

FINAL REPORT

Shuswap and Mara Lakes Aquatic/Development Fringe Study-

**Existing Information Research And Analysis
(December 2000 - March 2003)**

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Shuswap and Mara Lakes Aquatic/Development Fringe Study

Existing Information and Research Analysis

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1 Background

When the provincial government adopted the Fish Protection Act and began its consultation with the various Regional Districts on the development of the Streamside Protection Guidelines the Columbia Shuswap Regional District found they were lacking in the basic information needed to participate. This coupled with minimal planning guidelines in place throughout the Regional District, and the increased pressure on the Regional District staff to develop the remaining waterfront parcels along Shuswap and Mara Lakes and their tributaries, gave rise for concerns within the Regional District. As a result they looked on the Streamside Protection Regulations as another burden being forced on them by a senior Government, which they were ill equipped and under resourced to implement.

The Fraser Basin Council is an autonomous group of people who work together to ensure that decisions/choices being made in the Fraser Basin are the best for all residents of the basin. It is a 36-member council with representatives from 5 Fraser Basin regions of which the Thompson is one. The council and its partners facilitate problem solving by bringing together the people necessary to create appropriate solutions that balance social, economic, environmental and institutional considerations. The council works to minimize duplication of existing services and programs and points the way for decisions, made by consensus to be transformed into sustainable actions.

The Fraser Basin Council – Thompson Region was awarded a habitat steward position by the Habitat Conservation Stewardship Program (HCSP). The steward was assigned to work collaboratively for the last 2 years with the Columbia Shuswap Regional District in an attempt to enable the Regional District to participate in these processes. The Stewards project was the *Shuswap and Mara Lakes Aquatic/Development Fringe Study*. The position was created by a five-way partnership between Fisheries and Oceans Canada (HCSP – Habitat Conservation Stewardship Program), the Ministry of Water, Land and Air Protection, the Ministry of Sustainable Resource Management, the Fraser Basin Council and the Columbia Shuswap Regional District.

Through the work of the Fraser Basin Council, the study partners will have available a library and subsequent analysis including mapping products that will provide the tools necessary for the Regional District to include accurate scientific information in their planning processes. By providing the community with complete access to the information collected, this study will contribute data to local organizations to help influence sustainable land use decisions. Through gathering this information, the study will enable the Regional District, senior Governments (Federal and Provincial), and the community to incorporate community values and knowledge in land use practices on the lakes and their environs.

2 Introduction

The Columbia Shuswap Regional District (CSRD) is under intense pressure to develop remaining waterfront parcels, especially along Shuswap and Mara lakes and their tributaries. CSRD staff, faced with the increase in development pressure and potential provincial development regulations through streamside protection guidelines, realised that they needed to obtain the relevant background information to ensure that development proposals were consistent with streamside protection regulations and with sustainability principles.

Existing studies, reports, surveys, geo-referenced data, were gathered for Mara and Shuswap Lakes, concerning fish habitat, wildlife habitat, foreshore/riparian habitat, water quality, hydrologic interactions, human activities, and historic/cultural sites. This data was supplemented with the communities' anecdotal knowledge, ensuring that all available background information was provided to the Regional District. This study was conducted in several stages: *Phase 1*, *Phase 2*, *Information Interviews*, and a *Gap Analysis*. The following report highlights the process and findings of the *Shuswap and Mara Lakes Aquatic/Development Fringe Study*.

3 Purpose

The *Shuswap and Mara Lakes Aquatic/Development Fringe Study* was to gather and analyse existing information on Shuswap and Mara Lakes. The study was developed to research information that the Regional District can/will use as a framework for sensitivity mapping. It was designed to provide, to the regional district, the information, tools and abilities to include fish and wildlife habitat, historic and cultural, recreation and water quality data in their long term planning. This information should allow technically sound planning advice and to create a level playing field for all the parties involved in land use planning.

3.1 Goal

The goal of the *Shuswap and Mara Lakes Aquatic/Development Fringe Study* was to gather, organise, and map, the available background information, to enable the Columbia Shuswap Regional District, senior Governments, and the community to incorporate environmental, economic, social and institutional values in land use practices on Shuswap and Mara Lakes.

3.2 Objectives

- ✧ Gather and document existing studies, reports, surveys, geo-referenced data;
- ✧ Conduct anecdotal Information Interviews to gather local knowledge on both Mara and Shuswap Lakes;
- ✧ Conduct an analysis of the existing data to determine any information gaps that exist; and
- ✧ Produce a general description of the environment of the lakes, their key components, and their functions within that environment.

4 Project Deliverables

4.1 Phase 1 Report

- ✧ Gather and generate a library of existing information for the Phase 1 study area;
- ✧ Develop a Searchable Database to highlight and allow for easy access to reports and information gathered; and
- ✧ Map this information to highlight past resource expenditures.

4.2 Phase 2 Report

- ✧ Gather information for the Phase 2 study area;
- ✧ Incorporate this information into the existing Phase 1 library and Searchable Database; and
- ✧ Map this information to highlight past resource expenditures.

4.3 Information Interviews Report

- ✧ Gather expert and community anecdotal knowledge through a public outreach program;
- ✧ Map this information to highlight community values and knowledge.

4.4 Gap Analysis

- ✧ Conduct a gap analysis on the existing information to determine where future research resources could be allocated.

4.5 Information Fact Sheet

- ✧ Develop an Information Fact Sheet publication that would provide a general description of the environment of the lakes, their key components, and their functions within that environment

5 Study Areas

The Study Area for Phase 1, conducted during December 2000 – March 2001, encompassed the water bodies and foreshores of Mara and Shuswap Lakes. Phase 2, conducted during April 2001 - March 2003, included all lands 600-metre above the Lakes' natural boundary, and incorporates Little Shuswap Lake, Little River and defined portions of the lakes' tributaries.

These study areas were chosen because of the amount of development pressure on the Regional District and because of the study areas amount of influence on the biological functions of the Lake systems. The Information Interviews were conducted throughout the span of the project and encompass the study areas of both phases.

6 Methods – Information Collection

6.1 Phase 1 & Phase 2

The information gathered during Phase 1 and 2 of the *Shuswap and Mara Lakes Aquatic/Development Fringe Study* was collected from various sources. Collecting this information involved contacting all the ministries in the Provincial Government, all relevant ministries in the Federal Government, and First Nations Governments around the lakes. These governments were asked if they had information relevant to fish, wildlife, habitat, cultural activities, recreational areas and areas important to the government itself. These documents were gathered and copied to be included in the library.

The consultant community was then contacted and information was gathered based on their works for various clients with interest on the lakes. In all cases it was disclosed that this information would be mapped, copied and kept in a library and be made readily available to the public if they requested it. The forest industry was then contacted with the intentions of gathering watershed surveys and documented reports generated during their business practises.

All documents gathered were to be included in the library showcasing their bibliography, abstracts and conclusions of each report. Each documents study area was to be mapped and linked to their document information. This searchable database was to be made available in both a printed version and digital format (CD), and, to encourage public access, it was to be developed into an interactive web mounted resource library.

6.2 Information Interviews

The Information interviews conducted during Phase 1 and Phase 2 were to gather, from the local citizens and various experts, non-documented sensitive habitats and/or areas of concern around the lake. These would include regulation and policy issues, and historical and cultural documentation. The Information Interview stage of the study provided the community a forum to showcase their values and knowledge to the Regional District.

There are five components to in the process of conducting the information interviews:

- ✧ Expert or professional interviews,
- ✧ Service club and industry interviews,
- ✧ Information presentations and booths,
- ✧ On-site field investigation/ground-truthing, and
- ✧ Documentation.

The first of these components, the **expert or professional interviews**, involved identifying the various individuals, past and present, which have conducted works on either of the lakes or their tributaries. Once this contact list was compiled individual and

group interviews were conducted. During the interviews expert anecdotal information was collected for all areas encompassed in the eighteen, 1:20,000 Orthophoto Trim maps of the Shuswap, provided by the Columbia Shuswap Regional District. Experts recorded data, and information, which may not have previously been recorded, on these maps, in addition to, identifying regulation and policy recommendations for Columbia Shuswap Regional District land use planning around the lakes.

The second of these components, the **service club and industry interviews**, like the above process, involved first identifying the various organizations and individuals who utilize or have a vested interest in the lakes and/or their tributaries. Once this list was compiled individuals and organizations were contacted to have presentations made on the *Shuswap and Mara Lakes Aquatic/Development Fringe Study* and to share their knowledge/ information about the lakes and their tributaries. The individuals recorded their knowledge on a 1:150,000 scale map. As well, they provided recommendations and policy concerns for the Regional District and senior governments (Federal & Provincial). In addition, the Fraser Basin Council took time to encourage these individuals to get involved in land-use planning in their region.

The third of these components the **information presentations and booths**, involved the identification and attendance of the Fraser Basin Council at community events where outreach to the general public was possible. This enabled the council to highlight the study and gather information that had not been previously collected as part of the earlier information gathering stages. Presentations were made to regional organizations with the intent to raise awareness of the study and the interest in attending individual delegate service club meetings.

The **ground-truthing or on-site field assessment** was the fourth component in the Information Interviews process. This was an opportunity for the council to conduct a simple visual assessment, with the assistance of professionals, of the lakes current foreshore conditions. This process involved visual assessments of the shoreline, identifying recreation uses, water quality issues, and unique habitats.

Lastly, was the **documentation** component of the process. This component involved synthesizing the mapped information collected into a series of indexed quadrant maps and compiling the various recommendations for the study partners. The information recorded on these maps is general in scale and placement; thus, they should only be used as a general guide for areas of development concern.

6.3 Information Fact Sheet

The *Shuswap and Mara Lakes Information Fact Sheet* was intended to provide a general description of the environment of the lakes, their key components, and their function in that environment. As a result of the usefulness of this information to visitors of the lake the fact sheets format was changed to an Information Poster, which could be easily marketed and distributed. Provincial Government staff reviewed the information displayed on the poster, and Brimacombe Design Associates developed the layout and design.

7 Results – Information Collection Analysis

7.1 Phase 1 & Phase 2

A total of 217 published and un-published reports were collected on various topics from many sources on Shuswap and Mara Lakes. Of this 115 documents were collected during Phase 1 of the study and the remaining 102 documents were collected during Phase 2. (See *Compendium Reports – Shuswap and Mara Lakes Aquatic/Development Fringe Study Phase 1 & Shuswap and Mara Lakes Aquatic/Development Fringe Study Phase 2*) In total the information collected during both Phases can be broken down into the following statistics:

- 51 Environment, Community / Groups, & Watershed documents
- 91 Fish & Fish Habitat documents
- 8 Plants & Riparian documents
- 38 Regulation and Planning documents
- 21 Water Quality documents
- 8 Wildlife documents

Documents were collected from as many sources as were willing to share data with the Fraser Basin Council. There are some documents that the consulting community has decided to not include within the library at their clients request. In addition, the Forest Companies in the area decided to not participate in the library as the majority of their works were in the upper watershed and did not highlight specific habitats within the study areas. Although disappointing, we did not pursue the forest companies any further and as such there is minimal inclusion in the report of their studies, works and prescriptions in the watershed.

7.2 Information Interviews

Just over 650 people were directly contacted to supply, to the Fraser Basin Council, their expertise, knowledge and experiences, on Shuswap and Mara Lakes. The individual's information was mapped and notes were recorded during each of the interviews. The individual comments made during each interview were summarized in the series of index maps. These interviews can be broken down as follows:

There were 11 expert or professional interviews conducted. These interviews gathered information learned from 24 individuals whose work history on the Shuswap spanned decades. In addition, a two-day on site field investigation or ground-truthing of the shoreline habitat occurred with Fraser Basin Council staff and Provincial and Federal government biologists.

A total of 13 service groups, including all the local BC Wildlife Federation Fish and Game Clubs, the two local Naturalist Clubs, all of the local Museum and Archive Representatives, local long-time residents and the Shuswap Lake Houseboat

Association, were interviewed. These interviews focused on just over 100 individuals' knowledge and experiences around the lakes.

In addition to these targeted interviews, there were two information only presentations with a total of 25 individuals present. These presentations were to the Shuswap and Okanagan Regional Committees of the BC Wildlife Federation, with the intent of identifying other members of the BC Wildlife Federation that we may not have contacted at the local club level.

And finally, there were two public information booths hosted by the Fraser Basin Council, which surveyed the values and concerns of close to 500 people. These booths were at the Lumby Family Fun Days in the town of Lumby and the Salmon Arm Fall Fair in the town of Salmon Arm. Both of these community events had local participants as well as a substantial draw from tourists and users of the area. We used these occasions to highlight the project, and share the opportunity to contribute users knowledge that may have been missed in other interviews.

The index maps, in the Information Interview Report showcase the synthesized data collected during the Information Interview Stage of the project. (*See Compendium Report – Shuswap and Mara Lakes Aquatic/Development Fringe Study Information Interviews*)

7.3 Information Fact Sheet

An Information Poster was created entitled *Shuswap Lake. A Delicate Balance*. This poster highlights the lakes' seasonal processes, unique features and key habitat features. (*See Appendix 1 – Poster: Shuswap Lake: A Delicate Balance*)

8 Gap Analysis – Methods

The Information Sources were given an index code and mapped by their study areas to simplify the gap analysis, by showcasing like studies and /or research. An analysis was to be conducted on the existing data to determine any information gaps that may exist within the 600-meter area from the natural boundary of the lake for both Shuswap and Mara Lakes. This analysis consisted of general observations followed by specific notations on information gaps regarding:

- ✧ Foreshore / Riparian Habitat
- ✧ Fish Habitat
- ✧ Wildlife Habitat
- ✧ Water Quality
- ✧ Hydrologic Interactions
- ✧ Anthropogenic activities
- ✧ Historic / Cultural Sites

The Gap Analysis was to provide for the regional district an overview of where past resources for research had been spent and where potential information gaps exist in the data required for planning.

9 Gap Analysis – Results

9.1 General Observations

General observations, determined while collecting and researching existing information on Shuswap and Mara Lakes, indicate a lack of documented reports/studies for Mara Lake. There is minimal information for this area limited to geotechnical information, some rare and endangered plant species, and some fish habitat information for the mouth of the Shuswap River. Many fish and fish habitat studies have been conducted on the Shuswap River itself but only the studies located in the lower reach of the Shuswap River have been included in the library.

42% of the library consists of Fish and Fish Habitat related documents, with the next closest topic being, Environment & Community/Groups at 23%. This would indicate that there has been a fair amount of resources allocated to assessing the fisheries values on Shuswap and Mara Lakes. In reality this would make sense, due to the fact that Sockeye Salmon are an important commercial fish species and the Shuswap Lake System is considered one of the key Sockeye Salmon nursery lakes in the Fraser River system.

The Environment & Community / Groups topic and the Regulation & Planning topics combined are a total of 41% of the library. Generally this is would make sense due to the fact that these topics are more broad in scope, and focus on holistic topics ranging from watershed data & zoning by-laws to historic village sites. The remaining topics of

Plants and Riparian, Wildlife, and Water Quality make up a total of 17 % of the library. This would indicate that fewer resources have been allocated to these topics in comparison to the others.

Cooperation with the Ministry of Forests, the Ministry of Water, Land and Air Protection, the Ministry of Sustainable Resource Management, the Ministry of Transportation, the Ministry of Health, the Department of Fisheries and Oceans Canada, various consulting organizations and local community groups, has occurred throughout the duration of this project and information included encompasses these data sources. Research collected does not include any of British Columbia Assets and Lands (BCAL) data (now Land and Water BC Inc.), as this information was too costly for the project to acquire.

9.2 Specific Observations

9.2.1 Foreshore / Riparian Habitat

Much of the Plant and Riparian information collected to date is specific to the Provincial Parks inventory. There is some endangered plant/riparian species information, but this is limited to the COSEWIC information documentation. There are some Regulation/Planning documents that focus on development within a riparian area but there are not specific guidelines for Shuswap or Mara Lakes. Some key riparian area and wetland areas were noted during the Okanagan Shuswap LRMP process. These sites were acquired through information interviews and thus have not been included in this report. Some key riparian habitat may have been noted in some of the fisheries documents but these are noted solely for the purposes of their significance to fish habitat. These have not been included in this section of the analysis but rather can be found in the fish and fish habitat section.

9.2.2 Fish & Fish Habitat

Much of the fish studies have focused on salmonid species with only minimal information documented on other species. In addition, numerous documents were collected from the Shuswap Nation Fisheries Commission, which focus on tributaries to the lake but not specifically on the lake itself. Few documents focus solely on the lake. However, three reports exist which focus on inventories of the lake:

- ✧ 1996 Hatfield report focusing on a Shoreline Inventory and Fisheries Classification of the Main Arm of Shuswap Lake,
- ✧ 1981 Russell report focusing the Distribution of Juvenile Chinook, Coho and Sockeye Salmon in Shuswap Lake; and
- ✧ 1991 Bison report Population and Habitat Characteristics for Spawning Lake Char in Shuswap Lake.

In addition, raw data exists for Rainbow Trout distribution in Shuswap Lake that coincides with the 1981 Russell report.

Some of the documents focus on the management of the fisheries resource, such as the management of the recreational fishery; however, most focus solely on fish stocks and habitat assessments.

9.2.3 Wildlife Habitat

Through a review of the information collected in the library, it is apparent that a minimal amount of information exists on Wildlife in the study area. There is much wildlife information included in the Okanagan Shuswap LRMP but this data does not include private property or reserve lands, and as such is considered incomplete. The majority of the reports collected as part of the library focus on red or blue listed species. There are a few documents which focus on the Salmon Arm bay habitat but these are limited to Western Grebe studies or viewing plans.

9.2.4 Water Quality

There are numerous water quality reports, which encompass many years worth of data. Although there are only a total of 21 documents on Water Quality, this section of the research is well documented in its current state. The Fraser Basin Council completed a full review of all data acquired by the then Ministry of Environment, Lands and Parks in the 1999 Stroh document "The Water Quality of Shuswap Lake From 1985 to 1998". Data continues to be collected by the Pollution Prevention section of the Ministry of Water, Land and Air Protection on a yearly basis. Data collected by the Ministry of Health was also made available for this project; however, much of this information is anecdotal and highlights only human health issues, such as swimmers itch and elevated coliforms levels.

9.2.5 Hydrologic interactions

The Hydrologic interactions focus on groundwater, aquifers and our influence on these. Parts of the hydrologic interactions in Shuswap and Mara Lakes have been studied for various other projects. The South Shore of the Main Arm of Shuswap Lake has been documented as part of the 1999 EBA Engineering report on the Environmental Study of the South Shuswap Official Community Plan Area. In addition, there was a study conducted on the Scotch Creek Aquifer by Golder and Associates in 1998. Although studies do exist they are limited in geographic scope and often are used as background information for other planning processes. There has not been a separate report, which focuses solely on the watersheds hydrologic interactions and the influences we can have upon them.

9.2.6 Anthropogenic activities

The research indicates a lack of recreational uses and values information for communities, as well as a distinct lack of holistic environmental documents. However, there were reports collected on access to park systems, park use, and log marshalling. Certain information can be extrapolated from Liquid Waste Management Plans as well as from water quality information to showcase human uses on the lake. Information has been collected as part of the Sicamous Narrows Dredging project as to the human activities, which occur within the Narrows. The majority of the information that has been collected does not focus on the lakes but rather were conducted to assess the Salmon River and have been included in this library for this reason.

9.2.7 Historic / Cultural sites:

Information interviews were conducted with all the local Archivist and Museum curators to identify key historic / cultural sites and documents for the library. Specific notation was recorded as part of the Information Interview report however, there were numerous documents collected during these interviews which have been included as part of the library. Many of these documents focus on unique pioneers of the Shuswap or homesteader stories that were included as part of the Shuswap Lake Chronicles.

There is a distinct lack of First Nations Cultural information as a result of their concerns with the misappropriation of their data. Some first nations pit house and pictographs have been noted, however, out of respect for the First Nations bands the library does not contain complete Cultural First Nations documentation. This information is available from each individual band on a case-by-case basis.

10 Discussion

During the Shuswap and Mara Lakes Aquatic/Development Fringe Study, the Habitat Steward with the Fraser Basin Council, facilitated communications between the Columbia Shuswap Regional District staff and board with other senior governments. Through this study common ground between various parties was established and each parties' intentions for their involvement in the process were communicated. In addition, employment by the Fraser Basin Council served as an asset, by providing different avenues and new levels of trust, during the data collection phase that may not have otherwise existed.

The local community knowledge is often over-looked by the scientific and regulatory community. This community knowledge, although lacking in technical scientific merit, is often the only first hand knowledge available. The communities, local organizations and professionals anecdotal knowledge expanded upon the existing studies collected during Phase 1 and 2 of the Study, and confirmed many of the conclusions. This process was necessary to allow for community buy-in into the study, as well as any future planning process by the Regional District and/or senior governments.

The information interview component of the study is significant as it helped, through the process of gathering the anecdotal knowledge, to raise the profile of the project. The study initiated and continues to provide a forum for open lines of communication between all partners. This forum assists in community understanding of regulations and allows decision makers to gauge community will. Gathering the professional and local information together was necessary in ensuring that the communities' information was given value. It is evident that the communication and open sharing of data will help to build trust and the capacity of community organisations to work together.

As a result of the study guidelines and deliverables being set by the partners, the compilation of the library and research of data has proven to be an asset to the regional district, as well as to the senior governments. Complete access to the information was made available so that it may be influential in all land management planning. Although at the time not completed, the study has already been utilized by two University College of the Cariboo students conducting research and two different consulting companies -

one working on the Liquid Waste Management Plans for the Regional District and the other working for the District of Salmon Arm.

As a result of the Ministry of Environment, Lands and Parks being amended to the Ministry of Sustainable Resource Management and the Ministry of Water, Land and Air Protection some data may have been unavailable. The Ministry of Sustainable Resource Management is developing a new branch within itself called '*Integrated data and information systems*'. This branch is to focus on compiling all 'on the ground' inventories and data collections, which have occurred through the various government agencies into one information-clearing house. In the future this information will be easier for the regional district to access and acquire, when expansion of this project occurs beyond the current study areas. It is not yet clear however, if other Governments will have their information included in this database.

10.1 Tools and Benefits

The study was implemented through the good will of the partners, as well as the political clout of the Fraser Basin Council. The tools used to implement the study are:

- ✧ Continued cooperation, through increased communications. from groups that usually did not work together
- ✧ Absolute buy-in, from the partners, for the study need.
- ✧ Partners identified end products.
- ✧ Partners assisted in developing the study guidelines and deliverables.
- ✧ End Products relevant and necessary for the development of future planning processes.
- ✧ Searchable database on-line to increase information dissemination.

The benefits of the Shuswap and Mara Lakes Aquatic/Development Fringe Study are:

- ✧ Gathered information into one place.
- ✧ Provided access to information that may have been lost over time.
- ✧ Passed on the knowledge to the decision makers.
- ✧ Raised the profile of the partners and the funders.
- ✧ Brought together people with a common interest in Shuswap and Mara Lakes.
- ✧ Facilitated communications between the Columbia Shuswap Regional District staff and board with other senior governments.
- ✧ Discovered common ground between the various parties that were often adversaries.
- ✧ Began to build levels of trust between agencies, ministries and the regional district.

- ✧ Potential expansion of the geographic scope of the study in the future.
- ✧ Ensured access to habitat information for land use management decisions.

10.2 Challenges/Obstacles

Although the Fraser Basin Council has done an admirable job in attempting to gather all of the known information into one place there were many challenges that had to be overcome during the completion of the final report.

- ✧ There is a high probability that out of the 217 documents collected, some documents, which should be included as part of this library, may not have been included. Over the years many reports have been created on Shuswap and Mara Lakes and it is the opinion of the researcher that although this library is expansive in it's content it is likely not complete as this would require many more years of work and would likely become a never ending lifelong project. However, this library does represent an extensive array of topics and information and is complete enough to make some observations for the information gap analysis.
- ✧ The project included a lack of direct cultural information from First Nations, since they expressed concerns with regards to a potential misappropriation of the data. Letters discussing the project intent and potential solutions to their concerns were sent to the Chief and Council of the Little Shuswap Indian Band, the Neskonlith Indian Band, the Adams Lake Band, the Spallumcheen Band and the Shuswap Nation Tribal Council (See *Appendix 2: Sample Letter - First Nations Information Request Letter*). The local First Nations Governments should be contacted directly by the Regional District, as they have the necessary information that the regional district will need to conduct their planning process. Thus, the regional district will have to work closely with the local First Nations bands to ensure that First Nations information is recorded and is considered during the planning processes.
- ✧ Mapping issues occurred in the display of the anecdotal knowledge collected. Much of the data collected was done with general placement and not specifically to scale. These issues along with the wide array of topics, and varying comments in similar geographic areas, contributed to the challenges faced by the GIS Analyst. Summarizing the data into like-minded topics and grouping them into index codes overcame these challenges. As noted above information scale issues were also a challenge. Data collect during various studies vary greatly in their range of scale. The GIS Analyst attempted to incorporate this data at the correct scales and then convert where necessary to our studies mapping scale. It is important to note that as a result of this issue some data scale discrepancies may occur.
- ✧ The development of the contact lists was another challenge of this study. There are many individuals who, over the years, have worked in a professional level on these two lakes. Tracking down and gathering information from all these parties has proven to be challenging. In addition, contacting and setting up interviews for all the

many different community user groups also presented some difficulties. Individual organizations, by their very nature have meeting schedule conflicts, volunteer turn over, and the continuous formation and disbanding of their groups. In some cases suggested leads proved difficult to trace but established community groups were more than cooperative.

- ✧ Unstable project funding challenged the implementation of this study. This study was funded by a joint partnership between the former Ministry of Environment, Land and Parks and Fisheries and Oceans Canada. During the Core Review undertaken by the Province, early in the new government's mandate, they did not identify a source for maintaining the provincial contribution for the final year of the agreement, and as a result there was a concern raised that the study would not be completed. However, thanks to the efforts of Deputy Ministers Jon O'Riordan and Derek Thompson the province was able to continue support for the Habitat Steward position and in turn the completion of the study. In addition, as a result of the unstable project funding, additional funds were required to produce the various technical maps for the study. These funds were sought via foundation support and were granted by the Real Estate Foundation to ensure that the remaining technical maps could be produced.

11 Conclusions

With the completion of this study British Columbians have complete access to documents that may influence how we use the land in and around Shuswap and Mara Lakes. Through the use of this study and its deliverables we can see how putting information in the right hands, will lead to knowledge and better on the ground management of British Columbia's resources.

Furthermore, the information interviews and subsequent compilation of data has provided for the first time, mapped un-recorded values for the Shuswap community. This project has helped to facilitate communications between the Columbia Shuswap Regional District and the senior levels of government, and was able to find common ground between the various users of the lakes and regional government, regardless of what brought the users to the table in the first place.

Some 650 people were contacted, with regards to acquiring information for this project, on behalf of the regional district, the Habitat Conservation Stewardship Program, the Ministries of Water, Land and Air Protection & Sustainable Resource Management, and the Fraser Basin Council. These individuals were given the opportunity to share and discuss their values, concerns and common issues around the lakes environs. Not only were they given a platform of which to speak on these issues but also their comments were mapped and recorded for posterity.

12 Recommendations

The following recommendations are for the project funding partners:

1. That this library and subsequent study be utilized by funding partner staff and board of directors to influence the planning processes in the Shuswap
2. That the local First Nations bands be contacted directly for information pertaining to their Traditional Use Studies to influence the planning processes in the Shuswap.
3. That this information be readily available and promoted for use by the public and consultants, to influence the planning processes in the Shuswap.
4. That the study be used as a framework for sensitivity mapping
5. That the study assists in the inclusion of fish and wildlife habitat, historic and cultural, recreation and water quality data in long term planning process.

Appendix 1

Shuswap Lake

A Delicate Balance



photo: R.C. Pelt



photo: Fraser Basin Council



photo: Duncan Myers



photo: R.C. Pelt



photo: Brian Chan

*A*s morning breaks over the lake you may catch a glimpse of an osprey soaring high above the trees. The rhythmic sound of the waves is broken only by the eerie call of a lonely loon. Slowly, as the community awakens, you begin to hear children laughing and the drone of outboard motors. Tucked quietly into a bay, a fisherman patiently waits to catch that infamous “big one”, while a great blue heron patiently pursues a catch of its own. At the height of the day, the lake and its users are all buzzing. While the water-skiers, speedboaters, kayakers, swimmers, rock climbers, mountain bikers, hikers, bird watchers, anglers and cliff jumpers enjoy their pastimes, Shuswap Lake functions in a delicate balance.

Shuswap Lake is in the southern interior of British Columbia, located in the Shuswap Highlands midway between Vancouver, B.C. and Calgary, Alberta. This multi-basin lake with over 1400 kms of shoreline is shaped like a crooked H. It can be divided into six sections or arms: Seymour, Anstey, Sicamous, Salmon (Tappen Bay), the Main or West Arms and Mara Lake, which is joined to Shuswap Lake at the Sicamous Narrows. The lake's maximum depth is 161 m but on average it is only 62 m deep and has a surface area of 310 km². Several streams, creeks and rivers flow into the lake. The lake empties into the South Thompson River through Little Shuswap Lake, and eventually becomes part of the Fraser River System.

Shuswap Lake is one of the few large lakes in B.C., which is not controlled by dams. The lake rises and falls an average of 3 m annually, its catchment (or watershed) drains an area of 16,200 km². As a result of the large drainage area and small surface area, the water inside the lake is replaced about every two years.

The landscape around the lake consists of coniferous forests dominated by Cedar and Hemlock to the North and East, while Douglas-fir is found to dominate the South and West. White birch and cottonwood line the shorelines and settled areas. At the top of the Northern-most arms of the lake, there are about 20,000 ha of old growth forest and wetlands which have been protected as a newly created provincial park.



Rubber Boa

photo: Karl Larsen

In the Fraser River system Shuswap Lake is the largest producer of sockeye salmon. The Lake, its tributaries and its surrounding vegetation are a key source of food and rearing habitat for fish and wildlife, and are fundamental to the survival of many unique species in the area such as the rubber boa and the trumpeter swan. Seventy per cent of the important commercial or recreational fish species in the lake depend on the lake's shoreline habitats for their survival. The Shuswap is an important low elevation nursery lake where practically every stream, creek or river supports at least one species of salmon.

Some 250 species of birds migrate to the Shuswap to use the surrounding habitats. Salmon Arm Bay is one of only two places in B.C. where Western Grebes breed.

ECOLOGY OF THE LAKE
The lake's fragile ecosystem is comprised of the water, the surrounding shoreline, and the plant and animal communities that live within them. Habitats for both fish and wildlife provide shelter, food, water and breathable oxygen, allowing the organisms to carry out their basic life activities – feeding and reproduction. The shoreline habitats of the lake are key to providing these basic needs. The near-shore shallows, which are known as littoral areas, are the most productive. This productivity is linked to what happens in the upland and the rocky lakeshore habitats.

Riparian Zones are those areas that are found immediately beside the water. Riparian vegetation is made up of the trees, shrubs and other plants that depend on moisture to survive. These plants provide cooling shade to the shallow waters, while their roots provide shelter and help to protect the shoreline from erosion. The riparian vegetation provides habitats for many wildlife species such as deer, moose, frogs, salamanders and songbirds.

The greatest varieties of aquatic species are found in the **Vegetated Shoals** of the lake. These areas have high nutrient levels, and provide food and shelter for many different species including the young stages of many insects. In this habitat, aquatic plants stabilize the lake bottom from the lake's wave actions.

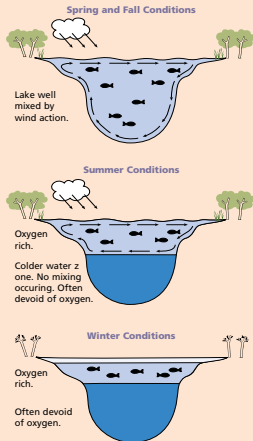
The deeper (5-10+ m) **Rocky Lakeshore Habitats** are where many of the fish species lay their eggs. These rocky gravelly areas provide protection for the eggs in the fall, and in early spring provide cover and food sources until the newly hatched fish are big enough to move into the near-shore habitats to feed.

LAKE PROCESSES

Life within a lake is dependent on two factors — oxygen and sunlight. Lakes receive their largest amount of oxygen through surface exchanges between the air and water. Since Shuswap Lake seldom freezes over completely, this exchange continues throughout the year.

Sunlight contributes to oxygenation by stimulating plant growth. This growth usually occurs in the shallow areas of the lake, as sunlight can't easily penetrate deeper water. The maximum storage of oxygen occurs when the water is at a temperature of 4°C. The sunlight can also warm the water and reduce its capacity to store dissolved oxygen.

If you have swum in the lakes, you will have noticed that temperatures vary at different depths. This layering of different temperatures in the water is called stratification and sometimes this leads to what is known as “turnover”. Turnover usually occurs in the spring and fall, and causes the layers to mix.



Denser (cooler) water is near the surface in the spring, and winds can push the water violently toward the bottom of the lake causing the lower warmer water to rapidly rise to the surface. When this occurs you will observe weeds and oil-like slicks, which may remain for several days on the lake surface. This is not a dangerous condition and usually only occurs in the shallower portions of the lake. In the fall, the same can occur as the lake begins to cool and sunlight is reduced.

Oxygen can be removed from a lake through the decomposition of plant and animal matter. As light penetration decreases with the approach of fall, it slows plant growth, reducing the conversion of carbon dioxide until the plants eventually die. As part of the natural process, the same plants that contributed to the oxygen supply by converting carbon dioxide can now strip the oxygen from the water as they decompose.

Algae are also plants. If you scoop a glass of water from the lake, you will notice that it contains little green tea leaves or cylinders. This is algae, and it is natural to the lake. Algae depend on sunlight for oxygen, and dissolved nutrients for food. In some years, when there is a long summer filled with sunny days, the arms of the lake can turn green as the algae spreads. This is called an algae bloom.

The nutrient balance in a lake is key to the survival of life. Just like a plant that gets sick if it is given too much fertilizer, so too does the lake and its organisms. We often alter the natural levels of nutrients in lakes through our developments and recreational activities.

Surface water runoff, groundwater contamination, direct discharge of septic systems into the lake, storm water runoff, lawn fertilizers result in elevated levels of nutrients. These nutrients feed algae and may result in the formation of an algae bloom.

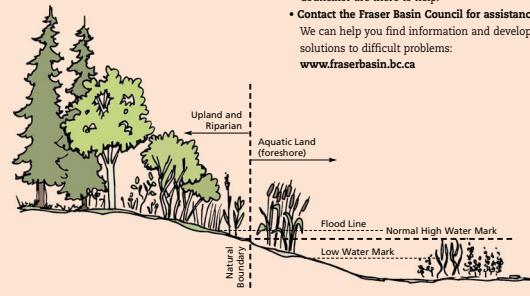
If the algae bloom is large enough, it will reduce the amount of sunlight reaching other aquatic plants, causing them to die. As plants, including algae, die and begin to decompose, they increase the removal of needed oxygen from the water; leaving other organisms oxygen deprived and will seriously impact the lake's ecology.

WHAT CAN THREATEN THE LAKE?

Large lakes are a delicate balancing act between the life above and below the waters. Both these components depend on each other to support a fragile and complex ecosystem. The health of the lake is impacted through the loss of riparian habitat by poorly planned development, by modification of foreshores, and by increased recreational and lakeshore access.

Water quality is impacted by the increase of nutrients from groundwater or surface water. Upland development and riparian vegetation removal can increase the amount of erosion and sediment in these two habitats. Sediment can fill the cracks in the rocky lakeshore, destroying fish spawning grounds. Increased nutrients entering the lake from improperly maintained septic systems can stimulate plant life and bacteria, and cause events such as green algae blooms, or alter natural insect populations and fish and bird food sources.

Dock and beach alterations have great influence on water currents and can result in habitat destruction. Removal of coarse materials from these shoreline habitats will severely impact the spawning of fish.



WORKING TOGETHER

Human activities such as settlement, recreation, industrial activities, forestry, mining and agriculture can have an impact on the water quality, the fish and the wildlife.

To keep the lakes delicate balance, you can...

- Ask before you do!** Before doing any works in or around the lake, contact your local government, band council, Environment Ministry or Department of Fisheries and Oceans office.
- Protect the shoreline.** Leave woody debris, vegetation and rocks where they are. This will maintain existing fish and wildlife habitat.
- Maintain your septic system.** Toxins and nutrients introduced into the lake can seriously alter the water chemistry.
- Screen your water intake systems.** Without screens, aquatic organisms are drawn into your system and killed.
- Keep stocks wild.** Never transport live fish or other organisms from one water body to another.
- Observe, Record and Report.** If you notice practices harmful to the lake, notify your local RCMP detachment, provincial Conservation Service and/or Fisheries and Oceans office.
- Educate, Cooperate and Participate.** Get involved in local community groups and planning processes.
- Learn boating safety and follow guidelines and restrictions.** These guidelines not only protect you and the local residents, but also help sustain the natural beauty of the lake and will keep you coming back for years.
- Ask your elected representative for help.** Your member of Parliament, member of the Legislative Assembly, Regional District, Municipal Representative and local Band Councillor are there to help.
- Contact the Fraser Basin Council for assistance.** We can help you find information and develop solutions to difficult problems: www.fraserbasin.bc.ca



photo: BCWF

Appendix 2

Fraser Basin Council – Thompson Region
1383 McGill Road
Kamloops, BC V2C 6K7

Sample Address

February 17, 2003

Attn: Chief XXXX XXX and XXXXX Indian Band Council,

Re: Traditional Use Study Information Request

The Fraser Basin Council is collecting and reporting on existing information on Shuswap and Mara Lakes. This information is being collected as part of partnership with the Habitat Conservation Stewardship Program of the Department of Fisheries and Oceans Canada, the Ministry of Water, Land and Air Protection, the Ministry of Sustainable Resource Management, the Columbia Shuswap Regional District, and the Fraser Basin Council. It will be used to provide the regional district and the community with the data required to develop technically sound documents and background research into values around the lakes.

We understand that first nations have traditional use information, for Shuswap and Mara Lakes. We would like to include this information as part of our study. This is an opportunity to include your communities values and culture in this library and, in turn, the planning processes of the regional district. We are aware of the cultural sensitivities of this information and the potential for its misappropriation and as such we are suggesting a unique opportunity to ensure the protection of your communities values – but assist in the community planning processes.

It is our hope to incorporate your communities traditional use values in the library as a simple reference which would highlight the potential types of information that could be available should the researcher directly request this information from the band and council. This would ensure that the regional district is aware of the existence of documented traditional use values of your community. In addition, we would encourage the regional district to communicate with your band and council regarding development proposals in your traditional use areas.

Should the band and council be interested in participating in this opportunity we would simply require a simple reference page of the available documents, an executive summary of the type of information available in those documents and contact information should an individual or the regional district be interested in accessing your data.

Thank you for the opportunity to discuss our works. Please contact me should you need any clarification in our request.

Sincerely,

Jennifer Krotz, Assistant Regional Coordinator
Fraser Basin Council – Thompson Region