SCEE Background Information from the CBPTF

The following serves as a Table of Contents – arranged in what is hoped to be a logic path – of information related to SCEE that was generated by the CBP Task Force. Most of this information is not in the Task Force Phase 2 Report (Report). This information is in the archive of documents developed in the planning, preparation for, and then summaries of Task Force Meetings.

Let's begin with a recommendation from the Sera Workshop Summary Memo that is in the Report.

MAFAC CBP Task Force SCEE Relationship Flow Mapping Exercise Sera Workshop Summary Memo_2019_508----------Page 4

RECOMMENDATIONS FOR FUTURE SCENARIO PLANNING Page 29

The initial relationship flow mapping exercise enabled participants to visualize existing systems relationships within each sub-basin and throughout the Basin. With this baseline information and learning, we recommend the task force use systems thinking to engage in future scenario planning.

2. Identify systems to strengthen.

- Identify "good" systems that should be strengthened as part of future scenario planning and that could be central to a scenario. These are likely to be the ones that span multiple dials.
- Identify weak systems that could be strengthened in service of achieving Basin goals.
- Identify systems containing conflicting elements.
- Identify potential new systems of relationships and potentially new elements.

◊ *Note the ICON KEY on p. 28 for all of the SCEE elements considered in this Workshop, as well as the most frequently appearing SCEE elements on p. 19. These Icons were developed from a previous Task Force exercise to determine: What are the key questions you would like answered in Phase 2"*

Key Questions from April 23-24 2019 MAFAC CBPTF Meeting----------Page 33

What are the key questions you would like answered in Phase 2?
April 23 & 24, 2019 MAFAC CBP Task Force Meeting

Brainstorming Guidance CBP Task Force- April 23-24, 2019 Meeting---------- Page 35

Framing a Mindset for the Day: The intent for the day is to be able to talk frankly about interests, needs, and concerns, to talk broadly, to hear all sides, to not judge or critique, to walk in each other's shoes, shoes, to take a long term view, and to protect a safe space during the dialogue.

MAFAC CBP Task Force Sticky Wall 5.17.19----------Page 36

Comprehensive list of items generated in the April 23-24 Workshop. These were summarized into the Icons used in the **SERA Workshop.**

MAFAC CBPTF SCEE Activity for June 26 and 27, 2019 Meeting----------Page 46

These Social, Cultural, Economic and Ecosystem (SCEE) Considerations initiated the Task Force's incorporation of SCEE into the Salmon Slider Dial to refine:

Qualitative Goal 4. Make decisions within a broader context that reflects, and considers effects to, the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia.

This was a worksheet to be completed by Task Force Members. We do not have the summary of this input.

◊ *Note, this activity initiated the incorporation of SCEE information into the Salmon Slider.*

MAFAC CBP Task Force- Condensed SCE&E Table as of 1.2.20---------- Page 54

CBP Task Force
Table of Social, Cultural, Economic and Ecological (SCEE) Considerations
Draft 11-12-19

The details in this table would be rolled up into a summary description to go along with scenarios.

◊ *This Table of Social, Cultural, Economic and Ecological (SCEE) Considerations may provide a model for consideration of SCEE elements.*

CBP Task Force SCEE + Limiting Factors diagram---------- Page 56

◊ *This diagram portrays how the salmon system in nested in the SCEE system.*

River Economics/ Evaluating Trade-offs in Columbia River Basin Fish and Wildlife Programs and Policies – February 2, 1999---------- Page 57

EXCERPT: Rivers are a challenging arena for the economic study of natural resources, an area of study that seeks an understanding and explanation of the use, allocation, and conservation of scarce resources. Because fresh water, fish habitats, and forests are scarce, hard choices must be made. Such choices involve trade-offs between Columbia `River fish and wildlife projects versus hydropower, river navigation, and irrigated agriculture. Each mix of river uses presents a unique

set of costs and benefits, with economic impacts distributed across various communities and economic sectors.

To evaluate the magnitude of costs, benefits, impacts, and the distribution of these impacts, economists study human behavior, emphasizing individual and group responses to changing economic conditions, institutions, and rules. An understanding of behavioral responses of people and institutions facilitates assessment and forecasting of economic effects of alternative projects and policies. The role of economic information is, therefore, to narrow and focus the discussion of alternatives, allowing non-economic forces to be evaluated with more clarity. If the analysis can clarify the magnitude and incidence of economic trade-offs, the decisions become clearer, but not necessarily easier. While economics does not "show the path," it does clarify important consequences of choosing alternative paths. Analysis of these consequences can suggest new and more effective ways to design and implement resource conservation policy.

The Independent Economic Analysis Board was established to review existing information and to advise the Northwest Power Planning Council, and thereby the region represented by the Council — the states of Idaho, Montana, Oregon and Washington — about economic effects of fish and wildlife recovery projects, policies and changes in the hydroelectric system. This report establishes a conceptual foundation concerning the economics of alternative Columbia River fish and wildlife recovery measures, seeking toput the economic information into perspective. The paper describes when and why economic information should influence decisions of resource policy. And it offers a frank reminder of the limitations and shortcomings of economic information.

◊ *Can the Collaborative continue and add value to this Evaluation?*

MAFAC CBP Task Force
SCEE Relationship Flow Mapping Exercise
DRAFT Summary Memorandum

November 4, 2019

SERA

ACKNOWLEDGMENTS

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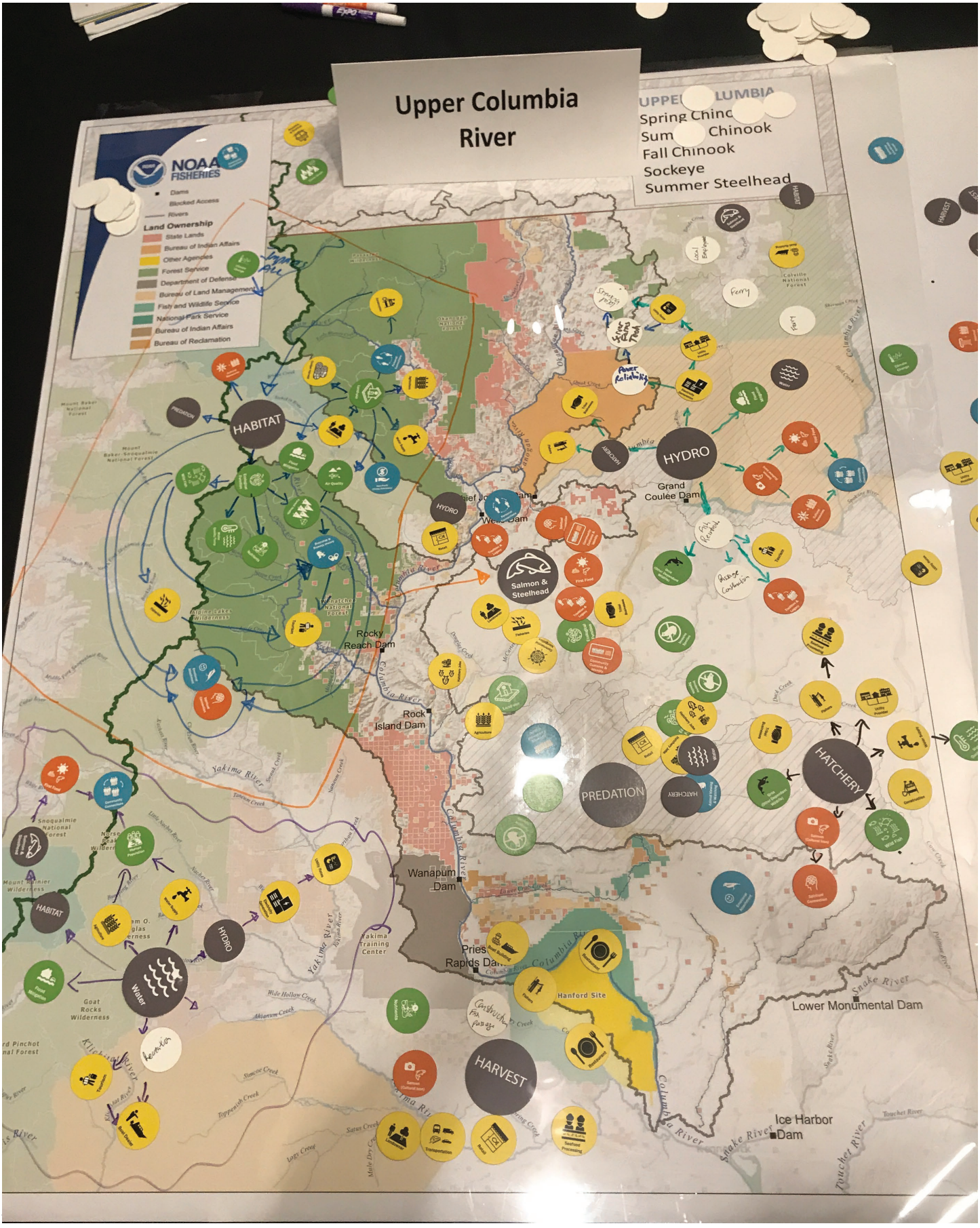

Upper Columbia River
UPPER COLUMBIA
Spring Chinook
Summer Chinook
Fall Chinook
Sockeye
Summer Steelhead
NOAA FISHERIES
Dams
Blocked Access
Rivers
Land Ownership
State Lands
Bureau of Indian Affairs
Other Agencies
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
HABITAT
HYDRO
HARVEST
HATCHERY
PREDATION
Salmon & Steelhead
Water
Grand Coulee Dam
Rocky Reach Dam
Rock Island Dam
Wanapum Dam
Priest Rapids Dam
Hanford Site
Lower Monumental Dam
Ice Harbor Dam
Columbia River
Snake River
Yakima River
Yakima Training Center
Goat Rocks Wilderness
Mount Baker-Snoqualmie National Forest
Colville National Forest
Wenatchee National Forest
Snoqualmie National Forest
Mount Rainier Wilderness
Alpine Lakes Wilderness
Touchet River

THE COLUMBIA BASIN PARTNERSHIP TASK FORCE AND RELATIONSHIP FLOW MAPPING

The Columbia Basin Partnership (CBP) Task Force was convened in 2017 by NOAA Fisheries and the Marine Fisheries Advisory Committee to develop shared goals and a comprehensive vision for the future of Columbia Basin salmon and steelhead. In Phase 1 the CBP Task Force developed qualitative goals and provisional quantitative goals for each of the 24 salmon and steelhead stocks in the Columbia Basin. In Phase 2, the CBP Task Force is developing scenarios for how the goals could be achieved. In addition, consistent with its Qualitative Goal #4, the Task Force is exploring social, cultural, economic, and ecological considerations related to those scenarios.

Qualitative Goal #4:

Make decisions within a broader context that reflects, and considers effects to, the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin.

The CBP Task Force engaged SERA Architects to assist with the exploration of these social, cultural, economic, and ecological (SCEE) considerations. Relationship flow mapping is a tool developed by SERA Architects for mapping complex systems relationships and impacts within a community, institution or watershed. Relationship flow mapping is a visual exercise that literally lays the elements of a system out on the table, allows participants to see the myriad of variables that could be impacted by changes in the system, and helps them identify what factors might be involved in those changes.

CBP Task Force members were asked to work in groups to identify SCEE variables within a sub-region of the Columbia Basin, to think about the directionality and significance of the relationships they identified, and to link those ideas to the Columbia Basin as a whole in order to deepen the understanding of SCEE considerations within the basin. This report summarizes the various SCEE considerations and systemic relationships identified by the CBP Task Force to enrich future work on scenarios and achieving the goals for salmon and steelhead in the Columbia Basin.

RELATING SCEE CONSIDERATIONS TO SALMON RECOVERY STRATEGIES

Recovery of salmon and steelhead involves implementing various biological strategies and actions across the landscape and life-cycle of salmon and steelhead to improve survival. These biological strategies and actions are targeted at reducing specific threats to fish survival and thereby reducing mortality associated with a particular threat to achieve an overall increase in survival. The CBP Task Force has employed a tool (a simple life-cycle model) that can be used to explore how reducing these threats in various combinations could improve salmon survival and achieve the provisional goals. This simple life-cycle model, also known as “the slider” – has a user interface that displays each of these threats as a “dial” that could be turned to increase or decrease the magnitude of that threat and its associated mortality.

The threats (“dials”) that the slider evaluates are:

- Hydro
- Predation
- Habitat (habitat, estuary, blocked)
- Harvest (fishery)
- Hatchery

THE ICONS

The relationship flow mapping was based on a set of icons representing a variety of important SCEE considerations within each region of the Columbia River Basin. The icons were created based on individual task force member feedback regarding the impact turning each of the dials might have on SCEE considerations. The icons are not an exhaustive representation of the SCEE consideration in the basin, however, so blank icons were provided for task force members to fill in with other SCEE considerations their group identified.

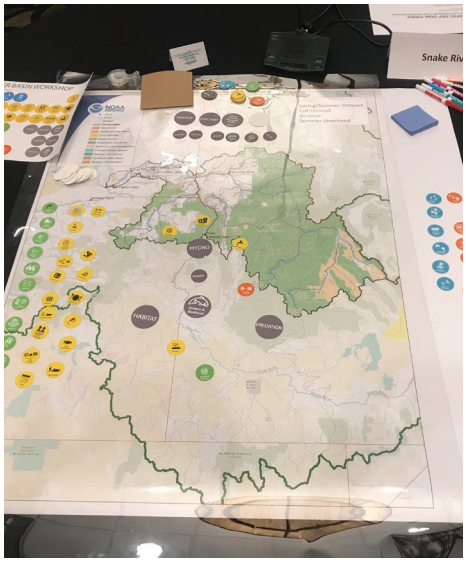
The icons were color coded to aid in identifying which SCEE category they pertain to, however the colors are not definitive. Many of the icons could fit into multiple SCEE categories; color-coding enables icons to be easily located and differentiated within the exercise process and on final maps. A balance of icon colors is one of the desired outcomes of this exercise, as that may indicate a balanced consideration of social, cultural, economic, and ecological elements.

Additionally, the pictorial symbols on the icons are not meant to be a definitive representation of a SCEE element, only representational and conceptual; each person involved in the workshop may have interpreted the pictures and elements differently. The purpose of this workshop was not to determine which SCEE category or picture with which to represent each element impacted by the dials, but to identify and map the relationships between those elements.

Above: Sample SCEE icons. A full list of icons and a color code key is located in Appendix 2.

SET UP

MAFAC task force members selected a sub-region of the basin to focus their discussion around for round one of the workshop. The Columbia Basin sub-regions identified were: Lower Columbia River/Willamette River; Middle Columbia River; Upper Columbia River; and Snake River. Each sub-region was represented on a large physical map, which table groups worked on top of to create relationship flow maps. There was also a table that mapped relationship flows in the Columbia River Basin as a whole.



FLOW MAPPING

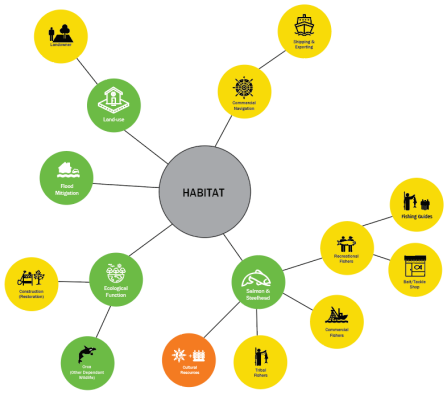
Relationship flow mapping took place on top of physical maps of each sub-region. Table groups could choose to georeference their flow mapping by placing icons on the map where they are geographically relevant, or the maps could be used as a only a reference and source of inspiration for the groups. Several tables took a hybrid approach to icon placement, geolocating the most important icons and conceptually placing the rest. More discussion on this is included in each sub-region section.

To begin, task force members were asked to identify the SCEE elements (icons) most pertinent to each of the dials in their sub-region. In round one, the goal was to identify primary, secondary, and tertiary levels of relationships to the dials and the fish.

In round two, task force members changed tables and checked the work of other groups. The primary goal of this round was to provide more diversity in viewpoints informing each relationship flow map. This round allowed relationship maps to be built out and refined, ensuring that all applicable SCEE elements were on the table and being considered.

Round three of the workshop dug deeper into the relationships identified in rounds one and two. Task force members returned to their original sub-region tables and worked to identify several deeper characteristics about the relationships present. First, the directionality of the relationship; which element was being impacted, which element was the impacting force. Second, the level of impact or intensity of the relationship. Third, what was flowing between the relationship. Finally, identify whether the potential impacts of the relationships were positive or negative.

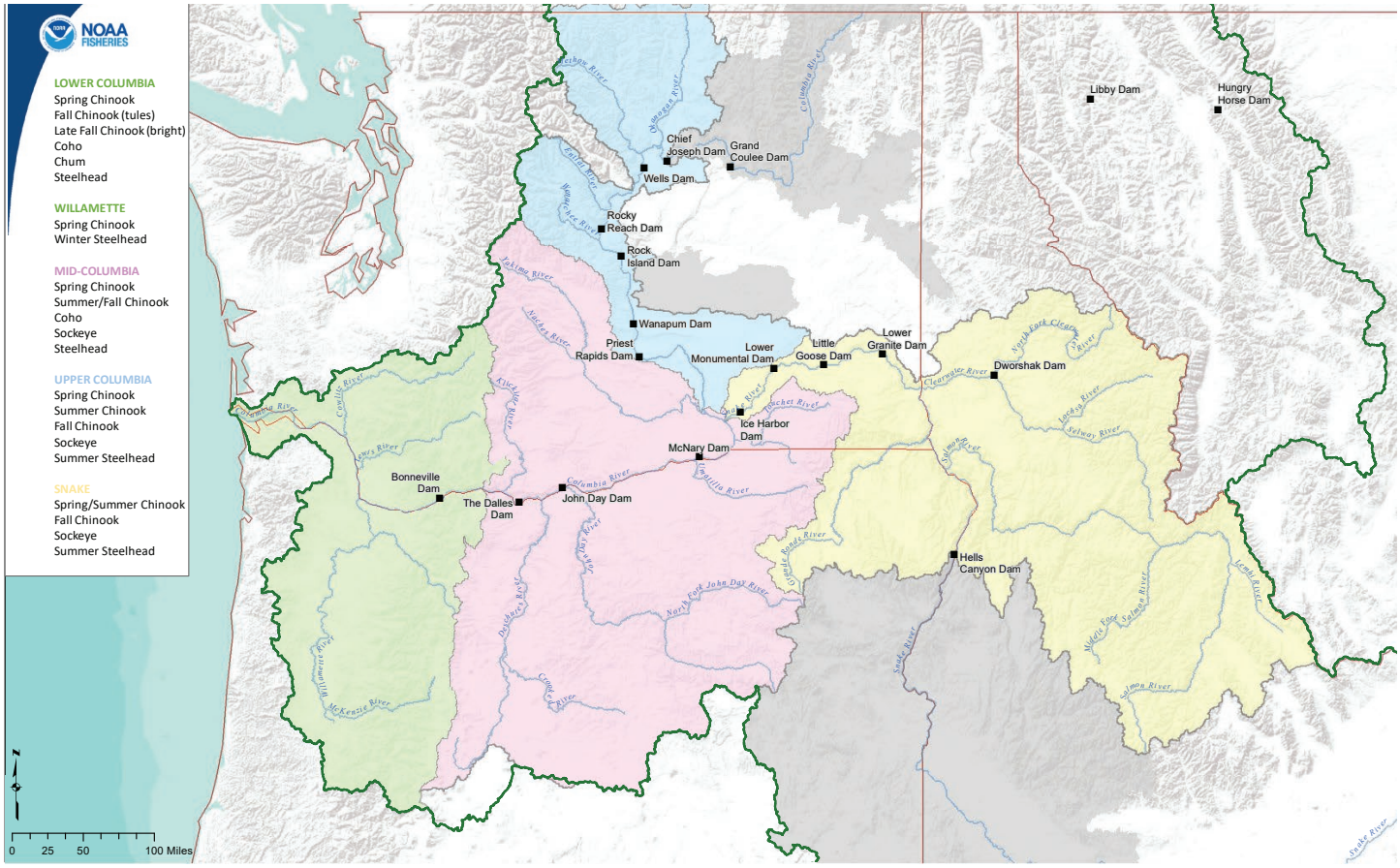
Identifying the specific impacts and outcomes were outside of the scope of this exercise.



Above: A pre-populated sample relationship flow map for the habitat dial in the Columbia Basin as a whole.

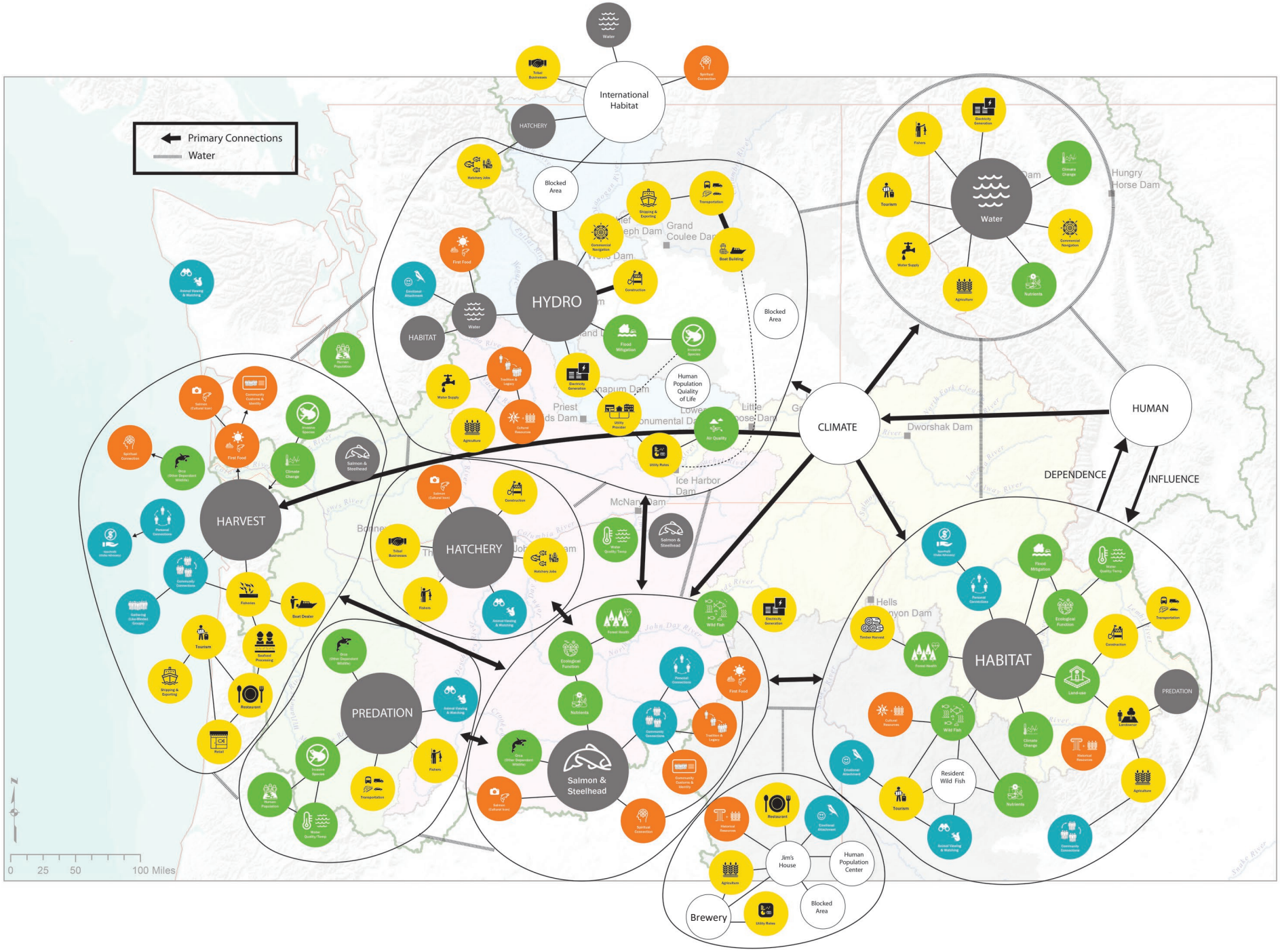
Below: Task Force members work to map primary relationships in the Middle Columbia River Basin sub-region.

TASK FORCE SCEE WORKSHOP OUTCOMES
COLUMBIA RIVER BASIN-WIDE

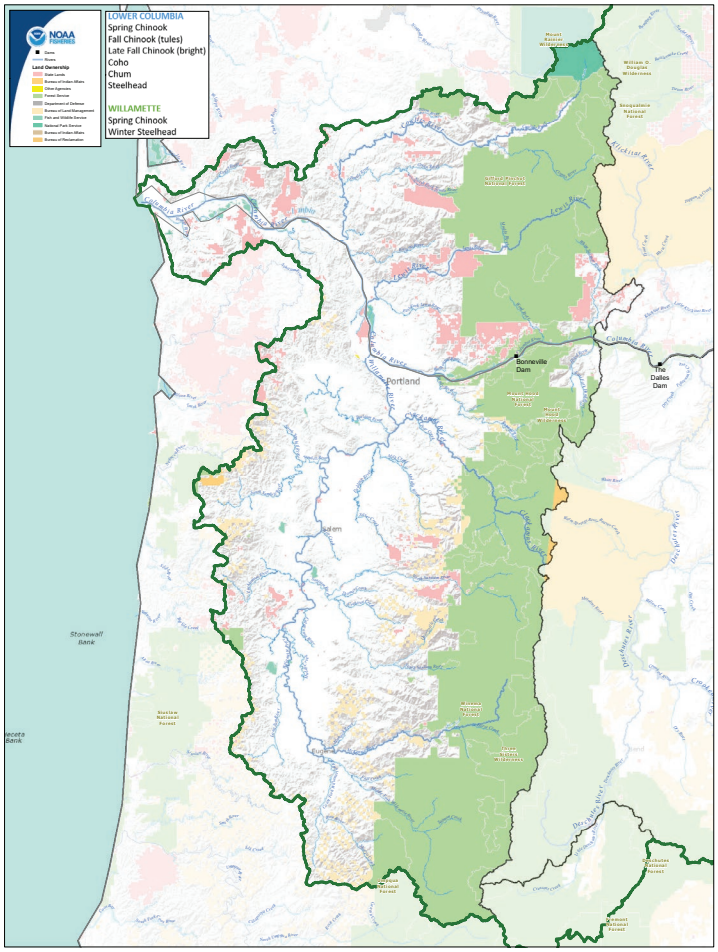


GROUP COMMENTS & INSIGHTS

- Climate change affects everything
- Harvest has strong social and cultural ties; as well as ties into economics, habitat, and hydro
- Within a particular community, there may be things happening outside of the area that are impactful.
- Everything is connected in different ways.
- Humans influence and at the same time are dependent upon the environment.
- Salmon and steelhead were at the center of the map in round one, but ultimately the larger conversation revolved around water. Water connects everything. One participant notes the direct connection between water and tribal culture, as every meal begins and end with water.

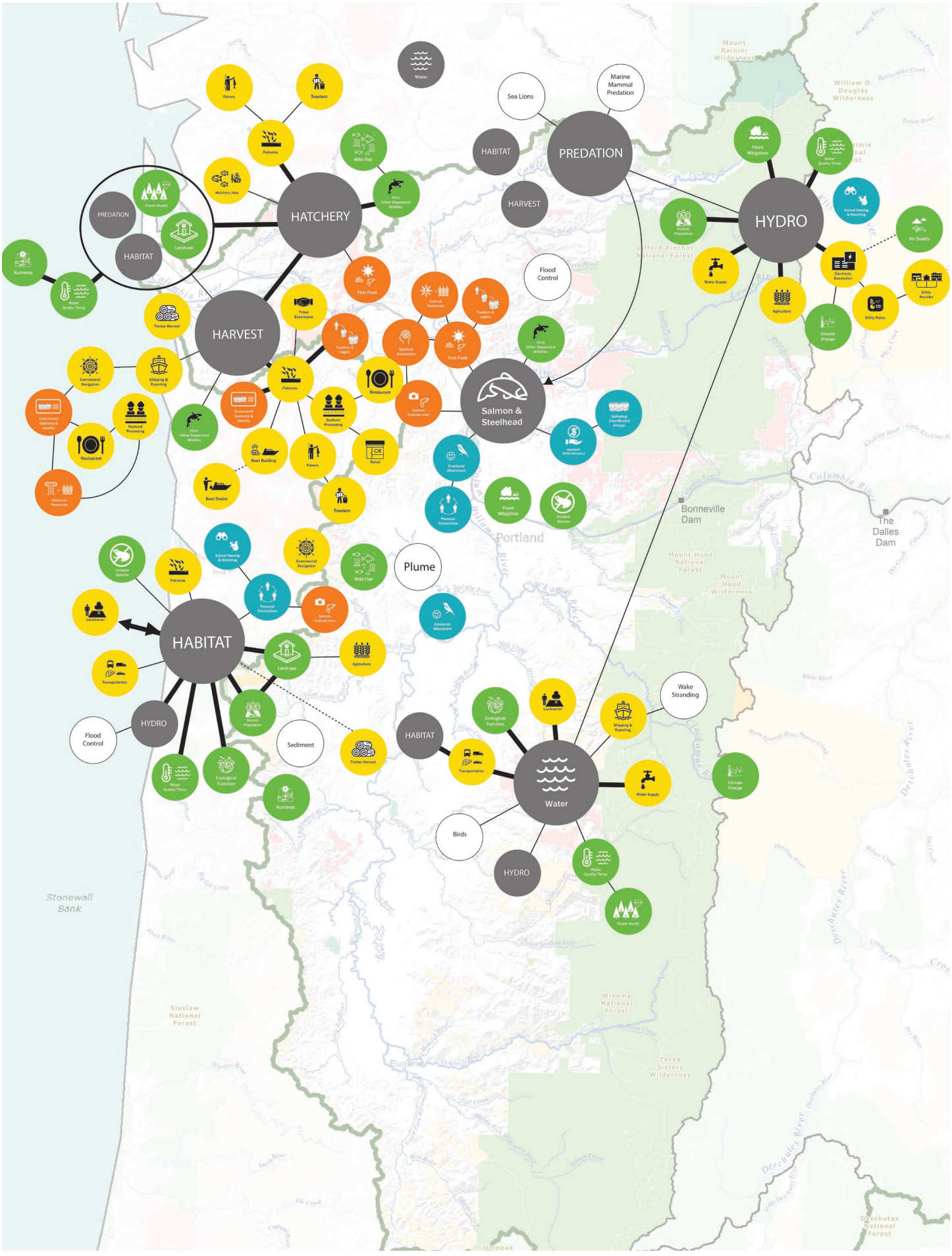

Primary Connections
Water
International Habitat
HATCHERY
Blocked Area
HYDRO
HABITAT
Water
Blocked Area
Human Population Quality of Life
CLIMATE
HUMAN
DEPENDENCE
INFLUENCE
HARVEST
HATCHERY
PREDATION
Salmon & Steelhead
HABITAT
Resident Wild Fish
Jim's House
Human Population Center
Brewery
Blocked Area
Grand Coulee Dam
Hungry Horse Dam
Dworshak Dam
Ice Harbor Dam
McNary Dam
Hells Canyon Dam
0 25 50 100 Miles

LOWER COLUMBIA RIVER/WILLAMETTE RIVER

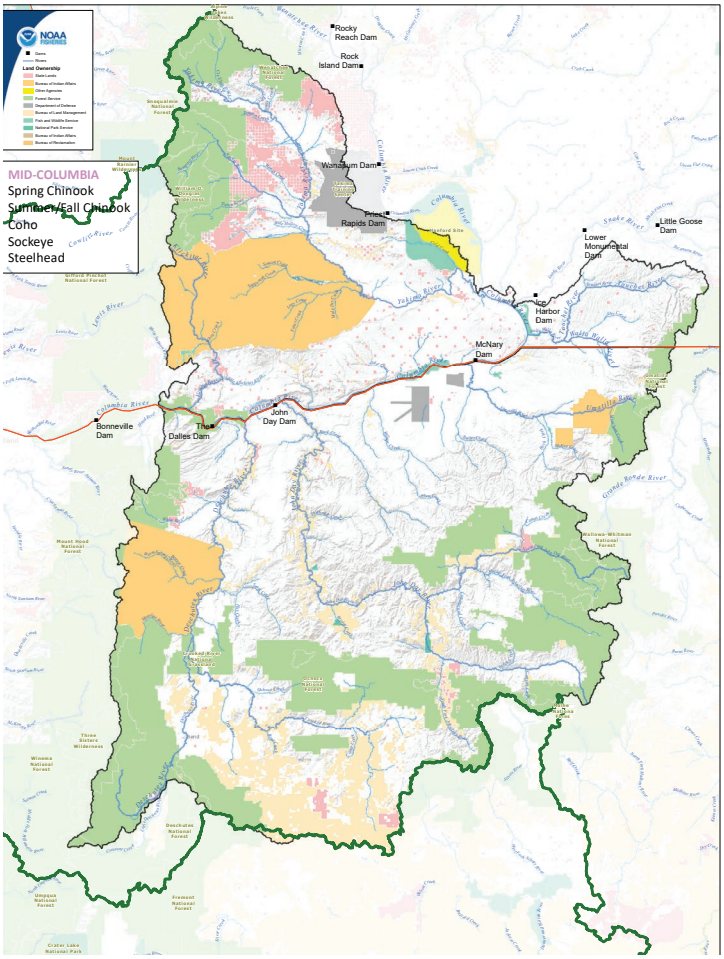


GROUP COMMENTS & INSIGHTS

- Habitat impacts are different in the mainstem and tributaries. They also vary by stock.
- There are challenges associated with habitat improvement in heavily populated areas of the Lower Columbia/Willamette area.
- Hatcheries have social and cultural implications.
- Predation is closely tied to mainstem hydro. Predation can be acted upon quickly, and we can see results quickly.
- Everything is connected to the mouth of the Columbia and the community of Astoria: transportation, shipping, birds (predation), and ecosystems.
- This table noted that they were missing tribal representation and important cultural considerations.
- Discussed spill and flows and demonstrated both positive and negative impacts.
- Flood control is closely related to dams, and drives access to habitat.
- Recognized the transformative power of water.

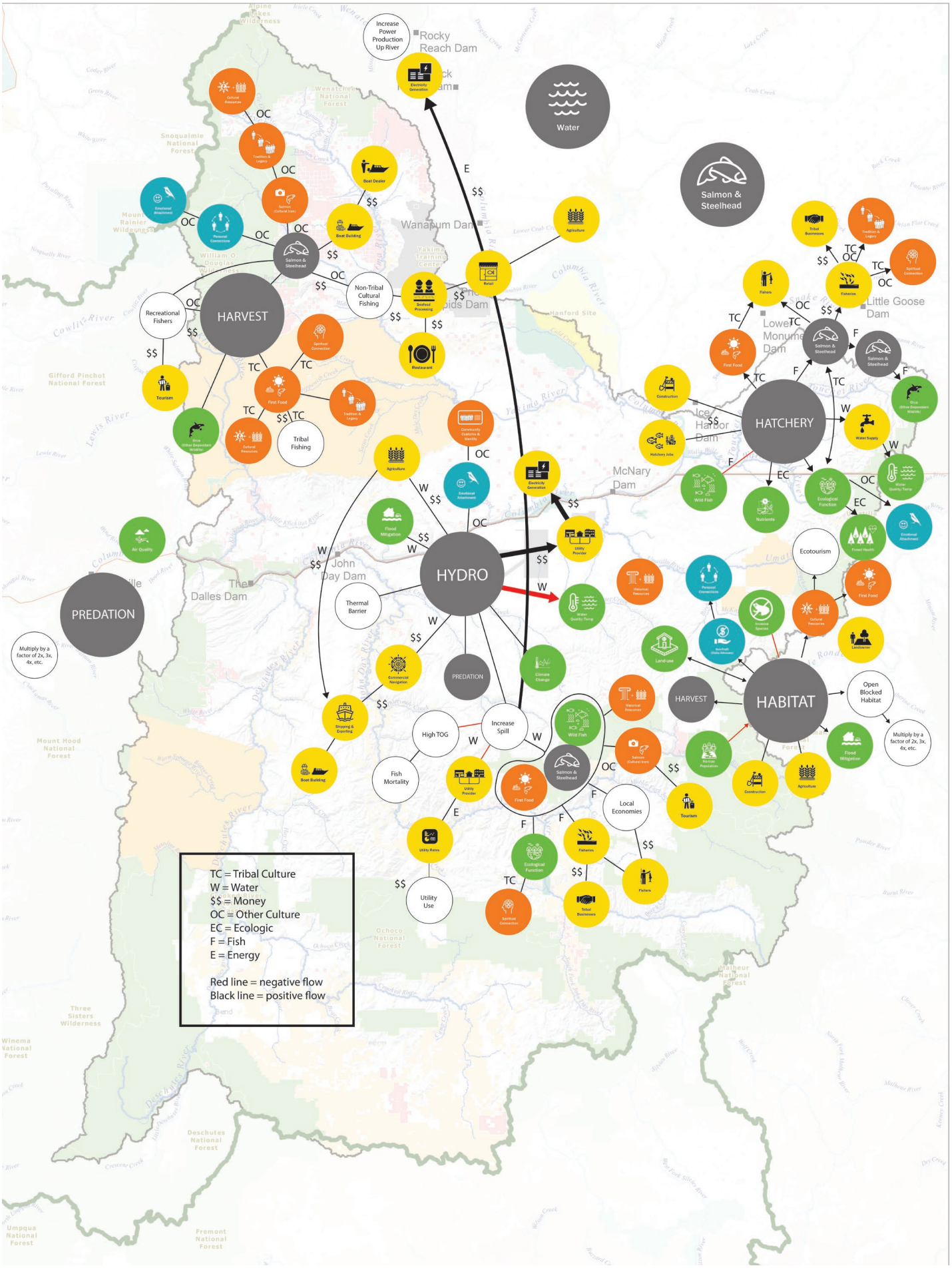

HATCHERY
HARVEST
HABITAT
PREDATION
HYDRO
Salmon & Steelhead
Water
Plume
Flood Control
Sediment
Wake Stranding
Birds
Sea Lions
Marine Mammal Predation
Water
Fisheries
Tourism
Wild Fish
Hatchery Jobs
Forest Health
Land-use
Nutrients
Water Quality/Temp
Timber Harvest
Tribal Businesses
Cultural Resources
Tradition & Legacy
First Food
Spiritual Connection
Commercial Navigation
Shipping & Exporting
Community Customs & Identity
Seafood Processing
Restaurant
Boat Building
Boat Dealer
Retail
Orca (Other Dependent Wildlife)
Salmon (Cultural Icon)
Emotional Attachment
Personal Connections
Flood Mitigation
Invasive Species
Gathering (Like-Minded Groups)
Non-Profit (Kids Advocacy)
Animal Viewing & Watching
Landowner
Transportation
Agriculture
Human Population
Ecological Function
Water Supply
Air Quality
Electricity Generation
Utility Provider
Utility Rates
Climate Change
Historical Resources
Bonneville Dam
The Dalles Dam
Portland
Mount Rainier Wilderness
William O. Douglas Wilderness
Gifford Pinchot National Forest
Mount Hood National Forest
Mount Hood Wilderness
Three Sisters Wilderness
Siuslaw National Forest
Winema National Forest
Deschutes National Forest
Stonewall Bank
Eugene
Umpqua

MIDDLE COLUMBIA RIVER

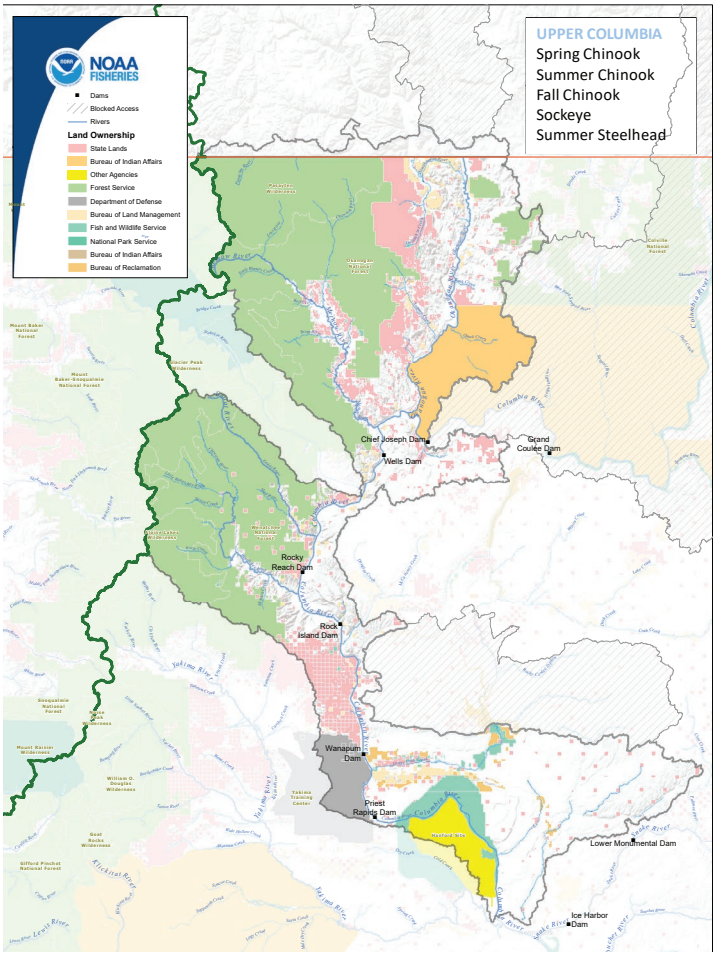


GROUP COMMENTS & INSIGHTS

- The group identified several relationships between water, money, energy, tribal culture, other culture, and fish.
- Increasing habitats may have a positive impact on ecological function but a negative impact on land owners and land use.
- Water is at the top of the map. Everything depends on water quality and quantity.
- It was one thing to identify the relationships but it is more challenging to characterize the magnitude of impact.

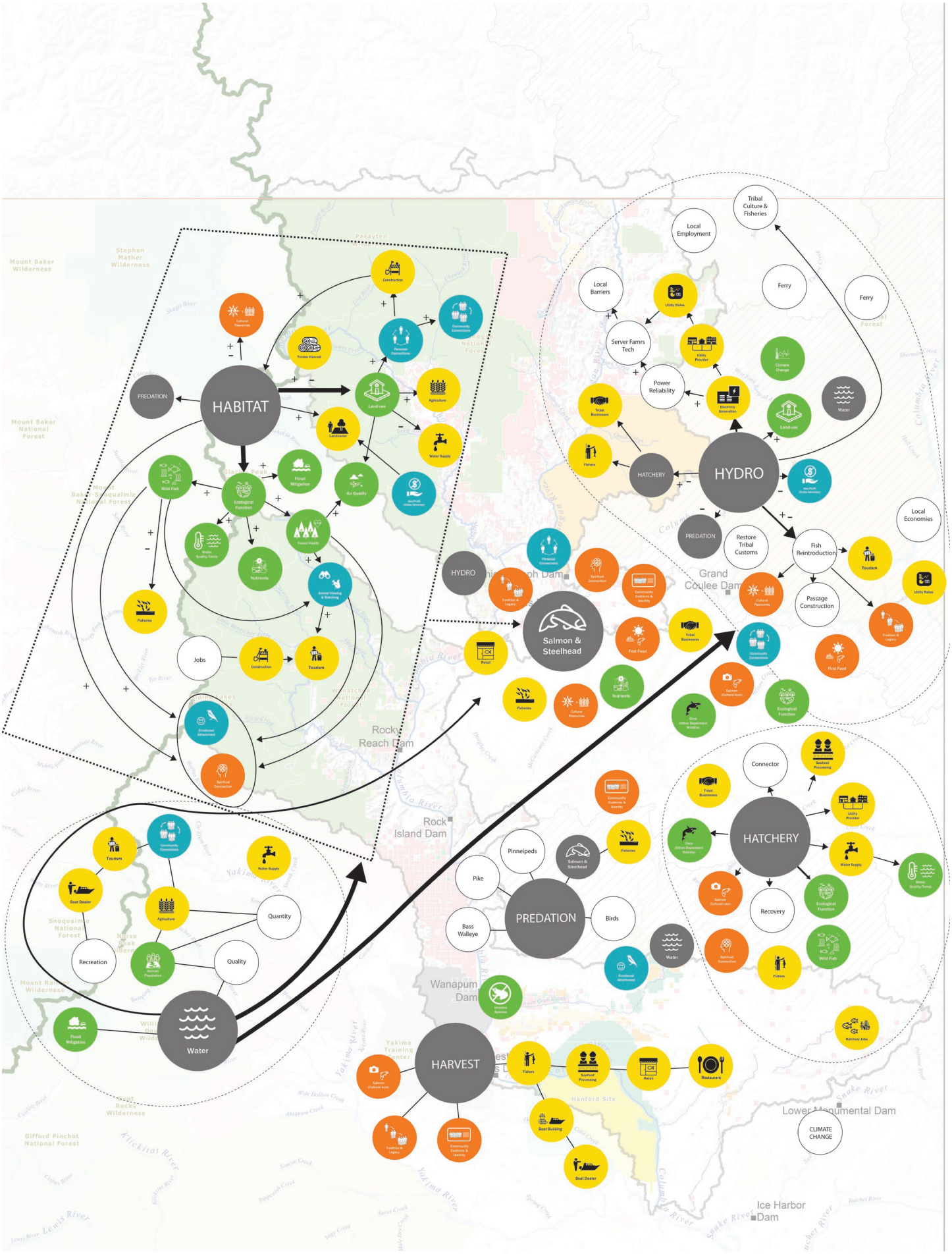

Increase Power Production Up River
Rocky Reach Dam
Water
Salmon & Steelhead
Wanapum Dam
Agriculture
Retail
Seafood Processing
Restaurant
Non-Tribal Cultural Fishing
Recreational Fishers
HARVEST
Tourism
Tribal Fishing
Boat Dealer
Boat Building
Tradition & Legacy
Personal Connections
Emotional Attachment
Spiritual Connection
First Food
Orca (Other Dependent Wildlife)
Cultural Resources
Salmon (Cultural Icon)
Gifford Pinchot National Forest
Mount Rainier Wilderness
Snoqualmie National Forest
Wenatchee National Forest
Yakima Training Center
Hanford Site
Lewis River
Cowlitz River
Columbia River
Snake River
Little Goose Dam
Lower Monumental Dam
Ice Harbor Dam
McNary Dam
John Day Dam
The Dalles Dam
HATCHERY
Fishers
Fisheries
Tribal Businesses
Construction
Hatchery Jobs
Water Supply
Wild Fish
Nutrients
Ecological Function
Water Quality/Temp
Forest Health
Ecotourism
Landowner
Land-use
Non-Profit (Habitat Advocacy)
Invasive Species
Human Populations
Open Blocked Habitat
Flood Mitigation
HABITAT
HYDRO
Agriculture
Community Customs & Identity
Emotional Attachment
Flood Mitigation
Air Quality
Thermal Barrier
Commercial Navigation
Shipping & Exporting
Boat Building
Utility Provider
Electricity Generation
Water Quality/Temp
Climate Change
PREDATION
Multiply by a factor of 2x, 3x, 4x, etc.
High TOG
Increase Spill
Fish Mortality
Utility Rates
Utility Use
Salmon & Steelhead
First Food
Ecological Function
Fisheries
Tribal Businesses
Fishers
Local Economies
Tourism
Historical Resources
Cultural Resources
Wild Fish
Human Populations
Construction
Agriculture
Flood Mitigation
Open Blocked Habitat
Multiply by a factor of 2x, 3x, 4x, etc.
TC = Tribal Culture
W = Water
$$ = Money
OC = Other Culture
EC = Ecologic
F = Fish
E = Energy
Red line = negative flow
Black line = positive flow
Three Sisters Wilderness
Mount Hood National Forest
Deschutes National Forest
Ochoco National Forest
Malheur National Forest
Umpqua National Forest
Fremont National Forest
Winema National Forest

UPPER COLUMBIA RIVER

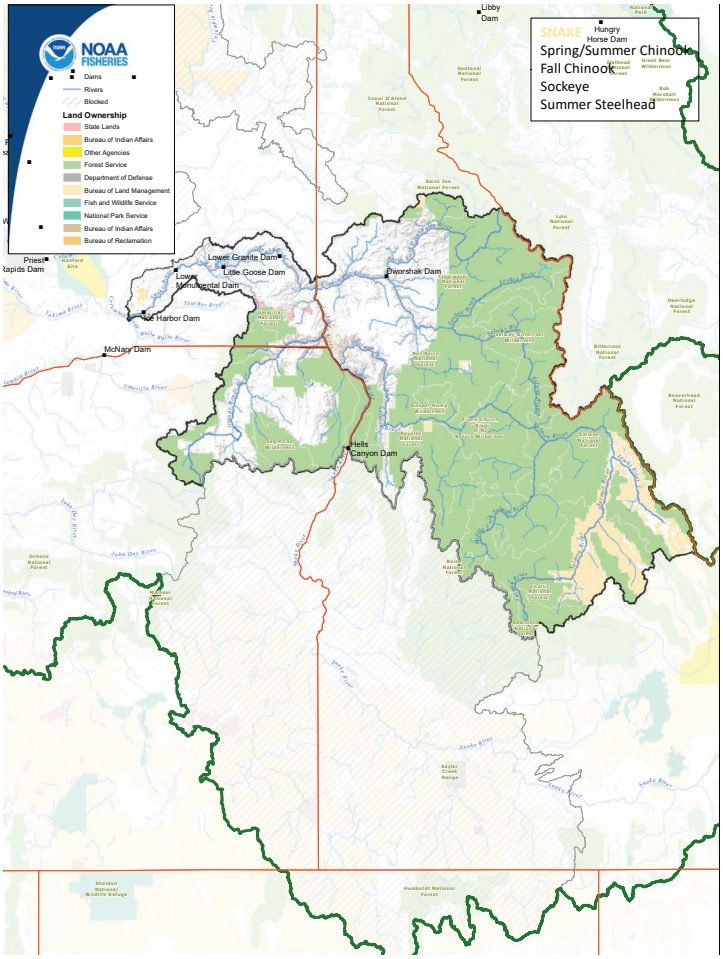


GROUP COMMENTS & INSIGHTS

- Hydro around the Grand Coulee dam is very significant; started there and built relationships out. Grand Coulee is critical for regional electricity generation and flood control. Related considerations are utility rates and community businesses dependent on electricity.
- At the same time, the effects of Grand Coulee dam construction on tribal culture were devastating to several tribes and First Nations in Canada. Grand Coulee also blocked habitat and that's why its important now to discuss reintroduction.
- The group discussed the impacts of hatcheries. Hatchery impacts vary by type. Related considerations include ecological interactions with wild fish in particular. Hatcheries also have an impact on tribal culture by supporting fisheries.

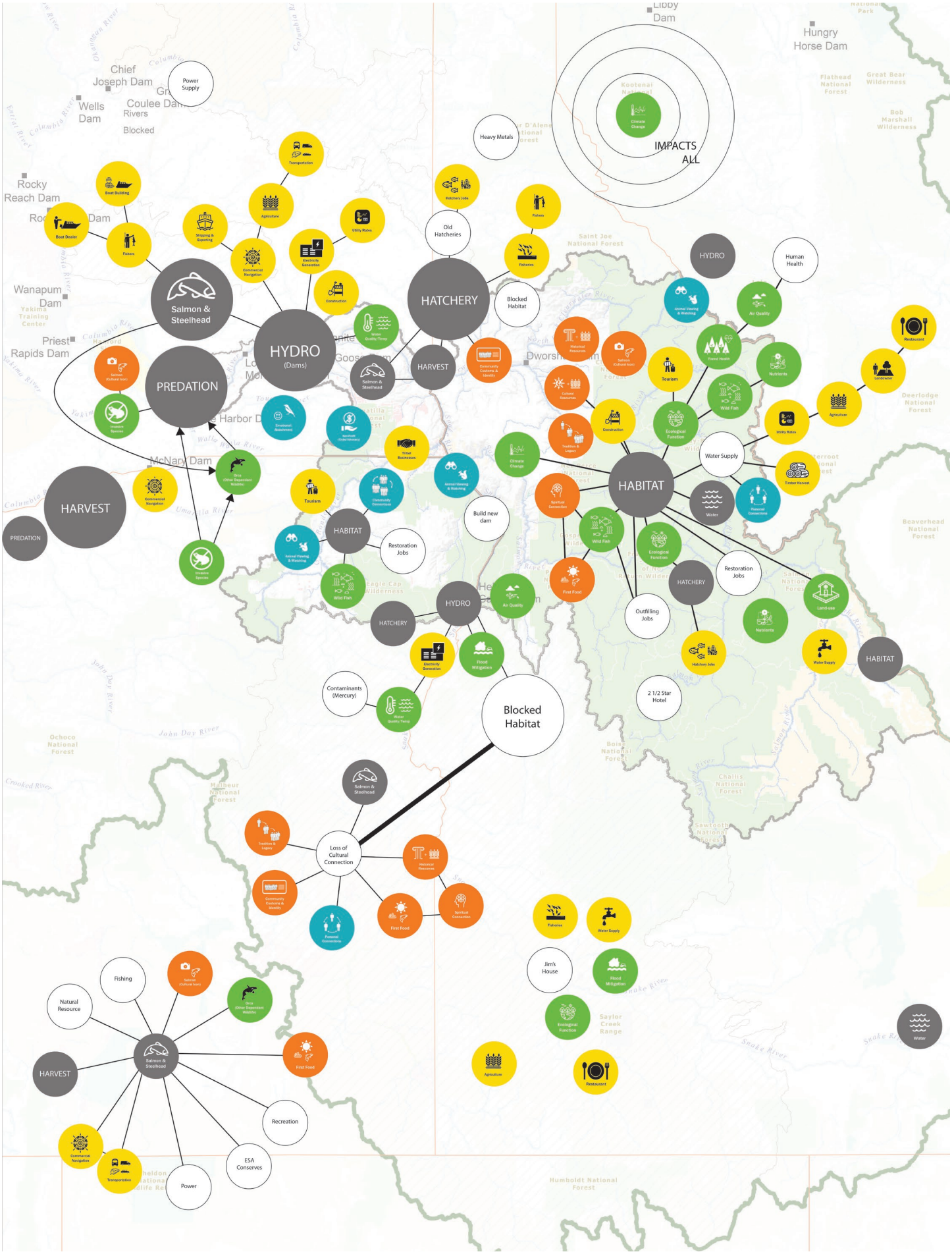

HABITAT
PREDATION
Construction
Cultural Resources
Timber Harvest
Community Connections
Personal Connections
Land-use
Agriculture
Landowners
Water Supply
Wild Fish
Ecological Function
Flood Mitigation
Air Quality
Non-Profit (Habitat Advocates)
Water Quality: Temp
Forest Health
Nutrients
Animal Viewing & Watching
Fisheries
Jobs
Construction
Tourism
Emotional Attachment
Spiritual Connection
HYDRO
HATCHERY
PREDATION
Tribal Culture & Fisheries
Local Employment
Local Barriers
Utility Rates
Ferry
Ferry
Server Farms Tech
Utility Provider
Climate Change
Power Reliability
Electricity Generation
Water
Land-use
Tribal Businesses
Fishers
Non-Profit (Habitat Advocates)
Restore Tribal Customs
Fish Reintroduction
Local Economies
Tourism
Utility Rates
Passage Construction
Cultural Resources
Tradition & Legacy
First Food
Salmon & Steelhead
Retail
Nutrients
Fisheries
Cultural Resources
Orca (Other Dependent Wildlife)
Ecological Function
Rocky Reach Dam
Rock Island Dam
Wanapum Dam
Grand Coulee Dam
Connector
Seafood Processing
Tribal Businesses
Utility Provider
Water Supply
Recovery
Ecological Function
Wild Fish
Hatchery Jobs
Pinnipeds
Pike
Bass Walleye
Birds
Water
Tourism
Boat Dealer
Agriculture
Quantity
Recreation
Quality
Water
Food Mitigation
HARVEST
Fishers
Seafood Processing
Retail
Restaurant
Boat Building
Boat Dealer
Hanford Site
Lower Monumental Dam
CLIMATE CHANGE
Ice Harbor Dam

SNAKE RIVER



GROUP COMMENTS & INSIGHTS

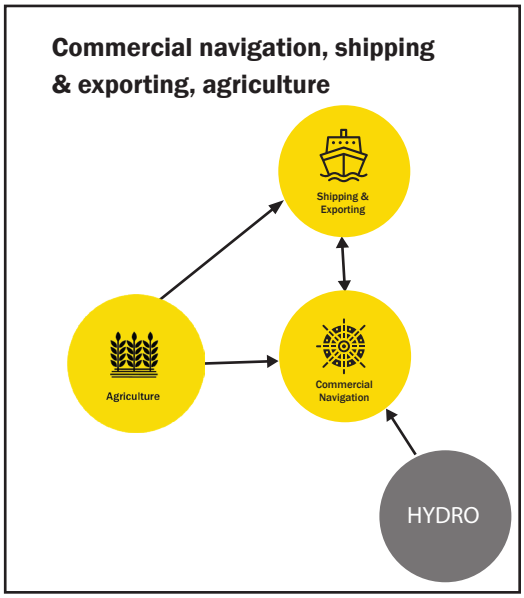
- The group noted the community of Lewiston, Idaho, near Lower Granite Dam and clustered economic, fishing, and tourism icons there.
- Blocked habitat at the south of the sub-region has unique features
- Focusing on hydro rather than dams led to identifying positive Impacts on: Transportation, Power and water supply
- Negative Impacts identified were: Water quality, loss of habitat, salmon and steelhead impacts, predation, and tribal culture and economy
- Some impacts of hydro were more neutral/ balanced such as recreation, tourism, available money for mitigation. For example, because of the dams, there is mitigation money for restoration. Without the dams, power rates would go up.

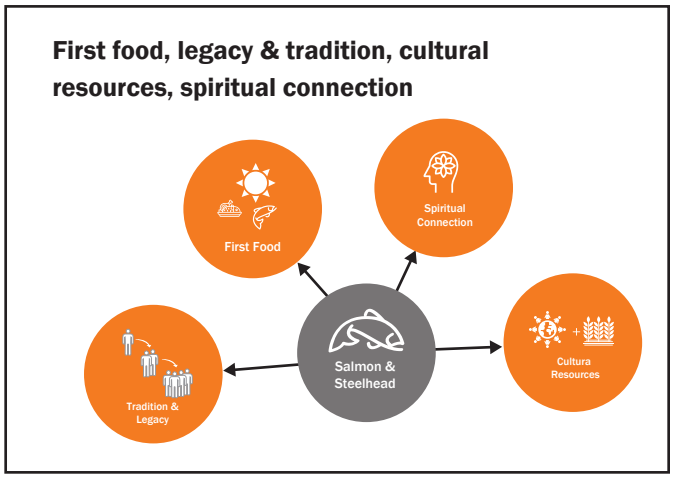

Libby Dam
Hungry Horse Dam
Chief Joseph Dam
Power Supply
Wells Dam
Coulee Dam
Rivers Blocked
Rocky Reach Dam
Wanapum Dam
Priest Rapids Dam
McNary Dam
IMPACTS ALL
Climate Change
Heavy Metals
Salmon & Steelhead
HYDRO (Dams)
PREDATION
HARVEST
HATCHERY
HABITAT
Old Hatcheries
Blocked Habitat
Restoration Jobs
Build new dam
Water Supply
Outfilling Jobs
2 1/2 Star Hotel
Contaminants (Mercury)
Loss of Cultural Connection
Fishing
Natural Resource
Recreation
Power
ESA Conserves
Jim's House
Saylor Creek Range
Human Health
Tourism
Transportation
Agriculture
Boat Building
Boat Dealer
Fishers
Shipping & Exporting
Commercial Navigation
Electricity Generation
Utility Rates
Construction
Water Quality/Temp
Salmon (Cultural Icon)
Invasive Species
Environmental Attachment
Non-Profit (Tribal Advocacy)
Tribal Businesses
Community Commerce
Animal Viewing & Watching
Orca (Other Dependent Wildlife)
Community Customs & Identity
Historical Resources
Cultural Resources
Tradition & Legacy
Spiritual Connection
Personal Connections
First Food
Flood Mitigation
Hatchery Jobs
Fisheries
Water
Air Quality
Forest Health
Wild Fish
Ecological Function
Nutrients
Restaurant
Landscape
Agriculture
Utility Rates
Timber Harvest
Land-use
Water Supply
Hatchery Jobs
Nutrients
Fisheries
Flood Mitigation
Ecological Function
Restaurant
Water
Deerlodge National Forest
Beaverhead National Forest
Bob Marshall Wilderness
Great Bear Wilderness
Flathead National Forest
Ochoco National Forest
Malheur National Forest
Boise National Forest
Challis National Forest
Sawtooth National Forest
Humboldt National Forest
Saint Joe National Forest
Eagle Cap Wilderness
Columbia River
Snake River
John Day River
Crooked River
Yakima Training Center

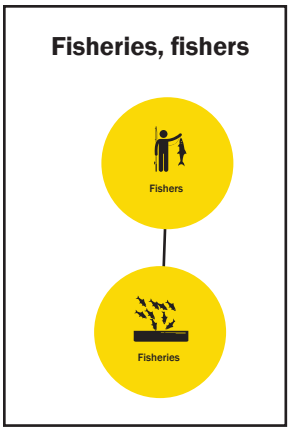
RELATIONSHIP FLOW MAP FINDINGS

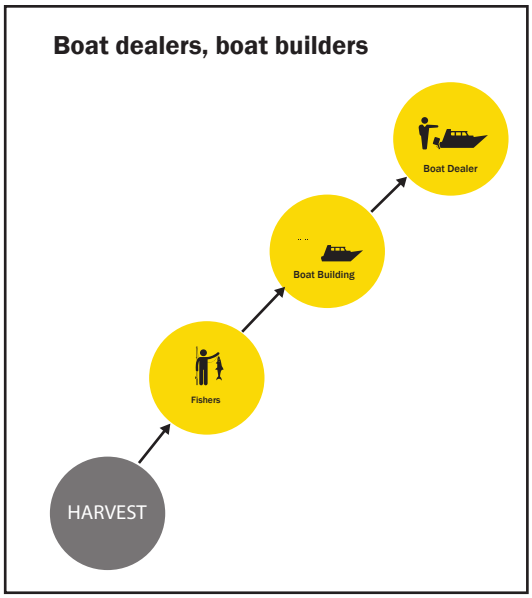
FOUNDATIONAL RELATIONSHIPS

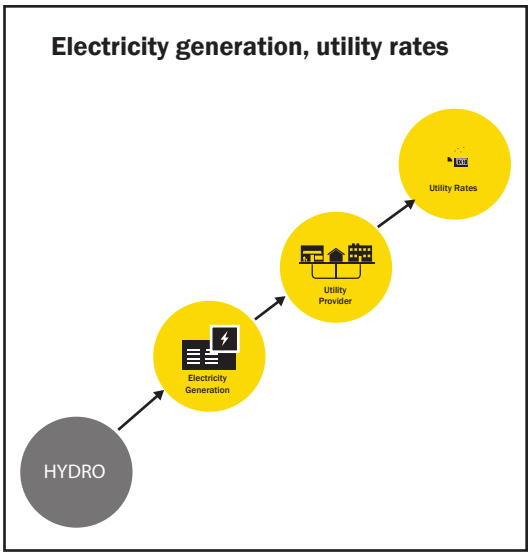
The relationships drawn between SCEE elements mapped in this exercise are the basic building blocks of systems. However, some SCEE elements are more closely related to one another and appear more frequently in relation with other elements than others. These patterns of relationships will be important to recognize when engaging in scenario planning. The recurring relationships create the foundation of the flow maps and help deepen the understanding of the system in which these relationships exist. Each dial has a specific set of foundational relationships that will be discussed in the following sub-sections. The following figures show the relationships that recurred across each of the flow maps and represent the foundational relationships for the Columbia River Basin as a whole.











Though it is of primary importance to consider SCEE elements as pieces of a larger system, several individual elements appeared frequently throughout a variety of systems. The most frequently appearing individual SCEE elements included were:

Wild fish

First food

Ecological function

Fishers

Land use

Agriculture

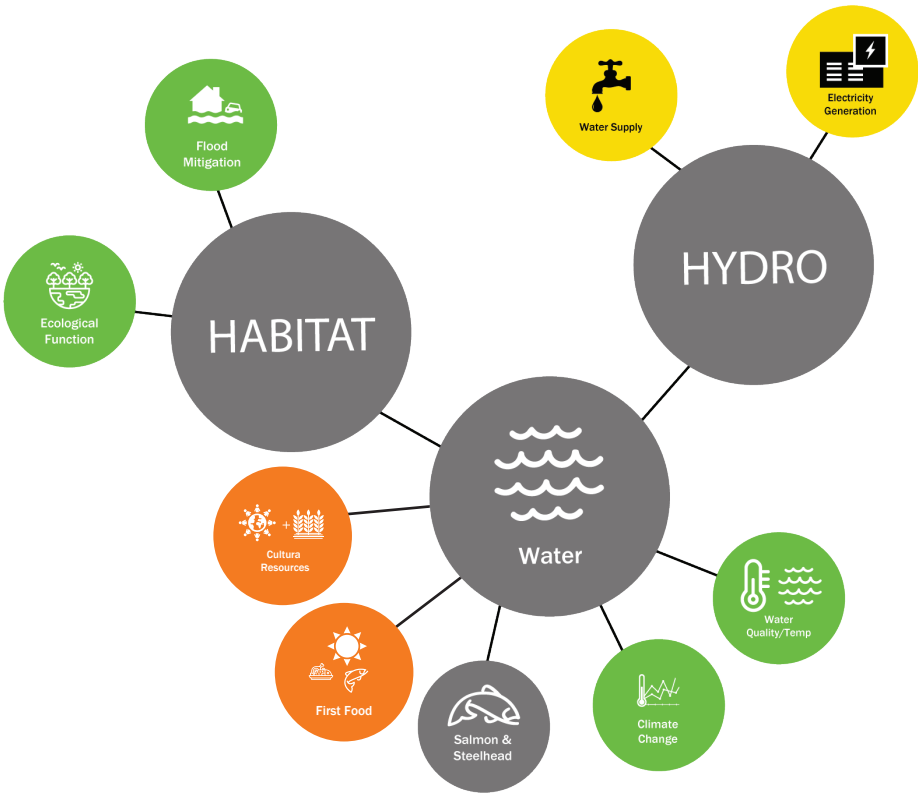
Emotional attachment

Fisheries

“Every meal starts and ends with **water.**”

RELATIONSHIPS TO WATER

Relationships to water were ubiquitous across all of the relationship flow maps. Though water is not one of the dials, it is of central importance ecologically, culturally, socially, and economically in the Columbia River Basin. As such, it was the center of many of the relationship flows mapped in this exercise. Several foundational patterns with primary relationships to water included: **agriculture**, **tourism**, **water supply**, **hydro**, **salmon & steelhead**, **first food, cultural resources,** and **habitat**. Water was fundamentally connected to the hydro and habitat dials, which created a pattern of relationships to electricity generation, climate change, water supply, ecological function, flood mitigation, water quality, and tourism.



HYDRO DIAL RELATIONSHIPS

Ecological and economic considerations were the most prominent categories represented in relation to the hydro dial. Each of the maps were generally lacking in culture and social related icons. Cultural elements were only present in the Basin wide map as a primary connection; they were included in the secondary and tertiary levels of relationships on the Upper Columbia and Middle Columbia sub-region maps. This indicates that the cultural and social systems of relationships to hydro may be harder to draw out in some of the sub-regions, and therefore, special attention should be paid to these elements in future scenario planning.

Recurring SCEE element relationships to be aware of when considering the hydro dial in scenario planning include:

Electricity generation or utility rates

Flood mitigation

Commercial navigation and shipping & exporting

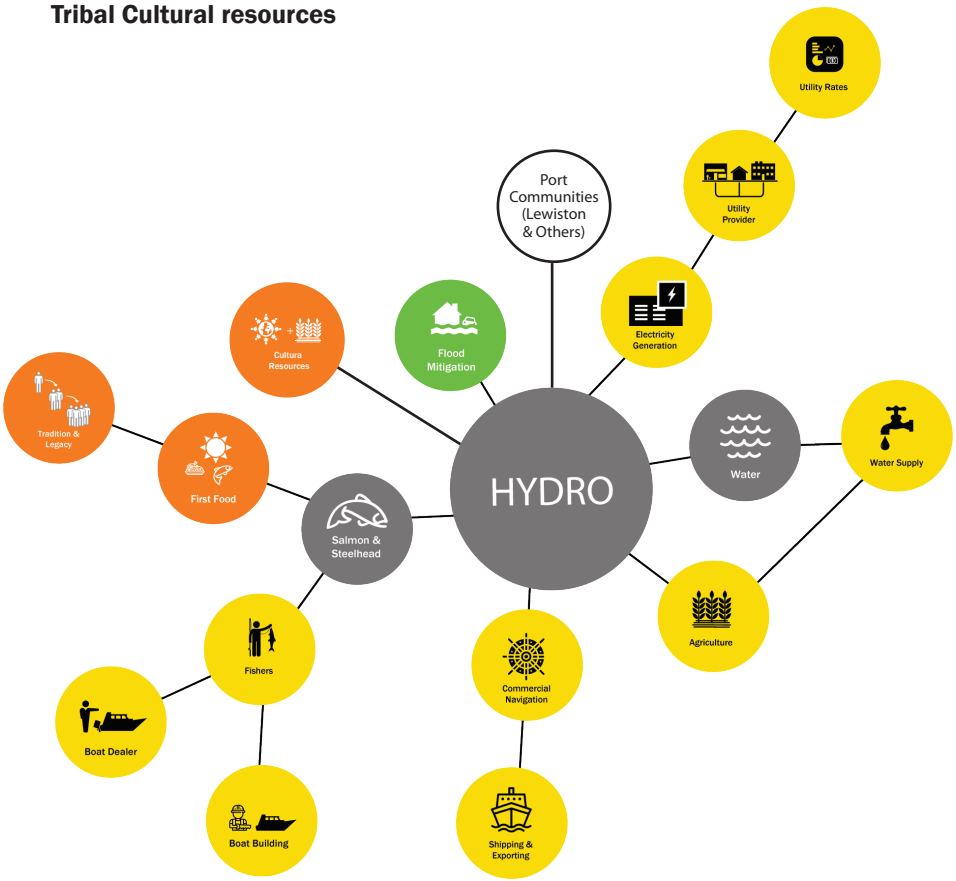
Agriculture

Salmon & steelhead and First Food

Water

Lewiston & other port communities

Tribal Cultural resources



HABITAT DIAL RELATIONSHIPS

The ecological, cultural, and social recurring relationships of the habitat dial were frequently mapped across the Basin, so it may be of particular importance to pay attention to economic impacts of changes to the habitat dial in future scenario planning exercises. When measuring the impact of the habitat dial in future scenarios, the following relationships between SCEE elements are important to be aware of:

Cultural Resources

First Food

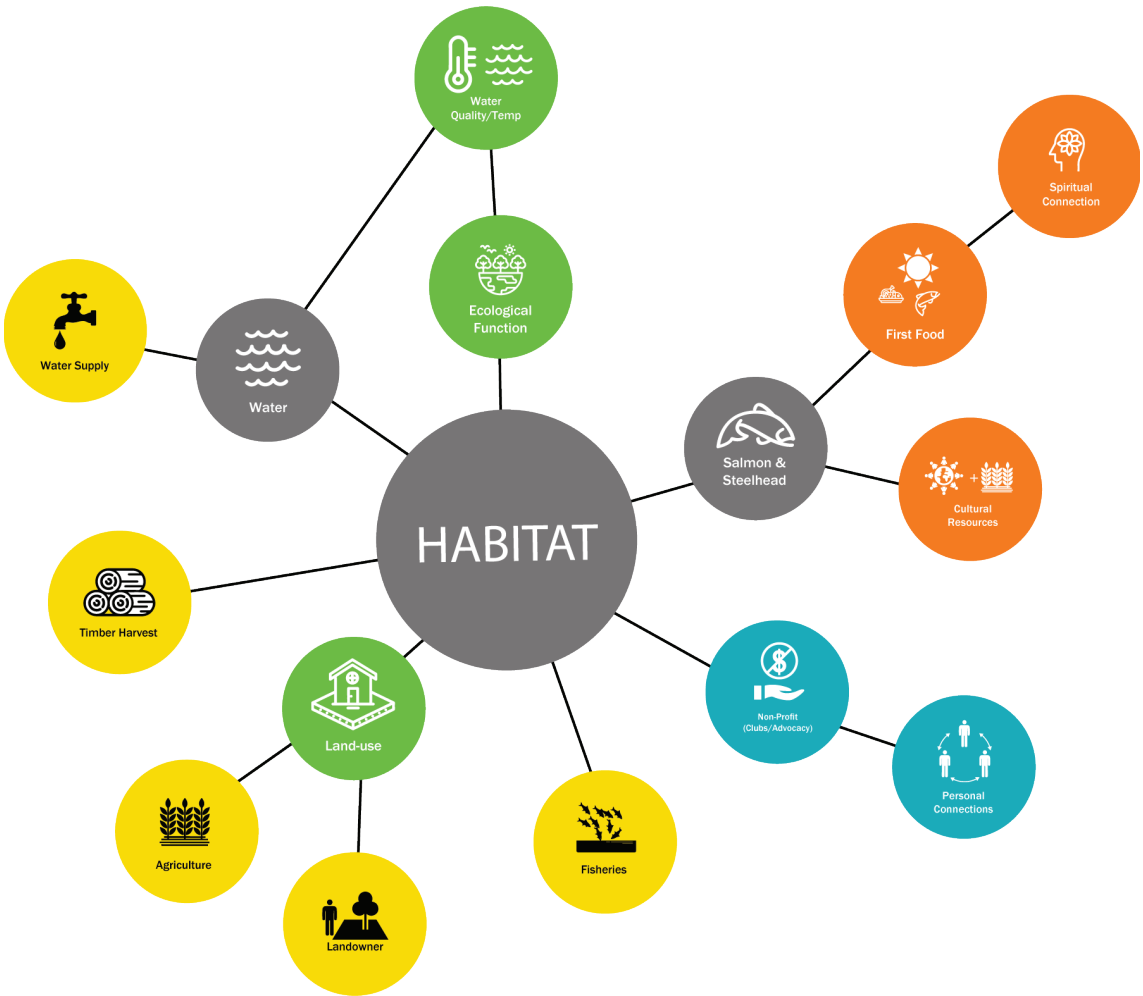
Land Use

Ecological Function

Salmon & Steelhead

Water

Secondary and tertiary relationships to the habitat dial include timber harvest and land owners. Other dials were indirectly related to habitat including predation, hatchery, harvest, hydro.



HARVEST DIAL RELATIONSHIPS

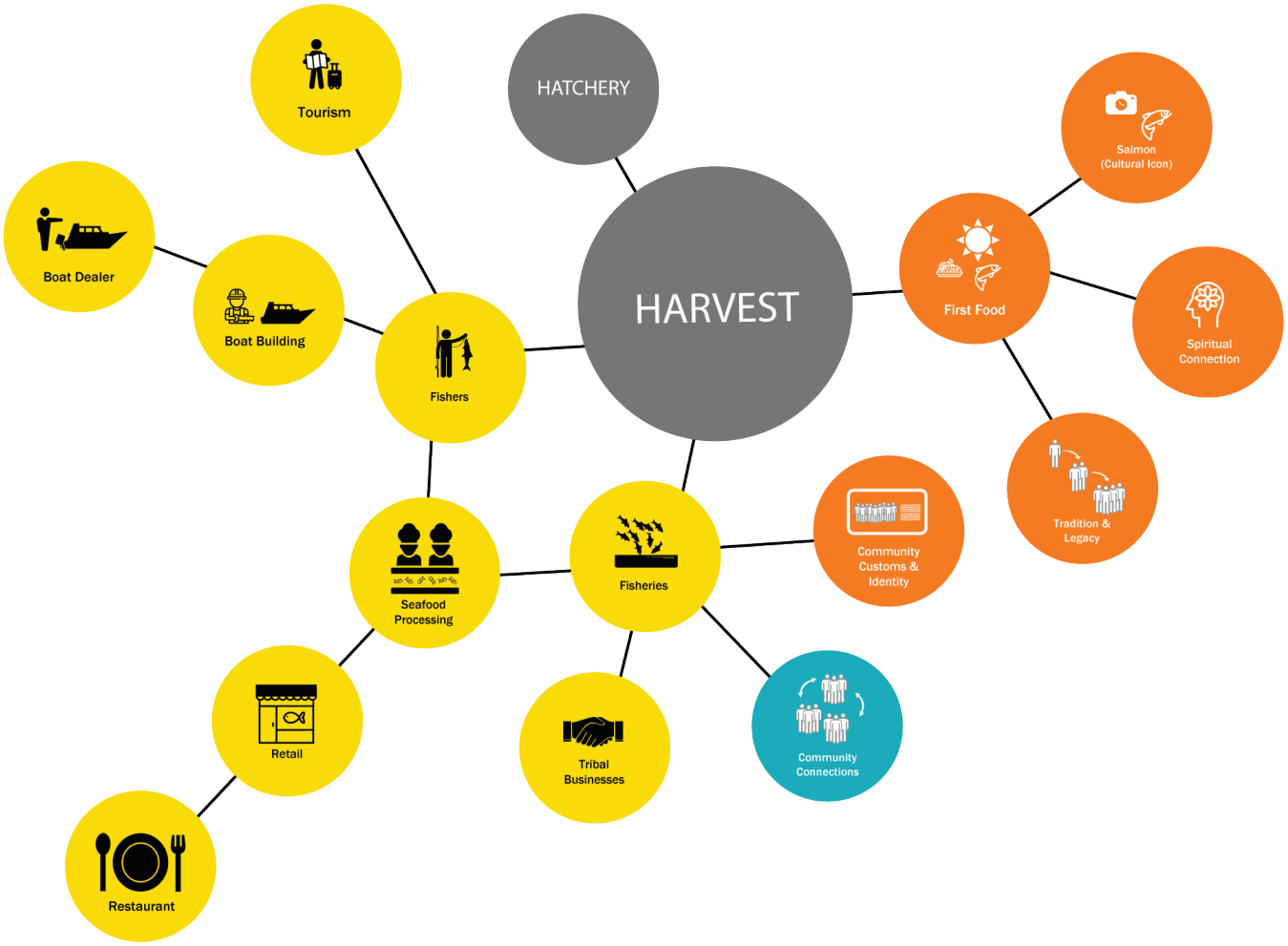
Relationships impacted by the harvest dial to be particularly aware of include:

Habitat

Community (Astoria)

Fisheries and Fishers

Overall, the relationship flows from the harvest dial impacts were focused primarily on economic and cultural elements. The basin-wide map includes some social and ecological relationships. Much of the community identity and economy is impacted by the harvest dial and it is a deeper connection than reflected by the community connections icon alone. In the Middle Columbia sub-region, tribal culture was frequently related to harvest. Impacts of the harvest dial are most robust in the Lower Columbia/Willamette sub-region.



HATCHERY DIAL RELATIONSHIPS

Frequent SCEE elements related to hatcheries on each of the maps include:

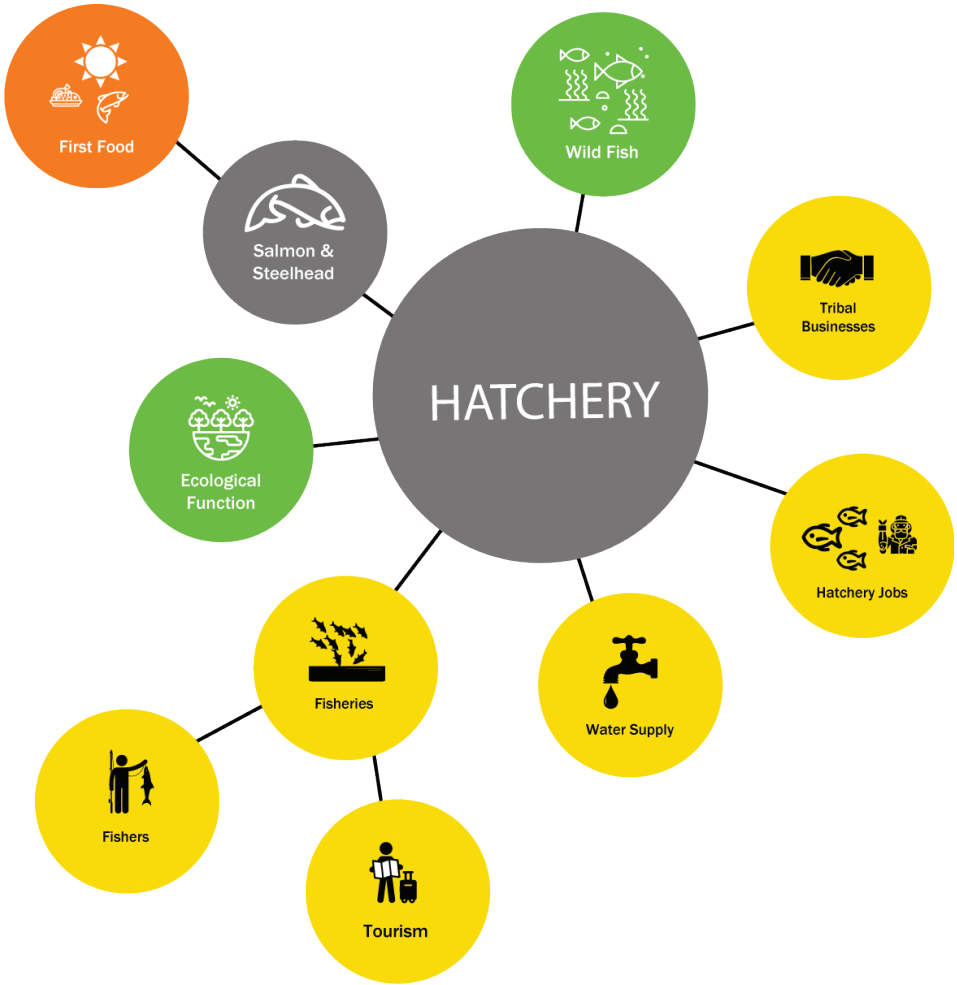
Fisheries

Hatchery jobs

Tribal business

Salmon & Steelhead

Hatcheries



PREDATION DIAL RELATIONSHIPS

Overall, the predation dial was the least built out relationship flow of all of the dials. The basin-wide map had the most robust set of relationships to predation. Predation relationships were primarily ecologically concerned. SCEE elements frequently related to predation included:

Orcas

Invasive species

Human population

Human influenced factors like air quality and water quality & temperature were other frequently related SCEE elements.

RECOMMENDATIONS FOR FUTURE SCENARIO PLANNING

The initial relationship flow mapping exercise enabled participants to visualize existing systems relationships within each sub-basin and throughout the Basin. With this baseline information and learning, we recommend the task force use systems thinking to engage in future scenario planning.

Toward this end we suggest the following:

1. Check your work.
    - Make another pass through the slider elements to ensure each element's performance is considering the systemic relationships suggested by the exercise.
    - Make sure that the operationalization of variables that go into the dials are correct.
    - Confirm foundational systems relationships, some of which were identified in this flow mapping exercise.
    - Are there others? Are the relationships identified in the exercise accurately depicted? Are they complete? Are they really foundational or just recurring?
2. Identify systems to strengthen.
    - Identify "good" systems that should be strengthened as part of future scenario planning and that could be central to a scenario. These are likely to be the ones that span multiple dials.
    - Identify weak systems that could be strengthened in service of achieving Basin goals.
    - Identify systems containing conflicting elements.
    - Identify potential new systems of relationships and potentially new elements.
3. Put it all together in scenarios.
    - Build out future scenarios for the Basin based on project goals and considering the systems mapped.
    - Depict each scenario as a systems diagram with supporting text.
4. Engage in a dial turning exercise to identify which scenarios are useful.
    - Evaluate scenarios with dial impacts exercise to map and assess the positive, negative or neutral impacts turning a dial has on social, cultural, economic and ecological systems.

Note: It will be important to leave a graphic trail of all systems and scenario work accomplished in this stage of the project so that future scenario work can start with the same baseline system information. Graphic representations of systems are generally easier to interpret than written descriptions of relationship flow mapped systems.

APPENDIX 1: WORKSHOP AGENDA

MAFAC CBP Task Force
SCEE Relationship Flow Mapping Exercise

9:30 am - 12:30 pm | September 25, 2019

Embassy Suites at the Portland Airport, 7900 NE 82nd Ave. Portland, OR 97220

CIVIC ECOLOGY PRESENTATION

What is Civic Ecology? A brief introduction to the principles, benefits, and process, including community case study examples. [9:30-9:45]

SESSION #1: BUILDING RELATIONSHIPS

Groups identified SCEE elements important to the region of the basin their table represents and begin identifying relationships between them. Identified primary, secondary, and tertiary relationships to the Dials. [9:45-10:25]

SESSION #2: REFINING RELATIONSHIPS

Task force members switched tables and checked the work done on other regions of the basin. Groups identified new relationships and began to discuss the directionality and resource flows of relationships. [10:25-10:45]

ROUND 2 REPORT OUT

Table groups shared their initial process and method of identifying important variables and relationships. Groups also discussed their initial observations for their region and conflicts during their work. [10:45-11:15]

SESSION #3: DEFINING IMPACTS & FLOWS

Returning to their original region/table, task force members defined the directionality and significance of relationships, plus positive and negative impacts. Groups also identified resource flows represented in relationships. [11:15–11:45]

FINAL REPORT OUT, OPEN DISCUSSION + WRAP UP

Groups shared their final relationship findings, including points of agreement and conflict. Task force members asked about moving forward with the results of the exercise and next steps. [11:45-12:30]

APPENDIX 2: COLUMBIA RIVER BASIN SCEE ELEMENT ICON KEY

Non-Profit (Clubs/Advocacy)
Tourism
Commercial Navigation
Shipping & Exporting
Seafood Processing
Retail
Restaurant
Utility Rates
Transportation
Construction
Utility Provider
Landowner
Climate Change
HYDRO
HARVEST
Salmon & Steelhead
Human Population
HABITAT
PREDATION
Historical Resources
Salmon (Cultural Icon)
HATCHERY
Water

What are the key questions you would like answered in Phase 2?
April 23 & 24, 2019 MAFAC CBP Task Force Meeting

Aspirational Nature of the Goals

- Is this process aspirational or will we have a practical and implementable product?
- We developed very aspirational goals – are we still committed to being aspirational in our strategies and objectives for achieving the goals?
- Do we want to drop the term "provisional" and establish a working set of goals that the group agrees on? What can we move forward with right now?
- How do we achieve the quantitative numbers that we have developed in our regions?

Achieving the Goals

- Can we actually achieve the goals? Can we create a scenario that optimizes the strategies to get the biggest benefit?
- What is realistic and achievable over the 100-year time frame? Every basin needs to test the different scenarios to figure out what works best. We should determine if some of the goals are too high or some are too low.
- Which human-caused factor has the greatest negative impact on salmon and steelhead populations in the Columbia Basin? Which has the least?
- How do we ensure proportionality between strategies and actions and their impacts on certain sectors and the four H's?
- How do we optimize production of summer chinook and other salmon populations?
- What is the willingness and the ability of this group to have difficult, outside of the box conversations about solutions?
- What baseline data about salmon populations throughout the basin do we need to improve?

Prioritization and Speed

- Which stocks should we prioritize for obtaining our high-end natural production quantitative goals?
- What measures will provide the greatest impact of improving salmon and steelhead returns?
- Can we focus on areas where we can be successful quickly?
- How fast do we act when we identify a scenario, strategy, or action? How can we expedite action?

Social & Economic Considerations

- What are the economic effects associated with the various factors limiting salmon and steelhead?
- What is the economic value of fish?
- In Phase 2, how do we consider the many social and economic factors and align those linkages with the goals?
- How will we account for cultural resources?
- What are the most cost-effective strategies for achieving the quantitative goals? Can we minimize economic and social losses?
- How are we going to pay for it? How can we keep using clean power, like hydropower, which allows us to have clean air, but also help the fish?
- Why has there been inconsistent science management and economic and social concerns in the last 20 years?
- How can we account for the benefits that fish bring beyond their monetary value?

Working with Nature / Ecosystem Considerations

- How do we get out of the mindset of fighting natural processes? How do we work with those processes to leverage our attempts to reach these goals?
- Can we work with nature?
- How can we design human interactions with the river that promote a natural river system?
- How can we create more normative natural hydrographs throughout the Basin?
- What is the capacity for river ecosystems to adapt? At what scales?
- Do baseline invertebrate biology indicators need to be assessed?

Building Upon Existing Efforts

- What are we currently doing to achieve the goals and how far from the status quo?
- How do we ensure that any newly proposed strategies, measures and/or actions build upon those within the existing recovery plans? How do we leverage the plans?
- How can we leverage watershed plans, sub-basin plans, and local and state recovery plans?

Climate Change

- How will we incorporate current changes in climate and projected climate change into our strategies and actions?
- Can we develop future water temperature models to account for climate change?

Adaptive Management

- Within the 100-year timeframe, how are we going to incorporate changing science and values? Can we predict this in our process?
- How are we going to balance establishing the quantitative goals with elements of adaptive management?
- How will technology change adaptive management? What will that look like 50 years from now?

Communication & Marketing

- How do we maintain and broaden support for achieving broad-based goals in the face of "salmon fatigue"?
- How do we change cultural and societal values in favor of salmon? How do we market these values to people in the Basin?
- How do we change our thought processes to identify and address the different user groups?
- How do we market the importance of the Columbia River system to the rest of the world?
- How can Basin residents (current and future) learn about salmon, the river ecosystem, and the interdependent human relationship to galvanize the collective will to achieve our goals?
- How do we change cultural and societal values in favor of salmon? How do we market these values to the rest of the people in the basin?
- What will communication look like between the Upper Columbia Basin, Lower Columbia Basin, and ocean stakeholders?
- How do you improve communication throughout the Basin to prioritize issues?

Sustained Efforts & Governance

- What can this group produce that is going to live beyond the group and benefit others?
- How will we maintain this level of effort to achieve the goals in the long term?
- How will we sustain our efforts after we reach the goals?
- How will we maintain federal focus on the Columbia Basin throughout this process when there are so many needs for federal funding?

Brainstorming Guidance for Day 1
Of the April 23 & 24 MAFAC CBP Task Force Meeting

Framing a Mindset for the Day: The intent for the day is to be able to talk frankly about interests, needs, and concerns, to talk broadly, to hear all sides, to not judge or critique, to walk in each other's shoes, to take a long term view, and to protect a safe space during the dialogue.

Step 1: Plenary Questions
During the plenary discussion with all Task Force members, ask the following question and go around the room to hear Task Force members' thoughts:

- What are key questions you would like to have answered in Phase 2?

Step 2: Brainstorm
Large group brainstorming on what is needed to achieve the goals. Task Force members will put their ideas up on a large wall using sticky notes. We will give the group the following guidance:

- What are the strategies and actions that contribute to achieving the provisional quantitative goals?
- What are the social, cultural, economic, and ecosystem considerations?
- What do you care about, what do you need and want, and what are you afraid of?
- Feel free to think basin-wide, stock-specific, or by geographic region and to suggest biological, socioeconomic, cultural, ecosystem, policy, and/or legal strategies and actions. Feel free to be as general or specific as you want.

Step 3: Walking the Wall/Reflection
Group members take some time to read and reflect on all the sticky notes on the wall. Ask clarifying questions among Task Force members and discuss with one another. Once Task Force members have returned to their seats, using the curiosity model, allow for Task Force members to share stories as a way to better understand each other's perspectives.

Step 4: Small Group Discussions
Continue the brainstorming discussion in small groups and start to organize the brainstormed ideas into themes. We will give the group the following guidance:

- What are the overarching themes?
- What are some ideas or suggestions for how to organize these brainstormed ideas?

Step 5: Report Out
Small groups report out to large group. We will do this at the end of Day 1 if time permits.

Step 6: Next Steps
Integration Team helps to synthesize, organize, and coalesce the ideas and suggestions in preparation for the June MAFAC CBP Task Force meeting.

MAFAC CBP Task Force Sticky Wall
April 23 and 24, 2019 Meeting

	Hatchery
1	Increase escapement objectives in harvest management plans
2	Tailor hatchery programs to harmonize with recovery goals
3	Hatchery production: In mainstem rivers, does hatchery production have a negative impact on native fish?
4	Evaluate existing hatchery migration requirements in light of best available science and CBP natural production goals
5	Hatcheries operated and sited to be consistent with natural production goals while providing harvest/fishing benefits
6	Declare the USA a hatchery system -- work with Canada to preserve wild stocks
7	Close all hatcheries OR maximize hatchery production
8	Focus hatchery production for low quality spawning areas
9	Increase hatchery production in near-term in responsible approach: 1) Helps address other out-of-basin impacts (e.g. Orcas) 2) Satisfy short term needs of multiple users 3) When done correctly, proven method to rebuild and reintroduce stocks.
10	Salmong gene pool: 1) how to ressurect june hogs? 2) Identify stocks with more tolerance for warmer water: Los Angeles River Steelhead
11	Changes to hatchery operations to minimize impacts to wild fish and improve fitness of hatchery stock. Changes to broodstock, changes to production level, changes in release locations, potential closures
12	What's the process for optimizing the use of hatcheries for recovery and human consumption?
13	Focus on development of salmon more tolerant to warm water. Those existed historically in some of the blocked off desert tribes
	Hydro
1	How far does "smart spill" or "flex spill" go toward increasing survival?
2	What trajectory does 2019 hydro systems operations have us on? Flat, increasing, or steeply increasing?
3	What did the fish say when it ran into the wall?
4	For upriver populations, aggressive hydro-system actions must be implemented to achieve quantitative goals…but economic impacts of those actions must be transparent
5	Rethink river operations from a fish perspective. With current infrastructure, could operations change? Examples: seasonal barging outside fish migration sesaons, flex spill - hourly variation in spill to balance power and fish, use dredging to maintain river mouth habitat, irrigation?
6	Identify realistic life span of dams
7	Try and work with the Columbia and Snake River Dams
8	Dam/hydro management: salmon priority, power/transportation secondary
9	Removal of dams to understand how they affect salmon populations/prey species
10	Spill to 125 TDG 24/7 during outmigration
11	Dam Breaching: how does dam breaching affect the reliability of the PNW electrical grid?
12	Remove Lower Snake River dams
13	Enhanced spill operations at dams to improve juvenile outmigration
14	Lower Snake River dam removal
15	Change to dam operations: increase spill, modificiation of flood control rule curve
16	Increase spill to 125% TDG
17	How do we think about dam removals in an organized way? This must be thought through on a case by case basis

18	Consider different transportation options if navigation is impacted by removal of Lower Snake River Dams.
19	Over the next 100 years, nearly every dam in the basin will reach its designed life-span! How can we redesign and replace them to be more fish-friendly?
	Habitat
1	More carefully include ocean/conditions as habitat
2	Eliminate all development in the floodplains. Restore floodplain function
3	Improve spawning and rearing habitat
4	Develop cold water refuges between gorge and lower estuary
5	Cold water refuges are needed
6	Moratorium on floodplain development
7	Robust floodplains; tributaries and mainstem
8	Emphasize natural floodplain production: it worked great before encroachment, stop the bleeding/development, set back levees (change in Corps policy!), reconnect channels to floodplain
9	Maximize escapement to habitat potential
10	Mid-Columbia Steelhead Focus: Sub-basis ready to act, identify synergistic, collateral benefits for other runs.
11	Increase money for species protection, habitat restoration above tidal/wetland
12	Habitat restoration in mainstem, tributaries, and estuary
13	Protection of cold-water refugia habitat in mainstem and key tributaries
14	Maximize productivity of estuary habitat
15	Design infrastructure. E.g., culverts for projections of increased precipitation/storminess
16	Bring back the beavers
17	Maximize habitat restoration in all watersheds
18	Protect remains of habitat
19	Understand role of tidal estuary plumes
20	Track eutrophication/hypoxia/acidification. Identify impacts, sources, and solutions
21	Maintain/increase revenue for habitat restoration and protection
22	Consider conservation reserve program
23	Require adequate riparian buffers
24	Cold water refugia: mainstem and tributaries
25	Maximize use of habitat including to inaccessible areas
26	Require 200% replacement for all development that damages habitat
27	Moratorium on floodplain development
28	Try to achieve 100% restoration of a few "demonstration watersheds" as places to incubate ideas to be used elsewhere
29	National Columbia River Flood Plain Park System: protect all tributary flood plains (mainstem) from further development and shift ownership to refuges
30	Promote salmon conservation on forest service lands
31	Design with nature: remove development, especially non-water depending from floodplain/flooding
32	Operate John Day to MDP for 20 years to test creaion of fish habitat
33	Expand geographic diversity to combat climate change and development by providing passage into currently blocked areas
34	Create salmon habitat which can be also used in agriculture
35	How do we institutionalize a 100 year restoration effort? How do we assure it will happen?
36	Action to alleviate density dependence limites on wild fish
37	Protect and expand floodplain habitat
38	Ensure hatchery actions are supportive of habitat investments

39	Open confined channels and restore floodplains
40	Have BNSF open up side channel habitat on mainstem Columbia
	Harvest
1	Use mark/select live release harvest methods in all fisheries/in none/ in some
2	Close all harvest OR maximize
3	Increase regulations on farming salmon, especially Atlantic in Pacific
4	Moratorium on recreational fishing
5	What would short-term negotiated harvest reductions do to jump start seeding under seeded habitats?
6	Determine which species decrease salmon pops (fish species) and allow for higher quota of that species to be bought/caught
7	Harvest adjustments i.e., gear restrictions, moratoria, etc.
8	Develop better run size forecasting to ensure escapement objectives are met
9	Temper fisheries with respect to run-timing concerns. If you always fish the early fish hard, your run will get later and later
10	Harvest: Use of selective nets on all in-river harvest
11	Remove artificial sea lion haulouts on lower Columbia
12	Changes to gear/area/time restrictions for recreational/commercial fishing
	Predation
1	Increase efforts to target predation: 1) believe predation by fish (e.g. bass, pike minnow), avian species, and sea lions is underreported 2) Disparate impacts on different stocks 3) Large cost-benefit potential
2	Minimize bird predation
3	Increase predator controls
4	Implement Corps Mid C bird predation plan
5	Predation management
6	How far can minimizing predation (avian, picivorus, pinne.) take us toward short, medium, and long-term goals
7	Develop effective programs to respond to invasive species
8	Invasive fish species are a problem. Management of non-native species and salmon/steelhead restoration needs to be addressed. The states, feds, and tribes of the Columbia Basin need to come together on a common sense approach
9	Predation control measures
10	Action: Reduce predation by birds, pinnipeds, and non-native fish Social constraint: educate public about human influence that has led to high predation
	Stronghold
1	Designate salmon sanctuaries as a means to preserve wild populations
2	Identify and protect areas that harbor "salmon strongholds"
3	Improve most productive stocks first
4	Develop wild fish emphasis areas
5	Prioritize stocks and populations within stocks for meeting quantitative goals
6	Emphasize geographic areas that have greatest potential to recover fish runs and meet goals considering future conditions such as climate change
	Weak Stock Management
1	Implement weak stock harvest management at MPG level
2	Evaluate impact of hatchery smolt abundance on predator populations and predation on wild fish
3	Address bird predation at the mouth of Walla Walla and in Lower Yakima River.

4	Substitute C+R Fisheries (sport) for harvest to maintain fishing opportunity and advance conservation
5	Salmon memorial: say goodbye to some stocks, triage.
6	Reduce exploitation rates on weak stocks
	All H's
1	Understand extent of man-induced fish mortalities (limiting factors) gravel-to-gravel. Acknowledge the gap between historical and current fish life history stage survivals (what is "broken") to develop targeted restoration "fixes" that have the best biological benefit (by subregion and species)
2	Need to ensure a "all H" approach: habitat, hatcheries, harvest, hydro, ecological interactions (balanced)
3	Harvest, hydro, hatcheries, habitat, predation, reintroduction, water quantity, water quality, ocean density dependence
4	Key Phase 2 Expectations: 1) Prioritize action strategies (H's by subregion and species) where most gains towards our goals can reasonably be attained 2) Begin a process which will allow natural resource managers to implement the restoration packages identified above (prepare to turn planning into action)
5	Harvest - limit on key populations Hydro - limit juvenile and adult mortality, address blockages Habitat - Improve natural floodplain quality and quantity (fish productivity)(tributaries, mainstem, and estuary) Hatcheries - Incorporate supplementation with minimized fitness impacts (spawner abundance) Predation - Reduce artificially inflated predator abundance Contaminants - Reduce at source and abundance in water and substrates
	Natural Production
1	Want: to keep provisional goals live targets that the region continues to strive for
2	Consider mechanisms to restructure in-river fisheries to meet natural production goals while meeting tribal treaty rights and non-tribal fishing opportunity
	Fish Passage and Reintroduction
1	Create quantitative goals for above HCC and other blocked areas
2	For Mid C and Snake Steelhead, address "overshoot" issue
3	Make sure to identify the duration of the recovery action
4	Quantitative goals for the HCC blocked area need to be established
5	Increase speed and efficiency of down-stream and upstream passage in the Columbia
6	Increase production to allow for fish in blocked areas
7	Reestablish salmon runs above existing dams - Chief Joesph/Grand Coulee and Hells Canyon Complex
8	Provide fish passage wherever possible
9	Fish passage: Improvement of existing fish passage infrastructure and consideration of new fish passage (WF Clearwater etc.)
10	Reintroduction into blocked areas
11	Take a modern/fresh look at fish passage technology
12	Implement phased approach to fish passage
	Life Cycle Modeling
1	Conduct life cycle modeling to identify key bottlenecks to focus on across all H's
2	Given ocean caused fish mortality, can we improve fish survival by decreasing in-river fish mortality?
3	Manage flows to match life cycle needs of fish
4	Life cycle analysis: basin-wide energy/water/chemistry foodprint analysis -- can then compare impacts across the basin for all industries
5	Identify key factors limiting productivity and abundance across the life cycle of each population, to esnure actions, measures, and strategies focus on the most important bottlenecks

6	State-of-the-art life cycle fish modeling must provide science-grounded direction for addressing the right life history gaps/needs for each location and species. We must stand out beyond past plans that did not have specific prioritized actions necessary to achieve defined goals
	Ecosystem
1	Catalog and map ecosystem services
2	Salmon 200: Salmon only able to survive in artificial, designed, engineered basin
3	Healthy soils: sequester carbon and store water
4	Account for ecosystem services
5	Marine derived nutrients: restore Lamprey in abundance throughout the basin
6	Add 3rd leg to Columbia River Treaty (CRT) Ecosystem based function. Not just flood control and power production
7	The home (aquatic ecosystem) for our salmon has been extremely diminshed to where it cannot support the numbers/goals we would like to see. Status quo is not working so we must make a full-court press to try and regain a natural functioning, ecologically sustained ecosystem, which is the best way to produce and sustain fish (plus numerous other benefits...)
8	Rely on natural processes to help meet goals
9	Restore natural river complexity
10	Understand regulatory interactions between T + E species. For example, will improvements for salmon impact recovery of smelt, sturgeon, stellars, streaked horned larks, etc.?
11	Columbia River Treaty: Add ecosystem services objective
	Future Conditions (Climate, Population, Etc.)
1	Is there a limit to how much wheat, apples, grapes, hops, potatoes, cows, etc. that the region produces?
2	Salmon zen: with climate change, there is little chance for present biological and human functions to persist
3	Develop strategies that are robust to climate change and population growth
4	Maximize natural function of fresh water aquatic ecosystems to moderate climate change effects
5	Understand population growth
6	How do we achieve our goals if climate change makes salmon rivers south of British Columbia problematic?
7	Changes in sea level: especially river and estuary will change what habitat we should protect; where we build; current location of infrastructure (e.g. treatment facilities)
	Adaptive Management
1	Be able to effectively modify management strategies as conditions change
2	Evaluate and compare provisional goals with current SAR's in respective subbasins. How many smolts would be needed to meet those goals at a given SAR? Start your back-calculations in how to get there.
3	How can we develop a process that is nimble that can respond to changing conditions?
4	How will we know if we achieve our goals? 1) Long-term reporting on progress (status and trends) 2) Comprehensive M+E Strategy: Task Force Goals, 5 year status reports, Recovery Plans, FCRPS BiOp, NPCC F+W Program
5	Adaptive management
	Building on Existing Efforts
1	Incorporate and build upon existing actions, strategies, and measures from recovery plans, subbasin plans, and watershed plans as a starting point. Don't reinvent the wheel!
2	Development of existing recovery plans factored into various degrees -- social, economic, and cultural considerations and trade-offs. We need to maintain the balance of these considerations in moving forward
3	Need to fully invest in implementing existing plans as start

4	Honor existing NOAA approved recovery plans in their entirety, and use them as the foundation for moving forward
5	Make sure "fish restoration projects/expenses" benefit fish. We need implementation standards consistent for all projects
6	Start where projects are ready to go and build from there in a scaleable fashion
7	Use existing recovery plans as the framework for implementation
Water	
1	Enhance water storage capacity
2	Tribal water rights: prioritize ajudication
3	Toxics? Willamette River Portland Harbor
4	Continue to develop technologies which optimize the use of water on farm lands
5	Water quality focus: 1) toxins, temperature, and sediment. 2) Salmon Safe Certification. 100 years: entire basin is salmon-safe
6	Teach the basin to "not crap where they eat" and take care of the place they and their children live and grow. Take care of the water you and your neighbors drink
7	State water rights -- add "salmon stewardship" to current beneficial use
8	Improve water quality in mainstem and tributaries: 1) Completion of TMDLs 2) Implementation of TMDLs 3) Cold-water refuge protection 4) Habitat restoration 5) Dam operations
9	Must include assessment of toxics and be reducing/removing toxics
10	Water rights lease: generate to sustain livelihoods by staying in the river
11	Change irrigation practices to more efficient (i.e., drip)
12	How do we store water in a future with 20% of our current snowpack?
13	Identify cold water storage opportunities: reservoir, snowpack, and glacial
14	Identify and address sources of toxics and endocrine disruptors to salmon
15	Columbia River Treaty renegotiation provides opportunity to change the flow regime to that of a more natural river. The challenge is engaging the state department to make ecosystem function a priority
16	Meet water quality standards
17	Finish and implement Columbia River termperature TMDL
18	Identify water storage and conservation projects
19	Address water quality
Energy and Renewables	
1	Consider mechanisms to secure replacement power if LSRD are removed
2	Invest in energy storage
3	Invest in much more power storage through batteries to reduce load following needs
4	Renewables: dedicate additional wind poewr to recirculate river water -- use over and over agin to generate power when needed
5	A true cost, in terms of monthly utility bills for residential and industrial customers, of aggressive actions to recover listed populations should be collaboratively dveloped and communicated
6	Energy: maximize alternative energy options including energy efficiency to move away from hydropower over time
Regulation	
1	Legislative action to protect in-stream flows, especially in Washington

2	Upgrade administrative rules of natural resource management agencies (e.g. state instream water management, corps levee management)
3	Provide legal and regulatory certainty (i.e. no more lawsuits) to allow solutions to take place
4	Allow permitting processes that are efficient for projects that are restoring or improving
5	Design tributary management for flood control - floodplain
6	Create alternative no-harm options for industry practices that have negative impacts (i.e., micronutrient products)
7	Work with the state department to renegotiate salmon treaties and reduce hatchery inputs of sockeye, chums, and pinks
8	Salmon food tax; so consumers help pay for recovery (Pittman-Robertson model)
9	Set a small tax on each salmon caught as bycatch (Ak/Commercial fisheries)
10	Understand interfaces, consistency, conflits, and leverages of regulations, plans, and lawsuits
11	Use existing authorizations and laws at the federal and state levels and build upon them for appropriations
12	Identify need for regulatory changes
13	Reduce government regulations to accomplish habitat restoration
14	How do we balance getting all the data we need to design a solution versus trying something and seeing what works and what we can learn?
15	Substantive changes to land management on federal lands (e.g. USFS) is needed to support recovery in the upper Columbia region
16	Acknowledge what regulations would be required for implentation and how that would affect the regulated community
17	Fully implement the Clean Water Act
18	Streamlined regulations among various regulatory entities
Funding and Incentives	
1	Create incentive to catch and kill non-native fish species
2	Reliable and fair funding for the long-term effort: Is there a multi-state/federal formula that can be established based on Columbia River flow, water use, or some other set of factors?
3	Reduce the "Frictional Costs" of making the changes that are needed…This catalyzes rapid change
4	Develop long-term investment portfolio
5	Provide incentive grants to ports and others towards restoration
6	Prevent attempts to permanently reduce funding for the Fish & Wildlife Program of the NW Power Act
7	Based on limited funding -- how are current and future priorities funded?
8	Make sure that the plan and goals are crafted in such a way that political support can be found and funding achieved
9	Combination of Urban and Steve Fick's ideas as we go forward. We will need funding to hit quantitative goals. To achieve funding, we need to think about how to market our work products: i.e., successful outcomes to user groups and ecosytem
10	Salmon subsidies: identify acceptable, dependable sources of money
11	Expand funding options for salmon restoration -- salmon tax?
12	Provide incentive programs for riparian protection
13	Prevent immediate declines in US ACOE CRFM budget, and develop strategy to increase it in the future
14	Change incentive structures
15	Reduce expense of habitat restoration and implement incentive based money for positive results
16	Achieving goals will require additional funding and public support. What is our strategy to do this?
Overall Socioeconomic Considerations	
1	Highlight benefits of increasing natural production to economy: Increased recreation and tourism, increased commercial and recreation economy

2	Fear: cost will undermine the most impactful actions
3	Achieving goals will require maintaining functioning ecosystems and improving degraded ecosystems. These changes are best achieved by considering social, cultural, and economic considerations
4	Equal consideration of salmon, economic, business, and cultural interests
5	Consider mechanisms to mitigate the economic and social impacts that will result from actions necessary to meet natural production goals
6	Be aware of unintended social consequences of proposed actions
7	Use economic value/benefit/fish to motivate and inspire society to act or replace value of industry
Cost Benefit Analysis	
1	Do real costs vs benefits analysis -- includes the"cost of doing nothing" -- the status quo is not free and is NOT the best baseline. All costs and all benefits of change must be considered…
2	Cost-benefit of proposed actions. Can we define a metric of adult salmon per dollar?
3	Include considerations and cost estimates of not taking actions to recover fish/salmon
4	Having more fish in the river will not be enough to "sell" our forthcoming "Master Partnership Plan." All benefits tied to fish/fish habitat restoration will need to be identified and promoted. Boost local economies, recreation, aesthetics, fish and wildlife habitat, agricultural benefits (groundater and reduced erosion), etc.
Timing and Time Frames	
1	Do something that can help right now
2	How to achieve agreement on what "science" will be used to make management decisions
3	Can we embrace a 1% solution? (i.e., a small gain gets compounded with lots of other small gains)
4	The goals must be able to be achieved in an incremental and step by step way -- "scaleable"
5	Prioritize actions with large, near-term benefits, multi-stock benefits, and benefits to high potential populations
Big Picture Thinking	
1	Prioritize actions = build on success
2	Develop list of short-term actions
3	To the extent that we can, project technologies of the future rather than rely on past technologies -- test innovations
4	How do we estimate to capacity of technology to change the picture?
5	Attempt to identify every variable in the salmon/steelhead equation
6	Large, basin-scale experiments to answer critical uncertainties about efficacy of management actions
7	Let nature rule for one lifecycle: no harvest, no flood control, no mitigation work
8	Joy: map joy in the basin. Identify sources.
9	Columbia River and Salmon Holiday: Rest and recuperation for 5 to 10 years
10	Cross basin prioritization (impact, cost, timing)
11	What is the social capacity for radical change?
12	Value each other and our environment. Take care of it, and it will take care of us. We aren't moving to Mars :)
13	Declare International Salmon Day - make people invested in this effort
14	Pain: Map pain in the basin. Identify sources
15	Ocean impacts: Reduce plastics, especially single use
16	What is our best "Model of Change?" How do we manage change to minimize negatives and maximize benefits?
17	Look for opportunities to link strategies/actions to get strong synergistic effects
18	CRB Salmon Regional Park: salmon centric management paid for by California as they say goodbye to salmon due to climate change
19	Direct our efforts to negate the impact of greatest harm first

20	Salmong Thanksgiving: salmon become our region's symbol of giving and thanks; gift culture/economy
21	Less talk, more action
	Governance
1	Ensure adaptive management and monitoring programs to support implentation are in place, fully funded, and coordinated across the basin
2	Given the longer time frame proposed to achieve goals: how does the Partnership plan continue in the future?
3	Create a position or a body to oversee progress: Salmon Chief or Salmon Commission
4	Create a product and strategy that can live beyond this group -- i.e., durable goals and strategies
5	Use money efficiently -- allow processes and money to be less bureaucratic that can get money on the ground more effectively
6	Need new forum, moving forward, to implement the ultimate strategies from Phase 2, including funding
7	Establish a long-standing panel (state/tribal/fed/NGO) that oversees long-term implementation (akin to the Power Council?)
8	Support WA funding proposals for WDFW budget/hatchery production and Lower Snake River dam removal collaborative process
9	Every entity that manages natural resources, specifically those who control floodplain land and water (fish habitat), must improve their governance/adequacy and admin of rules/etc. as necessary for successful implementation of our "Partnership Plan." This includes Feds, states, counties, municipalities, tribes, etc.
	Branding and Communications
1	Fear: People are too entrenched in positions to change
2	Salmon as savior: Continues to show us, guide us, to learn how to live together with a healthy river
3	Create a communication network to be aware of issues (fires, landslides, predation, over harvest, etc.)
4	K-12 CR Basin Environmental Education - salmon as the organizing narrative thread. All schools in the basin in 25 years
5	Develop methods to elevate Columbia River salmon to a world-class resource (branding, basin-wide awareness, economic support)
6	Education/outreach achieve buy-in
7	Inherent cultural value of salmon can't be captured in economic value of the fish
8	The next generation(s) of children are informed of these issues and want to be a part of reaching our future goals
9	In order to gain the necessary broad public support that will help justify and pay for the salmon/steelhead recovery, would it help to frame the issue as a "water quality and water quantity program"? This may help with the marketing of the effort
10	Salmon nation "citizen" naturalization process for all CRB immigrants
11	How to account for entire cost of action that impacts fish or environment?
12	Take everyone fishing - get them "connected"
13	Is there <u>actual</u> support in the Pacific NW for recovery and rebuilding of salmon and steelhead populations?
14	Increase funding/efforts to purchase water rights and dedicate them to in-stream flows
15	How can we present the information about the importance of salmon in the Columbia River Basin to the general public? (to show how important the Basin is)
16	How do we brand the Columbia?
17	Understand secondary impacts of actions
18	River as food. River is food. Widespread recognition and honoring this -- that food doesn't just come from withdrawn irrigation water
19	How do you get the diverse stakeholder groups "outside the room" on board with identified priorities

20	As the plan is being created, think about how you/we will be "talking it up" in the halls of Congress and the state legislatures
21	Address the question -- "If salmon/steelhead is endangered, why can I buy it to eat?"
	Equity/Diverse Perspectives
1	Consider impacts on marginal communities, especially low income, most at risk, most impacted and least able to respond who are not part of processes
2	Remember and apply the precautionary principle
3	Many regionally based stakeholders who are key to implementation -- counties, cities, state agencies, etc -- are not present at the table. These organizations make the majority of decisions that drive recovery. Expand the table to include them
	Other
1	There is some old and aging infrastructure in the Columbia Basin. Example: old hatcheries, dams, etc. Are ther technological advancements that will help fish while still meeting the demands of industry?
2	Can we develop a priority for "actions" that places a preference for leveraging natural processes, verses man-made infrastructure projects?

Name: _____

MAFAC CBP Task Force
Social, Cultural, Economic and Ecosystem (SCE&E) Considerations
June 26 & 27, 2019 Meeting

Qualitative Goal 4. Make decisions within a broader context that reflects, and considers effects to, the full range of social, cultural, economic, and ecosystem values and diversity in the Columbia Basin.

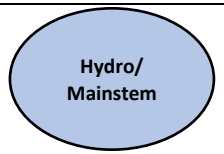
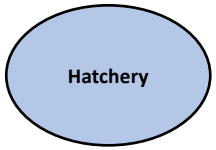
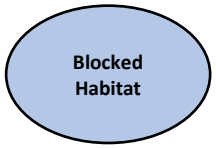
Discussion Questions

We want to start a conversation about the social, cultural, economic, and ecosystem (SCE&E) considerations of turning the dials. These will be important considerations in evaluating options to achieve the goals. Please see the next page for a useful chart to help you discuss the following questions:

1. When you turn a dial to make improvements and reduce impacts, what considerations are affected? List the affected social, cultural, economic, and ecological considerations in column B.
2. When you turn a dial to make improvements and reduce impacts, why are those social, cultural, economic, and ecological considerations affected? List your answers in column C.
3. When you turn a dial to make improvements and reduce impacts, how are those social, cultural, economic, and ecological considerations affected? List your answers in column D.

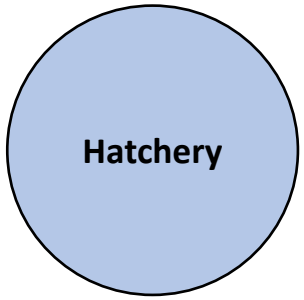
Please write your name on this packet and return it to Abby Cheskis when you are done filling it out

Example Chart with All Dials

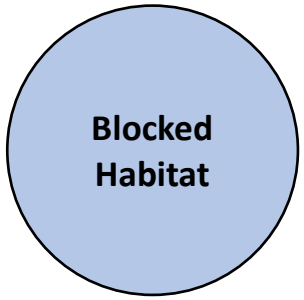
A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
   	**Social**		
	Diversity		
	Energy production		
	Cultural		
	Tribal culture		
	Economic		
	Fisheries		
	Navigation		
	Irrigation		
	Agriculture/ranching		
	Utility rates		
	Ecological		
	Promotes natural systems		
	Dependent wildlife		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
Hydro/ Mainstem	**Social**		
	Cultural		
	Economic		
	Ecological		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
Tributary & Estuary Habitat	**Social**		
	Cultural		
	Economic		
	Ecological		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
	**Social**		
	Cultural		
	Economic		
	Ecological		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
Predation	**Social**		
	Cultural		
	Economic		
	Ecological		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
	**Social**		
	Cultural		
	Economic		
	Ecological		

A Dial	B (what) When you turn a dial, what SCE&E considerations are affected?	C (why) Why are those considerations affected?	D (how) Is it better or worse? [+/-]
	Social		
	Cultural		
	Economic		
	Ecological		

CBP Task Force
Table of Social, Cultural, Economic and Ecological (SCEE) Considerations
Draft 11-12-19

Note: The details in this table would be rolled up into a summary description to go along with scenarios.

SCEE	***Scenario 1***	***Scenario 2***	***Scenario 3***	***Scenario 4***
Water Quantity/Supply				
Water Quality/Temperature				
First Food				
Cultural Resources				
Traditions and Legacy				
Spiritual Connection				
Fisheries				
Fishers				
Boat Builders & Dealers				
Electricity Generation				
Utility Provider				
Utility Rates				
Commercial Navigation & Shipping				
Agriculture				
Communities – e.g. Lewiston, Astoria				
Forestry/ Timber				

SCEE	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*
Private Landowners				
Land-use				
Seafood Processors				
Hatchery jobs				
Tribal Businesses				
Tourism/Restaurants/Hotels				
Ecological Function				
Dependent Wildlife/ Orcas				
Air Quality				
Animal Viewing & Watching				
Invasive Species				

Water quantity/supply
Water quality
Habitat quantity/quality
Cultural
Fishing and related businesses (including seafood processing, fishery supply, etc.)
Power producers and users
Navigation and shipping
Agriculture
Forest management/timber production
Local communities
Private landowners
Tourism
Dependent wildlife

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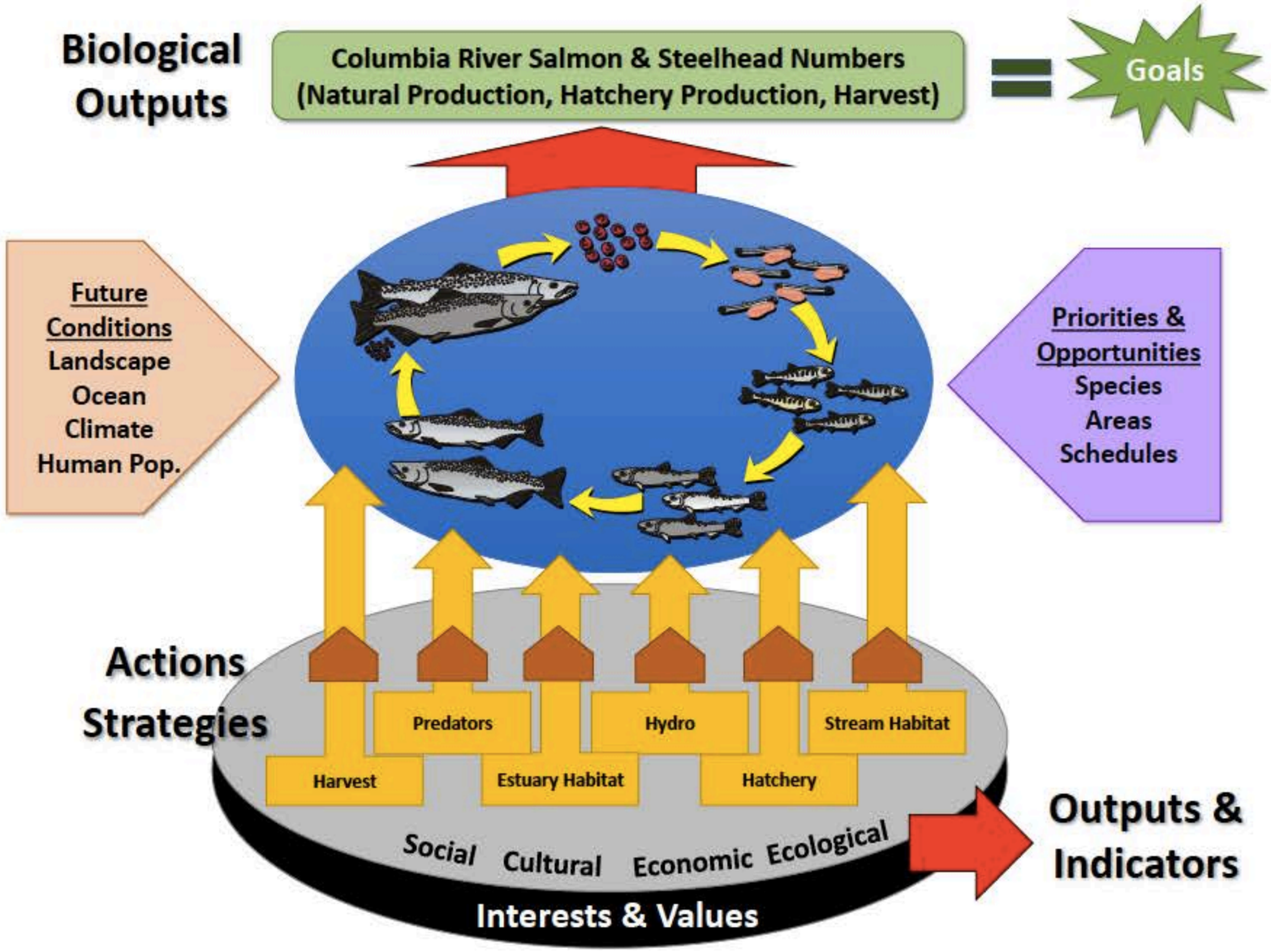

MAFAC CBP Task Force Phase 2 Potential Logic Path Discussion for March 18 & 19 Meeting

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River Economics: Evaluating Trade-offs in Columbia River Basin Fish and Wildlife Programs and Policies

COUNCIL DOCUMENT NUMBER: 2007-1001 | Adopted by the Council: May 9, 2007 | Publication Date: May 2007

Prepared by the Independent Economic Analysis Board
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Staff
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Technical Guide
Paul Sorensen

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EXECUTIVE SUMMARY

The movement toward a more ecosystem river ecosystem involves policy decisions that include trade-offs between values and important regional social and economic factors. These changes will affect the distribution of costs and benefits among the various parties, but a sharp focus on the ecosystem does not guarantee that any of these groups will be made better off.

There are a wide range of economic tools and concepts that have been put to be applied to Pacific Northwest fish and wildlife issues. The Independent Economic Analysis Board has developed a framework that is organized around a number of key questions. The framework is designed to help policymakers quantify the value of things given up in the pursuit of a particular course of action. It also helps them identify the costs and benefits of alternative ways of achieving a particular goal, and to evaluate the distributional effects. When a specific proposal or project budget is developed, alternative project designs or revenues may be considered using cost-effectiveness analysis. If cost-effectiveness analysis is not sufficient to make a decision because the benefits are not the same, then a benefit-cost analysis could be employed and encouraged or proposed. A benefit-cost analysis requires that the Council and others decide explicit attention to quantification of project benefits. The successful application of cost-effectiveness and benefit-cost analysis requires that the Council and others decide explicit attention to the principles of economic efficiency. When the analysis is difficult, economic tools can help inform decision makers more broad-minded decisions by assessing the costs of alternative projects and programs and the benefits they provide.

Economic information is a part of information that is relevant to the Council's decisions. The nature, strengths and weaknesses of economic information is necessary before decision makers can effectively use it. Economic analysis is a tool that can help inform decisions, but it is not a decision tool. The role of economic analysis is limited by at least three considerations. First, economic analysis (property rights, contracts, legal rules, etc.) may have only a small role for economic analysis in the decision process. Second, economic analysis may be limited by the availability of information. Third, benefits may make the results of some economic analyses so uncertain and unreliable as to reduce their usefulness. Economic analysis is a tool that can help inform decisions, but it is not a decision tool. The role of economic analysis is limited by at least three considerations. First, economic analysis (property rights, contracts, legal rules, etc.) may have only a small role for economic analysis in the decision process. Second, economic analysis may be limited by the availability of information. Third, benefits may make the results of some economic analyses so uncertain and unreliable as to reduce their usefulness.

The next five perspectives are organized with the measurement and context of costs and benefits for decision making. The goals and issues associated with these perspectives are important to consider in the context of the Council's program. The Council's program is a complex mixture of biological, economic and political components of the ecosystems of the ecosystems. The uncertainty of ecological responses and impacts affects both costs and benefits. The Council's program is a complex mixture of biological, economic and political components of the ecosystems of the ecosystems. The uncertainty of ecological responses and impacts affects both costs and benefits. The Council's program is a complex mixture of biological, economic and political components of the ecosystems of the ecosystems. The uncertainty of ecological responses and impacts affects both costs and benefits.

Finally, the goal of the report on river economics is to provide information useful to the Northwest Power and Conservation Council's Fish and Wildlife Program and to the Bonneville Power Administration's efforts to implement the Program. The Council's Program is a complex mixture of biological, economic and political components of the ecosystems of the ecosystems. The uncertainty of ecological responses and impacts affects both costs and benefits. The Council's program is a complex mixture of biological, economic and political components of the ecosystems of the ecosystems. The uncertainty of ecological responses and impacts affects both costs and benefits.

River Economics: Evaluating Trade-offs in the Columbia River Basin Fish and Wildlife Program

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Table 5 Changes in the Alaska Economy, 1960–1995, Includes Washington, Oregon, Idaho, and Montana. All dollar values are in billions of 1995 dollar equivalents.

	1960	1995		Held Oil	
Category	Billions	Share %	Billions	Share %	Change
Total Personal Income	$764.9	100.0%	$2,152.0	100.0%	+181.4%
Farming	$.43	0.1%	$.28	1.2%	-42.6%
Agric. Services	$.0.01	0.0%	$.1	0.1%	+1941.7%
Mining	$.3	0.5%	$.52	2.4%	+1,600.0%
Construction	$.5.8	5.4%	$.11.4	4.9%	+96.7%
Manufacturing	$.35.1	18.8%	$.39.3	12.1%	+14.8%
Transportation,Utilities, & Communications	$.6.4	6.0%	$.14.4	6.8%	+119%
Wholesale Trade	$.15.2	4.8%	$.15.9	4.6%	+18.5%
Retail Trade	$.10.3	9.4%	$.19.4	9.0%	+88.4%
Finance, Insurance, and Real Estate	$.3.9	3.7%	$.9.4	4.0%	+130.7%
Services	$.9.7	9.0%	$.40.1	18.3%	+314.2%
Government	$.15.8	14.8%	$.28.3	12.5%	+78.6%
Dividends	$.15.2	14.2%	$.41.4	17.4%	+172.5%
Transfer Payments	$.12.2	11.5%	$.30.3	14.7%	+281.6%

Source: Regional Economic Information System (REIS).

Table 5 Changes in the Alaska Coastline River Basin, 1960 - 1995, Includes selected counties from eastern Washington and Oregon, Idaho, and western Montana. All dollar values are in billions of 1995 dollar equivalents.

	1960	1995		Held Oil	
Category	Billions	Share %	Billions	Share %	Change
Total Personal Income	$. 100.5	100.0 %	$. 165.6	100.0 %	+64.8%
Farming	$.6.0	10.3%	$.7.8	2.9%	+30.0%
Agric. Services	$.1.8	0.6%	$.3.8	0.9%	+170.7%
Mining	$.1.8	1.3%	$.3.0	0.8%	+9.6%
Construction	$.7.7	5.4%	$.12.1	5.2%	+91.9%
Manufacturing	$.15.9	13.6%	$.24.7	14.2%	+57.1%
Transportation,Utilities, & Communications	$.7.7	5.7%	$.12.7	4.3%	+57.4%
Wholesale Trade	$.7.7	4.1%	$.12.2	5.6%	+60.1%
Retail Trade	$.13.0	10.0%	$.6.8	7.6%	+18.4%
Finance, Insurance, Real Estate	$.8.9	2.8%	$.1.8	2.9%	+93.5%
Services	$.5.4	11.1%	$.19.5	16.7%	+253.4%
Government	$.6.2	14.4%	$.8.5	13.8%	+90.4%
Dividends	$.0	0.7%	$.0	1.1%	+44.4%
Transfer Payments	$.3.1	10.3%	$.9.8	18.8%	+262.7

Proposition 2. The economic gains and losses caused by fish and wildlife projects may be spread unevenly across the region. Use the development of peak discovery and flow and wildlife projects as two examples of distinctly negative and positive effects, raising issues of economic fairness.

The recent trend away from natural resource development and toward fisheries habitat has not affected all communities equally. The economy of the Pacific Northwest remains largely concentrated in the Columbia River Basin. Table 5 shows the changes in the economy of the Columbia River Basin between 1960 and 1995. Comparing this table with Table 4 shows that the Columbia River Basin economy has been less dependent upon agriculture, forestry, mining and manufacturing than the region as a whole. Dependence upon agriculture, forestry, mining and manufacturing. The disparity in economic dependence between the Columbia River Basin and the region as a whole is likely to increase in the future. As a consequence of this and wildlife policies that reduce watershed impacts on forest and mining activities, it is even more important that the expansion of freshwater industries with support and respect the economic activities of the Columbia River Basin. Because the Columbia River Basin is the region's largest watershed, its economy has the most at risk and the greatest potential to gain as its recreational resources, others combine to depend upon the land, forests, minerals, and water for basic commodity production.

While environmental conservation and the habitat protection is of increasing importance to the regional economy, an economic assessment of fish and wildlife programs should recognize both sides of this issue. Fish and wildlife programs can affect the economy by changing the availability of water for irrigation and water uses, as well as land use and pollution that degrades water quality and habitat for wildlife. Commercial water navigation on the Columbia River is an inexpensive and energy efficient means to transport bulk commodities. The Columbia River is the largest river in the region. Its value as a low cost agricultural product from producing areas in the east to the Portland for export purposes. Because the low-lift of the vessel and by ramps in the Lower Columbia for export corner so large that there is no alternative to barging. Barging costs are about 1/3 of alternative transportation costs. Barging is approximately 1/3 of the cost of rail and. The largest concentration of irrigated agriculture in the region lies, but there is about the same amount in eastern Washington and Oregon. Nearly all of the region's hydroelectric power is generated in the Columbia River Basin. Irrigation uses about 1/3 of the water in the basin of flow and grain production. Recreational and industrial water use is also important and a critical part of the Columbia River system.

The system of dams has created new recreational opportunities in the many reservoirs. Recreational activities supported by the reservoirs include fishing, boating, swimming, and camping. Many of the Recreational activities support local businesses, such as motels, eating and drinking establishments, tackle shops, and marinas. The Columbia River Basin is also a major producer of hydroelectric power. Hydroelectric power is generated at dams throughout the basin, but the largest concentration of passive economic effects of Columbia River development. Of particular note, are the regions economic activities that depend upon the availability of water. Many of these activities are located in the Columbia River Basin.

Agriculture and the food processing industry will remain a significant economic sector throughout the Columbia River Basin. As shown in Figure 6, the sector represents more than 10 percent of the personal income in several counties but more than 15 percent of income in some counties in Washington and Oregon. Figure 7 shows that the food processing industry is important in Alaska and make more. In addition to farming, there are also important water uses, beneficial and wasteful, of irrigated lands, especially potato and vegetable processing plants in eastern Washington and Oregon and Idaho. Food processing plants are located throughout the region, but there is a concentration of processing plants in the Columbia River Basin counties and in food processing plants in the Portland metropolitan area. As shown in Figure 8, only a handful of counties have experienced an increase in the share of their economy from the agricultural sectors.

Many counties in the Columbia River basin have significant resource extraction and production sectors. As shown in Figure 9, the mining industry is important in a number of counties in Washington and Oregon and in a few counties in Montana and Idaho. Many of these activities are dependent or supported in part by the river system.

> *High energy users, such as aluminum smelters and chemical plants, were attracted to the area by low cost energy, and the Columbia River Basin's ability to provide that power is still a significant industry in and of itself.* [1]

Through 1995, the share of income from the extraction industries has remained remarkably stable in most Columbia River Basin.

Where local economies are dependent upon using the river and surrounding resources, improving fish and wildlife habitat can be a source of economic growth. Fish and wildlife habitat is affected by a variety of economic livelihoods from traditional communities through regulatory actions and management, is often caused by these communities as unfair and unwarranted. The clash of values and objectives between economic activities and environmental protection is a common phenomenon throughout the region. Some economic effects. But the interrelated regional economy is also an opportunity to promote economic growth in particular regions.

For example, the rush of California, 1849, spurred by sudden recreation visitors to the Columbia supported in 1990 and 1991, December recreation sites attracted about 125,000 visitors per year for fishing, boating, swimming, and camping. Recreational activities support local businesses, such as motels, eating and drinking establishments, tackle shops, and marinas. Fish and wildlife habitat is affected by a variety of economic livelihoods from traditional communities through regulatory actions and management, is often caused by these communities as unfair and unwarranted. The clash of values and objectives between economic activities and environmental protection is a common phenomenon throughout the region. But the interrelated regional economy is also an opportunity to promote economic growth in particular regions. Useful tax credits to policy makers.

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FIGURE 6

FIGURE 7

FIGURE 8

FIGURE 9

Proposition 3. Economic values that are not reflected in markets, such as recreational and amenity values associated with fish and wildlife habitat, can be significant and should be considered in economic assessments. However, despite the difficulties of estimating non-market values, the methodology of these values may be crucial to rational fish and wildlife project selection.

The harvest of mining as people moved to the Columbia River. An economic benefits of long lives – derives from the broad array of goods, services, and experiences enjoyed by people living there. The most important economic benefits are not reflected in markets. Thus, they are not considered in economic assessments of fish and wildlife projects. Without adequate consideration of non-market economic values, government programs, private investments, and individual decisions can result in inefficient and unwise allocations of resources. Because of the significant open agriculture, forestry, mining and manufacturing. The disparity in economic dependence between the Columbia River Basin and the region as a whole is likely to increase in the future. As a consequence of this and wildlife policies that reduce watershed impacts on forest and mining activities. It is even more important that the expansion of freshwater industries with support and respect the economic activities of the Columbia River Basin. Because the Columbia River Basin is the region's largest watershed, its economy has the most at risk and the greatest potential to gain as its recreational resources, others combine to depend upon the land, forests, minerals, and water for basic commodity production.

While environmental conservation and the habitat protection is of increasing importance to the regional economy, an economic assessment of fish and wildlife programs should recognize both sides of this issue. Fish and wildlife programs can affect the economy by changing the availability of water for irrigation and water uses, as well as land use and pollution that degrades water quality and habitat for wildlife. Commercial water navigation on the Columbia River is an inexpensive and energy efficient means to transport bulk commodities. The Columbia River is the largest river in the region. Its value as a low cost agricultural product from producing areas in the east to the Portland for export purposes. Because the low-lift of the vessel and by ramps in the Lower Columbia for export corner so large that there is no alternative to barging. Barging costs are about 1/3 of alternative transportation costs. Barging is approximately 1/3 of the cost of rail and. The largest concentration of irrigated agriculture in the region lies, but there is about the same amount in eastern Washington and Oregon. Nearly all of the region's hydroelectric power is generated in the Columbia River Basin. Irrigation uses about 1/3 of the water in the basin of flow and grain production. Recreational and industrial water use is also important and a critical part of the Columbia River system.

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Proposition 5. When a regional economy analysis relies upon definitive scientific information about the biological effects of a given alternative. When comparing scientific theory, the uncertainties of economic projections are great, economic uncertainty increases the difficulty and ultimately the evaluation of cost-effectiveness. Economic analysis should be conducted in a manner that reflects the degree of uncertainty and the sensitivity of the outcome of the cost analysis to individual variables.

"Cost-effectiveness analysis seeks to maximize the extent of achievement of a given beneficial goal within a constrained budget or opportunity, to minimize the expenditure required to achieve a fixed level of that goal," Grieve Lee 1984). Hence, by definition, a cost-effective fish and wildlife project performs fish and wildlife habitat improvement activities in a manner that minimizes the cost per unit of habitat. Cost-effectiveness analysis for Alaska River ethical analysis become a tool for implementation of a fish and wildlife habitat improvement program. Cost-effectiveness analysis is a tool that can be used to compare the expense over time of direct implementation costs and opportunity costs. The present value of costs for each alternative is calculated by discounting the annual expenditures to present value

Unused water is the use of non-consumptive or excess water in a certain period, the full migration effect of which is not realized in the period. Unused water is the main source of water saving. The potential of higher income-based groups, even when no one in the community is specifically targeted, is treated as bad for the community. This at least seems true of the measurement of 'community resilience' proposed in Norris and Stevens (2007) and Norris et al. (2008) in the literature.

Whether people will migrate between two places depends on the 'push' of environmental conditions in the origin and the 'pull' of the environmental conditions in the destination. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Satisfactory performance of a market economy relies upon appropriate definition and enforcement of property rights (Coase, 1960). Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Historically, property rights were poorly defined because water and salmon do not reside in clearly delineated areas, and because the costs and benefits from human and non-human activities are not fully internalized by individuals. For example, the water that one farmer uses to increase crop yields, may also be the water that a downstream farmer needs to irrigate his crops. Or, the pollution emitted by a downstream firm that flows into the nearby aquatic species. When flow reduction diminishes recreational survival, it imposes a reduced level of economic welfare on the salmon harvester. It is often difficult to measure the economic value of the environmental impacts that result from these flows. In the case of defined rights, the water resource creates an unorganized loss to defined rights. The water is not registered in market transactions because no one's rights to the salmon habitat rise to the level of a property right. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Successful fish and wildlife conservation often requires that people who have some form of right, legal or customary, to some river can be induced to alter their use of the river, thus enhancing habitat for fish and wildlife. There are two general systems for inducing people to give up or change their use of environmental resources: command-and-control systems, and incentive-based systems. Command-and-control systems rely on rules created by government authorities, and penalties for violating them, to control the timing and magnitude of fishing (harvest management) and the number of licensed commercial fishermen. Incentives are used in water rationing systems, such as the 'water banks' in the Columbia River.

The commercial fishing license system creates a more clearly defined right to engage in salmon fishing, and these licenses are traded in markets. The market facilitates the entry and exit of fishermen from the fishery, and thereby helps to reduce the economic inefficiency that arises from the common property nature of fish. As a consequence, we find individual licensees creating or investing in fishing gear that is collectively ruin attempt to catch more fish. A further refinement would create salmon fishing quotas as individual property rights. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Duration. If the duration of the right is short, the holder has little incentive to invest in the security of the water supply.

Transferability or Liability. Without transferability, or control aspect refers to shift the rights to allow the highest value on them.

Flexibility. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Flexibility. Some rights may allow the holder to acquire the capital get associated with ownership.

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Reliability. sometimes called quality of title, security, or enforceability. A complete property holder may rely on title, and need not worry that his/her rights to title will be granted or taken away. Investment in using or improving the land will not be made unless the holders' powers are enforceable.

Exclusivity. Complete exclusivity is a property right (how the holder has (require, restraint, theft, and "gathers" such as pollution originating from others). Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Transferability. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Various kinds of property rights host their own amounts of such characteristics. Owners whose rights have few characteristics have not much power over any piece of rent or water. Whereas, those who have rights combine large amounts of every characteristics, giving holders long run powers to plan and manage a resource as they see fit, without unilaterally spillovers and to the most use of the water in the best economic sense.

Because of deficiencies in the characteristics of property rights held by some of its users, a resource may not be allocated to its most valuable use. Two examples elaborate on this.

Example 1: Water Rights

Under state laws in each of the Pacific Northwest states, there are property rights to water (normally called 'water rights'). They were originally allotted by appropriation, meaning that on each stream the first user to put a measured amount of water to 'beneficial use' has a better right to that amount than any subsequent user. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

The restriction of the prior appropriator's right to be place of diversion, and to the nature and place of its use. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Based only on surplus stored water, and at an administrative fee, the state water bank is a clearing house for information about water supplies and water needs. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

The system was put to the test when, motivated by severe drought in 1977, Idaho increased the transferability of water rights by establishing a water bank. Farmers with excess storage water could consign water to the bank, and others could withdraw water from the bank. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Example 2: River Use and Navigation Lockage

The proper operation of a small vessel on the Columbia or Snake rivers now has a "right" to be passed through as soon as the vessel arrives at a lock. However, as a property right, this privilege lacks both reliability and flexibility. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

To deal with this "waste" of water, the Secretary, through the Corps of Engineers, could change the rule. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Between these extremes are a number of intermediate possibilities. For example, the Corps could give recreation craft a reliable right for immediate passage, but only at certain times of day. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Presentation C: Cost-allocation rules are used to assign responsibility for funding multipurpose river projects. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

The federal agencies that build and operate Columbia River dams allocate the construction and operating costs of those projects among purposes authorized by Congress: hydroelectric power production, flood control, navigation, irrigation, municipal water supply, and fish and wildlife enhancement. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Cost-allocation rules can result in lower overall economic benefits if they assign excessive costs to project purposes that, in the absence of cost allocation, would not be undertaken. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Uncertainty can be created by the administration of the power project licensing system. For example, an electric utility that owns a generating project that may not be licensed would rationally defer investments in upgrading the project's efficiency. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

One means to avoid the uncertainty and cost is to commit to specific actions over extended periods. For example, three Utah utilities have signed long-term contracts for several years in the implementation of Federal Conservation Plans (HCPs) for their hydroelectric projects. The plans are intended to reduce to 'incidental' levels the harm to endangered species that may result from project operations. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

An example of spending to reduce risk is the construction of excess electrical generating capacity to reduce the likelihood of a shortage. In the power industry, conservative planning methods, such as maintaining excess capacity, are sometimes referred to as 'fat' in the system. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

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Arbitrary assignment of project costs, or failure to properly allocate costs may send distorted signals to project managers. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

Presentation B: Uncertainty about the economic consequences of fish and wildlife projects can cause people to make inappropriate cost-reducing decisions. Opportunities to reduce the "cost of uncertainty" should be fully considered in fish and wildlife policy development.

Decision makers in any economy, both consumers and corporations, always face uncertainty regarding the future. For example, a decision to build a new factory must be based on projections of future demand for the factory's products. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about. Water rights are the right to use the property that is the subject of the quit and sell, and more time to consider how to use the property in the future. They know over short distances, but not over distances too remote to unfamiliar places take longer to learn about.

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