The Fraser
A Canadian Heritage River

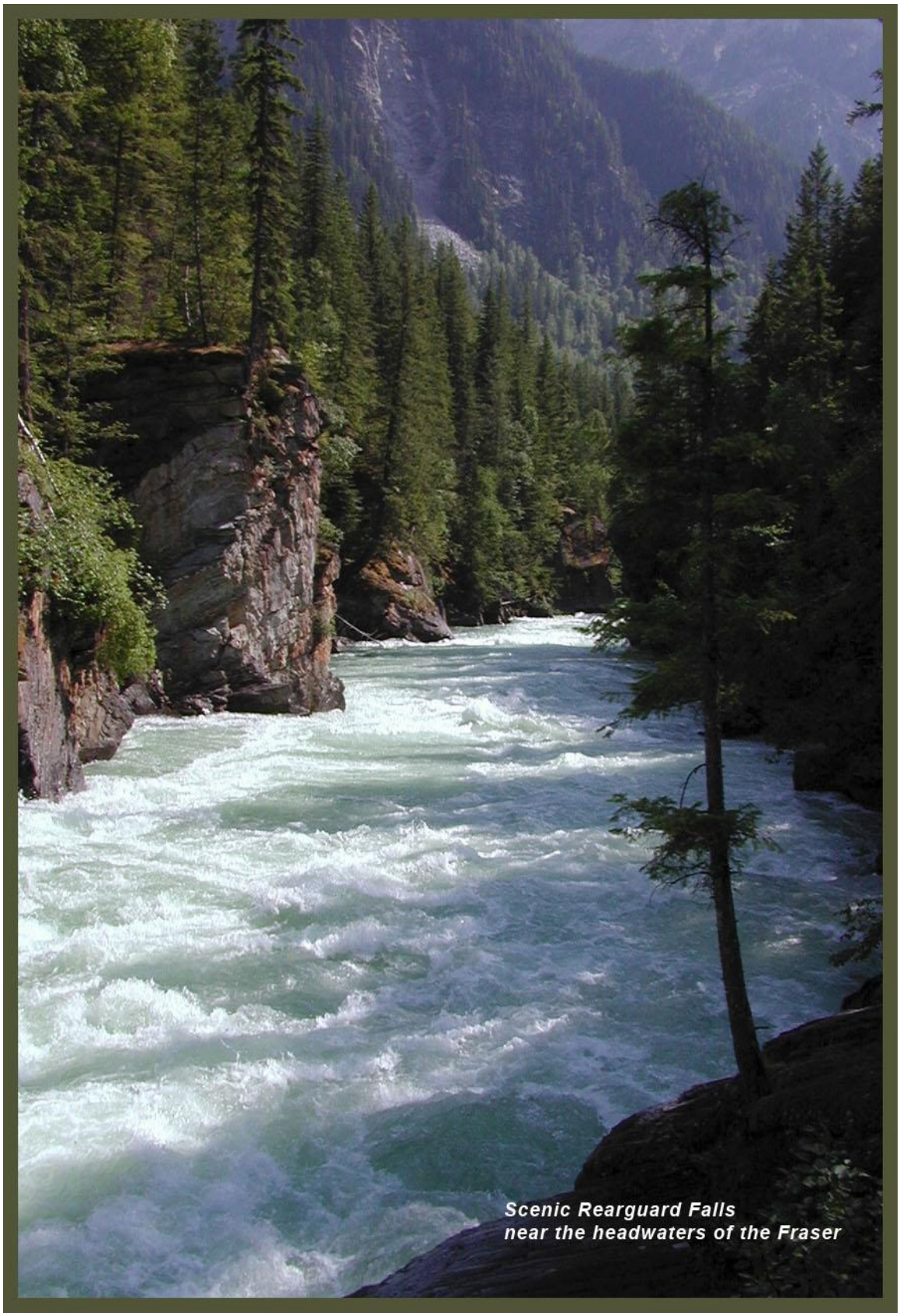
10-Year Monitoring Report (1998-2008)

March 31, 2010

Submitted to
The Canadian Heritage Rivers Board

Submitted by
The BC Ministry of Environment

Prepared by
The Fraser Basin Council
in collaboration with
The BC Ministry of Environment



Scenic Rearguard Falls
near the headwaters of the Fraser

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A river of diversity and contrast,
the Fraser flows through six
of the 10 ecoprovinces in BC

1.0 Executive Summary

Travelling 1,370 kilometres from its headwaters in the Rocky Mountains to its mouth at the Strait of Georgia, the Fraser River is the longest river in British Columbia. Renowned for its biological diversity and natural beauty, the Fraser drains more than a quarter of the province. The Fraser River Basin is now home to 2.73 million people or 67% of British Columbia's (BC) population. The main stem of the river was nominated as a Canadian Heritage River in 1997 and designated in 1998 in recognition of its exceptional natural, cultural, and recreational values.

Over the past 10 years, the key natural and cultural heritage values, and recreational values of the Fraser River that supported its Canadian Heritage River designation remain and are described in this report.

The Fraser River is somewhat vulnerable to the impacts of human population growth, habitat loss and degradation, pollution and invasive species, and to the overarching threat of climate change, which is projected to impact both water flow regimes and water temperatures. Climate change is also predicted to result in sea level rise with significant potential impacts to the ecosystem of the Fraser River estuary.

For the most part, the cultural and recreational heritage values of the Fraser River have remained intact since the time of designation in 1998. The most significant exception involves those cultural and recreational values related to fishing. Aboriginal, commercial and recreational fisheries have all been adversely impacts by declines in salmon stocks and corresponding reductions in harvest rates.

There are many activities that have positively contributed to the natural, cultural and recreational values of the Fraser over the past decade:

- Formal commitments to Greenhouse Gas reductions to mitigate climate change impacts (BC's Climate Action Plan);
- Provincial introduction of a Living Water Smart Plan, and a provincial commitment to better protect groundwater in BC – important for the health of freshwater systems;
- Work of the Fraser Basin Council to advance sustainability in the Basin and encourage collaborative solutions among authorities and interested parties across sectors;
- Investment of time and resources through the Fraser Salmon and Watersheds Program, focusing on fisheries management, habitat improvement, watershed governance and public education and engagement;
- International recognition of key ecosystems features in BC, in particular for migrating shorebirds and waterfowl of the Fraser River delta;
- An invasive plant strategy for BC, and management plans that are underway in many communities;
- Species recovery plans;

- Opening of the Fraser River Discovery Centre to educate the public on the importance of the Fraser as a living, working river;
- Opportunities for the public to experience natural and cultural heritage on the Fraser, existing historic sites and museums and new and pre-existing parks;
- Growth of BC's tourism sector, including the Aboriginal tourism sector and activities on the Fraser;
- Steps towards recognition of Aboriginal rights and title through treaties and other means, various partnerships and co-management agreements and leadership in economic sectors; and,
- Leadership by watershed stewards and advocates.

In the context of this report, it is also timely to flag the challenges ahead for the Fraser. While Canada is blessed with 7% of the world's freshwater, its rivers are not immune to the pressures on freshwater ecosystems worldwide. The Fraser River is vulnerable to the impacts of human population growth, habitat loss and degradation, pollution and invasive species, and to the overarching threat of climate change, which impacts water flow regimes and temperatures.

It is timely to recognize the importance of quality data, monitoring and information-sharing in the management of watersheds and water resources. Because responsibility for the management of the Fraser River and its resources is shared across many agencies and organizations, the future of the river calls for collaboration among all orders of government (federal, provincial, local and First Nations), the private sector, non-profit organizations and the general public.

The collaborative management of the river would be improved through a more detailed and updated management plan involving various communities and organizations along the Fraser River. The Ministry of Environment will work with the Canadian Heritage Rivers Board to determine appropriate scheduling for drafting a revised management plan.

The Fraser River's current designation as a Canadian Heritage River has potential to raise public appreciation for Canadian rivers generally, and for the Fraser in particular. Perhaps most importantly, it is a fresh opportunity to encourage decision-makers and all those interested in the river's future to come together on current issues. Maintaining the Fraser River's designation as a Canadian Heritage River for its natural, cultural and recreational values over the long-term will demand a serious commitment, but one worth assuming. The river is worth it.

2.0 Introduction

In recognition of its exceptional natural and cultural heritage values, and recreational values, the main stem of the Fraser River was nominated as a Canadian Heritage River in 1997 and designated in 1998. The Canadian Heritage River System (CHRS) is a national river conservation program. A cooperative effort by the federal, provincial and territorial governments, the CHRS promotes river heritage conservation and encourages sustainable management through recognition of the country's outstanding rivers. The CHRS includes a responsibility to prepare a 10-year monitoring report to ensure that designated rivers continue to possess the remarkable heritage values for which they were originally nominated.

The Fraser River is the longest river in the CHRS, flowing 1,370 kilometres from source to sea, and is the largest river in British Columbia. Beginning in Mount Robson Provincial Park, the Fraser traverses alpine tundra, pine forests, grasslands, desert-like canyons, and old growth rainforest. It greets the Pacific Ocean in a fertile, lowland valley and an estuary that provides internationally recognized habitat and refueling areas for millions of shorebirds and waterfowl. While renowned for its biological diversity and natural beauty, the Fraser is also a working river that supports agriculture and industry. The Fraser River Basin is currently home to 2.73 million people or 67% of British Columbia's population. The river and its basin are also central to the history of BC's Aboriginal people and are home to about half of the 198 First Nations in BC.

The objectives of the Fraser 10-year monitoring report are to:

- Describe major changes in relation to the river over the past 10 years;
- Report on the current condition of heritage values for which the river was nominated and whether the river still possesses these values;
- Review CHRS integrity guidelines and determine if they are still being met; and,
- Determine the degree to which actions outlined in the management plan have been implemented.

The size and complexity of the Fraser River pose unique challenges for reporting on its Canadian Heritage River values. These values are diverse and widely distributed along the length of the river. Similarly, changes to the heritage values may be different at different points along the river. For example, a particular natural heritage value may have been enhanced in one or more locations but adversely impacted in other locations. The sheer size of the Fraser River also makes it difficult, within the scope of this reporting initiative, to assess in a comprehensive way the conditions of all heritage values along the entire length of the river over a 10-year period.

It should be noted that the nomination documents were prepared (1997) prior to the establishment of the current CHRS natural (2001) and cultural heritage values frameworks (2000). At the time of the Fraser River's nomination and designation, the overarching natural heritage, cultural heritage and recreational values of the Fraser River were described in a narrative fashion, with heritage examples identified, but without an exhaustive description.

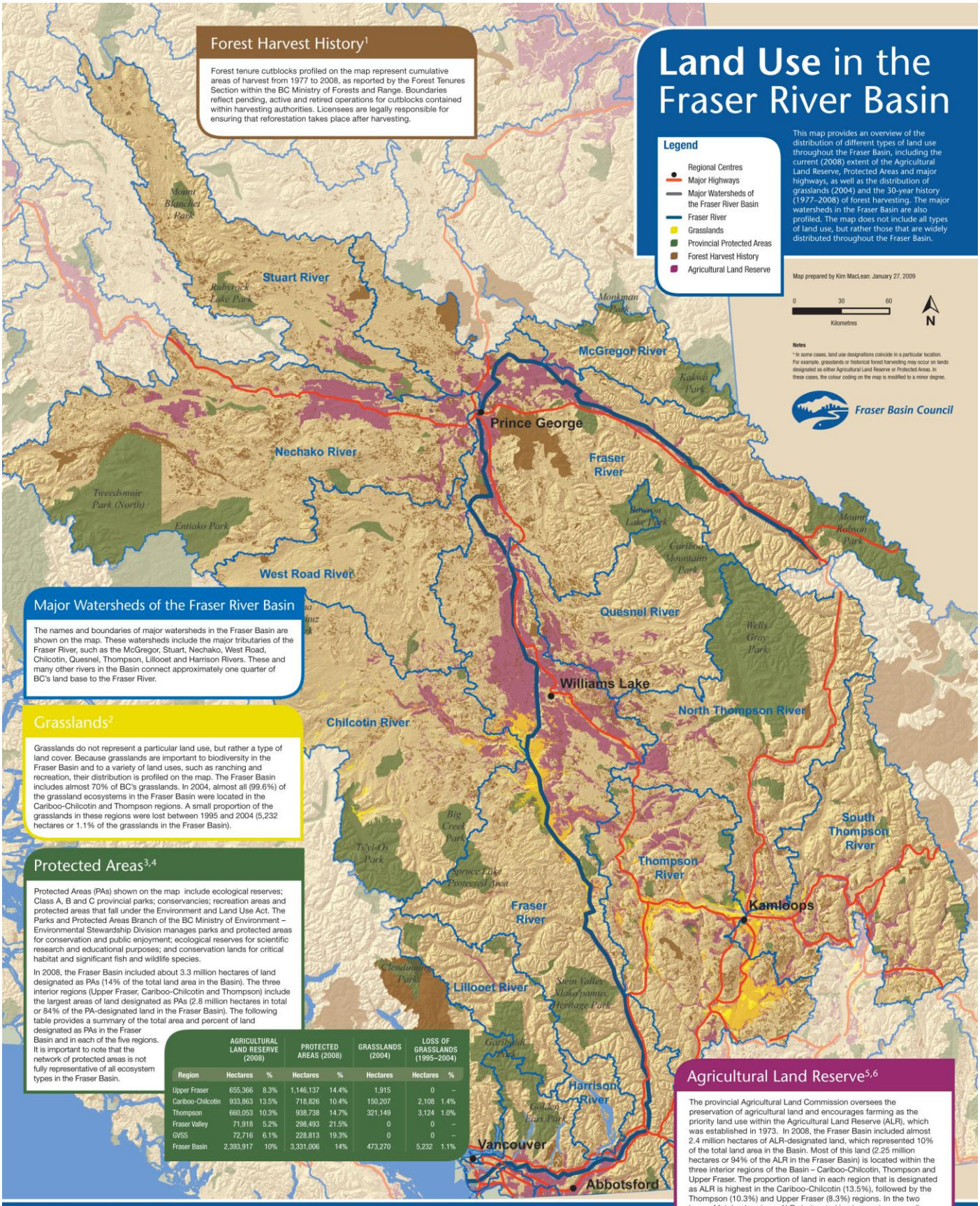
Within the CHRS natural heritage framework, characteristics for the Fraser River have been mapped onto the current natural heritage values framework, and this monitoring report follows and respects the descriptions as shown. The monitoring report similarly folds the Fraser's cultural heritage and recreational value descriptions into their respective CHRS frameworks.

This report should be treated as an overview of the Fraser River's key values that is based on readily available and accessible information. Since new activities, new studies, changes or threats to river values may emerge at any time – it is sensible to invite interested parties along the river to contribute to future monitoring reports by flagging developments of significance.

One additional observation may be helpful, particularly when using this document for planning. While this report is focused on the main stem of the Fraser River, the river's health is dependent on the health of its tributaries and all activities in the surrounding river basin. Those interested in a look at issues impacting the Fraser Basin and its communities may

wish to consult other resources, including *Sustainability Snapshot 4: The Many Faces of Sustainability*.

The *Snapshot 3* (2006) and *Snapshot 4* (2009) reports are referenced in some sections of this report. For convenience, a summary of highlights from *Snapshot 4* is included in the Appendix to this report. For a look at the full report, visit the Fraser Basin Council website at www.fraserbasin.bc.ca/publications/indicators.html or request a print copy.



Region	Agricultural Land Reserve (2008) Hectares	%	Protected Areas (2008) Hectares	%	Grasslands (2004) Hectares	Loss of Grasslands (1995–2004) Hectares	%
Upper Fraser	655,366	8.3%	1,146,137	14.4%	1,915	0	–
Cariboo-Chilcotin	933,863	13.5%	718,826	10.4%	150,207	2,108	1.4%
Thompson	660,053	10.3%	938,738	14.7%	321,149	3,124	1.0%
Fraser Valley	71,918	5.2%	298,493	21.5%	0	0	–
GVSS	72,716	6.1%	228,813	19.3%	0	0	–
Fraser Basin	2,393,917	10%	3,331,006	14%	473,270	5,232	1.1%

[1] Integrated Land Management Bureau. 2008. Forest Tenure Cut Block Polygons (FTA 4.0). Geographic Data Discovery Service. http://aardvark.gov.bc.ca/apps/metastar/home.do [accessed November 2008]. • [2] MacKenzie, I. 2008. Geo-spatial Coverages of Grasslands Change in BC (2004). Grasslands Conservation Council of BC. • [3] Ogbourne, C. 2008. Geo-spatial Coverages of Provincially Protected Areas in BC. BC Integrated Land Management Bureau. • [4] BC Ministry of Environment, BC Parks. 2008. Preserving Our Legacy. www.env.gov.bc.ca/bcparks/legacy.html [accessed November 2008]. • [5] BC Agricultural Land Commission. 20808. About the Agricultural Land Reserve. www.alc.gov.bc.ca/alr/alr_main.htm [accessed November 2008]. • [6] Integrated Land Management Bureau. 2008. Agricultural Land Reserve. Geographic Data Discovery Service. Land and Resource Data Warehouse. http://aardvark.gov.bc.ca/apps/metastar/home.do [accessed November 2008].

3.0 Background

From its headwaters in the Rocky Mountains upstream from Prince George, the Fraser River flows through a broad trench bordered by mountains. From Prince George to Lytton, the river winds along the rolling hills and flatlands of the interior plateau. On its way to Hope, it passes through the Coast Mountains and the magnificent Fraser Canyon. From Hope, it flows through the fertile Fraser Valley to the cities of Vancouver, Delta and Richmond and the Fraser River estuary where it enters the Strait of Georgia and the Pacific Ocean.

The river flows through diverse landscapes on its 1,370 km course, including six of the 10 eco-provinces within British Columbia and 7 of 16 biogeoclimatic zones. The Fraser River supports freshwater, estuarine and marine ecosystems that provide habitat for a rich variety of fish, wildlife and plant species. It is Canada's most productive salmon river, and one of the most important in the world. All five species of Pacific salmon (genus *Oncorhynchus)* make their return journey up the Fraser and its tributaries to spawn and rear: sockeye, coho, chum, chinook and pink, along with steelhead of the same genus, which is a sea-run form of cutthroat trout.

The Fraser River and its basin support a range of economic activities, including forestry, fishing, mining, manufacturing, agriculture, tourism and recreation. Abundant resources along the Fraser's length have always made the river an attractive place to live. First Nations have lived along the river for thousands of years, establishing distinct histories, languages and cultures. The Fraser also played key roles in the post-contact historical events, such as the Fur Trade and Gold Rush eras and the construction of a major transportation corridor linking the west with the rest of Canada. Today, the river and its tributaries continue to function as important transportation corridors within the Fraser Basin and BC. The river corridor also facilitates international transportation by linking national rail lines, highways and a marine port, providing a gateway to the larger Asia-Pacific region.

In September 1995, the BC Heritage Rivers Board (BCHRB) recommended to the provincial government that the Fraser River be nominated to the national program. Not only would the Fraser increase representation of Western Canada in the CHRS, the river was also the greatest contribution the province could make to the system in terms of river size, natural beauty, biophysical diversity, recreational opportunities, and historical and contemporary significance. Because of the large number of tributaries and the extensive area of land covered by the drainage system, only the main stem of the river was recommended for nomination.

To demonstrate strong public support for the nomination, the Fraser Basin Management Program (FBMP), the predecessor of the Fraser Basin Council, consulted with government and non-governmental stakeholders, including federal and provincial agencies, municipalities, First Nations, and individuals. The FBMP's summary report confirmed that the Fraser's nomination was well supported. The Ministry of Environment, Lands and Parks prepared a background report and nomination document establishing the rationale for the river's nomination on the basis of all three CHRS heritage categories and most of its integrity guidelines. The nomination was formally accepted by the CHR Board in January 1997 and the formal designation was made in 1998. A management plan was written the following year describing the collaborative partnerships and principles that would be key to future management of the Fraser River.

The Fraser Basin Council (FBC) was established in 1997. The Council brings together on its board representatives of the four orders of government (federal, provincial, local and First Nations) together with the private and non-profit sectors. The Council is not a river management authority, but a charitable non-profit organization devoted to advancing social, economic, and environmental sustainability in the Fraser Basin and beyond. Recognizing that today's sustainability issues involve many organizations, FBC helps others work together in collaboration. Over the past 10 years, the Council has partnered on many initiatives, including those that impact on the health of the river and the basin, including climate change, sustainable fish and fisheries initiatives, an invasive plant strategy and numerous regional and local initiatives.

The main lesson that emerges from successful initiatives to safeguard and enhance the Fraser River is that working together is essential. The Fraser River belongs to all of us, and we have a shared responsibility to pass a healthy river legacy to future generations.

4.0 Methodology

Within the scope of this project, the following approach was used to gain information about activities and changes on the Fraser River since its designation:

- Review of the Fraser River CHRS nomination and designation documents to clarify relevant river values and integrity guidelines;
- Review of the Fraser River plan to manage its natural, cultural and recreational values;
- Review of the CHRS natural and cultural heritage values frameworks;
- Review of the best available quantitative data, including data from the Fraser Basin Council's *State of the Fraser Basin: Sustainability* Snapshot reports; and,
- Literature review of periodicals, media sources, website sources from academic, government and non-profit organizations.

5.0 Chronology of Events

Table 1 lists specific events, actions, research and studies that have occurred on the Fraser River since its nomination in 1997 and designation in 1998. General observations and developments that cannot be dated are included in the appropriate sections of the report.

Table 1: Chronology of Events for the Fraser River since 1997

1997	Fraser Basin Council is established (succeeding the Fraser Basin Management Program). The Fraser River Sturgeon Conservation Society (FRSCS) is founded to conserve and restore white sturgeon in the Fraser. The Annacis Island Wastewater Treatment Plant, the largest of the five facilities operated by Metro Vancouver, was upgraded from primary to secondary treatment in 1997. Others in the region (Lions Gate and Iona) still offer primary treatment.
1998	BC Ministry of Environment, Lands and Parks Report – *Environmental Trends in BC.* This report includes different kinds of environmental data and trend analysis across BC, some of which is relevant to the Fraser River and/or Fraser Basin.
1999	The Garry Oak Ecosystems Recovery Team (GOERT) is formed.
2000	BC Ministry of Environment, Lands and Parks Report – *Environmental Trends in BC* Fin Donnelly, local river advocate, swims the Fraser River for a second time (the first being in 1995) to raise awareness of the river's values and threats to its health.
2001	The Fraser River estuary is designated an Important Bird Area. The Fraser River Discovery Centre opens a preview centre on the historic New Westminster waterfront. The mountain pine beetle outbreak begins in the Fraser River Basin; a reflection of a changing climate.
2002	The Second Sunday in June is declared Canada's national Rivers Day, supported by CHRB and inspired by BC Rivers Day. BC Ministry of Water, Land and Air Protection Report – *Environmental Trends in BC*

2003	In response to population declines, the Fraser River white sturgeon is reclassified from "special concern" to "endangered" in COSEWIC listings. The Fraser River Estuary Management Program updates its Estuary Management Plan, reflecting new laws, plans, and policies. Fraser Basin Council – State of the Fraser Basin Conference and *Sustainability Snapshot – State of the Fraser Basin Report*
2004	A federal-provincial agreement is reached on lower Fraser River gravel removals. Fraser Basin Council – State of the Fraser Basin Conference and *Sustainability Snapshot 2 – State of the Fraser Basin Report*
2005	The Fraser River Estuary joins the Western Hemisphere Shorebird Reserve Network. World Rivers Day begins on the last Sunday in September, inspired by BC's Rivers Day. The international event has been endorsed by the United Nations, complementary to its "Water for Life Decade". Source: http://commons.bcit.ca/riversinstitute. The Fraser Salmon and Watersheds Program begins, with a combined federal-provincial funding commitment of $20 million over five years to improve fisheries management, habitat, watershed governance and public engagement. Co-managed by the Fraser Basin Council and Pacific Salmon Foundation, with input from a broad cross-section of interests in fish management, fisheries and watershed health. See www.thinksalmon.com.
2006	The "Heart of the Fraser" conservation initiative (in the Mission to Hope gravel reach) is launched, a partnership that includes the BC Institute of Technology and the Nature Trust of BC. Canfor donates Harrison Knob (a parcel of land near the confluence of the Fraser and Harrison Rivers). The land will be managed by Scowlitz First Nation. This is the first of a dozen properties secured under the initiative (as of early 2010). Source: Nature Trust of BC press release September 18, 2006 and oral report. Fraser River Estuary Management Program – *Monitoring Report Update* BC Ministry of Water, Land and Air Protection report – *Alive and Inseparable – BC's Coastal Environment* Fraser Basin Council report – State of the Fraser Basin Conference and *Sustainability Snapshot 3 – State of the Fraser Basin Report Inspiring Action* Fraser Basin Council report – *Bridge Between Nations: A History of First Nations in the Fraser River Basin*
2007	BC Ministry of Water, Land and Air Protection Report – *Environmental Trends in BC*

	High flood risk in Fraser Basin during spring freshet. Simon Fraser's letters and journals are published in book form. BC Flood Protection Program announced in September 2007, including a 10-year program to support flood risk mitigation. BC Institute of Technology's "Explore the Fraser" website is launched http://commons.bcit.ca/explorethefraser/.
2008	200th Anniversary of Simon Fraser's expedition and 150th Anniversary of BC becoming a Crown Colony – celebrations focused on tourism and local community events. New Pathways to Gold Society (www.newpathwaystogold.ca) focused on economic development, heritage and reconciliation with First Nations. Other events were based on the "Rivermania" theme.
2009	State of the Fraser Basin Conference and *Sustainability Snapshot 4 – State of the Fraser Basin Report: The Many Faces of Sustainability* British Columbia Institute of Technology (Burnaby) establishes the Rivers Institute, with Mark Angelo becoming the first Rudy North Chair in River Ecology. The Institute works for the protection and restoration of waterways and coordinates World Rivers Day. World Wide Fund for Nature (WWF) issues report: *Canada's Rivers at Risk: Environmental Flows and Canada's Freshwater Future.* Province of BC launches "Experience the Fraser," a pilot project to enhance recreational riverside trails in Langley and Mission, with a vision to create trails all along the lower Fraser. The Golden Ears Bridge (Maple Ridge-Langley) opens and the Albion Ferry crossing is closed. The Trans-Canada Trail is rerouted across the bridge and along the south side of the Fraser River. A 3,600-year-old riverside First Nation village site is discovered during the Golden Ears bridge excavation, including evidence of wapato (an aquatic plant) cultivation from that period. The Tswwassen First Nation signs the first urban treaty in BC. This community is located at the mouth of the Fraser River. A federal commission of inquiry, led by BC Supreme Court Justice Cohen, begins work to look into the collapse of BC sockeye stocks. The Fraser River Discovery Centre opens a renovated, expanded facility in New Westminster. Port Metro Vancouver and Terminal Systems Inc. expand the existing container operations at the Deltaport container terminal at Roberts Bank, at the mouth of the Fraser River.


The Fraser Valley boasts rich, productive farmland
alongside growing urban centres

6.0 Fraser River Natural Heritage Values

6.1 Background

The Fraser River was designated as a Canadian Heritage River based on these natural heritage values:

- The geology and hydrology of the river provide outstanding examples of processes associated with the major glaciations in British Columbia. The glacial processes that formed the Fraser River and surrounding areas have determined much of the history of the province of British Columbia through their influence on topography and settlement

- The Lower Fraser River and delta provide remarkable examples of historic and ongoing fluvial and geomorphologic processes. These processes have a continuous influence on both the biotic and abiotic environments of the Lower Fraser River

- The Fraser River Canyon provides an excellent example of natural formations and features and demonstrates hydrologic processes by which powerful rivers can shape landscapes over time

- The Fraser River exhibits a wealth of wildlife values and contains along its course habitats of several rare or endangered species, particularly white sturgeon. The river is known internationally as a significant salmon-producing river and also supports an outstanding diversity of bird species that are of national and international importance.

6.2 Condition of Values since Designation

All of the above values remain on the Fraser River, and the natural integrity guidelines that begin on page 16 have been fulfilled, and the river merits ongoing recognition as a Canadian Heritage River.

Rivers are dynamic, and the landscape of the Fraser Basin is likewise ever-changing. Most impacts are significant over much longer periods of time than the timeframe for this 10-year monitoring report, as reflected in the stability of most features in the table below.

That said, it is important to highlight some impacts of climate change on the abiotic and biotic features of the Fraser River system.

Peak flows on the Fraser River and its tributaries are now occurring earlier in the year than 85 years ago. The Fraser is reaching half of its annual cumulative flow nine days earlier, on average, than a century ago. One study projects that in 2070-2099 the Fraser's peak flows will be smaller and occur 24 days earlier. Overall volumes are predicted to decrease only 5% in that time. Projections are that water temperature will increase and this could have serious implications for salmon, a keystone species of the Fraser River ecosystem.

Projections for sea level rise could also mean danger of flood, changes in the lower Fraser estuary, and consequent risks for the human populations and communities of the region.

Climate change and overall warmer temperatures across BC have also been significant in enabling the outbreak of the mountain pine beetle, which has impacted forests, hydrology and landscapes. The Fraser Basin, the largest watershed in BC, is the most affected watershed by the beetle, with an infested forest area of 7.7 million hectares (88% of the watershed) [Redding and Pike 2007]. From 1998 to 2006, an estimated 46% of the merchantable pine volume (MPV) on BC's timber harvesting land base was killed. It is currently estimated that the provincial peak in annual kill for this outbreak occurred during the summer of 2004, but the destructive trend will continue through to 2015 (76% MPV killed), and will taper off by 2019 (Fraser Basin Council, Sustainability Snapshot 4: The Many Faces of Sustainability, 2009).

The mountain pine beetle outbreak is expected to influence hydrology in the Fraser Basin until a healthy forest cover is restored. A loss of living tree cover due to mortality and salvage logging is likely to increase the frequency and magnitude of peak flows on tributary rivers, and also result in earlier peak flows. However, this is not likely to result in significant hydrological impacts on the Fraser because the areas most impacted by mountain pine beetle do not contribute a substantial proportion of Fraser River flows. Hydrological changes and associated impacts erosion and sediment transport are likely to have adverse impacts on fish and fish habitat such as scouring or siltation of spawning and rearing habitats, low summer flows and warm water temperatures.

The Fraser remains one of the most productive Pacific salmon rivers in the world, and the importance of salmon to the natural and human history of the region should not be underestimated. Salmon are an important food source for wildlife and people alike. Aboriginal people across the Fraser Basin and BC have relied on salmon for food and trade for 10,000 years, and salmon has been a significant economic contributor, both for sport fishing and for commercial fishing and processing. For all people of the Basin and across BC, salmon means more: it is a cultural icon.

Many different stocks across all five species of Pacific Salmon depend on the Fraser River – and many of these species and stocks are in decline. For example, total annual returns of sockeye salmon in 2007 and 2008 were the lowest observed in the past 30 years.

The marine survival of salmon has recently been a focus of concern, but the decline in salmon stocks has been attributed to multiple factors, including freshwater habitat where salmon rear and return to spawn. Factors include inadequate water flows and warm temperatures, mixed-stock fishing, habitat deterioration, pollution and habitat loss from agricultural use, industrial expansion and human population growth. Of course these pressures impact other aspects of the ecosystem, including vegetation, birds, other wildlife, and other fish species, notably sturgeon. White sturgeon remain endangered and conservation efforts continue.

In its 2007 report *Status of the White Sturgeon in the Lower Fraser River*, the Fraser River Conservation Society found that comparisons of population estimates before and after January 2003 strongly suggest a decrease in the overall population of the lower Fraser sturgeon. The greatest decreases were for sturgeon smaller than 100 cm fork length. The report identified the reduction in overall food availability, including all salmon species and Pacific eulachon, as a contributing factor to poor population recovery (Source: Fraser River Conservation Society 2007).

It is an important time in the history of the Fraser River to protect the health of the river and its estuary by preventing and mitigating human activities that lead to climate change and

otherwise may degrade the river's natural heritage values. Positive steps include: stewardship programs, and improved collaborative fisheries management, habitat enhancement, governance and public education (such as the Fraser Salmon and Watershed Program); fisheries conservation measures; the federal Wild Salmon Policy and a provincial Living Water Smart plan, including a provincial intent to better protect surface water and groundwater.

As noted earlier in this report, there is a challenge in assessing and maintaining the natural values in a river as diverse as the Fraser. It calls on people first to understand and respect these values, and then to work together to safeguard them for the future.

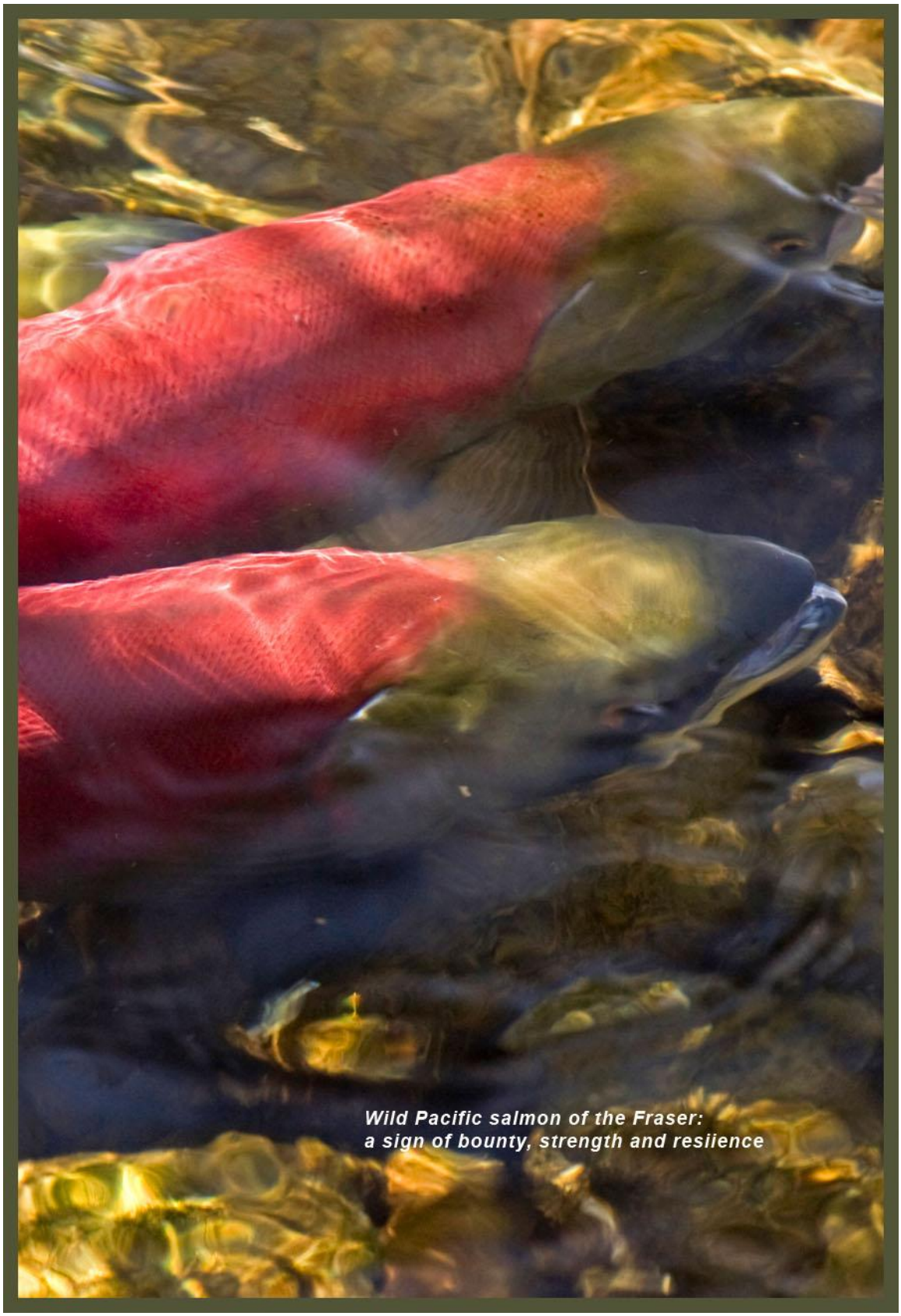

Wild Pacific salmon of the Fraser:
a sign of bounty, strength and resiience

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 1: HYDROLOGY			
Sub-theme 1.1 Drainage Basins.	Pacific Ocean Basin Stream Number 1.	A new study by researchers with Geographical Survey of Canada, University of BC and Simon Fraser University yielded an interesting finding – that the Fraser River once flowed north during Pleistoncene period, possibly as a tributary to the Peace River and draining into the Arctic Ocean. The Fraser later reversed course when glacial ice melt on the Interior Plateau greatly increased water flows and carved a new course to the Pacific. Source: Vancouver Sun.	None
Sub-theme 1.2 Seasonal Variation.	Period of highest flow is June (summer snowmelt); period of lowest flow is October-April.	A recent report by World Wildlife Fund Canada characterized the environmental flows of the Fraser River as “Good”. The Fraser is considered one of the less-impacted major rivers in North America from this perspective. The Fraser Basin system is considered moderately affected by fragmentation and flow regulation, due to damming of some major tributaries (e.g., Nechako, Bridge, and Stave Rivers). Source: Becky Swainson. 2009. Canada’s Rivers at Risk: The Status of Environmental Flows in Canada. Prepared for WWF-Canada. http://assets.wwf.ca/downloads/wwf_canadas_riversatrisk_technicalreport.pdf [accessed February 2010].	Peak flows on the Fraser River and its tributaries are now occurring earlier in the year than 85 years ago. The Fraser is reaching half of its annual cumulative flow nine days earlier, on average, than a century ago. One study projects that in 2070-2099 the Fraser’s peak flows will be lower and will occur 24 days earlier. Overall volumes may decrease by 5% in that time. Projections are that water temperature will increase and this could have serious implications for salmon.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
		Local watershed roundtables have been formed in some Fraser Basin communities to discuss water allocation issues in recognition that there are competing demands. BC's Living Water Smart Plan and *Water Act* Modernization aim to regulate groundwater use in priority areas and large groundwater withdrawals for protection of the resource.	Source: Abstract of *"Climate Change in the Fraser River watershed: flow and temperature projections"* Journal of Hydrology (2002): John Morrison, Michael Quick and Michael Foreman. http://www.pac.dfo-mpo.gc.ca/sci/OSAP/publ/online/HistoricalFlowsandTemperatures.pdf [Accessed February 2009] The mountain pine beetle outbreak is also expected to influence hydrology in the Fraser Basin until a healthy forest cover is restored. A loss of living tree cover due to mortality and salvage logging is likely to increase the frequency and magnitude of peak flows on tributary rivers and also result in earlier peak flows. However, this is not likely to result in significant hydrological impacts on the Fraser because the areas most impacted by mountain pine beetle do not contribute a substantial proportion of Fraser River flows.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 1.3 Water Content.	The Fraser River has a moderate 201-400 mg/l (10.1-20.0 JU) sediment load. The river has medium level (51-100 mg/l) of total dissolved solids in its middle stretch and high level (>100 mg) in its lower stretches. Source: CHRS framework document, drawn from Hydrological Atlas of Canada Map 28C: Turbidity of Surface Waters and from Map 28B Total Dissolved Solids of Surface Waters.	Data not available or accessible.	Unknown

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 1.4 River Size.	Major River of >800 m^3/sec: The Fraser's average annual flow at lowest measured point (Hope) is 2,720 m^3/sec. Source: Environment Canada website 2/2/10 as of 1999 data, extracted from national HDAT database. The length of the entire Fraser River is >1,000 km (1,356 km). It drains 232,300 square km (Can) and 800 (US): see note below.Source Natural Resources Canada website [accessed January 30, 2010].	None. See note above under seasonal variation.	None. See note above under seasonal variation.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 2: PHYSIOGRAPHY			
Sub-theme 2.1 Physiographic Regions.	Cordilleran Plateau/Mountains and West Coast Ranges Source: CHRS Framework for the Natural Values of Canadian Heritage Rivers (March, 2001), as drawn from Bostock's Physiographic Subdivision of Canada (1964).	None	None
Sub-theme 2.2 Geological Processes.	Sedimentation: laying of sedimentary rocks, sandstones, limestones, shales.	None	None

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 2.3 Hydrogeology.	Pervious bedrock, with surficial unconsolidated materials of both high porosity and low porosity clay and silt. Also impervious (igneous and metamorphic) bedrock with surficial unconsolidated materials of low porosity clay and silt.	None	None

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 2.4 Topography.	Moderate gradient (1-2 m/km). Height above sea level 0-400 m. Variation in gradient and height above sea level: ○ Shallow gradient <1m/km, with 0-400 metres above sea level ○ Moderate gradient 1-2 m/km at >1000 metres above sea level ○ Steep gradient >5m/km at >1000 metres above sea level Source: CHRS framework.	Numerous topographic surveys have been undertaken in different parts of the Fraser River Basin and along the river corridor using Light Detection And Ranging (LiDAR) technology and aerial photography. For example, LiDAR surveys were undertaken in 1999, 2004, 2005/06 and 2008/09 to support a variety of flood and river management initiatives as well as community land use planning and drainage studies.	None

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 3: RIVER MORPHOLOGY			
Sub-theme 3.1 Valley Types.	Both concave-walled and straight-walled valleys, with significant floodplain.	Data not available or accessible	None
Sub-theme 3.2 Channel Patterns.	Stream configuration is meandering.	Data not available or accessible	None
Sub-theme 3.3 Channel Profile.	Level water (flatwater) with insignificant gradient and level water (swift water) with regular shallow gradient with notable surges.	Data not available or accessible	None

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 3.4 Fluvial Landforms.	Depositional landforms: fans, deltas and braiding.		Sediment removals: ○ 1997: The Fraser River Estuary Management Program began calculating a sediment budget. The amount of sediment removed in this year was 1.83 million cubic meters less than the budget. ○ 2000: Cumulative amount of sediment removed between 1997 and 2000 was 2.66 million cubic meters less than the accumulative sediment budget. ○ 1998-2006: Amount of dredged sediment amounts to 67% of forecasted incoming sediment load, so dredging levels are considered to be sustainable. Source: Fraser River Estuary Management Program. 2006. A Living, Working River. www.bieapfremp.org/fremp/pdf_files/Monitoring Report FINAL_2006_MR.pdf [accessed February 2010]

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
			Subsidence at the Fraser Estuary: ○ Sediment loading is causing the Fraser delta to sink at rates of 1-2mm per year. ○ Due to dredging, construction of training walls and dikes, and large construction projects (e.g., ferry terminals, port facilities), sediments that would add to the surface of the delta are diverted into deeper water, increasing the natural subsidence rate to 2mm per year Source: Brian Bornhold. 2008. Projected sea level changes for British Columbia in the 21st Century. Prepared for the BC Ministry of Environment.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 4: BIOTIC ENVIRONMENTS			
Sub-theme 4.1 Aquatic Ecosystems.	Riverine systems: Lowland zone (region of sediment deposition; fine sediment substrate; stable discharges; and high species diversity) Estuarine systems: Subtidal zone (substrate is continually submerged) Wetland systems: Marshes (mineral wetlands or peatlands periodically flooded or inundated by standing or moving waters) Source: CHRS framework	The critical importance of the Fraser River estuary has resulted in extensive stewardship activities, river education and advocacy over the past 10 years. Examples include: ○ World Rivers Day (based on BC Rivers Day, engaging communities annually); ○ Establishment of the Fraser Basin Council; ○ Second swim of the Fraser River by Fin Donnelly to raise awareness; ○ Stewardship and educational work on the river, including that of numerous community-based and/or multi-stakeholder organizations; and, ○ Creation of new riverside parks and protected areas. 2001: The estuary is designated an Important Bird Area and is recognized as the most significant of all of Canada's 597 designated areas. Source: BC Nature Federation of BC Naturalists website. www.bcnature.ca/pages/stewardship_projects/IBA_milestones.html. [accessed February 2010]	A wide variety of land use activities have, over many years, resulted in damage and loss of stream habitats for salmonids and other fish throughout the Fraser Basin. This is particularly evident in the Lower Fraser region where agriculture and flood management practices have resulted in fragmentation and substantial loss of rearing habitats. Salmon habitats in the Interior Fraser (particularly the Thompson drainage) have also been heavily impacted by forestry and agriculture, as well as linear and hydroelectric development. Excessive water withdrawals in some watersheds are an impediment to recovery of salmon. In addition, some smaller, genetically unique sockeye stocks have been seriously impacted by habitat alterations since the early 1900s, including extinction (e.g., Coquitlam, Alouette sockeye). Salmon-rearing wetlands on the Fraser have also suffered substantial human-caused losses. These impacts have been

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
		2005: the estuary joins the Western Hemisphere Shorebird Reserve Network. Western Hemisphere Shorebird Reserve Network website www.whsrn.org [accessed February 2010]. 2007: The Fraser River Major Drainage Area is ranked as imperilled/vulnerable (L. Kremsater. 2007. Draft S Ranks and Surrogate G Ranks for BEC Zones and Draft S Ranks for Ecoprovinces and Major Drainage Areas of BC: Preliminary Rankings for Informing the Biodiversity Status Report and Action Plan. Biodiversity BC. Victoria, BC.)	cumulative and continue to outstrip habitat recovery measures. Source: Fraser Basin Council. 2006. *Sustainability Snapshot 3: Inspiring Action.* Since 2000, some unvegetated intertidal mudflats and sandflats have been converted to marsh habitat, resulting in habitat gains. Overall, loss has occurred in subtidal and intertidal mudflats. From 1986-2000:net gain of 9.2 hectares of productive habitat from compensation and enhancement projects[1] Sea level rise may have significant impacts to the estuary ecosystem.- It is predicted that, by 2100, sea level rise in Vancouver will be: • 0.04-0.18m based on extreme low estimate of global sea level rise • 0.20-0.33m based on mean estimate • 0.89-1.03 based on extreme high estimate[2]

[1] Source: Fraser River Estuary Management Program. 2006. A Living, Working River. www.bieapfremp.org/fremp/pdf_files/Monitoring Report FINAL _2006_MR.pdf. [Accessed February 2010]

[2] Source: Brian Bornhold. 2008. Projected sea level changes for British Columbia in the 21st Century. Prepared for the BC Ministry of Environment.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 4.2 Terrestrial. Ecosystems.	Ecozone: 4.9% is Pacific Maritime Source: CHRS framework (derived from 15 terrestrial ecozones developed by Environment Canada in 1986; these zones are sub-divided into 217 ecoregions that may be used for detailed descriptions of individual rivers based on length of rivers in each ecozone) Ecoprovinces: The Fraser River passes through the following 6 ecozones: Georgia Depression, Coast and Mountains, Southern Interior, Central Interior, Sub-	The Government of BC and the federal government collaborate in recovery planning for species and ecosystems at risk. Recovery planning is the process of identifying and facilitating the implementation of priority actions to ensure the survival and recovery of species and ecosystems at risk. Recovery planning generally involves the development of a recovery strategy and of one or more action plans. In 2004, there were 45 recovery teams in BC. As of March 2008, there were 72 recovery teams and recovery implementation groups. *Sources: Fraser Basin Council. 2004. Sustainability Snapshot 2.* Ministry of Environment, Environmental Stewardship Division website. www.env.gov.bc.ca/wld/documents/recovery/RcvryTeams_RIGs_BC.pdf. [accessed February 2010] 2008. Biodiversity BC. Taking Nature's Pulse: The Status of Biodiversity in BC.	Classification as Pacific Maritime Ecozone remains unchanged. Six of eight BC ecosystems that have been assessed as being "at risk" occur in the Fraser Basin. At risk ecosystems include grasslands, estuaries, wetlands, coastal Douglas-fir, Garry oak and cottonwood riparian ecosystems. Across BC, 49% of bunchgrass grasslands (which occur primarily in the Thompson and Cariboo-Chilcotin regions) and 21% of coastal Douglas-fir forests are listed as "globally imperilled" due to loss or degradation of habitat. Over 3.3 million ha of land in the Fraser Basin (14%) is designated as Protected Areas. The Upper Fraser region has the largest total area of protected land (1.15 million ha). The Fraser Valley has the highest proportion of land protected (21.5%), followed closely by the Greater Vancouver-Sea to Sky region (19.3%). Source: (Fraser Basin Council. 2009. *Sustainability Snapshot 4: The Many Faces of Sustainability)*

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
	boreal Interior, and Southern Interior Mountains Source: M.A. Austin and A. Eriksson. 2009. The Biodiversity Atlas of British Columbia. www.biodiversitybc.org/assets/Default/BBC_Biodiversity_Atlas.pdf. [accessed February 2010]		Forests and the Mountain Pine Beetle Outbreak – From 1981 to 2008, forested lands in BC were affected by the Mountain Pine Beetle infestation. The total area affected in 2008 was estimated as 13,500,000 ha. From 1998 to 2006, an estimated 46% of the merchantable pine volume (MPV) on BC's timber harvesting land base was killed with a projection that this will continue through to 2015 (76% MPV killed), and then will largely be over by 2019. From 2003 to 2007, 88–95% of the forested area infested annually in BC occurred in the Fraser Basin. Source: Fraser Basin Council. 2009. *Sustainability Snapshot 4: The Many Faces of Sustainability.*

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 5: VEGETATION			
Sub-theme 5.1 Significant Plant Communities.	Plant communities are influenced by the biogeoclimatic zones in the Fraser Basin, which include Coastal Western Hemlock, Interior Douglas Fir, Ponderosa Pine, Bunchgrass, Sub-Boreal Spruce and Coastal Douglas Fir. Among the significant plant communities of the Fraser, those mentioned in nomination materials are: Churn Creek grasslands, Garry Oak /Big-Leaf Maple-Wild Cherry: Source: CHRS framework		Six of eight BC ecosystems that have been assessed as being “at risk” occur in the Fraser Basin. At risk ecosystems include grasslands, estuaries, wetlands, coastal Douglas-fir, Garry oak and cottonwood riparian ecosystems. Source: Biodiversity BC.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 5.2 Rare Plant Species.	Garry Oak	The Garry Oak Ecosystems Recovery Team (GOERT) was formed in 1999 as a partnership of experts from all orders of government, including First Nations, non-governmental organizations, academic institutions, volunteers and consultants. The recovery team coordinates efforts to conserve and restore endangered Garry oak and associated ecosystems and species at risk that inhabit them. A recovery plan was created in 2002. Source: Garry Oak Ecosystems Recovery Team website. www.goert.ca/about_what_we_do.php. [accessed February 2010]	Habitat conversion by agricultural and urban uses poses the most serious threat to this species. Additional threats include habitat loss, fragmentation, invasion by exotic species and altered fire regimes.

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
THEME 6 FAUNA			
Sub-theme 6.1 Significant Animal Populations.	The lower Fraser contains internationally significant populations of resident and migratory waterfowl and shorebirds and inter-tidal life, and offers a vital staging area on the Pacific Flyway. The Fraser also supports internationally significant salmon runs.	According to a World Wildlife Fund technical report, ○ approximately one of every 10 vertebrate species in the Fraser Basin is "red-listed"; ○ The Fraser River supports 5 species of Pacific salmon, 30 species of other fish, and 87 more species in its estuary; ○ Fishing in the Fraser Basin is worth over $300 million per year; and, ○ The Fraser River delta supports the highest densities of wintering birds in Canada. Source: Becky Swainson. 2009. *Canada's Rivers at Risk: The Status of Environmental Flows in Canada*. Prepared for WWF-Canada. http://assets.wwf.ca/downloads/wwf_canadas_riversatrisk_technicalreport.pdf. [accessed February 2010] The Fraser Salmon and Watersheds Program aims to conserve and restore the diversity and abundance of salmon in the Fraser Basin. This multi-year program focuses on improved fisheries management, habitat, governance, and public education and engagement. It is jointly managed by the Fraser Basin Council and the Pacific Salmon Foundation, with federal and provincial funding. Projects are delivered throughout the Fraser Basin, including many led by First Nations: see www.thinksalmon.com.	While the Fraser continues to be one of the most productive Pacific salmon rivers internationally, many factors are contributing to the decline of salmon stocks, including mixed-stock fishing, poor ocean survival, habitat deterioration (including water quality and quantity), and, in some cases, inadequate information to support decision-making (Fraser Basin Council. 2009. *Sustainability Snapshot 4: The Many Faces of Sustainability)* The estuary is under pressure from agricultural and non-agricultural development. There is potential for water pollution from pesticides, and urban and industrial developments along the river and shipping in the Georgia Straight. An exotic eelgrass (*Zostera japonica*) was introduced to the area and poses a threat. Canadian Important Bird Areas database www.ibacanada.ca/site.jsp?siteID=BC017. [accessed February 2010].

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
			Sockeye Salmon (1980–2008): Total annual returns of sockeye salmon in 2007 and 2008 were the lowest observed in the past 30 years. Declines were worse than the expected cyclic lows, but escapements for some of the major summer-run stocks in 2005 and late-run stocks in 2006 were good, so there is some potential for better returns in 2009 and 2010. Annual sockeye management continues to be strongly influenced by measures to address pre-spawn mortality, high river temperatures and efforts to protect depleted stocks (e.g., Cultus and Sakinaw sockeye, interior coho, steelhead and some chinook stocks). **Coho Salmon (1980–2007):** Severe conservation concerns remain for interior Fraser coho. Harvest rates were reduced substantially in the late 1990s in response to declines in marine survival and the sharp drop in run size from 1993 to 1994. Interior Fraser coho returns were at record lows in 2006. Returns in 2007 improved but were still

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
			only 30% of the average for the 1980–1993 period. **Chinook Salmon (1986–2008)** Harvest rates for spring (Upper Fraser) stocks tend to be higher than for other Fraser chinook stocks and returns have been declining since their recent peak in 2003. Returns of summer-run stocks have increased substantially since 1995, likely as a result of reduced harvest rates introduced in the late 1990s to protect late-run sockeye and interior coho stocks. However, fall-run stocks returning to the lower Fraser declined substantially since their recent peak in 2003. Source: (Fraser Basin Council. 2009. *Sustainability Snapshot 4 The Many Faces of Sustainability)* Projections are that water temperature will increase and could have serious implications for salmon. Source: Abstract of “Climate Change in the Fraser River watershed: flow and temperature projections” Journal of Hydrology (2002): John Morrison, Michael Quick and Michael Foreman

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
Sub-theme 6.2 Rare Animal Species.	White sturgeon are the largest freshwater fish in North America, reaching more than 6 m and 600 kg in size and living for over 150 years. There are four “stock groups” of white sturgeon in the Fraser Basin: Nechako, Upper Fraser, Middle Fraser and Lower Fraser. White sturgeon spawn only in freshwater and are very dependent on the health of critical in-river habitats. They are a prized species for recreational anglers, particularly in the Lower and Middle Fraser.	1997: The Fraser River Sturgeon Conservation Society (FRSCS) is founded to conserve and restore wild white sturgeon in the Fraser. 1999: The FRSCS establishes a white sturgeon monitoring and assessment volunteer-driven program. 2003: In response to population declines, white sturgeon were reclassified from “special concern” to “endangered” in COSEWIC listings. 2004: Results of a 5-year study on the population and distribution of white sturgeon on the lower Fraser River is published. 2005: The Fraser River White Sturgeon Conservation Plan was developed to provide information on white sturgeon biology and conservation, identify information gaps, and set priorities for action by government and non-government organizations. 2006/2007/2008: The FRSCS publishes the Status of White Sturgeon in the Lower Fraser River reports, which reports on data summaries and population assessments from the monitoring and assessment program.	

Table 2: Fraser River Natural Heritage Values			
CHRS Natural Framework (2001) **Themes and Sub-Themes**	**Fraser River Natural Heritage Elements Description**	**Significant Actions, Research or Studies Since Designation**	**Changes or Threats to Nomination Value(s)**
		2008-2009: The FRSCS commissions a report aimed at developing a strategic plan for conservation and protection of the Matsqui Channel and Hatzic Eddy, which provide important feeding, rearing, and overwintering habitat for white sturgeon. Source: The information above on Fraser River white sturgeon can be found on various reports hosted at: www.fraserstургeon.com/about.html. [accessed February 2010].	

7.0 Fraser River Cultural Heritage Values

7.1 Background

The Fraser River was designated as a Canadian Heritage River based on cultural values for the following reasons:

- The river has made an important contribution to the development of British Columbia and Canada through its influence on such important events as the fur trade and settlement of the West, and on such important themes as riparian settlement and transportation.

- The Fraser River is strongly associated with the exploration of western Canada and such influential people as Simon Fraser for whom the river was later named. It is also directly associated with the formation of British Columbia, first as the Crown Colony of British Columbia and later as a Province of Canada.

- The banks of the Fraser are home to two nationally significant historic sites: Fort Langley, the site of the first permanent European settlement in British Columbia, and the Gulf of Georgia Cannery, an authentic fish processing plant located at the river's mouth.

- Hundreds of archeological and historical sites and features are known to exist along the banks of the Fraser. These sites contain artifacts and structures that represent some of the human heritage themes of the river, namely First Nations and European settlement and transportation.

7.2 Condition of Values since Designation

As described at the time of nomination, the Fraser River reflects many of the cultural heritage themes in the Cultural Heritage Framework – ranging from river resource harvesting, water transport and riparian settlement to culture and recreation.

The table below highlights these themes, confirms their status and offers an update on their connection to life today along the Fraser. The original nomination described cultural values in a narrative format. This monitoring report maps the narrative description onto the Cultural Heritage Framework that was developed in 2000.

To quote the framework document, the aim is "to classify the historic connections between rivers and human activity in Canada." This creates a challenge. The Fraser River is both very old in its cultural history of Aboriginal people (dating back 10,000 years), but relatively young (200 years) when considering subsequent settlement, in particular Europeans, who spurred growth in population, agriculture and industry. The river is very young (50 years) for those of many other cultures who live in the Fraser Basin today. While the focus of the framework and this monitoring report is on historical connections, it may be helpful to consider in future reports how more recent cultural heritage attributes of the river should be recognized.

Early history of the Fraser River region comes from the culture, traditions, art, traditional knowledge and oral histories of the Aboriginal people, along with archeological records and features in the landscape. European settlement, beginning in the early 1800s, brought great change. Of particular note, many Aboriginal communities were adversely affected or displaced by changes to ecosystems and food sources, by the introduction of a reserve system and by creation of a residential school system. Although not specifically identified in the original nomination materials, these profound changes in the lives of Aboriginal people impacted their culture, and ultimately the cultural heritage of the region.

Aboriginal people along the Fraser River have always relied on river resources. Archeological sites along the entire length of the river reveal more about early cultures, including village sites such as Xay:tem (Mission), the Great Fraser Midden (Marpole), transformer sites and other spiritual sites, petroglyphs and burial grounds. Interior peoples have had economies that included salmon, deer and plants, and those of the lower reaches of the river relied on fish, land and sea mammals, shellfish, berries and roots. There is recent confirmation of early agriculture (some 3,600 years ago) of arrowhead or wapato (a potato-like tuber grown along the lower Fraser estuary). Today, Aboriginal people continue to work to safeguard their language, culture and heritage and foster a renewed understanding of their values. Neither the original nomination nor this report can adequately describe the many heritage values of First Nations.

The Fraser River has been known by many names. For those of the lower Fraser it was "Stó:lō″ and they themselves carried this name as meaning "People of the River." As noted in the nomination, the first non-Aboriginal person explorer was Simon Fraser after whom the river was later named. His voyage in 1808 began at Fort George (now the City of Prince George) on behalf of the Northwest Company. His goal was to establish a new fur trade route to the mouth of the river (which he believed to be the Columbia River). Simon Fraser's canoe voyage took 35 days, navigating 900 km of challenging, sometimes treacherous waters. Fraser benefited from existing routes, such as riverside portages (including one through most of the Fraser Canyon) and through Hell's Gate, the narrowest gorge. The mission would not have been possible without the help of his voyageurs, his Aboriginal guides and the many Aboriginal communities along the way. 2008 marked the 200th anniversary of this remarkable journey, as well as the 150th anniversary of the Crown Colony of British Columbia. Fraser's journey was commemorated during several events across the province. A book of his letters and journals was made in 2007 and a biography followed in 2008: W Kaye Lamb (ed). *The Letters and Journals of Simon Fraser 1806-1808*. Toronto: Dundurn Press, 2007.

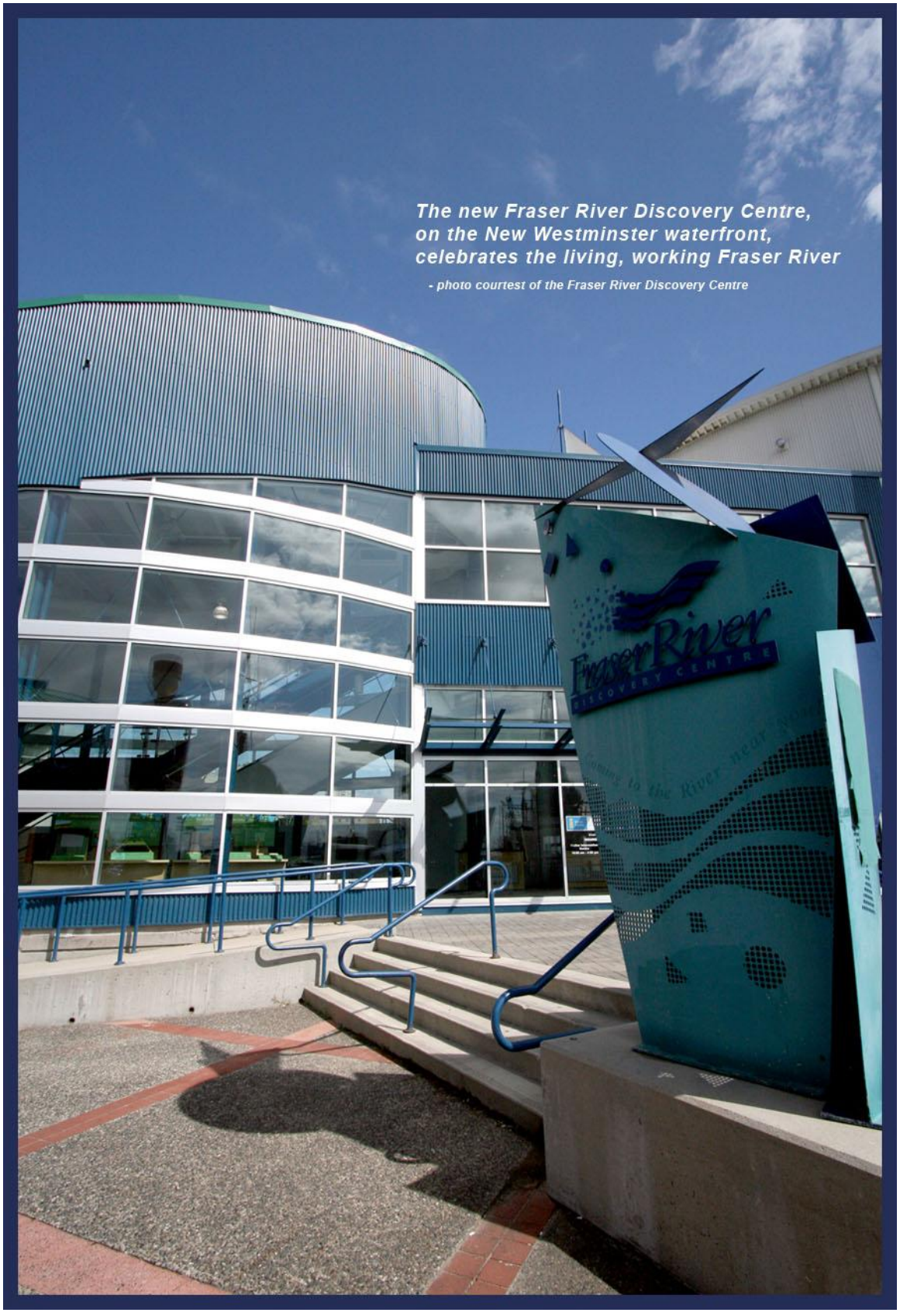
This early river route was the first of many developments in the 1800s. First came the fur trade. In the Fraser Valley the Hudson's Bay Company (HBC) built the first fur trading post on the Pacific coast (Fort Langley in 1827). After its closure, the buildings were renovated and the fort was designated a National Historic Site. Over the past 10 years, it has remained a popular attraction. Historic fur trade routes remain, including the 1840s HBC fur brigade trails out of the Fraser Canyon, which are being considered for restoration: www.hopemountain.org.

Fishing has been important on the Fraser River throughout its history. Today the cultural landscape includes traditional and current First Nations fishing sites (such as in the Fraser Canyon), historical fishing villages such as Steveston, Ladner and Finn Slough, the Gulf of Georgia Cannery (a national historic site) and various fishing artifacts in museums and

exhibits. Recent declines in salmon runs have had a significant impact on the First Nations, sport and commercial fisheries, and the future of the fishery remains a challenge.

The Gold Rush in the late 1850s brought an influx of gold prospectors, first to the Fraser Canyon and later to the Cariboo region. Steamboat travel began in this era, with boats running passengers and materials up the river to Yale, where travel by foot and/or horse resumed. The railroad later became the predominant means of transportation, followed by the TransCanada highway. The Fraser River remains central to these criss-crossing transportation routes. Travel on the water today is primarily for fishing, the commercial transport of logs and aggregate, port operations and for pleasure. Tourism on the river includes cultural and historical interpretation tours, including trips on a replica paddlewheeler, and opportunity to tour one of Canada's last sternwheelers.

There are a number of tours, self-guided walks, exhibits, signboards and museums that help people discover the richness of the Fraser River, its history and its cultural diversity. One of the most recent developments is the opening (2001) and reopening (2009) of the Fraser River Discovery Centre at the New Westminster Quay, in celebration of the living, working Fraser River. The Centre hosts exhibits and hands-on educational programs for schools and the public on the life, history and future of the Fraser River and its people.



The new Fraser River Discovery Centre, on the New Westminster waterfront, celebrates the living, working Fraser River

- photo courtest of the Fraser River Discovery Centre

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
1 RESOURCE HARVESTING			
Sub-theme 1.1 Fishing.	As noted in the nomination documents, fishing on the Fraser dates back thousands of years, supporting First Nations, a commercial sector and a recreational sector.	For a recent synopsis of different First Nations' traditional harvesting of fish, shellfish and other riverside goods for food, medicine and other uses, see www.aboriginalbc.com. For a look at plant harvesting, see also *Food Plants of Coastal First Peoples* (1995); *Food Plants of Interior First Peoples* (1997) and *Plant Technologies of First Peoples in British Columbia* (1998). Today's cultural landscape reflects the importance of fish and includes traditional First Nations' fishing sites (such as in the Fraser Canyon), historical fishing villages such as Steveston, Ladner and Finn Slough, the Gulf of Georgia Cannery (a national historic site) and various fishing artifacts in museums and exhibits. The new Fraser River Discovery Centre features a hands-on exhibit on building wooden boats, including construction of a Fraser River skiff to set gillnets, based on the 1860s bateaux style boats used by the Hudson's Bay Company.Data on recent Aboriginal, commercial and recreational harvesting of salmon stocks within the Fraser Basin are summarized in *Sustainability Snapshot 3: Inspiring Action* (Fraser Basin Council, 2006). Between 2005 and 2009 the Fraser Salmon and Watersheds Program, with federal and provincial funding, invested $12 million in 273 projects to support better fisheries management, habitat restoration and enhancement, governance and public education on watersheds. For projects, see www.thinksalmon.com. A key program focus is to encourage collaboration across sectors. A federal commission of inquiry has begun to look into the decline of BC sockeye stocks, led by BC Supreme Court Justice Cohen.	Pacific Salmon harvest rates have varied from year to year and across different fish species. However, total run size, catch and harvest rates have been consistently lower for Fraser River sockeye, coho and chinook when comparing data pre- and post-1998. *(See Natural Heritage Values section for detail)* Conservation measures necessary to protect salmon stocks have negatively impacted commercial and recreational sectors and also Aboriginal fishing for food, social and ceremonial use. There are also conservation measures in place for the red-listed white sturgeon, which is a "catch and release" recreational fishery.

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
Sub-theme 1.2 Shoreline Resource Harvesting (Aquatic plant and shellfish)	As noted in the nomination documents, Aboriginal harvesting of shorelines resources includes shellfish, game and plants.	See above note for information resources on traditional shoreline harvesting of aquatic plants and shellfish. Researchers have found the cultivation of foods dates back to ancient times in the region. During a 2007-08 excavation near the site of the new Golden Ears Bridge in Maple Ridge, the traditional territory of the Katzie First Nation, an Aboriginal village site was discovered. Cultivated wapato (*Sagittaria latifolia*) tubers, an aquatic potato-like plant, were found in a water garden and dated at 3,600 years, the oldest example of agriculture in the region: Source: "Ancient Harvest, " *Surrey Leader,* June 20, 2008.	There are no known threats that would affect this value. Although not noted in the original nomination documents, historic diking of the lower Fraser, along with population expansion, agriculture and industry have impacted and reduced the wetlands and riparian corridors available for wild harvesting.
Sub-theme 1.2 Shoreline Resource Harvesting (Furs/Minerals)	As described in the nomination material, the past 200 years on the Fraser saw a shift in focus: from trade in fur to gold.	Fort Langley, the first fur trading post on the Fraser, today remains a national historic site. Other riverside trading posts included Fort Hope and Fort George (later the City of Prince George and the site of a local museum). Today mineral extractions on the river are primarily for aggregate. The federal and provincial governments have agreed to allow targeted gravel extractions in the Fraser Valley for flood control and use of aggregate: see Natural Heritage Values. The Fraser River Estuary Management Program also sets sediment budgets for dredging in the lower Fraser, primarily for navigation.	There are no known threats to this value. Note that the benefits of aggregate extraction (flood control, aggregate use) may conflict with fish habitat in some areas, such that location, timing and technique of extraction are critical to mitigating harm.

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
Sub-theme 1.3 Extraction of Water.	Not described as a value at the time of designation.	Although not considered part of the cultural framework for the Fraser, water has been extracted on the Fraser River for many years for agricultural use, for crop irrigation and livestock watering, and in much more recent history for industry.	None. Today there are competing demands for water and in some cases there are water shortages in the Fraser Basin. BC's Living Water Smart program and *Water Act* modernization will be monitored to see how they address water allocations to protect flows for ecosystem values.
2 WATER TRANSPORT			
Sub-theme 2.1 Commercial transportation.	The Fraser River is a historically significant transportation corridor, instrumental in the development of British Columbia. As noted in the nomination documents, Fraser River waters and riverside trails have long been a navigable corridor	Water travel on the Fraser remains important, although most recent commercial water travel is the tugboat transport of logs and barges and movement of ships at the Fraser River Port. In 2008, the formerly separate Fraser River Port Authority, North Fraser Port Authority and Vancouver Port Authority merged to become Port Metro Vancouver. It is the fourth largest tonnage port and the most diversified port in North America. In 2010 the Port and TSI Terminal Systems Inc. expanded existing container operations at the Deltaport container terminal at Roberts Bank by adding a third berth and 20 hectares of container storage facilities. Source: Port Metro Vancouver website. www.portmetrovancouver.com [accessed February 2010] The prospect of short sea shipping in the lower Fraser River was	None.

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
	for Aboriginal peoples. In 1808 Simon Fraser and his crew travelled by canoe down from the current site of Prince George to the river's mouth in search of a trade route. The subsequent fur trade led to the establishment of several trading posts, including Fort Langley in 1827, and a new trail to the canyon and the interior Gold Rush. Road and rail routes also followed the river, supporting towns, resource development and agriculture.	raised by the former Fraser Port Authority, but there has been no public discussion of a specific project, or of benefits/ risks.	
Sub-theme 2.2 Transportation Services.	The importance of the Fraser River in facilitating travel and transportation services was noted	In more recent times, the historic passenger travel on sternwheelers has been replaced with cultural and recreational boat tours, including the opportunity to travel on a replica paddlewheeler, the MV Native: see subtheme 4.	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
	in the original nomination materials. The Fraser River Gold Rush of the 1850s in the lower Fraser and Fraser canyon introduced new forms of transportation to the river, including steam-powered sternwheelers. By the early 1900s, these boats travelled from McBride to Fort George carrying passengers, forest products and other materials.	The last working sternwheeler was a snagpuller (the Samson V), now owned by the City of New Westminster and available for public touring at the New Westminster Quay: http://www2.canada.com/newwestrecord/news/story.html?id=1a3dcf54-1e8a-4196-89ba-9b462211b11f	
Sub-theme 2.3 Exploration and Surveying.	Not described at time of designation.	The letters and journals of Simon Fraser were published in book form in 2007. A biography was published in 2008 in time for the 200-year commemoration of his trip down the Fraser River.	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
3 RIPARIAN SETTLEMENT			
Sub-theme 3.1 Siting of Dwellings.	Not described at time of designation.	Data not available or accessible.	None
Sub-theme 3.2 River-based Communities.	Generally described at time of nomination. The fur trade of the 1800s led to the establishment of trading routes along the river and riverside posts, such as Fort Langley, Fort Hope, Fort Yale and Fort George (now Prince George). The Gold Rush led to further settlements up the Fraser Canyon in the 1850s and into the Cariboo region in the 1860s, now the sites of modern BC communities. Many settlements were close to rivers on traditional sites	The Fraser River remains central to the lives of many British Columbia communities. Heritage features of riverside communities include road and rail travel routes, agricultural communities, early mills (Harrison Mills, now represented by historic Kilby Farm and Store), and Fraser Mills, now slated for development as a riverside living and business development. Fishing villages in the cultural landscape today include Steveston, Britannia Heritage Shipyard, and Finn Slough in Richmond. The river has been home to many First Nations communities for thousands of years. As noted in the nomination, one of the oldest known permanent settlements in BC is Xa:ytem, an Aboriginal village site near Mission dating back 4,000-7,000 years. Formally designated as a National Historic Site in 1992, Xa:ytem has been under management of the Sto:lo Heritage Trust Society since 2006. Source: www.xaytem.ca. Current First Nations settlements are a result of imposition of the reserve system. Modern treaties and other approaches are underway to address the title and rights of First Nations. In 2009, the Tswwassen First Nation signed the first urban treaty in BC. This community is located at the mouth of the Fraser River. In 2010, the Yale First Nation initialled a Final Agreement; a critical step towards completing the treaty process. There has been continued population growth in the population in	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
	(such as Fort George, which is the home of the Lheidli T'enneh). First Nations river communities were disrupted by European settlement and creation of Indian reserves Although not noted in the original nomination, the development in the lower Fraser floodplain became viable after dikes were built. The first dikes followed the great flood of 1894, and these were rebuilt after a second flood in 1948. Dikes help protect communities and infrastructure from flooding. Diking and development of the floodplain, however, has also resulted in the loss	most Fraser River communities, the highest concentration along the lower Fraser River, from 2.1 million in 1996 to 2.4 million in 2006. The face of the landscape and people are ever-changing.	

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
	of fish and habitat. The history of floods is documented in the 2006 publication *High Water: Living with the Fraser River Floods.*		
Sub-theme 3.3 River-influenced Transportation.	Generally described at the time of designation.	Today river crossings (rail, road and ferry) continue to link communities all along the river, and some historic crossings remain tourist attractions (original Alexandra bridge near Spuzzum, built 1864, rebuilt 1926). The Albion Ferry, which began service in 1957 between Langley and Maple Ridge, ceased operations in July, 2009, after the opening of the Golden Ears Bridge.	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
4 CULTURE AND RECREATION			
Sub-theme 4.1 Spiritual Associations.	Not described at the time of designation.	While features of spiritual sites were not specifically described in the nomination, there are many along the Fraser River. An example of Aboriginal spiritual places include Xa:ytem near Mission, the site of a Transformer Rock (Hatzic Rock). Also of historical interest from the Gold Rush era is St. John the Divine, near the river in Yale, one of BC's oldest churches, built in 1863.	None
Sub-theme 4.2 Cultural Expression.	Several features and sites of cultural expression were described in the nomination documents:	Here are some named (and new) examples of heritage sites: The Fraser River Discovery Centre connects communities in discovery and celebration of the living, working Fraser River. It hosts exhibits and runs hands-on educational programs for schools and the public on the life, history and future of the Fraser River and its people. Located at the New Westminster Quay, the Discovery Centre opened in 2001 as a Preview Centre and re-opened in 2009 after expanding from 5,000 square feet to 17,000 square feet: www.fraserriverdiscovery.org. The Gulf of Georgia Cannery is a National Historic Site of Canada that commemorates the development of the west coast fishing industry. The cannery is located in Steveston Village at the mouth of the Fraser River, once the largest commercial fishing port in Canada. *Source: Parks Canada website. www.pc.gc.ca/eng/lhn-nhs/bc/georgia/natcul.aspx. [accessed March 2010]* Fort Langley was the Hudson's Bay Company's first outpost on the West Coast. Established in 1827, it was built on the south	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
		bank of the Fraser approximately 56 kilometres from the river's mouth. The fort traded furs, salmon and cranberries with First Nations. Given its proximity to the Fraser, the settlement expanded into a regional depot and forwarding centre and eventually led to the creation of the colony of British Columbia. Fort Langley was declared a National Historic Site in 1955. *Source*: *Parks Canada website. www.pc.gc.ca/eng/lhn-nhs/bc/langley/natcul.aspx. [accessed March 2010]* The New Pathways to Gold Society is a new organization dedicated to promoting economic development, investment in heritage, and grassroots reconciliation with First Nations. The society held a 2007 Fraser River War Symposium in Lytton and a 2008 Centenary conference in Lytton, introduced an interactive guide on BC history, and conducted consultation with a broad spectrum of British Columbians on potential legacy projects that will encourage heritage education and provide local employment: www.newpathwaystogold.ca/index.aspx. Xats'ull Heritage Village (Williams Lake): A First Nations settlement where guests can stay overnight in a reconstructed pit house or tepee, with sweat lodge retreats, day tours of petroglyphs and artifacts dating back 4,000 years, storytelling workshops and discussions on traditional ways of life, Native arts and living off the land: www.xatsull.ca Sto:lo Artisan Centre (Chilliwack): With more than 70 Aboriginal artists represented, the Sto:lo Artisan Centre presents a diverse cultural mix and range of art forms, including masks, paddles, carved boxes, paintings, prints, Salish weavings, handmade silver jewellery, pottery, beadwork and Native music. In addition, the	

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
		centre hosts regular cultural events, such as dance performances and artist demonstrations: http://www.stolotourism.ca. Historic Village of Steveson, including Britannia Heritage Shipyards. Once a cannery, this facility began ship building and repairs in 1889, and the shipyard continued to 1917. Stilt houses and bunkhouses built on the river are featured, which were home to cannery workers and fishermen during this era. Source: Venture Vancouver website http://www.venturevancouver.com/.	
Sub-theme 4.3 Early Recreation.	Not described at time of designation.	NA	None

Table 3: Fraser River Cultural Heritage Values since Designation			
CHRS Cultural Framework (2000)	**Fraser River Cultural Heritage Value(s)**	**Significant Actions, Research or Studies**	**Changes or Threats to Nomination Value(s)**
5 JURISDICTIONAL USES			
Sub-theme 5.1 Conflicts and Military Associations.	Not described at time of designation.	NA	None
Sub-theme 5.2 Boundaries.	Not described at time of designation.	NA	None
Sub-theme 5.3 Environmental Regulation.	Not described at time of designation.	NA	Although jurisdictional issues were not described in the nomination materials, multiple authorities have influence over the river's values (federal and provincial legislators, local governments, diking authorities, port operations). These complex relationships require collaborative management of activities on the Fraser River.

8.0 Fraser River Recreational Values

8.1 Background

The Fraser River offers a wide array of exciting recreational adventures for people of all ages, ability and inclination. Residents and visitors alike can enjoy first-class river rafting, canoeing, kayaking and boating; superb angling for salmon, trout and sturgeon; wildlife viewing and birdwatching, including access to shorebirds and waterfowl from around the world in the Fraser River Estuary; picnicking and sightseeing in a tremendous network of national, provincial, regional and local parks on or near the Fraser's riverbanks; camping; walking, hiking or cycling trail systems of varying lengths; and participation in local interpretive programs that enhance appreciation of this Canadian Heritage River.

Note that, at the time of nomination and designation, there was no recreational values framework. The values described in the original nomination document have been incorporated into the 10-year monitoring report.

8.2 Condition of Values since Designation

Note that all recreational values described in the original nomination have been maintained on the Fraser River, and in many cases enhanced, with the addition of new parks and trails and the emergence of new cultural interpretation programs and opportunities.

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
1 BOATING				
1.1 Whitewater canoe, kayak and rafting	Whitewater opportunities exist on the Fraser	The Fraser is the most popular of BC's rivers for rafting trips, generating 31.6% of business: Source: Tourism BC in *British Columbia Outfitters Report 2005* (www.tourismbc.bc.ca) A 2009 Tourism BC survey of BC river outfitter clients showed that, for 50%, the river trip was the main reason for their travel to the region. 72% who chose the rafting trip were attracted by BC's scenic beauty and 88% said they were "very satisfied": with their experience: Source: Tourism BC (www.tourismbc.bc.ca). A noteworthy rafting endeavour was "Fraser River Journey: 200 years of discovery," a documentary film that follows a group of 12 Aboriginal youth from British Columbia on a raft trip down the Fraser, exploring the past, present and future of Aboriginal life in BC. Source: http://fraserriverjourney.ning.com/	There are multiple companies operating rafting trips on the Fraser. Opportunities include Class IV whitewater, such as in the Fraser Canyon north of Hope. Source: *Backroad Mapbooks*: Lower Mainland, Cariboo Chilcotin, Coast and Northern BC, 2nd Edition. For more information, contact the BC River Outfitters Association: www.bcroa.com.	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
1.2 Extended canoe tripping (motor and non-motor)	Canoe trip opportunities exist	2008 was the 200th anniversary of Simon Fraser's journey down the river, which was commemorated along with the 150th anniversary of the Crown Colony of British Columbia.	There are extended canoe trips in different sections of the Fraser. To travel the entire length of the river (all 1,356 km); however, is a challenging endeavour. One recent example of an extended trip is that of the Rivershed Society (an educational "Sustainable Living Leadership Program"), which takes young leaders from a location near the headwaters of the Fraser to the sea, to learn about river ecology and sustainability.	None
1.3 Day paddling and rowing	Day trip paddling opportunities exist		There are day paddling opportunities on the river, in the more placid or manageable stretches of water, including McBride, Prince George, Quesnel and the Fraser estuary. Tours exist, such as through the Hope Mountain Centre for Outdoor Learning (paddles from Chilliwack to Mission in the Fraser Valley) and Kaymaran Adventure Tours (Delta).	None
1.4 High speed boating	Not described at time of designation		High speed boating opportunities exist in many stretches of the Fraser.	None
1.5 Motorized pleasure cruising and houseboats	Not described at time of designation		Pleasure boating opportunities exist on the Fraser.	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
1.6 Commercial tourboats	Not specifically discussed at time of designation, but boating tour opportunities exist		Touring is a popular activity on the Fraser. Examples include: • Cariboo-Chilcotin Jetboat tours (west of Williams Lake) • Fraser River Safari (Mission) • MV Native Riverboat Paddlewheeler tours (New Westminster)	None
2 ANGLING				
2.1 Day angling (from urban centre)	Opportunities for angling (various types) exist	A look at data from the commercial fishery, aquaculture, fish processing and sport fishing sectors showed the greatest growth in aquaculture by 2005. This was the largest sector (by GDP), followed by the sport fishery. The sport fishery was the largest employer, offering 40% of all employment and also connected with other tourism-related benefits. Source: *BC's Fisheries and Aquaculture Sector, 2007*, BC Ministry of Environment.	Day angling opportunities exist in many sections of the Fraser from most urban centres. Examples include sand bar fishing in the lower Fraser, such as at Derby Reach, to fishing by canoe and other craft near Prince George. In British Columbia, nearly 900 lakes and streams are stocked annually with trout, char and kokanee produced from facilities operated by the Freshwater Fisheries Society of BC. The number of freshwater anglers has been in decline since the 1990s. Angler recruitment now includes a "Learn to Fish" program, which has introduced 40,000 youth and family members to the sport, and a 30% increase over 2005 levels is targeted. Source: Survey of Recreational Fishing in Canada. www.gofishbc.com.	Conservation restrictions on salmon stocks create challenges for the recreational fishery, along with competition from other recreational activities.
2.2 Weekend angling (from urban centre)	As above		As above	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
2.3 Extended angling vacation	As above		The Fraser River is a superb destination for angling vacations, and there are fishing lodges and guides throughout the Basin. A 2009 study for the Freshwater Fisheries Society of BC found that 270,000 freshwater anglers spend $480 million annually on equipment, travel, accommodation and hospitality services, involving 1,000 businesses and generating $125 million in tax revenues. Source: www.gofishbc.com	None
2.4 Fly fishing	No specific reference was made at time of designation		N/A	N/A
2.5 Ice fishing	Not described at time of designation		N/A	N/A
2.6 Specific fish species	Not described at time of designation		Sport fishing on the Fraser includes all species of salmon, steelhead, dolly varden, rainbow trout, bull trout, whitefish and white sturgeon (catch and release): Source: BC Ministry of Environment (www.env.gov.bc.ca/fw/fish/sport_fish)	Sport fishing for a given species is dependent on the health of stocks and on priority fisheries.

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
3 WATER CONTENT				
3.1 Swimming	Not described at time of designation		N/A	N/A
3.2 Water skiing	Not described at time of designation		N/A	N/A
3.3 Snorkelling/SCUBA diving	Not described at time of designation		N/A	N/A
4 WATER-ASSOCIATED ACTIVITIES				
4.1 Trail use (hiking, walking, cycling)	Trail use opportunities exist for hikers, walkers and cyclists		Walking, hiking and cycling are popular activities along the Fraser and surrounding region. Most communities of the Fraser have riverside access and related trails: from the Fraser River Nature Walk near the headwaters in Mt. Robson Provincial Park, to the historic Giscome-Portage Trail (tracing historic trader route of Lheidli T'enneh First Nations), to the many regional park and dike trails of the Fraser Valley and lower mainland. Some of the newer riverside walks include those at Surrey Bend and Brae Island and the Fraser River Walk in Vancouver. Many of these parks feature historic signboards and nature interpretation. The Fort-to-Fort Trail, linking historic Derby Reach (original site of Fort Langley) to the current	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
			National Historic Site of Fort Langley was completed in 2001. There are many guidebooks and parks programs to assist those in exploring the regions of the Fraser. In 2009 the BC Government announced $2.5 million for an interregional multi-use trail plan and a pilot project in the lower Fraser. One trail will connect the new Golden Ears Bridge to the Fort-to-Fort trail (see above). Another will feature a gathering place along the Mission waterfront. Source: Fraser Valley Regional District website: www.fvrd.org [accessed March, 2009]	
4.2 Camping	Camping opportunities exist near the river and surrounding area.		Both campground and wilderness camping are available throughout the Fraser Basin, including many locations on or near the river. Details on locations and facilities are available through BC Parks and local camping guidebooks.	None
4.3 Hunting	Hunting opportunities exist near the river and throughout the basin.		Conservation measures needed to protect some species have resulted in Limited Entry Hunts (random draws for licences): www.env.gov.bc.ca/fw/wildlife/hunting/news/ Participation in residential hunting has declined, leading to a hunter recruitment and retention strategy in BC: www.env.gov.bc.ca/fw/ds/docs/070607_HunterRecruitment-RetentionStrategy.pdf	None, although declines in participation have been noted.

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
5 WINTER ACTIVITIES				
5.1 Snowmobiling/dog sledding	Not discussed at time of designation		While these activities take place in the Fraser Basin, they are not specific to the river.	NA
5.2 Cross-country skiing (day use urban centre)	Not discussed at time of designation		While this activity takes place in the Fraser Basin, it is not specific to the river.	NA
5.3 Skating	Not discussed at time of designation		While this activity takes place in the Fraser Basin, it is not specific to the river.	NA
6 NATURAL HERITAGE APPRECIATION				
6.1 Wildlife	Wildlife viewing opportunities are available near the river throughout the Basin. Special note was made of animals in the Junction Sheep Range and birds of the Fraser estuary, including migratory species in the Pacific Flyway.		See table on natural heritage values, including animal species. It is estimated that a minimum of 1.5 million birds from 20 countries travel through the Fraser River delta each year. Activities to protect wildlife and wildlife viewing opportunities include national, provincial and regional parks and provincial protected areas. There are innovative stewardship programs, including the Delta Farmland and Wildlife Trust, which cooperates with local farmers to seed cover crops and set aside some grassland to benefit nesting birds, voles and raptors: www.deltafarmland.ca At the time of the Fraser's CHRS designation, 230 species of birds had been seen in the Reifel Bird Sanctuary, a preserve featuring 850 acres of	Habitat loss and ecosystem alternations (noted under Natural Heritage values) remain a concern.

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
			natural wetlands in Delta. By 2010, that number had increased to over 280 species. Source: www.reifelbirdsanctuary.com The Junction Sheep Range in the Chilcotin region is home to many birds, deer and an internationally significant population of California bighorn sheep.	
6.2 Vegetation	Generally described at time of nomination		Visitors can see great variety of vegetation along the Fraser River including Coastal Western Hemlock, Interior Douglas Fir, Ponderosa Pine, Bunchgrass, Sub-Boreal Spruce and Interior Cedar-Hemlock.	None
6.3 Vista/Scenic Quality	The river and surrounding landscape offer breathtaking scenic views, a number of which were noted at the time of designation.		All features noted in the nomination material remain: • Pristine headwaters in Mt. Robson • Lillooet, Fort George and Yale, for historic and archaeological features • Lytton and Fraser/Thompson corridor, where the confluence of the Fraser and Thompson offers brilliant contrast in river colours • Fraser Canyon, a scenic and historic corridor • Hell's Gate • Fraser Delta/Boundary bay estuary, featuring intertidal flats and significant bird populations • Burns Bog wetlands Many national, provincial, regional and city parks are situated on or near the river, and their popularity is growing. In the estuary, for example,	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
			the human population in the region grew 4% while park visits increased 28% between 2000 and 2004. Source: Fraser River Estuary Management Program. 2006. *A Living, Working River.* www.bieapfremp.org/fremp/pdf_files/Monitoring Report FINAL _2006_MR.pdf [accessed February 2010]	
6.4 Geological features/water	Included in above		As above	None
7 HUMAN HERITAGE APPRECIATION				
7.1 Historic sites	Not discussed at time of designation		As noted in other sections, historic sites exist throughout the Fraser River Basin, and many can be explored as recreational experiences (see Cultural Heritage Values section for examples). Local tours and self-guided tour books offer insights on location and significance.	None
7.2 Cultural Landscapes	Not discussed at time of designation		As above	None
7.3 Sporting events/activities	Not discussed at time of designation		There are formal sporting venues, such as golf courses, near the Fraser River.	None
7.4 Cultural events/activities	Not discussed at time of designation		Community events take place on or near the Fraser River. Those offering a focus on the Fraser include BC Rivers Day (communities on the Fraser and across BC, such as Prince George), Fraser Fest (New Westminster) and Celebration	None

Table 4: Fraser River Recreational Values Since Designation				
Recreational Capability Themes and Subthemes	**Original Recreational Capability**	**Significant Actions, Research or Studies**	**Current Situation**	**Changes or Threats to Nomination Values**
			of Community (Mission). There are many non-profit organizations and provincial, local and regional parks boards that focus on events that better acquaint residents with local culture and history. Cultural interpretation includes boat tours, theatre, and exhibits, such as those in riverside museums and at the new Fraser River Discovery Centre.	


The Fraser at Richmond

9.0 Integrity Guidelines

Table 5: Fraser River Integrity Guideline(s)	
CHRS Principles, Procedures and Operational Guidelines (2000)	**Changes or Threats to River Integrity**
NATURAL INTEGRITY GUIDELINES	
1. Rivers should not have any human-made impoundments within the nominated section.	There are no impoundments on the Fraser River.
2. All key elements and ecosystem components must be unaffected by impoundments located outside the nominated section.	The Kenney Dam on the Nechako River (near Prince George) is used for hydro-electric generation and has reduced flows on that river, a tributary of the Fraser. The facility has not been expanded since CHRS designation. In June 2009 the Nechako Watershed Council proposed a new water storage and release facility to better control flows and temperatures for fish, including salmon and sturgeon.
3. Natural values for which a river is nominated must not have been created by impoundments.	None of the values on the Fraser have been created by impoundments.
4. The river's outstanding natural heritage features and key elements of ecosystems must be unimpaired by human land uses.	While comprehensive work would be necessary to study the health of the Fraser River ecosystems in their entirety, it is estimated that this value has not significantly changed since designation. That said, much of the land surrounding the Fraser River, particularly in the lower and middle stretches, is used for agriculture, forestry, industrial, recreational and urban land and water uses. Management planning for the Fraser River is needed to ensure that existing land use practices maintain the river's heritage values. A number of pressures are known to be affecting river ecosystems worldwide, and the Fraser is not immune: human population and consumption: infrastructure development, land conversion and loss of habitat, overharvesting, invasive species and pollution. An overarching issue, which affects river flows and timing, is climate change, driven by human activities. Here are some key steps taken that will benefit the health of the Fraser: o Formal commitments to greenhouse gas reductions (BC's Climate Action Plan). o Government intention to improve water resources management (Living Water Smart Plan) and to protect groundwater in BC – of

	critical importance to surface freshwater systems[3]. o Work of the Fraser Basin Council to advance sustainability in the Basin and encourage collaborative solutions among authorities and interested parties across sectors. o Investment in better fisheries management, habitat improvement, governance and public education, such as through the Fraser Salmon and Watersheds Program. o International recognition of key ecosystems features in BC, in particular for migrating shorebirds and waterfowl. o Species recovery plans. o Invasive plants management plans. o Continued support for federal and provincial heritage sites. o Opening of the Fraser River Discovery Centre to educate public on importance of the Fraser as a living, working river. o Growth of BC's tourism sector, including the Aboriginal tourism sector. The sector includes operators with a focus on the Fraser.
5. The river's water must be uncontaminated to the extent that its natural aquatic ecosystem is intact.	The large volume of water flowing within the Fraser River allows for high dilution capacity. For this reason, the system as a whole has been relatively uncontaminated. However, this characteristic has also led to the practice of discharging wastes, chemicals and toxic substances, resulting in site-specific problems with water quality for fish and wildlife, recreation and human consumption. In 2004-2006, three of eight water bodies in the Fraser Basin were ranked as "Good" under the provincial Water Quality Index (WQI) meaning that "conditions rarely depart from natural or desirable levels and that all uses are protected, with only minor threats or impairment." Two were ranked as "Fair," meaning that "conditions sometimes depart from natural or desirable levels and that most uses are protected, but a few uses are threatened or impaired." The Salmon River at Salmon Arm and Sumas River at the International Boundary were ranked "Marginal" indicating that "several uses are threatened or impaired, more than one use may be temporarily interrupted and conditions often depart from natural or desirable levels." At the other extreme, the Fraser River at Red Pass was ranked as "Excellent," meaning that conditions between 2004 and 2006 were very close to natural or pristine levels. In the 2004–2006 period, five of the water bodies in the Fraser Basin had similar ratings as in the period from 2001 to 2003. The Fraser River at Red Pass improved from "Good" to "Excellent". The site on the Salmon River at Salmon Arm improved from "Poor" to "Marginal"; however, the Sumas River site declined from "Fair" to "Marginal." Three sites declined in their numeric WQI scores, while two remained stable and three improved. Source: Fraser Basin Council, 2009, *Sustainability Snapshot 4: The Many Faces of Sustainability.* The Fraser River Estuary Management Program has also reported the following for the lower reach of the Fraser:

3 Review of Groundwater-Salmon Interactions in British Columbia, Watershed Watch Salmon Society, Tanis Douglas 2006.

	• Maximum concentrations of ammonia, nitrate, nitrite, arsenic, cobalt, lead, manganese, nickel, and zinc were less than 20% of the provincial Water Quality Objectives values. • Copper levels were less than 30% of their WQI value • Fecal coliform levels suddenly and significantly decreased due to upgrades to wastewater treatment plants; levels have remained low since 2000 Source: Fraser River Estuary Management Program. 2006. A Living, Working River. www.bieapfremp.org/fremp/pdf_files/Monitoring Report FINAL _2006_MR.pdf. [Accessed February 2010] In 2004, on average, 45 municipalities in the Fraser Basin provided 89% of their residents with wastewater treatment systems. Of those populations connected to municipal wastewater treatment systems, 59.4% received secondary levels of treatment while 36.2% received primary treatment. In the Lower Fraser, the Annacis Island sewage treatment plant was upgraded to secondary treatment in 1997. While the Iona and Lions Gate sewage treatment plants were to be upgraded from primary to secondary treatment by 2020, a delay to 2030 is currently under consideration.
CULTURAL INTEGRITY GUIDELINES	
1. Most of its regime should have the same visual appearance as it had during the period of the river's historical importance.	As noted in the nomination materials, the river has had historical significance to different peoples throughout its history, including First Nations for the past 10,000 years and to several generations of settlers in the past 200 years. The landscape has been altered significantly over that time through increased settlement and development – in particular the middle and lower reaches. While a comparative look of the entire river is not readily available, it is estimated that most of the Fraser region has not changed since the time of designation.
2. Most of the artifacts comprising the values for which the river is nominated must be unimpaired by impoundments and human land uses.	While data is not readily accessible on this point, there are no impoundments or known human land uses that would seriously change this value of the Fraser since its designation, and it is estimated that the status has not changed. Significant sites and related artifacts that have been preserved include those at Fort Langley and Gulf of Georgia Cannery, Xáy:tem Longhouse Interpretive Centre, St. John the Divine Church and Fraser Fort George Regional Museum. Riverside development has potential to impact aspects of cultural heritage values, including artifacts. Heritage conservation can be researched through the BC Ministry of Tourism, Culture and the Arts.
3. Neighbouring land uses must not seriously affect the historical experience offered by the river environment.	While data is not readily accessible on this point, it is estimated that the status has not changed since the time of designation. As noted in the nomination documents, historical uses of the river that continue (towing logs, fishing, agriculture) add to the cultural experience on the river, and these activities continue. While many riverside parks exist along the Fraser, an ongoing challenge of development is to ensure that access to the river by people and wildlife is not impaired by development or transportation routes. In the Lower Fraser, options for connected riverside trails are being explored in an "Experience the Fraser" pilot project.
4. The biophysical quality of the water must be suitable for non-contact recreation.	It is estimated that the status has not changed since the time of designation.

RECREATIONAL INTEGRITY VALUES	
1. The river possesses water of a quality suitable for those recreational opportunities for which it is nominated.	It is estimated that the status has not changed since the time of designation.
2. Be capable of supporting recreational uses without significant loss of or impact on its natural, historic or aesthetic values.	It is estimated that the status has not changed since the time of designation.
GENERAL INTEGRITY GUIDELINES	
1. The river should be of sufficient size and contain all or most of the key interrelated and interdependent elements to demonstrate the key aspects of the processes, features, activities or other phenomena which give the river its outstanding value.	It is estimated that the status has not changed since the time of designation.
2. The river should contain those ecosystem components required for the continuity of the species, features or objects to be protected.	Some fish species and stocks are at risk because of diverse pressures and impacts, including freshwater and marine habitat conditions as well as fisheries management. Examples of fish species at risk include salmon, white sturgeon and eulachon.
3. The quality of water should be such as to provide for the continuity and/or improvement of the resource upon which value to the system has been determined.	See also other water quality data throughout this report.

10.0 Review of Management Plan

Table 6: Fraser River Management Plan Recommendations and Status

The Fraser Canadian Heritage River Management Plan (1998)	Degree of Achievement (Initiated, Ongoing, Addressed, Partial, Complete)	Notes
Action 1.1: Encourage agencies and individuals that do research, inventories and monitoring of Fraser River values (physical attributes, natural and historic values and recreational opportunities) to continue to research, inventory and monitor.	Ongoing	There are several authorities monitoring the Fraser (e.g., on the natural heritage values side: BC Ministry of Environment and Environment Canada on water quality and flows, and also Fisheries and Oceans Canada on fish stocks and habitat quality. In addition there are multiple organizations undertaking indicators research and reporting on issues affecting the Fraser River and its health. Examples include: o Fraser Basin Council State of the Fraser Basin Report: Sustainability Snapshot reports o BC Ministry of Environment: Environmental Trends in BC o Georgia Basin – Puget Sound Ecosystem Indicators initiative o Fraser River Estuary Management Program o World Wide Fund for Nature report on rivers - Canada's Rivers at Risk: The Status of Environmental Flows in Canada.
Action 1.2: Monitor Fraser River for CHRS values, to involve the regular collection of information on its heritage and recreational values. A checklist for submission to the CHRS Board is to be submitted in form of Appendix C. Changed values are to be recorded. (pp 18-19)		There are a variety of groups conducting monitoring activities in the Fraser Basin. This 10-year monitoring report is the first formal monitoring document submitted to the CHRS Board.

Action 2: Formally recognize and support private and public stewardship efforts	Ongoing	BC Rivers Day is a province-wide annual event that occurs on the last Sunday in September. It was established in 1980 by the Outdoor Recreation Council of BC and has grown exponentially in the last three decades. Locally planned events range from stream clean-ups to paddle trips, community festivals and stream stewardship. The event celebrates the recreational, environmental, economic, and aesthetic importance of BC rivers and attracts over 100,000 participants each year. Based on the success of BC Rivers Day, National Rivers Day was established in 2003 and World Rivers Day in 2005: www.orcbc.ca/pro_bcriversday.htm The Environmental Farm Plan (EFP) program is a partnership program designed to complement and enhance the stewardship practices of BC farmers. Launched in 2003, 1,137 EFPs were completed in the Fraser Basin as of 2008. This represented 12% of all Fraser Basin farms. Under the program, farmers have access to cost-sharing incentives for such things as nutrient management, irrigation planning, wildlife and riparian management, integrated pest management and grazing management. In 2006, 17% of all farms (1,700 in total) in the Fraser Basin had established or maintained buffer zones around water bodies while 36% (3,530 in total) were using rotational grazing (i.e., soil conservation) practices. Source: Fraser Basin Council, 2009, *Sustainability Snapshot 4: The Many Faces of Sustainability.* Stewards have long been the champions of the Fraser River and its fish. The Fraser Salmon and Watersheds Program (FSWP) (noted In previous sections) includes a focus on habitat improvement and education/engagement. There has been funding and other support for stewards and a "Salmon Heroes" award. The FSWP also encourages input on program priorities through an inclusive '"Fraser Assembly."
Action 3: Advocate for greater compliance with existing legislation and rules.	Ongoing	A comprehensive assessment is not possible due to the geographic extent, diversity and complexity of the Fraser River Basin. There are, however, many river advocacy groups that have called for greater compliance with fisheries regulations and water quality standards and these offer extensive web resources. These include West Coast Environmental Law, EcoJustice Canada (formerly the Sierra Legal Defence Fund), Alouette River Management Society, Western Canada Wilderness Committee, Rivershed Society of BC, Watershed Watch, David Suzuki Foundation, BC Wildlife Federation and Federation of BC Naturalists.
Action 4: Ensure that the CHRS status of the Fraser is considered at all planning levels in looking at land use, resource management and settlement planning.	Unknown	Data not available or accessible.

Action 5: Provide ongoing opportunities for stakeholder/public involvement in management of the Fraser as a Canadian Heritage River.	Ongoing	Substantial collaborative and consultation processes have been undertaken to manage the Fraser River. Some examples of where opportunities for stakeholder / public involvement include the State of the Fraser Basin Conferences, Integrated Salmon Dialogue, Joint Program Committee for Integrated Flood Hazard Management, Invasive Plant Council of BC, New Pathways to Gold Society, BC Rivers Day and various watershed roundtables. The degree to which the Canadian Heritage River designation has been considered in these processes is unknown and warrants clarification.
Action 6: Celebrate and promote the Fraser's CHRS designation.	Ongoing	The Fraser River Canadian Heritage River commemorative plaque is permanently installed on the riverfront at the New Westminster Quay, accessible to residents and visitors year-round. The Quay is currently under renovation and expansion. The Fraser Basin Council promotes the CHRS designation in some of its publications and presentations, and BC Parks has the designation promoted on their website. The Fraser River Discovery Centre has confirmed that the CHRS designation is regularly acknowledged, including during their re-opening, at Rivers Day, in public presentations, on their website and on a permanent exhibit panel in the gallery.
Action 7: Encourage community and public education programs promoting river stewardship and appreciation	Ongoing	The Pacific Streamkeepers Federation offers training modules for stewards, the BC Stewardship Centre offers an array of resources, several organizations hold workshops and networking, and a new stewardship centre is proposed in Maple Ridge. Examples of organizations involved in public education programs promoting river stewardship and appreciation include: • BC Freshwater Institute • Burns Bog Conservation Society • Coquitlam River Watershed Society • BC Stewardship Centre • Pacific Streamkeepers Federation • Pacific Salmon Foundation • Rivershed Society of BC • Fraser Basin Council • Fraser River Discovery Centre • Fraser Headwaters Alliance • Fraser Valley Regional Watersheds Coalition • Kanaka Education and Environmental Partnership Society • Langley Environmental Partners Society • Pitt River and Area Watershed Network • Watershed Watch Salmon Society

11.0 Summary and Conclusions

In recognition of its exceptional natural, cultural and recreational values, the main stem of the Fraser River was nominated as a Canadian Heritage River in 1997 and designated in 1998. As a responsibility of the Canadian Heritage Rivers System, this 10-year monitoring report has been prepared to assess the degree to which the Fraser River continues to possess the remarkable heritage values for which it was originally nominated. The objectives of the Fraser 10-year monitoring report are to:

- Describe major changes in relation to the river over the past 10 years
- Report on the current condition of heritage values for which the river was nominated and whether the river still possesses these values
- Review CHRS integrity guidelines and determine if they are still being met
- Determine the degree to which actions outlined in the management plan have been implemented

The size and complexity of the Fraser River pose unique challenges for reporting on its Canadian Heritage River values. These values are diverse and widely distributed along the length of the river (1,370 km). Similarly, changes to the heritage values may be different at different points along the river. The sheer size of the Fraser River also makes it difficult, within the scope of this reporting initiative, to assess in a comprehensive way the conditions of all heritage values along the entire length of the river over a 10-year period.

Therefore, this report provides an overview of the Fraser River's key values based on readily available and accessible information. Since new activities, new studies, changes or threats to river values may emerge at any time – it is sensible to invite interested parties along the river to contribute to future monitoring reports by flagging developments of significance.

The Fraser River is the largest river in British Columbia. While renowned for its biological diversity and natural beauty, the Fraser drains more than a quarter of the province. The Fraser River Basin is home to 2.73 million people or 67% of British Columbia's population.

The Fraser River is a living, working river. Pivotal to the history of British Columbia, the river basin remains one of Canada's most valuable assets. Over the past 10 years, the key natural, cultural and recreational heritage values of the Fraser River that supported its CHRS designation remain and are described in this report. While it is not easy to identify all the factors that support or detract from these values, there are a number that merit mention.

The Fraser River is somewhat vulnerable to the impacts of human population growth, habitat loss and degradation, pollution and invasive species, and to the overarching threat of climate change, which is projected to impact both water flow regimes and water temperatures. Climate change is also predicted to result in sea level rise with significant potential impacts to the ecosystem of the Fraser River estuary.

The Fraser River is home to five species of Pacific salmon, steelhead, white sturgeon and many other fish species. For the people of British Columbia, and First Nations people in particular, wild Pacific salmon are a cultural icon, and critically important to the social and economic life of local communities. Pacific salmon harvest rates have varied annually and across different fish species. However, total run size, catch and harvest rates have been consistently lower for Fraser River sockeye, coho and chinook since 1998, negatively

affecting Aboriginal communities and the commercial and recreational fisheries. The decline of sockeye salmon stocks is now (in 2010) the subject of a federal commission of inquiry, and both freshwater and marine factors will be assessed.

Another key concern for the Fraser River is the population of white sturgeon (and also Nechako white sturgeon, although on a tributary system), which are now a COSEWIC listed species. The estimated population of juveniles in the lower Fraser declined 26.7% between 2003 and 2008.

For the most part, the cultural and recreational heritage values of the Fraser River have remained intact since the time of designation in 1998. The most significant exception involves those cultural and recreational values related to fishing. Aboriginal, commercial and recreational fisheries have all been adversely impacts by declines in salmon stocks and corresponding reductions in harvest rates.

On a positive note, there are many activities that have positively contributed to the natural, cultural and recreational values of the Fraser over the past decade:

- Formal commitments to GHG reductions to mitigate climate change impacts (BC's Climate Action Plan)
- Provincial introduction of a Living Water Smart Plan, and a provincial commitment to better protect groundwater in BC – important for the health of freshwater systems
- Work of the Fraser Basin Council to advance sustainability in the Basin and encourage collaborative solutions among authorities and interested parties across sectors
- Investment of time and resources through the Fraser Salmon and Watersheds Program, focusing on fisheries management, habitat improvement, watershed governance and public education and engagement
- International recognition of key ecosystems features in BC, in particular for migrating shorebirds and waterfowl of the Fraser River delta
- An invasive plant strategy for BC, and management plans that are underway in many communities
- Species and ecosystem recovery plans
- Opening of the Fraser River Discovery Centre to educate the public on the importance of the Fraser as a living, working river
- Opportunities for the public to experience natural and cultural heritage on the Fraser, existing historic sites and museums and new and pre-existing parks
- Growth of BC's tourism sector, including the Aboriginal tourism sector and activities on the Fraser
- Steps towards recognition of Aboriginal rights and title through treaties and other means, various partnerships and co-management agreements and leadership in economic sectors.
- Leadership by watershed stewards and advocates.

The Fraser River's designation as a Canadian Heritage River has potential to raise public appreciation for Canadian rivers generally, and for the Fraser in particular. Perhaps most importantly, it is a fresh opportunity to encourage decision-makers and all those interested in the river's future to come together to address current challenges. Maintaining the Fraser River's designation as a Canadian Heritage River for its natural, cultural and recreational values over the long term will demand continued progress and ongoing commitment. This is a challenge worth embracing.

It is timely to recognize the importance of quality data, monitoring and information-sharing in the management of watersheds and water resources. Because responsibility for the management of the Fraser River and its resources is shared across many agencies and organizations, the future of the river calls for collaboration among all orders of government (federal, provincial, local and First Nations), the private sector, non-profit organizations and the general public.

The collaborative management of the river would be improved through a more detailed and updated management plan involving various communities and organizations along the Fraser River. The Ministry of Environment will work with the CHRS Board to determine appropriate scheduling for drafting a revised management plan.

Summary of Sustainability Highlights

APPENDIX

Sustainability Snapshot 4 sets out an in-depth analysis of 18 different sustainability topics, describes the status of four or five distinct indicators for each topic, and offers examples of initiatives advancing sustainability throughout the Fraser Basin. Upon completion of the data analysis, 50 "headline indicators" were identified to compile an overall summary. This process was similarly undertaken for the Sustainability Snapshot 3 report, which was published in November 2006.

The following highlights focus on two to three[a] headline indicators for each topic and a description of the status of those indicators. This is intended as a helpful synthesis, not an exhaustive summary of all of the indicators or data in this report. The status of each of the indicators is characterized using one of the following descriptions, which can be considered on a spectrum from best to worst.

GOOD / GETTING BETTER – The current state is good and/or the trend is improving when comparing the present to the past. The data must be good or improving for the Fraser Basin as a whole, a majority of the Basin regions, or for British Columbia (if data are unavailable for the Basin).

FAIR / MIXED RESULTS – The current state is fair and/or the trend is stable with minimal variation over time. Mixed results refer either to variations within the sub-regions of the Fraser Basin or to variations between sub-indicators (some are getting better and some are getting worse; for example total versus per capita). More than half of the sub-regions or sub-indicators are fair, good or improving.

MIXED RESULTS / POOR – The current state is poor and/or the trend is stable or getting slightly worse over time. Mixed results refer either to variations within the sub-regions of the Fraser Basin, or to variations between sub-indicators (some are getting better and some are getting worse). More than half of the sub-regions or sub-indicators are poor, or deteriorating.

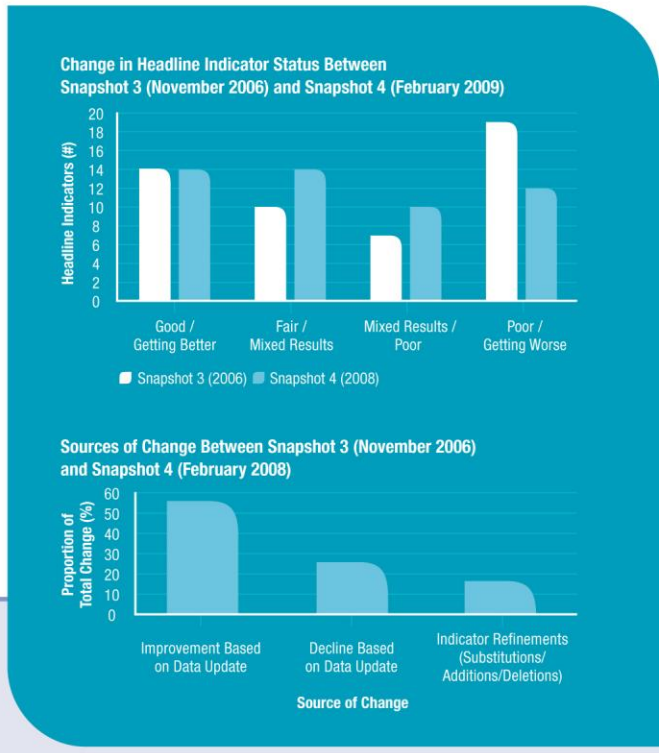
POOR / GETTING WORSE – The current state is poor and/or the trend is deteriorating when comparing the present to the past. The data must be poor or deteriorating for the Fraser Basin as a whole, for a majority of the regions or for British Columbia (if data are unavailable for the Basin).

The following analysis compares the status of headline indicators in the Sustainability Snapshot 3 (2006) and Sustainability Snapshot 4 (2008) reports. For purposes of measuring change over time, the following numeric values were assigned to the rating scale for the headline indicators.[b]

Status	GOOD / GETTING BETTER	FAIR / MIXED RESULTS	MIXED RESULTS / POOR	POOR / GETTING WORSE
Value	4	3	2	1

As the status of the indicators moves up or down the rating scale, the numeric value also changes. Using this scale, modest but notable improvements have been identified in the overall status of the headline indicators between the Snapshot 3 and 4 reports, including the following:

- There was an overall increase of 9% in the total numeric value of the headline indicators, based on a change from 119 to 130 on a scale up to 200;
- This represented an increase from 60% to 65% of the maximum possible score of 200;
- The same number (14) of indicators were assigned the status "Good / Getting Better" in both 2006 and 2008;
- There was an increase in the number (4) of indicators that were assigned the status "Fair / Mixed Results";



Notes

[a] Fifteen of the 18 topics list three indicators each; two topics list two indicators each; and one topic lists one indicator.

[b] This scale is intended to describe relative, not absolute, degrees of sustainability (e.g., a rating of Good / Getting Better may not imply absolute sustainability in all cases).

• There was an increase in the number (3) of indicators that were assigned the status "Mixed Results / Poor"; and

• There was a decrease in the number (7) of indicators that were assigned the status "Poor / Getting Worse."

Many of the headline indicators have been updated with data from consistent sources; however, other headline indicators have been refined with substitutions, additions or deletions for the following reasons:

• Availability or unavailability of data updates since previous Snapshot reports were prepared;

• Emergence of new data for indicators of interest;

• Interest in broadening the scope of previous indicator measures; and

• Challenges related to data access, verification or quality.

Because the Fraser Basin Council aims to continually improve on the suite of indicators used within the series of Snapshot reports, and because of the above-noted reasons for refining the indicators over time, it is important to assess the sources of change in the status of headline indicators between the two most recent Snapshot reports. The following are the results of this analysis:

• 83% of the overall change in status was based on updating indicator data for consistent or very similar indicator measures.

• Of these updates, more than half (57%) of the total change included measurable improvements in indicator trends, while one quarter (26%) included measurable declines.

• About 17% of the overall change in the status of headline indicators resulted from refinements in the suite of headline indicator, including substitutions, additions or deletions, which were implemented because of the reasons noted above such as data improvements, quality and availability.

Aboriginal & Non-Aboriginal Relations

MIXED RESULTS / POOR
Aboriginal Health and Well-Being – Between 2000 and 2004, there were signs of improvement; however, significant differences in many key health statistics still existed between Aboriginals and non-Aboriginals in BC.

MIXED RESULTS / POOR
Children in Care – The total number and proportion of Aboriginal children in care in BC continued to increase between 2000 and 2008.

FAIR / MIXED RESULTS
Progress in the BC Treaty Commission Process – Since 2002, some progress has been made by some First Nations participating in the BC Treaty Commission process.

Agriculture & Food

MIXED RESULTS / POOR
Average Farm Income – In 2006, average farm income was very low in interior regions and higher in the Fraser Valley and GVSS regions.

FAIR / MIXED RESULTS
Agricultural Land Reserve – There was a net increase in ALR in the Fraser Basin, a net loss in 4 of 5 regions, and a net loss in prime agricultural land between 1973 and 2005.

GETTING BETTER
Agriculture and the Environment – Between 2006 and 2008, there were increasing numbers of completed Environmental Farm Plans in all regions as well as a high use of organic farming practices.

Air Quality

GETTING BETTER
Particulate Matter$_{2.5}$ – Levels have either improved or remained low and stable since 2004.

GETTING BETTER
Ground Level Ozone – Levels have either improved or remained low and stable since 2004.

GOOD
Air Quality Health Index – Ratings were consistently good (Low Health Risk) between 2000 and 2006.

Biodiversity

POOR
Ecosystems at Risk – Six of eight BC ecosystems assessed as being "at risk" in 2008 were in the Fraser Basin.

FAIR / MIXED RESULTS
Protected Areas – In 2008, the Fraser Basin overall and four of five regions had 14% or more of the land base designated as Protected Areas; however, Protected Areas were not representative of all types of ecosystems in the Fraser Basin.

MIXED RESULTS / POOR
Woodland Caribou – Of 12 caribou herds in the Fraser Basin in 2008, six were declining in population, four were stable, one was increasing and one was of unknown status.

Business & Sustainability

FAIR / MIXED RESULTS
Corporate Social Responsibility – In 2007 and 2008, several companies based in the Fraser Basin and BC continued to be recognized by Stratos Inc. and Corporate Knights as CSR leaders in Canada.

GETTING BETTER
Carbon Disclosure – Between 2005 and 2008, the number of Canadian companies participating in the Carbon Disclosure Project increased from zero to 106.

Climate Change

MIXED RESULTS / POOR
Greenhouse Gas Emissions in BC – In 2004, both total (65,600 kilotonnes) and per capita (15.6 tonnes) GHG emissions in BC were at their highest levels reported since 1990; however, total emissions decreased by 5% between 2004 and 2006.

POOR / GETTING WORSE
Climate Change Impacts in the Fraser Basin – Average freshwater and air temperatures have warmed over the past 50–100 years, and Fraser River flows are occurring earlier than in the past 85 years.

GETTING BETTER
Climate Change Mitigation and Adaptation in the Fraser Basin – Communities and organizations are identifying and pursuing many opportunities for reducing their greenhouse gas emissions, and are planning to adapt to climate-related vulnerabilities, such as flooding, drought and interface fires.

Community Engagement

GOOD
Volunteerism – In 2004, the rate of volunteerism in BC matched the Canadian average in terms of the proportion of British Columbians that volunteered (45%) and was high in terms of the average number of hours volunteered (199).

GOOD
Charitable Giving – In 2004, rates of charitable giving in BC were strong but below the Canadian average in terms of the proportion of British Columbians that donated money (78%), and were high for the average value of donations ($467).

Consumption & Waste

FAIR / MIXED RESULTS
BC Households and the Environment – In 2006, participation of BC households in environmental activities was better than the Canadian average in four of six categories. In two of those categories—rates of recycling and use of compact fluorescent light bulbs—BC led the country.

POOR / GETTING WORSE
Solid Waste Disposal – Total solid waste disposal increased in the Fraser Basin overall and in most regional districts in the Basin between 1996 and 2006.

POOR
Canadian Consumer Choices – In 2008, the Consumer Greendex™ measured environmentally sustainable behaviour of consumers in 14 countries by ranking their choices in housing, transportation, food and consumer goods. Canadians ranked second to last in the survey.

Economy

GETTING BETTER
Strength of the Economy (per capita GDP) – Per capita GDP increased steadily year to year between 2002 and 2007.

FAIR / MIXED RESULTS
Individual Disposable Income – Disposable income in BC increased by 26% between 1997 and 2007 and was similar to the Canadian average throughout this period.

FAIR / MIXED RESULTS
Unpaid Work – In 2006, 36% of the population dedicated their time, without pay, on a weekly basis to care for children; 17.5% volunteered their time to provide assistance to seniors.

Education

FAIR / MIXED RESULTS
Educational Attainment – In 2006, overall levels of educational attainment in the Fraser Basin were above the provincial average, but in certain regions they were well below the average.

FAIR / MIXED RESULTS
Graduation Rates – In 2006/2007, six-year completion rates varied throughout the Fraser Basin and differed between genders and Aboriginal and non-Aboriginal students.

GETTING WORSE
Composite Learning Index (CLI) – CLI scores declined between 2007 and 2008 and were below the provincial average.

Energy

FAIR / MIXED RESULTS
Total Energy Consumption in BC – Although energy consumption in BC increased by 24% from 1990 to 2006, annual consumption has levelled off since 2000.

GETTING BETTER
Energy Intensity in BC – Rates of energy consumption per person and per unit of real GDP declined between 1990 and 2006 (by 5% and 33% respectively).

FAIR / MIXED RESULTS
Residential Electricity Consumption in the Fraser Basin – There was a 6% increase in average annual electricity consumption per residential account between 2000 and 2004; however, there was a 1.5% decrease between 2004 and 2006.

Fish & Fisheries

POOR / GETTING WORSE
Sockeye, Coho and Chinook Salmon – Sockeye, coho and chinook salmon returns are in varying states of decline with significant cause for concern in recent years. The one exception is summer chinook (Upper Fraser) runs, which are increasing.

POOR / GETTING WORSE
Steelhead – Thompson River populations have fallen to critically low levels, resulting in closures of the inland catch and release fishery in both 2004 and 2008.

MIXED RESULTS / POOR
Fraser River White Sturgeon – The number and growth rate of Lower Fraser white sturgeon

have declined since 2003. The Nechako River population remains critically endangered. Upper Fraser and Middle Fraser River populations are low but apparently stable.

Forests & Forestry

POOR
Mountain Pine Beetle Outbreak – The area affected by the MPB epidemic has grown rapidly since 2000; in 2007 the epidemic affected more than 8.8 million ha in the Fraser Basin.

MIXED RESULTS / POOR
Community Vulnerability to the Mountain Pine Beetle – In 2005, vulnerability was higher for communities in the Upper Fraser and Cariboo-Chilcotin than for those in the Thompson region.

FAIR / MIXED RESULTS
Forest Restocking in BC – In the 1980s the area of satisfactorily restocked forest was less than the area disturbed. From the early 1990s to 2005 it was more than the area disturbed; from 2005 to 2008 it was again less than the area disturbed.

Health

GETTING BETTER
Life Expectancy – Average life expectancy across the Fraser Basin continued to rise over the 2002–2006 period.

GETTING WORSE
Low-Weight Births – The proportion of low-weight newborns increased between 1996 and 2006.

GETTING BETTER
Leading Causes of Death – Rates of the seven leading causes of death in the Fraser Basin decreased between 2001 and 2006, with the exception of diabetes.

Housing

POOR / GETTING WORSE
Housing Affordability – In 2006, BC had the least affordable housing market among all provinces in Canada, and in 2005, had the second highest (worst) proportion of urban residents living in core housing need.

POOR / GETTING WORSE
Rental Housing – Urban centres in all regions of the Fraser Basin recorded declining vacancy rates and increasing rental costs between 2001 and 2007.

POOR / GETTING WORSE
Homelessness – In 2008, the rate of homelessness had increased in Metro Vancouver and the Fraser Valley since previous counts throughout the 2000s.

Income & Employment

GETTING BETTER
Employment Rate – The employment rate in the Fraser Basin in 2006 (62.8%) was almost 2% higher than in 2001.

MIXED RESULTS / POOR
Average Household Income – Average household income in the Fraser Basin was higher than the BC average in 2005 but was lower than in 2000.

MIXED RESULTS / POOR
Incidence of Low Income – In 2005, the proportion of low-income families (11.7%) had decreased since the proportion in 1995 (17.3%) and 2000 (15.7%); however, the number of children living in poverty had increased.

Population

FAIR / MIXED RESULTS
Population – Between 1996 and 2006, the Fraser Basin population increased steadily (13.3%); however, population declines were observed in the Upper Fraser (-6%) and Cariboo-Chilcotin (-7.4%) regions during this period.

Water Quality & Quantity

MIXED RESULTS / POOR
Municipal Domestic Water Consumption – Domestic (i.e., residential) water consumption per capita increased in the Fraser Basin overall but declined in three of five regions between 2001 and 2004.

FAIR / MIXED RESULTS
Municipal Wastewater Treatment – Together, municipalities in the Fraser Basin provided wastewater treatment services to 85% of the population in 2004: 36.2% with primary treatment, 59.4% with secondary treatment, and only 4.3% with tertiary treatment.

GOOD / MIXED RESULTS
Water Quality Index – Four Fraser Basin sites were given Good or Excellent Water Quality Index rankings, while four sites were Fair or Marginal for the period between 2004 and 2006.

Fraser Basin Council