Koocanusa Reservoir Sensitive Habitat Inventory Mapping – Phase 1
Final Report
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Prepared with financial support of the Fish and Wildlife Compensation Program on behalf of its program partners BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations and public stakeholders.
The East Kootenay Integrated Lake Management Partnership (EKILMP) has worked together since 2006 to address the intensification of shoreline development pressures on lakes in the Kootenay Region.

The Partnership is made up of federal, provincial, regional, municipal and First Nations governments, community representatives as well as non-government organizations. This collaborative adopted Fisheries and Oceans Canada's methodology for Sensitive Habitat Inventory Mapping (SHIM). SHIM helps to develop and implement guidelines for shoreline development that protects existing fish and wildlife values and conserves ecosystems and species of conservation concern.

To date, EKILMP has completed projects for Windermere Lake, Columbia Lake, Wasa Lake, Moyie Lake, Monroe Lake, Tie Lake, Rosen Lake, St. Mary’s Lake, and Jimsmith Lake. The reports can be viewed at ekilmp.com.

In 2015, EKILMP initiated Sensitive Habitat Inventory Mapping projects for the Canadian portion of Lake Koocanusa. Foreshore Inventory and Mapping, and Fish and Wildlife Habitat Assessment were completed during July and September.

The Foreshore Inventory and Mapping (FIM) identified the land use, shore type, existing riparian condition, and anthropogenic alterations along the foreshore of Lake Koocanusa. The field team used a Trimble GPS unit to map approximately 160km of shoreline and document modifications. Based on this data, the shoreline was broken into 57 segments. The FIM serves as a benchmark for regulatory agencies by documenting current foreshore condition and structures such as docks and mooring buoys.

The Fish and Wildlife Habitat Assessment identified 17 sampling sites spanning a variety of shore types, including low rocky shore, sandy beach, cliff/bluff, and creek mouth. Fish, bird and wildlife habitat and occurrence and aquatic invertebrate presence/absence data was collected in July and September to capture fish and wildlife various breeding, rearing and migration timeframes.

Some observations of note included: the presence of juvenile yellow perch in the reservoir; the high value habitat and cold source water provided by the limited number of tributaries; and, the extensive Off Road Vehicle use in the drawdown zone.

Critical nesting habitat for the long-billed curlew was also identified. While provincial government agencies have previously identified long-billed curlew habitat, and implemented protection mechanisms by designating the lands as Wildlife Habitat Areas, new nesting locations were recently identified by the East Kootenay Integrated Lake Management Partnership.
The next step for Lake Koocanusa will be to conduct the low-pool survey, and conduct the data assessment to complete the Aquatic Habitat Index and corresponding Shoreline Management Guidelines for Lake Koocanusa. The index will identify habitat values and level of risk associated with shoreline modifications. EKILMP looks forward to sharing and discussing the results with the lake communities, and receiving feedback.
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1. Introduction

Koocanusa Lake is a reservoir formed by the creation of the Libby Dam in Montana in 1973 (Figure 1). Since then, land use pressures have escalated including off-road vehicle use, informal camping, shoreline disturbance, and water quality concerns resulting from upstream mining activity.

Sensitive Habitat Inventory Mapping (SHIM) is a protocol developed by Fisheries and Ocean Canada. It provides decision-makers, planners, developers, landowners and government agencies with the tools required to make sustainable foreshore land use decisions that take into account cumulative impacts to fish and wildlife habitats. The resulting Shoreline Management Guidelines are used as an initial step when reviewing, planning for, or prescribing alterations along the shoreline. This approach provides a science-based assessment of areas of highest natural value requiring the highest level of ongoing protection. Shoreline Management Guidelines can also be used when assessing shoreline property values through BC Assessment. Projects have been completed for nine lakes across the East Kootenay, and are underway for two additional lakes in the West Kootenay. Guidelines have been implemented into local planning policies for two lakes, and partnership continues to support the implementation of the remaining guidelines into policy.

The Sensitive Habitat Inventory Mapping program has three stages:

1. Foreshore Inventory Mapping (FIM)
2. Fish and Wildlife Habitat Assessment
3. Shoreline Management Guidelines

FIM assists in identifying the land use, shore type, existing riparian condition, and anthropogenic alterations along the foreshore. Based on this data, the shoreline is broken into a number of segments. The FIM serves as a benchmark for regulatory agencies by documenting current foreshore condition, and provides evidence for regulatory investigations and will assess objectives set out in foreshore protection initiatives.

The Fish and Wildlife Habitat Assessment uses scientific analysis to identify zones of sensitivity and key habitat features, and rank shoreline segments using the Aquatic Habitat Index (AHI). Fish, bird and wildlife habitat and occurrence and aquatic invertebrate presence/absence data is collected during the summer and fall over a one-year period. The AHI quantifies the Ecological Value for each shoreline segment and identifies the potential if anthropogenic alterations were to be removed.
The information analysis and resulting Shoreline Management Guidelines are used as an initial step when reviewing, planning for, or prescribing alterations along the shoreline. This approach provides a science-based assessment of areas of highest natural value requiring the highest level of on-going protection. EKILMP believes the Guidelines will help focus where new development could be located on the lake while sustaining priceless natural public assets and maintaining the economic viability of the area.

SHIM helps build local expertise and allows communities to take a more active role in planning and management.

Due to overwhelming interest from lake stewardship groups across the East Kootenay to have the SHIM process completed for their lakes, EKILMP developed a list of criteria to be considered a priority for SHIM. This includes: heavy development pressures; land use planning in place or underway; presence of a motivated local group; cooperative partners present; source water issues; and, high fish, wildlife and archaeological values. Koocanusa has been identified as the next priority lake by the partnership (see table 1).

Lakes completed:
- Lake Windermere
- Columbia Lake
- Wasa Lake
- Moyie Lake
- Monroe Lake
- Jimsmith Lake
- St. Mary Lake
- Rosen Lake
- Tie Lake

In recognition of the success of the East Kootenay Integrated Lake Management Partnership, a similar initiative was created in the West Kootenay in 2011, to focus on inventory and mapping projects for West Kootenay lakes. This initiative is called the Kootenay Lake Partnership and leading the initiatives for the two additional lakes.

Lakes underway:
- Kootenay Lake
- Slocan Lake
Table 1: Lake Koocanusa Priority Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Lake Koocanusa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy development pressure</td>
<td>High number of seasonal visitors and day-users including off-road vehicle use and informal camping on Crown Land.</td>
</tr>
<tr>
<td>Land use planning in place or underway.</td>
<td>Baynes Lake Official Community Plan 2011.</td>
</tr>
<tr>
<td></td>
<td>South Country Zoning and Floodplain Management Bylaw.</td>
</tr>
<tr>
<td></td>
<td>Lake Koocanusa Official Community Plan 2013.</td>
</tr>
<tr>
<td></td>
<td>Watershed Action Plan underway.</td>
</tr>
<tr>
<td></td>
<td>Lake Koocanusa Land-Use Area Analysis underway.</td>
</tr>
<tr>
<td>Presence of a motivated local group.</td>
<td>The Lake Koocanusa Community Council has identified stewardship of the lake as a priority.</td>
</tr>
<tr>
<td>Cooperative partners present.</td>
<td>The Regional District of East Kootenay and provincial government are represented and involved in EKILMP.</td>
</tr>
<tr>
<td>Source water issues.</td>
<td>Erosion potential of foreshore can result in increased sediment load.</td>
</tr>
<tr>
<td></td>
<td>Individual drinking water systems are located on the lake.</td>
</tr>
<tr>
<td>High fish and wildlife values.</td>
<td>Encompasses trans-boundary migratory routes and part of the Pacific Flyway.</td>
</tr>
<tr>
<td></td>
<td>Surrounding lands provide winter range for ungulates, habitat for wildlife and endangered plant species and provincially listed red and blue mammals and birds.</td>
</tr>
<tr>
<td></td>
<td>Lake and tributaries support an abundance of sport fish and provide spawning/rearing habitats for a variety of species.</td>
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</tbody>
</table>
### Fish Values

Koocanusa contains a productive fishery for a variety of species, though a primarily pelagic food web. While populations of adfluvial salmonids (bull trout and kokanee) are relatively well studied in spawning and rearing streams, the habitat use and shoreline associations of these and other species is poorly characterized in Koocanusa relative to other large lakes and reservoirs in the Kootenay region. Focal species that are of conservation concern, are highly exploited by recreational fisheries and significant for traditional use by First Nations include kokanee, rainbow trout, cutthroat trout, bull trout and burbot. Burbot may be particularly sensitive to shoreline habitat disruption in Koocanusa due to reservoir operations due to spawning habitat requirements and migratory behaviour. Spawning and associated migrations occur during the reservoir drawdown period in late winter. It is possible that operations may cause dewatering of burbot spawning areas or reduction in suitability of spawning habitat for fish that spawn in shallow habitats. For fish that ascend streams to spawn or spawn in stream confluence areas, operations may restrict access or spawning site suitability.

While some data has been compiled on fish occurrence and abundance on shoreline areas in Koocanusa and in tributaries, the area is largely data deficient and will require field sampling to determine species occurrence and abundance. In addition, shoreline habitat use may change depending on reservoir elevation at different periods of the year, and be dynamically responsive to changing habitat conditions as a result of sediment transport and shoreline erosion. Fisheries values will have to accommodate the dynamic nature of such changing habitat conditions in the reservoir.

### Wildlife Values

An abundance of important wildlife habitat surrounds the reservoir and many species utilize the foreshore for some of their life requisites. Five ungulate species inhabit the area and several threatened and endangered species occur in the upland habitats. One species of concern, the long-billed curlew, nests along the shoreline of Koocanusa. Unfortunately, one colony nests within the draw down zone and their nests are inundated each spring when the reservoir level increases. Many other species such as cavity nesting ducks and raptors, and mammals such as grizzly bear are dependent on shoreline attributes found along the shores of the reservoir.

### 2. Goals and Objectives

The goal of the Lake Koocanusa Sensitive Habitat Inventory Mapping project is to complete a comprehensive aquatic monitoring strategy that will guide foreshore development in a manner that protects the ecological and cultural health of the lake.
The objectives of the project are:

- Greatly improve information about the fish, wildlife and archaeological values of Lake Koocanusa;
- Develop science-based coordinated management guidance for land and water uses associated with Lake Koocanusa, and promote the application of this guidance in decision-making by all levels of government including First Nations, developers, planners, and all other interests;
- Liaise with related initiatives to enable aquatic and terrestrial ecosystem monitoring to effectively contribute to a cumulative effects assessment and an improved understanding of the overall health of the lake ecosystem; and,
- Facilitate information sharing and encourages collaboration amongst the community to efficiently and effectively coordinate and integrate land use decision-making.

3. Study Area

Figure 1: Map of study area outlined
4. Methods

The Foreshore Inventory and Mapping methodology is based upon mapping standards developed for Sensitive Habitat Inventory Mapping (SHIM) (Mason and Knight, 2001).

Fieldwork was conducted during July, 2015 (at reservoir elevation level 2,444 ft), and September, 2015 (at reservoir elevation level 2,459 ft).

The Foreshore Inventory and Mapping (FIM) identified the land use, shore type, substrate, existing riparian condition, and anthropogenic alterations along the foreshore of Lake Koocanusa. The field team travelled the length of the shoreline via houseboat, and used a Trimble GPS unit to map approximately 160 km of shoreline and document modifications. Based on this data, the shoreline was broken into 57 segments (see Figure 2). The FIM serves as a benchmark for regulatory agencies by documenting current foreshore condition, and provides evidence for regulatory investigations and will assess objectives set out in foreshore protection initiatives.

The Fish and Wildlife Habitat Assessment identified 17 sampling sites (see Figure 2) spanning a variety of shore types, including low rocky shore, sandy beach, cliff/bluff, and creek mouth. Fish, bird and wildlife habitat and occurrence and aquatic invertebrate presence/absence data was collected in July and September to capture fish and wildlife various breeding, rearing and migration timeframes. Fish sampling was conducted using snorkel, beach seine, and gee-trap protocols, macro-invertebrates were sampled using Pacific Streamkeepers Federation protocols, and wildlife sampling was conducted using observation techniques.

The following additional information was collected during field surveys:

- **Biophysical**
  - Shore type
  - Substrate
  - Percentage natural
  - Aquatic vegetation
  - Overhanging vegetation
  - Large woody debris
  - Pocket beach

- **Fisheries**
  - Juvenile rearing
  - Migration corridor
  - Staging area

- **Terrestrial**
  - Veteran trees
  - Snags
  - Wildlife corridor

- **Modifications**
  - Retaining walls
  - Docks
  - Groynes
  - Boat launches
  - Staircases
  - Marinas
  - Mooring buoys
  - Swimming platforms
  - Breakwaters
  - Pillings
  - Unorganized camping
  - Cattle access
  - Livestock fencing
  - Evidence of ORV use
Figure 2: Koocanusa Foreshore Inventory Mapping map
5. Results and Outcomes

The East Kootenay Integrated Lake Management Partnership has achieved significant successes with Phase 1 of the Koocanusa Reservoir Sensitive Habitat Inventory Mapping Project. The partnership completed the Foreshore Inventory Mapping component and the mid- and high-pool surveys and Fish and Wildlife Habitat Assessments.

Some observations of note included: the presence of juvenile yellow perch in the reservoir; the high value habitat and cold source water provided by the limited number of tributaries; and, the extensive Off Road Vehicle use in the drawdown zone.

Critical nesting habitat for the long-billed curlew was also identified. While provincial government agencies have previously identified a few parcels of long-billed curlew habitat, and protected them by designating the lands as Wildlife Habitat Areas, new nesting locations were recently identified by the East Kootenay Integrated Lake Management Partnership.

Long-billed curlew are Blue-Listed in British Columbia, and federally listed as a Species of Special Concern. Urbanization, forest encroachment due to fire suppression, noxious weeds, conversion of native grasslands to agricultural crops, and soil erosion and recreational disturbances all threaten these shorebirds that are protected under the provincial Wildlife Act and federal Migratory Birds Convention Act.

Both EKILMP and the communities surrounding Lake Koocanusa have an opportunity to further protect the long-billed curlew by identifying these habitats as conservation zones within the Shoreline Management Guidelines.

In partnership with the Lake Koocanusa Community Council, EKILMP hosted a public open house, BBQ and dialogue with community members during the July field sampling event. Approximately 25 individuals attended to learn about the project and view maps of the reservoir provided by EKILMP. Attendees asked thoughtful and pertinent questions regarding the project and outcomes, and also discussed relevant issues surrounding the reservoir, such as Off Road Vehicle use, reservoir levels and timing, and land-use and development.

A newsletter was created and circulated to the community, and was also made available to community members during the field events. Stops were made at various communities to welcome members of the public on board the field crew’s boat to talk about issues surrounding the reservoir and learn more about the goals and objectives of the SHIM project.
6. Acknowledgements

The following parties carried out fieldwork for Phase 1 of the project:
Bruce MacDonald, Fish Habitat Biologist, Fisheries and Oceans Canada (retired), Terra Limnic Consulting
Peter Holmes, Ministry of Forests, Lands and Natural Resource Operations
Heather Leschied, East Kootenay Integrated Lake Management Partnership Coordinator
Walter Kehler, Lake Koocanusa Community Council

Funding and or inkind donations for this Project were provided by the following different agencies or parties:
Fish and Wildlife Compensation Program
Regional District of East Kootenay
Ministry of Forests, Lands and Natural Resource Operations
Wildsight
Living Lakes Canada
Lake Koocanusa Community Council
Sunshine Houseboats Ltd.

7. References


8. Confirmation of FWCP Recognition

Recognition of FWCP’s support has been given where applicable including:
• East Kootenay Integrated Lake Management Partnership Summer 2015 newsletter.
• www.ekilmp.com

Attachments

The following documents are attached to this report:

• Statement of Accounts and supporting documents
• Fisheries and Oceans Canada StreamTalk newsletter
• EKILMP Summer 2015 newsletter