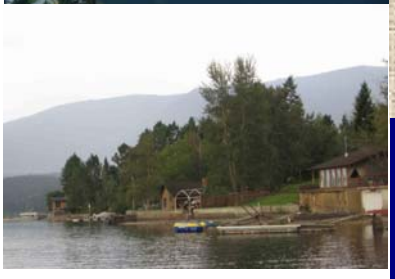


# Windermere Lake
# Foreshore Inventory and Mapping

**Prepared for:**
**East Kootenay Integrated Lake Management Partnership**

**Sherri McPherson, B.Sc. and David Michel.**

**Interior Reforestation Co. Ltd.**

INTERIOR REFORESTATION CO. LTD.

**Final Report**

**June 2007**

**Suggested Citation:**
McPherson S and D. Michel. 2007. Windermere Lake Foreshore Inventory and Mapping. Consultant report prepared for the East Kootenay Integrated Land Management Partnership. Prepared by Interior Reforestation Co. Ltd., Cranbrook, BC.

# Executive Summary

The study area for this project is Windermere Lake, located in the southern interior of British Columbia. In August 2006, members of the East Kootenay Integrated Lake Management Partnership ([EKILMP] including staff from the Department of Fisheries and Oceans, Ministry of Environment and Wildsight) conducted a detailed inventory of the foreshore of Windermere Lake. The objective of the inventory was to provide an overview of the lake foreshore habitat condition. Information was collected on foreshore morphology, land use, riparian condition and anthropogenic alterations. The survey used Global Positioning System (GPS) technology and detailed digital shoreline video to capture foreshore characteristics. In October 2006, Wildsight obtained additional information, through a detailed field survey of retaining walls around the lake. Interior Reforestation Co. Ltd. was provided with the data from these two surveys and was commissioned to report and map the findings.

The results show that railway, residential, private recreational, parks and commercial uses have compromised the integrity of over half of the foreshore area of Windermere Lake. Anthropogenic alterations include riparian vegetation removal and construction of foreshore modifications (including retaining walls, docks, groynes, boat houses, marinas and boat launches). Retaining walls in particular have been built along substantial portions of the residential and private recreational areas, with nearly half of these constructed below the high water mark. There are concerns that these modifications are fragmenting and degrading foreshore habitats that are relied on by a variety of aquatic and terrestrial species. Despite these foreshore impacts, nearly half of the foreshore of Windermere Lake remains undisturbed. The undisturbed areas present management with both challenges and opportunities.

The information collected will aid all levels of government and organizations overseeing foreshore and upland developments. It serves as a benchmark by documenting land use and riparian habitat changes, necessary for the development of regulations, standards, policies and education materials. The ultimate goal of raising public awareness to ensure community stewardship to protect the inherent values of Lake Windermere is passionately desired. Several recommended actions are proposed, including: developing a foreshore protection plan, determining carrying capacity, conducting additional inventories to determine sensitive species and habitats, addressing modifications, conducting monitoring and further involving the community.

# Acknowledgements

Interior Reforestation (IR) would like to thank the Department of Fisheries and Oceans for funding the development of this report. IR would also like to acknowledge the following individuals for their contributions to this project:

| | |
|---|---|
| Amber Ashenhurst | Biologist, Interior Reforestation Co Ltd |
| Jon Bisset | Senior Biologist, Manager, Interior Reforestation Co Ltd |
| Tola Coopper | Habitat Biologist, Department of Fisheries and Oceans. |
| Laurie Cordell | Planner, Regional District of East Kootenay |
| Merideth Hamstead | Director of Development Services, District of Invermere |
| Peter Holmes | Ecosystem Biologist, Ministry of Environment |
| Heather Leschied | Program Assistant, Lake Windermere, Wildsight |
| Brad Mason | Senior Habitat Inventory Biologist, Department of Fisheries and Oceans |
| Jeff Nicolajsen | GIS Mapping Technician, Regional District of East Kootenay |

These individuals provided valuable assistance by providing data, project direction, mapping support, and/or knowledge of Windermere Lake. Their involvement was integral to completion of this report, and was greatly appreciated.

# Table of Contents

# List of Tables



# List of Figures

# List of Appendices

# 1 Introduction

Windermere Lake is an attractive tourist, recreation and retirement area, with its 36 km of shoreline and warm waters. The lake's popularity has resulted in a steady increase in the density of shoreline dwellings and in the area leading the East Kootenays in growth and development (RDEK 2007a). Alberta's strong economy has particularly fuelled the increased development around the lake, and this growth trend is anticipated to continue into the future (RDEK 2007a). Although tourism derived from the lake is important to the growing local economy, the community's dependence on the lake for drinking water and recreation has resulted in concerns being raised about the influences of human activities (Masse and Miller 2005, Fedrigo 2006). Observations from lake users and interview data collected indicates serious concerns with crowding at the lake, and serious impacts on lakeshore habitats from shore land development (Fedrigo 2006)

The East Kootenay Integrated Lake Management Partnership (EKILMP [*See* Appendix A]) formed in early 2006 in response to concerns made by the public, resource agencies and non government organizations over the very fast pace of foreshore development in the East Kootenays (EKILMP 2006). The EKILMP's aim is to protect lakes in the East Kootenays by producing land use and development guidance, encouraging more integrated and coordinated approaches, as well as providing guidance on best practices and restrictions of use where necessary (EKILMP 2006). Due to the intensity of new development pressure, the EKILMP decided to use Windermere Lake as a pilot for a Sensitive Habitat Inventory Mapping (SHIM) project of the shoreline. The shoreline inventory and analysis would provide a framework upon which ecologically based long term lake management guidelines could be developed (EKILMP 2006). EKILMP personnel conducted Field reviews in the summer of 2006, and Interior Reforestation Co. Ltd. (IR) was commissioned by the EKILMP to use the data and prepare a comprehensive SHIM report. This SHIM report is to be used by EKILMP to help develop science-based coordinated management guidance for land and water uses associated with Windermere Lake, and promote the application of this guidance in decision-making by all levels of government, developers, planners and all other interests (EKILMP 2006).

## *1.1 Foreshore Significance*

The foreshore area of Windermere Lake is the primary focus of this report. The foreshore is defined as the part of the shore between the high and low watermarks and is an important link between the aquatic and terrestrial environments**.** The foreshore is known to have important biological and ecological significance and is extremely sensitive to disturbance (RDCO 2005). These areas also hold important social significance for their residents (human and otherwise) (RDCO 2005). Foreshore ecosystems function upon intricate relationships, provide living space for permanent and transitory species, and support primary production and food webs (Batelle 2001).

Often, shoreline development results in alterations of the foreshore environment. When the natural shoreline is altered, the intricate balance between the creatures, plants and processes can easily be toppled (Department of Fisheries and Oceans [DFO] 2007). Urban Systems (2001) identifies a number of possible impacts that developments along the foreshore may have on the environment including:

1) the habitat may be totally altered (e.g. by draining marshes) impacting waterfowl and spawning/rearing ground for fish;
2) structures along the foreshore may alter natural patterns of erosion (removal of land) and accretion (deposition of land), potentially negatively impacting fish and wildlife habitat;
3) potential fuel spills (e.g. from marinas) could contaminate the water affecting drinking water and recreation areas, and impact insect larvae; and

4) increases in nutrient supply could cause algal blooms, impacting water quality for human consumption, fish and other species dependant on the water.

Protecting the foreshore environment is often a difficult task for land managers. The Regional District of Central Okanagan, in their SHIM report for Central Okanagan Lake (2005), provided the following synopsis of difficulties faced with providing protection to the foreshore:

> *Historically, the long-term effects of foreshore disturbance were not well understood, resulting in inadequate protection, a cumulative loss of foreshore habitats, and ultimately, public and agency frustration over management of the foreshore. There are numerous reasons for such widespread frustration: the difficult task of coordinating a large-scale effort in managing resources over multiple jurisdictions and agencies; lack of inter-agency cooperation and program integration; limited funding resources; and limited consequences for foreshore degradation. These challenges often lead to further frustration by landowners, developers, and government staff alike. Foreshore ecosystems continue to be the subject of development pressure, which further compromises ecosystem function. The lack of comprehensive information on foreshore ecosystem relationships makes foreshore management difficult*.

## *1.2 Foreshore Management*

Currently, the Upper Columbia Valley Zoning Bylaw (RDEK 2007a) administers development within the Regional District of East Kootenay (RDEK), in the Lake Windermere area. Although this zoning bylaw determines what can occur on an individual parcel of land, it does not provide an overall plan guiding land use change or implement a community vision (RDEK 2007a). To address this, the development of an Official Community Plan (OCP) is currently underway (RDEK 2007a). The foreshore concerns the OCP is to consider include local environmental and natural resource issues, local parks trails and green spaces, and protection from and potential constraints against development within environmentally sensitive areas (RDEK 2007a).

A Foreshore Policy document was adopted in 1993 for the east side of Windermere Lake (RDEK 1993). The Foreshore Policy provides background on the area, jurisdictional responsibilities, authorizations required, and lake status (RDEK 1993). The policy also identifies key issues such as the need to protect water quality, a need for improved public access planning, foreshore development issues and erosion and accretion problems (RDEK 1993). The Foreshore Policy requires updating, as it was only meant to provide interim guidance for development in advance of the OCP being developed (RDEK 1993). It is recommended that it also consider current standard practices, and include the whole foreshore of Windermere Lake.

As a result of a steady increase in the number of people moving to the area, development pressures on natural resource values in the Columbia River valley area in the East Kootenays have been substantial over the past decade (EKILMP 2006). In association with preparing the OCP, management agencies have been striving to better deal with the increased numbers of development proposals by improving coordination of efforts and communications, and providing consistent policy information and direction. The EKILMP, which is made up of stakeholders with common concerns and joint responsibilities, have combined resources to address issues of concern in an integrated way (EKILMP 2006). Due to the combined pressures of providing timely and cost effective reviews of proposals to determine cumulative impacts, and interests in sustaining water quality in the lake (for aquatic life, recreation and drinking water), the EKILMP decided to use Windermere Lake as a pilot for demonstrating the advantages of an integrated and collaborative approach to lake management (EKILMP 2006).

## 1.3 Purpose of the Foreshore Mapping and Inventory Project

The purpose of the Windermere Lake Foreshore Inventory and Mapping project is to provide baseline information for future decision-making about development of the Windermere Lake foreshore. The project is intended to help partnering agencies identify the ecological condition of the foreshore, evaluate resource values, and explore conservation and restoration opportunities associated with lakeshore habitats. The information will be useful for local, regional, provincial, and federal organizations when addressing development issues related to foreshore sensitivity.

The project will also provide agencies with an easily accessible inventory of land use, shore type, existing riparian condition, and anthropogenic alterations along Windermere Lake. It will aid in developing land use policies, regulations and standards; and is intended to increase long-term environmental capabilities for the protection of aquatic and riparian habitat within existing local government land use planning programs. The project will serve as a benchmark for regulatory agencies by documenting current foreshore condition, and it will also provide evidence for regulatory investigations and will assess objectives set out in foreshore protection initiatives.

## 1.4 Objectives of the Foreshore Mapping and Inventory Project

The objectives of this project are to:

- provide an overview of foreshore habitat condition on the lake;
- inventory foreshore morphology, land use, riparian condition and anthropogenic alterations;
- obtain spatially accurate digital video of the shoreline of the lake, made available through Geographic Information Systems (GIS);
- develop an easily accessible GIS database on the ecological integrity of the lake foreshore;
- collect information that will aid in prioritizing critical areas for conservation and or protection;
- make the information available to planners, politicians and other key referring agencies that review applications for land development approval; and
- integrate information with upland development planning, to ensure protection of sensitive foreshore areas; so that lake management planning is watershed based.

# 2 Known Environmental Conditions and Sensitive Areas Associated with the Windermere Lake Foreshore

Windermere Lake is located within the Columbia River Valley. The Columbia River Valley is a physically diverse area characterized by a mixture of coniferous and deciduous trees and substantial marshlands (Urban Systems 2001). Due to this physical diversity, the watershed has a considerable variety of plant and animal species. Upland and foreshore development has been concentrated at the north end of Windermere Lake, both on the west side in the District of Invermere and on the east side within the RDEK. A review of pertinent Windermere Lake literature has provided the following overview of information relating to current understandings of environmental conditions associated with the foreshore. The overview includes water quality, wildlife, fish, aquatic plants and sensitive species.

## *2.1 Water Quality*

Water quality was monitored by the Ministry of Environment annually from 1971 to 1989 and then again in 1999 (Urban Systems 2001). Both Urban Systems (2001) and Masse and Miller (2005) reviewed the monitoring results; however they had contradictory conclusions. Urban Systems (2001) identified that the lake had excellent ambient (whole lake) water quality and a low sensitivity to nutrient inputs (due to the large volume of water that enters the lake and its rapid turnover). Masse and Miller (2005) identified that nutrient enrichment is a concern in Windermere Lake, and there is evidence of the lake becoming more enriched or eutrophic with time, particularly at the northern end. Significant negative trends were evident in the following parameters: oxygen, pH, total organic nitrogen and total dissolved phosphorus (Masse and Miller 2005).

A 1985 Leachate study found numerous locations along the shore where nutrient levels were higher than average, which suggests localized sources of nutrient inputs could have fairly rapid and noticeable impacts on the nearshore (Urban Systems 2001). Data suggested that the intensive use of domestic septic fields might be causing the nearshore water quality 'hot spots'. The problem is exacerbated by many septic systems (along the eastern shore) located on soils with limited or poor drainage capability (Urban Systems 2001). Non-point sources of pollution, such as storm drain run-off and contaminants from lakeshore properties are also potential sources of concern (Urban Systems 2001).

## *2.2 Wildlife*

The north and south ends of Windermere Lake are known to have particularly valuable wildlife habitat. The wetlands at the inlet (south) and just downstream of the outlet (north) of the lake are classified within the Columbia River Wetlands. These wetlands are known to provide internationally significant staging and breeding areas for a multitude of waterfowl species (Living Lakes 2007). In 2005, the Columbia Wetlands were designated under Ramsar (Holmes 2007). The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (Holmes 2007). There are presently 154 Contracting Parties to the Convention, with 1674 wetland sites (36 in Canada), totaling 151 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance (Holmes 2007). The Columbia Wetlands, Columbia Lake and Lake Windermere serve as a critical part of the Pacific Flyway migration route for large numbers and varieties of bird species (Living Lakes 2007, Holmes 2007). A census of the Columbia wetlands identified that more than 20,000 swans, geese and ducks use the area throughout the migratory periods (Living Lakes 2007). Some details on species using the Windermere Lake area are as follows (Urban Systems 2001):

- Trumpeter swans (*Cygnus buccinator*) and tundra swans (*Cygnus columbianus*) commonly migrate through the area;
- Common loons (*Gavia immer*) breed in the shallow lagoons;
- Dabling ducks that commonly breed in the Windermere watershed include: mallards (*Anas platyrhynchos*), American wigeon (*Anas Americana*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), cinnamon teal (*Anas cyanoptera*), as well as most other dabbling species that pass through the valley;
- Common diving ducks include: common goldeneye (*Bucephala clangula*), redheads (*Aythia Americana*) and canvasback (*Anas valisineria*);
- Older stands of cottonwood provide important habitat for cavity nesters such as the wood duck (*Aix sponsa*), bufflehead (*Bucephala albeola*) and hooded merganser (*Lophyodytes cucullatus*); and
- Production of Canada goose (*Branta canadensis*), great blue heron (*Ardea herodias*), and several birds of prey (including osprey [*Pandion haliaetus*], and 8 owl species) is also significant in these areas. The north and south ends of the lake have at least 24 active nesting pairs of osprey and provide valuable feeding habitat to these birds. Osprey inhabit this area from late April to early October.

The Windermere Lake wetland areas are also known to have important muskrat and beaver habitat (Urban Systems 2001).

## *2.3 Fish*

Windermere Lake has an extremely high diversity of fish species present because of its continuity with the Columbia River (Urban Systems 2001). The wetlands at the north and south ends of Windermere Lake provide good to excellent sport and course fish habitat (Urban Systems 2001). In response to possible boat launch and marina developments, some specifics on fish and habitat usage along the foreshore at the north end of the lake were provided by Urban Systems (2001). These details are included below alongside the listing of fish species known to inhabit Windermere Lake (Urban Systems 2001). The Field Key to the Freshwater Fishes of British Columbia (RIC 1994) was used to designate native versus introduced species.

**Native Fish**

- bull trout (*Salvelinus confluentus*);
- rainbow trout (*Oncorhynchus mykiss*); most abundant species captured in gill netting survey (Griffith 1994);
- mountain whitefish (*Prosopium williamsoni*), north end provides good spring, summer and fall habitat;
- westslope cutthroat trout (*Oncorhynchus clarkii. lewisi*);
- burbot (*Lota lota*), north end provides good year round habitat;
- chislemouth chub (*Acrocheilus alutaceus*);
- lake chub (*Couesius plumbeus*), north end provides excellent year round habitat;
- peamouth chub (*Mylocheilus caurinus*), north end provides good year round habitat;
- torrent sculpin (*Cottus rhotheus*);
- largescale sucker (*Catostomus macrocheilus*), north end is excellent spring summer and fall habitat;
- longnose sucker (*Catostomus catostomus*);
- longnose dace (*Rhinichthys cataractae*), north end provides good year round habitat.
- redside shiner (*Richardsonius balteatus*); and
- northern pike minnow (*Ptychocheilus oregonensis*), north end provides good spring, summer and fall habitat.

**Introduced Fish**

- kokanee (*Oncorhynchus nerka*);
- eastern brook trout (Salvelinus fontinales);
- largemouth bass (*Micropterus salmoides*); and
- pumpkinseed (*Lepomis gibbosus*).

Although Windermere Lake has a high diversity of sport and coarse fish species present, total numbers of individual fish, particularly sport fish, are generally low (Urban Systems 2001). The lack of success of sports fish has been attributed to competition and predation by coarse fish, limited availability of spawning and recruitment habitat, and possible angler effort/catch (Urban Systems 2001). Windermere Lake itself is reported to provide good spawning, rearing and over wintering habitat; good cover and food sources associated with the high aquatic macrophyte populations; and to have water chemistry that is optimal for fish survival (Urban Systems 2001). When Griffith (1994) surveyed major tributary streams entering Windermere Lake, Windermere Creek was found to be the main system providing fish recruitment/production for the lake. While kokanee production was particularly high; rainbow trout, bull trout and westlope cutthroat trout were also found in Windermere Creek (Griffith 1994). Goldie Creek showed some bull trout spawning / recruitment potential. Fisheries production in the other tributaries reviewed was likely limited by excessively steep and swift water flows (Griffith 1994).

## *2.4 Aquatic Plants*

The warm, shallow waters of Windermere Lake provide good growing conditions for plant growth. Over 95% of the lake's surface area is at a depth that light can penetrate to a sufficient degree to support plant growth (Urban Systems 2001). This coupled with the frequent winds and nutrient availability, makes Windermere Lake susceptible to highly productive aquatic plant growth (Urban Systems 2001). Urban Systems (2001) summarized that aquatic plant surveys conducted in 1971, 1989 and 1995 showed little change in species composition or distribution with time. Lake Windermere Project (a partnership program organized by Wildsight) is conducting a macrophyte survey in August 2007 to document densities and types of aquatic plants (Leschied 2007).

## *2.5 Sensitive Species*

The BC Conservation Data Centre "BC Species and Ecosystems Explorer Internet Tool' (CDC 2007) was used to generate a list of sensitive species known to the Rocky Mountain Forest District (RMFD) in the Interior Douglas Fir (IDF) biogeoclimatic zone, of which Windermere Lake is situated. This search identifies that there are 123 species of plants and animals that are either endangered or vulnerable in the area (*See* Appendix B1). This list reveals that many of these species are associated with lacustrine (lake) and palustrine (wetland) habitat types, and are thus likely to be associated with the Windermere Lake foreshore. In addition, a number of these sensitive species are identified as being associated with both aquatic and terrestrial habits, which additionally suggests that they could be found in the foreshore area.

A more refined search of the CDC archives using the 'Mapped Known Locations Tool, provides that there are 12 species of concern that have been mapped in the immediate vicinity of Windermere Lake (associated with the foreshore). Details on these plants and animals identified in the vicinity of Windermere Lake are provided in Table 1 (*See* map in Appendix B2). In addition to this, a cross reference of fish and bird species identified during other field inventories (*See* Sections 2.2 and 2.3) and the CDC list of species in the IDF zone of the RMFD, reveals that there are four additional blue-listed species known to inhabit the Windermere Lake area: chislemouth chub (*Acrocheilus alutaceus*), bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Oncorhynchus clarkii. lewisi*), and great blue heron (*Ardea herodias herodius*).

**Table 1. Blue and red listed species associated with the Windermere Lake area (BC CDC 2007)**

| CDC Map ID # | Common Name | Scientific Name | Status | | | Occurrence Information |
|---|---|---|---|---|---|---|
| | | | Global | Prov. | BC | |
| **Vascular Plants** | | | | | | |
| 4132 | Nuttall's sunflower | *Helianthus nuttallii* var. *nuttallii* | G5T5 | S1 | Red | Habitat: Terrestrial, Riparian. Wet ground and wet area in marshy field, roadside ditches and fields. |
| 3658 | Plains reedgrass | *Calamagrostis mintanensis* | G5 | S2 | Red | Habitat: Terrestrial; Grassland/Herbaceous. Dry south slopes |
| 14353 | Water marigold | *Megalodonta beckii* var. *beckii* | G4G5 T4 | S3 | Blue | Lacustrine; Shallow Water. |
| 3754 | Stiff-leaved pondweed | *Potamogeton strictifolius* | G5 | S2S3 | Blue | Lacustrine; Shallow Water. |
| 4270, 6740 | Hooker's townsendia | *Townsendia hookeri* | G5 | S2 | Red | Terrestrial; Grassland/Herbaceous. Dry rolling land above lake; and in disturbed grassland seeded with domestics and mowed on shore of lake, west aspect. |
| 1840 | Saltwater cress | *Arabidopsis slasuginea* | G4G5 | S1 | Red | Terrestrial. Dry ground probably with some alkali |
| 2140 | Scarlet globe-mallow | *Sphaeralcea coccinea* | G5? | S1 | Red | Terrestrial. South slope of hill near Indian Reserve. |
| 2256 | Alkali plantain | *Plantago eriopoda* | G5 | S1 | Red | Terrestrial; Aluvial Flats. |
| 2370 | Booth's willow | *Salix boothii* | G5 | S2S3 | Blue | Lacustrine; Swamp. Low alluvial swamp area. |
| **Vertebrate Animals** | | | | | | |
| 23251 | Badger | *Taxidea taxus* | G5 | S1 | Red | Terrestrial; Grassland; Roadside. |
| 13732, 14353 | Lewis's Woodpecker | *Melanerpes lewis* | G4 | S2B | Red | Terrestrial; Grassland/Herbaceous. *Purshia* grass with scattered snags and live ponderosa pine. Sharptail Prairie, south of Goldie Creek. Nests sites also found in large burn area with Douglas fir snags and adjavcent riverside riparian cottonwood woodland and golf course. |
| 11268 | Chiselmouth | *Acrocheilus alutaceus* | G5 | S3S4 | Blue | Lacustrine; Deep water; Shallow Water. |

**Global Rank**:
G1= Critically Imperiled
G2= Imperiled
G3= Vulnerable
G4= Apparently Secure
G5= Secure

**Provincial Rank:**
S1= Critically Imperiled
S2= Imperiled
S3= Vulnerable
S4= Apparently Secure
S5= Secure
B= Breeding

**BC Status:**
Red= Extirpated, endangered, threatened, or candidates for such status
Blue= Sensitive or vulnerable

# 3 Methodology

The methods used to obtain the information in this report include EKILMP field assessments, retaining wall field assessment, and data compilation of the field assessments. Inventory and mapping of Windermere Lake were conducted according to standard SHIM procedures (Mason and Knight 2001).

## *3.1 Study Area*

Windermere Lake is located in the southern interior of British Columbia in the Rocky Mountain Trench. The lake forms part of the Columbia River Valley and is a widening of the Columbia River rather than a "true lake" (Urban Systems 2001). The study area includes the entire shoreline perimeter (36.3 km) of Windermere Lake. The North West end is under the jurisdiction of the District of Invermere, while the remainder of the Lake is within the RDEK's administrative boundary. Table 2 provides a summary of Windermere Lake's physical parameters and Figures 1 and 2 depict Windermere Lake.

**Table 2. Windermere Lake physical characteristics (Urban Systems 2001)**

| Parameter | Amount |
|---|---|
| | |
| Volume | 55.19 x$10^6$ $m^3$ |
| Surface Area | 1610 ha |
| Littoral Area | ~1530 ha |
| Drainage | 1340 $km^2$ |
| Maximum Depth | 6.4 m |
| Mean Depth | 3.4 m |
| Length | 17.7 km |
| Average Width | 1.1 km |
| Shoreline Perimeter | 36.3 km |

**Figure 1. View towards north end of Windermere Lake, showing the District of Invermere along the North West boundary of the lake (area left of the lake outlet).**

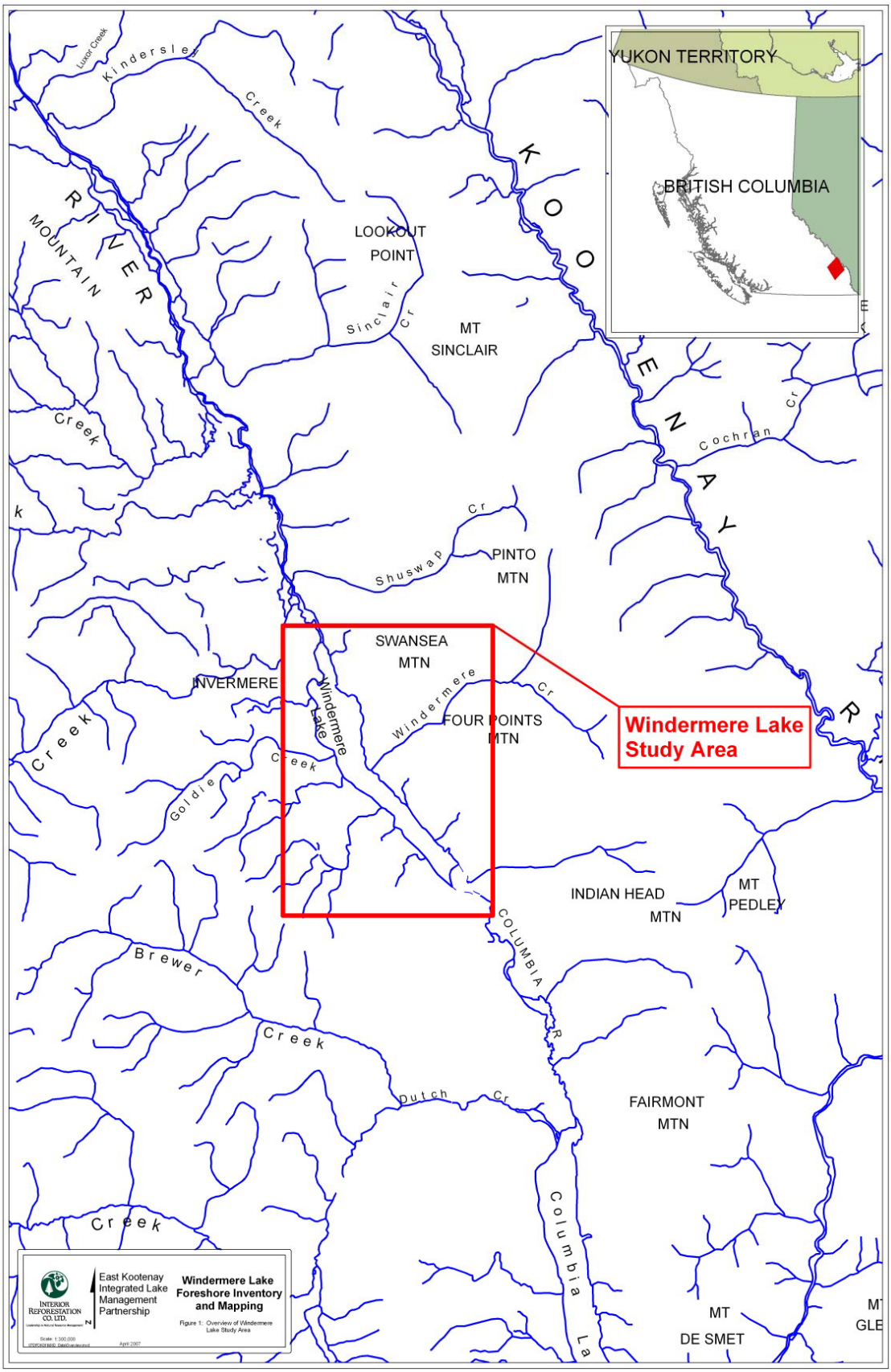



**Figure 2. Overview Map of Windermere Lake Study Area**

## 3.2 EKILMP Field Assessment

Field assessments were conducted on August 15-16, 2006, aboard the Joe C (DFO Nelson's sampling boat) by EKILMP members. Individuals involved included: Tola Coopper, Brad Mason, Louise Porto (Department of Fisheries and Oceans [DFO]); Peter Holmes and Kristin Murphy (Ministry of Environment [MoE]); and Amanda Fedrigo (Wildsight). The survey team followed the shoreline from a set distance (optimally 60m) and at a speed of 4 knots. The entire shoreline was recorded using digital video, as well as still photos. A GPS unit was used to delineate foreshore Segments, which are contiguous sections of shoreline that are determined by similar foreshore characteristics. These characteristics include land use designation adjacent to the foreshore, shore type, foreshore condition and modification, and disturbance (see Tables 3-6 and Figures 3-4 for detailed descriptions). DFO personnel input all of the information collected into a database via field cards and the GPS unit.

Field personnel used visual observations, not direct measurements, to estimate percentages. For example, a value of 80% disturbed is an estimate rather than a physical measurement of the length of disturbed foreshore within the Segment. As a method of qualifying the overall health of the foreshore, each Segment was assigned a value describing Level of Impact (LoI) by field personnel. The LoI is a qualitative measurement of the overall health of the foreshore and can be categorized as Low, Medium, or High (Table 7 and Figure 5). The LoI is based on visual observations during the assessment, including attributes from the database such as percent disturbed and presence of man-made structures (e.g. retaining walls, docks, groynes and marinas).

**Table 3. Land uses adjacent to the foreshore (adapted from RDCO 2005).**

| Land Use Designation | Purpose |
|---|---|
| Agricultural | To accommodate agricultural operations and related activities on parcels usually located on the Agricultural Land Reserve. |
| Canadian Pacific Railway (CPR) | To accommodate private land owned by CPR. |
| Commercial | To accommodate a mix of commercial, retail, recreation and service uses primarily intended for Town Centre areas. |
| Crown (other) | To accommodate land belonging to the Province of BC, such as forest and resource management lands. |
| Industrial | To accommodate industrial activities. |
| Park | To accommodate active recreation lands, community oriented cultural centres and other similar areas available to the general public. |
| Private Recreational | To accommodate private lands set aside for recreational purposes such as marinas, private beaches, or resorts. Resorts include strata complexes with a mix of recreational and residential uses. Also accommodates private lands that have not yet been developed. |
| Residential Development | To accommodate residential use (mainly single family). |
| Undeveloped Indian Reserve | Indian Reserve Land (Indian Reserve #3 Columbia Lake), managed by the federal government, which for the purposes of this study, remain in a natural condition. |

**Table 4. Predominant shore types as defined by the Resources Inventory Committee (1999).**

| Shore Type | Description |
|---|---|
| Cliff/Bluff | Adjacent to steeper slopes, usually indicating a steep-sided lake basin or sudden drop-off |
| Sand Beach | Often associated with alluvial fans or other shoreline deposition areas. |
| Gravel Beach | Often associated with low gradient foreshore, coves with pockets of riparian vegetation among steeper hillsides or alluvial fans. |
| Vegetated Shoreline | Characters of undisturbed foreshore with narrow littoral width. Vegetation is commonly shrubs and small trees. Overhanging vegetation occurs to the mean water level. |
| Low Rocky Shore | Cobble, boulder or bedrock substrate often prevalent along the base of steeper shorelines. |
| Wetland | Characteristic of wide littoral zones with fine substrates promoting abundant emergent vegetation such as sedges, reeds and cattails. |

Cliff/bluff

Vegetated Shore

Sand Beach

Wetland

Gravel Beach

Low Rocky Shore

**Figure 3. Examples of predominant shore types along Windermere Lake.**

**Table 5. Foreshore conditions (RDCO 2005).**

| Condition | Description |
|---|---|
| Natural | Shoreline is unmodified. |
| Disturbed | Foreshore has been modified through human alteration. |

**Table 6. Foreshore modifications (RDCO 2005).**

| Modifications | Description |
|---|---|
| Docks | Long, narrow structures stretching into a body of water. |
| Retaining Walls | Structural walls with the primary function of supporting soil from behind or any caused by wave action. |
| Groynes | Protective structures of stone or concrete that extend from shore into the water to prevent a beach from washing away. |
| Boat Launches | Sections of foreshore dedicated to launching boats and removing boats with vehicles. |
| Marine Railways | Railway tracks used to lift boats in and out of the water or to adjacent boat houses. |
| Marinas | Harbours specially designed to moor a collection of boats. |

**Figure 4. Examples of foreshore modifications along Windermere Lake, including boathouse, dock, retaining wall (left); and marina, dock and retaining wall (right, [photo provided by Wildsight]).**

**Table 7. Level of Impact (RDCO 2005)**

| Level of Impact | Description |
|---|---|
| Low | Segments that show little or limited signs of foreshore disturbance and impacts. These Segments exhibit healthy, functioning riparian vegetation. They have substrates that are largely undisturbed, limited beach grooming activities and no to few modifications. |
| Medium | Segments that show moderate signs of foreshore disturbance and impacts. These Segments exhibit isolated, intact, functioning riparian areas (often between residences).<br>Substrates (where disturbed) exhibit signs of isolated beach grooming activities. Retaining walls (where present) are generally discontinuous. General modifications are well spaced and do not impact the majority of the foreshore Segment. |
| High | Segments that show extensive signs of disturbance and impacts. These Segments exhibit heavily disturbed riparian vegetation, often completely removed or replaced with non-native species.<br>Modifications to the foreshore are extensive and likely continuous or include a large number of docks. Generally, residential development is high intensity. Modifications often impact a majority of the foreshore. |

Low Level of Impact

Medium Level of Impact

High Level of Impact

**Figure 5. Examples of low, medium and high Levels of Impact at Windermere Lake**

## *3.3 Retaining Wall and Wetland Field Assessment (Wildsight)*

Wildsight staff, Amanda Fedrigo and Heather Leschied, circumvented Windermere Lake in October 2006 to obtain detailed information on retaining wall structures and wetland features. Their retaining wall assessment included identification of: location, construction materials, condition, % of lot length, height, number of tiers, and photo documentation. Wetland areas were also mapped and locations were recorded using GPS. Wetlands included any areas containing features such as shallow water areas with emergent vegetation (i.e., cattails, rushes, and sedges).

## *3.4 Data Compilation and Report Preparation (IR Personnel)*

DFO provided IR personnel with the Windermere Lake SHIM database from the EKILMP's August 2006 field assessment, the database from Wildsight's October 2006 retaining wall field assessment, and corresponding GPS data. IR was responsible for providing a written report on the data and summary map product(s).

### 3.4.1 Updating the EKILMP Foreshore Database

In order to prepare this report, IR first reviewed the field data in detail and completed an office exercise to address any inconsistencies or omissions in the EKILMP foreshore database. A main area requiring attention was the determination of land use. Land uses for each Segment were obtained by cross-referencing Segment locations with information available on the legal map base for the area. The legal boundaries of properties around the lake were obtained from the RDEK (2007b). Confirmation of land use and other data areas also involved discussions with field staff (i.e., conference call of Feb 15, 2007) and other EKILMP individuals (i.e., Laurie Cordell, RDEK). Appropriate new land use designations were added to those defined in the Okanagan Foreshore report (RDCO 2005), to most appropriately describe the Windermere shoreline. These new land-use designations included: Canadian Pacific Railway, Undeveloped Indian Reserve, and Private Recreational areas. As well, because there was very little urban residential property around the lake, it was decided that the urban designation used in the Okanagan Foreshore report, would not be used for Windermere Lake. Instead, all residential properties (other than resort strata types) were lumped together under the residential category. Roads and access points were incorporated into the land use that was most prevalent around them, and not given their own designation.

Some additional data gaps were identified where Segment values for respective parameters did not equal 100% (i.e. for natural vs. disturbed, and shore types). Peter Holmes (MoE) assisted by conducting an office review of ortho-photos to provide the necessary updates. A key to the field headings in the EKILMP foreshore data base and a hardcopy of the database are provided in Appendices C and D, respectively.

### 3.4.2 Use of DFO's Digital Atlas

The Community Mapping Network (CMN), providing online natural resource information and maps, was particularly useful to this project. The digital atlas for Windermere Lake, located at http://www.shim.bc.ca/atlases/atlas.html#windermere (currently under development), integrates lake data and makes it accessible through a user friendly mapping system. The digital atlas was used mainly to confirm data. For example the photo-documentation (obtained both from air and boat) within the atlas was used to confirm Segment details. Many of these photos were included in this report. The compilation of ortho-photos and TRIM (Terrain and Resource Information Management) data overlain onto Segment locations were also used, in the early report development stages. The video of Windermere Lake shoreline which is linked to a coordinate system at the SHIM website was also valuable.

### 3.4.3 Retaining Wall Data

The fields in the EKILMP database referencing retaining wall numbers and construction materials were updated using Wildsight's information. Since the Wildsight data was referenced according to property addresses and legal lot numbers, respective Segment numbers had to be determined for each of the entries using legal maps for the area. Brad Mason, of DFO, provided assistance with this task. A hardcopy of the retaining wall data collected by Wildsight, showing associated Segment numbers is provided in Appendix E.

The Wildsight retaining wall data was summarized by providing totals (e.g., # of lots assessed, # with retaining walls, # below the high water mark) and averages (i.e., average % of lot length and average height). The percent of lot length values as provided by Wildsight were also used with lot boundary maps to calculate a total value (m) of retaining wall for each lot and for each Segment. This task was mainly completed by hand using a ruler and basic ratio calculations. Where Wildsight provided GPS locations for the north and south retaining wall end points, GIS mapping applications were used to determine retaining wall lengths.

Wetlands polygons identified in the Wildsight data base were also digitized onto the Foreshore summary maps. Wetland locations were provided by Wildsight as GPS coordinates, and in some cases as hand marked polygons on field maps. When digitizing these polygons, Wildsight's mapped polygons were used when available. For other wetlands the GPS coordinates were used.

### 3.4.4 Reporting

Report development involved preparation of detailed descriptions of each Segment (*See* Appendix F), analysis of data in order to provide a summary of results (*See* Section 4, and Appendix G), discussion of the results (*See* Section 5), and recommendations (*See* Section 7). Unless otherwise referenced, all photos in this report were provided by DFO.

### 3.4.5 GIS Products

IR GIS personnel constructed a map of Windermere Lake indicating Segment break locations, lots with retaining walls and wetland polygons (Appendix H). Segment breaks and wetlands were interpolated by overlying GPS locations onto existing TRIM line maps. Local cadastral and land use maps were also used as an aid. As a result, locations are applicable only at a large scale and may require further refinement at a smaller scale.

The SHIM procedures (Mason and Knight 2001) and the Central Okanagan Lake Foreshore Inventory and Mapping Report (RDCO 2005) provide additional technical methodology procedures including GPS and video data collection, data management, database development, and quality control. See digital shapefile data for more detailed information and accurate delineation of Segments (Appendix I).

# 4 Results

The foreshore of Windermere Lake totals 35,559m. The foreshore was divided into 26 contiguous Segments, according to morphology. These Segments range in length from ~150-3800m. Detailed descriptions of individual Segments are provided in Appendix F and GIS maps showing Segment locations and key Segment information are provided in Appendix H. Results are presented in a way that reviews parameter findings for the whole shoreline of the Lake (considering results of all segments). In order to provide additional detail, results also compare findings between Segments groupings. Segment groupings are based on geographic shoreline location; they separate the lake into four quadrants and are described in Table 8:

**Table 8. General description of Segment groupings.**

| Segment Grouping Location | Segments Included | Total grouping length (m) |
|---|---|---|
| South East Shore | Segments 1-6 | 10,400 |
| South West Shore | Segments 7-12 | 7,067 |
| District of Invermere | Segments 13-19 | 8209 |
| North East Shore | Segments 20-26 | 9017 |

Natural vs. disturbed areas, land use, shoreline type, modifications along the foreshore and level of impact are reviewed in detail in order to provide an inventory of the foreshore condition.

## *4.1 Natural vs. Disturbed Areas*

Overall, results indicate that more than half (62% or 21,912m) of the lake's foreshore is disturbed (Table 9).

**Table 9. Total disturbed and natural shoreline along Windermere Lake.**

| Foreshore | Length (m) | % of total |
|---|---|---|
| Disturbed | 21,912 | 62% |
| Natural | 13,647 | 38% |
| Total Foreshore | 35,559 | 100% |

Figure 6 shows the extent of disturbed and natural foreshore area for each of the Segment groupings. Results indicate that shoreline disturbance is the least (9%) along the South East shore, and that disturbance is highest in the Segments within the District of Invermere (94%) and along the North East shore (76%).

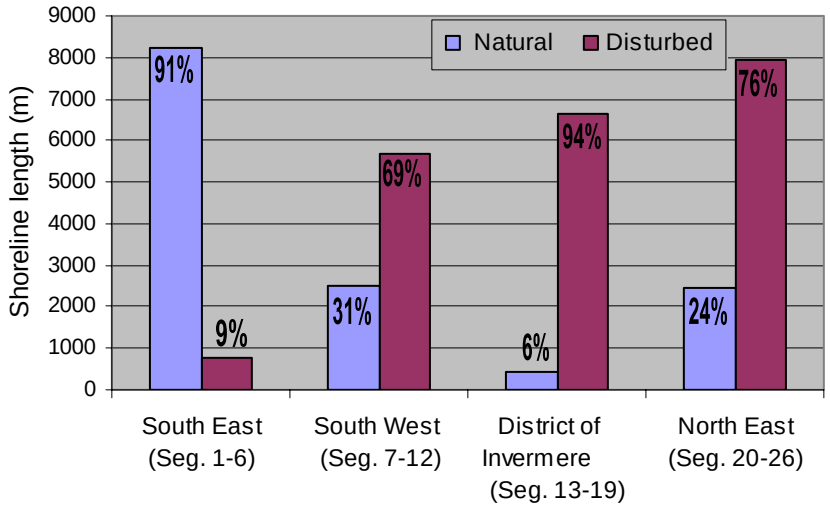



**Figure 6. Natural and disturbed values for each of the Segment groupings of Windermere Lake depicted as a length (m) of the total foreshore, and a percentage (%) of each Segment grouping.**

## *4.2 Land Use*

This assessment found that there are several primary land use types around Windermere Lake (Figure 7). Some of the land uses inherently have little impact on the foreshore conditions such as crown land and undeveloped Indian Reserve areas. Other land uses, by their nature, generally disturb the foreshore including the Canadian Pacific Railway (CPR), residential areas, private recreational areas, and commercial lands. The lake also has some parkland, which appear to be approximately half disturbed and half natural.

A review of the shoreline length for each of these land uses indicates that two land uses which result in disturbance, run along the longest lengths of shore. These are the CPR (spanning 10,440m or 29% of the shoreline) and residential development (spanning 8491m or 24% of the shoreline). Undeveloped Indian Reserve lands provide the most substantial foreshore length which has not been disturbed (8,226m or 23%). Private recreational properties generally have a moderate influence around the lake as a whole (3,933m or 11%); while crown, park and commercial land uses comprise the least foreshore length (respectively at 2,164m or 6%, 1756m or 5%, and 547m or 2%).

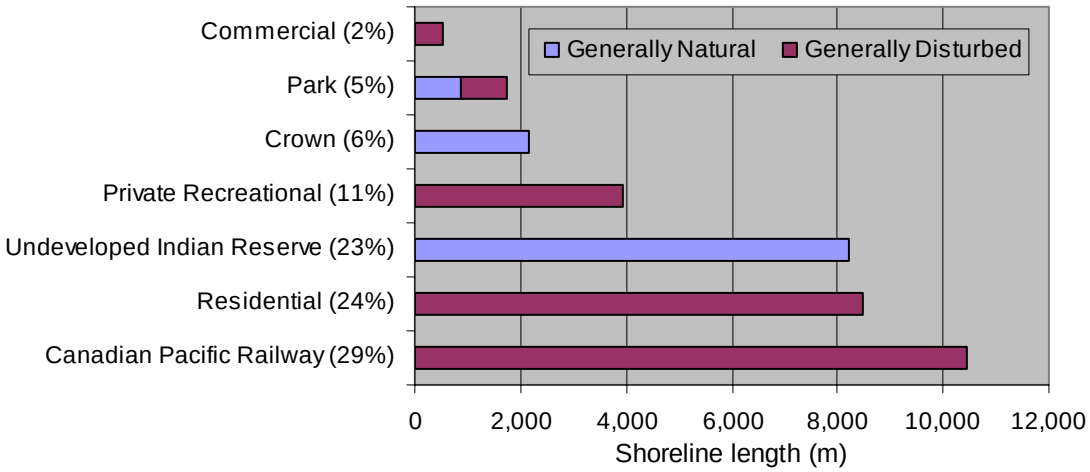



**Figure 7. Land uses along the foreshore of Windermere Lake, depicted as length (m) coverage along shoreline, percentage of total foreshore length (%); with an indication of whether the land use generally maintains a natural condition or contributes to disturbance.**

Figure 8 indicates where the primary land uses are generally located around the perimeter of Windermere Lake. From Figure 8, the following is evident: undeveloped Indian Reserve is concentrated in the Segments along the south east shore, the CPR runs along most of the eastern shoreline, most of the residential and private recreational areas are located along the north east shore, and that the small park areas are located in the District of Invermere and along the north east shoreline.

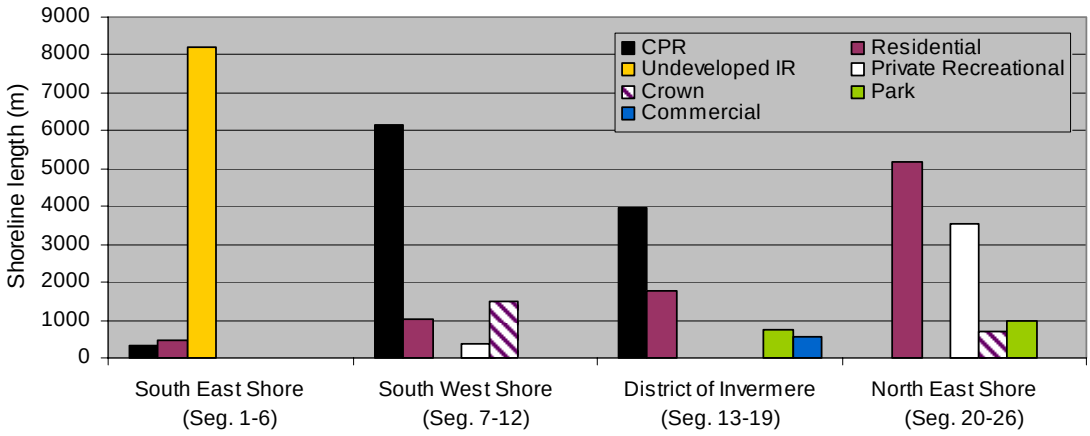



**Figure 8. Land use type and extent (m) for each Segment grouping along the shoreline of Windermere Lake.**

## *4.3 Shoreline Type*

The foreshore of Windermere Lake is diverse containing vegetated, wetland, low rocky, cliff/bluff, sand beach and gravel beach types. A breakdown of the length and overall percentage of each of these shoreline types along the perimeter of the lake is provided in Figure 9. The foreshore is dominated by vegetated shoreline (10,718m, or 30%). Wetland, low rocky shore, and cliff/bluff types also make up substantial lengths of the shore at (7,240m, 6,689m, and 5,400m respectively), while sand and gravel beach areas (at 2,750m and 2,652m respectively) make up the smallest lengths of foreshore.

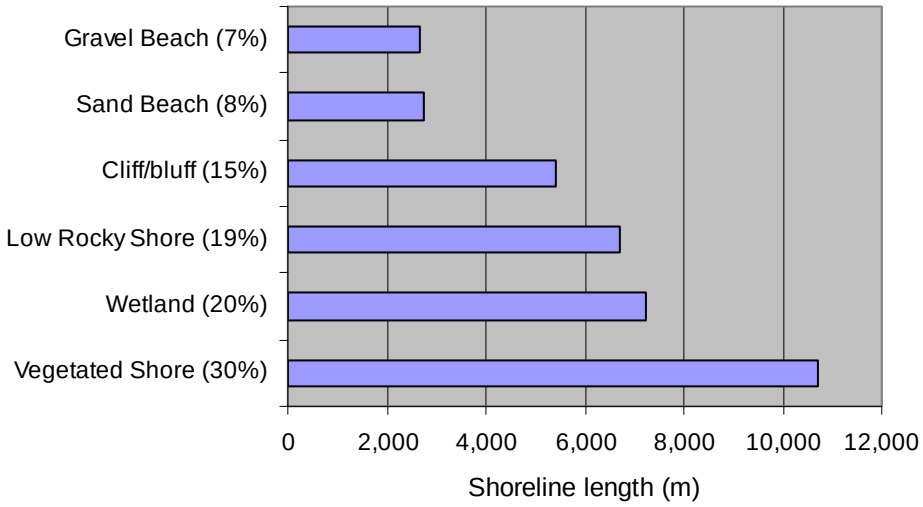



**Figure 9. Length (m) and percentage (%) of total foreshore for each shore type along Windermere Lake.**

Figure 10 provides detail on how these shoreline types are distributed within the four Segment groupings of Windermere Lake. Some observations from the data are as follows:

- each Segment grouping contains a variety of shoreline types;
- the south east shore contains the greatest extent of cliff/bluff (2,917m) and wetland (4,880m) areas;
- the south west shore and the District of Invermere both are mainly composed of vegetated shoreline and low rocky shoreline; and
- the north east shore is primarily vegetated shoreline type (4196m).

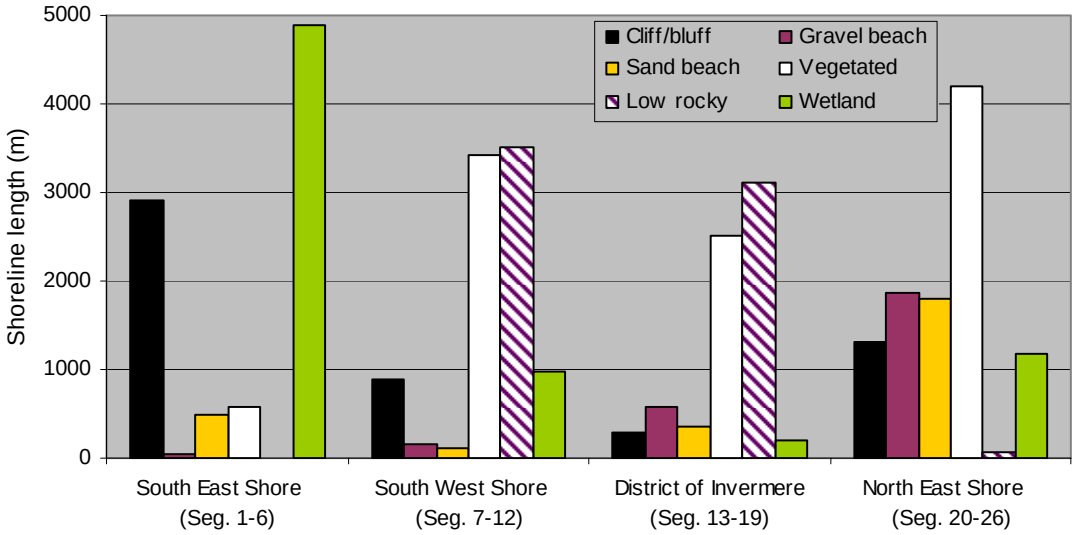



**Figure 10. Shoreline Type and extent (m) for each Segment grouping along the shoreline of Windermere Lake.**

## *4.4 Foreshore Modifications*

Foreshore modifications constructed along Windermere Lake include retaining walls, docks, groynes, marinas, boat houses, and boat launches. From Figure 11, it is evident that the greatest numbers of structures are retaining walls (443), docks (202), and boat houses (107). 29 groynes, 9 marinas, and 2 public boat launches were also noted during this review. Although not recorded during this project's field assessment, 10 additional private boat launches exist along the foreshore (Leschied 2007).

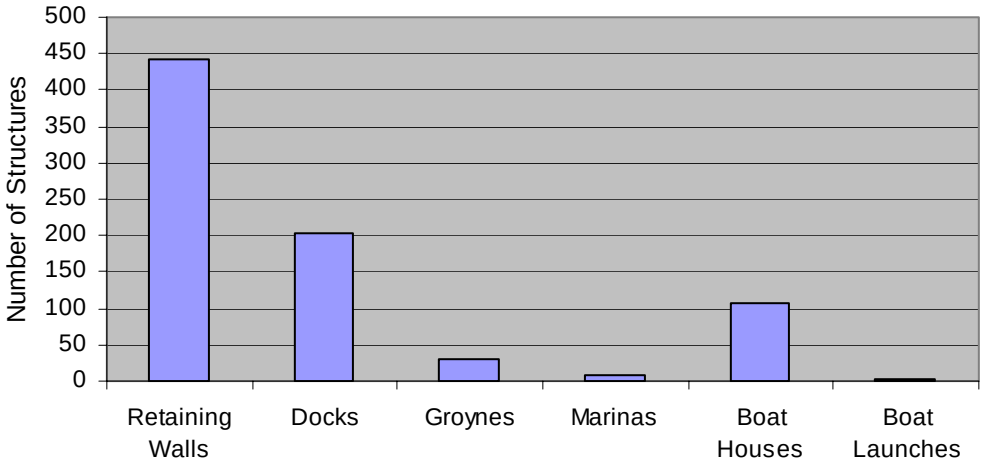



**Figure 11. Total number of modifications along the foreshore of Windermere Lake.**

The shoreline modifications are generally associated with residential and private recreational areas. The highest numbers of structures per kilometer occur in the North East Segment grouping, followed by the District of Invermere Segment grouping (Figure 12). A cross reference with Figure 8 confirms that these are the areas with the greatest extent of residential and/or private recreational development. Numbers of modifications per kilometer in the North East

Segment grouping are as follows: 30 retaining walls/km, 12 docks/km, 7 boat houses/km, 2 groynes/km and, 1 marina/km.

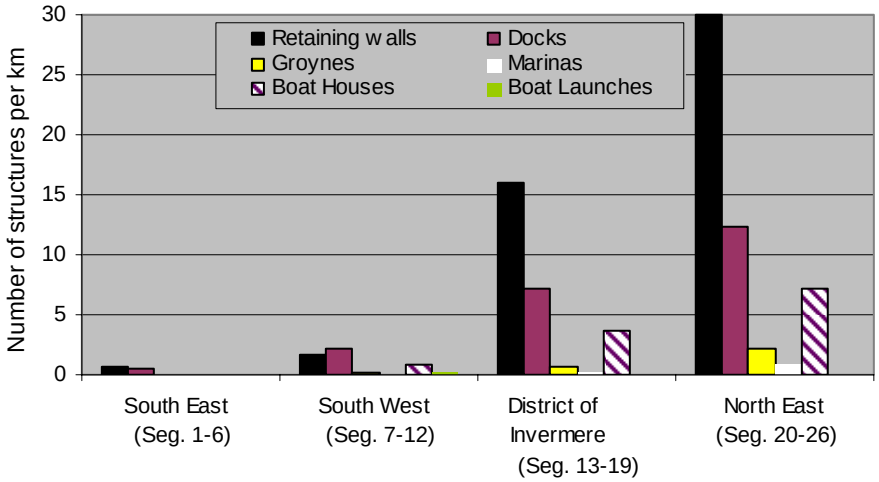



**Figure 12. Number of modifications (by type) per kilometre for each Segment grouping along the shoreline of Windermere Lake.**

## 4.4.1 Retaining Walls

Retaining walls have been analyzed in greater detail due to the specific data collected by Wildsight. Table 10 provides a summary of the retaining wall data collected by Wildsight (2006) and identifies that there are a total of 443 retaining walls constructed along the foreshore of Windermere Lake. Nearly half of these (201) are located below the high water mark. Of the lots with retaining walls, the retaining walls span an average of 89% of the lot length and are of an average height of 1.3m. It is typical for lots to have multiple retaining walls on them, with usually 1 (and sometime 2) below the high water mark and often at least 1 (and as many as 7) above the high water mark.

**Table 10. Summary of Wildsight (2006) retaining wall data for Windermere Lake.**

| Total # of lots | | Total #of retaining walls | High water mark | | | Average % of lot length | Average height (m) |
|---|---|---|---|---|---|---|---|
| Assessed | With retaining walls | | # Above | # Below | # Not assessed | | |
| 278 | 195 | 443 | 201 | 226 | 16 | 89 | 1.3 |

When the total length of retaining walls along each Segment is considered (Figure 13), there are several Segments with extensive coverage along their shorelines. For example, Segments 14, 16, 20, 21, 22, 23, 24, and 26 all have retaining walls along more than 50% of their total lengths. Segments 16, 21 and 24 have the greatest lengths of retaining walls at 1255m, 1048m, and 1051m respectively.

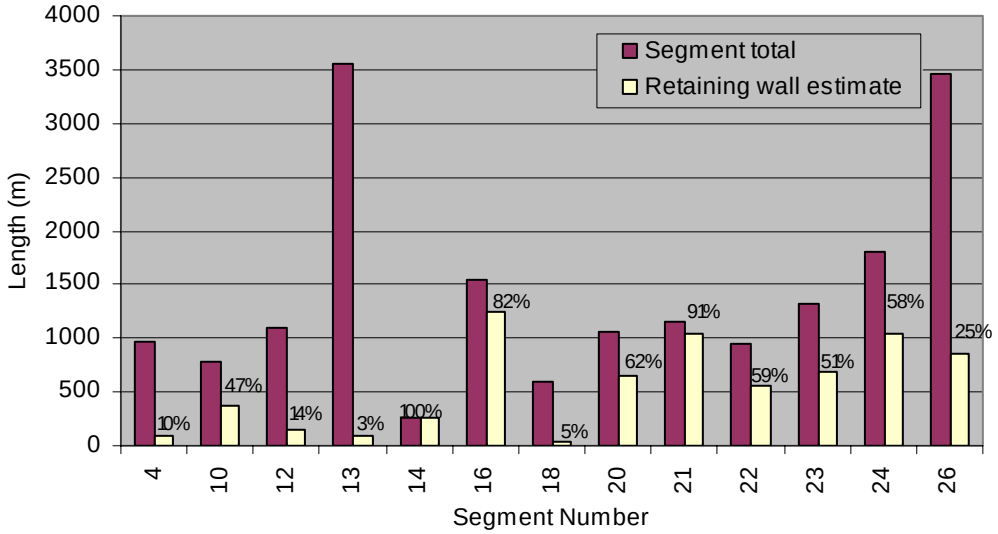



**Figure 13. Total Segment length (m) and retaining wall length (m and % of total) for Segments with retaining walls present.**

Retaining walls are generally associated with residential and private recreational land use. The foreshore summary maps (*See* Appendix H) further depict this by identifying individual lots around Windermere Lake, which have retaining walls. The maps do not account for percentage of lot coverage (i.e., if the lot has a retaining wall of any length, it is highlighted). All lots identified have retaining walls located below the high water mark (and often as well above the high water mark). The total extent of foreshore alteration could certainly be reported higher for most of these Segments if coverage with the other structures such as boathouses, docks, marinas etc. were considered.

## *4.5 Wetlands*

The foreshore summary map (Appendix H) shows wetland features identified during Wildsight's field review. A total of 32 individual wetland areas exist, and are found in many of the Segments. The southern half of the lake has particularly extensive wetland features. The depicted wetlands represent features evident during low water conditions, as reviews were conducted in October.

## *4.6 Level of Impact (LoI)*

LoI provides a qualitative indication of the overall health of the foreshore and considers the land use, level of disturbance, and modification information presented above. Figure 14 provides a summary of the LoI ratings for Windermere Lake, and reveals that 58% (20,666m) of the shoreline has a low LoI, 25% (8,820m) has a medium LoI, and 17% (6,072m) has a high LoI.

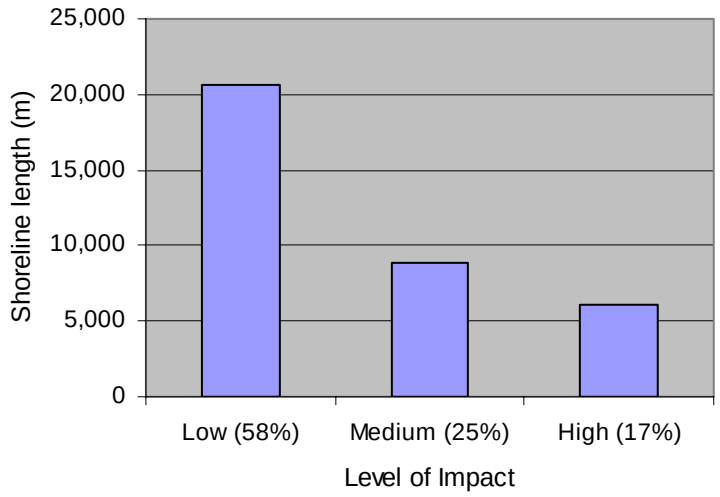



**Figure 14. Length (m) and percentage (%) of total foreshore area for each Level of Impact type (high, medium, low) along the foreshore of Windermere Lake.**

When LoI is compared for each of the Segment groupings (Figure 15), it is evident that the South East shore has been impacted the least (100% low LoI), followed by the South West shore (82% low LoI, and 18% medium LoI). The greatest impacts on Windermere Lake are evident along the North East shoreline, where 39% of the shore length is determined to have a high LoI, and 55% a medium LoI.

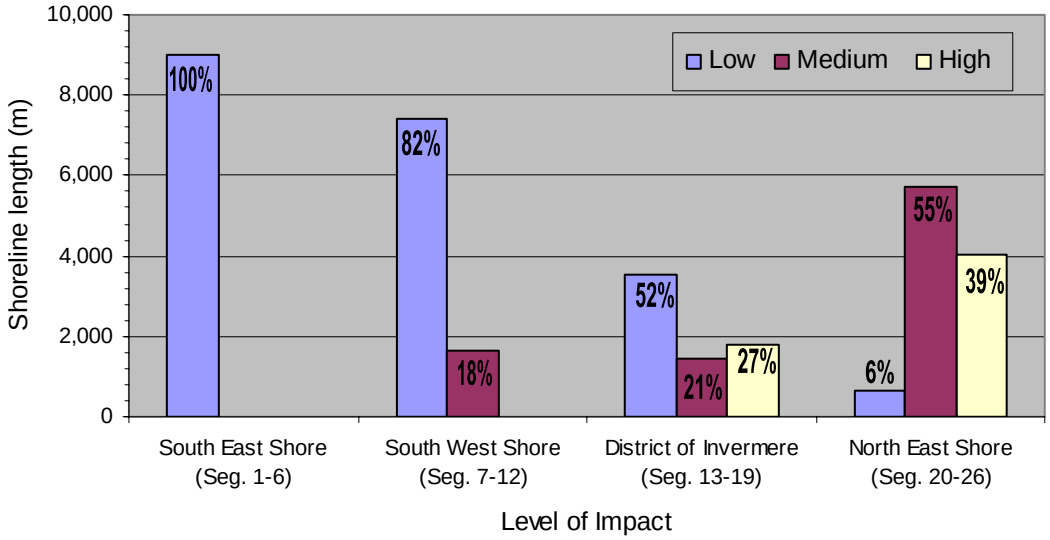



**Figure 15. Level of Impact for each of the Windermere Lake Segment groupings, depicted as length (m) of the total shoreline, and as a percentage (%) of each Segment grouping.**

The break down of LoI ratings for each of the Segments of Windermere Lake are provided in Table 11. Additional key information (including primary shore type, primary land use, and percent disturbed) for each Segment has been presented in order to compare Segments and provide generalities between the low, medium and high level of impact areas.

**Table 11. Level of Impact ratings for each Segment and associated primary shore type, primary land use and % disturbed information.**

| Segment Number | Segment Grouping | Primary Shore Type | Primary Land Use | % Disturbed |
|---|---|---|---|---|
| **Low Level of Impact** | | | | |
| 1,2 | South East | Cliff/Bluff | Undeveloped Indian Reserve | 0 |
| 3 | South East | Cliff/Bluff & Wetland | Undeveloped Indian Reserve | 0 |
| 4 | South East | Sand Beach | Undeveloped Indian Reserve/ Residential | 50 |
| 5 | South East | Cliff/Bluff | Undeveloped Indian Reserve | 0 |
| 6 | South East | Wetland | Undeveloped Indian Reserve | 10 |
| 8 | South West | Vegetated Shore & Wetland | CP Rail | 100 |
| 9 | South West | Vegetated Shore | Crown | 0 |
| 11 | South West | Low Rocky Shore | CP Rail | 85 |
| 12 | South West | Vegetated Shore | CPR/Private recreational/Residential | 40 |
| 13 | District of Invermere | Low Rocky Shore | CP Rail | 100 |
| 25 | North East | Vegetated Shore | Park | 20 |
| **Medium Level of Impact** | | | | |
| 7 | South West | Cliff/Bluff & Low Rocky & Wetland | CP Rail | 100 |
| 10 | South West | Vegetated Shore | Residential | 50 |
| 15 | District of Invermere | Gravel Beach & Sand Beach | Park | 100 |
| 17 | District of Invermere | Low Rocky Shore & Vegetated shore | CPR/Commercial | 70 |
| 18 | District of Invermere | Gravel Beach & Sand Beach | Park | 60 |
| 22 | North East | Cliff/Bluff | Private Recreation | 50 |
| 23 | North East | Vegetated Shore/Sand beach | Residential | 75 |
| 26 | North East | Vegetated Shore/Gravel Beach/Wetland | Private Recreational/Residential | 70 |
| **High Level of Impact** | | | | |
| 14 | District of Invermere | Gravel Beach | Residential | 100 |
| 16 | District of Invermere | Vegetated Shore | Residential | 100 |
| 19 | District of Invermere | Vegetated Shore | Commercial | 100 |
| 20,21 | North East | Vegetated Shore | Residential | 100 |
| 24 | North East | Vegetated Shore | Private Recreation/residential | 95 |

### 4.6.1 Low LoI Segments

The Segments rated as a low LoI are located in areas with low levels of development (Figure 16). Most of the low LoI Segments are located along the southern parts of the Lake, many of which have undeveloped Indian Reserve or CPR as their primary land use. Development along the shoreline of cliff/bluff shore type areas is generally inhibited and less than in other shore type areas, leading to low (or medium) LoI's in most of the Segments with cliff/bluff shore type being predominant.

It is important to note that when LoI was determined for the foreshore areas of Windermere Lake, some areas were deemed to have a high disturbance level but an overall low LoI. This occurred mainly in Segments where the CPR was the primary Land Use Type, such as in Segments 11, 12 and 13. For these Segments, the railway was assessed to be a disturbance; however, the railway's presence did not affect the overall shoreline integrity to the same extent that other land uses, such as residential development would. Figure 16 portrays some examples of Segments with disturbance, but overall a low LoI.

Segment 5

Segment 13

**Figure 16. Examples of Segments ranked with Low Level of Impact at Windermere Lake.**

### 4.6.2 Medium LoI Segments

Segments with a medium LoI are dispersed around the lake, other than in the South East Segments. They include a variety of land use and shore types. Generally these Segments have been developed to some extent, but have not been disturbed as much (i.e. with shoreline modifications) or have not been developed as densely as those Segments rated with a high LoI. Figure 17 depicts example Segments with a medium LoI.

Segment 10

Segment 17

**Figure 17. Examples of Segments ranked with Medium Level of Impact at Windermere Lake.**

### 4.6.3 High LoI Segments

Residential and commercial areas associated with the Town of Invermere generally were determined to have a high LoI (Segments 14, 16 and 19). The densely populated residential areas and private recreational areas associated with the north east side of the lake also have high LoI's (Segments 20, 21 and 24). These areas are all primarily on low gradient shore types (vegetated or gravel beach). Figure 18 shows some of the high LoI areas around Windermere Lake.

Segment 16 (residential area in foreground)

Segment 24

**Figure 18. Examples of Segments ranked with High Level of Impact at Windermere Lake.**

# 5 Discussion

## *5.1 State of the Foreshore of Windermere Lake*

The foreshore (and adjacent upland areas) of Windermere Lake has undergone substantial alteration. Over half of the lake foreshore area studied has been disturbed through anthropogenic alterations. Alterations are concentrated around the north and northeast ends of the lake, and are a factor of both topography and proximity to infrastructure. Areas found to have the highest impacts from development generally are located along low gradient shoreline areas within the District of Invermere and along the northeast shore proximal to the highway infrastructure and the Town of Windermere. A large portion of the shoreline in these areas is made up of fine substrate materials that are easily moved and built on, such as vegetated, low rocky, gravel and sand beach shore types.

The southeast shore of Windermere Lake has had the least development, while development along much of the western shore (south of the District of Invermere) has been moderate. Development along the southeast shore appears to have been limited by a prevalence of cliff/bluff and wetland topographies, and possibly by the Indian Reserve land use designation (Indian Reserve #3 Columbia Lake). In the case of the western shore, pre-existing CPR infrastructure along the shoreline and distance from major amenities appears to have limited growth and thus alteration of the shoreline. Although these conditions may have constrained foreshore development in the past, evidence of encroaching development is visible, due to the extensive growth pressures and popularity of the area.

The main foreshore modifications along Windermere Lake include construction of foreshore structures (particularly retaining walls, docks and boat houses), riparian vegetation removal, and modifications to the land base (including building of a railway and road ways/ lake access points). As was found at Okanagan Lake (RDCO 2005), foreshore modifications along Windermere Lake tend to be similar for adjacent properties throughout the study area, especially in residential areas. RDCO (2005) discovered that it is typical for neighbours to conduct similar activities that cause foreshore impacts. For example, where one resident had built a house immediately adjacent to the foreshore, the others appeared to do the same. This is particularly evident at Windermere Lake, where retaining walls constructed below the high water mark are typical of most residential and private recreation properties. Docks and boathouses are also often constructed along the foreshore of these properties. These activities pose a special challenge to regulatory agencies when dealing with precedence, consistency, and the manner in which development and redevelopment are viewed and managed (RDCO 2005).

Provincial and Federal agencies have worked together to develop policies to protect and improve fish habitat. Constructions of foreshore retaining walls that affect fisheries habitat are no longer an acceptable practice (Coopper 2005). The agencies are also striving to avoid the reconstruction of damaged retaining walls within the high water mark (Coopper 2007). Retaining walls are instead to be moved back and/or be reinforced using methods that preserve the natural shoreline and improve fish habitat conditions (such as using shoreline planting or other soft bioengineering structures) (Coopper 2007). The hope is that once a few good examples are in place, a trend may begin of the foreshore area being left more natural, and of modifications being designed in manner that is more sensitive to the environment.

With guidelines such as those outlined above and community plans under development, it is apparent that there is a strong desire on the part of government regulators to provide clear direction for sustainable development along Windermere Lake. The finding of the 2005 Lake Use Survey (Fedrigo 2006) reveal that the communities too, are ready to embrace a stewardship initiative on Lake Windermere, and that they see the bigger picture and are asking for a long-term development strategy for the region. The integration of agencies into the EKILMP and the development of an OCP for the area are expected to facilitate consistent lake management.

## *5.2 Regional Protection*

Despite many foreshore impacts revealed by this project, a substantial portion of the foreshore within the study area remains undisturbed. The bulk of the undisturbed foreshore is located along the southeast shore (Figure 19). From the background review of species information for Windermere Lake, it is apparent that there are sensitive species/habitats associated with the undisturbed foreshore areas (i.e., south western grasslands and southern wetland areas) as well as the foreshore areas that have already been disturbed or that are in the vicinity of development (i.e. lake outlet at north end and outlet of Windermere Creek). These areas present a unique challenge to governing agencies responsible for balancing unprecedented growth with environmental protection. It is important to have preservation as a goal for the remaining intact ecosystems that exist along Windermere Lake.

Intact ecosystems have biological, social, and economic value, and the cost of protecting these areas may be low compared to the cost of restoration (Battelle et al. 2001). Additionally, the effectiveness of restoration is often unclear (RDCO 2005). At Okanagan Lake, for example, most foreshore restoration efforts are recent and have not been monitored for long-term effectiveness (RDCO 2005). Challenges are especially formidable when dealing with foreshore protection issues in areas where long-term visions have not been established (RDCO 2005), such as Windermere Lake, which does not yet have an Official Community Plan to guide development. However, the RDCO (2005) does warn that foreshore protection can be equally as challenging in areas where long-term visions have been established. Along Okanagan Lake, most parks are geared toward recreation and unimpeded public access, making it difficult to provide protection to natural features and ecosystems (RDCO 2005).

**Figure 19. The foreshore along the south west side of Windermere Lake remains undisturbed.**

Clearly defined principles and associated policies/strategies will help guide future decisions and promote a coordinated approach to foreshore management among regulatory agencies. Some guiding principles and associated policies have been outlined in the RDEK East Side of Windermere Lake Foreshore Policy (1993). The guiding principles presented in the Foreshore Policy, as well as policies relating to protection of sensitive foreshore species and habitats are as follows:

**Principle 1. Protection of the water quality of Windermere Lake is the highest priority.**

- Policy - Works shall not have a negative impact on the quality of water which, in turn, would contribute to a health problem in the fish population.
- Policy - Works constructed along the foreshore shall not have a negative impact on fish and waterfowl habitat.
- Policy - All construction along the foreshore shall be structurally sound to minimize erosion.

**Principle 2. The lake is a public resource for everyone to use. Maintaining access to the water for both waterfront residents and other members of the community is important.**

Policy - The regional district will not generally support new construction of boathouses or other similar structure, which are located entirely on Crown Land.

Policy - Where topography or other considerations, such as lack of parking, do not permit practical public access to the foreshore, the RDEK will recommend approval of existing works [on Crown Land] provided their presence does not pose a threat to drinking water quality, cause excessive erosion or siltation, or threaten fish and wildlife habitat.

**Principle 3. The natural boundary of the lake should be respected.**

Policy - No additional filling of the lake will be supported except where necessary for erosion control or to protect adjacent structures from wave action.

**Principle 4. The natural beauty of Windermere Lake should be respected.**

**Principle 5. All approved existing works and structures shall be covered by agreements with BC Lands.**

These principles and policies are key to establishing a regional vision and common goals while considering provincial and federal government interests (RDCO 2005). Review and further refinement of these principles and policies are expected to be an important component of the OCP development process. Additionally, other documents reviewed during this study (such as the Lake Windermere Management Strategy [2001]) have further outlined strategies or action items required for implementation of these principles and policies at Windermere Lake. Addressing these action items (*See* Section 7 – Recommended Actions) will compliment this inventory by providing additional baseline information as well as identifying and prioritizing sensitive species and habitat areas. This will help guide protection of critical foreshore areas.

In summary, the RDCO (2005) provides the following valuable advice on subsequent efforts and refinement of planning tools:

> *Subsequent efforts should be concentrated on protecting critical habitats using tools available in the planning environment, such as regional policies, foreshore plans, and foreshore development guidelines. These tools should all be examined and updated to include science-based policy direction for conservation planning. This direction should be intent on achieving a higher quality of development that preserves the integrity of upland areas and maintains environmental attributes of the foreshore while facilitating human requirments. Other potential tools include public education, which can be used to curtail the loss of critical habitat on private property, and expanding partnerships, which can increase local government's ability to adapt to increasing development pressure.*

# 6 Conclusions

The foreshore of Windermere Lake is dominated by vegetated, wetland, low rocky shore and cliff/bluff shoreline types. Over half of the foreshore of Windermere Lake has been disturbed by anthropogenic alterations. Although historical disturbance has resulted in changes to all shore types, development has occurred over much of the low lying easily moved shore types (i.e. vegetated, low rocky, sand beach, gravel beach). Dominant types of disturbance are dependant on the part of the lake reviewed. The CPR runs along most of the west side of the lake, while the north end and the north east sides have a combination of residential and private recreational land uses. Most of the disturbance can be characterized by the removal of native riparian vegetation and primary modifications including retaining walls (in particular), docks, boathouses, groynes and marinas (Figure 20). The south east shore, which is all located in the Indian Reserve, contains the greatest extent of undisturbed foreshore area, including substantial wetland and cliff/bluff shore types. The undisturbed wetland area at the south end of the lake is known to provide valuable fish and waterfowl habitat.

The results of this inventory are intended to increase the effectiveness and coordination of foreshore management activities at Windermere Lake, leading to improved ecosystem structure and function and integration of human use with environmental protection (RDCO 2005). Specifically, this study will help identify where significant impacts have and have not occurred in order to provide information that guides decisions on future works, areas requiring protection, and suitable areas for enhancement (Coopper 2007). In making decisions about future works, the intention is to use what is already disturbed or of low value to continue to allow sustainable development (Coopper 2007), while providing protection to undisturbed critical habitat areas.

In order to adequately address foreshore protection issues, it is important to examine the way residents and stewards view foreshore ecosystems (RDCO 2005). The key to protection is our ability to recognize and acknowledge our influence on these systems and the role they play in the health and vitality of Windermere Lake (Battelle 2001). Preservation of these ecosystems is critical in maintaining the environmental, social, and economic values that have drawn people to the East Kootenay Region (RDCO 2005).

**Figure 20. Foreshore modifications include removal of riparian vegetation, construction of retaining walls, docks, and boat houses.**

# 7 Recommended Actions

The Central Okanagan Lake foreshore inventory and mapping report (RDCO 2005) was provided as a template to use in completing this Windermere foreshore inventory report. Due to its relevance, this Recommended Actions Section reflects much of what was provided in the Okanagan Report, with some modifications. In addition to the Okanagan Report, additional items requiring attention were identified from a review of Windermere Lake planning documents; namely the Lake Windermere Management Strategy (Urban Systems in 2001) and the 2005 Windermere Lake Water Quality Monitoring Program and Literature Review (Masse and Miller 2005). The recommendations from these documents are referenced accordingly below.

Decisions regarding the management of the Windermere Lake foreshore should be based on the best available science and should reflect policies set out in regional strategies and guidelines as well as those of senior levels of government (RDCO 2005). Based on the current state of the foreshore, measures should be taken to conserve areas that contribute to maintaining and restoring sensitive foreshore ecosystems and to preserving the ecological integrity of Windermere Lake. Regional and local governments possess a variety of means to ensure development is sensitive to environmental values, including Official Community Plans, zoning, and bylaws. These are useful in many situations, provided the baseline information on which decisions are made is both current and accurate. Action items recommended to help further understand and protect the natural integrity of Windermere are as follows:

**Action #1. Develop a Foreshore Protection Plan (RDCO 2005). This action is being initiated by EKILMP this year.**

- Set objectives, which should consider shore type and disturbance level for the management of Windermere Lake.
- Address specific zoning of the foreshore of Windermere Lake.
- Include regulations and guidelines for new development, re-development and management of existing developments (e.g., riparian area regulations).
- Designate protection of critical areas in policies.
- Explore a memorandum of understanding with all levels of government regarding foreshore management roles and responsibilities.
- Develop jointly with all partnering agencies.
- Consider lakeshore development guidelines being developed elsewhere (e.g., Lindros Project Development, Urban Systems 2004).
- Link foreshore activities to upland portions of the watershed.

**Action #2. Determine carrying capacity**

- Obtain necessary shoreline data to determine carrying capacity (the impact of foreshore modifications and activities on shore zone ecosystems).

  The carrying capacity of a lake is defined as *a 'lake's ability to accommodate recreational use (e.g. boating, skiing, bathing) and residential occupation of the foreshore and adjacent upland areas without excessive overcrowding, pollution and consequent danger to human health and safety'* (RDCO 2005). Although not easily measured, carrying capacity may be useful in assessing cumulative loss of foreshore habitats resulting from human disturbance (RDCO 2005). Urban Systems (2001) completed preliminary calculations for Windermere Lake and determined that the carrying capacity was 40,250 user days (based on water quality). Shoreline data was not available, thus affecting the validity of the assumptions and the accuracy of the results (Urban Systems 2001). Some of the shoreline data gaps identified included: how often cottage/permanent residents use the lake, number of boats per cottage/permanent residence, occupancy rates for hotels/lodges/campgrounds, and average number of vehicles per day at boat

launch. The 2005 Lake Use Survey (Fedrigo 2006) may provide some of this information.

**Action #3. Identify critical areas for protection, restoration and enhancement (RDCO 2005)**

- Use the information presented in this report to help identify critical habitat areas (e.g., areas without retaining walls, low LoI's, undeveloped land, etc).

**Action #4. Conduct additional inventories to determine sensitive species and habitats associated with the foreshore. This action is being initiated by EKILMP this year.**

- Identify critical habitat areas for species through further analysis and future addition to the project database.
- Determine fisheries sensitive zones for the variety of fish species in Windermere Lake, including identification of spawning, migration and rearing areas for fish (Masse and Miller 2005).
- Conduct inventories of reptile, amphibians, small birds and small mammals (Urban Systems 2001).
- Conduct plant inventories in undisturbed foreshore areas, to identify whether provincially listed "at risk or sensitive" species or plant communities are present.

**Action #5. Protect critical and natural areas (RDCO 2005)**

- Protect undeveloped areas adjacent to the foreshore. This is especially important when dealing with ecosystems that are threatened or endangered.
- Protect substrates from alteration. Beach grooming, lake infilling, importation of sand, armouring, and dredging all have the potential to negatively impact substrate materials.
- Pursue agreements between local governments and provincial agencies about foreshore management. "Head lease" agreements give one party control over the management of the foreshore and have been obtained by local governments such as the District of Peachland. This will reduce difficulties in coordinating inter-agency management strategies.

**Action #6. Address modifications (RDCO 2005)**

- Restore or enhance foreshore areas affected by past modifications, such as armoring, infilling, beach grooming, etc., if restoration or enhancement is likely to benefit habitat quality.
- Prevent or mitigate further modifications to foreshore areas where they are likely to reduce habitat quality. For example, in kokanee spawning areas modifications should not disrupt wind and wave action.
- Make technical guidance available to agencies and the public regarding alternatives to traditional shoreline modifications such as armoring. Such guidelines should be developed in conjunction with senior government agencies to ensure consistency with regulatory requirements and resource management objectives.

**Action #7. Monitor habitat losses and gains to measure success (RDCO 2005)**

- Develop and produce indicators, actions and timelines.
- Initiate a detailed habitat monitoring program on Windermere Lake.
- Develop a coordinated enforcement protocol with all levels of government to respond to foreshore habitat impacts.
- Compare results from a monitoring program to the original inventory data to determine compliance with best management practices and effectiveness of protection activities.

**Action #8. Continue to make inventory data and habitat information available (RDCO 2005)**

- Provide federal, provincial, and local jurisdictions with inventory data.
- Provide partnering agencies with inventory data.

- Continue to make the inventory data available to the public via the Internet through continued partnership with the Community Mapping Network.
- Update the Community Mapping Network with data revisions identified in this report.

**Action #9. Establish a citizen-based group to manage Lake Windermere (Urban Systems 2001). This item has been implemented by the Lake Windermere Project.**

- Establish a citizen-based group to manage Lake Windermere and coordinate the implementation of recommendations. The group should include residents living around the lake, staff from the District of Invermere and Regional District, as well as representatives of the Shuswap and Columbia Lake First Nations. Involvement of people living around and using the lake would aid in successful implementation of monitoring programs and managing water quality and recreation concerns.

**Action #10. Monitor water quality. This item has been implemented by the Lake Windermere Project.**

- In cooperation with the Ministry of Environment and with the involvement of the citizen based group, initiate a 5 year program to monitor Windermere Lake's water quality (Urban Systems 2001, Masse & Miller 2005).
- The water quality program should focus on lake productivity and assess the overall water quality state in Windermere Lake and determine trends (Masse & Miller 2005).
- Update the 1985 fluorometry study for the entire lakeshore affected by development to detect leachate inflows from onsite wastewater disposal (Urban Systems 2001, Masse & Miller 2005).

**Action #11. Address septic issues**

The use of septic fields around Windermere Lake is a key issue to local government (Cordell 2007). Concerns with nutrients entering the lake from septic systems built on poor soils will likely intensify with time in association with trends of increasing populations, increasing numbers of permanent residents and larger building footprints (Urban Systems 2001). To address this issue, Urban Systems (2001) recommends the following:

- efforts be continued to develop a community sewering strategy for the entire east side of Lake Windermere; and
- subdivision and development around the Lake be prohibited (but allowing redevelopment) until a community sewage system is provided.

**Action #12. Restrict marinas, boat launches and foreshore improvements in sensitive and significant habitat areas (Urban Systems 2001)**

- Where the habitat is sensitive only during critical periods (e.g., during bird breeding/nesting and rearing/fledgling periods), marinas and boat launches should remain closed. Motorized and non-motorized recreation should also be restricted in sensitive and significant habitat areas, particularly during critical periods.
- Prohibit the establishment of new or the expansion of existing marinas until the environmental inventory of the lake and foreshore has been conducted, and the calculation of the lake carrying capacity has been refined.
- Review the status of Pete's marina to determine whether it negatively impacts the osprey feeding area and fish habitat at the north end of the lake and Columbia River.
- All marinas should maintain a code of practice to reduce the potential for hydrocarbon or other pollutant introduction.
- Close the boat launch north of the Columbia River Bridge, as it is in an environmentally sensitive and significant area.

# 8 References


Batelle Marine Sciences Laboratory et al. 2001. *Reconnaissance Assessment of the State of the Nearshore Ecosytem: Eastern Shore of Puget Sound, Including Vashon and Maury Islands* (WRIAs 8 and 9). King County *In* RDCO 2005.

BC Conservation Data Centre (CDC). 2007. BC Species and Ecosystems Explorer and Mapped Known Locations Services. Website address: http://www.env.gov.bc.ca/cdc. Ministry of Environment, Victoria BC.

Coopper, T. 2007. Personal Communications. Habitat Biologist, Department of Fisheries and Oceans, Nelson, BC.

Coopper, T. 2005. Personal Communications. Habitat Biologist, Department of Fisheries and Oceans, Canada. *In* Masse and Miller 2005.

Cordell, L. 2007 Personal Communications. Planner, Regional District of East Kootenay, Cranbrook, BC.

Department of Fisheries and Oceans (DFO). 2006. Windermere Lake Field Data Collected During Foreshore Inventory and Mapping on August 15 and 16, 2006. Provided by Brad Mason, Senior Habitat Inventory Biologist, DFO, Vancouver BC.

DFO. 2006. *The Shore Primer - Ontario Edition: Your Shore: A Natural Wonder*. http://www.dfo-mpo.gc.ca/regions/CENTRAL/pub/shore-rivages-on/shore3_e.htm

East Kootenay Integrated Lake Management Partnership (EKILMP). 2006. Terms of Reference to the East Kootenay Integrated lake Management Partnership. Draft Version 1.2 (December 19, 2006).

Fedrigo, A. 2005. *Healthy Water, Healthy Communities – The Lake Windermere Project; Findings of the 2005 Lake Use Survey*. Report prepared by Lake Windermere Project Coordinator, Wildsight, Kimberley BC. 34 pp.

Griffith, R.P. 1994. *A Reconnaissance Survey of Windermere Lake*. Report prepared for: Mica Fisheries Compensation Program, BC Hydro / BC Environment. *In* Masse and Miller 2005 and Urban Systems 2001.

Holmes, P. 2007. Personal Communications. Ecosystem Biologist, Ministry of Environment, Invermere, BC.

Leschied, H. 2007 Personal Communications. Program Coordinator, Lake Windermere Project, Wildsight.

Lindros Project Development, Urban Systems. 2004. *Lakeshore Development Guidelines*. Draft. Thompson Nicola Regional District, Kamloops BC. *In* Regional District of Central Okanagan, 2005.

Living Lakes Partnership. 2007. Columbia Wetlands. Website address: http://www.livinglakes.org/top.htm.

Mason, B and R. Knight. 2001. *Sensitive Habitat Inventory and Mapping*. Community Mapping Network. Vancouver BC. 315pp+viii. M. Johannes, editor.

Masse and Miller Consulting Ltd. 2005. *Windermere Lake Water Quality Monitoring Program and Literature Review*. Report prepared for the Regional District of East Kootenay, Cranbrook BC. 52 pp.

Regional District of Central Okanagan (RDCO). 2005. *Central Okanagan Lake Foreshore Inventory and Mapping*. Planning Services Department. 91 pp.

Regional District of East Kootenay (RDEK). 1993. *East Side of Windermere Lake Foreshore Policy*. Regional District of East Kootenay.

RDEK. 2007a. *Lake Windermere Area Official Community Plan Newsletter No. 1* (January 2007).

RDEK. 2007b. Columbia Valley Consolidation Zoning Bylaw maps (Bylaw No. 900, 1992). Maps: Lakeview/Windermere (A7), Rushmere (A15). Website address: http://www.rdek.bc.ca/Bylaws/bylawmain.htm

Resources Inventory Committee (RIC). 1999. *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Lake Survey Form Field Guide.* Errata #3, (March 2004). *In* RDCO 2005.

RIC. 1994. Field Key to the Freshwater Fishes of British Columbia. Publication #045. Province of British Columbia.

Urban Systems. 2001. Lake *Windermere Management Strategy*. Draft. Report prepared for the District of Invermere. 87 pp.

Wildsight. 2006. Windermere Lake Retaining Wall Assessment Database. Created by Amanda Fedrigo, Wildsight, Kimberley BC.

# Appendix A. East Kootenay Integrated Lake Management Partnership (EKILMP) Participant List (2006)

Core Group

- Regional District of East Kootenay
- Fisheries & Oceans Canada
- Integrated Land Management Bureau
- Transport Canada: Navigable Waters and Office of Boating Safety
- Interior Health Authority
- Canadian Columbia River Intertribal Fisheries Commission (CCRIFIC) representing A'kisq'nuq First Nation (AFN), Shuswap Indian Band and Ktunaxa Land and Resource Council
- BC Ministry of Environment (Water Stewardship, Environmental Protection & Environmental Stewardship divisions)
- Wasa Lake Land Improvement District
- Wildsight

Windermere Interest Participants

- District of Invermere
- Wildsight: Lake Windermere Project
- Others as identified
- Village of Canal Flats

# Appendix B. Species of Concern in the Interior Douglas Fir Biogeoclimatic Zone of the Rocky Mountain Forest District (B1), and Mapped Known Locations of Sensitive Species in the Windermere Lake Area (B2)(CDC 2007).

## Appendix B1. Species of Concern in the Interior Douglas Fir Biogeoclimatic Zone of the Rocky Mountain Forest District (BC Conservation Data Centre 2007)

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| **Invertebrate Animal** | | | | | | | | | |
| *Anguispira kochi* | Banded Tigersnail | G5 | S3 | | Blue | | | Gastropods | TERRESTRIAL |
| *Argia vivida* | Vivid Dancer | G5 | S2 | | Red | | 3 - Sensitive | Insects | RIVERINE |
| *Gastrocopta holzingeri* | Lambda Snaggletooth | G5 | S3? | | Blue | | | Gastropods | TERRESTRIAL |
| *Glaucopsyche piasus* | Arrowhead Blue | G5 | S4 | | Blue | | 4 - Secure | Insects | TERRESTRIAL |
| *Hemphillia camelus* | Pale Jumping-slug | G4 | S3 | | Blue | | | Gastropods | TERRESTRIAL |
| *Lycaena dione* | Dione Copper | G5 | S2 | | Red | | 4 - Secure | Insects | PALUSTRINE; TERRESTRIAL |
| *Magnipelta mycophaga* | Magnum Mantleslug | G3 | S2S3 | | Blue | | | Gastropods | TERRESTRIAL |
| *Oreohelix strigosa* | Rocky Mountainsnail | G5 | S3S4 | | Blue | | | Gastropods | TERRESTRIAL |
| *Oreohelix subrudis* | Subalpine Mountainsnail | G5 | S3S4 | | Blue | | | Gastropods | TERRESTRIAL |
| *Vallonia cyclophorella* | Silky Vallonia | G5 | S3 | | Blue | | | Gastropods | TERRESTRIAL |
| **Vascular Plant** | | | | | | | | | |
| *Adiantum capillus-veneris* | southern maiden-hair | G5 | S1 | E (May 2000) | Red | | 1 - At Risk | Ferns | RIVERINE |
| *Agoseris lackschewitzii* | pink agoseris | G4 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Anemone canadensis* | Canada anemone | G5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Apocynum* x *floribundum* | western dogbane | GNA | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Arabidopsis salsuginea* | saltwater cress | G4G5 | S1 | | Red | | | Dicots | TERRESTRIAL |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| *Arnica chamissonis* ssp. *incana* | meadow arnica | G5T3T5 | S2S3 | | Blue | | | Dicots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Artemisia ludoviciana* var. *incompta* | western mugwort | G5T3T5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Aster ascendens* | long-leaved aster | G5 | S1S3 | | Red | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Astragalus filipes* | threadstalk milk-vetch | G5 | S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Atriplex argentea* ssp. *argentea* | silvery orache | G5T5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Botrychium ascendens* | upswept moonwort | G2G3 | S2 | | Red | | 3 - Sensitive | | PALUSTRINE; TERRESTRIAL |
| *Botrychium simplex* | least moonwort | G5 | S2S3 | | Blue | | 4 - Secure | | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Bouteloua gracilis* | blue grama | G5 | S1 | | Red | | | Monocots | TERRESTRIAL |
| *Calamagrostis montanensis* | plains reedgrass | G5 | S2 | | Red | | | Monocots | TERRESTRIAL |
| *Carex crawei* | Crawe's sedge | G5 | S1 | | Red | | | Monocots | PALUSTRINE; TERRESTRIAL |
| *Carex geyeri* | elk sedge | G5 | S3 | | Blue | | | Monocots | TERRESTRIAL |
| *Carex lenticularis* var. *lenticularis* | lakeshore sedge | G5T5 | S2 | | Red | | | Monocots | LACUSTRINE; PALUSTRINE |
| *Carex rostrata* | swollen beaked sedge | G5 | S2S3 | | Blue | | | Monocots | PALUSTRINE |
| *Carex sychnocephala* | many-headed sedge | G4 | S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Carex xerantica* | dry-land sedge | G5 | S2 | | Red | | | Monocots | TERRESTRIAL |
| *Castilleja cusickii* | Cusick's paintbrush | G4G5 | S1 | | Red | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Castilleja minor* ssp. *minor* | annual paintbrush | G5T5 | S1 | | Red | | | Dicots | LACUSTRINE; PALUSTRINE; RIVERINE; |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | TERRESTRIAL |
| *Cheilanthes gracillima* | lace fern | G4G5 | S2S3 | | Blue | | 3 - Sensitive | Ferns | TERRESTRIAL |
| *Cirsium scariosum* | elk thistle | G5 | S1S3 | | Red | | | Dicots | TERRESTRIAL |
| *Cryptantha ambigua* | obscure cryptantha | G4 | S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Delphinium bicolor* ssp. *bicolor* | Montana larkspur | G4G5T4T5 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Eleocharis elliptica* | Slender spike-rush | G5 | S2S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE |
| *Eleocharis rostellata* | beaked spike-rush | G5 | S2S3 | | Blue | | | Monocots | ESTUARINE; LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Epilobium glaberrimum* ssp. *fastigiatum* | smooth willowherb | G5T4T5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Gaura coccinea* | scarlet gaura | G5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Gayophytum humile* | dwarf groundsmoke | G5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Gayophytum racemosum* | racemed groundsmoke | G5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Gayophytum ramosissimum* | hairstem groundsmoke | G5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Gentiana affinis* | prairie gentian | G5 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Glyceria pulchella* | slender mannagrass | G5 | S2S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE |
| *Glycyrrhiza lepidota* | wild licorice | G5 | S2 | | Red | | | Dicots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Hedeoma hispida* | mock-pennyroyal | G5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Helianthus nuttallii* var. *nuttallii* | Nuttall's sunflower | G5T5 | S1 | | Red | | | Dicots | PALUSTRINE; TERRESTRIAL |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| *Heterocodon rariflorum* | heterocodon | G5 | S3 | | Blue | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Hypericum scouleri* ssp. *nortoniae* | western St. John's-wort | G5T3T5 | S2S3 | | Blue | | | Dicots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Impatiens ecalcarata* | spurless touch-me-not | G3G4 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Isoetes howellii* | Howell's quillwort | G4G5 | S1 | | Red | | | Quillworts | LACUSTRINE; PALUSTRINE |
| *Juncus confusus* | Colorado rush | G5 | S1 | | Red | | | Monocots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Lathyrus bijugatus* | pinewood peavine | G4 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Lepidium densiflorum* var. *pubicarpum* | prairie pepper-grass | G5T4 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Lewisia triphylla* | three-leaved lewisia | G4? | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Linanthus septentrionalis* | northern linanthus | G5 | S3 | | Blue | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Lomatium sandbergii* | Sandberg's desert-parsley | G4 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Lomatium triternatum* ssp. *platycarpum* | nine-leaved desert-parsley | G5T3T5 | S2 | | Red | | | Dicots | TERRESTRIAL |
| *Lupinus arbustus* ssp. *neolaxiflorus* | spurred lupine | G5T1T3 | SH | | Red | | | Dicots | TERRESTRIAL |
| *Lupinus arbustus* ssp. *pseudoparviflorus* | Montana lupine | G5T2T3 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Megalodonta beckii* var. *beckii* | water marigold | G4G5T4 | S3 | | Blue | | | Dicots | LACUSTRINE; PALUSTRINE; RIVERINE |
| *Melica smithii* | Smith's | G4 | S2S3 | | Blue | | | Monocots | PALUSTRINE; |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| *Melica spectabilis* | melic purple oniongrass | G5 | S2S3 | | Blue | | | Monocots | TERRESTRIAL PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Mimulus breviflorus* | short-flowered monkey-flower | G4 | S1 | | Red | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Muhlenbergia andina* | foxtail muhly | G4 | S1 | | Red | | | Monocots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Muhlenbergia glomerata* | marsh muhly | G5 | S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Myriophyllum ussuriense* | Ussurian water-milfoil | G3 | S3 | | Blue | | | Dicots | ESTUARINE; LACUSTRINE; PALUSTRINE; RIVERINE |
| *Orobanche corymbosa* ssp. *mutabilis* | flat-topped broomrape | G4T3? | S2 | | Red | | | Dicots | TERRESTRIAL |
| *Orobanche ludoviciana* ssp. *ludoviciana* | Suksdorf's broomrape | G5T5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Pellaea gastonyi* | Gastony's cliff-brake | G2G3 | S2 | | Red | | 3 - Sensitive | Ferns | TERRESTRIAL |
| *Physaria didymocarpa* var. *didymocarpa* | common twinpod | G5T4 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Plantago eriopoda* | alkali plantain | G5 | S1 | | Red | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Polemonium elegans* | elegant Jacob's-ladder | G4 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Polygonum engelmannii* | Engelmann's knotweed | G3G5 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Potamogeton* | stiff-leaved | G5 | S2S3 | | Blue | | | Monocots | LACUSTRINE |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| *strictifolius* | pondweed | | | | | | | | |
| *Potentilla diversifolia* var. *perdissecta* | diverse-leaved cinquefoil | G5T4 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Potentilla nivea* var. *pentaphylla* | five-leaved cinquefoil | G5T4 | S2S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Salix boothii* | Booth's willow | G5 | S2S3 | | Blue | | | Dicots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Schizachyrium scoparium* | little bluestem | G5 | S1 | | Red | | | Monocots | RIVERINE; TERRESTRIAL |
| *Scirpus pallidus* | pale bulrush | G5 | S1 | | Red | | | Monocots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Scolochloa festucacea* | rivergrass | G5 | S2 | | Red | | | Monocots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Silene drummondii* var. *drummondii* | Drummond's campion | G5T5 | S3 | | Blue | | | Dicots | TERRESTRIAL |
| *Silene spaldingii* | Spalding's campion | G2 | S1 | E (May 2005) | Red | | | Dicots | TERRESTRIAL |
| *Sphaeralcea coccinea* | scarlet globe-mallow | G5? | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Sphenopholis intermedia* | slender wedgegrass | G5 | S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Sphenopholis obtusata* | prairie wedgegrass | G5 | S1 | | Red | | | Monocots | LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Sporobolus compositus* var. *compositus* | rough dropseed | G5T5 | S3 | | Blue | | | Monocots | PALUSTRINE; TERRESTRIAL |
| *Stellaria obtusa* | blunt-sepaled starwort | G5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Stuckenia vaginata* | sheathing | G5 | S2S3 | | Blue | | | Monocots | LACUSTRINE; |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| | pondweed | | | | | | | | RIVERINE |
| *Thalictrum dasycarpum* | purple meadowrue | G5 | S2S3 | | Blue | | | Dicots | PALUSTRINE; TERRESTRIAL |
| *Thermopsis rhombifolia* | prairie golden bean | G5 | S1 | | Red | | | Dicots | TERRESTRIAL |
| *Townsendia hookeri* | Hooker's townsendia | G5 | S2 | | Red | | | Dicots | TERRESTRIAL |
| *Trichophorum pumilum* | dwarf clubrush | G5 | S2S3 | | Blue | | | Monocots | LACUSTRINE; PALUSTRINE; TERRESTRIAL |
| *Veronica catenata* | pink water speedwell | G5 | S1 | | Red | | | Dicots | LACUSTRINE; PALUSTRINE; RIVERINE |
| **Vertebrate Animal** | | | | | | | | | |
| *Acrocheilus alutaceus* | Chiselmouth | G5 | S3S4 | NAR (May 2003) | Blue | | 3 - Sensitive | Ray-finned Fishes | LACUSTRINE; RIVERINE |
| *Ammodramus leconteii* | Le Conte's Sparrow | G4 | S3S4B | | Blue | | 4 - Secure | Birds | PALUSTRINE; TERRESTRIAL |
| *Ardea herodias herodias* | Great Blue heron, *herodias* subspecies | G5T5 | S3B,S4N | | Blue | | | Birds | ESTUARINE; LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Ascaphus montanus* | Rocky Mountain Tailed Frog | G4 | S1 | E (May 2000) | Red | Y (May 2004) | | Amphibians | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Asio flammeus* | Short-eared Owl | G5 | S3B,S2N | SC (May 1994) | Blue | Y (May 2004) | 3 - Sensitive | Birds | ESTUARINE; PALUSTRINE;TERRESTRIAL |
| *Athene cunicularia* | Burrowing Owl | G4 | S1B | E (Apr 2006) | Red | Y (May 2004) | 1 - At Risk | Birds | TERRESTRIAL |
| *Botaurus lentiginosus* | American Bittern | G4 | S3B | | Blue | | 4 - Secure | Birds | ESTUARINE; PALUSTRINE |
| *Buteo platypterus* | Broad-winged Hawk | G5 | S3B | | Blue | | 4 - Secure | Birds | PALUSTRINE; TERRESTRIAL |
| *Chrysemys picta pop. 2* | Western Painted Turtle - | G5TNR | S3 | | Blue | | | Turtles | PALUSTRINE; RIVERINE |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| | Intermountain - Rocky Mountain Population | | | | | | | | |
| *Corynorhinus townsendii* | Townsend's Big-eared Bat | G4 | S3 | | Blue | | 2 - May be at risk | Mammals | PALUSTRINE; SUBTERRANEAN; TERRESTRIAL |
| *Dolichonyx oryzivorus* | Bobolink | G5 | S3B | | Blue | | 4 - Secure | Birds | PALUSTRINE; TERRESTRIAL |
| *Grus canadensis* | Sandhill Crane | G5 | S3S4B | NAR (May 1979) | Blue | | 4 - Secure | Birds | LACUSTRINE; PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Gulo gulo luscus* | Wolverine, *luscus* subspecies | G4T4 | S3 | SC (May 2003) | Blue | | | Mammals | TERRESTRIAL |
| *Martes pennanti* | Fisher | G5 | S2S3 | | Blue | 4 - Secure | | Mammals | PALUSTRINE;TERRESTRIAL |
| *Megascops kennicottii macfarlanei* | Western Screech-Owl, *macfarlanei* subspecies | G5T4 | S1 | E (May 2002) | Red | Y (May 2004) | | Birds | PALUSTRINE;TERRESTRIAL |
| *Melanerpes lewis* | Lewis's Woodpecker | G4 | S2B | SC (Nov 2001) | Red | Y (May 2004) | 3 - Sensitive | Birds | PALUSTRINE;TERRESTRIAL |
| *Numenius americanus* | Long-billed Curlew | G5 | S3B | SC (Nov 2002) | Blue | Y (May 2004) | 3 - Sensitive | Birds | ESTUARINE; PALUSTRINE; TERRESTRIAL |
| *Oncorhynchus clarkii lewisi* | Cutthroat Trout, *lewisi* subspecies | G4T3 | S3 | SC (May 2005) | Blue | | | Ray-finned Fishes | LACUSTRINE; RIVERINE |
| *Otus flammeolus* | Flammulated Owl | G4 | S3S4B | SC (Nov 2001) | Blue | Y (May 2004) | 3 - Sensitive | Birds | TERRESTRIAL |
| *Ovis canadensis* | Bighorn Sheep | G4 | S2S3 | | Blue | | 4 - Secure | Mammals | PALUSTRINE; TERRESTRIAL |
| *Plethodon idahoensis* | Coeur d'Alene Salamander | G4 | S3 | SC (Nov 2001) | Blue | Y (May 2004) | 2 - May be at risk | Amphibians | PALUSTRINE; RIVERINE; SUBTERRANEAN |
| *Rana pipiens* | Northern | G5 | S1 | E (May | Red | Y (May | 4 - Secure | Amphibians | LACUSTRINE; |

| Scientific Name | Common Name | Global Rank | Prov Rank | COSEWIC | BC Status | Identified Wildlife | National GS | Class | Habitat Type |
|---|---|---|---|---|---|---|---|---|---|
| | Leopard Frog | | | 2000) | | 2004) | | | PALUSTRINE; RIVERINE; TERRESTRIAL |
| *Salvelinus confluentus* | Bull Trout | G3 | S3 | | Blue | | 3 - Sensitive | Ray-finned Fishes | LACUSTRINE; RIVERINE |
| *Sphyrapicus thyroideus nataliae* | Williamson's sapsucker, *nataliae* subspecies | G5TU | S1S2B | E (May 2005) | Red | Y (Jun 2006) | | Birds | TERRESTRIAL |
| *Spizella breweri breweri* | Brewer's Sparrow, *breweri* subspecies | G5T4 | S2B | | Red | | | Birds | TERRESTRIAL |
| *Taxidea taxus* | Badger | G5 | S1 | E (May 2000) | Red | Y (May 2004) | 3 - Sensitive | Mammals | TERRESTRIAL |
| *Tympanuchus phasianellus columbianus* | Sharp-tailed Grouse, *columbianus* subspecies | G4T3 | S2S3 | | Blue | | | Birds | PALUSTRINE; TERRESTRIAL |
| *Ursus arctos* | Grizzly Bear | G4 | S3 | SC (May 2002) | Blue | Y (May 2004) | | Mammals | PALUSTRINE;RIVERINE; TERRESTRIAL |

**Global Rank:**

GX = Presumed Extinct
GH = Possibly Extinct
G1 = Critically Imperiled
G2 = Imperiled
G3 = Vulnerable
G4 = Apparently Secure
G5 = Secure

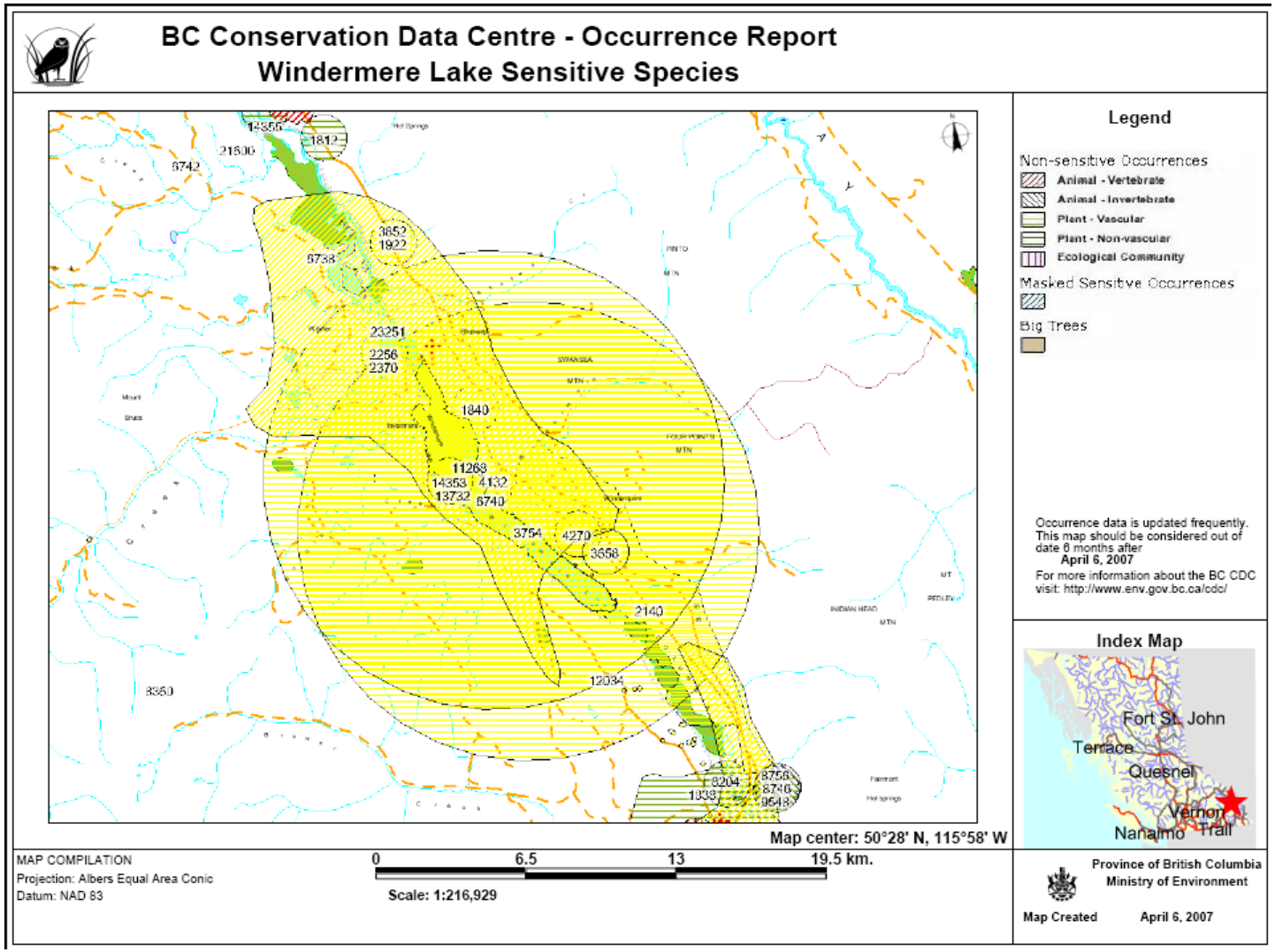
**Provincial Rank:**

SX = Presumed Extirpated
SH = Possibly Extirpated
S1 = Critically Imperiled
S2 = Imperiled
S3 = Vulnerable
S4 = Apparently Secure
S5 = Secure
B = Breeding
N = Non Breeding
Z = Moving - diffuse, usually moving population

**COSEWIC**

E = Endangered
SC = Special Concern
NAR = Not at Risk

## Appendix B2. Mapped Known Locations of Sensitive Species in the Windermere Lake Area (CDC 2007)



# Appendix C. A Key to the Field Headings in the EKILMP Windermere Lake Arcview Foreshore Database (Adapted from Mason and Knight 2001)

| Column Heading | Unabbreviated Column Heading | Heading Description / Defining Parameters |
|---|---|---|
| LAKE_NAME | Lake Name | Local name |
| ORGANIZATI | Organization | Data Collection |
| DATE | Date | yy/mm/dd |
| TIME_ | Time | Local Time |
| CREW | Crew | Initials |
| WEATHER | Weather | Description |
| AIR_TEMP_ | Air Temperature | Degrees Celsius |
| WATER_TEMP | Water Temperature | Degrees Celsius |
| COMMENTS | Comments | General comments regarding Segment. |
| SEGMENT_NUM | Segment Number | Unique identifier |
| SHORE_TYPE | Shore Type | Dominant shore type based on percentage of shore type which occupies the entire Segment. |
| LAND_USE | Land Use | Land use was interpolated for each Segment based on local land use or zoning maps in digital or hard copy format. This column designates the most abundant land use within the Segment. |
| LEV_OF_IMP | Level of Impact | Level of impact describes the disturbance level (low, moderate, high) that has occurred throughout the Segment. It is based on visual observations during the assessment including attributes from the database such as % disturbed, retaining wall number and type, docks, groynes, and presence of marinas. |
| LIVEST_ACC | Livestock Access | Describes access to foreshore. |
| PHOTONUM | Photo Number | Lists all photos taken in Segment. |
| RESIDENT | Residential | Percentage of Segment occupied by residential land use. |
| COMMERCIAL | Commercial | Percentage of Segment occupied by commercial land use. |
| AGRICULTUR | Agricultural | Percentage of Segment occupied by agricultural land use. |
| PARK | Park | Percentage of Segment occupied by park land use. |
| INDUSTRIAL | Industrial | Percentage of Segment occupied by industrial land use. |
| CPR | Canadian Pacific Railway | Percentage of Segment privately occupied by the Canadian Pacific Railway |
| UNDEV_IR | Undeveloped Indian Reserve | Percentage of Segment designated as Indian Reserve (Federal), which remains undeveloped. |
| PRIV_REC | Private Recreational | Percentage of Segment occupied by private recreational land use (such as marinas, recreational strata complexes, and resorts). |
| CROWN_OTH | Crown Land Other | Percentage of Segment designated as Crown Land (other than Park). |
| NATURAL | % Natural | Approximate percentage of Segment which remains natural. Based on field observations. |
| DISTURBED | % Disturbed | Approximate percentage of Segment which has been disturbed. Based on field observations. |
| CLIFF_BLUF | Cliff or Bluff shore type | Approximate percentage of Segment which is occupied by Cliff/Bluff shore type. |
| GRAVEL_BEA | Gravel Beach shore type | Approximate percentage of Segment which is occupied by Gravel Beach shore type. |
| SAND_BEACH | Sand Beach shore type | Approximate percentage of Segment which is occupied by Sand Beach shore type. |
| VEGE_SHORE | Vegetated shore type | Approximate percentage of Segment which is occupied by a vegetated shore type. |
| LW_RCKY_SH | Low Rocky shore type | Approximate percentage of Segment which is occupied by low rocky shore type. |

| | | |
|---|---|---|
| WETLAND | Wetland shore type | Approximate percentage of Segment which is occupied by wetland shore type. |
| OTHER | Other shore type | Approximate percentage of Segment which is occupied by another shore type than those listed. |
| SUB_FINES | Substrate Fines | Approximate percentage (above water) that is composed of fine material. |
| SUB_GRAVEL | Substrate Gravel | Approximate percentage (above water) that is composed of gravel material. |
| SUB_COBBLE | Substrate Cobble | Approximate percentage (above water) that is composed of cobble material. |
| SUB_BOULDE | Substrate Boulder | Approximate percentage (above water) that is composed of boulder material. |
| SUB_BEDROC | Substrate Bedrock | Approximate percentage (above water) that is composed of bedrock material. |
| COMPACTION | Compaction | Degree of relative looseness of bed material, where feasible. |
| RIP_CLASS | Riparian Class | Land cover classes (i.e. based on % crown cover and dominant vegetation). |
| RIP_QUALIF | Riparian Qualifier | Describes type of disturbance/usage for the area. |
| RIP_STAGE | Riparian Stage | Structural Stage of the dominant vegetation. |
| SHOR_COVER | Shore Cover | Percentage of the shore that is occupied by riparian vegetation |
| RIP_VETER | Riparian Veteran | Number of veteran trees - mature trees that are significantly older than the dominant forest cover. |
| RIP_SNAG | Riparian snags | Number of snags- dead standing trees |
| RIP_BANDWI | Riparian Band Width | Number of metres of riparian area reviewed (up from the water line). |
| RIP_BANKSL | Riparian Bank Slope | Number of degrees |
| RIP_OVERHA | Riparian Overhang | Distance (m) that riparian vegetation overhangs within 1 m of the channel. |
| AQUATI_VEG | Aquatic Vegetation | Percentages of submerged and emerged vegetation |
| LITTORAL_Z | Littoral Zone | General depth of the littoral zone. |
| SPAWN_H | Spawning Habitat | Presence/absence of fish spawning habitat. |
| RETAIN_WAL | Retaining Wall | Number of retaining walls per Segment. |
| RETAIN_MAT | Retaining Wall Material | Primary material that the retaining wall(s) are constructed from. |
| DOCKS | Docks | Number of docks per Segment |
| DOCK_MATER | Dock material | Primary material that the dock(s) are constructed from. |
| GROYNES | Groynes | Number of groynes per Segment. |
| GROYNE_MAT | Groyne material | Primary material that the groynes are constructed from. |
| RAILWAY | Railway | Presence or absence of a railway along the foreshore of the Segment. |
| MARIN_RAIL | Marine Railway | Number of marine railways /trams per Segment. |
| MARINAS | Marinas | Number of marinas per Segment. |
| COMMNT_MOD | Comment Modification | Comments regarding modifications. |
| MAX_PDOP | Maximum PDOP | See SHIM Methodology (GPS/GIS) |
| MAX_HDOP | Maximum HDOP | See SHIM Methodology (GPS/GIS) |
| CORR_TYPE | Correction Type | See SHIM Methodology (GPS/GIS) |
| RCVR_TYPE | Receiver Type | See SHIM Methodology (GPS/GIS) |
| GPS_DATE | GPS Date | See SHIM Methodology (GPS/GIS) |
| GPS_TIME | GPS Time | See SHIM Methodology (GPS/GIS) |
| LENGTH | Length | Length (m) of Segment. |
| SOURCETHM | Source Theme | See SHIM Methodology (GPS/GIS) |
| CMMNT_FAUN | Comment Fauna | Comments regarding fauna in the Segment. |
| CMMNT_FLRA | Comment Flora | Comments regarding flora in the Segment. |
| CMMNT_FLRA2 | Comment Flora | Additional comments regarding flora in the Segment |
| CMMNT_FLRA3 | Comment Flora | Additional comments regarding flora in the Segment |

# Appendix D. A Hardcopy of the EKILMP Windermere Lake Foreshore Inventory Database (DFO 2006)

| LAKE_NAME | ORGANIZATI | DATE | TIME_ | CREW | WEATHER | AIR_TEMP_ | WATER_TEMP | COMMENTS | SEGMNT_ NUM |
|---|---|---|---|---|---|---|---|---|---|
| Windermere | EKILMP | 08/15/06 | 07:44:46pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | | 1 |
| Windermere | EKILMP | 08/15/06 | 08:08:52pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | Large emergent veg area | 2 |
| Windermere | EKILMP | 08/15/06 | 08:22:35pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | Gullied seg w rip veg; emergent veg present | 3 |
| Windermere | EKILMP | 08/15/06 | 08:59:36pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | HOUSES | 4 |
| Windermere | EKILMP | 08/15/06 | 09:19:48pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | EMRGT LOWER CLIFFBLUFFS | 5 |
| Windermere | EKILMP | 08/15/06 | 09:34:20pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | EMRGT LOWER CLIFFBLUFFS | 6 |
| Windermere | EKILMP | 08/15/06 | 09:47:06pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | RES | 7 |
| Windermere | EKILMP | 08/15/06 | 10:09:12pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | SEG5 AND 6 DO NOT HAVE MODIFICATIONS | 8 |
| Windermere | EKILMP | 08/15/06 | 10:29:45pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | | 9 |
| Windermere | EKILMP | 08/15/06 | 10:54:41pm | BM TC LP AF KM LP | Clear | 20.0 | 19.0 | | 10 |
| Windermere | EKILMP | 08/15/06 | 11:21:20pm | BM TC LP AF KM LP | Over cast | 20.0 | 19.0 | | 11 |
| Windermere | EKILMP | 08/16/06 | 12:06:28am | BM TC LP AF KM LP | Over cast | 20.0 | 19.0 | | 12 |
| Windermere | EKILMP | 08/16/06 | 12:19:52am | BM TC LP AF KM LP | Over cast | 20.0 | 19.0 | | 13 |
| Windermere | EKILMP | 08/16/06 | 04:48:23pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | | 14 |
| Windermere | EKILMP | 08/16/06 | 05:03:12pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | kinsman beach | 15 |
| Windermere | EKILMP | 08/16/06 | 05:08:08pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | | 16 |
| Windermere | EKILMP | 08/16/06 | 05:36:02pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | | 17 |
| Windermere | EKILMP | 08/16/06 | 05:49:27pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | | 18 |
| Windermere | EKILMP | 08/16/06 | 06:03:39pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | NEED TO CHANGE LENGTH TO EXCLUDE EAS | 19 |
| Windermere | EKILMP | 08/16/06 | 06:11:54pm | BM TC LP AF KM LP | Over cast | 14.0 | 18.0 | | 20 |
| Windermere | EKILMP | 08/16/06 | 07:07:24pm | BM TC LP AF KM LP | Partly Cloudy | 15.0 | 18.0 | restart seg20 | 21 |
| Windermere | EKILMP | 08/16/06 | 07:40:00pm | BM TC LP AF KM LP | Clear | 15.0 | 18.0 | | 22 |
| Windermere | EKILMP | 08/16/06 | 07:52:57pm | BM TC LP AF KM LP | Clear | 15.0 | 18.0 | | 23 |
| Windermere | EKILMP | 08/16/06 | 08:21:47pm | BM TC LP AF KM LP | Clear | 20.0 | 18.0 | | 24 |
| Windermere | EKILMP | 08/16/06 | 08:49:41pm | BM TC LP AF KM LP | Over cast | 20.0 | 18.0 | | 25 |
| Windermere | EKILMP | 08/16/06 | 08:57:55pm | BM TC LP AF KM LP | Over cast | 20.0 | 18.0 | | 26 |
| | | | | | | | | | |

| SEGMNT_NUM | SHORE_TYPE | LAND USE | LEV_OF_IMP | LIVEST_ACC | PHOTONUM | RESIDENTIAL | CPR | UNDEV_IR | PRIV_REC | CROWN | COMMERCIAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Cliff/Bluff | Undeveloped Indian Reserve | Low | No | | 0 | 0 | 100 | 0 | 0 | 0 |
| 2 | Cliff/Bluff | Undeveloped Indian Reserve | Low | No | | 0 | 0 | 100 | 0 | 0 | 0 |
| 3 | Cliff/Bluff & Wetland | Undeveloped Indian Reserve | Low | No | TC05 | 0 | 0 | 100 | 0 | 0 | 0 |
| 4 | Sand Beach | Undeveloped Indian Reserve/Resi | Low | No | | 50 | 0 | 50 | 0 | 0 | 0 |
| 5 | Cliff/Bluff | Undeveloped Indian Reserve | Low | No | | 0 | 0 | 100 | 0 | 0 | 0 |
| 6 | Wetland | Undeveloped Indian Reserve | Low | No | | 0 | 10 | 90 | 0 | 0 | 0 |
| 7 | Cliff/Bluff & Low Rocky & Wetland | CP Rail | Medium | No | | 0 | 100 | 0 | 0 | 0 | 0 |
| 8 | Vegetated Shore & Wetland | CP Rail | Low | No | | 0 | 100 | 0 | 0 | 0 | 0 |
| 9 | Vegetated Shore | Crown | Low | No | | 0 | 0 | 0 | 0 | 100 | 0 |
| 10 | Vegetated Shore | Residential | Medium | No | | 100 | 0 | 0 | 0 | 0 | 0 |
| 11 | Low Rocky Shore | CP Rail | Low | No | | 0 | 85 | 0 | 0 | 15 | 0 |
| 12 | Vegetated Shore | CP Rail | Low | No | | 25 | 39 | 0 | 36 | 0 | 0 |
| 13 | Low Rocky Shore | CP Rail | Low | No | | 0 | 100 | 0 | 0 | 0 | 0 |
| 14 | Gravel Beach | Residential | High | No | | 100 | 0 | 0 | 0 | 0 | 0 |
| 15 | Gravel Beach & Sand Beach | Park | Medium | No | | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | Vegetated Shore | Residential | High | No | | 100 | 0 | 0 | 0 | 0 | 0 |
| 17 | Low Rocky Shore & Vegetated shore | CP Rail | Medium | No | | 0 | 60 | 0 | 0 | 0 | 40 |
| 18 | Gravel Beach & Sand Beach | Park | Medium | No | | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | Vegetated Shore | Commercial | High | No | | 0 | 0 | 0 | 0 | 0 | 100 |
| 20 | Vegetated Shore | Residential | High | No | TC15, 16 | 100 | 0 | 0 | 0 | 0 | 0 |
| 21 | Vegetated Shore | Residential | High | No | TC18 | 100 | 0 | 0 | 0 | 0 | 0 |
| 22 | Cliff/Bluff | Private Recreation | Medium | No | | 0 | 0 | 0 | 87 | 0 | 0 |
| 23 | Vegetated Shore | Residential | Medium | No | | 80 | 0 | 0 | 20 | 0 | 0 |
| 24 | Vegetated Shore | Private Recreation/residential | High | No | TC21 22 | 50 | 0 | 0 | 50 | 0 | 0 |
| 25 | Vegetated Shore | Park | Low | No | TC23 | 20 | 0 | 0 | 0 | 0 | 0 |
| 26 | Vegetated Shore | Private recreational | Medium | No | TC24 25 2 | 25 | 0 | 0 | 45 | 20 | 0 |
| | | | | | | | | | | | |

| SEGMNT_NUM | AGRICULTUR | PARK | INDUSTRIAL | NATURAL | DISTURBED | CLIFF_BLUF | GRAVEL_BEA | SAND_BEACH | VEGE_SHORE | LW_RCKY_SH | WETLAND | OTHER | SUB_FINES | SUB_GRAVEL | SUB_COBBLE | SUB_BOULDE | SUB_BEDROC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 100 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 100 | 0 | 78 | 0 | 0 | 12 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 100 | 0 | 45 | 0 | 0 | 10 | 0 | 45 | 0 | 100 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 50 | 50 | 20 | 5 | 50 | 0 | 0 | 25 | 0 | 90 | 10 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 100 | 0 | 45 | 0 | 0 | 15 | 0 | 40 | 0 | 100 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 90 | 10 | 0 | 0 | 0 | 0 | 0 | 100 | 0 | 100 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 100 | 30 | 0 | 0 | 10 | 30 | 30 | 0 | 100 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 100 | 10 | 0 | 0 | 40 | 10 | 40 | 0 | 30 | 40 | 20 | 10 | 0 |
| 9 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 20 | 60 | 20 | 0 | 0 |
| 10 | 0 | 0 | 0 | 50 | 50 | 10 | 0 | 0 | 85 | 0 | 5 | 0 | 10 | 70 | 20 | 0 | 0 |
| 11 | 0 | 0 | 0 | 15 | 85 | 10 | 0 | 0 | 10 | 80 | 0 | 0 | 0 | 35 | 35 | 30 | 0 |
| 12 | 0 | 0 | 0 | 60 | 40 | 0 | 15 | 10 | 70 | 0 | 5 | 0 | 0 | 15 | 80 | 5 | 0 |
| 13 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 15 | 80 | 5 | 0 | 0 | 15 | 80 | 5 | 0 |
| 14 | 0 | 0 | 0 | 0 | 100 | 0 | 90 | 0 | 10 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 |
| 15 | 0 | 100 | 0 | 0 | 100 | 0 | 50 | 50 | 0 | 0 | 0 | 0 | 0 | 50 | 50 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 100 | 10 | 0 | 0 | 90 | 0 | 0 | 0 | 30 | 60 | 10 | 0 | 0 |
| 17 | 0 | 0 | 0 | 30 | 70 | 20 | 0 | 0 | 40 | 40 | 0 | 0 | 10 | 60 | 10 | 20 | 0 |
| 18 | 0 | 100 | 0 | 40 | 60 | 0 | 45 | 45 | 5 | 0 | 5 | 0 | 0 | 50 | 50 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 80 | 0 | 20 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 100 | 0 | 30 | 10 | 60 | 0 | 0 | 0 | 30 | 35 | 30 | 5 | 0 |
| 21 | 0 | 0 | 0 | 0 | 100 | 5 | 40 | 0 | 50 | 5 | 0 | 0 | 10 | 70 | 10 | 10 | 0 |
| 22 | 0 | 13 | 0 | 50 | 50 | 60 | 0 | 20 | 20 | 0 | 0 | 0 | 50 | 50 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 25 | 75 | 25 | 0 | 35 | 40 | 0 | 0 | 0 | 50 | 50 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 5 | 95 | 10 | 0 | 20 | 65 | 0 | 5 | 0 | 80 | 10 | 10 | 0 | 0 |
| 25 | 0 | 80 | 0 | 80 | 20 | 0 | 33 | 0 | 35 | 0 | 32 | 0 | 50 | 50 | 0 | 0 | 0 |
| 26 | 0 | 10 | 0 | 30 | 70 | 5 | 25 | 20 | 25 | 0 | 25 | 0 | 45 | 45 | 5 | 5 | 0 |
| | | | | | | | | | | | | | | | | | |

| SEGMNT_NUM | COMPACTION | RIP_CLASS | RIP_QUALIF | RIP_STAGE | SHOR_COVER | RIP_VETER | RIP_SNAG | RIP_BANDWI | RIP_BANKSL | RIP_OVERHA | AQUATI_VEG | LITTORAL_Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Low | Shrubs | Natural | tall shrubs 2-10m | Moderate (5-20%) | <5 | No | 30 | 70 | 0 | 35submergveg | Shallow |
| 2 | Low | Mixed forest | Natural | tall shrubs 2-10m | Moderate (5-20%) | No | >=5 | 30 | 75 | 0 | 62sub 38emergt | Shallow |
| 3 | Low | Mixed forest | Natural | tall shrubs 2-10m | Abundant (>20%) | >=5 | <5 | 30 | 75 | 0 | 65sub 35emrgt | Shallow |
| 4 | Low | Mixed forest | Urban Residential | mature forest | Sparse (<5%) | No | No | 30 | 50 | 0 | 80SUB 20EMRGT | Shallow |
| 5 | Low | Mixed forest | Natural | tall shrubs 2-10m | Moderate (5-20%) | >=5 | <5 | 30 | 60 | 0 | 80SUB 20EMRGT | Shallow |
| 6 | Low | Natural wetland | Natural | | Abundant (>20%) | | | 30 | 0 | 0 | 55SUB 45EMRGT | Shallow |
| 7 | Low | Mixed forest | Disturbed | tall shrubs 2-10m | Sparse (<5%) | <5 | No | 30 | 40 | 0 | 90SUB 10EMRGT | Shallow |
| 8 | Medium | Mixed forest | Disturbed | low shrubs <2m | Moderate (5-20%) | No | <5 | 30 | 30 | 0 | 75SUB 25EMRGT | Shallow |
| 9 | Low | Mixed forest | Natural | tall shrubs 2-10m | Abundant (>20%) | >=5 | <5 | 30 | 5 | 25 | 100EMRGT | Shallow |
| 10 | Low | Mixed forest | Urban Residential | sapling >10m | Moderate (5-20%) | <5 | No | 30 | 5 | 25 | 97SUB 3EMRGT | Shallow |
| 11 | Medium | Mixed forest | Disturbed | mature forest | Moderate (5-20%) | >=5 | >=5 | 30 | 60 | 0 | 92SUB 8EMRGT | Shallow |
| 12 | Low | Broadleaf forest | Natural | mature forest | Abundant (>20%) | >=5 | >=5 | 30 | 0 | 60 | 68SUB 82EMRGT | Shallow |
| 13 | Medium | Coniferous forest | Disturbed | mature forest | Moderate (5-20%) | >=5 | >=5 | 30 | 35 | 0 | 95SUB 5EMRGT | Shallow |
| 14 | Medium | Herbs/grasses | Urban Residential | low shrubs <2m | Abundant (>20%) | No | <5 | 30 | 5 | 5 | | Shallow |
| 15 | Medium | Broadleaf forest | Recreation | mature forest | Abundant (>20%) | No | No | 30 | 5 | 5 | 10sub | Shallow |
| 16 | Medium | Mixed forest | Urban Residential | mature forest | Abundant (>20%) | >=5 | No | 30 | 25 | 15 | 10SUB | Shallow |
| 17 | Medium | Broadleaf forest | Disturbed | sapling >10m | Abundant (>20%) | No | No | 30 | 60 | 5 | 10SUB | Shallow |
| 18 | Medium | Herbs/grasses | Recreation | low shrubs <2m | Abundant (>20%) | No | No | 30 | 5 | 5 | 15SUB 10EMRGT | Shallow |
| 19 | Medium | Shrubs | Disturbed | tall shrubs 2-10m | Moderate (5-20%) | No | No | 30 | 5 | 5 | 65SUB 35OTHER | Shallow |
| 20 | Medium | Broadleaf forest | Disturbed | mature forest | Moderate (5-20%) | <5 | <5 | 30 | 8 | 5 | 50SUB | Shallow |
| 21 | Medium | Mixed forest | Urban Residential | mature forest | Moderate (5-20%) | <5 | <5 | 30 | 15 | 10 | 40SUB | Shallow |
| 22 | Medium | Broadleaf forest | Recreation | mature forest | Abundant (>20%) | No | No | 30 | 60 | 15 | 20SUB | Shallow |
| 23 | Medium | Broadleaf forest | Recreation | mature forest | Abundant (>20%) | No | No | 30 | 60 | 15 | 10SUB | Shallow |
| 24 | Medium | Mixed forest | Urban Residential | mature forest | Abundant (>20%) | >=5 | <5 | 30 | 15 | 10 | 10SUB | Shallow |
| 25 | Low | Shrubs | Natural | tall shrubs 2-10m | Abundant (>20%) | >=5 | >=5 | 30 | 5 | 40 | 10EMRGT | Shallow |
| 26 | Low | Shrubs | Disturbed | tall shrubs 2-10m | Abundant (>20%) | >=5 | >=5 | 30 | 40 | 25 | 60SUB 20EMRGT 20 OT | Shallow |
| | | | | | | | | | | | | |

| SEGMNT_NUM | SPAWN_H | RETAIN_WAL | RETAIN_MAT | DOCKS | DOCK_MATER | GROYNES | GROYNE_MAT | RAILWAY | MARIN_RAIL | MARINAS | COMMNT_MOD | MAX_PDOP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Unknown | 0 | | 0 | Wood | 0 | | No | 0 | 0 | | 2.4 |
| 2 | Unknown | 0 | | 0 | Wood | 0 | | No | 0 | 0 | | 2.5 |
| 3 | Unknown | 0 | | 0 | Wood | 0 | | No | 0 | 0 | | 2.4 |
| 4 | Unknown | 6 | Wood | 5 | Wood | 0 | | No | 0 | 0 | AF1 PH5 " Shoreline stabilization below dwellings using | 3.0 |
| 5 | Unknown | 0 | | 0 | | 0 | | No | 0 | 0 | | 3.1 |
| 6 | Unknown | 0 | | 0 | | 0 | | Yes | 0 | 0 | Railway along western edge of segment | 3.5 |
| 7 | Unknown | 0 | | 7 | Wood | 0 | | Yes | 0 | 0 | | 8.0 |
| 8 | Unknown | 0 | | 0 | Wood | 0 | | Yes | 0 | 0 | | 6.0 |
| 9 | Unknown | 0 | | 0 | Wood | 0 | | Yes | 0 | 0 | | 5.6 |
| 10 | Unknown | 13 | Mixed | 10 | Wood | 0 | | No | 0 | 0 | 7 BOAT HOUSES 1 LAUNCH | 6.0 |
| 11 | Unknown | 0 | | 2 | Wood | 0 | | Yes | 0 | 0 | | 4.4 |
| 12 | Unknown | 2 | Stonework | 0 | Wood | 1 | Stonework | No | 0 | 0 | 1 LAUNCH | 11.0 |
| 13 | Unknown | 1 | Concrete | 1 | Wood | 0 | | Yes | 0 | 0 | | 4.4 |
| 14 | Unknown | 1 | Stonework | 2 | Wood | 0 | | No | 0 | 0 | 1 lg retain wall 4 entire seg | 4.5 |
| 15 | Unknown | 0 | | 0 | | 0 | | No | 0 | 0 | | 5.7 |
| 16 | Unknown | 109 | Mixed | 43 | Wood | 4 | Stonework | No | 0 | 1 | AF2 PH14 26 BOAT HOUSES | 3.8 |
| 17 | Unknown | 0 | | 3 | Wood | 1 | Concrete | Yes | 0 | 0 | PH15, " Stormwater culvert (point #45) under railroad tra | 3.7 |
| 18 | Unknown | 1 | Wood | 1 | Wood | 0 | | No | 0 | 0 | BOARD WALK, gulls, good overhanging vegetation locat | 22.7 |
| 19 | Unknown | 1 | Wood | 0 | | 0 | | No | 0 | 0 | | 3.3 |
| 20 | Unknown | 65 | Mixed | 32 | Wood | 4 | Stonework | No | 0 | 0 | AF3. 5 boathouses described by Wildsight | 5.3 |
| 21 | Unknown | 75 | Mixed | 27 | Wood | 9 | Stonework | No | 0 | 0 | AF4 PH 24 boat houses | 8.3 |
| 22 | Unknown | 6 | Mixed | 3 | Wood | 1 | Stonework | No | 0 | 1 | AF5 PH 12 boat houses | 28.3 |
| 23 | Unknown | 88 | Mixed | 18 | Wood | 2 | Stonework | No | 0 | 1 | AF6 PH 12 boat houses | 24.5 |
| 24 | Unknown | 46 | Mixed | 17 | Wood | 1 | Stonework | No | 0 | 2 | AF7 KM2 PH 13 boat houses | 5.6 |
| 25 | Unknown | 0 | | 0 | Wood | 0 | | No | 0 | 0 | | 3.0 |
| 26 | Unknown | 24 | Mixed | 31 | Wood | 6 | Stonework | No | 0 | 4 | AF8 KM4 PH 24 8 boat houses Non-conforming structur | 20.9 |
| | | | | | | | | | | | | |

| SEGMNT_NUM | MAX_HDOP | CORR_TYPE | RCVR_TYPE | GPS_DATE | GPS_TIME | LENGTH | SOURCETHM | CMMNT_FAUN |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.4 | Real-time Code | Pro XR | 08/15/06 | 09:59:47am | 239.033 | Segment1.shp | PH1 Swallow nests in bank, recent wildlife trac |
| 2 | 1.5 | Uncorrected | Pro XR | 08/15/06 | 10:23:52am | 1095.556 | Segment2.shp | Swallow nests, Turkey Vultures, grebes |
| 3 | 1.4 | Uncorrected | Pro XR | 08/15/06 | 10:37:35am | 1877.530 | Segment3.shp | Large burrow, Osprey, grebes, Large diameter |
| 4 | 1.6 | Real-time Code | Pro XR | 08/15/06 | 11:14:36am | 962.810 | Segment4.shp | PH4 |
| 5 | 1.9 | Real-time Code | Pro XR | 08/15/06 | 11:34:48am | 1747.668 | Segment5.shp | PH6 Swallows, High value wetland/ gully, Bald |
| 6 | 1.8 | Real-time Code | Pro XR | 08/15/06 | 11:49:20am | 3094.846 | Segment6.shp | PH7 |
| 7 | 4.4 | Uncorrected | Pro XR | 08/15/06 | 12:02:06pm | 865.183 | Segment7.shp | |
| 8 | 2.7 | Uncorrected | Pro XR | 08/15/06 | 12:24:12pm | 1584.576 | Segment8.shp | PH8 juvenlile fish use of submergent vegetatio |
| 9 | 1.7 | Uncorrected | Pro XR | 08/15/06 | 12:44:45pm | 892.178 | Segment9.shp | PH9 |
| 10 | 1.8 | Uncorrected | Pro XR | 08/15/06 | 01:09:41pm | 773.393 | Segment10shp.shp | |
| 11 | 4.3 | Uncorrected | Pro XR | 08/15/06 | 01:36:20pm | 3868.309 | Segment11.shp | PH10 numerous wildlife trails, high value grass |
| 12 | 8.1 | Uncorrected | Pro XR | 08/15/06 | 02:21:28pm | 1090.485 | Segment12.shp | |
| 13 | 2.5 | Uncorrected | Pro XR | 08/15/06 | 02:34:52pm | 3550.218 | Segment13.shp | PH12 High value, isolated wetland, motorized |
| 14 | 4.4 | Uncorrected | Pro XR | 08/16/06 | 07:09:48am | 255.586 | Segment14.shp | |
| 15 | 5.6 | Uncorrected | Pro XR | 08/16/06 | 07:18:12am | 163.817 | Segment15.shp | |
| 16 | 3.7 | Uncorrected | Pro XR | 08/16/06 | 07:23:08am | 1539.490 | Segment16.shp | PH14 "  Extensive retaining walls in segment v |
| 17 | 1.7 | Real-time Code | Pro XR | 08/16/06 | 07:51:02am | 696.174 | Segment17.shp | |
| 18 | 22.7 | Uncorrected | Pro XR | 08/16/06 | 08:04:27am | 593.690 | Segment18.shp | |
| 19 | 3.1 | Uncorrected | Pro XR | 08/16/06 | 08:18:39am | 268.367 | Segment19.shp | |
| 20 | 5.2 | Uncorrected | Pro XR | 08/16/06 | 08:26:54am | 1054.070 | Segment20.shp | |
| 21 | 8.3 | Uncorrected | Pro XR | 08/16/06 | 09:35:04am | 1153.654 | Segment21.shp | |
| 22 | 28.3 | Uncorrected | Pro XR | 08/16/06 | 09:54:59am | 940.491 | Segment22.shp | |
| 23 | 5.6 | Uncorrected | Pro XR | 08/16/06 | 10:07:57am | 1328.182 | Segment23.shp | |
| 24 | 5.5 | Uncorrected | Pro XR | 08/16/06 | 10:46:43am | 1800.857 | Segment24.shp | |
| 25 | 2.8 | Uncorrected | Pro XR | 08/16/06 | 11:04:43am | 663.377 | Segment25.shp | waterfowl, kingfisher, loon |
| 26 | 20.9 | Uncorrected | Pro XR | 08/16/06 | 11:12:55am | 3459.250 | Segment26.shp | PH 24"  Important riparian habitat at outlet of V |
| | | | | | | | | |

| SEGMNT_NUM | CMMNT_FLRA | CMMNT_FLRA2 | CMMNT_FLRA3 | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | ks up clay bank between upland area and water, osprey | | | | | | | |
| 2 | PH2 | | | | | | | |
| 3 | PH3 | | | | | | | |
| 4 | " High value wetland located at tributary mouth | | | | | | | |
| 5 | Eagle, swallows, Canada geese | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | n, waterfowl use | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | land communities, wildlife lick | | | | | | | |
| 12 | PH11 High value riparian with cottonwood and wetland | | | | | | | |
| 13 | mpacts on upland grasslands | | | | | | | |
| 14 | | | | | | | | |
| 15 | PH13 Gulls, erosion evidence (exposed tree roots, on eastern shore of Kinsmen Park, Anticipate contr | | | | | | | |
| 16 | PH14 " Numerous sheds below high water mark, | | | | | | | |
| 17 | | | | | | | | |
| 18 | PH16 Osprey nest in parking lot of James Chabot Prov.Park, high value wetland in east park area | | | | | | | |
| 19 | PH17 high level waterfowl use, significant disturbed area beyond shoreline at future resort location | | | | | | | |
| 20 | PH18 Belted Kingfisher, osprey, pileated wp, nothern flicker, sandpiper, goldeneye, otters in area. | | | | | | | |
| 21 | PH19 Loon, mallards | | | | | | | |
| 22 | PH20 important wetland habitat at mouth of Holland | Wildlife tracks observed from lake to burrow on clay bank, eagle, gulls, crow, swallows, high value natural grassland slope. | | | | | | |
| 23 | PH21 Exposed banks and erosion | | | | | | | |
| 24 | PH22 good natural vegetation on point of land, | large upland area disturbed by creation of private beach (Akiskinook) first evidence of undistrubed shoreline and intact upland forested habi | | | | | | |
| 25 | PH23 very good natural shoreline vegetation on poir | important isolated wetland below cem | important wetland the head of the bay, natural plant communities in the undeveloped areas and topo | | | | | |
| 26 | PH24 Only island on Windermere Lake provides imp | Non-conforming structure (boat house | Important riparian habitat at outlet of Windermere Creek, unstable bank with swallows, grebes, loons | | | | | |
| | | | | | | | | |

| SEGMNT_ NUM | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| 11 | | | | | | | | | |
| 12 | | | | | | | | | |
| 13 | | | | | | | | | |
| 14 | | | | | | | | | |
| 15 | | | | | | | | | |
| 16 | | | | | | | | | |
| 17 | | | | | | | | | |
| 18 | | | | | | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |
| 21 | | | | | | | | | |
| 22 | | | | | | | | | |
| 23 | | | | | | | | | |
| 24 | tat encountered on eastern shoreline (point#75). This fore: | | | | | | | | |
| 25 | graphy providing protection, this area is one of the most important habitats on north-eastern shor | | | | | | | | |
| 26 | , gulls, mergansers | | | | | | | | |
| | | | | | | | | | |

# Appendix E. A Hardcopy of the Retaining Wall Inventory Database (Wildsight 2006)

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 437 Lakeview Place | Y (2) | PTW, W, C | A | | 100 | 0.5 - 1.5 | 1 | 1 | 2 | 1 | | 010-777-971 | | **20** |
| 441Lakeview Place | Y (3) | PTW | A (lower) N (2 upper) | | 100 | 1 | 1 | 2 | 3 | 2 | | 014-971-801 | | 20 |
| 445 Lakeview Place | Y (3) | C | A (lower) N (2 upper) | | 90 | 0.5 - 2.0 | 1 | 2 | 3 | 3 | | 012-249-777 | | 20 |
| 449 Lakeview Place | Y (2) | S, C | S | | 95 | 1 | 1 | 1 | 2 | 4 | | 014-971-798 | | 20 |
| 453 Lakeview Place | Y | S | S | | 75 (+25 BH) | 1 | 1 | 0 | 1 | 5 | | 024-839-973 | | 20 |
| 457 Lakeview Place | N - small concrete feature below water line L1.0m x H0.5m | | | | | | | | | 6 | | 024-839-965 | | 20 |
| 461 Lakeview Place | N - natural shoreline | | | | | | | | | 7 | | 024-839-892 | | 20 |
| 465 Lakeview Place | Y | C | A | | 80 (+20 BH) | 0.75 | 1 | 0 | 1 | 8 | | 025-096-435 | | 20 |
| 469 Lakeview Place | Y | C | A | | 25 | 0.75 | 1 | 0 | 1 | 9 | | 014-971-755 | | 20 |
| 475 Lakeview Place | Y (5) | PTW | N | | 100 | 0.5 - 2.0 | 1 | 4 | 5 | 10 | | 012-840-602 | | 20 |
| Lakeview Access #1 | N - runoff pipes upland of natural shore | | | | | | | | | 11 | | | | 20 |
| 483 Lakeview Place | Y (3) | PTW | N | | 100 | 1.5 | 1 | 2 | 3 | 12 | | 009-681-230 | | 20 |
| 487 Lakeview Place | Y (3) | S, PTW, S | N | | 100 | 0.5 - 1.5 | 1 | 2 | 3 | 13 | | 009-796-037 | | 20 |
| 491 Lakeview Place | Y | PTW | A | | 100 | 0.25 - 2.0 | 1 | 0 | 1 | 14 | | 025-114-875 | | 20 |
| 495 Lakeview Place | Y | S, C | S | | 90 | 1 | 1 | 0 | 1 | 15 | House is built on retaining wall | 015-068-196 | | 20 |
| 499 Lakeview Place | Y | C | S | | 20 | 0.5 - 1.0 | 1 | 0 | 1 | 16, 17 | | | | 20 |
| 503 Lakeview Place | N | | | | | | | | | 18 | | 012-229-156 | | 20 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 511 Lakeview Place | Y | C, PTW | S | | 100 | 0.5 -1.5 | 1 | 0 | 1 | 19 | | 024-592-561 | | 20 |
| 515 Lakeview Place | Y (3) | PTW, C | S | | 100 | 0.5 - 3.0 | 1 | 2 | 3 | 20 | | 011-922-265 | | 20 |
| 523 Lakeview Place | Y (5) | PTW, S, B | S | | 100 | 0.5 - 3.0 | 1 | 4 | 5 | 21 | | 014-242-621 | | 20 |
| 535 Lakeview Place | Y (5) | PTW | N | | 100 | 0.5 - 2.0 | 1 | 4 | 5 | 22 | | 025-987-623 | | 20 |
| 541 Lakeview Place | Y (2) | B, S | S | | 100 | 0.25 - 2.0 | 1 | 1 | 2 | 23 | | 015-082-202 | | 20 |
| 547 Lakeview Place | Y | PTW | S | | 100 | 1 | 1 | 0 | 1 | 24 | | 011-717-360 | | 20 |
| 551 Lakeview Place | Y (3) | S (RIP RAP) | S | | 100 | 0.5 - 2.0 | 1 | 2 | 3 | 25 | ALL TIERS RIP RAP | 024-719-374 | | 20 |
| 553 Lakeview Place | Y (5) | PTW, B | FA (PTW), S (B) | | 100 | 1.0 - 2.0 | 1 | 4 | 5 | 26 | Retaining wall is brick under brush | 007-380-224 | | 20 |
| Lakeview Access #2 | N | | | | | | | | | 27, 28 | Has runoff pipe draining, pumphouse, piled rock on site | | | 20 |
| 583 Lakeview Place | Y (3) | C | S | | 25 | 1.0 - 3.0 | 1 | 1 | 2 | 29, 30 | Shopping cart in water 20m offshore north end of lot | 015-093-701 | | 20 |
| 593 Lakeview Place | Y (4) | PTW, C | A (PTW) N (C ) | | 100 | 2 | 1 | 3 | 4 | 31 | | 015-086-941 | | 20 |
| 603 Lakeview Place | Y | L | A | | 80 (+20 BH) | 2 | 1 | 0 | 1 | 32 | | 014-741-326 | | 20 |
| 613, 615, 617, 619, 621 Lakeview Place | Y | PTW | N | | 50 | 0.5 - 2.0 | 1 | 0 | 1 | 33, 34 | | 009-782-737 | | 20 |
| 623 Lakeview Place | N | | | | | | | | | 34 | | 014-970-163 | | 20 |
| 627 Lakeview Place | N | | | | | | | | | 35 | | 010-862-790 | | 20 |
| 631 Lakeview Place | N | | | | | | | | | 36 | | 013-288-032 | | 20 |
| 637 Lakeview Place | Y | B | S | | 75 (+20 BH) | 0.5 | 1 | 0 | 1 | 37 | Owner has dumped sand on shore | 015-093-697 | | 20 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 641 Lakeview Place | Y | B | S | | 90 (+10 BH) | 0.75 | 1 | 0 | 1 | 38 | | 005-477-417 | | 20 |
| double lot | Y | B | S | | 100 | 0.5 | 1 | 0 | 1 | 39 | | 007-101-325 | | 20 |
| 651 Lakeview Place | Y | W, B | A (W) , S (B) | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 40 | | 012-960-560 | | 20 |
| Lakeview Access #3 | N | | | | | | | | | 41 | | | | **21** |
| A, 661 Lakeview Place | Y (8) | C, S | A | | 100 | 0.5 - 1.5 | 1 | 7 | 8 | 42, 43 | Madson's place | 025-879-430 | | 21 |
| 669 Lakeview Place | Y (4) | C, B | A | | 100 | 0.5 - 1.5 | 1 | 3 | 4 | 44 | | 025-918-249 | | 21 |
| 673 Lakeview Place | Y (2) | W, S | N | | 100 | 1.5 | 1 | 1 | 2 | 45 | | 026-147-131 | | 21 |
| 677 Lakeview Place | Y | W | A | | 100 | 2 | 1 | 0 | 1 | 46 | | 015-086-909 | | 21 |
| 683 Lakeview Place | Y (2) | B, C | A | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 47 | | 026-181-355 | | 21 |
| 687 Lakeview Place | Y (2) | B, C | A (B), S (C ) | | 100 | 0.75 | 1 | 1 | 2 | 48 | | 025-101-811 | | 21 |
| 691Lakeview Place | Y (2) | C | A | | 100 | 0.5 - 1.0 | 1 | 1 | 2 | 49 | | 015-095-347 | | 21 |
| 695 Lakeview Place | Y (2) | S, B | A (S), N (B) | | 80 (+20 BH) | 1 | 1 | 1 | 2 | 50 | | 015-081-699 | | 21 |
| 701 Lakeview Place | Y (3) | C, B | A (C ), N (B) | | 80 (+20 BH) | 1 | 1 | 2 | 3 | 51 | | 025-192-833 | | 21 |
| A Lakeview Place | Y | C | FA | | 100 | 1 | 1 | 0 | 1 | 52 | | 025-854-283 | | 21 |
| 711 Lakeview Place | Y | S | FA | | 60 | 0.5 | 1 | 0 | 1 | 53 | | 025-854-305 | | 21 |
| 110 Lakeview Place double lot | N | | | | | | | | | 54 | | 015-086-976 | | 21 |
| 725 Lakeview Place double lot | Y (2) | PTW | FA | | 80 (+20 BH) | 1.5 | 1 | 1 | 2 | 55 | | 015-086-925 | | 21 |
| 735 Lakeview Place | Y (2) | PTW, C | A | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 56, 57 | | 018-428-452 | | 21 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 745 Lakeview Place | Y (2) | C, S | N | | 50 | 2 | 1 | 1 | 2 | 58, 59, 60 | (Irvine's place) Map indicates long lot however, calc of wall length based on a single lot but may have been subdivided with some public access bw/ lot 745 - 791 | 026-271-982 | | 21 |
| Unmarked bw/ 745-791 Lakeview Rd | Y (2) | W, C | A (W) , FA (C) | | 90 (+10 BH) | 0.5 - 3.0 | 1 | 1 | 2 | 61 | Ida's boat house | 024-456-900 | | 21 |
| Storm drain bw/ unmarked and 791 Lakeview Rd | | | | | | | | | | 62 | | | | 21 |
| 791 Lakeview Rd | Y (2) | C, S | N | | 100 | 0.5 | 1 | 1 | 2 | 63 | | 024-456-900 | | 21 |
| 795 Lakeview Rd | Y | W, S | FA | | 100 | 2 | 1 | 0 | 1 | 64 | | 014-959-461 | | 21 |
| 799 Lakeview Rd | Y | C | FA | | 100 | 1 | 1 | 0 | 1 | 65 | House is built on retaining wall | 008-700-401 | | 21 |
| 805 Lakeview Rd | Y (2) | PTW, C | FA | | 100 | 1.0 - 1.5 | 1 | 1 | 2 | 66 | | 015-065-375 | | 21 |
| 811 Lakeview Rd | Y | W | A | | 90 (+10 BH) | 1 | 1 | 0 | 1 | 67 | | 011-029-340 | | 21 |
| Lakeview Access #4 | N | | | | | | | | | 68 | | | | 21 |
| 825 Lakeview Rd | Y | C | A | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 69 | | 012-570-184 | | 21 |
| 829 Lakeview Rd | Y | C | A | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 70 | | 012-873-225 | | 21 |
| 833 Lakeview Rd | Y (2) | C, B | A | | 80 (+20 BH) | 0.5 - 1.0 | 1 | 1 | 2 | 71 | | 025-447-467 | | 21 |
| 835 Lakeview Rd | Y (2) | W, S | A (W), N (S) | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 72 | | 014-959-445 | | 21 |
| 841 Lakeview Rd | Y (2) | C, W | FA | | 100 | 1.0 - 2.5 | 1 | 1 | 2 | 73 | | 025-082-272 | | 21 |
| 847 Lakeview Rd | Y (3) | C, B, S | S | | 100 | 1.0 - 3.0 | 1 | 2 | 3 | 74 | | 025-086-294 | | 21 |
| Lakeview Access #5 | N | | | | | | | | | 75 | Stone dumped on shore | | | 21 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 857 Lakeview Rd | Y (2) | C, W, S | FA | | 100 | 1 | 1 | 1 | 2 | 76, 77 | | 015-065-472 | | 21 |
| 863 Lakeview Rd | Y (3) | C, B | A | | 100 | 0.5 - 1.0 | 1 | 2 | 3 | 78 | | 024-800-465 | | 21 |
| 867 Lakeview Rd | Y | C, B | A | | 80 (+10 BH) | 2 | 1 | 0 | 1 | 79 | | 014-804-808 | | 21 |
| 875 Lakeview Rd, double lot | Y (2) | B | N | | 90 (+10 BH) | 1.0 - 1.5 | 1 | 1 | 2 | 80 | | 006-616-887 | | 21 |
| 883 Lakeview Rd | Y (3) | B, W, C | N | | 100 | 0.5 - 3.0 | 1 | 2 | 3 | 81 | | 014-959-429 | | 21 |
| 887 Lakeview Rd | Y (3) | C, W | A | | 90 (+10 BH) | 1.0 - 1.5 | 1 | 2 | 3 | 82 | | 014-959-411 | | 21 |
| 891Lakeview Rd | Y (4) | S, W. B | A | | 100 | 1.0 - 3.0 | 1 | 3 | 4 | 83 | Wood wall is stained | 014-959-399 | | 21 |
| Lakeview Access #6 | N | | | | | | | | | 84 | Natural bluff, stone added to shore | | | 22 |
| Lakeview Meadows Marina | Y (3) | B | N | | 75 | 1.0 - 6.0 | 1 | 2 | 3 | 85 | | 024-847-941 | | 22 |
| Lakeview Meadows Wetland Area (Holland Creek) | | | | North Point: N 50.29.727' - W 116.00.532'; South Point: N 50.29.705' - W 116.00.547'; East Point: N50.29.715' - W 116.00.514 | | | | | | 86, 87, 88, 89, 90 | Mouth of Holland Ck, Kokanee swimming up Holland Ck | | | 22 |
| Timber Ridge Marina | Y | C | S | 75m | | 2 | 1 | 0 | 1 | 91 | | | | 22 |
| Timber Ridge Beach Area | Y | C, S | S | IR calculated 385m from: North Point:N 50.29.638' - W 116.00.590'; South Point: N 50.29.508' - W 116.00.392' | | 1 | 1 | 0 | 1 | 92 | | | | 22 |
| Timber Ridge South Area | Y | C, S, W | FA (W) | IR calculated 95m from: North Point:N 50.29.485' - W 116.00.304'; South Point: N 50.29.470' - W 116.00.228' | | 1 | 1 | 0 | 1 | 93, 94 | | | | 22 |
| 1 Nappe Rd | Y (2) | W, PTW | FA | | 20 | 1 | 1 | 1 | 2 | 95 | | 014-868-181 | | 23 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 1039 Nappe Rd | N | | | | | | | | | 96 | | 014-868-202 | | 23 |
| 1045 Nappe Rd | Y (3) | C, W | S | | 100 | 1.0 - 2.0 | 1 | 2 | 3 | 97 | | 024-389-536 | | 23 |
| 1051 Nappe Rd | N | | | | | | | | | 98 | | 010-424-156 | | 23 |
| Baltac/Nappe Rd Access Pt. | N | | | | | | | | | 99 | Road to water edge has some vegetation | | | 23 |
| 1033 Baltac Rd | Y | S, C | N | | 100 | 1.0 - 1.5 | 1 | 0 | 1 | 100 | Shaw house | 026-331-861 | | 23 |
| 1039 Baltac Rd | N | | | | | | | | | 101 | | 014-688-174 | | 23 |
| 1045 Baltac Rd | Y | S, C | A | | 60 | 0.25 | 1 | 0 | 1 | 102 | | 012-960-853 | | 23 |
| 1051 Baltac Rd | N | | | | | | | | | 103 | | 014-869-853 | | 23 |
| 1057 Baltac Rd | Y | B | N | | 90 | 0.25 | 1 | 0 | 1 | 104 | | 012-239-208 | | 23 |
| 1065 Baltac Rd | Y | L | FA | | 95 | 0.5 | 1 | 0 | 1 | 105 | | 024-442-011 | | 23 |
| 1069 Baltac Rd | N | | | | | | | | | 106 | | 024-442-020 | | 23 |
| Unmarked (1075) Baltac Rd | Y (2) | S | N | | 100 | 0.5 | 1 | 1 | 2 | 107 | Missed 1075 on the original tally sheet. Check 1075 and vacant lot. New house being built on vacant lot and the figures recorded on spreadsheet are for the vacant lot only | 014-856-905 | | 23 |
| 1081 Baltac Rd | Y | C | FA | | 80 (+20 BH) | 1.0 - 2.0 | 1 | 0 | 1 | 108 | | 014-869-403 | | 23 |
| Baltac Access North and Beach | Y (5) | C | S | IR calculated 42m from: North Point: N 50.29.377' - W 115.59.904':South Point: N 50.29.369' - W 115.59.874' | | 1.0 - 2.0 | 1 | 4 | 5 | 109, 110 | | 009-581-626 | | 23 |
| Warbler Rd Access | Y | S | FA | 10m | | 1 | 1 | 0 | 1 | 111 | | | | 23 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 1151 Baltac Rd | Y (5) | B | N | | 100 | 1.0 - 1.5 | 1 | 4 | 5 | 112 | | 025-610-147 | | 23 |
| 1157 Baltac Rd | Y (3) | S, C | A | | 100 | 2.0 - 4.0 | 1 | 2 | 3 | 113 | | 025-630-962 | | 23 |
| 1163 Baltac Rd | Y | M | S | | 90 (+10 BH) | 2 | 1 | 0 | 1 | 114 | | 025-802-178 | | 23 |
| 1169 Baltac Rd | Y (2) | C, B | A | | 80 (+20 BH) | 1.0 - 3.0 | 1 | 1 | 2 | 115 | Murray's House | 025-867-881 | | 23 |
| 1173 Baltac Rd | Y (2) | C, PTW | S | | 80 (+20 BH) | 0.5 - 2.0 | 1 | 1 | 2 | 116 | | 025-631-012 | | 23 |
| 1177 Baltac Rd | Y | PTW | A | | 100 | 1 | 1 | 0 | 1 | 117 | | 025-630-997 | | 23 |
| 1183 Baltac Rd | Y (6) | PTW | S | | 100 | 1.0 - 2.0 | 1 | 5 | 6 | 118 | | 025-871-587 | | 23 |
| 1187 Baltac Rd | Y (4) | PTW | S | | 100 | 0.5 - 2.0 | 1 | 3 | 4 | 119 | | 025-767-640 | | 23 |
| 1193 Baltac Rd | Y (6) | PTW, C | A | | 100 | 0.5 - 1.3 | 1 | 5 | 6 | 120 | | 025-868-004 | | 23 |
| 1197 Baltac Rd | Y (3) | W, C | FA | | 100 | 1.5 - 2.0 | 1 | 2 | 3 | 121 | | 025-778-366 | | 23 |
| 1205 Baltac Rd | Y (2) | W, C | A | | 100 | 1.5 | 1 | 1 | 2 | 122 | | 025-789-139 | | 23 |
| Blackwing Rd Access | Y | W | A | | 100 | 1.5 | 1 | 0 | 1 | 123 | | | | 23 |
| 1213 Lake Dr | Y (4) | PTW, C | S | | 100 | 1.5 - 2.0 | 1 | 3 | 4 | 124 | | 025-871-561 | | 23 |
| 1217 Lake Dr | Y (6) | PTW | S | | 100 | 0.5 - 2.0 | 1 | 5 | 6 | 125 | | 025-917-099 | | 23 |
| 1219 Lake Dr | Y (2) | W, S | S | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 126 | Shared w/ 1221 house not visible but on left | 025-646-176 | | 23 |
| 1221 Lake Dr | Y (4) | W, S, C | FA | | 100 | 1.0 - 2.0 | 1 | 3 | 4 | 126 | | 025-932-349 | | 23 |
| 1225 Lake Dr | Y (6) | C, PTW | FA (C), N (PTW) | | 75 (+25 BH) | 1.5 | 1 | 5 | 6 | 127 | | 025-630-938 | | 23 |
| 1229 Lake Dr | Y (4) | PTW, S | S | | 75 (+25 BH) | 1.0 - 2.0 | 1 | 3 | 4 | 128, 129 | Has undergrounbd stream beneath house - see pipe exiting retaining wall | 025-683-616 | | 23 |
| 1233 Lake Dr | Y (2) | L, C | S | | 75 (+25 BH) | 1.5 | 1 | 1 | 2 | 130 | | 025-630-989 | | 23 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 1241 Lake Dr | Y | PTW | S | | 100 | 1.0 - 2.0 | 1 | 0 | 1 | 131 | | 025-678-990 | | 23 |
| 1245 Lake Dr | N | | | | | | | | | 132 | | 025-678-990 | | 23 |
| 1251 Lake Dr | Y (2) | C, PTW | S | | 100 | 1.0 - 1.5 | 1 | 1 | 2 | 133 | | 015-413-349 | | 23 |
| 1257 Lake Dr | Y | C | S | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 134 | | 010-800-433 | | 23 |
| 1263 Lake Dr | Y | C | S | | 100 | 1.0 - 1.5 | 1 | 0 | 1 | 135 | | 006-271-731 | | 23 |
| 1269 Lake Dr | Y | C, B | A | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 136 | | 015-413-381 | | 23 |
| Beach Dr Access | N | | | | | | | | | 137 | Road into lake | | | 23 |
| Beach Dr Wetland Area | N | | | North Point: N 50.28.891' - W 115.59.670' ; South Point: N 50.28.870' - W 115.59.665' | | | | | | 138, 139, 140 | | | | 23 |
| A Beach Dr | N | | | | | | | | | 138 | | 011-677-651 | | 24 |
| 2 Beach Dr | N | | | | | | | | | 139 | | 008-473-935 | | 24 |
| 1 Beach Dr | N | | | | | | | | | 140 | | 008-270-490 | | 24 |
| Andreen Rd Access | N | | | | | | | | | 141 | Runoff | | | 24 |
| 4806 Sand Rd | Y | C | A | | 100 | 1 | 1 | 0 | 1 | 142 | | 024-832-871 | | 24 |
| 1317, 1319 Sand Rd | Y | C | FA | | 100 | 1.5 | 1 | 0 | 1 | 143 | Duplex | 006-550-142 | | 24 |
| 1325 Sand Rd | Y | S | S | | 100 | 1.5 | 1 | 0 | 1 | 144 | 2 drums lay 30m offshore of property | 009-070-508 | | 24 |
| 1331 Sand Rd | Y | C | S | | 100 | 1.5 | 1 | 0 | 1 | 145 | | 008-499-951 | | 24 |
| 1337 Sand Rd | Y | PTW | S | | 100 | 1.0 - 2.0 | 1 | 0 | 1 | 146 | | 010-123-911 | | 24 |
| 1342 - 1356 Sand Rd | Y | W, L | FA | | 100 | 0.5 - 1.5 | 1 | 0 | 1 | 147 | | 015-394-239 | | 24 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Terra Vista Marina | Y | W, R | S | IR calculated 75m from: North Point: N 50.28.698' - W 115.59.553' ; South Point: N 50.28.656' - W 115.59.564' | | 1 | 1 | 0 | 1 | 148 | | | 7043428100 | 24 |
| Terra Vista Beach Area | Y | PTW | S | 25m - satellite communication too weak for GPS reading | | 0.75 | 1 | 0 | 1 | 148 | | 005-959-659 | | 24 |
| 1395 Stoddard Ave | Y | W | S | | 100 | 1.5 | 1 | 0 | 1 | 150 | | 014-463-547 | | 24 |
| 1399 Stoddard Ave | Y | PTW | S | | 100 | 1.5 | 1 | 0 | 1 | 151 | | 016-384-041 | | 24 |
| 1405 Stoddard Ave | Y | PTW | S | | 100 | 1.5 | 1 | 0 | 1 | 152 | | 015-578-470 | | 24 |
| 1411 Stoddard Ave | Y | W | FA | | 100 | 0.5 - 1.0 | 1 | 0 | 1 | 153 | | 012-827-941 | | 24 |
| 1413 Stoddard Ave | Y (2) | PTW | S | | 100 | 0.5 - 1.5 | 2 | 0 | 2 | 154 | | 014-602-890 | | 24 |
| 1417 Stoddard Ave | Y (2) | PTW | FA | | 100 | 0.5 - 2.0 | 1 | 1 | 2 | 155 | | 015-507-297 | | 24 |
| 1421 Stoddard Ave | Y | W | FA | | 100 | 0.5 - 2.0 | 1 | 0 | 1 | 156 | | 015-600-793 | | 24 |
| Boulevard Stoddard Access | Y | PTW, S | FA | | 100 | 0.5 -1.0 | 1 | 0 | 1 | 157 | | | | 24 |
| 1425 Stoddard Ave | Y (3) | PTW, C | S | | 100 | 1.5 | 1 | 0 | 1 | 158 | | 006-146-066 | | 24 |
| 1429 Stoddard Ave | Y | W, Tires | FA | | 100 | 0.25 - 1.0 | 1 | 0 | 1 | 159 | | 011-927-101 | | 24 |
| 1433 Stoddard Ave | Y | PTW | S | | 50 | 0.75 | 1 | 0 | 1 | 160 | | 015-489-574 | | 24 |
| 1437 Stoddard Ave | Y (5) | PTW | N | | 100 | 0.75 - 2.0 | 1 | 5 | 6 | 161 | | 009-398-724 | | 24 |
| 1441 Stoddard Ave | Y (2) | PTW | A | | 100 | 0.5 - 1.0 | 1 | 1 | 2 | 162 | | 024-210-609 | | 24 |
| 1449 Stoddard Ave | Y (8) | C, W | A | | 100 | 1.5 - 2.0 | 1 | 7 | 8 | 163 | | 014-155-281 | | 24 |
| Calberley Beach Access - Private Trail | Y (4) | PTW | A (below water line) N (upland) | | 100 | 1.5 | 1 | 3 | 4 | 164 | | | | 24 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Akiskinook Beach | Y | C | S | IR calculated 78m from: North Point: N 50.28.377' - W 115.59.725' South Point: N 50.28.336' - W 115.59.716' | | 0.25 - 2.0 | 1 | 0 | 1 | 165 | | 006-369-774 | | 24 |
| Akiskinook Marina | Y | S (gravel) | A | IR calculated 180m from: North Point: N 50.28.336' - W 115.59.716';South Point: N 50.28.244' - W 115.59.670' | | 2 | 1 | 0 | 1 | 166 | | | 7043460000 | 24 |
| Akiskinook Wetland Area | | | | North Point: N 50.28.253' - W 115.59.673' ;South Point: N 50.28.215' - W 115.59.657' | | | | | | 167 | | | | 24 |
| 1541 N. of Yako-Naki | N | | | | | | | | | 168 | | 015-025-756 | | 24 |
| 1557 Yako-Naki | Y (2) | C, M | A | 40 m | | 1.0 - 2.0 | 2 | 0 | 1 | 169, 170 | Ya-ko-naki | 025-111-451 | | 24 |
| DD21688, DD21690-1, DD13184 (Yako-naki Wetland Area) | N | | | North Point: N 50.28.121' - W 115.59.706'; South Point: N 50.28.071' - W 115.59.699' | | | | | | 171 | 025-111-451 | | | 25 |
| Windermere Cemetery Small Wetland | N | | | Small single point wetland location: N 50.27.985' - W 115.59.645' | | | | | | 172 | | | | 25 |
| Windermere Cemetery Cove Wetland | N | | | Inlet Wetland: West Point (first point along shoreline heading south): N 50.28.043' - W 115.59.601'; North Point: N 50.28.069' - W 115.59.588'; East Point: N 50.28.027' - W 115.59.567 | | | | | | 173 | | | | 25 |
| Hidden Bay Marina Beach & Marina Area | Y (5) | W, PTW, S, C | FA | | 50 | 0.25 - 1.0 | 1 | 0 | 1 | 174, 175, 176, 177, 178, 179 | | | | 26 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| DL16274 Wetland Area | Y | L | FA | Small single point wetland location: N 50.27.824' - W 115.59.563' [Length of log retaining wall - 20m] | | 0.25 | 0 | 1 | 1 | 180 | | | 7046241050 | 26 |
| DL16274 Windermere Public Beach Area | Y | S | FA | | 70 | 0.25 - .50 | 1 | 0 | 1 | 181 | | | | 26 |
| DL16274 Windermere Island Wetland Area | | | | Single main shoreline pt for wetland (see notes): N 50.27.730' - W 115.59.597' | | | | | | 182, 183 | This wetland extends off of the main shoreline west around the entire Windermere Island | | | 26 |
| Cardiff Cove Marina (has wetland area) | N | | | Wetland start and end: North Point: N 50.27.718' - W 115.59.534';South Point: N 50.27.659' - W 115.59.501' | | | | | | 184, 185, 186, 187 | | | | 26 |
| Shadybrook Marina &Campground Beach Area | | L, C | A | | | 1 | 1 | 0 | 1 | 188 | | | | 26 |
| Shadybrook Marina & Campground Marina Area | | L | A | | | 1.0 - 2.0 | 1 | 0 | 1 | 189 | | | | 26 |
| Shadybrook Marina & Campground Wetland Area | Y | S | S | Wetland start and end: North Point: N 50.27.530' - W 115.59.590' ;South Point: N 50.27.370' - W 115.59.444' | 60 | 1 | 1 | 0 | 1 | 190 | | | | 26 |
| Windermere Creek Outflow | N | | | | | | | | | 191 | | | | 26 |
| Tretheway Beach | N | | | | | | | | | 192 | | | | 26 |
| Tretheway Marina | Y (+break water) | S | FA | | 30 | 1.5 | 1 | 0 | 1 | 193 | | 015-423-883 | | 26 |
| Ash Street Access | N | | | | | | | | | 194 | | | | 26 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 4644 Ash St | Y | PTW | A | | 50 | 1 | 1 | 0 | 1 | 195 | This house has a boat house built over Jane Creek - the boat is stored in the actual creek outflow | 014-921-588 | | 26 |
| Jane Creek Wetland Area | N | | | North Point: N' 50.27.296' - W 115.59.257 South Point: Unable to mark as inaccessible due to construction. Wetland spans approx 20 meters south along shoreline | | | | | | 196 | | | | 26 |
| 4670 Aeneas Rd (The Beaches) | N (has breakwater) | | | | | | | | | 197 | Beaches' property under subdivision - formerly Coldstream Campground | | | 26 |
| Properties 1-20 below are in the Indian Beach Subdivision | | | | | | | | | | | | | | 26 |
| 1 | Y | S | N | | 100 | 1 | 1 | 0 | 1 | 198 | | | | 26 |
| 2 | Y | W | S | | 75 | 1 | 1 | 0 | 1 | 198 | | | | 26 |
| 3 - 13 on cliff bluff | N | | | | | | | | | 199 | | | | 26 |
| 14-17 property boundaries indescernable | Y | PTW | A | 30 m | property boundaries indescernable | 1 | 1 | 0 | 1 | 199, 200 | | | | 26 |
| 18 | Y | PTW | FA | | 100 | 1 | 1 | 0 | 1 | 201 | | | | 26 |
| 19 | Y | PTW | FA | | 100 | 1 | 1 | 0 | 1 | 201 | | | | 26 |
| 20 | Y (2) | S, W | S | | 100 | 1.0 - 3.0 | 1 | 1 | 2 | 202 | | | | 26 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Indian Beach North | N | | | | | | | | | 203 | | | | 26 |
| Indian Beach Mid | Y | S | FA | | | | 1 | 0 | 1 | 204 | | | | 26 |
| Indian Beach Wetland Area 1 | Y | C | FA | Wetland start and end: North Point: N 50.26.978' - W 115.58.709'; South Point: N 50.26.963' - W 115.58.667' | | | 1 | 0 | 1 | 205 | | | | 26 |
| Indian Beach Marina / South Area | Y | S | S | | 10 | 0.5 - 1.0 | 1 | 0 | 1 | 206 | 3 separate retaining walls that span about 10% of the entire property | | | 26 |
| Indian Beach Wetland Area 2 | N | | | Wetland start and end: North Point: N 50.26.925' - W 115.58.652'; South Point: N 50.26.910' - W 115.58.620' | | | | | | no photo | | | | 1 |
| Akiskinook First Nation (AFN) Wetland 1 | N | | | Wetland start and end: North Point: N 50.26.808' - W 115.58.483' ; South Point: N 50.26.096' - W 115.57.557' | | | | | | 207, 208 | | | | 1 |
| AFN Wetland 2 | N | | | Wetland start and end: North Point: N 50.26.047' - W 115.57.492'; South Point: N 50.25.636' - W 115.56.897' | | | | | | 209, 210 | | | | 4 |
| AFN Wetland 3 | | | | Wetland start and end: North Point: N 50.25.594' - W 115.56.802';South Point: N 50.25.544' - W 115.56.756' | | | | | | 211 | | | | 4 |
| AFN Shoreline Lots 3-6 | Y (6) | W | FA | 100 m | 100% of the 3 lots but no lot maps avail for AFN | 0.5 - 1.0 | 1 | 5 | 6 | 212, 212B | | | | 4 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| AFN Wetland 4 | | | | Wetland start and end: North Point: N 50.25.481' - W 115.56.664' South Point: N 50.25.136' - W 115.56.044' | | | | | | 213, 214 | | | | 5 |
| South End Wetland | | | | Wetland start and end: East side Point: N 50.25.082' - W 115.55.949'; West side Point: N 50.24.811' - W 115.56.754' | | | | | | 215, 216 | Wetland wraps from east side to west side of Lake Windermere shoreline. Southern most tip of wetland too shallow to mark | | | 6 |
| South End Wetland | | | | | | | | | | 217 | | | | 6 |
| Rushmere Wetlands | | | | Wetland start and end: South Point: N 50.24.857' - W 115.56.871' ; North Point: N 50.25.334' - W 115.57.371' | | | | | | 218, 220 | This wetland spans south - north encompassing the Rushmere subdivision | | | 6 |
| Rushmere Subdivision | N | | | | | | | | | 219 | | | | 6 |
| Westside Wetland 1 | | | | Wetland start and end: South Point: N 50.25.336' - W 115.57.432' ; North Point: N 50.25.488' - W 115.57.646' | | | | | | 221, 222 | | | | 7 |
| Westside Wetland 2 | | | | Wetland start and end: South Point: N 50.25.537' - W 115.57.703' North Point: N 50.25.682' - W 115.57.968' | | | | | | 223, 224 | | | | 7 |
| 2398 Rualt Rd | Y (2) | PTW | S | | 100 | 0.5 - 1.5 | 1 | 1 | 2 | 225 | | 012-833-061 | | 10 |
| 2394 Rualt Rd | Y (2) | PTW | A | | 100 | 0.5 - 1.5 | 1 | 1 | 2 | 226 | | 011-738-219 | | 10 |
| 2388 Rualt Rd | Y | PTW | A | | 100 | 1 | 1 | 0 | 1 | 227 | | 014-040-883 | | 10 |
| 2384 Rualt Rd | Y (3) | PTW, W | FA | | 100 | 1 | 1 | 2 | 3 | 228 | | 014-039-907 | | 10 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 2376 Rualt Rd | Y | PTW, C | N (PTW), FA (C ) | | 100 | 1 | 1 | 0 | | 229 | | 014-039-842 | | 10 |
| Larch Point Wetland 1 | | | | end: South Point: N 50.26.109' - W 115.58.332'; North Point: N 50.26.135' - W 115.58.358' | | | | | | 230, 232 | This wetland is infront of lot 2370 | | | 10 |
| 2370 Rualt Rd | Y | S, W | FA | | 50 | 0.75 | 1 | 0 | 1 | 231 | | 014-055-821 | | 10 |
| 2366 Rualt Rd | Y | C | A | | 100 | 0.75 | 1 | 0 | 1 | 233 | | 014-040-662 | | 10 |
| Larch Point Wetland 2 | | | | Wetland start and end:South Point: N 50.26.145' - W 115.58.362';North Point: N 50.26.178' - W 115.58.386' | | | | | | 234, 235 | This wetland is infront of lot 6 | | | 10 |
| 6 | N | | | | | | | | | no photo | | | | 10 |
| 2358-2350 Rualt Rd | N | | | | | | | | | 236 | | | | 10 |
| 2346 Rualt Rd | Y | C | A | | 100 | 1.5 | 1 | 0 | 1 | 237 | | 014-055-813 | | 10 |
| 2336 Rualt Rd | Y | W, PTW | FA (W), N (PTW) | | 100 | 0.5 - 1.5 | 1 | 1 | 2 | 238 | | 014-055-791 | | 10 |
| DL 21 | N | | | | | | | | | 239 | | | | 11 |
| Westside Wetland 3 | | | | Wetland start and end: South Point: N 50.26.548' - W 115.59.099' North Point: N 50.26.727' - W 115.59.501' | | | | | | 240, 241 | | | | 11 |
| Westside Wetland 4 | | | | Wetland start and end: South Point: N 50.26.816' - W 115.59.695' North Point: N 50.27.258' - W 116.00.131' | | | | | | 242, 243 | | | | 11 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Westside Wetland 5 | | | | Wetland start and end: South Point: N 50.27.306' - W 116.00.209' North Point: N 50.27.597' - W 116.00.555' | | | | | | 244, 245 | | | | 11 |
| Westside Wetland 6 | | | | Wetland start and end: South Point: N 50.27.641' - W 116.00.588' North Point: N 50.27.748' - W 116.00.578' | | | | | | 246, 248 | This wetland is infront of lot 1616 | | | 11 |
| 1616 | N | | | | | | | | | 247 | Red caboose house | | | ? |
| Lot 3 Coy Rd | Y | R | FA | | 80 | 1.0 - 1.5 | 1 | 0 | 1 | 249, 252 | | | | 12 |
| Westside Wetland 7 | | | | Wetland start and end:South Point: N 50.27.777' - W 116.00.598' North Point: N 50.27.876' - W 116.00.627' | | | | | | 250, 251 | | | | 12 |
| Coy Rd Lot 2 | Y | S | FA | | 60 | 0.5 - 2.0 | 1 | 0 | 1 | 253 | Has 2 houses on lot / subdivided | | | 12 |
| Coy Rd 4404 | N | | | | | | | | | 254 | | | | 12 |
| Westside Wetland 8 | | | | Wetland start and end: South Point: N 50.28.037' - W 116.00.764' North Point: N 50.28.118' - W 116.00.884' | | | | | | 255, 256 | | | | |
| Dome House | N | | | | | | | | | 256B | | | | |
| Taynton Wetland A | | | | Wetland start and end: South Point: N 50.29.391' - W 116.01.580' North Point: N 50.29.423' - W 116.01.618' | | | | | | 257 | | | | |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Taynton Wetland B | | | | Wetland start and end: South Point: N 50.29.503' - W 116.01.725' ;North Point: N 50.29.599' - W 116.01.783' | | | | | | 258 | | | | |
| KPOKYL | Y | C, S | FA | 100m (includes KPOKYL property west towards Kinsmen properties) | | 0.5 - 2.0 | 1 | 0 | 1 | 259 | KPOKYL beach is private property. There is a public beach area to the east with a stone retaining wall that is included in this entry as it is continuous from the KPOKYL concrete retaining | | | 13? |
| Kinsmen Residential Properties | Y | S | N | | 100 | 1 | 1 | 0 | 1 | 260, 261 | | | | 14 |
| Kinsmen Public Beach | N | | | | | | | | | - | | | | 15 |
| 12 | N | | | | | | | | | 262 | | | | |
| 2649 | Y | W | FA | | 80 (+15 BH) | 0.2 | | | | 263 | | | | 16 |
| AB | Y (3) | W | S | | 75 | 0.2 - 1.0 | 1 | 2 | 3 | 264 | | | | 16 |
| 18 668 A | Y (2) | C | A | | 75 (+25 BH) | 1.5 - 2.0 | 1 | 1 | 2 | 265 | | | | 16 |
| NEP 20886 | Y (2) | B | N | | 50 (+50 BH) | 0.5 | 1 | 1 | 2 | 266 | | | | 16 |
| 8 (1736 3rd Ave) | Y (2) | S, C | FA (S), N (C ) | | 50 (+50 BH) | 0.5 | 1 | 1 | 2 | 267 | | | | 16 |
| 5 | Y | W | A | | 60 (+15 BH) | 2 | 1 | 0 | 1 | 268 | | | | 16 |
| CD, EF, GH (1752 3rd Ave) | Y (5) | M, C, S | S | | 90 (+10 BH) | 1.0 - 2.0 | 1 | 4 | 5 | 269 | | | | 16 |
| A | Y (6) | PTW | N | | 100 | 1.5 - 3.0 | 2 | 4 | 6 | 270 | | | | 16 |
| P2649 1 | Y (6) | M, PTW | S | | 90 | 1.0 - 2.0 | 2 | 4 | 6 | 271 | | | | 16 |
| P14825 A | Y | M | S | | 100 | 2.0 - 2.5 | 1 | 0 | 1 | 272 | | | | 16 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| 1 | Y (2) | C, PTW | FA | | 100 | 1.5 - 2.0 | 1 | 1 | 2 | 273 | | | | 16 |
| IJ | Y (3) | C, PTW | FA | | 100 | 1.5 - 2.0 | 1 | 2 | 3 | 274 | | | | 16 |
| P. | Y | C | FA | | 100 | 1.5 | 1 | 0 | 1 | 275 | | | | 16 |
| A 11009 | Y (6) | C, PTW | FA (below water line only) | | 100 | 1.5 - 2.0 | 1 | 5 | 6 | 276 | | | | 16 |
| MN | Y (5) | C, PTW | S | | 100 | 2.0 - 3.5 | 1 | 4 | 5 | 277 | | | | 16 |
| P.6264 '0' | Y (2) | C, PTW | A | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 278 | | | | 16 |
| P.6264 'A' | Y (6) | C, PTW, B | S | | 100 | 1.0 - 2.0 | 1 | 5 | 6 | 279 | | | | 16 |
| P.6264 'B' | Y (3) | C, PTW | A | | 100 | 2 | 1 | 2 | 3 | 280 | | | | 16 |
| P.6264 'C' | Y (2) | C | S | | 100 | 1.0 - 2.0 | 1 | 1 | 2 | 281 | | | | 16 |
| P.6264 'D' | Y | C | A | | 100 | 1.0 - 1.5 | 1 | 0 | 1 | 282 | | | | 16 |
| P.6264 'E' | Y (4) | C, S | S | | 90 (+10 BH) | 1 | 2 | 2 | 4 | 283 | | | | 16 |
| P.6264 'F' | Y (4) | C, PTW | FA | | 100 | 1 | 1 | 3 | 4 | 284 | This lot has been subdivided | | | 16 |
| P.2649 18 | Y | C, S | A | | 20 | 0.5 - 1.0 | 1 | 0 | 1 | 285 | | | | 16 |
| P.9481 A | Y | C | A | | 100 | 1 | 1 | 0 | 1 | 285 | | | | 16 |
| P.2649 A | Y (3) | C, S | A | | 100 | 1.0 - 1.5 | 2 | 1 | 3 | 286 | | | | 16 |
| B | Y | C, B | FA | | 100 | 2.5 | 1 | 0 | 1 | 288 | | | | 16 |
| P.12034 'A' | Y | C | FA | | 60 | 1.5 - 2.0 | 1 | 0 | 1 | 289 | | | | 16 |
| P.12034 '3' (Big 3) | Y (2) | C | FA | | 80 (+20 BH) | 0.5 | 1 | 1 | 2 | 290 | | | | 16 |
| Double Dot | Y (2) | C, S | A | | 80 | 0.5 - 1.0 | 1 | 1 | 2 | 291 | | | | 16 |
| little '3' | Y (3) | C, PTW | FA | | 90 (+10 BH) | 1.0 - 2.0 | 1 | 2 | 3 | 292 | | | | 16 |

| Lot # | Retaining Wall? (#) | Material | Condition | Length or GPS locations | % of Lot Length | Height | High Water | | # of Tiers | Photo # | NOTES | PID Number | GIS LINK | Segment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y/N (# on property) | C-concrete, S-stone, B-brick/square, cut stone, PTW-pressure treated wood, W-wood, L-logs, M-metal | New, Stable, Aging, Falling Apart | Meters or GPS start and end points of retaining walls / wetlands | Length of wall (+ any additional % or shoreline retained with a boat house) | Meters | Below (#) | Above (#) | | | | | | |
| Triple Dot Canterberry Beach | Y | C | FA | | 100 | 1 | 1 | 0 | 1 | 293 | | | | 16 |
| 1 Canterberry Beach | Y | C | FA | | 50 | 1 | 1 | 0 | 1 | 294 | | | | 16 |
| 11 Canterberry Beach | N | | | | | | | | | 295 | | | | 16 |
| Quad Dot Canterberry Beach | N | | | | | | | | | 296 | | | | 16 |
| 1 Canterberry Beach | N | | | | | | | | | 297 | | | | 16 |
| 2 Canterberry Beach | N | | | | | | | | | 297 | | | | 16 |
| 15 Canterberry Beach | N | | | | | | | | | 298 | Canterberry Beach Properties | | | 16 |
| X | Y (5) | C, B, PTW | S | | 100 | 2 | 1 | 4 | 5 | 299 | | | | 16 |
| Y | Y (3) | C, S | A | | 100 | 0.5 - 2.5 | 1 | 2 | 3 | 300 | | | | 16 |
| FP 5 | Y (3) | C | FA | | 100 | 2.0 - 3.0 | 1 | 2 | 3 | 301 | | | | 16 |
| P.4124 A | Y (4) | PTW | FA | | 100 | 0.5 - 3.0 | 1 | 3 | 4 | 302 | | | | 16 |
| (Unmarked under large 1) | Y (4) | PTW | FA | | 100 | 1.0 - 3.0 | 1 | 3 | 4 | 303 | | | | 16 |
| P.4124 '1' (Small 1) | Y (3) | PTW | FA | | 100 | 1.0 - 2.0 | 1 | 2 | 3 | 303 | | | | 16 |
| L3737 | Y (3) | C, PTW, B | FA | | 100 | 1.0 - 2.0 | 1 | 2 | 3 | 304 | | | | 16 |
| Athalmer - James Chabot Wetland | N | | | Wetland start and end:South Point: N 50.30.494' - W 116.01.440' ;North Point: N 50.30.557' - W 116.01.387' | | | | | | 305, 306 | | | | 18 |
| P.2139 (Lakeside Pub) | Y (2) | W | S (above water) FA (below water) | | 20 | 0.5 - 2.0 | 1 | 1 | 2 | 307 | | | | 18 |

# Appendix F. Segment Descriptions

Summary descriptions and Level of Impact (LoI) of each Segment are provided below. Segment delineation was initiated mid way along the east shore of Windermere Lake (starting with Segment 1), and circumvented clockwise around the lake, ending at Segment 26. Segment locations can be found in map format in Appendix E. See Section 2 Methodology for additional descriptions of shore type designations and LoI.

In some Segments the percentage disturbed was reported as high (100%), while the LoI remained low. This occurrence was particularly seen in Segments 7, 8 and 11, located on the south west side of the lake, which have the Canadian Pacific Railway running alongside the shore. Although the railway's presence was considered to have disturbed the Segment, the overall impact (particularly relative to other development types such as commercial or urban residential) was not considered to be high.

**Segment 1 (239m) – LoI Low**

Segment 1, located along the Columbia Lake Indian Reserve (Indian Reserve #3), is comprised of 100% cliff/bluff that is in a natural condition. The riparian area is moderately vegetated (5-20%), and is primarily made up of tall shrubs (2-10m). The littoral zone at this site is shallow, which is characteristic of the entire lake perimeter. Thirty-five percent of the littoral zone is composed of submerged aquatic vegetation. Wildlife usage was evident here, with swallow nests in the banks, recent wildlife tracks up the clay bank from the water, and osprey sightings.

**Segment 2 (1095m) – LoI Low**

Segment 2 is located along Indian Reserve #3 and is in a natural condition. The shore type of this Segment is predominantly cliff/bluff (78%), with some vegetated shoreline area (12%). The riparian area is classified as a mixed forest, provides moderate cover, and is dominated by tall shrubs. There are some snags in this area (≥5). Sixty-two percent of the aquatic area contains submerged vegetation and 38% contains emergent vegetation. Swallow nests are evident in the banks, and turkey vultures and grebes were sited during the field review.

**Figure 1. Segment 2 is undisturbed, is mainly cliff/bluff shoreline, and has an abundantly vegetated littoral area.**

**Segment 3 (1878m) – LoI Low**

Segment 3, is located along Indian Reserve #3. This Segment is in a natural condition. The shore type is mainly a mix of cliff/bluff (45%) and wetland (45%), with some vegetated shoreline (10%). The riparian vegetation is classified as a mixed forest, and the area is abundantly vegetated (>20%), mostly with tall shrubs. A number of veteran trees exist in this Segment (≥5). Much of the aquatic area is vegetated with 65% covered by submergent and 35% with emergent vegetation types. During the field review the following wildlife features/sightings were noted: a large diameter wildlife tree with a large cavity, a large burrow, osprey, and grebes.

**Figure 2. The south east side of Windermere Lake remains generally unaltered. The cliff/bluff and wetland shore types as seen here in Segment 3 are found along much of this portion of the lake.**

**Segment 4 (962m) – LoI Low**

This Segment is in the Indian Reserve #3, and includes a residential area. Although approximately 50% of this shoreline Segment has urban development, the remaining 50% is in a natural condition, and the overall impact to the shoreline remains low. This site is mainly sandy beach (50%), with some cliff/bluff (20%), wetland (25%), and gravel beach (5%) shore types. Riparian vegetative cover is sparse in this Segment with the mixed mature forest providing less than 5% cover to the area. Six wood retaining walls have been constructed along the shoreline below the dwellings. Five wooden docks are also present. A high value wetland is located at the tributary mouth in this Segment with 80% of the aquatic area estimated to contain submergent vegetation and 20% emergent vegetation.

**Figure 3. Urban development in Segment 5 comprises approx. 50% of the shoreline, and the remaining area is in a natural condition.**

### Segment 5 (1748m) – LoI Low

This Segment, also in Indian Reserve #3, is in a natural condition. The shore type is primarily cliff/bluff (45%) but also contains some wetland (40%) and vegetated shore (15%) areas. The shoreline is moderately vegetated (5-20%), and is composed primarily of tall shrubs (2-10 m). There are a number of veteran trees (≥5) as well as a few snags (<5) evident. The aquatic area contains approximately 80% submergent and 20% emergent vegetation. During the field review swallows, a bald eagle, and Canada geese were observed and the wetland/gully was noted as high value.

### Segment 6 (3095m) - LoI Low

Segment 6 encompasses the southern tip of the Windermere Lake. Other than a small section (approximately 10% of area) on the western side being occupied by the Canadian Pacific Railway (CPR), most of the shoreline is in IR3 and is a natural wetland. The riparian area is aptly classified as natural wetland and riparian cover is abundant (>20%). Fifty-five percent of the aquatic area is covered by submerged vegetation and 45% by emergent vegetation.

**Figure 4. Segment 6 is undisturbed wetland area.**

### Segment 7 (865m) – LoI Medium

The CPR runs along the entire shoreline length of Segment 7. As well, the northern part of this Segment contains a residential development immediately behind the railway (for approximately 20% of the Segment). Due to these land issues, 100% of the shoreline is estimated to be disturbed. The shore type of this section is a mix of cliff/bluff, wetland, and low rocky shore (each at 30%) as well as vegetated shoreline (10%). The riparian vegetation is disturbed, sparse (providing less than 5% shore cover), and where evident, is predominantly tall shrubs. Ninety percent of the aquatic area is vegetated with submerged plants, while 10% contains emergent vegetation. Seven wooden docks have been constructed along the shoreline.

**Figure 5. The CPR runs the length of Segment 7, and some residential area lies beyond (the railway) in the northern end.**

### Segment 8 (1584m) – LoI Low

Segment 8 is comprised of 40% each of vegetated and wetland shore types, as well as 10% each of cliff/bluff and low rocky shore types. The CPR runs the length of the shoreline. Approximately 40% of this Segment is also impacted by residential development that is located immediately behind the railway. The riparian area shows signs of disturbance, is moderately covered, and composed primarily of low shrubs. The aquatic area contains approximately 75% submergent and 25% emergent vegetation. This is the first of the Segments reported so far (of Segments 1-8) to show signs of compaction. Juvenile fish were noted using the submergent vegetation and waterfowl were observed in the area.

**Figure 6. This portion of Segment 8 has not been disturbed by residential development, but has been impacted by the railway.**

### Segment 9 (892m) – LoI Low

The shoreline of Segment 9 is vegetated shore type, is in a natural condition, and is located entirely on Crown Land. The riparian vegetation is classified as mixed forest, contains mainly tall shrubs, provides abundant cover, and includes several veteran trees (≥5). Riparian overhang along the lake is good providing 25% coverage. One hundred percent of the aquatic area is vegetated with emergent plants.

### Segment 10 (773m) – LoI Medium

Segment 10 is mainly vegetated shoreline shore type (85%), but also contains some cliff/bluff (10%) and wetland (5%) areas. This Segment shows signs of disturbance related to the residential development that is located along the shoreline. The riparian area is moderately covered with a mixed forest at the sapling (>10m) structural stage. In terms of aquatic vegetation, 97% of the area contains submerged plants, while 3% of the area contains emerged plants. The overhanging riparian vegetation is good here, providing 25% coverage along the shoreline. Thirteen retaining walls (constructed of various materials), 10 wooden docks, 7 boathouses and 1 launch exist along the shore of this Segment.

**Figure 7. The attributes of Segment 10 are evident in these photos, which show moderate impacts on the shoreline as a result of residential development.**

### Segment 11 (3868m) – LoI Low

Segment 11 is 80% low rocky shore type, and cliff/bluff and vegetated shore type (10% of each). Approximately 85% of this Segment is impacted by the CPR while a small area is in natural condition due to a crown land outcropping which provides some buffering from the railway. Although riparian disturbance is evident, the vegetation is in a mature forest stage, and provides moderate cover. Several (≥5) veteran trees and snags exist in this Segment. There is an abundance of submerged aquatic vegetation (92%), as well as some (8%) emergent areas. Modifications to the shoreline include 2 wooden docks. Numerous wildlife trails were noted along the shoreline, as well as a high value grassland communities and a wildlife lick.

### Segment 12 (1090m) – LoI Low

Segment 12 is comprised mainly of vegetated shore type (70%), but also has gravel beach (15%), sand beach (10%) and wetland (5%) features. Sixty percent of the shoreline is estimated to be in a natural condition, and the remaining 40% is disturbed. The primary land use here is the CPR, which runs along 48% of the shore. Twenty-five percent of the area also has residential development and 36% is undeveloped private land. Riparian vegetation here provides abundant cover, is in a natural state, and is classified as a mature broadleaf forest. This riparian area is considered to be high value, particularly due to the cottonwood and the wetland. Numerous (≥5) riparian veteran trees and snags exist in this Segment. A substantial part of the shoreline (60%) contains overhanging riparian cover. The aquatic area is 68% covered by submergent and 82% covered by emergent vegetation. Two stonework retaining walls, a stonework groyne and a boat launch have been constructed along the shoreline in this Segment.

### Segment 13 (3550m) – LoI Low

This Segment is located on private land, and is located on the southern outskirts and just within the boundaries of the District of Invermere. It is mainly low rocky shore (80%), and also includes vegetated shore type (15%) and wetland areas (5%). The CPR runs the length of this Segment and contributes to its disturbed condition (100%). The riparian area shows disturbance, and is mainly mature coniferous forest that provides moderate coverage to the foreshore. Riparian veterans and snags (≥5 for each) are present. Ninety-five percent of the aquatic community is vegetated with submerged plants, while 5% has emergent plants. The isolated wetland in this Segment is considered high value, and motorized impacts were noted on the upland grasslands during the survey.

**Figure 8. Segment 13, showing Taynton Bay, and the railway running along the length of the shoreline.**

### Segment 14 (256m) – LoI High

Segment 14 is a small area located within the District of Invermere. The shoreline is 100% disturbed as a result of urban residential development. Gravel beach predominates (90%), and some vegetated shoreline (10%) is also present. The riparian area is classified as herbs/grasses, is mainly composed of low shrubs, and provides abundant cover. One large stone retaining wall runs the entire length of this Segment and 2 wooden docks have also been erected.

### Segment 15 (164m) – LoI Medium

Kinsman Beach City Park is located along the shoreline of Segment 15. The park provides recreational opportunities to the public and has altered the shoreline (100%) from its natural condition. The shore type here is half sand beach and half gravel beach. The riparian area is composed of a mature broadleaf forest, which provides abundant (>20%) cover to the area. Erosion along the eastern shoreline of the park was also evident (i.e. exposed tree roots) during the field review. There is little aquatic vegetation.

**Figure 9. View inland from shore of Segment 15, which includes Kinsman Beach Park.**

### Segment 16 (1539m) – LoI High

Segment 16 is predominantly vegetated shore type (90%), which has been 100% disturbed by residential development. The urbanized riparian area provides abundant cover, and contains a mixed mature forest. Numerous (≥5) riparian veteran trees are evident. There are an extensive number of retaining walls in this Segment (109 made of a mixed variety of materials). Fourty-three wooden docks, 4 stonework groynes, 1 marina and 26 boathouses are also evident along this stretch of shoreline. Numerous sheds sit below high the water mark. There is little aquatic vegetation here.


**Figure 10. Urban development along the shoreline of Segment 16 includes dock and retaining wall shoreline modifications.**

### Segment 17 (696m) – LoI Medium

The shore type of Segment 17 is a mixture of vegetated rocky shore (40%), low rocky shore (40%), and cliff/bluff shore (20%). Approximately 70% of this site is estimated to have been disturbed. The CPR runs along 60% of this Segment, and the remainder of the shoreline (40%) is commercial development. Further disturbance to this Segment is expected since it is adjacent to downtown Invermere, and plans are in place for a resort development. Although disturbed, the

riparian area provides abundant cover to this Segment, and is primarily made up of broadleaf saplings >10m. There is little aquatic vegetation here (10% submerged). Three wooden docks and 1 concrete groyne have been built.


**Figure 11. Shoreline along Segment 17, showing location for water side resort development (LHS) and downtown Invermere beyond the shoreline (RHS).**

### Segment 18 (594m) – LoI Medium

Segment 18 runs along James Chabot Provincial Park (100% park). The shoreline is mainly gravel beach (45%) and sand beach (45%) shore types. A valuable wetland area also comprises 5% of the shoreline. Approximately 40% of this Segment remains in a natural condition. The riparian area provides abundant cover of herbs/grasses (mainly low shrubs <2m). Approximately 15% of the aquatic area in this Segment contains submerged vegetation, while 10% contains emergent vegetation. There is 1 wooden dock, 1 wooden retaining wall, and a boardwalk in this Segment. An Osprey nest is located in the parking lot.

**Figure 12. Segment 18 is bordered by James Chabot Provincial Park.**

**Segment 19 (268m) – LoI High**

Segment 19 is located at the outlet of Windermere Lake. This Segment is vegetated shore line, which has been 100% disturbed. It is all commercial land use and has a hotel/convention centre planned for construction. Some current sources of the disturbance are 1 wooden retaining wall, and a clearing at a site of a future resort. The riparian vegetation consists of tall shrubs, which provide moderate coverage to the area. The aquatic area contains 65% coverage with submerged vegetation and 35% with other vegetation. The area is highly used by waterfowl. There is a public easement along the shoreline allowing for pedestrian access.

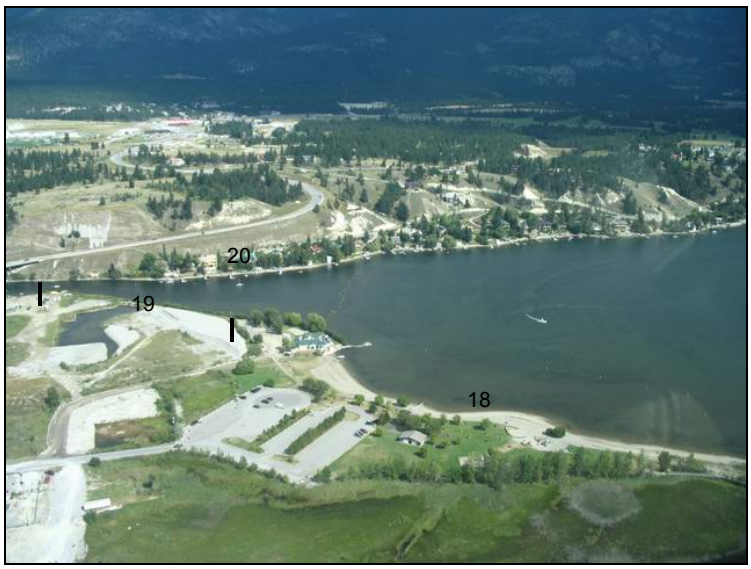



**Figure 13. Segment 19 located at the outlet of Windermere Lake, is the shoreline area between the markers in this photo.**

**Segment 20 (1054m) – LoI High**

Segment 20 lies at the north east end of Windermere Lake. This entire Segment has residential development, which is the primary disturbance along the entire shoreline. The shore type is mainly vegetated shoreline (60%), with some gravel beach (30%) and sand (10%) beach types. The riparian vegetation is classified as a mature broadleaf forest, and provides moderate coverage. Fifty percent of the aquatic area contains submerged vegetation. There have been a number of structures built along the shoreline including 65 retaining walls (mixed materials), 32 wooden docks and 4 stone groynes. A variety of wildlife was observed during the field review, including a belted kingfisher, osprey, pileated woodpecker, northern flicker, sandpiper, goldeneye, and otters.

**Figure 14. Most of the shoreline along Segment 20 has disturbed by residential development.**

### Segment 21 (1154m) – LoI High

This Segment has been disturbed by residential development, which covers 100% of the area. The shore type here is predominantly vegetated (50%), although there is also a substantial amount of gravel beach (40%), as well as some cliff/bluff and low rocky shore (5% each). The riparian vegetation is composed of a mixed mature forest, which provides moderate coverage to the area. Forty percent of the aquatic area is covered with submerged aquatic vegetation. There are numerous structures built along the shoreline including 80 retaining walls (mixed construction materials), 27 wooden docks, 9 stonework groynes, and 26 boathouses.

**Figure 15. Lower Lake View Road along Segment 21.**

### Segment 22 (940m) – LoI Medium

The land use of Segment 22 is mainly private recreational (87%), held by Timber Ridge Marina and Beach Resort. At the north end of the Segment there is a small public park (13%) at the mouth of Holland Creek. This Segment is mainly cliff/bluff shore type (60%), with some sand beach and vegetated shore type areas (20% each). The riparian area is composed of mature broadleaf vegetation, which provides abundant cover. Six retaining walls (of mixed construction materials), 3 wooden docks, 1 stonework groyne, 1 marina, and 12 boathouses have been constructed along this Segment. Wildlife notes from the field review indicate that:

- the mouth of Holland Creek provides important wetland habitat and is used by Kokanee moving in and out of Holland Creek;
- wildlife tracks were observed from the lake to a burrow located in the clay bank;
- the natural grassland slope is high value; and

- an eagle, gulls, crow, swallow were seen.

**Figure 16. North end of Segment 22 showing the public park along the north side of Holland Creek, and the Timber Ridge marina and beach private recreational properties.**

### Segment 23 (1328m) – LoI Medium

Eighty percent of Segment 23 consists of residential properties, and the remaining 20% is private recreational property (i.e. Baltac Beach). These land uses are estimated to have disturbed 75% of the foreshore. The shore type here is a mix of vegetated shore (40%), cliff/bluff (25%), and sand beach (35%). The riparian vegetation is made up of a mature broadleaf forest that provides abundant cover to the shoreline. Structures built along the shoreline include 88 retaining walls (mixed materials), 18 wooden docks, 2 stonework groynes, 1 marina, and 12 boathouses. Bank erosion is evident along the exposed bank areas.

**Figure 17. Segment 23 showing the Baltac Beach (private) on the left and the Baltac residential community on the right**

### Segment 24 (1800m) – LoI High

The land use of Segment 24 is composed of approximately half residential and half private recreational (50%) properties. The recreational developments include strata type complexes, such as Terra Vista, Calberley and Akiskinook resorts. These resorts are officially zoned as multi-family residential (R-3; RDEK 2007b). However, for the purposes of this review, they are described as being recreational in nature, because of their private recreational foreshore facilities such as marinas and beach access. The land uses have contributed to disturbance along most of the foreshore (95%). This Segment is mainly vegetated shore type (65%), and there is also some sand beach (20%), cliff/bluff (10%) and wetland (5%) shore types here. The riparian area

is a mixed mature forest that provides abundant cover. Riparian veteran trees are evident (≥ 5). A total of 46 retaining walls (of mixed materials), 17 wooden docks, 1 stonework groyne, 2 marinas, and 13 boathouse structures are evident along this section of shoreline. The first evidence along the eastern shore of undisturbed shoreline and intact upland forested habitat was encountered in this Segment (coming from the north).

**Figure 18. Half of Segment 24 has private recreational type developments along the foreshore such as that at Terra Vista Resort and Marina and Calberley Beach (both near the centre of the photo).**

**Figure 19. Segment 24 Akiskinook Resort and Marina (private), located near the south end of Segment 24, has contributed to disturbance along a large upland portion of the shoreline.**

### Segment 25 (663m) - LoI Low

Eighty percent of Segment 25 is located in a cemetary/park and is in a natural state. The remaining 20% is located on the eastern side of the Hidden Bay and is influenced by a road right of way and residential properties (just beyond the road). The shore types here are: vegetated shore (35%), gravel beach (33%) and wetland (32%). The riparian vegetation is mainly tall shrubs, which provide abundant cover. Several (≥ 5) riparian veterans and snag trees also exist here. The overhang of riparian vegetation into the water column is also substantial, at 40%. Overall, this area is viewed as providing one of the most important habitats on the north eastern

shore. There were several additional field notes made, relating to the high quality habitat in this Segment; these are as follows:

- very good natural shoreline vegetation on the point below the cemetery;
- important isolated wetland below the cemetery and at the head of the bay;
- largest natural protected bay (Hidden Bay) on eastern shore of Windermere Lake provides an important area for waterfowl refuge;
- natural plant communities in the undeveloped areas; and
- topography provides protection.

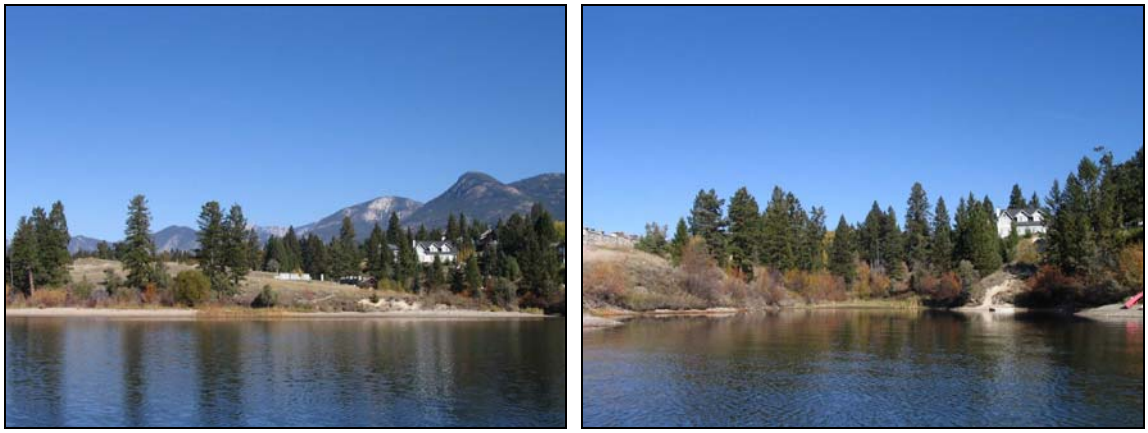


**Figure 20. Segment 25 is all park and provides one of the most important habitats on the north eastern shore of Windermere Lake. The left photo shows the cemetery and the right photo shows the isolated wetland below the cemetery (photos provided by Wildsight).**

### Segment 26 (3459m) – LoI Medium

The shoreline of Segment 26 is composed of 45% private recreational, 25% residential, 20% Crown (Transportation and Highway right of way), and 10% park land. The private recreational lands include properties such as Cardiff Cove Marina, Shadybrook Marina, Trethaway Beach and Marina, and Indian Beach Marina. The park-land is the Town of Windermere's public beach, and is unique in that it includes the only island on Windermere Lake. The island provides important nesting foraging and perching habitat.

The shore types of this Segment include gravel beach, vegetated and wetland (all at 25%), sand beach (20%) and cliff/bluff (5%). Approximately 30% of the foreshore is in a natural condition. The riparian vegetation is comprised of mainly tall shrubs, which provide abundant cover. Several riparian veteran trees and snags are evident in this Segment. The aquatic vegetation is varied, covered by 60% submergent plants, and 20% each of emergent and other plant types.

Several structures have been constructed along the foreshore including 24 retaining walls (of mixed materials), 31 wood docks, 6 stonework groynes, 4 marinas, and 8 boathouses. One non-conforming boat house structure located above the outlet of Jane Creek was identified during the field review. This structure is believed to create a barrier to fish movement upstream (Figure 33). The photos provided (Figures 32- 34) progress along the shoreline of Segment 26 in a southerly direction. The riparian habitat at the outlet of Windermere Creek is considered to be important.

**Figure 21. Segment 26 - Windermere public beach and the private Cardiff Cove Marina (left); right hand photo shows Shadybrook Marina (private) and valuable riparian / foreshore habitat at outlet of Windermere Creek.**

**Figure 22. Segment 26 – Left photo shows Trethaway Beach Marina (private), and what was previously Coldstream campground; the right hand photo depicts a closer view of a boat house which is believed to inhibit fish access up Jane Creek.**

**Figure 23. Southern end of Segment 26 has Indian Beach Resort and Indian Beach Marina (private).**

# Appendix G. Data Tables with Details for Figures in Results (Section 3)

**Figure 6. Natural and disturbed values for each of the Segment groupings of Windermere Lake, depicted as a length (m) of the total foreshore, and a percentage (%) of each Segment grouping.**

| Segment Grouping | Natural (m) | Disturbed (m) | Sum (m) | % Natural | % Disturbed |
|---|---|---|---|---|---|
| South East (Seg. 1-6) | 8227 | 791 | 9017 | 91 | 9 |
| South West (Seg. 7-12) | 2513 | 5696 | 8209 | 31 | 69 |
| District of Invermere (Seg. 13-19) | 446 | 6621 | 7067 | 6 | 94 |
| North East (Seg. 20-26) | 2461 | 7939 | 10400 | 24 | 76 |

**Figure 7. Land uses along the foreshore of Windermere Lake, depicted as length (m) coverage along shoreline, percentage of total foreshore length (%); with an indication of whether the land use generally maintains a natural condition or contributes to disturbance.**

| | CPR (29%) | Residential (24%) | Undeveloped Indian Reserve (23%) | Private Recreational (11%) | Crown (6%) | Park (5%) | Commercial (2%) |
|---|---|---|---|---|---|---|---|
| Generally Natural | 0 | 0 | 8227 | 0 | 2164 | 878 | 0 |
| Generally Disturbed | 10440 | 8491 | 0 | 3934 | 0 | 878 | 547 |

**Figure 8. Land use type and extent (m) for each Segment grouping along the shoreline of Windermere Lake.**

| | CPR | Residential | Undeveloped Indian Reserve | Private Recreational | Crown | Park | Commercial | Total Length |
|---|---|---|---|---|---|---|---|---|
| South East (Seg. 1-6) | 309 | 481 | 8227 | 0.00 | 0 | 0.00 | 0 | 9017 |
| South West (Seg. 7-12) | 6163 | 1046 | 0 | 393 | 1472 | 0.00 | 0 | 9074 |
| District of Invermere (Seg. 13-19) | 3968 | 1749 | 0 | 0.00 | 0 | 758 | 547 | 7067 |
| North East (Seg. 20-26) | 0 | 5168 | 0 | 3541 | 692 | 999 | 0 | 10400 |
| | | | | | | | | 35559 |

**Figure 9. Length (m) and percentage (%) of total foreshore for each Shore Type along Windermere Lake.**

| | Vegetated Shore (30%) | Wetland (20%) | Low Rocky Shore (19%) | Cliff/bluff (15%) | Sand Beach (8%) | Gravel Beach (7%) | Total Length |
|---|---|---|---|---|---|---|---|
| Shoreline length (m) | 10717.80 | 7240.41 | 6688.99 | 5399.91 | 2749.91 | 2652.22 | 35449 |
| % of Total | 30.14 | 20.36 | 18.81 | 15.19 | 7.73 | 7.46 | 100 |

**Figure 10. Shoreline Type and extent (m) for each Segment grouping along the shoreline of Windermere Lake.**

| | Cliff/bluff | Gravel beach | Sand beach | Vegetated | Low rocky | Wetland | Total |
|---|---|---|---|---|---|---|---|
| South East Shore (Seg. 1-6) | 2917 | 48 | 481 | 581 | | 4880 | 9017 |
| South West Shore (Seg. 7-12) | 882 | 164 | 109 | 3420 | 3513 | 987 | 9074 |
| District of Invermere (Seg. 13-19) | 293 | 579 | 349 | 2520 | 3119 | 207 | 7067 |
| North East Shore (Seg. 20-26) | 1307 | 1861 | 1810 | 4196 | 58 | 1167 | 10400 |

**Figure 11. Total numbers of modifications along the foreshore of Windermere Lake**

| Retaining Walls | Docks | Groynes | Marinas | Boat Houses | Boat Launches |
|---|---|---|---|---|---|
| 443 | 202 | 29 | 9 | 107 | 2 |

**Figure 12. Number of modifications (by type) per kilometer for each Segment grouping along the shoreline of Windermere Lake.**

| Segment Grouping | # Structures /km | | | | | |
|---|---|---|---|---|---|---|
| | Retaining walls | Docks | Groynes | Marinas | Boat Houses | Boat Launches |
| South East (Seg. 1-6) | 0.665 | 0.550 | 0 | 0 | 0 | 0 |
| South West (Seg. 7-12) | 1.65 | 2.100 | 0.11 | 0 | 0.77 | 0.2 |
| District of Invermere (Seg. 13-19) | 16 | 7.100 | 0.7 | 0.14 | 3.7 | 0 |
| North East (Seg. 20-26) | 30 | 12.300 | 2.2 | 0.76 | 7.1 | 0 |

**Figure 13. Total Segment length (m) and retaining wall length (m and % of total) for Segments with retaining walls present.**

| Segment Number | Segment Total Length (m) | Retaining wall length (m) | % of shoreline with retaining wall |
|---|---|---|---|
| 4 | 963 | 100 | 10 |
| 10 | 773 | 364 | 47 |
| 12 | 1090 | 158 | 14 |
| 13 | 3550 | 100 | 3 |
| 14 | 256 | 256 | 100 |
| 16 | 1539 | 1255 | 82 |
| 18 | 594 | 31 | 5 |
| 20 | 1054 | 655 | 62 |
| 21 | 1154 | 1048 | 91 |
| 22 | 940 | 555 | 59 |
| 23 | 1328 | 680 | 51 |
| 24 | 1801 | 1051 | 58 |
| 26 | 3459 | 848 | 25 |

**Figure 14. Length (m) and percentage (%) of total foreshore area for each Level of Impact Type (high, medium, low) along the foreshore of Windermere Lake.**

| | Low (58%) | Medium (25%) | High (17%) |
|---|---|---|---|
| Length (m) | 20667 | 8820 | 6072 |
| % of Total | 58 | 25 | 17 |

**Figure 15. Level of Impact for each of the Windermere Lake Segment groupings, depicted as length (m) of the total shoreline, and as a percentage (%) of each Segment grouping.**

| | Low | Medium | High | Sum | % Low | % Med | % High |
|---|---|---|---|---|---|---|---|
| South East Shore (Seg. 1-6) | 9017 | 0 | 0 | 9017 | 100 | | |
| South West Shore (Seg. 7-12) | 7436 | 1639 | 0 | 9074 | 82 | 18 | |
| District of Invermere (Seg. 13-19) | 3550 | 1454 | 1808 | 6812 | 52 | 21 | 27 |
| North East Shore (Seg. 20-26) | 663 | 5728 | 4009 | 10400 | 6 | 55 | 39 |

# Appendix H. Foreshore Summary Maps

# WINDERMERE LAKE FORESHORE INVENTORY AND MAPPING

Appendix I: Foreshore Summary Map

Map 1 of 2
Date: 2007/04/16
Scale: 1:25,000

N

0 250 500 1,000 Meters

Fisheries and Oceans Canada
- Pacific Region

## Legend

**Dominant Shore Type**

- Cliff/Bluff
- Gravel Beach
- Low Rocky Shore
- Sand Beach
- Vegetated Shore
- Wetland
- Segment Break
- Index Contour (100m)
- Intermediate Contour (20m)
- Retaining Wall (Location Offset)

- City of Invermere
- Indian Reserve
- Park
- Roads and Access
- Waterbody
- Wetland
- Highway
- Secondary Road
- Gravel Road
- Unclassified Road
- Trail

**Note:** Retaining wall and wetland data is an interpreted overview from Wildsight's data. For detailed list of retaining walls refer to Wildsight's record.

Segment Number | Shore Type | Primary Land Use | % Disturbed | Dominant Substrate | Littoral Zone | Level of Impact | Length (m)

1, M, CB, UR, 50, Sh, G, 1200

**Land Use**
Res - Residential
Com - Commercial
Ag - Agriculture
P - Park
Ind - Industrial
CP - Crown Provincial
UIR - Undeveloped Indian Reserve
CPR - CP Railway

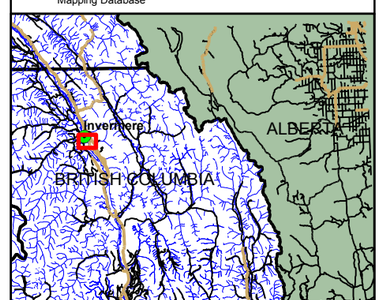
**Littoral Zone Depth**
D - (Deep)
M - (Moderate)
Sh - (Shallow)

**Level of Impact**
Low - No or limited signs of disturbance and foreshore impacts
Moderate - Moderate signs of disturbance and foreshore impacts
High - Extensive signs of disturbance and foreshore impacts

**Dominant Substrate**
G - Gravel
F - Fines
C - Cobble
B - Boulder
R - Bedrock
C/B - Cobble/Boulder (mix)

**Shore Type**
CB - Cliff Bluff
GB - Gravel Beach
SB - Sand Beach
VS - Vegetated Shore
LRS - Low Rocky Shore
W - Wetland

**Note:** This map is used for illustrative purposes only and should be used in conjunction with the Invermere Lake Foreshore Inventory and Mapping Database




Digital Mapping By:

INTERIOR REFORESTATION CO. LTD.
*Leadership In Natural Resource Management*

Creation Date: April 16, 2007 By: DM Last Major Edit: By:
Mapping File: 07DFOK01\SHIM_Sum.mxd

20, H, VS, UR, 100, Sh, G, 1054

19, H, VS, Com, 100, Sh, F, 268

21, H, VS, UR, 100, Sh, G, 1154

18, M, GB, Park, 60, Sh, G, 894

17, M, VS, CPR, 70, Sh, G, 696

16, H, VS, UR, 100, Sh, G, 1539

15, M, SB, Park, 100, Sh, G, 164

14, H, GB, UR, 100, Sh, G, 256

22, M, CB, PR, 50, Sh, F, 940

23, M, VS, UR, 75, Sh, F, 1328

13, L, LRS, CPR, 100, Sh, C, 3550

24, H, VS, UR, 95, Sh, F, 1801

12, L, VS, CPR, 40, Sh, C, 1090

25, L, VS, Park, 20, Sh, F, 663

# WINDERMERE LAKE FORESHORE INVENTORY AND MAPPING

Appendix I: Foreshore Summary Map

Map 2 of 2
Date: 2007/04/16
Scale: 1:25,000

N

0 250 500 1,000 Meters

Fisheries and Oceans Canada
- Pacific Region

## Legend

**Dominant Shore Type**

- Cliff/Bluff
- Gravel Beach
- Low Rocky Shore
- Sand Beach
- Vegetated Shore
- Wetland
- Segment Break
- Index Contour (100m)
- Intermediate Contour (20m)
- Retaining Wall (Location Offset)

- City of Invermere
- Indian Reserve
- Park
- Roads and Access
- Waterbody
- Wetland
- Highway
- Secondary Road
- Gravel Road
- Unclassified Road
- Trail

**Note:** Retaining wall and wetland data is an interpreted overview from Wildsight's data. For detailed list of retaining walls refer to Wildsight's record.

Segment Number | Shore Type | % Disturbed | Dominant Substrate | Littoral Zone | Primary Land Use | Level of Impact | Length (m)

1, M, CB, UR, 50, Sh, G, 1200

**Land Use**
Res - Residential
Com - Commercial
Ag - Agriculture
P - Park
Ind - Industrial
CP - Crown Provincial
UIR - Undeveloped Indian Reserve
CPR - CP Railway

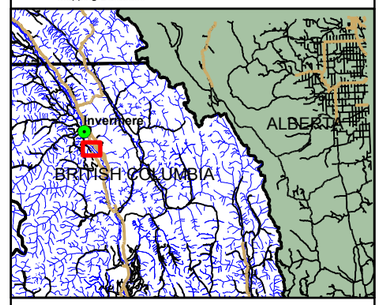
**Littoral Zone Depth**
D - (Deep)
M - (Moderate)
Sh - (Shallow)

**Level of Impact**
Low - No or limited signs of disturbance and foreshore impacts
Moderate - Moderate signs of disturbance and foreshore impacts
High - Extensive signs of disturbance and foreshore impacts

**Dominant Substrate**
G - Gravel
F - Fines
C - Cobble
B - Boulder
R - Bedrock
C/B - Cobble/Boulder (mix)

**Shore Type**
CB - Cliff Bluff
GB - Gravel Beach
SB - Sand Beach
VS - Vegetated Shore
LRS - Low Rocky Shore
W - Wetland

**Note:** This map is used for illustrative purposes only and should be used in conjunction with the Invermere Lake Foreshore Inventory and Mapping Database




Digital Mapping By:

INTERIOR REFORESTATION CO. LTD.
*Leadership In Natural Resource Management*

Creation Date: April 16, 2007 By: DM Last Major Edit: By:
Mapping File: 07DFOK01\SHIM_Sum.mxd

26, M, VS, PR, 70, Sh, G, 3459

11, L, LRS, CPR, 85, Sh, G, 3868

1, L, CB, UIR, 0, Sh, F, 239

2, L, CB, UIR, 0, Sh, F, 1096

10, M, VS, Res, 50, Sh, G, 773

3, L, CB, UIR, 0, Sh, F, 1878

9, L, VS, CR, 0, Sh, G, 892

8, L, VS, CPR, 100, Sh, G, 1585

4, L, SB, Res, 50, Sh, F, 963

5, L, CB, UIR, 0, Sh, F, 1748

7, M, LRS, CPR, 100, Sh, F, 865

6, L, W, UIR, 10, Sh, F, 3095

# Appendix I. Arcview Shapefiles for the Foreshore Database (on CD ROM)