engagement

Public engagement tools

- Website
- Social media
- Press coverage
- Council meetings
- Consultations
- Public hearings
- Forums and workgroups
- Conferences
- Presentations
- Congressional tours
- Government affairs

Public engagement key issues

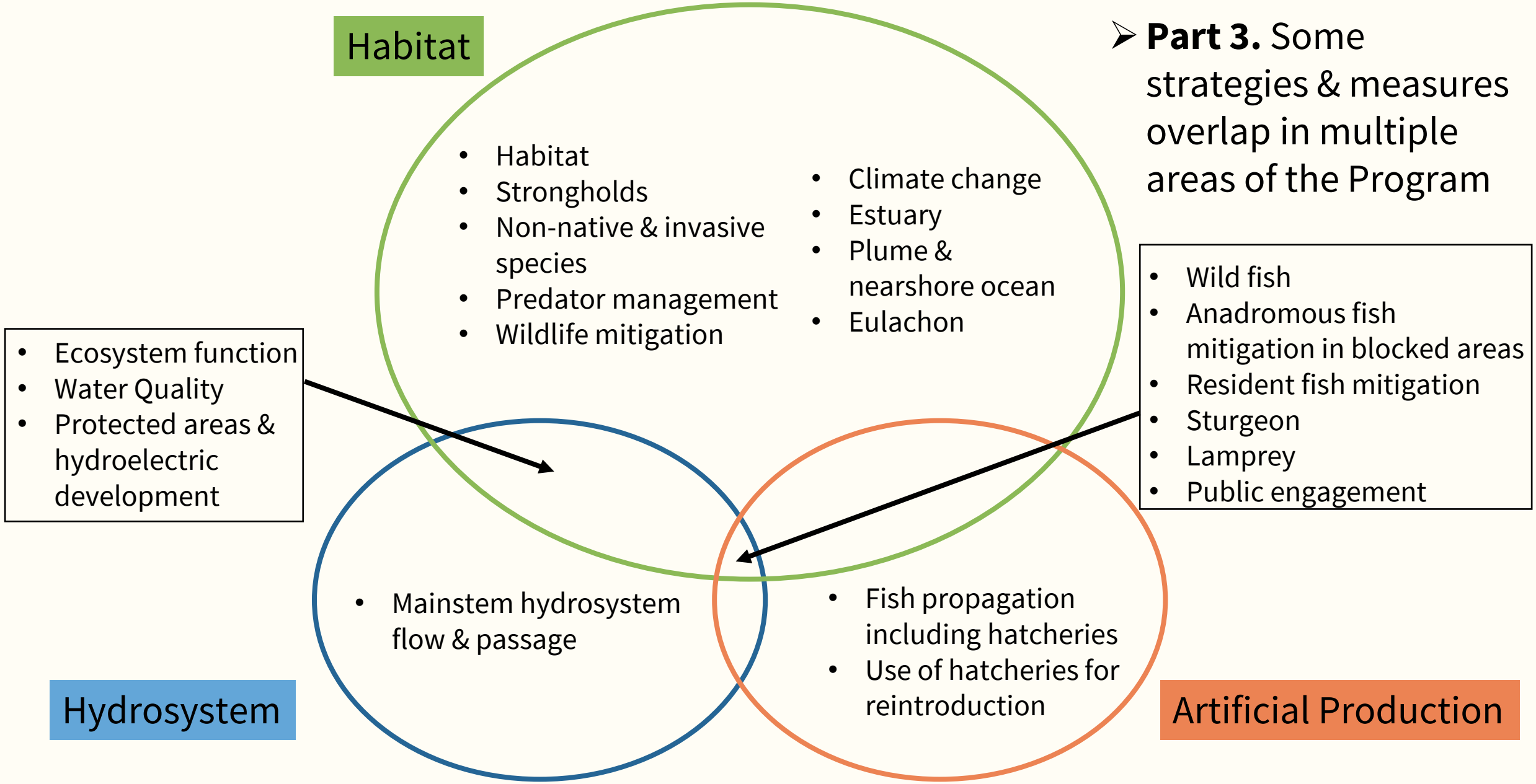
- Distinguishing Council's Fish & Wildlife Program and how it integrates with tapestry of efforts in the Columbia River Basin
- Explaining the unique position of Northwest Power Act and Council's role in both power planning and fish and wildlife mitigation
- Uplifting stories of projects and partners
- Highlighting successes and challenges through media engagement, Council products, and other outlets
- Connecting F&W Program to the broader public's lived experience to build recognition, support, and engagement

Next up: examples of overlap

… among strategies and Categorical Assessments

… among measures within strategies

➢ **Part 3.** Some strategies & measures overlap in multiple areas of the Program



Examples of overlap across strategies

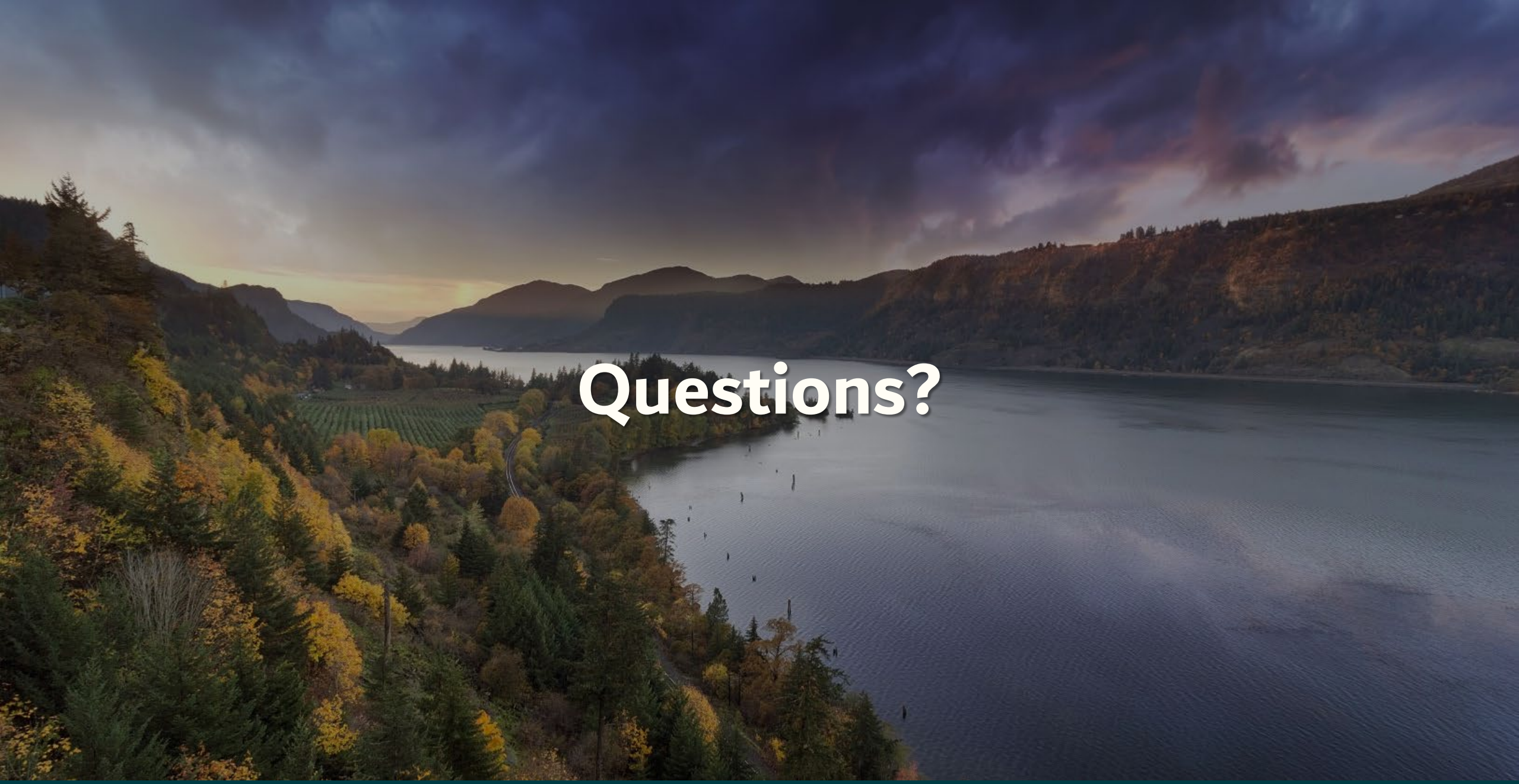
- Habitat restoration benefits multiple species, and Program calls for multi-species approach
  - Called for under Habitat, Blocked area mitigation, Resident fish mitigation, Wildlife, Sturgeon, Lamprey, Eulachon

- Hydrosystem strategy covers flows and passage for resident and anadromous species, along with identifying where RM&E needed
  - Also reiterated in Resident fish mitigation, Blocked area mitigation, Sturgeon, Lamprey, eulachon

- Artificial production strategy describes general and specific measures related to production of fish, RM&E, wild fish, etc.
  - AP measures also appear in Resident Fish Mitigation, Blocked area mitigation, Use of hatcheries for reintroduction, Sturgeon, Lamprey

Example from Sturgeon strategy

- Principles:
- General measures
  - Hydropower dam operations and fish passage
  - Mainstem habitat
  - Predation- See predator management strategy
  - Research- See research section of the adaptive management strategy
  - Monitoring-
  - Hatchery-
  - Upper-Columbia specific…
- Links to subbasin plans
- Links to the following other strategies: mainstem hydro, predator management, water quality, habitat, and adaptive management


Questions?

Explain and give examples of redundancy, improve integration

2014/ 2020 Program Strategies in Part Three

- Ecosystem function
  - Habitat
  - Strongholds
  - Non-native and invasive species
  - Predator management
  - Protected areas
  - Water quality
  - Climate change
  - Mainstem flow and passage
  - Estuary
  - Plume and nearshore ocean
  - Wildlife mitigation
- Fish propagation including hatchery programs
- Other strategies
  - Wild fish
  - Use of hatcheries for reintroduction
  - Anadromous fish mitigation in blocked areas
  - Resident fish mitigation
  - Sturgeon
  - Lamprey
  - Eulachon
  - Public engagement