As implemented in 1964, the Columbia River Treaty (Treaty) addresses two primary purposes – hydropower and flood risk management. During the Sovereign Participation Process, the Columbia Basin tribes (tribes) proposed integrating ecosystem-based function operations into Columbia River flood risk and hydropower management under a modernized Treaty. This proposal was adopted by regional sovereigns and stakeholders in the U.S. as integral to modernizing the Treaty and is a principle element of the U.S. Entity Regional Recommendation on the Future of the Columbia River Treaty after 2024. To implement this paradigm shift, the tribes also propose changes to Treaty governance, adaptations for climate change and structural upgrades for projects to better protect and enhance the tribes’ trust and treaty rights and resources, rights and resources that were neglected when the Treaty was developed.
Since time immemorial, the rivers of the Columbia Basin have been, and continue to be, the lifeblood of the tribes. Columbia Basin tribes depend on the ecosystem of the Columbia Basin watershed for its ability to provide, protect and nurture cultural resources, traditions, values and landscapes throughout its length and breadth. Clean and abundant water that is sufficient to sustain healthy populations of fish, wildlife, and plants is vital to holistic ecosystem-based function and life itself. A restored, resilient and healthy watershed will include ecosystem-based function as defined by the Columbia Basin tribes on page 7 of this publication.

While much has been done to address the adverse effects of hydropower development and operations on Columbia Basin ecosystem-based function, achieving ecosystem-based function is not limited to managing the Columbia Basin to address fish and wildlife listed under the Endangered Species Act or the Northwest Power and Conservation Act. The tribes have explored a range of ecosystem-based function operations for integration into a modernized Treaty as represented by two modeled scenarios, 3Ea and 3Eb in the following figures. While additional collaborative work needs to be pursued to determine operations that are implemented under a modernized Treaty, these operations would support a broad suite of fish, wildlife and other natural resources. With Treaty modernization, ecosystem integration at these levels or greater could be aggressively achieved and provide adaptation for climate change with minimal disruption to current existing uses such as water supply, hydropower operations, and flood risk management. The tribes believe that a regional flood risk management study is essential to properly and fully balance flood risks with other flow management priorities and costs. The tribes are optimistic that the study could lead to outcomes that would maintain adequate levels of flood risk with minimal economic consequences from infrequent high flows. Integration of ecosystem-based function requires the implementation of operational rule curves that address ecosystem needs in balance with hydropower and flood risk management at key Columbia Basin projects, similar to what has been accomplished at Libby and Hungry Horse dams.

The following are necessary elements to achieve ecosystem-based function in the Columbia Basin:

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**First Foods**

The First Foods are water, salmon, deer, cous (or roots) and huckleberry. Each First Food consists of ecologically related foods. The salmon grouping includes the various salmon species, including steelhead, and also lamprey, freshwater mussels, trout and other fishes. The deer grouping includes mule deer, white-tailed deer and elk, among other four-legged, hoofed animals. The roots are cous, celery, camas and bitterroot. The berries are huckleberry and chokecherry. All First Foods, all life, depends on water and is always served first in our longhouse ceremonies. Our relationship to salmon and the First Foods is a reciprocal one. The First Foods nourish the native people, while the native people must protect them and the habitats that support them.
Treaty Governance

• Expand the Treaty Entities to include expert knowledge and representation for ecosystem-based function in both the U.S. and Canada.

• Members of the sovereign tribal governments must participate as ecosystem representatives in the U.S. Entity.

Structural Modifications

• Fish passage facilities must be immediately investigated and, if warranted, installed at Chief Joseph and Grand Coulee dams in the U.S., and at Keenleyside, Brilliant, Waneta and Seven Mile dams in Canada to allow reintroduction of salmon, steelhead and other fishes to historical habitats.

• Infrastructure, including the spill gates at Grand Coulee Dam, must be modified as needed to increase operational flexibility and preserve storage, particularly in drier water years.

• Investigate raising the elevation of the Banks Lake diversions to leave cooler water in the river, diverting warmer water for irrigation.

• Investigate potential for reducing the generation of total dissolved gas (TDG) at Grand Coulee Dam.

• Investigate and if feasible, implement selective temperature regulation from high head dams so long as this action will not increase reservoir water temperatures.
Ecosystem-based Function Operations

- Keep reservoirs fuller and more stable with cooler waters, particularly in drier water years (Fig 1).
- Restore spring and early summer freshet flows, particularly in drier water years (Fig. 2).
- Increase springtime fish spills at run-of-river dams in the U.S.
- Reduce drafts at Grand Coulee, Libby, Brownlee, and Dworshak dams in the U.S. and at Mica and Keenleyside dams in Canada in drier water years.

Ecosystem-based function reservoir and river operations scenarios

The two river operations scenarios described in this paper are the continuation of years of modeling work initiated in the Sovereign Participation Process (SPP). They are labeled 3Ea and 3Eb. The 3 denotes it is the third iteration of this modeling, the E denotes it is an ecosystem-focused model, and the ‘a’ and ‘b’ denote two scenarios within the range of possible operations. Scenario 3Eb was developed after the cessation of the SPP.

**3Ea** retains more winter and early spring storage at upstream reservoirs, releasing extra water in the spring and early summer to recreate a partial peaking hydrograph in dry and average runoff years with a sustained declining limb and implements higher fish spill levels.

**3Eb** retains less winter and early spring storage than 3Ea in dry and average runoff years but more than the current condition. This storage is also released in the spring and early summer to create a partial peaking hydrograph with a sustaining limb. Fish spill levels are the same as for 3Ea.
- Continue VarQ operations at Hungry Horse and Libby dams.

- Implement rule curves at system dams that integrate ecosystem-based function, hydropower and flood risk management for climate change adaptation.

- For a more comprehensive explanation of ecosystem-based function operations, please contact the individuals listed at the end of this paper for the tribes’ detailed discussion paper.

Lake Koocanusa

Created by Libby Dam in Montana, the 90-mile long Lake Koocanusa reaches 48 miles (77 km) to the Canadian border and 42 miles (68 km) further into British Columbia. The lake holds 13% of the water in the Columbia River system.

Photo courtesy US Forest Service.
Key Facts

- Tribes, without consultation or prior and informed consent, have contributed substantially to the initial development and continued operation of the Columbia Basin hydropower system including flood risk management for downriver investments in cities, ports and other infrastructure through substantial sacrifices to their cultural, health, social, religious and ecosystem resources.

- Tribes are requesting that the U.S. Department of State include them in negotiations and future governance with Canada for a modernized and resilient Treaty that integrates ecosystem-based function as an equal purpose along with flood risk and hydropower management.

- The region needs to conduct a U.S. flood risk management study to seek alternative means (i.e. levees and floodplain management) to reduce the consequences of high flows thereby increasing needed flexibility in reservoir operations.
Definition of Ecosystem-based Function

Adopted by the Coalition of Columbia Basin Tribes, June 2013

Since time immemorial, the rivers of the Columbia Basin have been, and continue to be, the lifeblood of the Columbia Basin tribes. Columbia Basin tribes view ecosystem-based function of the Columbia Basin watershed as its ability to provide, protect and nurture cultural resources, traditions, values and landscapes throughout its length and breadth. Clean and abundant water that is sufficient to sustain healthy populations of fish, wildlife, and plants is vital to holistic ecosystem-based function and life itself. A restored, resilient and healthy watershed will include ecosystem-based function such as:

• Increased spring and summer flows resulting in a more natural hydrograph;
• Higher and more stable headwater reservoir levels;
• Restoring and maintaining fish passage to historical habitats;
• Higher river flows during dry years;
• Lower late summer water temperature;
• Reconnected floodplains throughout the river including a reconnected lower river estuary ecosystem as well as reduced salt water intrusion during summer and fall;
• Columbia River plume and near shore ocean enhanced through higher spring and summer flows and lessened duration of hypoxia; and,
• An adaptive and flexible suite of river operations responsive to a great variety of changing environmental conditions, such as climate change.

Improved ecosystem-based function in the Columbia Basin Watershed is expected to result in at least:

• Increased recognition, protection and preservation of tribal first foods and cultural/sacred sites and activities, First foods include water, salmon, other fish, wildlife, berries, roots, and other native medicinal plants;
• An estuary with an enhanced food web and increased juvenile fish survival;
• Increases in juvenile and adult salmon survival;
• Decreased mainstem travel time for migrating juvenile salmon;
• Increased resident fish productivity that provides stable, resilient populations;
• Increased wildlife productivity that provides stable, resilient populations; and,
• Salmon and other juvenile and adult fish passage to historical habitats in the Upper Columbia and Snake River basins, and into other currently blocked parts of the Columbia River Basin.
About this Paper

The Columbia Basin tribes prepared this paper after cessation of the Columbia River Treaty Review Sovereign Participation Process and the U.S. Entity’s submission of the Regional Recommendation to the Department of State in December 2013. The contents of this paper are consistent with the consensus regional recommendation. In addition to governance and infrastructure aspects, it addresses operations that might be implemented under the Treaty to integrate three primary purposes (ecosystem-based function, flood risk management and hydropower production). This paper does not represent a position on specific Treaty operations, but rather the intent is to provide a range of scenarios for further analysis and consideration in a collaborative forum used to determine future Treaty operations. And while fish passage and reintroduction are an integral aspect of ecosystem-based function, a substantive discussion of that issue is provided in a separate paper. This paper was approved for distribution by tribal leaders on October 1, 2014 and may be amended following additional analysis and review.

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Columbia River headwaters.