



Canadian Columbia River Forum

The Columbia River Basin: Issues & Driving Forces within the Columbia River Basin with the Potential to Affect Future Transboundary Water Management

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The Columbia River Basin: Issues and Driving Forces

Executive Summary

The objective of this report is to identify current and future social, economic, political, and environmental issues that have the potential to affect or influence transboundary water and energy management in the Columbia River Basin.

There can be no doubt that there will be increasing challenges to cooperative management of the Columbia River in the future. Expanded consideration of values beyond power and flood control is one example. There are a number of current and future social, economic, political, and environmental issues that have the potential to influence water and energy management in the Columbia River.

For example, issues relating to: (1) the legacy of the past (and future need to consult and accommodate); (2) reconciliation of Aboriginal title and rights with Crown title in the Columbia Basin; (3) hydroelectricity and the ability to secure energy from other sources; (4) water quality and environmental considerations; (5) water quantity and allocation; (6) industry and livelihoods; (7) salmon and other anadromous fish habitat including instream flows; (8) public participation and the role of civil society; (9) adaptability including climate change; (10) flood control provisions; and, (11) recreation are all issues and driving forces capable of influencing any future water and hydroelectric regime of the Columbia River basin.

Preface

The research for this report has been conducted on behalf of the Canadian Columbia River Forum, consisting of federal, provincial, regional and First Nations agencies that have entered into a Memorandum of Understanding to collaborate and share information concerning the Canadian portion of the Columbia Basin.

This 'snapshot' of current and future issues and driving forces describes the following information as related to water management in the transboundary reaches of the Columbia River Basin:

- An overview of issues in Canada and the US including...
 - Individual federal, state, provincial, First Nation and tribal interests and policy in the basin;
 - Local or regional issues driving transboundary water management in the Columbia and,
 - Broader issues, outside the Columbia River Basin, that are likely to influence the future of the basin's water management.
- The key players, and not just the lead regulatory agencies, concerned about aspects of transboundary water management or its impacts, particularly those identified with the above issues;
- Implications for transboundary water management in the Columbia River Basin—the key points of interface and areas requiring better understanding or dialogue across the border.

This report focuses on issues that are directly and indirectly related to the international water

management of the region. It does not attempt to discuss the workings of, or mechanisms produced by, the Columbia River Treaty.

The methodology for preparing this report was as follows:

First, a literature review was compiled that pertained to the above issues. Second, individuals and organizations knowledgeable in those specific issues were interviewed.¹ The authors of this report have also had the benefit of access to the preliminary findings of a similar US based study currently being undertaken by graduate students at the University of Montana, as well as papers for a major Columbia River Basin Symposium on 2 to 5 April 2009 hosted by the University of Idaho.

Terms that may be considered complex or need further explanation have been defined in a glossary located in Section 7.

Introduction

1.1 A Brief description of Geography/Hydrology of the Basin

The Columbia River Basin (Basin) is among the world's largest international drainage basins covering 670,810 km². Due to its position between the 41st and 53rd northern latitudes, the Basin receives a significant amount of precipitation. The Columbia River is the largest river in the Americas to drain into the Pacific Ocean and has the fourth-largest annual discharge volume in North America. The water flow in the Columbia River system is extremely variable with annual flows fluctuating by as much as 50% from long-term average values. The Basin network drains water from glaciers, mountains, and plains in one Canadian province and seven US states. Close to 10% of British Columbia (BC) lies within the river's catchment; and relatively larger percentages of Washington, Oregon, Idaho and Montana have from 69 and 17% respectively of their territories within the system. The Basin also covers smaller portions of Wyoming, Nevada, and Utah states.

Although BC has only 15% of the Columbia's drainage area, it produces close to 30% of the runoff. More significantly, east of the Cascades, where most of the major hydroelectric facilities are situated, 40% of the Columbia runoff originates in Canada.² Several large mountain ranges are included within the Basin, in particular, the Cascades and Northern Rocky Mountains. The northern regions have a snowmelt regime with lowest flows from September through March, which generally coincides with the season of highest energy demand.

The Columbia River has its source in BC's Columbia Lake, sitting 810 meters above sea level. Its largest tributary, the 1,660 kilometre Snake River, begins at the roof of the continent in two small lakes on Wyoming's Two Ocean Plateau. Another of the main tributaries, the Kootenay (spelled "Kootenai" in the US), rises in BC, crosses through north-western Montana and the north-eastern corner of Idaho before re-entering BC and Kootenay Lake, thus making Canada and the US both upstream and downstream riparian states. The Kootenay then turns west and meets the mainstem of the Columbia.

Several smaller tributaries (ex. Okanagan-Similkameen and Kettle Rivers) flow southward across the border to join the mainstem. These smaller rivers, as well as the larger tributaries like the Kootenay and Pend d'Oreille River (including the Flathead), are subject to the attention of International Joint Commission (IJC) and are governed by various international arrangements including the Boundary Waters Treaty (1909) and the Skagit River Treaty (1984).

Major reservoirs built in Canada under the Columbia River Treaty (1964) contribute significantly to flood control in both countries.

1 A list of those interviewed is shown in Section 9.

2 Keith A. Muckleston, "International Management in the Columbia River System" prepared for UNESCO's International Hydrological Programme to the World water Assessment Programme, undated, p. 6.

1.2 Brief History of the Columbia River Basin

For 10,000 years native peoples inhabited the Columbia's shores and surrounding regions. Their livelihoods, culture and identity became intricately linked to the river. By the mid-19th century European settlers, and subsequently colonial governments, incorporated the Pacific Northwest into their spheres of influence.

Beginning with the formation of the Hudson's Bay Company's Columbia department in the 1820s, through to the development of the Bonneville Power Administration's expansive grid system after 1940, the Pacific Northwest has been subject to relatively rapid human development. The governments of the early 20th century placed added importance on the development of the Columbia and the full harnessing of natural resources. To aid an ailing economy, suffering stagnation after the Great Depression and two World Wars, the US Congress created a variety of federal agencies and bureaus with regional offices to administer the nation's resources more efficiently. The development of the Columbia River primarily as a power-generating system became a vital component to bolster demographic and economic growth.

1.3 History of International Water Management in the Columbia River Basin

At the turn of the 20th century, the US Congress passed the Reclamation Act of 1902 which granted the federal government the authority to provide irrigation to farmers in the West. Consequently, the Pacific Northwest experienced a shift to intensive farming coupled with a regional population boom. This led to human activities and impacts such as industrial and biological wastes, which were thought to have begun to impact salmon runs and wildlife. Wildlife habitat was also affected as logging and road building commenced. In 1928, the US Army Corps of Engineers undertook a detailed investigation of navigation, hydropower, irrigation and flood control possibilities on the Columbia River with a specific focus on the feasibility of installing a dam on the northern US portion of the Columbia. In 1932 the Bureau of Reclamation endorsed the Corp's proposal for the construction of the Grand Coulee Dam, with hydroelectric facilities. In the same year, private power companies completed Rock Island Dam the first significant source of hydropower on the Columbia.

The US plans for the Grand Coulee Dam were authorized through the *Rivers and Harbours Act* of 1935 for the purposes of flood control, navigation, stream flow regulation, storage for and delivery of stored waters, and reclamation of public lands and Indian reservations. Development of the Columbia River, both in regulating river flow and producing a large amount of power, was intended to provide employment and foster growth in the Pacific Northwest. However, the Grand Coulee project also cut off salmon from returning up the Columbia into Canada.

In 1944, the United States and Canadian governments asked the already existing IJC to investigate the possibilities of developing the Columbia River basin on a unified basis. As these investigations progressed it became apparent that more upstream storage, particularly in Canada, would greatly facilitate and optimize power production and flood control, especially in the US. By the early 1950s the process of transforming the US Pacific Northwest from a relatively arid place into a productive heartland was well underway. The water stored behind the Grand Coulee Dam, Lake Roosevelt and Banks Lake provided irrigation for over 1.1 million acres. When a large-scale energy shortage spread across the region in the period following World War II, methods of increasing hydroelectric power were more thoroughly investigated. In 1951 the US government applied to the IJC for permission to build Libby Dam, which would provide a large volume of upstream storage (over 6 km³) to regulate power output at existing and planned hydropower plants. The project was not approved at that time due to the cross-border inundation by the reservoir.

A damaging flood in the spring of 1948, that decimated Oregon's second largest town and killed nearly 60 people, also served to fuel the public demand for stream-flow regulation and dam construction on the Columbia.

1.4 International Water Management of the Columbia River

The Columbia River Treaty (CRT) and subsequent international water and energy management agreements were negotiated at an intra- and international government level. The Columbia River Treaty was negotiated and based upon information gathered from more than 15 years of intensive research conducted by the IJC. The basic principles driving the Treaty have subsequently been extensively used in other international situations as a model of effective equitable sharing of benefits and bi-national cooperation.

1.5 Implementation

The CRT was created to meet flood control and hydroelectric power generation needs at a time when society and governments focused on demographic growth, flood control, harnessing resources and economic development. As Keith Muckleston notes, “the goal of the CRT is simple and straightforward: create upstream storage in Canada and share the power and flood control benefits derived there from downstream in the United States.”³

In the process of looking at the power potential of the Basin in Canada, some consideration was given to the beneficial or detrimental impact which hydroelectric development might have on other uses of the river and its valleys, including irrigation, agriculture, forestry, mining, manufacturing, fish and wildlife, recreation and transportation.⁴ Specific to the topic of fish and wildlife, it was recognized that fishing would be affected to some extent by any development of the Columbia River for the purposes of power production.⁵ It was also recognized that water diversion plans which gave rise to flooding would likely have an effect on wildlife in the area.⁶

The focus on power production and flood control was not imposed by the Treaty, but rather was a considered decision by each country, prior to entering into the Treaty, and subsequently in administering the system.⁷ The best way to view the Treaty is as a vehicle that has permitted optimization of the river system as a resource through international cooperation after each Party had determined the trade-offs it was prepared to make.

The Treaty came into effect on September 16, 1964, and called for the provision of 15.5 million acre-feet of storage in Canada at three projects to be constructed (Duncan completed in 1967, Keenleyside in 1968, and finally Mica in 1973) within nine years of ratification of the Treaty. The US also completed the Libby project, an optional project under the CRT, with 5 million ac-ft of storage in 1973. Storage at the planned projects was to be operated in such a way to maximize power generation in Canada and the US, and reduce flood hazards in both countries. The benefits accruing from hydropower production and flood control in the US were divided equally between the US and Canada. The Treaty has no expiration date, but either country may effectively seek to terminate most of the provisions of the Treaty after 60 years (2024) with at least 10 years prior notice i.e. the latest date for notification of Treaty termination at the earliest possible date is September 16, 2014.⁸ Open and transparent communication, and bimonthly

3 Muckleston, “International Management in the Columbia River System”, p. 34

4 *The Columbia River Treaty and Protocol, A Presentation*, issued by the Departments of External Affairs and Northern Affairs and National Resources (Canada), April 1964, Chapter III, at p. 36. This source will hereinafter be referred to as the “Blue Book”.

5 Blue Book at p. 44.

6 Blue Book at p. 44.

7 Sanderson at page 7

8 For the functioning and components of the Treaty please refer to Glenn Hearn’s comprehensive work titled “The Columbia River Treaty: A Synopsis of Structure, Content, and Operations” prepared for Canadian Columbia River Forum, September 2008.

meetings appear to have enabled Canadian and US personnel involved in implementation of the Treaty to “remain abreast of changing hydro-meteorological and demand phenomena in a well-informed and coordinated manner.”⁹

1.6 Effects of the Development on Rivers and Valleys in the Columbia River Basin

Hydro-electric development of the Columbia has impacted the Canadian portion of the Basin in numerous ways. The creation of dams and reservoirs caused the physical flooding of large tracts of valley bottom land. Ongoing dam operations have impacted fish and wildlife habitat and populations. Some low elevation communities and their residents were displaced. First Nations and aboriginal communities suffered substantial impact. Transportation routes in the Canadian portion of the Basin were impacted and altered.

The dams on the Columbia River and its major tributaries also form the backbone of the Pacific Northwest’s economy, providing power to homes and industry, controlling floodwaters, irrigating hundreds of thousands of hectares of farmland, and forming an extensive navigation system.¹⁰ The management of the Columbia, regulation of its flows and the creation of dams has reduced flood hazards in what was once a highly variable river system, in areas where nearby human settlement would be severely impacted if not destroyed.

Canadian Portion of the Columbia River Basin

Compared with its US counterpart, the Canadian portion of the Basin is not densely populated. Settlements developed but mainly after the turn of the 20th century and have centered around resource extraction such as mining, logging and agriculture (which were generally conducted on a relatively small scale due to the region’s topography). In areas where these resources were subsequently exhausted, towns have often dwindled or stagnated in population. More recently, the region has become a centre of tourism and recreation, drawing visitors and migrants from neighbouring provinces and other countries.

1.7 Canadian Legislative Processes relevant to Columbia Issues

Both Canada and the United States are “federal” states. Both countries consist of a network of semi-autonomous states beneath, or in partnership with, a broader and unifying national government body. However, how each country chooses to manage governance issues (like natural resources, taxation, etc.) is occasionally quite different. The relationship between the central federal and the provincial/state governments in the two countries can also be quite different.

In general, the Canadian federal government is less involved in natural resources management than its US counterpart. In Canada, although the provinces have acquired a great deal of autonomy, they generally work with the federal government where international agreements are concerned. As energy and water resources become increasingly important in the political sphere (nationally and internationally) this status quo may not necessarily persist.

⁹ Muckleston, “International Management in the Columbia River System”, p. 36.

¹⁰ “Columbia River Basin”, available at <http://www.waterencyclopedia.com/Ce-Cr/Columbia-River-Basin.html> (accessed Aug 16, 2008).

In Canada, the constitutional components from which federal and provincial governments derive powers relevant to international water and energy issues are delineated in the table contained in Appendix B. Residual power lies in the federal government, as outlined in the preamble of Section 91 of the Canadian Constitution.

The Canadian federal government has played a leading role in the past development of the Columbia River Basin. As the Canadian High Contracting Party, it also played a pivotal role in the negotiation and implementation of the Boundary Waters Treaty (1909) and appoints members to the IJC. In the case of developments on international rivers, the federal government also has the authority to issue licences under either the *International Boundary Waters Treaty Act* or the *International River Improvements Act*. If any such developments affect First Nations, fish, wildlife, migratory birds, and environmental quality of natural resources, the Federal government may also exercise authority.¹¹ In addition, the *Species At Risk Act* (SARA) gives the Canadian federal government specific authority to protect endangered species and their habitats including if the provincial authorities have not already taken action.

BC attained authority over its natural resources including water in 1871 when it joined Canada and became a party to the 1867 *British North America Act*. BC's authority over waters within the Basin was strengthened further with the Canada-British Columbia Agreements of 1962 and 1964. In these agreements, the province gained the responsibility for the construction and operation of water projects on the Columbia and received "all proprietary rights, title, benefits, and monies paid by the United States to Canada" (for downstream benefits).¹² These rights are specific to benefits that flow from the various Columbia River Treaty projects. BC is also endowed with a great deal of power over, and responsibility for, water resources within the Basin.

1.8 Key Canadian players & Stakeholders within the Basin

First Nations are the original residents and stewards of the Columbia Basin. Their stewardship continues as a number of basin stakeholders advance a wide range of agendas associated with the management of water and energy resources of the Basin. Within the Canadian portion of the Basin these parties include BC Hydro, Powerex, BC ministries of Environment (including the Comptroller of Water Rights) and Energy Mines and Petroleum Resources, federal departments of Fisheries and Oceans, Natural Resources, Foreign Affairs and Environment, the Columbia Basin Trust, Canadian Columbia River Intertribal Fisheries Commission, NGOs and Environmental NGOs, local governments and municipalities and the larger private sector and local businesses, along with various basin residents.

BC Hydro is the lead provincial agency for implementation of the Columbia River Treaty. It is a crown corporation, reporting to the BC Ministry of Energy, Mines and Petroleum Resources, that generates and distributes power across most of British Columbia. BC Hydro is charged with ongoing implementation of various transboundary water agreements with its US counterparts: the US Army Corps & Engineers and the Bonneville Power Administration. As the operator of provincial reservoirs, BC Hydro's decisions can have a significant impact on other water users on both sides of the international border, particularly in light of the fact that hydropower on the Columbia River and its tributaries provides a relatively low-cost source of power for the province, supplying approximately 50% of the province's electrical generation.

Powerex is a wholly-owned subsidiary of BC Hydro and is a leading marketer of wholesale energy products and services in western Canada and the western US. Powerex provides its customers (utilities, power pools, large industrials and power marketers) with energy products and services from energy and capacity sales to natural gas trading. Powerex markets the Canadian Entitlement power of the Columbia

11 Muckleston, p. 26.

12 Muckleston, p. 32.

River Treaty on behalf of the BC government. In a portfolio approach to energy acquisition, Powerex also often purchases energy during off-peak periods when demand and prices are lower, seasonally, and when it believes prices will be higher in future.¹³ It is the inherent flexibility of the province's hydro resources system that provides for these trade opportunities. Powerex contracts with many transmission service providers, including Bonneville Power Administration (BPA), for both firm and non-firm transmission service.

Fortis is the largest investor-owned distribution utility in Canada serving two million gas and electric customers. Fortis' subsidiary, **FortisBC**, serves domestic electricity customers in the south-central part of BC. In addition, FortisBC owns and/or operates and maintains hydroelectric power facilities in the region in both regulated and non-regulated environments. FortisBC owns four hydroelectric generating plants on the Kootenay River (Corra Linn, Upper Bonnington, Lower Bonnington, and South Slocan). It operates and maintains three additional generating plants, the Waneta Dam, which is owned by TeckCominco Ltd., and the Arrow Lakes Generation Station and Brilliant Dam which are both owned by **Columbia Power Corporation** (CPC) in joint ventures with the Columbia Basin Trust. Hydropower utility companies such as BC Hydro and FortisBC have an obligation to supply electricity to BC residents in an assured and reliable manner.

The **BC Utilities Commission** (BCUC) protects BC ratepayers by deciding what power company expenses and activities are in the public interest. In this way BC ratepayers have an interest in the management of the Columbia River system in supplying low-cost electricity for residential and industrial purposes.

The **BC Ministry of Environment** exercises a regulatory role in Columbia River basin management. The Ministry administers resident fisheries in addition to various quantitative and qualitative aspects of the BC Water Act. It also administers several other provincial acts that focus on issues surrounding water resources. In the past two decades, "its activities have assumed increasing significance, reflecting the growing concerns of society about environmental quality, leisure-time uses of resources, and issues of sustainability."¹⁴

The **Comptroller of Water Rights** (Comptroller) possesses authority within the Columbia Basin as an employee of the BC Ministry of Environment, and is appointed under the Water Act. The Water Act confers on the Comptroller responsibilities over flood control, public safety and the environment. The Comptroller must review and approve Water Use Plans before they can be implemented. The Comptroller also grants water licences which are required in order to construct and operate works to store, divert, or use a specified maximum amount of water for a certain use. However, the Comptroller must also consider the rights of the licensee and public interest (including consultations with First Nations) in decisions.

The BC Ministry of Energy, Mines and Petroleum Resources is the catalyst and facilitator for developing sustainable and competitive energy and mineral resource sectors for British Columbians.

Water control facilities, which are abundant in the Basin, are also subject to the Federal Fisheries Act, which includes empowering the Canadian federal **Department of Fisheries and Oceans (DFO)** to set up "requirements for minimum water flows; the construction of fish-ways, fish guards or screens; pollution prevention; fish habitat protection and other matters."¹⁵ Within the Basin, this means DFO participates in integrated resource planning with all resource sectors (forestry, mining, hydro-generation, etc.) as a means of ensuring that fisheries as a resource are maintained.

13 Brian Moghadam, "Powerex and IPPs in BC", presented to IPPBC Conference, Oct 23, 2003.

14 Muckleston, p. 25.

15 "Water-Use Plans: A Mechanism Involving Stakeholders to Manage Water-Use conflicts at Hydro Facilities"

Natural Resources Canada (NRCAN) is a federal Canadian agency which champions innovation and expertise in earth sciences, forestry, energy and minerals and metals to ensure the responsible and sustainable development of our nation's natural resources.

Environment Canada is responsible for implementation of the *International River Improvements Act*, enforcing rules and regulations made by the International Joint Commission, and generally managing transboundary water issues.

The formal mandate of **DFAIT** (the federal Canadian Department of Foreign Affairs and International Trade) is set out in the Department of Foreign Affairs and International Trade Act (R.S. 1985, c. E-22) and includes:

- ensuring that Canada's foreign policy reflects true Canadian values and advances Canada's national interests;
- strengthening rules-based trading arrangements and to expand free and fair market access at bilateral, regional and global levels; and
- working with a range of partners inside and outside government to achieve increased economic opportunity and enhanced security for Canada and for Canadians at home and abroad.

The **Columbia Basin Trust** (CBT) was created by the Columbia Basin Trust Act in 1995 to provide benefits to the region most adversely affected by the Columbia River Treaty. At its inception, the CBT received "a share for the Region of the downstream benefits ("the DSB") under the Columbia River Treaty, to help create sustainable development opportunities and to create a regional authority to invest and manage the regional share on behalf of the Region" (8 Sep 1994 Letter of Intent). Total provincial funding has been \$353 million (\$295 million plus \$32 million operating funds plus \$26 million expansion rights). The CBT is a joint venture partner with Columbia Power Corporation in Arrow Lakes Generation Station and Brilliant Dam (and its expansion). CBT shares the revenues from these projects equally with the Columbia Power Corporation. The income from the CBT's portion of the power investments has been spent on social, economic and environmental programs to benefit the residents of the Basin. The Trust exists to "strengthen the well-being of the Columbia Basin, and works with the communities of the region to accomplish this."¹⁶ The Columbia Basin Trust, and particularly its Water Initiatives Program, is targeted to aid communities in ensuring that "their values and views are incorporated into major decision-making processes around water in the Basin."¹⁷ In this way, the Trust acts as a convening or mediating body, helping Basin residents articulate issues and concerns regarding water management through communication with provincial and federal bodies.

First Nations within the Canadian portion of the Basin include the Ktunaxa Nation, the Secwepemc Nation, and the Okanagan Nation. The Sinixt people also inhabit the region despite being officially declared extinct.

The Ktunaxa Nation consists of the ?a'kisqnuq, St Mary's, Tobacco Plains and Lower Kootenay Bands in Canada. The Ktunaxa Nation Council is currently in the BC Treaty Process at Stage 4: Negotiation of an Agreement in Principle. The Ktunaxa hope that "three values, in particular, will inform water governance in the post-treaty environment: (i) the sacred, life-sustaining value of water; (ii) a holistic, ecosystemic view; and (iii) a long-term perspective."¹⁸ More information on this Nation is available at www.ktunaxa.org.

16 "Working with Communities", Columbia Basin Trust website, available at http://www.cbt.org/Working_With_Communities/ (accessed September 6, 2008)

17 CBT Water Initiatives, Columbia Basin Trust website, available at <http://www.cbt.org/Initiatives/Water/> (accessed Sept 6, 2008)

18 Kathryn Teneese, "Ktunaxa Values and Perspectives in Columbia Basin Governance" Presentation to the Columbia Basin Forum, Vancouver BC, Nov. 9, 2005.

The Secwepemc Nation consists of seventeen communities including the Adams Lake, Tk'emlups, Neskonlith, Splatsh, Simpcw, Shuswap, Whispering Pines/Clinton, St'uxwtéws, Skeetchestn, Little Shuswap, High Bar, Canim Lake, Dog Creek, Canoe Creek, Williams Lake, Soda Creek, and Big Bar (now extinct) communities/Indian Bands. Secwepemc communities with traditional territories in the Columbia Basin include Simpcw, Sexqéltkém (Adams Lake, Neskonlith & Splatsh), Little Shuswap and Shuswap Indian Bands. The first ten of these communities/Indian Bands are members of the Shuswap Nation Tribal Council and are not a part of the BC Treaty process. The Secwepemc aspire to reunite through their common interest to further their assertion of Aboriginal Title and Rights and to reinstate themselves as Yecwémínmen Secwepemcúlecw (Caretakers/Stewards of the Shuswap Traditional Territory).

The Okanagan Nation is represented by its Tribal Council the Okanagan Nation Alliance. Members of the Alliance include: Penticton, Upper Similkameen, Upper Nicola, Westbank, Osoyoos, Okanagan and Lower Similkameen Indian Bands. Of this group, only the Westbank First Nation has entered the BC Treaty process.

Sinixt (or Lakes) people continue to reside in the Canadian portion of the Columbia Basin, as well as on the US side, principally as part of the Confederated Tribes of the Colville Indian Reservation (CTCIR). The Arrow Lakes Band was declared extinct by the Department of Indian Affairs in 1954 when the last surviving band member died. Political representation of the Sinixt people occurs through the 'Sinixt Nation in Canada' and through the Business Council of the CTCIR.

First Nations also seek to minimize the erosion impacts of water and wind on potential archaeological zones; maintain the cultural, aesthetic and ecological context of important cultural resources and spiritual sites; minimize the impact of destructive human behaviour (eg. traffic) on potential archaeological zones, and maximize abundance and diversity of fish and wildlife populations to support First Nations harvesting and associated activities.

In 1993 the Ktunaxa, Okanagan and Secwepemc Nations formed the **Canadian Columbia River Inter-Tribal Fisheries Commission** (CCRIFC). Currently CCRIFC consists of a partnership between the Ktunaxa Nation Council, the Shuswap Indian Band and the Simpcw First Nation. The CCRIFC is an organization created with the mandate of coordinating and providing technical support for the efforts of the First Nations to conserve and restore fish and fish habitat within the Basin, including long-term efforts to restore salmon.¹⁹

The Upper Columbia Aquatic Management Partnership was formed in 2006 between the Shuswap Nation, Okanagan Nation and Ktunaxa Nation with the goal: "to conserve and enhance healthy aquatic ecosystems, wild indigenous fish communities, and aboriginal fisheries in the Columbia Basin." The Partnership is based on the following principles from each Nation.

Secwepemc: Tknémentem Secwepemcúlecw "Respect the earth and do not waste natural resources in our traditional territory."

Okanagan: Tel kqoolentsooten swhitzetxet ee toomtemtet, ksnpee-eelsmentem, kstxetdentim oothl kskgethlkchiwhentem. The creator has given us our mother, to enjoy, to manage and to protect. Loot penkin koo tdeks ntzespoolawhax. Peentk kstxtdiplantem ee tel toomtem an hchastantet koo kgel yayart, tel arpna oothl tdeswhoois. We will survive and continue to govern our mother and her resources for the good of all for all time.

Ktunaxa: The universal laws that guide us in our society, particularly in our relationship to the land: ?anumuçtitił.

19 Jim Mattison, "Water Governance in the Columbia River Basin", undated, available at <http://www.globalnature.org/bausteine.net/file/showfile.aspx?downaid=6199&sp=D&domid=1011&fd=2> (accessed September 4th, 2008)

In the past 20 years there has been an exponential increase in active and vocal **Non-Governmental Organizations (NGOs)** and **Environmental Non-Governmental Organizations (ENGOS)** in the Basin. These organizations and other non-profit groups have significantly raised the profile of environmental, social and sustainability issues on the Columbia River including through the legal system and the media. Some NGOs within the Columbia Basin include the Sierra Legal Defence Fund and West Coast Environmental Law Foundation. Prominent ENGOS within the Basin also include, WildSight, Sustainable Fisheries Foundation, Canadian Parks and Wilderness Society, Naturescape, West Kootenay Eco Society, Valhalla Society, WildBC, and Friends of the Columbia Wetlands Society.

Municipalities and regional districts are government bodies with uniquely specific regional voices, and constitute yet another important stakeholder. While governing the regions' social and economic activities, they are also responsible for channelling and expressing the views of their residents. In this way, issues are voiced to municipal councils, which must then address them by appealing to the provincial government, or directly to the Premier, or by taking action in other ways.

The **Private Sector**, including small local businesses, also constitutes an important stakeholder within the Canadian portion of the Columbia River Basin. Almost all economic activity in the region, from resource extraction to tourism, relies upon the availability and usage of water. Responsible to thousands of employees in some cases, business owners have a vested interest in securing stable water supply for their business operations. In places where resource extraction has dwindled, communities have sought to diversify their economies by buttressing regional tourism, an industry closely linked to water resources year-round (in maintaining reservoirs and lakes, ski resorts, eco-tourism, golf courses). The Private Sector's various industries also rely on the affordably-priced electricity produced in and supplied throughout the region.

1.9 Issues and driving forces within the Canadian portion of the Columbia River Basin

Some of the issues and driving forces within the Canadian portion of the Columbia River Basin include: the legacy of the past; energy security; water quality; water quantity and allocation; industrialization; salmon and other anadromous fish including environmental or instream flows; public participation and the role of civil society; climate change; flood control; recreation and external forces affecting the region including the global economy.

2.3.1 Aboriginal Title and Rights

The relationship between the Crown and First Nations in BC is unique in Canada. The traditional territories of the province's First Nations encompass the entire landmass of the province. Unlike other parts of the country, most BC First Nations did not sign treaties in the past, making the ownership of rights on most provincial landmass subject to claims. The government of Canada and the Province of BC currently have treaty negotiations underway with 60 First Nations. However the majority of First Nations within the Columbia Basin are not a part of this treaty process.

Over the last 40 years, a number of court decisions have made reference to Aboriginal title and rights in an effort to define how governments must interact with First Nations regarding Aboriginal Title and Rights. In 2005 the Province of British Columbia affirmed the "New Relationship" with the First Nations Leadership Council which was to be based on respect, recognition and accommodation of aboriginal title and rights; respect for each other's laws and responsibilities; and for the reconciliation of Aboriginal and Crown titles and jurisdictions.

2.3.2 Legacy of the Past

Since the late 1960s, there remains an opinion amongst the people of the Basin that they were not adequately consulted about the flooding of as much as 60,000 hectares of fertile valley-bottom land in order to implement the Columbia River Treaty. Twenty three hundred people were displaced and the property of these residents was expropriated in order to build the Treaty dams and reservoirs. While residents were financially compensated for their property according to the standards of the day, some people felt that the compensation was not prompt, adequate and/or effective. In addition, some of the affected individuals did not accept or settle their compensation claims.

Even though programs have been established to compensate for the impacts of the Treaty on fish and wildlife resources, there is a continued sentiment amongst residents that the lack of compensation extends to the potentially detrimental impact of Treaty implementation on various fish populations, wildlife and ecosystems. While salmon passage into the Canadian portion of the Columbia/Kootenay region was blocked in the late 1930s when the Grand Coulee Dam was constructed more than 20 years before the CRT was finalized, some fish populations appeared to experience further declines at the beginning of Treaty flow regulation. Seemingly paradoxically, other fish populations appeared to remain healthy. These memories are embedded in the social fabric of the Basin, and it is evident that some Basin residents continue to feel that they have never had a way to adequately and properly voice their legitimate concerns and grievances.

Although the Columbia Basin Trust has initiated what appears to be a sea of change in public attitude towards the benefits received by the region, the CBT is still in a nascent stage and some CBT programs with long-term positive effects will not be evident to the Basin residents for some time.

As recently as fall 2008, the community of Golden drafted an appeal to the Premier for losses incurred by the creation of reservoirs. Golden Area Initiatives (GAI), the economic development arm of both the Town of Golden and Electoral Area A of the Columbia Shuswap Regional District, drafted a letter outlining activities and issues in Golden. GAI expressed a summary of estimated losses based in key sectors: \$7.5 million in potential, annual revenues for damage to the local timber supply; \$50 million in lost waterfront recreation development; \$45 million lost due to depletion of wildlife resources, and \$13 million in loss of waterfowl resources. The draft letter goes on to state that “cumulative impacts have been affecting the Town of Golden and Rural Golden...for over 40 years...[e]xisting remedial programs/mechanisms for addressing these impacts have not, in our opinion been commensurate with the scale of the losses.”²⁰

Similarly, members of the Mica 5 and 6 Core Committee, who are in the process of reviewing the potential impacts of proposed new generating units at the Mica powerplant, drafted a letter to the BC Hydro President and CEO as recently as October 2008. In the draft letter they state that a new thorough process is needed to address long standing grievances surrounding the lack of adequate, prompt and effective compensation for communities and the environment which results from all hydro projects in the region. Like the concerns expressed by the town of Golden, the committee members outlined losses to forestry, regional transportation, recreation & tourism, and community economic development in millions of dollars. The committee members went on to express environmental and emotional losses, saying that “the social, environmental and economic impacts created anger and mistrust...[a] new generation is growing up resenting the situation because past grievances were never properly addressed.”²¹ In response, BC Hydro commissioned the report “Cross jurisdictional review – impact and benefit arrangements”

20 Golden Area Initiatives: Community Economy Development Services Draft letter to Gordon Campbell, Premier of British Columbia, dated Aug 20, 2008.

21 Aaron Orlando, “Committee seeks new Basin-wide Hydro compensation agreement” Published: October 13, 2008 in Revelstoke Times Review, available at http://www.bclocalnews.com/kootenay_rookies/revelstoketimesreview/news/30926314.html (accessed: October 14, 2008)

(May 2009). This report compares the approaches and mechanisms used in BC with those used in other jurisdictions within Canada and across the world to deal with the issue of local accommodation and benefits for major electricity projects.

First Nations witnessed the inundation of ancient burial sites and artifacts, and the loss of the cohesive cultural institution of salmon at a time when great social dislocation was occurring. The elders in certain communities within the Canadian portion of the Basin still say they recall “the year the salmon didn’t come.” Although this occurrence wasn’t a result of Canadian dams, and was before the CRT, First Nations have recently expressed an interest in restoring salmon to the river, including on the grounds that the loss of salmon as both a historic cultural construct and as means of sustenance for the past 50 years have had far-reaching negative effects in communities across the Basin.

The Ktunaxa, Secwepemc and Okanagan Nations house many individuals (and their descendants) who were displaced both internally (within the Columbia Basin), and externally (from the Columbia Basin) due to the construction of the dams. The losses to these people and communities are extensive. The construction of the Grand Coulee dam between 1933 and 1942 stopped the salmon in their migrations up the Columbia River to their spawning grounds throughout the accessible portions of the basin to the headwaters at Columbia Lake. First Nations view the construction of Grand Coulee as a major infringement on their rights as it contributed to the displacement of Columbia Basin Aboriginal People. The construction of other dams (Keenleyside [1968], Mica [1973], Duncan [1967] Seven Mile [1979] Waneta [1954] Revelstoke [1983], Libby [1972]) caused further losses. First Nations people have cited social, emotional, spiritual/ceremonial, economic, health, environmental (water, land and resource use), language and traditional skills & knowledge losses. The magnitude, nature and severity of these losses has never been adequately examined and documented.

2.3.3. Hydropower and Flood Control

The Columbia River Treaty was initially engineered to provide hydropower and flood control to the Basin on the whole. Currently the Basin provides about 50% of the electricity for the province annually. In a 2006 Integrated Energy Plan (IEP), BC Hydro estimated that there could possibly be a 25% to 45% gap between current electricity supply and demand in British Columbia in the next 20 years. BC has been a net importer of electricity in most years since 2000. With demand for electricity predicted to increase in the future, and climate expected to change with global warming, the importance of both hydropower and flood control in the Basin will likely increase as well.

Under current agreements the Canadian and US “entities” are obliged to meet flood control requirements and maximize electric production capability for the two countries. There are currently three main priorities for the operation of the Canadian Columbia River System powerplants and reservoirs:

- (1) upholding the obligations of the Columbia River Treaty and other related coordination agreements,
- (2) meeting all applicable regulations (e.g. Fisheries Act), and
- (3) reliably meeting provincial electricity needs.

All water in the Columbia system eventually flows southward to the US, aside from minor consumptive uses. The Treaty modifies the regulation (timing and volume) of flows, but not any “entitlement” to water. Flow regulation is essentially provided by controlled drafting and filling of reservoir storage.

Flood control procedures generally have priority over power generation, although these two Treaty objectives are often complementary. In periods of potential flooding (especially in spring months) release volumes can be set by the US Army Corps of Engineers (USACE) to route flood water regardless of the power impacts.

In negotiating the Columbia River Treaty, Canada obtained the right to operate Canadian Treaty storage “as a whole”. In other words, BC Hydro has the right to transfer water between the Kinbasket, Arrow and Duncan reservoirs as long as it does not affect overall Treaty obligations. Canada thus attained some flexibility in storage operations, allowing tradeoffs between Treaty reservoirs to better coordinate with storage operations at its other reservoirs and to make tradeoffs which benefit fisheries, recreation, or other non-power interests. In this way, BC Hydro can, at least partially, ameliorate potential conflicts between one primary Treaty goal, optimal hydrogeneration, in the two countries and local BC interests such as fisheries, recreation and domestic power production.

In addition, the entities are able to vary from preexisting Treaty obligations by agreeing to Supplemental Operating Agreements (SOA) to balance basic rights and obligations with composite CRT storage and releases to benefit both countries. One of the most prominent SOAs is the Non-Power Uses Agreement (NPUA) which has been in place, and signed yearly, since 1993.

The NPUA is important for Canadian fisheries, in reducing the dewatering and mortality of rainbow trout and whitefish eggs below the Keenleyside Dam. However, management flexibility is also needed by the US Entity in securing additional spring and summer releases from Treaty reservoirs to meet the needs of US fisheries efforts downstream. These additional releases help salmon smolts to travel to the Pacific Ocean as quickly as possible increasing survival rates. Although the Columbia River Treaty was negotiated at a time when hydro-power and flood control were its primary objectives, the inherent flexibility of the agreement allows both Canadian and US entities to address non-power uses in a crucial way.

In 2008, the Entities adopted a Non-Power Uses Agreement to manage Arrow Lakes Reservoir outflows to protect whitefish and rainbow trout spawning and incubation downstream of the Hugh Keenleyside Dam. In doing this, outflow was held to maintain low river levels during the whitefish peak spawning period, reducing the number of eggs being dewatered during the incubation and emergence period in the early spring. Arrow Lakes Reservoir was managed, under the same agreement, to enhance trout spawning and incubation protection. Similarly the Libby/Arrow swap agreement, signed in August 2008, allowed water exchange between Koocanusa Reservoir and Arrow Lakes Reservoir, improving summer recreation levels in both reservoirs in August. Through the Non-Power Uses Agreement, the Entities are able to accommodate other interests in reservoir/river management as best they can, and with benefits to both countries, within the confines of the Columbia River Treaty.

BC Hydro can utilize flexibility within the international water agreements to include other interests identified via Water Use Plans (WUPs). WUPs are “prepared through a collaborative effort involving the existing or prospective licensee, government agencies, First Nations, key stakeholders and the general public.”²² In this way, BC Hydro incorporates other stakeholders’ interests within the confines of legislative and legal boundaries. When undertaking Water Use Planning on the Columbia system, BC Hydro and the Province were only able to agree to changes in operation that were consistent with the Columbia River Treaty. In developing a Water Use Plan for the Arrow reservoir, the WUP committee “chose to avoid recommending ‘hard constraints’ (as had been done in other Water Use Plans) and instead recommended ‘soft constraints’ for CRT reservoir operation, because there was no unilateral Canadian mechanism to meet those ‘hard constraints.’”²³

22 “Water-Use Plans: A Mechanism Involving Stakeholders to Manage Water-Use conflicts at Hydro Facilities” published in “Mountains to Sea: Human Interaction with the Hydrological Cycle, Canadian Water Resources Association 51st Annual Conference Proceedings”, June 10-12 1998.

23 Glen Hearn, “The Columbia River Treaty: A Synopsis of Structure, Content, and Operations”, prepared for the Canadian Columbia River Forum, September 2008, p. 29.

Flood control seems to be less of an issue in the Basin now largely due to the effectiveness of ongoing water management efforts. Flooding has been drastically reduced, preventing extensive damage to both Canadian and US settlements around the river and its tributaries. For example, during the high-runoff year of 1997, flood control operations at Columbia basin reservoirs resulted in nearly \$200 million in flood control benefits in both countries. Current transboundary water agreements have been successful in supplying substantial amounts of hydroelectricity and reducing flood-risks in such a highly-variable river system.

2.3.4. Energy Security

When hydro-development efforts on the Columbia were first designed, they were intended to meet the current energy needs of the Basin and facilitate further growth. At the time, BC premier W.A.C. Bennett's "Two Rivers" policy reflected an image of progress for BC but also a rapidly growing demand for electricity. Between the 1950s and 1970s growth in electricity demand expanded by about 8% per year, effectively doubling every 7 years.²⁴ BC experienced a period of extraordinary industrial expansion during this period, fuelled largely by the inexpensive electricity provided by hydroelectric projects on the Peace and Columbia rivers.

Regional demand for power in BC has continued at a steady albeit slower, pace, and provincial demand has now increased to surpass supply. Hydropower facilities in the Canadian portion of the Columbia River, such as the Mica and Revelstoke, were constructed with the future demand in mind, leaving room for the possible instalment of new turbines at the existing dams.

As previously noted, BC has been a net importer of energy from neighbouring provinces and the US for all but one year between 2000 and 2008, in part as a result of few new generation facilities being built over the past 25 years. The recent BC Energy Plan intends to make BC self-sufficient by 2016, through environmental leadership, conservation, energy security, and funding innovative new production strategies. The Plan is based on securing 'clean' and 'green' energy sources within BC, and hydropower production is central in this goal. Energy security, driven by the Plan, will act as a driving force within the Basin in the future.

2.3.5. Water Quality

Water quality (physical, chemical, and biological characteristics) sustains life and is vital to humans and their environment. Within the Basin, water quality is an issue for drinking water, recreation, agriculture, and the various ecosystems that rely on it. The value that Canadians have attached to water quality is a relatively recent phenomenon. People are significantly more aware now, as opposed to 10 years ago, of the importance of water quality. This is a recent, current, and increasingly important issue for a lot of people in the Basin.²⁵ Within the Canadian portion of the Basin, residents "have identified a broad range of concerns regarding water quality and quantity, and want to ensure their values and views are incorporated into major decision-making processes around water in the Basin."²⁶

Water plays a particularly vital role in the Basin for both consumptive and non-consumptive uses. Consumptive uses can be divided into domestic (drinking water, hygiene, lawn irrigation, individual water licences), agricultural (farm-land irrigation, water for livestock), industrial (businesses, resource extraction, major water licences for industrial purposes), and recreational (snow-making at ski resorts,

24 Stephen Bocking, "Dams in Canada" from An Environmental Studies, Development Studies Teaching Resource, International Development Studies Network, available at <http://www.idsnet.org/Resources/Dams/>

25 Pers. Commun. with Hans Schreier

26 Columbia Basin Trust, "Working on Water Issues" available at <http://www.cbt.org/Initiatives/Water/>

irrigation for golf courses and parks). In these cases, consumptive uses return less water to the river system than they withdraw. Non-consumptive uses apply to the Basin environment. Water used for storage in reservoirs; in hydroelectric systems for power generation; for boating, fishing and swimming; by aquatic ecosystems; and transportation do not withdraw water from the system and are therefore non-consumptive. Consumptive uses are not constrained by the Columbia River Treaty.

The Canadian portion of the Basin, containing a significant portion of the headwaters, is a sensitive hydrological system. With regards to groundwater, only approximately 50% of aquifers have been mapped.²⁷ Many communities rely heavily on clean groundwater, yet many human activities can impact groundwater quality. Glacio-fluvial regions, such as those in the Basin, are easily contaminated, and once contaminated, are difficult to restore²⁸. Development near reservoirs and tributaries has contributed to urban runoff in more pristine areas, increasing the chance of contamination.

The pace of development in the Columbia River Basin generally appears to exceed the presence of water quality issues in public dialogue. Urban areas affect water in ways, and to an extent, that is not fully realized yet by urban residents. Land development results in a loss of green space, pervious surface area, diversion of streams and destruction of aquatic habitat. Urban runoff is also an important factor as rain and snowmelt carry pollutants from commercial, industrial and residential areas into storm drains that flush the wastes into the region's rivers, lakes and wetlands. Urban pollutants can affect human health by contaminating drinking water, recreational waters, and fish.

Dams along the Columbia River alter the flow of water to provide for irrigation and municipal use, flood control and power generation. Dams may impact downstream areas by trapping nutrient-bearing sediments behind them; spill at dams may also cause gas-supersaturation, which can damage fish populations through "gas bubble trauma." Streamflow changes due to dams can affect water chemistry, soil erosion potential, and the accumulation of toxins in these man-made reservoirs.

Industry in the Columbia River Basin also increases the chances of degradation to the region's water quality. Forestry, agriculture and resource extraction contribute to a variety of real and potential water contaminants. Aside from their economic value, forests are a vital component of the hydrological cycle. They purify water, stabilize soil, absorb toxins, and regulate water flow. Timber harvesting can decrease the region's ability to absorb and retain precipitation, contributes sedimentation from roads into streams, rivers and reservoirs, and alters the organic matter content of the system's water. Agricultural activities require a great deal of irrigation, erode soil through livestock keeping and field-tilling, increase nutrients into surface and groundwater, and can cause pharmaceutical contamination from manure.

Mining facilities can raise concerns through chronic exposure to low levels of metals, bioaccumulation of toxins, endocrine disruption and acid mine drainage. Mining and ore extraction industries have been subject to criticism both in the region itself and downstream in portions of the US. For example, a smelter run by Teck Cominco in BC was recently charged with depositing slag and metallurgical waste²⁹ into the Columbia River in the early 1900s, which later accumulated in Lake Roosevelt allegedly posing danger to nearby communities and wildlife. When Lake Roosevelt levels are drawn down, as much as 80 ft in some cases, to provide space to capture high river flows from spring runoff, vast expanses of lake-bottom sediment (containing smelter waste) are allegedly exposed for

27 Pers. Commun. with Hans Schreier

28 Minutes from Columbia Basin Trust Symposium, Selkirk College, May 21-23, 2008, available at <http://www.rosslandbc.org/images/CBT%20Water%20Symposium%20052108.pdf>

29 A series of studies have documented elevated concentrations of trace elements such as arsenic, cadmium, copper, lead, mercury, and zinc in the water, bed sediment, or fish of Lake Roosevelt and the upstream reach of the Columbia River.

several months, which provide a large source for wind-blown dust. In 2001, the US Geological Survey conducted research and produced a report concluding that trace-element concentrations in the surficial bed sediment varied, but the major components in slag—arsenic, cadmium, copper, lead, and zinc—showed generally pronounced gradients of decreasing concentrations from near the international border to the Grand Coulee Dam.³⁰ The concerned communities of the Colville Tribes in Washington state launched a lawsuit in 2004 against Vancouver-based Teck Cominco that, for nearly a century, operated a lead and zinc smelter in Trail, BC. Teck Cominco argued that US courts don't have the jurisdiction to hear a lawsuit over its actions in Canada. The United States Supreme Court disagreed and allowed the lawsuit to go forward. As recently as May 2008, Teck Cominco temporarily shut down operations after a chemical spill into the Columbia River allowed an acidic solution, containing lead, to get into the river through an industrial outlet.

Good water quality is the cornerstone of the communities and ecosystems of the Canadian Columbia River Basin. Water pollution effects human health, agriculture, tourism and the environment. As two-thirds of the world's population will have water issues in the next couple of decades³¹, the social importance of water quality within the Columbia Basin will only increase, raising its profile as an important issue in the future of transboundary water management.

2.3.6. Water Quantity and Allocation

Closely tied to the quality of water is the quantity, and allocation, of water within the Columbia Basin. Who receives the water, how much of it is allocated, and for what purpose are important issues within the Basin. Contributing to water allocation issues is increased demand for water supply. The adjacent Okanagan region [not subject to the CRT] has some of the highest per capita water use rates in Canada.³² Reservoir levels, stream-flow alterations, and water uses can also be sources of conflict across the Canadian portion of the Basin and across the border. The Columbia River is a highly variable system, providing water to a multitude of different stakeholders, each with varying views of how the river and reservoir levels should be managed.

A recent issue concerns the level of reservoirs and their impacts on human developments. During some years, reservoirs are drawn down during the recreation season, decreasing tourism and recreational uses of the reservoir, and generally deteriorating its aesthetic appeal. It is in the interest of lakeside communities to have reservoir levels maintained at an aesthetically pleasing level, which is not necessarily congruent with regional power production and flood control. This sentiment is expressed by the residents living near Arrow, Kinbasket and Koocanusa reservoirs, concerned with the impacts of severe fluctuations in water levels on recreation and aquatic habitat.

Lake and reservoir levels also impact sewage treatment, as towns in the lower Columbia Region rely on regular flow of the Columbia River for municipal sewage disposal, and fluctuations can alter dilution of wastes. Low levels in the Kootenay Lake may impact trout populations, and low reservoir levels at certain times appear to have contributed to dust storms in the Kinbasket Reservoir. As recommended by the Columbia Water Use Plan, BC Hydro is now mitigating Kinbasket Reservoir dust issues by planting vegetation.

30 U.S. Geological Survey, "Water-Resources Investigations Report 03-4170—version 1.10 Concentrations and Distribution of Slag-Related Trace Elements and Mercury in Fine-Grained Beach and Bed Sediments of Lake Roosevelt, Washington, April-May 2001", Report prepared in cooperation with Confederated Tribes of the Colville Reservation, Lake Roosevelt Water-Quality Council, Bureau of Reclamation, and the US National Park Service.

31 Pers. Commun.: Hans Schreier

32 "Human Population Impacts on Columbia River Basin Fish and Wildlife" report prepared by the Independent Scientific Advisory Board as part of ISAB Human Population Report, June 8, 2007.

Water Use Planning (WUP) was initiated by the BC government and BC Hydro as a public consultation approach to optimize water allocation and use associated within a number of BC Hydro's facilities throughout BC. This allows for input from various stakeholders as to how BC Hydro can accommodate demands on the region's water resources, but ultimately the authority rests in the Comptroller. Mitigating the myriad of competing interests in water allocation to best benefit all parties (knowing that these demands are often conflicting and not all stakeholders interests can be guaranteed) has been a difficult process and will continue to be so in the future.

2.3.7. Industrialization

Heavy industry in the Canadian portion of the Columbia Basin has traditionally been largely dominated by resource extraction. Many of the communities within the Basin are dependent on the extraction of ore and/or timber, and pulp and paper industries. Many communities are beginning to diversify their municipal economies and are looking particularly to tourism and town refurbishing to attract amenity migrants. There exists an emerging force throughout the Basin to continue to shift industry in a more diverse and sustainable direction.

Tourism and recreation have been important industries in the Basin since the early 20th century. In recent decades, the tourism industry has grown to be one of the most robust in the region. In the Okanagan valley there has been a 600% increase in golf courses, with only three of these facilities using recycled water.³³ The proliferation of ski resorts across the Basin has attracted tourism from neighbouring provinces and internationally but also places increasing strain on regional water resources. Ski resorts use water for snowmaking and to run other facilities at high altitudes. Concurrently, the snow line in the region is retreating yearly, forcing resorts to build facilities at higher and higher elevations. While the recent boom in the tourism industry is creating employment and development, Basin residents in the Elk Valley, among others, are concerned with contamination by industry facilities like mines, ski resorts and golf courses.

Jumbo Pass, a proposed ski resort in the remote Jumbo Valley located above Argenta in the West Kootenays, has met significant opposition from a notable array of interest groups since its initial stages in 1989. The BC Environmental Assessment Office website cited that over an 8 week period, 500 people responded to the government's call for input on the Jumbo Glacier Resort proposal, over 90% of respondents opposed the project.³⁴ Similarly, the Columbia Headwaters initiative undertaken by the Ktunaxa peoples strives to halt a proposed development of 'Lot 48'. Fairmont Hot Spring Resort has proposed to develop Lot 48, building a 600-room complex and golf course, adjacent to a provincial park, Wildlife Management Area, and Ecological Reserve. More importantly, Lot 48, within the Columbia headwaters, is in the region central to the Ktunaxa creation myth. The Ktunaxa are intimately tied to this land, through their myths, legacy of use, and connectedness. Chief Mary Jimmy stated in 2005, "[w]e will not stand silently by and watch private interests take precedence over public, ecological and Ktunaxa interests."³⁵

33 Minutes from Columbia Basin Trust Symposium, Selkirk College, May 21-23, 2008.

34 Under Review Public Comments/Submissions for "Jumbo Glacier Resort Project" available at http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_18_r_pub.html, (accessed: September 5, 2008)

35 "Ktunaxa Nation Opposes Fairmont Hot Springs Resort Proposal To Alter the Boundaries of Columbia Lake Provincial Park", Media Release, August 9, 2005, available at <http://www.columbiaheadwaters.com/media/KtunaxaNationEastSideColumbiaLakeMediaRelease.pdf> (accessed: September 6, 2008)

2.3.8. Salmon and other Anadromous Fish Habitat and Instream Flows

Salmon and anadromous³⁶ fish have been impacted by humans for centuries. However, the past 200 years has seen a general decline in their population and habitat in both regulated rivers such as the Columbia and unregulated rivers such as the Fraser. In the case of the Columbia River Basin, fish appear to have been impacted by habitat destruction through human development, the construction of dams, climate change and overfishing. Industrial practices in the Basin, especially the introduction of mechanized and more intrusive logging and agricultural activities, quickened the pace of environmental change in the region and appeared to contribute to a general decline in salmon and fish populations. Fish formed a vital component in the culture of native peoples and livelihoods of those who depend on them for income. While there is unending controversy about the reason for the decline in fish populations, there are two relevant issues. First, dams were constructed on major fish bearing streams, including the mainstem, blocking access to a significant portion of the Basin. Second, ecosystem alterations such as water temperatures (ocean, lake, and river), nutrients, turbidity, and the nature and timing of its flow have had direct affects on aquatic species. Third, over-fishing may have contributed to fish population declines. The extent of damage to anadromous fish and their habitat has been perceived by some as one of the more negative consequences of hydroelectric production on the Columbia.

The creation of dams in the US portion of the Basin, starting in the late 1930s, nearly eliminated salmon from the upper Canadian portion of the Basin.³⁷ White sturgeon populations have also declined. In 1994, the Kootenai River White Sturgeon was listed as endangered by the US Fish and Wildlife Service under the *Endangered Species Act*. This population of White Sturgeon has been isolated above Kootenai River's Bonnington Falls, a natural obstacle for thousands of years. BC Hydro and the FWCP (Fish & Wildlife Compensation Program) are striving to understand how to fully protect these populations throughout the Upper Columbia White Sturgeon Recovery Initiative.

There has been a concerted effort through the actions of First Nations, ENGOs and the CCRIFC to rehabilitate fish habitat and encourage fish stock recovery. In 1995, FWCP was created, which is jointly administered by BC Hydro and others. FWCP is provided with \$3.2 million annually from BC Hydro, in perpetuity, to deliver conservation and enhancement projects aimed at species adversely affected by BC Hydro Dams. Since inception, FWCP has launched more than 700 projects in attempting to enhance fish and wildlife.

The conflict between certain fish and dams arises because the life cycle of anadromous fish requires them to spawn in fresh water but spend most of their lives in the oceans. Both juvenile fish migrating toward the ocean and mature fish returning upriver to spawn are impeded by dams and other man-made structures. Despite the current situation of fish in the Canadian Columbia River basin, programs to rehabilitate various populations are perceived as extremely positive in reversing detrimental impact. Initiatives like the Upper Columbia White Sturgeon Recovery Initiative and the recent FWCP efforts to return kokanee and other fish stocks to Kootenay and Arrow Lakes involve the public in educational outreach and community involvement programs, which deliver not only environmental, but also social, returns.

36 Anadromous: Fish, such as salmon or steelhead trout, that hatch in fresh water, migrate to and mature in the ocean, and return to fresh water as adults to spawn.

37 K. Ashley, L.C. Thompson, D. Sebastien, D.C. Lasenby, K.E. Smokorowski and H. Andrusak, "Restoration of kokanee salmon in Kootenay Lake, a large intermontane lake, controlled by seasonal additions of nutrients" published in T. Murphy and M. Munawar (eds.) *Aquatic Restoration in Canada* (Leiden, Netherlands: Ecosvision World monograph Series, Backhuys Publishers, 1999), p. 127-180.

2.3.9. Public Participation and the role of Civil Society

Transparency, public consultation, and meaningful dialogue between federal/provincial governments and Canadian citizens have become a societal norm in recent decades. Given the circumstances under which many international agreements have been undertaken in the past, public involvement has been, and will continue to be in the future, a major issue within the Columbia River Basin. People generally feel entitled to consultation. “Public view and input into agency action is just as much a part of the modern democratic state as voting, and possibly more important for citizens to feel they have a stake in government policy that affects their lives.”³⁸

The Federal government has expressed similar commitments in the 1987 Federal Water Policy, in statements such as “the federal government will ensure that the public is consulted and that its views are considered in all major federal water management decisions.” Given this express commitments to public participation, and their publicity, it is likely incumbent upon the federal government to ensure that the public is engaged in long-range planning regarding Columbia River water management. The issues described in section 2 of this paper should be articulated through various mechanisms of public participation.

Public participation is also publicly promoted at the provincial level. Within the *Columbia Basin Trust Act* it is stated that “the people of the Columbia Basin were not adequately considered in the original negotiations of the Columbia River Treaty” and that the Province desires and intends to include, and work with, the people of the Columbia Basin in decisions that affect their lives and determine their future. The Trust, itself, is one of the mechanisms to address these shortfalls.

First Nations rights have evolved extensively over the past three decades, obligating the Crown to consult and accommodate certain interests. The duty to consult with First Nations has a specific and evolving legal meaning. The recent *Delgamuukw*, *Haida*, and *Taku* court decisions lend support to First Nations even before an aboriginal right is proven to exist. One of the strongest aboriginal rights defined in case law appears to be the aboriginal right to fish, and this may well eventually be extended to include the right to protection of riparian fish habitat including water.³⁹

Questions for the future include: How will the public be effectively and meaningfully included in complex long-term multi-stakeholder negotiations, how can conflicting and possibly mutually exclusive interests be appropriately balanced, and who will decide on this balance?

Currently, governments and smaller regulatory bodies are perceived by at least some Basin residents to not have the institutional capacity to respond to the multitude of values at play, nor has there been capacity shown to unify the varying opinions of its residents in a way to ensure that these are effectively expressed. Water Use Plans attempt to resolve this dilemma, but many interests are directly conflicted with others such that win-win outcomes are often not available. Tradeoffs can be problematic.

38 John Shurts, “Rethinking the Columbia River Treaty”, p. 42.

39 Richard Paisley, “Chapter 13: The Fishing Industry”, in Geoffrey Thompson (ed.) *Environmental Law and Business in Canada* (Ontario: Canada Law Book, 1993), p. 523-542.

2.3.10. Climate Change, Adaptation and Planning for the Future

Climate change is emerging as one of the more profound ecological and social concerns of our time, making the ecological axiom ‘adapt, migrate, or die’ extremely pertinent. Though climate change is a global phenomenon, in a highly variable system such as the Columbia River Basin, global climate change has the potential to disrupt hydropower, fisheries, irrigation, water supply and other water-related activities. The hydrology of the Canadian portion of the basin is dominated by the temperature-sensitive cycle of snow accumulation and melt, hence substantial shifts in runoff patterns can result from a relatively modest warming. Climate sensitivity is likely to add stress to the already complicated and conflicting objectives faced by Columbia River Basin water resources management.⁴⁰

Climate change impacts the Columbia River Basin in various ways: higher summer and winter temperatures, long and dry summers, declining mountain snowpack, reduced snowfall, and sudden heavy rains.⁴¹ A change in flows during the winter months effects hydroproduction during the season of highest demand in the Pacific Northwest, and altered flows in summer months affect hydropower, flood control, recreation and fish and wildlife habitat. Regional warming translates to less snow in the winter, an earlier melt and less water in the summer, impacting irrigation, urban uses, fisheries protection measures, etc. Less snow and more water in winter effects hydroproduction and increases the risk of flooding.

Global warming ultimately translates into predicted increased precipitation, reduction in snowpack, glacier recession and a corresponding predicted relative increase in flow of water from the mountainous portions of the Canadian Columbia River as compared to the lower and more arid regions in the US. Water use managers and policy makers, as well as the residents of the Basin, will have to adapt to change.⁴² Adapting to this change will require the negotiation of increasingly complex tradeoffs (such as new storage) between competing uses and objectives combined with regional mitigating strategies such as reducing emissions.

Global warming will affect Basin communities in numerous ways that will require innovative and progressive adaptation. The Basin will likely experience climate change in an array of areas: water supply and quality, access and transport, municipal infrastructure, and hydropower production. Changes will likely be felt in the Basin industries of forestry, tourism, recreation and agriculture, among others. For example, Regional Districts that accept surface water sources for new buildings or developments will likely feel a severe impact of climate change, especially where streams are over-subscribed. A predicted increase in precipitation and less retention in the higher altitudes due to an overall increase in temperature may also cause damage to infrastructure through flooding, with a possibility of both more prolonged and intense floods. Water supply in groundwater resources will likely also decrease, with slower recharge rates to wells and aquifers. In a system that is limited by the demand of multiple stakeholders and subject to somewhat rigid international water agreements, the most vital adaptation to climate change will be an increase in the flexibility of the existing water management structures and the incorporation of a sensitive mechanism for sharing highly variable water resources across the Basin. Communities may adapt to changes in water supply through increasing the storage of winter and spring runoff, education in and the implementation of water conservation techniques, and decreasing the human impacts on water quality through pollution and urban runoff.

40 Jeffrey T. Payne, A.W. Wood, Alan F. Hamlet, Richard N. Palmer, Dennis P. Lettenmaier; “Mitigating the effects of Climate Change on the Water resources of the Columbia River Basin”, featured in *Climatic Change* vol. 62 (Netherlands: Kluwer Academic Publishers, 2004), p. 234.

41 “Climate Change in the Canadian Columbia Basin: Starting the Dialogue” report prepared for Columbia Basin Trust,

42 Information on this section was borrowed heavily from two documents, “Preliminary Analysis of Climate Variability and Change in the Canadian Columbia River Basin: Focus on Water Resources” report prepared as collaborative effort led by the Pacific Climate Impacts Consortium, October 2006; and a pamphlet produced through the Columbia Basin Trust, “Climate Change in the Canadian Columbia Basin” mentioned above.

Hydropower may be affected by climate change in the future. A predicted increase in system variability may result in the weakening of firm power production in times of the year when it is most needed, and a decrease in the ability to regulate flows to accommodate other demands on water resources for non-hydropower uses and instream flows. Effects on hydropower from climate change may be mitigated by decreasing the demand for energy through innovative energy practices and conservation.

Industry throughout the Basin will likely be affected by climate change. Climate change will alter forest ecosystems in numerous ways: new and possibly invasive species will emerge, flora and fauna will occur at different elevations and in different regions than in the past, there will also be an increased risk of natural hazards such as wildfires. The forestry industry will most likely adapt to this by advancing knowledge of the changing Basin ecosystems, and potentially incorporating climate change into long-term economic planning. This can also be said for agricultural industries across the Basin. For the tourism and recreation industries, climate change will possibly mean less snow, warmer lake water which will possibly attract more water recreation and tourism, and an alteration of fish habitat.

Tourism and recreation are heavily dependent on the Basin's water resources. In order to prepare for the impacts of climate change, municipalities across the Basin may proactively seek to diversify their economies and increase warm-season activities, as well as integrating climate change into long-term planning. Tourism activities on larger water bodies may be subject to more frequent and damaging (and often toxic) algae blooms during the summer and peak-tourist seasons due to increased regional temperatures, eutrophication rates and higher phosphorus contents in the Basin's waterbodies.

There is a growing awareness of the effects of climate change and measures that can be taken to reduce the human factor in the larger climatic quotient, and several communities have initiated projects to achieve this. For example, the town of Elkford has recently installed solar powered sewage treatment facilities, switched municipal vehicles to biodiesel, and plans to build a new community centre entirely 'off the grid'.⁴³ Towns across the Canadian portion of the Basin will be making innovative and progressive decisions to ameliorate the effects of climate change in both their municipality's 'footprint' and energy demands. These activities will relate to future Basin-wide water management planning.

1.10 Similar Regions with the potential to affect the Columbia River Basin

Issues and driving forces that affect the Canadian Columbia River Basin are experienced in similar regions with similar conditions. Occurrences in these regions, the actions on behalf of the private sector, international governments, or NGOs, affect both sides of the Basin through media, education and regional, provincial and international partnerships.

The Flathead Valley, which is adjacent to the Kootenay and Elk river valleys, constitutes another hotspot in Canada-US water relations. The Flathead River crosses the international boundary into Montana, where it is called the North Fork Flathead River. The centerline of this river, from the border with Canada to the confluence with the Middle Fork Flathead River, forms the western boundary of Glacier National Park. This park, together with Waterton Lakes National Park in Alberta, is recognized as a World Heritage Site, a Biosphere Reserve, and was established as the world's first International Peace Park. Cline Mining Company has initiated the government approval process for the development of a coal mine in tributaries of the north fork of the Flathead River in south-eastern BC. The proposed mine calls for the extraction of as much as two million tonnes of coal per year for 20 years. The project location is near Fernie, approximately 35km north of the border with the State of Montana. In the 1980s, a similar mine was proposed in the Flathead, and following a referral to the IJC, and its subsequent report, Sage Creek Coal Limited decided to drop the project.

43 Presentation by Mayor Dean McKerracher to Elkford Chamber luncheon, March 25th 2008, and Pers. Commun.: Dean McKerracher.

Opposition to the Flathead development posits that Canada has an obligation under international law not to use, or permit the use of, its territory for activities that would result in harm (including environmental harm) in the US, and allowing the Cline Mine to proceed notwithstanding adverse environmental implications would be contrary to generally accepted and/or emerging principles of North-South equity, sustainable development, and responsibility to future generations. However, international law, specifically the Helsinki Rules and the 1997 UN Watercourses Convention, could allow for the development of the mine. Each country is entitled to a reasonable and equitable share of the benefits of a transboundary river. Further, under the Helsinki Rules, pollution is not prohibited and may even be seen as a byproduct of a beneficial use(s) of the river. A complete prohibition of environmental harm would not allow Canada equitable use of a transboundary river to generate economic development.

Decisions made with regards to water management of one river begin to form a precedent that is then ideologically applied to similar river basins. Residents in the Canadian Columbia River Basin absorb media on cases such as the Flathead, and thus decisions made elsewhere have the potential to directly affect water basin management.

US Portion of the Columbia River Basin

The population in the US portion of the Columbia Basin is significantly greater than in the Canadian portion, a ratio of approximately 10:1,⁴⁴ and has been subject to a particularly rapid increase in population in the past decades, particularly in arid and semi-arid regions that were previously uninhabited. Several factors differentiate experiences in the US from those in BC, some of which include the nature of the state-federal relationship, the geography of the US portion of the Basin, and the varied needs of the Basin states.

1.11 Review of the US Federal System, Legislative Process & Implications on Transboundary Water Management

As noted previously, both Canada and the US are federal systems but how each country chooses to designate governance issues (like natural resources, taxation, etc.) varies between the two nations. The US legal system has enabled the US courts, over time, to grant increasing powers to the federal level with regards to resource management.⁴⁵

The seminal document defining federal powers and jurisdiction is the Constitution of the United States (1789). Federal involvement in water resources in the US is justified commonly through four clauses: Treaty, Commerce, Property, and General Welfare. Each of these clauses has been exercised by the federal government in the US Columbia River Basin, but the major international water agreement, the Columbia River Treaty, is impacted directly by the first (the Treaty clause). The President, with the consent of the US Senate, exercises the power to negotiate and ratify international agreements or treaties.

The US Commerce clause (Article II, Section 8) has been the source of increasing federal powers with regards to water resources. Legal interpretations have granted the federal government the power to manage navigable waters, and potentially many of their non-navigable tributaries. Congress used this clause and others to justify the construction of four large dams on the mainstem of the Columbia below its confluence with the Snake River.⁴⁶

44 Muckleston, “International Management in the Columbia River System”, p. 6.

45 Water is a state and federal “resource”.

46 Muckleston, “International Management in the Columbia River System”, p. 13.

The judicial branch has also granted considerable rights to the federal government through interpretation of the Property Clause, in that control over water resources may be exercised by instrumentalities of the federal government. Further, the federal government gained the authority to own, sell, and distribute electrical energy produced at its dams.⁴⁷ The Bonneville Power Administration (BPA), a federal entity, sells and distributes the power generated from the federally owned power plants in the Pacific Northwest, which is why the BPA is one of two US federal agencies⁴⁸ to administer the Columbia River Treaty and other international water agreements involving hydropower in the Basin.

The General Welfare Clause of the US Constitution grants the US Congress the authority to levy taxes and provide funding for the general welfare of the country. This evolved through years of judicial interpretations to mean that Congress has the power to fund water projects (some enormous in scale) for reclamation, irrigation and other improvements, which includes flood-control projects. Thus, this clause has been significant in transforming the Pacific Northwest.

The authority and funds provided by the US Congress are exercised by numerous federal-level instrumentalities, such as agencies and commissions, in order to manage water resources. These instrumentalities operate under hundreds of Public Laws, some spanning decades, with numerous amendments, Executive Orders, and inter-agency agreements. These instrumentalities can be divided into two groups. The first group has functioned under previous laws that reflect the attitudes and values of the late 19th century up until the 1970s, tending to focus on the traditional and utilitarian outputs of water management like hydro-electric power, irrigation, navigation improvements, and flood damage reduction through structural means. This first group of federal instrumentalities remains dominant in managing US water resources. However, the creation of new agencies and public laws during the latter part of the 20th century “reflects evolving social values vis-à-vis the natural environment that were not widely articulated until that time.”⁴⁹ The second group of smaller and more nascent agencies have exercised less influence in international water management than their more established counterparts. The US governing system, and how it has evolved through decades of judicial interpretation, grant the largest share of water management authority to the federal government and its instrumentalities as opposed to individual states.

1.12 Key Players & Stakeholders within the US Columbia River Basin

As in Canada, US international water agreements have traditionally been negotiated among select personnel, politicians, and government employees with technical water management backgrounds. Other stakeholders such as those in the private sector, land holders, residents, and non-profit organizations generally did not participate in many water management negotiations until the later part of the 20th century. However, as in Canada today, many different stakeholders now have active voices, with recognized interests, in wanting to have their needs met in the running of the water of the Columbia River Basin. Within the US portion of the Basin, these stakeholders include numerous federal agencies and instrumentalities, individual states, Tribal governments, local governments, NGOs and ENGOs, the private sector (including small businesses and industries), and communities.

The **US Army Corps of Engineers (Corps)** is located within the Department of Defense, and is the nation’s oldest water resource agency, dealing primarily with the construction and maintenance of navigable streams and harbors since 1802. The US Congress expanded the Corps’ role in water management during the first half of the 20th century to include generation of hydro-electric power,

47 F.J. Trelease, H.S. Bloomenthal, J.R. Geraud, *Natural Resources*, (St.Paul, Minnesota: West Publishing, 1965) p. 316.

48 The other federal agency is the US Army Corps of Engineers.

49 Muckleston, “International Management in the Columbia River System”, p. 13.

nationwide flood control operations, and the creation of comprehensive river basin plans. The Columbia Basin's reservoirs are regulated from the Corps' Reservoir Control Center in Portland, Oregon. These reservoirs include projects owned by the Corps, the Bureau of Reclamation (Bu Rec), as well as public and private US utilities. The Corps also directs flood control operations for the Columbia River Treaty projects in Canada, owned by BC Hydro. Each year flood control curves (FCC), or upper rule curves (URC), are observed by managers of storage reservoirs across the Basin system to ensure that flood control measures are implemented appropriately under the terms of the Treaty. Under the Treaty, the Corps is also obligated to coordinate operations at the Libby Dam with the downstream needs of Canada (hydroelectric production and flood control) to meet the needs of both nations. In the 1990s, ecosystem restoration was officially stated as a primary mission of the Corps' civil works program. The role in water management was extended further in 2002 when the US Senate Committee on Environmental and Public Works included environmental stewardship as a central part of its mission. By 2003, the Corps had proposed a request for \$95 million dollars in funding for fish habitat restoration in the Columbia River Basin. The Corps has embraced its responsibility to plan, develop, and operate water resources projects in a way that considers both economic performance and opportunities for environmental restoration, while minimizing unwanted or negative impacts to other areas within a watershed, adjacent watersheds, and the coastal system. When given the "necessary authority and funding (typically following a high-visibility event such as a flood, the listing of endangered species such as the salmon, or the degradation of valued ecosystems such as Chesapeake Bay or the Everglades), the Corps has demonstrated capacity to carry out multi-stakeholder, multi-objective planning projects that incorporate a diverse range of economic and environmental issues over the necessary spatial and temporal scales."⁵⁰ The Corps holds a prominent position in managing the diverse components of the Columbia River Basin, and has attained expertise in answering the needs of modern multi-stakeholder demands in water management. It constitutes a dominant stakeholder with a wide range of responsibilities.

The **Bonneville Power Administration (BPA)** directs much of the reservoir management and river flow in the Columbia River system on a day-to-day basis to optimize electricity production at US powerplants. BPA also participates with the Corps as the US Entity for the Columbia River Treaty. The BPA was created by US Congress in 1937 to market electric energy from the initial federal dams (Bonneville and Grand Coulee Dams) on the Columbia River. The BPA is contained within the US Department of Energy, and constitutes the region's unrivaled leader in the marketing and transmission of electric energy. BPA owns transmission lines, but does not own dams or hydro-generation facilities.⁵¹ BPA wholesales much of its low-cost energy to public and private utilities, including a select number of industries that use large volumes of power per unit of output. The BPA recognizes that operating the Federal Columbia River Power system to produce electricity within the constraints of the dams' other public purposes is a "delicate balancing act that requires constant tradeoffs"⁵² As a public agency based in the Pacific Northwest, BPA is currently responsive to multiple interests and regional concerns, making its public policy decisions in an open public forum, but it's main objective is to maximize power generation and ensure its effective distribution to places of demand.

In 1980 the US Congress passed the Northwest Power Act which created the **Pacific Northwest Electric Power and Conservation Planning Council** (the Council)⁵³. As, journalist Blaine Harden stated, "[t]he Northwest Power Act, in theory, spelled out a revolution in western water management...[i]t

50 "River Basins and Coastal Systems Planning Within the US Army Corps of Engineers", p. 5.

51 Dams and hydro-power generation facilities in the US are owned and operated by the USACE and US Bureau of Reclamation.

52 Bonneville Power Administration, "Balancing River Uses" available at <http://www.bpa.gov/Power/pl/columbia/1-riv.htm> (accessed: August 30, 2008)

53 Now known as the Northwest Power and Conservation Council.

put long-time inmates of the engineered river – Indian tribes and fish agencies – in a position of power.”⁵⁴ The Council describes itself as an “interstate compact agency”, subject to both state and federal laws and with a broad jurisdiction. The Council consists of two representatives from the Pacific Northwest states of Montana, Idaho, Washington and Oregon, appointed by the governors. The Council draws up a plan for meeting the electrical needs of the region at the lowest possible cost, giving the highest priority to cost-effective conservation to meet future demand for electricity. The plan adopted by the Council, which is amended periodically, is the basis for Bonneville’s actions in meeting the necessary loads of its customers.

The Council is also responsible for preparing, and periodically amending, a program to protect, mitigate, and enhance fish and wildlife, and related spawning grounds and habitat that have been affected by the construction and operation of any hydroelectric project on the Columbia River or its tributaries. The Council’s environmental mandate applies to anadromous and resident fish populations, as well as terrestrial and aquatic habitat. The 1980 Act stipulated that all planning for electric resources and fish protection must involve the public. The Council is charged with providing a method for balancing environmental protection and the energy needs of the region, and for each new energy resource, the provisions of the National Environmental Policy Act must be complied with. It must also seek recommendations of the region’s tribal, state and federal fish and wildlife agencies and comply with the legal rights of the region’s tribes. The Council’s role here is significant, as “[n]ot only must the council solicit [the tribes] recommendations for fish and wildlife measures, but if there are conflicting recommendations for fish and wildlife measures, the Council must consult with the tribes and agencies and give ‘due weight’ to ‘their recommendations, expertise, and legal rights and responsibilities’ in resolving the inconsistency.”⁵⁵ The Council is poised in a special position; first, as a convening body between federal, state, local, tribal and private sector interests, and second, with a great deal of power in regulating the hydrogeneration system to consider these interests. The Fish and Wildlife Program developed by the Council is funded by ratepayers, thus funds for salmon recovery are dependent on hydroelectricity.

The **Bureau of Reclamation (Bu Rec)** was created by the Reclamation Act of 1902, as part of the US Department of Interior, to foster irrigation in the 17 western states. Bu Rec owns Grand Coulee, the largest U.S. project on the Columbia River system, as well as the associated Columbia Basin Irrigation Project. In addition, BuRec owns Hungry Horse Dam on the south fork of the Flathead River, which provides a large volume of active storage capacity in the Pend Oreille⁵⁶ system, firming up winter flows for all downstream hydroelectric projects (including Seven Mile and Waneta Dams in BC). Most of BuRec’s other projects are located on the Columbia’s largest tributary, the Snake River. In attempting to meet increasing demands for water in the Pacific Northwest without developing new water supplies, the Bu Rec’s current program focuses on encouraging water conservation and water reuse, and developing effective partnerships with all water users while protecting the environment and the public’s investment in its structures. Through various programs, initiatives, and activities, Bu Rec is attempting to improve its relationships with stakeholders. Currently this means “seeking customer and stakeholder input through a comprehensive outreach strategy including meetings, conference calls, and available web sites in order to continue to obtain input and explain process developments.”⁵⁷ Bu Rec continues to provide irrigation to the Pacific Northwest, and a variety of other water-use needs, and is sensitive to its responsibilities with regards to transparency and openness to its customers and water-users across the Columbia Basin.

54 Blaine Harden, *A River Lost: the Life and Death of the Columbia* (New York: W.W. Norton & company, 1996), p. 216.

55 Northwest Power and Conservation Council, “Briefing Book”, January 2007, available at <http://www.nwcouncil.org/library/2007/2007-1.htm> (accessed: Aug 15, 2008)

56 Canadian spelling is Pend d’Oreille.

57 Bureau of Reclamation, “Managing for Excellence”, available at <http://www.usbr.gov/excellence/> (accessed: Aug 30, 2008)

In the 1990s the **US Fish and Wildlife Service (FWS)** and the **National Marine Fisheries Service (NMFS)** gained an increased role in water management after several species of fish were listed under the Endangered Species Act (ESA). Due to divided responsibilities for fish listed under the ESA, the FWS, as part of the Department of Interior, assumes managerial responsibility for resident fish (white sturgeon in the Kootenai system) while NMFS, under the Department of Commerce has managerial responsibility for anadromous salmonids listed under the ESA in the Columbia River Basin.⁵⁸ It is in this way that the incongruity of federal laws, the lack of a unifying mechanisms for instrumentalities attempting to achieve similar goals, becomes a hinderance to conservation and rehabilitation programs in the Columbia River Basin. The FWS and NMFS determine whether to list a species as endangered and consult with federal agencies to avoid jeopardizing listed species, and thus they have the potential to affect a broad range of water-related actions.⁵⁹ They also produce Biological Opinions, documents that hold great sway in water management, and which consist of a set of recommendations that define the operations of the Columbia River system so that endangered species will not be jeopardized.

The **Bureau of Land Management**, the **US Forest Service** and others manage federal lands which account for 55% of the total land area in the Basin. Thus, they can determine the land management practices which can harm or protect fish and wildlife habitat.

The **Federal Energy Regulatory Commission (FERC)** is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. It also reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines, as well as licensing hydropower projects. In September 2008 FERC approved the first new natural gas import terminal in the Pacific Northwest to meet rising energy demands. The natural gas system would involve intra- and interstate pipelines that would supply natural gas at rates not met by renewable resource power generation stations (hydropower included). FERC insists that “energy conservation cannot replace the natural gas needed in the future.”⁶⁰ FERC’s role in managing the energy needs of the Pacific Northwest will increase in the future in tandem with the increasing demand for energy.

The **Natural Resource Conservation Service (NRCS)** is included within the US Department of Agriculture, and is authorized to cooperate with States and local agencies to carry out works of improvement for soil conservation and for other purposes including flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. NRCS also investigates and conducts surveys of river basins as a basis for the development of coordinated water resource programs, floodplain management studies, and flood insurance studies. It assists public sponsors to develop watershed plans to mitigate flood damage; conservation, development, utilization and disposal of water; and conservation and proper utilization of land in order to identify solutions using conservation practices (via nonstructural measures) to solve problems.

The **US Geological Survey (USGS)** is a biological science and civilian mapping agency that collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues and problems. In the Columbia River Basin, the USGS shares valuable knowledge about water conservation technology and water-management techniques to other federal agencies to help them make informed policy decisions. It also provides impartial data to the public, which proved important in the recent Colville Tribes action against Teck Cominco’s alleged pollution. The USGS often undertakes studies when an issue has been raised (like transboundary pollution) by citizens, and facilitates the spread of scientific data.

58 Muckleston, “International Management in the Columbia River System”, p. 13.

59 John Volkman, “A River in Common”, p. 26

60 “FERC authorizes Bradwood Landing Project: first U.S. west coast LNG Terminal” available at <http://www.ferc.gov/news/news-releases/2008/2008-3/09-18-08-C-1.asp> (Accessed: Sept 20, 2008)

The **Environmental Protection Agency (EPA)** leads the nation's environmental science, research, education and assessment efforts. Within the Basin, EPA develops and enforces environmental laws that are written by Congress, it gives grants to state and public environmental programs, studies environmental issues, and publishes information. Federal instrumentalities can utilize EPA to aid in water issues. For instance, the NWCP (Northwest Cascade Power) looked to EPA for help identifying water quality issues in the Columbia System. The agency is able to assist in preparing recommendations for issues in watershed management by facilitating exchanges of and utilizing a wide array of data within its reach. In the 1990s, EPA increased efforts to involve the public by giving citizens, industry, environmental groups, and academics an opportunity to play key roles in environmental decision making. EPA engages the public and stakeholders by conducting outreach, exchanging information, providing the public with opportunities to make formal recommendations, and working with certain groups to develop consensus agreements. Recently, EPA has adopted holistic planning efforts in advocating the 'Watershed Approach' and 'Community-based Environmental Protection'.

The **Columbia Basin Fish and Wildlife Authority (CBFWA)** was established in 1987. It is an organization consisting of members from four state and two federal fish and wildlife management entities, and eleven Indian tribes of the Columbia River Basin. The CBFWA is empowered by federal and state statutes, treaties and court actions. The Authority is intended to coordinate and facilitate fish and wildlife activities of interagency and tribal concerns, and interact with the water and land planning and management authorities of the Columbia River Basin. The Authority is a consensus organization, giving recommendations to the **Northwest Power Planning Council** and **BPA**.

Federal agencies are numerous and have a great deal of authority in the management of the US Columbia River Basin. **States** with portions of their territories within the Basin (Washington, Oregon, Idaho, Montana, Wyoming, Nevada, and Utah) are also stakeholders in the management of the River and its tributaries. Washington State is of particular importance in the international management as it contains a significant physical portion of the Basin and is adjacent to BC. States grant property interests to private parties, outside of the realm of federal policy. This structuring results in an extremely fragmented Basin management body, one involving a multitude of governing jurisdictions, policies, and Acts with limited places of interface and exchange. States control the purse strings, and the regional machinery of water permitting, transfers, instream flow protection and other matters. State courts play a vital role in the continuing evolution of water law. They also issue rights to fish and wildlife under state law. All of the Northwest states are 'prior appropriation states', but the original miner's rule that actual appropriation gives the only valid right to water has grown into a complicated body of jurisdictional law. Most of these states have public trust doctrines, instream flow laws, basin-planning processes and various innovations to deal with water management issues.⁶¹

Tribal governments constitute another stakeholder in the Basin. These tribes include the Burns Paiute, Coeur d'Alene, Confederated Salish and Kootenai of the Flathead Reservation, Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Colville Reservation, Confederated Tribes of the Grand Ronde Community of Oregon, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation of Oregon, Kalispel Tribe of Indians, Kootenai Tribe of Idaho, Nez Perce, Shoshone Bannock Tribes of the Fort Hall Reservation, Shoshone-Paiute Tribes of the Duck Valley Reservation, and the Spokane Tribe of Indians. Indian tribes who do not see their interests adequately protected in federal or state forums have their own mitigation plans,

61 "Symposium on the Public Trust and the Waters of the US West: Yesterday, Today and Tomorrow" published in *Environmental Law*, vol. 19 (Spring 1989)

which they use in asserting treaty and other rights. Tribes are also making substantial claims to water rights across the Basin under the doctrine first recognized in 1908 in *Winters vs. United States*. The doctrine rules that water rights needed to support reservations can include water to support hunting and fishing, and carry priority dates as of the date of the treaty with the tribe or, in some cases, from “time immemorial”. In this way, tribal water rights could potentially trump all or most state-based water rights in the Basin, depending on the particulars of the claim.⁶² Tribes work on collaborative conservation programs with a wide array of state and federal actors to aid in salmon recovery and ecosystem restoration.

The **private sector** constitutes an important stakeholder in the Basin, with a variety of needs and interests. The economy of the Pacific Northwest was jump-started on the electricity produced from the Columbia River Hydro-system, and subsequent development continues to rely heavily on its output. The economy of the region has become more diverse, with notable growth in technology, transportation, trade, and service sectors.⁶³ The private sector, from heavy industry to agriculture, demands a great deal of hydro-power in a system subject to rapid population growth and it holds a preeminent place in decision making processes.

NGOs and ENGOS constitute another group of stakeholders in the Basin. As in the Canadian case, these groups have amassed a great deal of authority with the rise of the environmental movement and their subsequent incorporation into the collaborative management structures of modern governance. Many of the groups are focused on salmon recovery and ecosystem conservation programs, and over the past three decades have moved from a ‘posture of confrontation and adversarial relations’ with government and industry to one characterized by professionalism and cooperation.⁶⁴ The most prominent ENGOS in the US portion of the Basin include Ecotrust, the Sierra Club, Friends of the Earth, Earthjustice, US Rivers, WaterWatch Oregon, Northwest Energy Coalition, Northwest Ecosystem Alliance, Northwest Environmental Defence Centre, Oregon Wild, Sustainable Northwest, Save Our Wild Salmon, Idaho Rivers United, Living Rivers. Although this is not an exhaustive list, the aforementioned groups have lobbied their interests in collaborative water management forums in the past.

Local governments constitute another stakeholder within the US portion of the Columbia River Basin. In recent decades the region has undergone rapid growth, with many small rural communities experiencing significant social and economic changes. Due to the immense federal presence, local governments have less of a role in managing water resources. However, these local governments are responsible for the well-being of their communities and are thus interested in ensuring good water quality, adequate water quantity, and the protection and management of land that borders the river and its tributaries within their jurisdiction. They receive requests and grievances from their constituents, but are only able to respond through small-scale initiatives.

Communities within the Basin, vary greatly with their interests, issues, and demands. The US residents of the Basin articulate their opinions through federal instrumentalities, local governments, NGOs and ENGOS, and the media. Some choose to align their agendas with politicians, using their votes to influence policy (including water management policy) through the electoral system. Other interest groups seek to advance their issues through the legal system. As in Canada, public participation has become a norm in US governance. Now, more than ever before, authorities are obliged to be sensitive to the desires and grievances of the citizens of the Basin while considering the river’s current and future management.

62 John Volkman, “A River in Common”, p. 71.

63 John Volkman, “A River in Common”, p. 24.

64 M.E. Kraft, Influence of US NGOs on Environmental Decisions and Policies: Evolution Over Three Decades”, published in The Role of Environmental NGOs--Russian Challenges, US Lessons: Proceedings of a Workshop, (Office of International Affairs (OIA), 2001)

1.13 Issues and driving forces within the US portion of the Columbia River Basin

The US portion of the Columbia River Basin is extremely varied in population density, history, topography, and hydrology making for an extremely complex river template. Some general experiences are similar to the Canadian situation in water allocation, quality, and environmental concerns. The biophysical nature of the Basin results in varying issues and driving forces with the management of the Columbia River between and within states, often in line with the upstream/downstream water management paradigm.

3.3.1. Regional Interests and water management

The climate of the region influences the biological productivity, soils, streamflows, wildfires, and human uses of land and resources. Much of the southern Columbia basin is arid, receiving less than 30 cm of precipitation annually, while the northern portion contains tracts of coastal rainforest and some regions receive 60 cm to 2 metres in precipitation.

Within the US, Washington, Idaho and Montana generate larger portions of the Columbia's runoff due to their climate and topography. Upstream states have different experiences than downstream states within the US portion of the Basin, and both have issues with current water management, mirroring the international upstream/downstream situation. In areas where water is needed for agriculture, elaborate irrigation methods have been constructed, and large scale diversions have occurred. Water in urban and rural regions is subject to industrial pollution and urban pollutants through rainfall and groundwater seepage.

Irrigation from surface and ground water is the dominant off-stream use of water in the Basin. Idaho has the largest irrigated area with 3,330,000 acres (45% of the total basin), Washington with 1,879,000 acres (25%), Oregon with 1,310,000 acres (18%) and Montana with 433,700 acres (6%).⁶⁵ Almost 6% of the Columbia Basin's runoff is diverted to irrigate about 7.8 million acres of land.⁶⁶ Farmers in arid parts of eastern Washington, northeastern Oregon, and southern Idaho depend on irrigation. Withdrawal from the Columbia's mainstem and tributaries to support agricultural industry has reduced the amount of water available in other regions.

During extreme weather events, such as the drought experienced in 2001, the river system is stressed. Irrigation and other industries draw on water resources in the Columbia River Basin through consumption, diversion and pollution. Problems of water quantity in the Snake River Basin do not directly affect transboundary water management with Canada, but must be considered when approaching the Columbia River as a whole. Efforts to decrease the demand for water from irrigation have met difficulties in part due to the industry's prevalence and enormous physical presence, but also due to the legacy of locally-driven water policy and long-standing "prior" claims.

65 Columbia River System Operation Review, *Final Environmental Impact Statement*, Appendix F: Irrigation, Municipal and Industrial/Water Supply, (November 1995).

66 Foundation for Water & Energy Education, "What Makes The Columbia River Basin Unique And How We Benefit", available at <http://www.fwee.org/c-basin.html> (accessed August 10, 2008)

Industry in the US portion of the Basin is an important factor when regulating mainstem river flows and reservoir levels (aside from flood-control and hydropower), a point that is of interest for some agricultural groups in Canada.⁶⁷ The ability of the Columbia River to serve its many uses is sometimes exceeded by the needs of lower Basin water users. Evolving state legislation has sought to return more water to the Columbia, however, previously-established consumptive water rights continue to stand. An overall decrease in streamflow in the recent past has shrunk the water pie so that irrigators, hydropower interests, and fish and wildlife are now fighting for the last drop of the Columbia River.⁶⁸

Water quality problems are persistent on the mainstem of the Columbia and the Snake. These include point-source effluents, impoundments, water withdrawals, and nonpoint source pollution, particularly from irrigation. Heavy industry, focused primarily in the Vancouver-Eugene corridor, has contributed potentially harmful levels of heavy metals, pesticides, dioxin/furans and other organic compounds in the water and sediment.⁶⁹ Return flows from irrigation are often degraded contributing to higher accumulation of pollutants in the mainstem. This holds particularly true for the Snake River. The ever-increasing expanse of industrial and rural land use in the Basin also increases the threat of water contamination and habitat destruction. In addition, water samples have detected pharmaceuticals, hormones, and personal care products (PPCPs) in watercourses within the basin. Water samples from the Columbia River estuary indicated that acetaminophen, diphenhydramine (a common antihistamine), antibiotics (erythromycin and trimethoprim), and bisphenol A, were all present.⁷⁰

A great deal of the regional issues and driving forces in the US portion of the Columbia River Basin are the result of competing demands for, and severe dependence on, the river's water. The nature of development in the Pacific Northwest promoted a boom in agricultural and heavy industry in a post-depression, post-war era. Hydrodevelopment facilitated growth at unprecedented and unregulated rates, creating centres of heavy industry and massive agricultural infrastructure across the region. The present US Columbia River basin management structure has inherited this complex economic and social template, and still must address present and future demands. The needs, whether for heavy industry, municipal use, or rural agriculture, vary from region to region depending on specific factors. The greatest conflict, it would seem, is not going to be between industry and other stakeholders in attaining necessary resources from the River system, but between stakeholder interests and environmental concerns over how best to manage the Columbia River system in the future. This is further complicated by the uncertainty of what is 'beneficial' to fish, and conflicts between upstream and downstream fish populations. In other words, even the subset of 'environmental concerns' has many interests that are conflicted and mutually exclusive.

67 See Wendy R. Holm, *Evaluation of the effect of downstream benefits to Washington State agriculture under the Columbia Treaty on the competitive positioning of B.C. producers*, submitted to Provincial Agricultural Land Commission, (1994)

68 Bridget Callahan, Edward Miles & David Fluharty, "Policy Implications of Climate Forecasts for Water Resources Management in the Pacific Northwest.

69 Lower Columbia River Bi-State Steering Committee, *Lower Columbia River Bi-State Water Quality Program: Final Executive Summary and Steering Committee Recommendations*. (June 1996)

70 Independent Scientific Advisory Board, "Human Population Impacts on Columbia River Basin Fish and Wildlife" included in *ISAB Human Population Report*, June 8, 2007, p. 27.

3.3.2. Population Pressure in the Pacific Northwest

The Pacific Northwest has been subject to rapid growth for close to a century that shows little sign of ceasing. As stated earlier, the asymmetry of the US/Canadian populations is approximately 10:1. Much of the growth in population is attributed to migration from other US states or other countries, as opposed to a high birth rate. While migration (particularly ‘amenity migrants’) has caused an increase in the Canadian portion of the Basin, the trend is much more pronounced in the US, with large populations relocating their primary residence to the region. More people, in recent decades, have chosen to move to rural areas over urban centres⁷¹. The densest population continues to be centered along the Vancouver/Eugene corridor. Migration to rural areas exhibits a shift in the demographic of these areas, challenges for municipal governance, and also a general shift in attitudes, as rural areas tend to place higher importance in the value of the surrounding ecosystems.

Current estimates state that if the largely migration-driven population growth continues unabated, it will result in a three to sevenfold increase in the population in the Columbia Basin region.⁷² With this growth will come new demands on the region’s already strained water resources. Increased rural development will have impacts on both water quantity and water quality available for aquatic ecosystems, draining groundwater resources and decreasing base flows in neighbouring streams. Human development is sprawling into arid and semi-arid regions that require water for domestic and municipal use, and energy to pump water to the regions where there is not enough to support the population. In California, Idaho, Oregon, and Washington, freshwater withdrawals for domestic and public uses are projected to increase by 71-85% by 2050.⁷³ In the rural Pacific Northwest, the physical environment is both a separate and highly inter-related component of where and how people live. The prevalence of federally owned lands has attracted a great deal of migrants, and for “newcomers in the rural West, the value of these public lands is related to protecting and preserving them.”⁷⁴

3.3.3. Energy Security, Climate Change and the Drive for non-fossil Fuel Energy

In his 2006 State of the Union address, then President George Bush stated “America is addicted to oil.” In fact, America is addicted to energy in general. With only 5% of the world’s total population, the US consumes 25% of the world’s annual energy supply.⁷⁵ Oil accounts for virtually all of the energy used for transportation in America. The dependence on oil, its cost, and known consequences of its use, have spurred a search for alternative energy sources.

71 Gundars Rudzitis, “Amenities Increasingly Draw People to the Rural West”, published in *Rural Development Perspectives*, vol. 14, no. 2., p. 12.

72 ISAB, “Human Population Impacts on Columbia River Basin Fish and Wildlife”, p. 6.

73 ISAB, “Human Population Impacts on Columbia River Basin Fish and Wildlife”, p. 17.

74 Gundars Rudzitis, “Amenities Increasingly Draw People to the Rural West”, published in *Rural Development Perspectives*, vol. 14, no. 2., p. 12.

75 National Wildlife Federation, “Fuelling the Fire: Global Warming, Fossil Fuels and the Fish and Wildlife of the US West”, Oct 2006, p. 7.

Hydro power is considered by many to be a “green” energy source, one that does not emit toxins into the atmosphere nor deplete finite natural resources. Other clean, renewable energy sources such as sun, wind and biofuels are increasingly affordable and “have tremendous potential to diversify the region’s and nation’s energy portfolio.”⁷⁶ These alternatives currently have “potential” – they do not yet have the substantial output that is needed by energy users. Firm energy, such as that supplied by hydro-electric dams, is critical in buttressing the intermittent nature of energy from renewable resources. These emerging energy alternatives often lack the dispatchability needed to properly meet variable electricity demands.

The federal agencies in the Columbia Basin region used the river’s hydro-electricity supply as the foundation for development. As Oregon Journal editor Marshall Dana prophetically put it in 1934: “The Columbia is the miracle of a power stream, the divider of mountain ranges... the reclamer and energizer of an empire. Population follows power. Develop power and other growth will come.”⁷⁷ Energy continues to be the foundation of the region, and climate change continues to threaten water resources and hydroelectricity when demand is predicted to only increase.

According to research by the US Department of Energy, global warming could lead to more than 50% reduction in snowpack along coastal mountains between 2040-2060, along with increased likelihood of wintertime flooding and decreased summertime water supply in major river basins.⁷⁸ The resulting energy resources equation is complex. With global warming expected to contribute to even greater reductions in available water supplies across the region, competition among users will likely escalate, pitting the needs of regions against the needs of ecosystems. Energy and water are inextricably linked and vital to the region’s economic sectors. Providing abundant and clean sources of water depends on the availability of clean, inexpensive, and sustainable energy. Likewise, providing abundant and clean sources of energy depends on the availability of clean, inexpensive, and sustainable sources of water. The US energy-security goals cannot be reached without simultaneously addressing the use of water for generating energy (for emissions scrubbing and energy-resource production) and the use of energy for purifying, distributing, and treating water and wastewater. The most daunting task for the future will be managing this water/energy nexus while meeting the needs of the Basin.

3.3.4. Basin-wide Environmental Concerns & Salmon Recovery

As in the Canadian case, environmental concerns and values have exploded into the public sphere. They are now as important politically, legally and socially as any other value or interest in Columbia River Basin water management. Endangered salmon have become the focus of a contentious political debate.

The Northwest Power Act of 1980 legally entrenched a basin-wide initiative to “protect, mitigate and enhance” the fish and wildlife of the basin affected by the hydrosystem. The Act declared that the region’s energy future should be planned in a public process that would take into account the full environmental and economic costs of energy alternatives; emphasize energy conservation, renewable

76 National Wildlife Federation, “Fuelling the Fire: Global Warming, Fossil Fuels and the Fish and Wildlife of the US West”, p. 9.

77 William G. Robbins, “Nature’s Northwest” published in “The Great Northwest: The search for Regional Identity” Robbins, W.G. ed. (Oregon State University Press: 2001), p. 67.

78 “Mid-Century Effects of Climate Change on Water Resources in the Western United States,” available at http://www.ccs.ornl.gov/CCR/west_effects.pdf (accessed: September 4, 2008)

energy development and high efficiency generation; and include a program to offset the effects of the dams on salmon and other fish and wildlife populations. Frustration began to brew by the beginning of the 1990s when various approaches to salmon recovery failed to deliver desired results. Legislation and programs of the past 30 years have accumulated to result in a dynamic that pits water management to benefit salmon against water management for power, flood control, and irrigation. Efforts to benefit a certain population may, in some cases, serve to detriment another. The picture becomes increasingly complex when US salmon managers request system operations to improve conditions for listed and non-listed salmon and steelhead in the lower Columbia River. In some cases, these US requests may conflict with upriver (Canadian) management procedures to improve conditions for listed and non-listed resident fish in storage reservoirs and river reaches.

The Endangered Species Act has had a profound effect on Columbia River water management, playing a major role in the Basin's recovery activities and making substantial progress in coordinating disparate programs on the river. Its traditional focus on individual species may be a hinderance in the future as new thinking emerges regarding the complexities of ecosystem science. Further, the ESA has legal muscle, but also has the potential to drive the region's attention on individual, weak populations at the expense of many other populations and species.⁷⁹

To date, no issue has dominated system planning and operations within the US like the drive to find a way to improve conditions for important fish and wildlife species, like juvenile and adult salmon and steelhead that spawn, rear or migrate in and through the system. Changes to management structures almost always involve economic tradeoffs in improving the river system for fish and wildlife rehabilitation. The dialogue in the US surrounding the Basin ecosystem is centered around questions as to whether there is a better way to store or release water in the storage projects to improve habitat conditions for fish and other ecological interests; what the resulting effects might be on the other purposes; whether reducing generation to benefit fish (such as through spill) is worth more collectively to society than the corresponding reduction in downstream power benefits; and whether and how to decide what the right set of operations might be to balance these needs.⁸⁰ A consensus within the scientific community appears to be that in order for salmon and other endangered fish to benefit from the efforts made in the US, the river must be allowed to move back toward a more natural hydrograph. This would, however, go against the other system priorities of flood control, hydrogeneration and irrigation.

In a 1996 report, the Power Planning Council's Independent Scientific Group suggested that "the industrial river cannot work for salmon over the long run, even with the technological and other fixes we have devised over the last twenty years....[the choice] is between a more complex working river with healthy salmon populations and a simpler river without them."⁸¹ Although these concerns dominate the dialogue regarding Columbia River water management, and they provide the necessary impetus for change, they hold only limited authority when competing with needs of industry and direct consumption. The question for the future is not whether or not environmental concerns will be considered by water managers, but rather how they will be addressed.

79 John Volkman, "A River in Common", p. 149.

80 John Shurts, "Rethinking the Columbia River Treaty", p. 23.

81 John Volkman, "A River in Common", p. 150.

3.3.5. External Forces and their impact in the US Portion of the Columbia River

The Columbia River Basin is subject to an array of external forces that affect international water management. Climate change, international trade, and global and national economic crises impact the Basin in different ways. The matrix of competing and conflicting needs, demands, and desires of the multitude of stakeholders will likely become more complex.

Climate change may affect water resources across the Basin due to its temperature-sensitive hydrological cycle. As in the Canadian Columbia River Basin, even relatively modest temperature increases will likely cause substantial shifts in runoff patterns. Further, climate change may cause reduced winter snow accumulation, earlier peak snowmelt, higher winter runoff and higher evapotranspiration; and may lead to lower streamflows during the low precipitation months of summer and autumn, with consequences for managed water resources.⁸² The more populated arid regions in the southern and eastern portions of the Basin may be subject to more severe and prolonged drought conditions, and the northern and eastern portions may be subject to more severe and prolonged flooding.

The effects of international trade have resulted in modifications to the lower river and estuary as shipping developed to export and import materials and commodities from overseas and eastern states. International trade affects specific resource extraction industries of the Basin in different ways, increasing the demand, price, and production of some resources and decreasing others. For example, recent droughts in Australia's wine producing regions have increased prices of Columbia River Basin wine grapes and led to expanded acreage in these crops and increased irrigation. In contrast, competition from low cost production areas such as Mexico in the strawberry market have led to decreases in commercial production in the Columbia River Basin.⁸³ Market forces also affect the hydropower system in the Pacific Northwest, shifting incentives for power generating agencies to meet demands. Hydropower agencies supply a great deal of funding for fish and wildlife recovery programs. If their yearly revenues decrease due to market fluctuations, funding for these programs will also decrease. Similarly, when or if affordable energy alternatives emerge in the Basin, demands for hydropower may decrease, allowing for greater flexibility in planned river fluctuations. Additional sources of alternative energy first reduces the amount of carbon-based fuel used, and may cause unexpected changes in the value of hydropower.

82 Jeffrey T. Payne et al., "Mitigating the Effects of Climate Change on the Water Resources of the Columbia River Basin", p. 234.

83 Oregon Department of Agriculture, "2007 State of Oregon Agriculture", available at www.oregon.gov/ODA (accessed: August 20, 2008)

The Boundary Waters Treaty and other Relevant International Agreements

Canada and the United States share a border that runs 8882 km across the continent. Numerous water bodies intersect this border, and rivers run from one country to the other, and sometimes back again. Canada and the US have a long and remarkably congenial relationship spanning centuries, one marked by transparency, trust and equitable agreements. It was this amiable relationship that gave rise to numerous transboundary water agreements, the largest in scope being the Boundary Waters Treaty (BWT). The Boundary Waters Treaty was ratified in 1909, and produced the International Joint Commission (IJC). Although irritants have arisen, the relationship continues to foster innovative and effective approaches to the management of international water resources by the two countries. The background to western border water issues can be drawn by reference to 5 main themes:⁸⁴

- The prevailing climate of bilateral relations;
- The geopolitical realities established by the location of the border;
- The institutional arrangements which are in place for settling water and environmental conflicts;
- The particular role played by the International Joint Commission in the region; and
- The interrelationship of transboundary problems and the water management strategies adopted by western states and provinces.

The emergence of environmental problems, characterized by hydrological, atmospheric and terrestrial interrelationships, have important implications for existing arrangements in transboundary water management. Environmental disputes have become multi-faceted, largely due to the expanding scope of bilateral issues. In recent decades, a network of extra-diplomatic linkages overlying the formal machinery for cooperative water management has arisen, supplementing and paralleling the work of the IJC and consular relations between the two nations. In this way, provincial-state consultations on water resource matters foster cooperative transborder relationships through a better regional understanding of their views and interests; and NGOs have established a range of contacts, engaging interest groups on both sides of the border to join together in common causes (ex. the Skagit River-High Ross Dam controversy in the 1980s).

1.14 The Boundary Waters Treaty and the Columbia River Basin

Many of the legal invocations over Columbia River development occurred during the 1950s, prior to the signing of the Columbia River Treaty. The legal discussions were centered on interpretations of international water law, the BWT, and water use doctrines used in both countries. The rationale for the BWT was “to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending...involving the rights, obligations, or interests of either in relation to the other [US or Canada] or to the inhabitants of the other, along their common frontier.” The BWT created the International Joint Commission, an institution with a mixture of quasi-judicial, investigative, advisory, and monitoring roles. For most of its history, the IJC has acted largely in an approval and regulatory capacity. In the case of the Columbia River Basin, the IJC conducted a 15 year study to address the feasibility of hydrodevelopment which largely laid the basis for the Columbia River Treaty.

84 Barry Sadler, “The Western Transboundary Agenda,” in *Border Waters: U.S./Canada Transboundary Management, Proceedings of a conference Oct 1987*, published by 49th Parallel Institute for Canadian-US Relations

Western water law has historically proceeded on the assumption that natural commons should be reduced to establish individual exclusive property rights to the maximum extent feasible. In the US, water law started with a system of private property rights. Subsequently, systems of administrative allocation were superimposed over these property rights and the integration has not always been smooth or easy. Waters on, or crossing the common border, are allocated between the two countries according to principles of international law and existing bilateral institutions. To be successful, the allocation principles and enforcement mechanisms must be consistent to the maximum extent possible with the domestic water law of the two countries. Exclusive Resource Sovereignty is referred to as the ‘Harmon Doctrine’. Article II of the treaty gives both countries (or their political instrumentalities) “exclusive jurisdiction and control over the use and diversion... of all waters on its own side of the line.” The Boundary Waters Treaty stresses equality rather than equity despite the striking differences in population and economic power between Canada and the US.

The BWT served as the foundation document for resolution of water-related disputes between the two countries. By the middle of the 20th century it became apparent that the negotiators of the treaty could not have foreseen the new demands for water use or the changing public perceptions of water and its place in the growing concern for environmental quality.⁸⁵ However, the BWT is still considered to be a “living document” with components elastic enough to meet new and evolving challenges of modern international water management.⁸⁶

1.15 The International Joint Commission

The International Joint Commission (IJC) was created by the Boundary Waters Treaty. It consists of six commissioners who meet at least twice a year: three appointed by each country and staffed from agencies’ personnel as the demand arises. The IJC’s powers are categorized as judicial, investigative, administrative, and arbitral; of these, the first two have been widely employed, the third sparingly, and the fourth never. The IJC looks at requests for approvals for projects concerning bordering and cross-bordering water courses, and is also able to regulate the exploitation of hydraulic structures.⁸⁷ According to the BWT, the IJC must give its agreement to any project that could modify the level or the flow rate of the shared water (Articles 3 & 4). In this way, the IJC can carry out studies or consultations, and has the right to make recommendations at the request of the two governments. The effectiveness of the IJC has remained largely the same for the duration of its existence. The IJC has relatively little power in policing the actions of either state. The IJC’s positive attributes include an approach to problems independent of either government’s influence, adaptability and flexibility, and impartiality, along with fulfilling the roles of arbiter of fact, facilitator of consensus, and problem-solving facilitator.⁸⁸ As a facilitator of consensus, the IJC’s method of public involvement has been seen as efficient – if a party is not active in airing their grievances, the Commission proceeds to rule on an order, stating that the party was present but no issue was raised.

85 Muckleston, “International Management in the Columbia River System”, p. 26.

86 D. Le Marquand, “The International Joint Commission and Changing Canada-United States Boundary Relations” published in *Natural Resources Journal*, vol. 33, p. 90.

87 A.L. Roux, “Proposal for A Strategic Guide to Assist in the Constitution of International Inter-state Commissions for Shared Water Resources”, *Academie de l’Eau*, April 2002, p. 19.

88 Le Marquand, “The International Joint Commission and Changing Canada-United States Boundary Relations”

Ultimately, the role of the IJC is weakened by its being limited to an advisory body. Other weaknesses may include: dependence on the governments for secondment of technical personnel, as well as for budget and staff resources; being able to deal with international water use questions only after being assigned a “reference” by the governments; and the variable expertise of its commissioners as their appointments may reflect the vicissitudes of patronage.⁸⁹

The IJC has been involved in the Columbia River Basin for over 70 years. In 1938 the IJC created the Kootenay Lake Order, which requires an orderly draw down of Kootenay Lake in preparation for the spring runoff such that the elevation does not exceed a certain level. It formed a board, the International Columbia River Engineering Board to carry out a reference requested in 1944. In the 1980s, the IJC was used to help with the Skagit River (Ross Dam) Treaty of 1984, and later, in 1988, in producing a report with recommendations on the potential impacts of a large coal mine in BC in the Flathead Valley. In 2003, the CCRIFC (the Canadian Columbia River Inter-Tribal Fishery Commission) asked the IJC to make further “orders necessary to protect and indemnify the fisheries interests of the indigenous communities located along the Columbia River on the Canadian side of the border; specifically the CCRIFC [were] looking for orders to restore salmon to this stretch of the Columbia.”⁹⁰ The IJC rejected the CCRIFC’s argument. The role of the IJC in future transboundary water issues in the Columbia River Basin is hard to foresee as its role is largely dependant on the power vested in it by the respective governments. It continues to be a useful tool in approaching transboundary water issues from an objective perspective. However, it is often called upon only after an issue has arisen and positions of various parties have been decided.

1.16 The North American Free Trade Agreement and International Watercourses

Under the North American Free Trade Agreement (NAFTA), Canada and the US committed to cooperate in the conservation, protection and enhancement of transboundary resources. The Center for Strategic and International Studies (CSIS) conducted a study focused on examination of future scenarios based on current trends – this report included mention of continental water scarcity. In its report, CSIS stated that water scarcity will be a major issue in the future for arid regions experiencing population growth and increased demand for strained water resources. It also stated “juxtaposed to the relative scarcity of water in the US and Mexico, Canada possesses about 20% of the earth’s fresh water...[c]ognizant that water will become a strategic resource, Canada’s federal and provincial governments have undertaken measures to protect the nation’s water supply.” It goes on to state that because water availability, quality, and allocation are likely to “undergo profound changes between 2006 and 2025, policymakers will benefit from a more proactive approach to exploring different creative solutions beyond the current transboundary water management agreements that the US has reached with both Mexico and Canada... one such option could be regional agreements between Canada, the US, and Mexico on issues such as water consumption, water transfers, artificial diversions of fresh water.”⁹¹ This report is only speculative, but it taps into a prevalent fear in Canada.

89 Muckleston, “International Management in the Columbia River System”, p. 27.

90 Andrew Cage & Nigel Bankes, “Submissions by West Coast Environmental Law to the International Joint Commission in Regard to the Application of the Canadian Columbia Inter-Tribal Fisheries Commission concerning the Grand Coulee Dam”

91 Center for Strategic and International Studies, “North US Future 2025 Project”, available at http://www.canadians.org/water/documents/NA_Future_2025.pdf

It is widely held that Canada has an abundance of water. This misperception (both in Canada and abroad) has hindered water conservation efforts and led to excessive water use in areas where there may not be enough to supply the population. Water exports, whether in the form of extraction from Canadian aquifers to ship bottled water abroad, or bulk water diversions (whether real or potential), may be an issue in the future for the Columbia River Basin, where water allocation and supply is already a concern.

Conclusion

For millennia, peoples and cultures have interwoven the winding Columbia River into their societies, relying on its water, fish and the life it bestows upon the region. In the past two centuries the Columbia River Basin has undergone rapid changes. The Columbia has witnessed steady population growth, widespread industrialization and habitation on an unprecedented scale. International water and energy management sought to harness the power from the natural flow of the river so that both Canada and the US could each have an equitable share of the accrued benefits, and the risk of annual floods could be reduced. In the early attempts to manage the river, Canada and the US benefited in attaining large amounts of hydroelectricity, flood control and the irrigation of huge tracts of farmland. Early water management agreements fulfilled the needs of the region in providing means for large-scale development and equitable apportionment of the benefits of hydrodevelopment, and Canada and the US continue to benefit from the development that occurred on the Columbia River.

Water managers of the early and mid-twentieth century could not have foreseen the changes that the region would undergo, or the societal changes that would occur in the latter part of the century. As such, current transboundary water management in the Columbia River is faced with new and evolving demands of the present and future, while the river must continue to supply current demands outlined by international agreements of the recent past. Though mechanisms providing flexibility and adaptation in the river's international management do exist, issues and driving forces beyond the scope of these agreements have the potential to affect future water management.

Canada and the US created a cooperative framework in ratifying the Boundary Waters Treaty and subsequent international water treaties like the Columbia River Treaty. Techniques to manage international waters have been established. However, there are some who believe that current agreements and mechanisms may lack the capability to fully evolve in a way that incorporates the wide array of values, many of which are mutually exclusive, that are a reality in today's society.

The geography of the Columbia River Basin dictates that water will mean different things to different ecosystems and water users in almost every region. History has created multi-layered political structures on both sides of the border to deal with resources. Dislocation between initiatives across the Basin detracts from the immense potential capacity to address the wide array of issues at play within the Basin equally. This dislocation exists between federal, state, provincial, tribal, local, and NGO initiatives and jurisdictions. Overlaps and gaps prevent effectiveness in any remedial programs. In terms of international water management, institutional barriers are prevalent, barring the current structure from treating the Basin as a whole. Groups responding to current issues have similar needs, want very similar outcomes, but lack the ability to form a cohesive group to achieve these ends, to ensure the best of all possible outcomes for all parties involved. Modern governance structures have begun to adapt, especially with regards to water management (e.g. BC's Water Use Planning process). Recent decades have witnessed the inclusion of previously ignored groups, sectors and needs in water management structures.

1.17 Summary of Issues Affecting the Basin

The Columbia River cuts through a wide array of landscapes and cultures. Experiences and concerns in some portions of the Basin may not be important in other regions, or nonexistent in others. However, certain issues and driving forces affect the Basin on the whole:

- **Aboriginal Title and Rights** is an important priority for the First Nations living in the Columbia Basin.
- **Hydroelectric generation** has provided power for development and industrial growth within BC and the US Pacific Northwest. In the past, an abundance of hydropower in the region ensured that almost all growth was feasible and easy. That growth has occurred, and recent global events have reasserted the importance of hydropower as a central source of energy for the Pacific Northwest. Hydroelectric facilities, their reservoirs and dams, are a tenet of the region, a central tenet to life in the region, and are indispensable at a time when energy security, especially using renewable sources, is becoming a global issue.
- **Flood Control** is a fundamental issue that is currently being well addressed under the Columbia River Treaty. But if climate change continues along its trajectory, floods will potentially occur more frequently and more severely than in the past, and current infrastructure may not suffice in guarding human development of the region. Though the risk of floods was substantially reduced by the Treaty, flood control measures, now and in the future, remain an essential issue in transboundary water management.
- **Water Quality** is an issue for almost every user in the Columbia River Basin; whether they be human, fish, or wildlife. Good water quality is integral in all ecosystems and humans rely on it for sustenance. Water pollution from industry, urban development, and unregulated water use is a concern for safeguarding the water of the Basin for future generations.
- **Consumptive Use** is a Basin-wide issue. In places of abundance, people use huge amounts of water as a central part of their lifestyle. In regions with a great deal of agriculture, people have come to rely on water allotments guaranteed by water licenses of the past. Further development ensures an increased need for consumptive use of the river's water. In the arid regions, water is a preeminent necessity for human settlements and almost all industry, and serves as the backbone for existence there. Growth, population pressure, increased consumption and industrial expansion all demand vast water resources in an already strained river system.
- **Environmental concerns** have exploded into the public sphere in the past 50 years. The societal importance in guarding portions of the Basin from degradation caused by development, programs attempting to rehabilitate damaged portions, and the inclusion of these concerns into modern political decision-making are relatively recent phenomena. The rise of ecosystem science, stressing the interconnectedness of water in all ecosystems has contributed to the widespread understanding of environmental concerns. Issues concerning the Basin's environment can serve to unite disparate societal groups; NGOs and ENGOs can utilize national courts and international media to further their cause. It can also split them apart when different issues and different populations require mutually exclusive actions; or when different experts call for very different operations for the same populations. How and to what extent environmental concerns will be considered in future transboundary water management is difficult to predict, but any potential negotiations in the future will have to address environmental concerns in order to be socially and politically effective.

Glossary of Terms

- Anadromous Fish** - Fish, such as salmon or steelhead trout, which hatch in fresh water, migrate to and mature in the ocean, and return to fresh water as adults to spawn.
- Boundary Water** – defined in the Boundary Waters Treaty as the waters of lakes and rivers along which the US-Canada boundary passes. Rivers flowing across the boundary are generally considered to be ‘transboundary waters’ as opposed to ‘boundary waters’.
- Entities** – The government agencies organization that are responsible for implementation and operation of the CRT. BC Hydro is the Canadian Entity, BPA and the North Pacific Division of the USACE constitute the US Entity.
- Flood Control** – with respect to engineering, the technique of trying to control rivers with dams and other structures in order to manage the occurrence of, and damage caused by, floods.
- Freshet** – high spring and summer flows resulting from snow and ice melt in rivers located in northern latitudes.
- Gas Bubble Trauma** - Dissolved gas super-saturation can produce a variety of physiological signs which are harmful or fatal to fish and other aquatic and marine organisms.
- Gas supersaturation** - the overabundance of dissolved gases in water, such as downstream of a dam spillway, which can cause gas bubble trauma in fish.
- Glaciofluvial** - Glacier stream/river generated deposited regions, referring to the layers of sands and gravels laid down by glacial river action.
- Hydrology** - is the study of water in the natural or disturbed environment. Another definition is the condition of a defined/limited environment (for example, a watershed) at any particular point in time and place.
- Hydro-meteorological** – science involving the study and analysis of the inter relationships between the atmospheric and land phases of water as it moves through the hydrologic cycle.
- Hydropower:** Electric Energy and capacity produced by falling water. As used in the report, hydropower refers to energy generation and/or capacity (the ability to schedule in advance and rely on energy generation).
- Instream Flows** - the water left in a stream to maintain the existing aquatic resources and associated wildlife and riparian habitat.
- Resident Fish** - fish that do not migrate out to the ocean, but remain in freshwater; for example, rainbow trout are resident fish, steelhead are anadromous; other resident fish would include species like sturgeon, mountain whitefish, burbot, shiners and dace that do not go to sea.
- Transboundary River** – the waters of rivers flowing across a political boundary.

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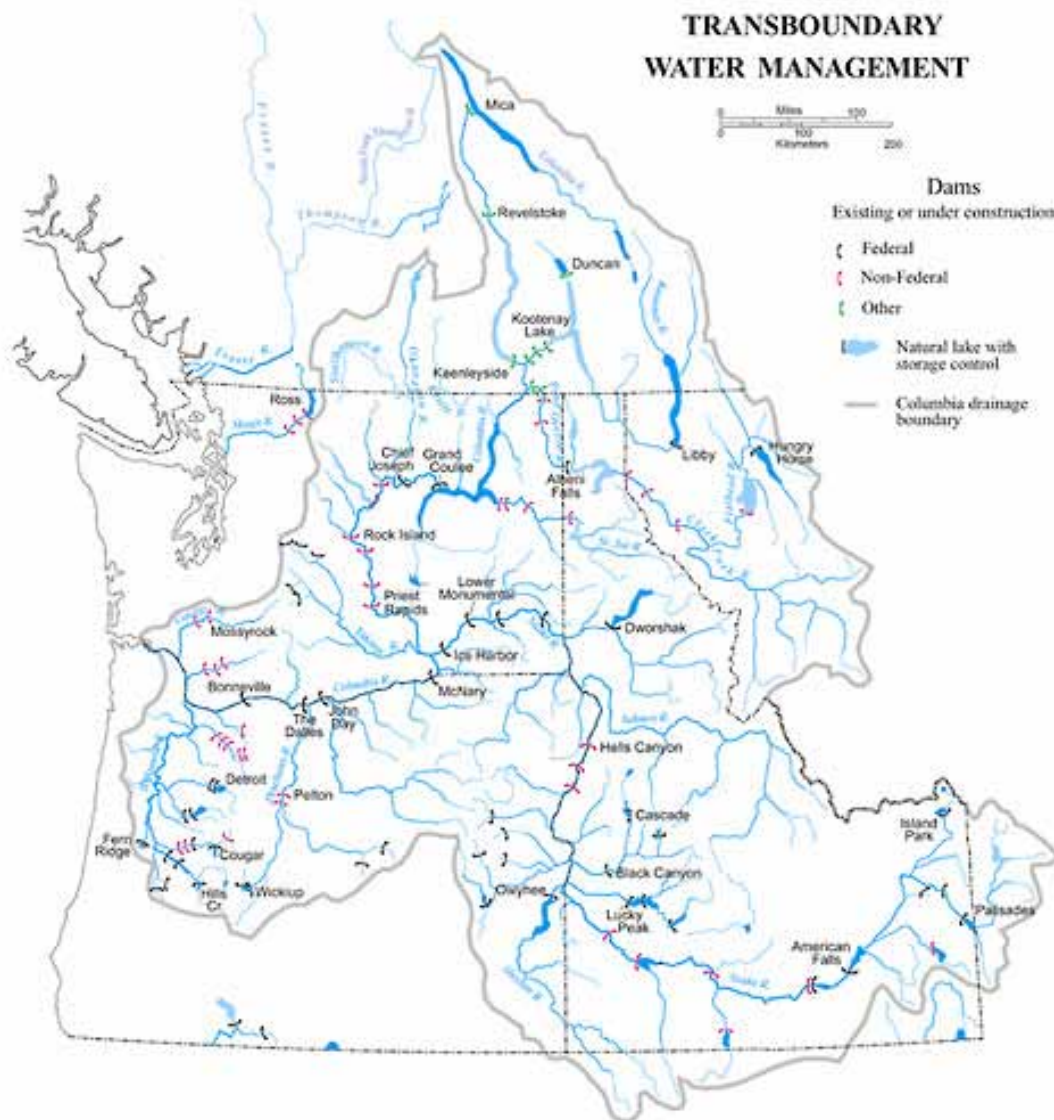
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Persons Interviewed

Name	Affiliation and organization
Tim Newton	BC member of the PEB to the Columbia River Treaty
Garry Merkel	Board Chair, Columbia Basin Trust
Aaron Wolf	Professor, Water Resources Policy, Oregon State University
Darcy Blais	Canadian Secretary, PEB
Chris Sanderson	Lawson Lundell
Karen Emond	Lawson Lundell
Kathryn Teneese	Ktunaxa Chief Negotiator
Daniel Millar	Water Issues, Environment Canada
Glenn Hearn	Senior Policy Analyst at EcoPlan International, PhD student UBC
Hans Schreier	Professor, Institute for Resources and Environment at UBC
Ronald Oszust	Town of Golden, CBT
Dean McKerracher	Mayor of Elkford
Rob Miller	Economic Development Manager, Golden Area Initiatives
Kindy Gosal	Water Initiatives, CBT
Les McLaren	Assistant Deputy Minister, EMPR
Jaye Ellis	Professor, Faculty of Law and School of Environment at McGill University
Nigel Bankes	Chair of Natural Resources, University of Calgary, Faculty of Law
Shelley Murphy	Executive Director, Electricity & Alternative Energy Division, EMPR
Bill Green	Director, Canadian Columbia Inter-tribal Fisheries Commission
Kelvin Ketchum	Canadian Chair of CRTOC, BC Hydro
Doug Robinson	Secretary, Canadian Entity, BC Hydro
Roger McLaughlin	Member of PEB Engineering Committee, Senior Policy Advisor for Provincial Government
Matt McKinney	Public Policy Research Institute, UMontana

Appendix A



Source: UNESCO website, “International River Basins of North America”
Available at: http://images.google.ca/imgres?imgurl=http://webworld.unesco.org/water/wwap/pccp/useful_links/maps/columbia.jpg (accessed: Oct 1, 2008)

Appendix B

Sections of the Canadian Constitution (1982) Relating to Water Resources	
Federal Constitutional Rights:	Provincial Constitutional Rights:
S.91(2) - The Regulation of Trade and Commerce	S.92(2) – Direct Taxation within the Province in order for the raising of Revenue for Provincial Purposes
S.91(3) - The Raising of money by any Mode or System of Taxation	S.92(5) – The Management and Sale of Public Lands belonging to the Province and of the Timber and Wood Thereon.
S.91(29) - Such Classes of Subjects as are expressly exempted in the Enumeration of the Classes of Subjects by this Act assigned exclusively to the Legislatures of the Provinces	S.92(13) – Property and Civil Rights in the Province
S.92(10)(a) – Works and Undertakings Connecting the Province with any other or others of the Provinces, or extending beyond the Limits of the Province.	S. 92 (16) – Generally all Matters of a merely local or private nature in the Province
S.92(10)(c) – Such Works as, although wholly situate within the Province, are before or after their Execution declared by the Parliament of Canada to be for the general Advantage of Canada or for the Advantage of two or more of the Provinces.	

Source: Nigel Bankes, C.D. Hunt & J.O. Saunders, “Energy and Natural Resources: the Canadian Constitutional Framework”, prepared for the “Royal Commission on the Economic Union and Development Prospects for Canada” Crown Copyright, 1984, p. 36.