The Columbia River Basin: Learning From Our Past to Shape Our Future

2014 CONFERENCE SUMMARY

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Acknowledgements

Columbia Basin Trust and the Northwest Power and Conservation Council (Council) wish to acknowledge the commitments of time, money, and effort by literally hundreds of individuals who made this conference a success.

We thank the Spokane Tribe of Indians for hosting and welcoming us to their community. We acknowledge and thank the 40 members of the conference planning committee for helping shape the event with their interest, expertise, and ideas.

We thank the many speakers, panel members, and resource people who facilitated discussions and shared their knowledge and experience at the conference. More than 60 volunteers helped with the on-site logistics. They kept us on schedule, ran microphones around the room, took notes for this report, and more. We thank them for their hard work.

We thank the conference sponsors listed on the previous page. Their generosity helped keep the conference affordable for participants and also provided scholarships for many of the young professionals and students in the audience.

We thank the artists and performers who graciously allowed us to display their work, and who inspired and entertained us with their words and music. The original art, which included large installations and art pieces hanging from the ceiling and lining the walls, and performances ranging from a-capella harmony to a charming performance by kindergartners from the Spokane Salish School, brought a depth of cultural experience to the conference that truly set it apart as an extraordinary event. Thanks to all of you, and especially the art curators, for sharing your work and talent.

Thanks, too, of course, to the 320 participants, representing all corners of the basin in Canada and the United States, who took time out of their busy schedules to lend their voices to this unique, collaborative conversation about the international Columbia River Basin.

Finally, the Trust and the Council plan to follow up on the commitments made and the challenges issued at the conference. While we are not the ultimate decision makers on many of these issues we are in a position to bring people together, as we did at this conference, to share information, facilitate cross-border discussions and collaboration among citizens, and help basin residents better understand this remarkable place we share. That is our commitment.

Introduction

The Columbia Basin, 2014 Conference: Learning From Our Past to Shape Our Future provided a forum for participants to reflect on and learn from the past, develop a common understanding of our present, and discuss the future of the basin. Specifically, the conference was an opportunity for participants to share their perspectives and build an understanding of current issues and emerging challenges with respect to ecosystem function, salmon restoration and fish

passage, climate change, energy, and transboundary river governance. During the plenaries and breakout sessions, participants identified and explored approaches, tools, and opportunities to address transboundary issues. The emerging opportunities and outstanding questions are captured in this document.

To encourage openness and information sharing, the conference operated under Chatham House Rule:

"When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed." In other words, every person participated on their own behalf and did not represent any organization or institution in any official capacity.

In keeping with Chatham House Rule, this report does not name any individuals, but rather seeks to capture the essence of the questions and conversation that occurred.

State of the Basin

The Columbia Basin has been significantly transformed in the past 300 years. Following the arrival of European settlers in the early 1800s, boundaries were created for American states and the Province of British Columbia in a region that tribes and First Nations have occupied since time immemorial. One of the most significant transformations was the construction of over 400 dams for various purposes such as hydropower generation, irrigation, navigation, and flood control.

Today, in 2014, we can look back and recognize how values and issues are changing with respect to the management of the river and its resources. The recently completed Columbia River Treaty review process in both countries helped to highlight a number of management issues—ecosystem function, salmon restoration and fish passage, alternative energy sources, transboundary river governance arrangements, climate change, and water quality and quantity (volume and flow). This myriad of issues and changing values highlights the need for on-going dialogue across this shared river basin.

This conference attracted participants with a broad range of expertise, from within and outside the basin. Ultimately, everyone attended the conference for the same thing: to consider the past, present, and future of the Columbia River Basin. Participants were challenged to: identify common ground, explore issues, ask questions, and begin to identify practical, workable solutions.

Ecosystem Function

Ecosystems, ecosystem function, and what constitutes a "healthy ecosystem" are difficult to define. Words like water quality, carrying capacity, resilience, and aquatic and terrestrial habitats begin to describe components of ecosystems and ecosystem functions, but our understanding of these words is dynamic and evolves with each scientific study. Add in climate change, dam operations, invasive species, chemicals, and jurisdictional boundaries and an already difficult concept becomes even more complex. Rather than focusing on defining ecosystems and ecosystem function, the presentations and discussions at the conference gravitated toward our shared objectives and how we can better manage our use of ecosystem resources.

Shared objectives that emerged through the two breakout sessions (of approximately 60 participants each) include:

- management of invasive species;
- preserving environmental quality;
- identifying conflicting goals; and
- restoring salmon and improving fish passage.

Participants in the breakout sessions recognized that stakeholder groups, local governments, tribes and First Nations, grassroots organizations, scientists, nonprofits, academics, and other interested parties must work together to achieve these shared objectives.

Invasive Species

Invasive species includes both aquatic and terrestrial plants and animals that are non-native to an ecosystem. Invasive species, where they are present or where they might invade, lack natural predators and other population controls and have the potential to significantly alter the ecosystem. Rather than address this real and potential problem species by species or watershed by watershed, the Columbia Basin community needs to recognize that invasive species and the threats they pose comprise a basin-wide economic and ecological issue that needs to be addressed in a coordinated, basin-scale approach. The importance of investing in preventing the introduction and spread of invasives in the basin cannot be overemphasized. Prevention is much more efficient and dynamic than the treatment of existing problems.

Environmental Quality

Conversations and actions around ecosystem function must also address environmental quality. Environmental quality is another difficult-to-define concept, but one that begins to address the health, vigor, and resiliency of an ecosystem.

Emerging goals and issues with respect to environmental quality include: stabilize and enhance plant communities around reservoirs; improve wildlife habitat and water quality (not just quantity); augment flows and improve habitat connectivity, both for salmon and endangered species; and manage reservoir levels, especially to reduce erosion.

Recognize Conflict

Conflict exists between competing uses—such as in-stream vs. out-of-stream uses or competing restoration values. For example, if salmon restoration activities increase in Lake Roosevelt, as some anticipate, kokanee enhancement efforts in the lake may be affected.

Salmon Restoration and Fish Passage

Salmon are an iconic and important species in the Columbia Basin ecosystem. In order to facilitate and enhance salmon restoration efforts, the habitat needs of salmon must be identified. Salmon restoration is very much a part of ecosystem function within the Columbia Basin, but salmon restoration—especially passage around the dams—is also an engineering question in the sense that some new structures would be required.

Emerging Challenges and Options

The basin as a whole is difficult to manage because of its sheer size and the conflicts that exist in managing for various values, yet there is acknowledgment that everything is ecologically and economically interconnected.

Challenges: our current management and funding mechanisms are not amenable to thinking about large-scale ecosystems. Decisions and funding are typically separated by species and jurisdictions that do not match complex, integrated ecological processes.

Emerging options: create, or lead from within existing organizations, a framework for increased cooperation and communication across borders (especially the 49th parallel). This entity, or group of individuals, need to craft a unified vision for the basin ecosystem and then identify small and focused steps toward that vision.

Such steps could include the following:

- Create opportunities for promoting and utilizing citizen science.
- Publish a "state of the basin" report. This report would identify ecosystem management goals at varying scales—from the transboundary and basin-wide to the local, watershed-scale.
- Map efforts to mitigate the presence and prevent the spread of invasive species.
- Map existing transboundary agreements and collaborative efforts.
- Support the addition of Columbia Basin tribes and First Nations to the Columbia River Treaty management framework. Tribes and First Nations would represent ecosystem function in river operations.
- Horizontal collaboration. Individuals need to reach out to their counterparts in other organizations and work together.

Salmon Restoration and Fish Passage

Columbia Basin tribes and First Nations estimate that salmon and steelhead historical annual returns totaled around 34 million. Despite the record returns in 2014, current return levels are less than two million. The historical decline in salmon populations can be attributed to a number of factors including canning and overharvest, deforestations, and dam development. As both Canada and the United States are responsible, in part, for the decline and loss (in the Canadian Columbia River portion of the basin) of salmon, recovery efforts should be a joint responsibility between the two nations. In addition, collaboration among tribes, First Nations, and various stakeholders will be required to restore salmon populations and fish passage.

Salmon restoration and fish passage collectively are a cultural imperative to Columbia Basin tribes and First Nations. Restoration and passage also have the potential to support economic revitalization and enhance ecosystem function. In the face of climate change, restoring connectivity to the cooler waters in the Canadian portion of the basin may be key to the long-term health and vigor of the existing salmon populations in the United States and Okanagan portions of the basin.

During a technical workshop in the spring of 2014, experts determined that well-developed fish passage technology exists, shifting the question of passage from "if" to "when" and "how." The

"how" of fish passage needs to not only address the upstream return of adult fish, but also the downstream migration of smolts.

Columbia Basin tribes and First Nations have worked together to develop unified priorities and strategies for salmon restoration. Efforts have been made to live-capture fish and return native fish to historical locations. These collaborative efforts include:

- Reintroduction of Okanagan sockeye in the 1990s followed by a three-year assessment in 2003;
- Proposed 12-year fish passage and reintroduction program with an adaptive framework and extensive monitoring;
- Identification of scientific uncertainties, such as:
- optimal donor stocks (a species not listed under the Endangered Species Act);
- adult and smolt migration time through Lake Roosevelt;
- habitat suitability and opportunities for improvement; and
- passage strategies around dams.

Emerging Challenges and Opportunities

Grand Coulee Dam—one of the dams blocking fish passage into the upper Columbia—predates the Columbia River Treaty. Regional federal representatives, states and tribes in the United States have endorsed a joint program to investigate and implement, if feasible, an anadromous fish passage and reintroduction program under the Columbia River Treaty. British Columbia, on the other hand, sees salmon restoration and fish passage as an issue outside of the Columbia River Treaty that should be addressed through a collaborative technical working group and stand-alone agreements. The resolution of the approach that will be used by the Parties to the Columbia River Treaty awaits formal discussions.

Climate Change

Climate change is projected to significantly affect the precipitation patterns, hydrology, and glaciers in the Columbia Basin.

The climate change plenary panel provided participants with a basic understanding of climate change, the changing hydrology, and the state and fate of the basin's glaciers. Although there was not a dedicated climate change breakout session, these topics surfaced in the discussions on governance, energy, ecosystem function, and volume and flow.

Climate Change in the Columbia Basin

Average annual temperatures in the Columbia Basin are expected to increase by 1.6 C to 3.2 C (compared to 1961-1990). Precipitation will have a median decrease of 6 percent during the summer and a median increase of 7 percent during the winter months. However, these averages do not paint the full picture of climate change. In the next 40 years, temperatures and precipitation in the Columbia Basin will reach new extremes, in comparison to the last 40 years.

Temperature extremes (compared to 1971-2000):

- up to 4 times as many warm summer days and nights;
- two—11 fold increase in occurrence of 25-year record extremely hot days; and
- hottest day of the month increases by 0.4 C to 4.7 C.

Precipitation extremes (compared to 1971-2000):

- two- to threefold increase in frequency of extreme precipitation events with 5-, 10-, and 25-year return patterns; and
- increased precipitation as rainfall on the west side of the Cascades.

Changing Hydrology

Reservoirs in the Columbia Basin can only store 20 percent of the average runoff[1]. In comparison, reservoirs in the Colorado River Basin can store 300 percent of the Colorado River's annual flow[2]. Most of the Columbia Basin's water is stored as snow or glaciers. Melting snowpack and glaciers slowly release water through the spring and summer, recharging aquifers and providing summer flows for returning salmon, irrigated agriculture, hydropower production, recreation, and other uses.

The basin's sensitivity to projected warming differs north and south of the U.S.-Canada border. Mountains in the United States are generally lower in elevation relative to the mountains in the Canadian portion of the basin. As a result, snow storage in the United States is especially sensitive to rising temperatures. All future climate scenarios indicate less April 1 snow in the Columbia Basin. This decline is due to shifting precipitation types - warmer winter temperatures cause more winter precipitation to fall as rain rather than snow, particularly in low- and mid-elevation watersheds where average winter temperatures already sit close to 0 C (32 F). The projected decrease in April 1 snowpack for the Columbia Basin is -19 percent in the 2020s, -29 percent in the 2040s, and -52 percent in the 2080s for a medium greenhouse gas emissions scenario (the A1B scenario). Much of the projected decline is due to losses in the U.S. portion of the basin; snowpack losses in the Canadian portion of the basin become more notable after the 2050s.

The shift to more winter rain will change the timing and volume of streamflow in temperature-sensitive watersheds, with the amount of change varying by watershed type (rain dominant, rain-and-snow mix [transient], and snow dominant). For example, the Yakima River at Parker Dam is expected to shift from a rain-and-snow mix basin to a rain-dominant basin by the 2080s

[1]See Fish Passage and Reintroduction into the U.S. and Canadian Upper Columbia Basin, a Joint Paper of the Columbia Basin tribes and First Nations. Final report released January 2015.

[2] Barton, James D. and Kelvin Ketchum. 2012. "The Columbia River Treaty: Managing for Uncertainty" in The Columbia River Treaty Revisited.

as a result of warming winter temperatures. Higher elevation snow-dominant basins north of the border, such as the Kootenay River at Corra Linn Dam, see relatively minor shifts in streamflow timing through mid-century; changes become more pronounced in all basins by the 2080s.

The transition to more rain dominant and transient watershed types will affect the timing and quantity of the available water supply. These streamflow timing shifts will likely require adjustments in the management of water currently allocated between hydropower, irrigation, flood risk management, instream flows, and other uses. For example, summer streamflows are expected to reach temperature thresholds that are stressful or fatal to salmon for longer periods of the summer, increasing demand for instream flows to help cold-water species. Shifts in hydrology, combined with rising air temperature and population growth, are also expected to affect hydropower production. Higher winter streamflows are expected to increase winter hydropower production capacity. This will help utilities meet projected increases in winter heating demand due to population growth. Summer hydropower production, on the other hand, is expected to decrease even as demand for summer cooling increases. Shifting precipitation patterns will also lead to an ever-increasing wildfire risk. According to projections, the area burned by fire will double by the 2020s, triple by the 2040s, and quintuple by the 2080s.

State and Fate of Glaciers

During the past 10 years, scientists have recorded accelerated glacial melt in the Columbia Basin. This pattern of accelerated melt is only expected to continue, given projected temperature increases. Almost no glaciers are expected to survive in the Columbia Basin by the year 2100. The loss of glaciers in the basin is a concern because glaciers are hydrologic buffers, adding cool, plentiful water to many headwater streams when winter snow packs are depleted. The loss of this buffering capacity will affect sensitive aquatic ecosystems especially during dry years. Glacier depletion will negatively affect hydroelectric power generation because there will be a loss of runoff during late summer when energy demand is typically high.

Emerging Opportunities and Next Steps

Continued collaboration in climate science, monitoring, and adaptation is key. By working together, scientists will be able to establish common objectives to address knowledge gaps.

Energy

Energy produced by hydropower is a valuable basin resource that provides electricity to millions of people living both within and outside of the Columbia Basin. Given projections of climate change and population growth in the Pacific Northwest, the importance of an adequate, efficient, economical, and reliable supply of energy cannot be overstated. Our energy future, both in terms of demand and sources, is an important issue for the basin, with a ripple effect across the entire West Coast. The rapid development of variable energy resources, such as wind and solar, have created both opportunities and challenges in the areas of economics and grid operations. The energy plenary panel and breakout discussions presented and explored the primary issues related to hydropower and other energy sources—including wind, solar, and energy efficiency. Discussions included the impacts of climate change and a path toward balancing the social, economic, and environmental needs of the basin.

Hydropower

It is impossible to have a discussion of hydropower in the Columbia Basin without also mentioning the Columbia River Treaty. Even though construction on the first hydropower dams began in the 1930s, the Columbia River Treaty (first implemented in 1964) authorized four

dams, provided a coordination framework for U.S. and Canadian dam operations and the sharing of downstream power benefits, and paved the way for coordinated energy markets in the Pacific Northwest.

Treaty dams: The Columbia River Treaty required Canada to provide 15.5 million acre-feet of water storage. Three dams—Duncan, Hugh Keenleyside (also called Arrow), and Mica—were built to meet that requirement. Canada built Mica to store an additional 5 million acre-feet of water than required by the CRT. Canada is required to operate these dams to optimize hydropower generation and flood control in the United States. The U.S. was also granted permission to build Libby Dam.

Benefits sharing: Canada and the U.S. share the downstream hydropower benefits produced in the United States attributable to the operations at Duncan, Arrow, and Mica dams. The United States transfers to British Columbia half of the estimated power generated by coordinating Canadian reservoir flows through the U.S. hydropower system, referred to as “downstream power benefits,” under a formula established in 1964. This transfer of power is called the “Canadian Entitlement” and will produce $150-160 million in revenue this year. Some utilities in the United States believe that the formula used to calculate the Entitlement needs to be updated.

Coordinated energy markets: As a by-product of the Columbia River Treaty, British Columbia and the United States have a history of coordinating transmission upgrades and expansion and marketing wholesale energy. The countries are currently evaluating plans for establishing a five-minute energy market, also known as an energy imbalance or ”Security Constrained Economic Dispatch” market. Such a market could provide a much more efficient dispatch of the region’s power generation and a more efficient integration of the region’s wind fleet.

While hydropower dams have brought and continue to bring many benefits to the region, the economic, environmental, and societal costs of those dams are significant and ongoing. Historical impacts include: the inundation of, cultural resources, important fish and wildlife habitat, and fertile, productive low elevation areas, as well as the displacement of communities and people who lived on the land. Current operations also impact various values; dams are responsible for high fish mortality during migrations and, in some parts of the basin, blocked passage; current reservoir operations cause erosion and impact local communities and their economies. Maintenance of the high-voltage transmission grid and related infrastructure is both costly and difficult.

The formal reviews by the U.S. Entity and the Province have provided communities on both sides of the border an opportunity to look carefully at the ongoing costs and benefits of the Columbia River Treaty. A more in-depth summary of the future of the Columbia River Treaty and perspectives begins on page 10, Update on the Columbia River Treaty.

Other Energy Sources
No new, single energy source will be able to meet the Northwest's future needs. The region will need a diverse portfolio of conservation, energy efficiency, natural gas, solar, wind, and other new renewable resources, in addition to the region's existing foundation of hydropower and thermal generation[3]. That said, solar and wind are intermittent or variable energy resources—generation may not always match demand in a given hour—but hydropower can help bridge that difference. Unfortunately, the existing wind generation capacity in the Northwest has exhausted the ability of the region's hydropower generators to balance supply and demand. Additional tools, such as a five-minute dispatch market are also necessary for meeting future energy needs.

Energy Efficiency
Energy efficiency and conservation (reduction in use) will continue to play critical roles as the region's least-cost resource for meeting new demand for electricity. The Pacific Northwest has a demonstrated a record of meeting and exceeding goals for improving energy-use efficiency. Smart grid initiatives, five-minute markets, and other efforts also present opportunities to reduce long-term utility costs and increase flexibility across a large geographic area.

Climate Change
Modeling shows that the Columbia River Basin can expect changes in precipitation patterns and river flows over the next 40 years. Electric utilities, the U.S. Army Corps of Engineers, and the Bureau of Reclamation will all have a role to play in mitigating the impacts of those changes. Revised river operations, in areas such as storage and flow regulation, can augment flows for the environment, wildlife, fisheries, power production, and other river uses.

Balancing Interests
There is now a strong interest in ecosystem function and salmon habitat restoration and fish passage above Grand Coulee and Chief Joseph dams. Collaboration in the Okanagan and mid-Columbia have demonstrated success in a number of projects, as reflected by this year's sockeye and chinook runs. The challenge is finding a balance in integrating improved operations for ecosystem function with existing river uses such as energy production, flood control, navigation, recreation, etc. Columbia River hydroelectric systems are important to the economic foundation and vitality of the Pacific Northwest.

Emerging Options and Opportunities

The key to all the options and opportunities listed below will be transboundary collaboration and coordination. Plans, funding, and implementation for efforts such as energy efficiency and technology development to support ecosystem mitigation efforts should be addressed at the basin scale with diverse interests at the table. Options include (in no particular order):

- modernizing the Columbia River Treaty to reflect potential legal obligations to tribes and First Nations, emerging science, new interests and economic trends;

[3] Communities and energy providers, for the most part, do not see new, additional nuclear energy, as a high probability option.

- implementing policies to reduce carbon and diversify energy portfolios with non-carbon emitting resources;
- continuing to monitor and reduce fish mortality at the dams and engage in related environmental efforts; and
- increasing energy efficiency efforts.

Transboundary River Governance

Governance is the who, what, and how of decision-making. People can have the best traditional knowledge and science, but frameworks of governance will always be shaped by values. Our values, and our governance frameworks, are organic and constantly evolving.

Governance occurs at different spatial scales—from the very local to the regional and international—and on a spectrum of formality—from informal partnerships to very formal agreements, such as a treaty. At the informal and local end of the governance spectrum, over 150 multi-stakeholder groups are active in their local watersheds. These groups work on a range of issues, including water quality, estuary restoration, education, and sustainable economic development. The Columbia River Treaty, which coordinates flood risk management and sharing of hydropower benefits, represents an example of the formal and international scale of governance in the Columbia Basin.

The scope of the Columbia River Treaty is focused on hydropower and flood risk management. However, other values such as ecosystem management have been addressed to some extent through supplementary agreements. Formal reviews on both sides of the border catalyzed much broader conversations about governance, transboundary issues, and the basin's contemporary values. Now is the time to tap into that momentum—to further clarify those broader interests and values and identify the existing building blocks that can help the basin adapt to meet current needs and values.

Emerging Opportunities

One proposal that emerged from discussions at the conference was to form a transboundary committee to enhance cross-border dialogue, especially on topics outside the parameters of the Columbia River Treaty. As envisioned, members of committee would include representatives from tribes, First Nations, Columbia Basin Trust, Northwest Power and Conservation Council, federal and provincial agencies, and others (nonprofits, utilities, etc.). This committee would be informal, with no decision-making authority, but it would identify gaps in transboundary coordination and provide the platform for basin-wide dialogue, information sharing, and collaboration. The basin committee would also provide vision and guidance to working groups on issues such as

ecosystem function, salmon restoration and fish passage, flood risk management, and other timely issues.

The first task envisioned for the committee would be to map the many existing transboundary areas of coordination on the above issues in the basin, with an eye toward identifying gaps (in information, governance, etc.) and analyzing how these initiatives could be better coordinated.

It was proposed that a conference be conducted about a year after the transboundary committee is formed to provide a venue for committee members to discuss their work and to engage a wider basin audience in the conversation. This conference would be a chance to further clarify common interests and ways to integrate ecosystem function, hydropower, flood risk management, irrigation, and navigation.

Finally, it was recommended that the committee be formed as soon as possible because a follow-up conference conducted within the next year could help define which ecosystem issues should be part of CRT discussions and which might better proceed outside of the Columbia River Treaty process.

Update on the Columbia River Treaty

September 2014 marked the 50th year of the Columbia River Treaty (CRT) and a new phase in the life of the treaty. This session was an opportunity for a brief update on what the CRT has done for the region and how the province of British Columbia, Canada, and the United States hope to move forward.

While the United States and Canada referred the question of how both countries might maximize their shared benefits in the basin to the International Joint Commission in 1944, devastating flooding in Trail, British Columbia, Vanport, Oregon and other areas in the basin in 1948 catalyzed the push to complete the technical work necessary for an international agreement. After nearly two decades of study, negotiations began in earnest in 1960, the Columbia River Treaty was signed in 1961, a Protocol to the Treaty was adopted and the Treaty was first implemented in 1964.

Key provisions of the CRT include:

- New dams: the CRT called for 15.5 million acre-feet of storage in Canada, which was fulfilled by Duncan, Mica, and Keenleyside (Arrow Lakes) dams, and allowed the United States to build Libby Dam.
- Flood control: Canada and the United States coordinate flood control operations until 2024, at which point “called-upon” flood control goes into effect.
- Equitable sharing of hydropower benefits: through a complicated formula, British Columbia and the United States share the economic benefits of hydropower attributed to the additional storage in Canada. Half of the estimated downstream power benefits generated at U.S. hydropower facilities by coordinating reservoir releases in British Columbia are returned to Canada through the “Canadian Entitlement.”
- Governance: the Canadian Entity, composed of BC Hydro, and the United States Entity (composed of the Administrator of the Bonneville Power Administration and the Division Engineer, North Pacific Division, U.S. Army Corps of Engineers), oversee daily implementation. The Permanent Engineering Board, composed of two Canadians and two Americans members and two alternates, monitors implementation and assists with reconciling technical and operational differences that may arise.

- Timeline: at any time on or after September 16, 2014, either country may provide notice to terminate most provisions of the Columbia River Treaty, with termination going into effect 10 years after notification. If the CRT is terminated, Canada would still be required to provide some flood risk assistance. The United States would be required to provide additional compensation for those flood operations, but would no longer be required to return the "Canadian Entitlement." Absent any notification to terminate, the Columbia River Treaty will continue in perpetuity.

The only definitive dates in the CRT are September 16, 2014, which opened the window for termination, and September 16, 2024, which will change flood control operations. These dates prompted multi-year reviews of the Columbia River Treaty in both countries.

Update from Canada
British Columbia wants to continue the Columbia River Treaty and seek improvements within the existing CRT framework. Possible improvements include: quantifying and spreading benefits more fairly, as well as recognizing impacts of dams and reservoir operations, changing flood control provisions, increasing opportunities for adaptive management, and mitigating climate change.

A regional advisory committee provides a forum for the people who live and work around the basin, as well as local politicians and First Nations, to provide the Province of British Columbia ideas for improving the CRT.

To read the Province of British Columbia's *Columbia River Treaty Review B.C. Decision*, please visit: http://blog.gov.bc.ca/columbiarivertreaty/.

The federal government of Canada is comfortable with the Province's desire to continue the CRT and will continue to work with all parties to define areas for improvement and seek consensus on a Canadian position before any potential negotiations with the United States.

Update from the United States
In the United States, the Columbia River Treaty review was a four-year process that concluded in December 2013 with the delivery of the *U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2024* to the U.S. State Department.

The stated goal outlined in the U.S. Entity cover letter submitted to the U.S. State Department summarizing the Regional Recommendation "is for both countries to develop a modernized Treaty framework that reflects the value of coordinated power operations with Canada, maintains an acceptable level of flood risk, and supports a resilient and healthy ecosystem-based function throughout the Columbia River Basin. For more information on the U.S. 2014/2024 Columbia River Treaty Review, please visit: http://www.crt2014-2024review.gov/Default.aspx.

The U.S. State Department has not developed an official position on the future of the CRT, nor a timeline for releasing a position. A thorough regional evaluation of the CRT has already taken place and an Interagency Policy Committee has been established under the National Security Council to conduct a National Interests Determination and consider the Regional Recommendation, so the CRT is receiving much thought and attention. Ultimately, the State Department will need to consider a broad range of interests, including relationships with Canada.

An ongoing role for the region—states, agencies, tribes, etc.—is currently being discussed, but the format for interaction and engagement is still unknown.

During the question and answer period of this session, it was clear that while there is no looming deadline for terminating or modifying the Columbia River Treaty, basin residents feel a sense of urgency and need for change.

Columbia River Treaty Dialogue—Areas of Convergence and Divergence

This session allowed panel members to provide their reflections on the future of the Columbia River Treaty. Ten panel members—five from each country—represented diverse basin interests and perspectives:

- elder statesmen, with insight on the original interpretation of the CRT;
- Columbia Basin tribes and First Nations;
- hydroelectric utilities;
- academics with expertise on transboundary river governance; and
- students.

Each panel member was asked to address these three questions:

- What are the areas of convergence?
- What are the areas of divergence?
- What suggestions do you have on how we can move forward? And what lessons learned would you like to share for the future?

Areas of Convergence
The Columbia River Treaty has created billions of dollars in benefits and a framework for coordinating dam operations. This coordination creates a certainty for planning purposes, both in terms of regulating flows and power planning.

Climate change, energy policies, and population growth will bring change and uncertainty, requiring the basin to adapt.

Canada and the United States should continue to share the benefits of the CRT, but there is also a desire for change and integration of other benefits, such as ecosystem function.

Areas of Divergence/Challenges
While there is broad interest in the way we manage our use of the river, the challenge lies in the details. Panel members raised many big questions in response:

How should both countries share benefits in the future? What benefits should we be looking at?

How can ecosystem function be integrated into existing uses of the river? What should be done within the framework of the CRT and what should be addressed outside the CRT?

Additional challenges include dealing with changes in coordinated flood risk management under the CRT and the ongoing costs of the dams into the future. Flood risk management is currently coordinated across the entire basin. Switching to called-upon in 2024 would present new challenges for both countries. Many upstream communities bear the ongoing costs of current operation—from permanent flooding to erosion to loss of salmon—of the dams and reservoirs.

First Nations in British Columbia did not cede any of their traditional territory or enter into any treaties with the government. While the constitution requires a "duty to consult" and the recent Tsilhqot'n Decision further defines Aboriginal Right and Title, there is still much uncertainty with respect to the legal relationship between First Nations, British Columbia, and Canada.

Moving Forward
These themes emerged from the discussions:

Transboundary dialogue: during the Columbia River Treaty Update session, many participants wanted to know the timeline for ongoing opportunities for participation. Venues such as this conference offer opportunities for the basin to be proactive and define the frameworks for participation and integrating a broader range of interests and values—IF the basin can reach a consensus.

Next generation of leaders: form a student/young professional coalition to hold leaders accountable and encourage students and elders to connect and form mentor relationships.

Nested governance: governance, as discussed during the governance plenary, occurs at different scales—from the very local to the regional to the international. During this session, the panel and audience posed some questions about the form and function of a basin-wide entity while still maintaining space for local interests. These questions were then fleshed out in more detail during the governance breakout session.

Volume and Flow

The Volume and Flow breakout discussion (there was not a plenary panel on this topic) was created because there was a need for conversation on irrigation, dam and reservoir operations, navigation, and other uses of the Columbia River. Rather than try to look at each issue in isolation, this session framed the discussion around volume (the amount of water in the system) and flow (the timing of water in the system). This approach created an opportunity to explore the nuance and interconnectedness of these uses of Columbia Basin resources.

Volume
By average annual volume, the Columbia River is more than ten times larger than the Colorado River—200 million acre feet and 15 million acre feet, respectively. However, the dams and reservoirs along the Columbia can only store 20 percent of the average runoff, while the dams and reservoirs along the Colorado can store 300 percent of the Colorado River's annual flow. Seasonal and year-to-year variations in volume depend on temperatures, rate of snowmelt, and precipitation levels.

The Columbia River Treaty plays a significant role in regulating the volume of the Columbia River at the U.S./Canada border. Under the Columbia River Treaty, Canada operates three

reservoirs to optimize hydropower production in the United States and coordinates flood risk management. For a more detailed discussion on hydropower and energy, please see the Energy summary. If the Columbia River Treaty remains in place—without modification—the coordinated flood risk management provision will expire in 2024. Canada and the U.S. will then enter into “called-upon” flood management. This automatic change, as well as support on both sides of the border for “modernizing” the Columbia River Treaty, creates a layer of uncertainty in the ongoing management and operation of Columbia Basin reservoirs.

The use of waters within a country is considered a domestic issue and one to be addressed by the states and Province of British Columbia. But even with frameworks of international and domestic law, the many demands placed on the river are often contradictory and the ethics of sharing are murky. For example, flood risk management and hydropower production place conflicting demands on reservoir operations. Hydropower production relies on full reservoirs that can release water based on the demand for electricity. Flood risk management, on the other hand, requires utilities to “dig a hole in the reservoir” to accommodate predicted runoff. Accurate flood risk management requires communication and up-to-date information on the snowpack, temperature, and precipitation—all of which are costly and time consuming.

While the dams have created many economic (electricity, transportation, irrigation) and public safety benefits across the basin, many local communities and ecosystem function continue to bear the cost of these dams.

Flow

Climate change models indicate no or very small changes to the average volume of water in the Columbia Basin. The climate models do, however, forecast a shifting hydrograph (due to increase in precipitation as rain) and higher high flows and lower low flows. These changes, as noted in other sessions during the conference, will disrupt the existing balance of river uses and ecosystem function. Flow affects navigation, irrigation, wildlife migration, spread of invasive species, sedimentation, beach development, channel structure and recreational uses. Each of these translates to a cost or gain and those effects are not evenly distributed across the landscape or user groups.

Emerging Challenges and Opportunities

The key to all the options and opportunities listed below is transboundary collaboration and information sharing. Options and questions to explore include (in no particular order):

- Better understand the current state of and options for modifying flood control, irrigation, and navigation.
- Define and broadly implement energy efficiency and conservation (reduced consumption) to create more flexibility for other interests.
- Increase public awareness and understanding of the complexity of the issues in a transboundary setting.
- Fish passage above Grand Coulee and Chief Joseph dams will create access to cooler waters of the Canadian portion of the basin, but what are some of the other habitat requirements for salmon restoration?

From Conversation to Action

The final day of the conference opened with breakout session summaries and reflections from conference participants. In the dialogue that followed, everyone in the room refined several potential, but not prescriptive, goals and next steps for the basin.

Cassidy/Merkel Challenge Cup
Participants challenged the Columbia Basin Trust and the Northwest Power and Conservation Council (NWPCC) to work together to connect people across the international boundary who have shared interests and to do this in a way that does not create a new bureaucracy. That is, instead of creating a new entity for this purpose, the Trust and Council were challenged to encourage Canadian and U.S. interested parties to form their own groups to explore emerging transboundary environmental and governmental issues such as salmon habitat and carrying capacity, ecosystem function, riparian and estuary protection, and basin-wide salmon recovery objectives, to name a few. Or alternatively, the Trust and Council could identify an existing transboundary group or groups to receive technical or organizational support from the two agencies.

In April 2015, the Lake Roosevelt Forum will host a conference in Spokane. This could be a venue to evaluate progress before the Trust and the Council award the Cassidy/Merkel Challenge Cup in the fall. Participants suggested that a group or groups identified through the Challenge Cup could receive funding from the Trust and Council so they could continue their work.

Basin wide Transboundary Information Sharing Group
Form a basin wide transboundary group composed of representatives of diverse basin interests to help facilitate transboundary dialogue on an on-going basis and potentially create an overarching vision on a broad range of transboundary issues. The primary objective of the group would be facilitating transboundary dialogue to increase understanding and potentially propose solutions/improvements on key transboundary issues. The group would not be a decision making body and would report out to various decision making bodies on both sides of the border. The group should be composed of individuals representing tribes, First Nations, local/state government, provincial/federal government, and utilities and convened by the Trust and the NWPCC. The group would be tasked with:

- developing a terms of reference, scope of work and list of partner organizations who can provide resources;
- developing a list of priority issues/areas that will be addressed (this could include those issues as identified as priorities in this conference; Ecosystem/Energy/Climate Change/Governance, etc.);
- coordinating and facilitating information and data sharing across the border,

- coordinating and facilitating transboundary research on key topics;
- supporting student and young professional engagement; and
- hosting annual or bi-annual workshops related to the priority transboundary issues.

Student/Young Professional Coalition
Over 40 students and young professionals attended the conference, and their presence was especially strong during the governance breakout session. So strong, in fact, that a group of students left the breakout to continue the discussion in the lobby. These students want to establish enduring transboundary dialogue on common values. Columbia Basin Trust pledged financial support to this student-led initiative.

Information Gaps
What are the current opportunities for utilizing citizen science?

What transboundary agreements and partnerships already exist? What are the gaps, both spatially and in terms of issues?