

# **Reconnaissance Inventory of Morton Lake Tributaries**

Watershed Code: 920-643100

Prepared for:

**BC Ministry of Environment, Lands and Parks**

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July 1999

## Project Reference Information

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| <b>MELP Project Number</b>          | IVNOI103                            |
| <b>FRBC Project Number</b>          | PA96163 IN/TR                       |
| <b>FDIS Project Number</b>          | 01-SALM-9200-9840-1998              |
| <b>FRBC Region</b>                  | Vancouver Region                    |
| <b>MELP Region</b>                  | 01                                  |
| <b>MELP District</b>                | Campbell River                      |
| <b>FW Management Unit</b>           | 1-10                                |
| <b>Fisheries Planning Unit</b>      | Campbell Oyster                     |
| <b>Forest Region</b>                | 01                                  |
| <b>Forest District</b>              | Campbell River                      |
| <b>Forest Licensee and Tenure #</b> | n/a                                 |
| <b>First Nations Claim Area</b>     | Campbell River and Cape Mudge Bands |

## Watershed Information

|                              |                     |
|------------------------------|---------------------|
| <b>Watershed Group</b>       | Salmon              |
| <b>Watershed Code</b>        | 920-643100          |
| <b>Waterbody Identifier</b>  | 00517SALM           |
| <b>UTM at Lake Outlet</b>    | 10.323277.5555152   |
| <b>Number of Tributaries</b> | 2 inlets, 1 outlet  |
| <b>Magnitude</b>             | 44                  |
| <b>Elevation</b>             | 208 m               |
| <b>NTS Map</b>               | 92 K/3              |
| <b>TRIM Map</b>              | 92K.013             |
| <b>Biogeoclimatic Zone</b>   | CWHxm2              |
| <b>Air Photos</b>            | BCB 91024 #164, 165 |

## Contractor Information

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This product has been accepted as being in accordance with approved standards within the limits of Ministry quality assurance procedures. Users are cautioned that interpreted information on this product developed for the purposes of the Forest Practices Code Act and Regulations, for example stream classifications, is subject to review by a statutory decision maker for the purposes of determining whether or not to approve an operational plan.

**Acknowledgments**

Forest Renewal BC provided funding for this inventory.

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## 1.0 Introduction

### 1.1 Project Scope and Objectives

- This report documents the findings of a reconnaissance survey conducted on the tributaries of Morton Lake in the Mohun Watershed during the spring of 1997. MJ Lough and Associates surveyed these streams as part of the Sayward Landscape Unit Fish and Fish Habitat Inventory, which was conducted between 1996 and 1998.
- This survey was limited to the tributaries because historical limnology, bathymetry and fish data for Morton Lake are available from previous studies.
- The primary objective of this inventory project is to provide fish and fish habitat information for use in resource management planning.

### 1.2 Location

- Morton Lake is located on Vancouver Island in the Sayward Provincial Forest 16 km northwest of the town of Campbell River and 42 km southeast of the community of Sayward. Morton Lake empties into Mohun Creek which flows southeast and discharges into the Pacific Ocean at the south end of Menzies Bay in Discovery Passage (Figure 1).
- The outlet of Morton Lake is Mohun Creek, which is also known locally as Trout Creek. This name however, is not a recognized alias as listed in the Gazetteer of Canada for British Columbia (CPCGN 1997).

#### 1.2.1 Access

- To access Morton Lake, start at the Campbell River bridge in the community of Campbellton and drive northwest on Hwy 19 (2-lane paved highway) for 14.5 km.
- Turn left onto the Menzies Mainline logging road (good 2 wheel drive gravel logging road) and drive west for 15.4 km.
- Turn right (north) onto Morton Lake Road (2 wheel drive gravel logging road) and drive north for 6.4 km.
- The road terminates at Morton Lake Provincial Park located on the northwest shore of Morton Lake.

## 2.0 Resource Information

### 2.1 Native Issues

- The Sayward Forest is included in the traditional claims to land title by the Campbell River and Cape Mudge Bands. The Kwakiutl Laich-kwill-Tach Council of Chiefs represents these and other bands in land claim issues, and have included the area in their *Statement of Intent* documents which were accepted by the BC Treaty Commission in February, 1997. Negotiations with the Federal and Provincial governments are currently proceeding through the BC Treaty Commission (Armstrong pers. comm.).

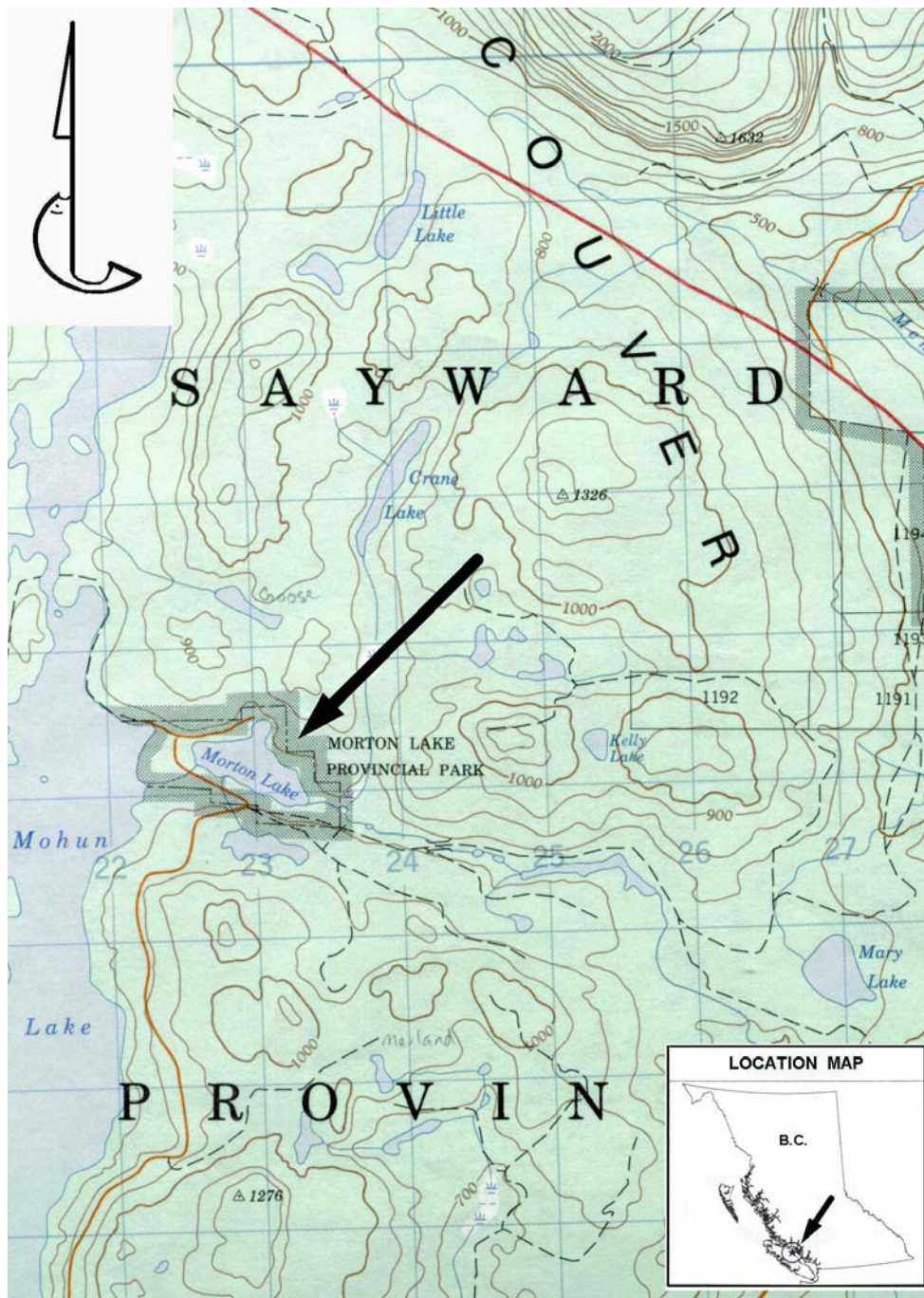


Figure 1 Arrow indicates the location of Morton Lake on excerpt from NTS map 92K3 (scale 1:50,000)

## 2.2 Wildlife

- Morton Lake is in the Coastal Western Hemlock Biogeoclimatic Zone (British Columbia 1996). This area is reported to be potentially the most productive region on Vancouver Island for Columbia blacktail deer (*Odocoileus hemionus columbianus*) and Roosevelt elk (*Cervus canadensis roosevelti*) (Diggle and Addison 1977).
- The integrated Wildlife and Intensive Forestry Research (IWIFR) project, a 9-year Vancouver Island coastal blacktail deer and Roosevelt elk study, identified important winter habitat criteria necessary to maintain stable populations (Nyberg and Janz 1990). Based in part on the IWIFR computer model for the Sayward Forest, the Ministry of Forests (MOF) in consultation with the BC Ministry of Environment, Lands and Parks (MELP) Wildlife staff, have designated key areas in the Sayward Forest that are important for wildlife. The MOF Forest Cover Map 92K.013 shows that slopes bordering the northeast shores of Morton Lake have been flagged as Environmentally Sensitive (EW/E2W) for wildlife (Sayward Forest 1998).
- A Forest Ecosystem Network (FEN) currently in draft status, surrounds Morton Lake (BCMOF-CRD 1998a). FEN's recognize areas that require a long term landscape management approach to better protect riparian zones, wildlife migration routes, and maintain or restore natural connectivity within the larger landscape unit (BCMOF 1995). The FEN's identified in the Sayward Forest indicate areas that are critical ungulate habitat (BCMOF-CRD 1998a).

## 2.3 Development, Land and Water Use

### 2.3.1 Recreation

- The 67 ha Morton Lake Provincial Park is located on the northwest shore of Morton Lake. It is open from May to October and has 24 campsites, boat launches, and offers swimming, hiking and fishing activities (PTC Phototype Composing Ltd. 1993).
- The Sayward Forest Canoe Route is a popular 50-km, circular canoe route through several lakes in the Sayward Forest. Mohun Lake is one of the larger lakes on the paddling circuit. The close proximity of Morton Lake Park facilities to the canoe route provides a convenient camping and rest area for canoeists (Sayward Forest Canoe Route 1995).
- The network of old railway grades and gravel roads in the Sayward Forest allows access to most areas. Some of the old railroad grades have been converted into hiking and mountain biking trails that receive heavy use during the summer and fall seasons. One such trail is the Goose Lake Trail, an easy 2.7 km trail loop beginning and ending in Morton Lake Provincial Park (Campbell River Forest District 1995). MOF is planning to construct additional paths that would link up with existing trail loops to form a network of trails throughout the Sayward Forest (Cornfield pers. comm.).
- The MOF conducted a recreational inventory throughout the Sayward Forest in order to identify use patterns and classify the region according to biophysical feature significance. These 1:50,000 level Recreation Resource Inventory maps are available for viewing at the MOF, Campbell River District Office.
- The biophysical feature codes for Morton Lake and surrounding area from MOF Recreation Resource Inventory Map 92K/3 are M<sup>3</sup> A<sup>1</sup> Q<sup>3</sup> bai (C1). This classification

- describes the terrain as predominately shorelands and large surface waters supporting sport fish populations. It further stipulates the area contains common biophysical features, which have a moderate ability to attract recreational use and requires special management considerations in order to protect recreation values. Currently angling, camping, picnicking, swimming, canoeing and hunting are major recreation pursuits in the region (Quadra Island 1987).
- BCMELP has conducted angler surveys to determine sport fishing activity on the lakes in the Sayward Forest. In 1989 an estimated 549 angler days were spent fishing on Morton Lake (BCMELP-FB-VIR 1998b).

### **2.3.2 Logging**

- The primary resource based activity in the Morton Lake area is logging. Most of the prime timber in the Sayward Forest was harvested during the early 1900's (BCMOF-CRD undated). The extensive logging resulted in a network of old railway grades and gravel roads in the Sayward Forest.
- Morton Lake and Morton Lake Provincial Park fall within the Sayward Block of the Strathcona Timber Supply Area (Strathcona TSA), which is situated on central Vancouver Island. It is an area of Crown Land that is managed for a range of objectives including timber production (BCMOF-CRD 1998b). Forest harvesting in land bordering Morton Lake Provincial Park is administered through the Small Business Forest Enterprises Program (SBFEP) of the MOF, Campbell River District.
- Second growth timber throughout the watershed is approaching merchantable size and many of the trees are slated for harvest as commercial thins or clear-cuts. The following proposed clear-cuts and road development are indicated on the MOF Small Business Forest Enterprise Program, Sayward Provincial Forest 1998-2002 Forest Development Plan (BCMOF-CRD 1998a):
- Two commercial thins (approximately 60 ha each) scheduled for harvest in 1998, are located near Morton Lake. One of these is on the north side of the Goose Lake outlet stream. It straddles the Little Goose Forest Service Road, a gravel logging road that was improved and extended in 1997. The other block bestrides the Morton Lake Forest Service Road, an all season gravel road that was upgraded for log hauling in 1998.
- A 15 ha commercial thin 600 m north of Morton Lake is proposed for harvest in the year 2000. This cut block is on the south side of the outlet stream of Goose Lake, and is accessed by the Little Goose Road.

### **2.3.3 Other Land and Water Use**

- Currently, there are no registered water licenses on Morton Lake (BCMELP-WQB-VIR 1998).
- There are no waste permits registered on Morton Lake although immediately upstream in Mohun Lake, a permit (PE0504401(12)) was issued to MELP for the purpose of fertilizing Mohun Lake to improve fish productivity from 1977 to 1979 (BCMELP-WMB-VIR 1998).
- Forested land surrounding Morton Lake also supports small-scale salal harvesting operations and pine/chanterelle mushroom picking.
- No mining operations are being conducted or proposed in the Morton Lake area (BCMEM 1996).

## 3.0 Summary of Historical Information

### 3.1 Previous Surveys

#### 3.1.1 Morton Lake

- Morton Lake is not accessible to anadromous fish, but it is inhabited by resident fish stocks (BCMELP-FB-VIR 1998a). Historical records show the presence of the following fish species in Morton Lake (BCMELP-FB-VIR 1998a and DFO-BCMELP 1998):
  - cutthroat trout (*Oncorhynchus clarki clarki*)
  - kokanee (*Oncorhynchus nerka*)
  - prickly sculpin (*Cottus asper*)
- The earliest documented fish sampling in Morton Lake was conducted by the Fish and Wildlife Branch in 1976 (BCMELP-FB-VIR 1998a) (Table 1).

Table 1 Summary of historical surveys at Morton Lake and tributary streams (species codes as in Hawthorn and others 1989)

| Date (Y/M) | Survey Type                                   | Performed by  | Location <sup>1</sup>           | Fish Species Sampled |
|------------|-----------------------------------------------|---------------|---------------------------------|----------------------|
| 1975       | Stream reconnaissance inventory               | DFO           | Site 1                          | CT, CC, TSB          |
| 1976/05    | Reconnaissance lake inventory with bathymetry | Burns, Walsh  | Morton Lake                     | CT, KO, CAS          |
| 1977/07    | Stream habitat survey                         | Students      | Morton Lake outlet, Reach 1     | Not sampled          |
| 1977/08    | Stream population estimates                   | Reid, Sjolund | Morton Lake outlet, Reaches 1,3 | CT, TSB, CC          |
| 1978/09    | Stream population estimates                   | Axford        | Morton Lake outlet, Reaches 1,3 | CT, CC, TSB          |
| 1987/09    | Stream debris removal                         | McPherson     | Morton Lake outlet, Site 1      | Not sampled          |

Source: BCMELP-FB-VIR 1998a

<sup>1</sup> Site numbers refer to 1997 sites

#### 3.1.2 Morton Lake Tributaries

- In 1975, DFO conducted a reconnaissance lake and stream survey on Mohun Lake, which included the main inlet of Morton Lake (outlet of Mohun Lake). In addition to assessing fish use potential, water chemistry and flow data were also collected (BCMELP-FB-VIR 1998a).
- In July 1977, tributary surveys were carried out on several reaches of the Morton Lake outlet by Campbell River Junior High School students to determine the quantity and quality of fish habitat available. The survey described mainly physical parameters such as important spawning and rearing habitat, debris jams and location of fish barriers. Stream survey forms describing some aspects of the

geomorphology were filled out, although these did not include many of the parameters such as gradient that are now standard (BCMELP-FB-VIR 1998a).

- During the fall of 1977 and 1978, MELP conducted fish population estimates at the Morton Lake outlet stream and main inlet stream (Sites 1, 3). Fish densities per species are tabulated in various progress reports located in MELP Region 1 lake files (BCMELP-FB-VIR 1998a).
- A Sayward Lakes tributary improvement project was carried out on the main inlet of Morton Lake (Site 1) during the fall of 1987. Reportedly, log debris was removed in the section of the stream between Mohun and Morton Lakes to improve adult and juvenile fish passage (BCMELP-FB-VIR 1998a). Following debris removal, gravel was placed in key areas to enhance cutthroat trout spawning habitat.

### 3.2 Stocking

- Stocking records compiled by MELP indicate that Morton Lake has been stocked with hatchery cutthroat trout annually since 1986 (BCMELP-FB 1998) (Table 2).
- Cutthroat trout released into the lake were raised from captive Taylor River or Paq Lake brood stock reared at Vancouver Island Hatchery (Billings pers. comm.).
- Discussions with DFO personnel found that coho juveniles from the Quinsam Hatchery are sometimes released upstream of the anadromous barrier on Trout Creek. On some years, coho are released as far upstream as the wetland area at the outlet of Morton Lake (Ewart pers. Comm.). These coho could easily move into Morton Lake from their release sites.

Table 2 Summary of hatchery stocking information for Morton Lake

| Release Date<br>(Y/M/D) | Species | Number<br>Released | Size<br>(g) | Stock Origin                   |
|-------------------------|---------|--------------------|-------------|--------------------------------|
| 86/04/01                | CT      | 1,000              | 27.5        | Taylor River, VIH <sup>1</sup> |
| 87/04/01                | CT      | 1,500              | 41.3        | Taylor River, VIH              |
| 88/03/01                | CT      | 1,500              | 26.9        | Taylor River, VIH              |
| 89/05/09                | CT      | 1,500              | 42.6        | Taylor River, VIH              |
| 90/04/19                | CT      | 1,500              | 33.2        | Taylor River, VIH              |
| 91/04/11                | CT      | 1,000              | 30.1        | Taylor River, VIH              |
| 92/05/06                | CT      | 500                | 38.7        | Taylor River, VIH              |
| 93/03/24                | CT      | 500                | 37.0        | Paq Lake, VIH                  |
| 94/03/21                | CT      | 500                | 32.4        | Taylor River, VIH              |
| 95/03/15                | CT      | 500                | 34.7        | Taylor River, VIH              |
| 96/03/27                | CT      | 1,000              | 32.4        | Taylor River, VIH              |
| 97/04/03                | CT      | 1,000              | 37.4        | Taylor River, VIH              |
| 98/03/18                | CT      | 1,000              | 38.6        | Taylor River, VIH              |

Source: BCMELP-FB 1998

<sup>1</sup> VIH - Vancouver Island Hatchery

## 4.0 Methods and Equipment

### 4.1 Standards

- Although this field survey was generally conducted according to standards described in the MELP *Lake and Stream Inventory Standards and Procedures Draft* (BCMELP-FB-IU 1995), the study design and hence reporting format was not entirely typical of a standard reconnaissance inventory. The primary differences as detailed in the services contract were:
  - Historical lake survey information was available for Morton Lake, but information was lacking for some of the tributary streams. Biophysical surveys were therefore only conducted on these lake tributaries.
  - The objectives of the tributary surveys were to identify and report the extent of potential fish habitat in the tributaries, where historical information was lacking. Field data was recorded on the blue DFO/MELP Stream Survey Forms, although in some cases, not all fields were completed (e.g. 6 channel widths were not always collected).
  - Only streams mapped on the Terrain Resource Information Management (TRIM) 1:20,000 maps were included in the survey of Morton Lake Tributaries.
  - Sampling protocol required that the first stream reach adjacent to the lake was to be included in the survey unless historical survey information was available. In such cases, surveys were optional.
  - Sampling protocol for this survey did not require sampling for fish presence if an upstream fish population was previously documented.
  - Data recorded on the blue DFO/MOE Stream Survey Form was entered into the DFO/MOE Stream Survey Form Data Entry Tool (Nelson Version) using an IBM compatible computer.
- The *Sayward Landscape Unit Fish and Fish Habitat Inventory 1996 Phase 2 Report* refines the project objectives and describes the project plan (Attachments).

### 4.2 Procedures

#### 4.2.1 Stream Fish Samples

- Tributaries of Morton Lake were not sampled for fish because the 2 inlet streams had documented fish populations in Mohun Lake and Loon Lake upstream. Similarly, the outlet stream was also not sampled because of the documented fish population in Morton Lake.

#### 4.2.2 Photodocumentation

- Photographs were taken with a Pentax ME 35-mm single lens reflex camera, a Yashica Microtec 35-mm camera and an Olympus AF-10 35-mm camera.
- Photo Survey Form 1 (Equipment Details) and Photo Survey Form 2 (Photo Details) were used for photodocumentation.

### 4.2.3 Site Sampling

- A 50-m tape, meter stick and hip chain were used for all depth and length measurements of stream channels and obstructions. A Suunto clinometer was used for measuring stream gradients.
- Field water chemistry measurements included temperature, dissolved oxygen specific conductance, pH and total alkalinity.
- A Hanna Instruments Model HI 9024C pH meter (Hanna Instruments Inc., Wainsocket, RI) was used to measure pH; and a YSI Model 85-10 Temp/DO meter (YSI Inc. Yellow Springs OH) was used to record the temperature, dissolved oxygen and specific conductance at the site. Total alkalinity was measured using a Lamotte field titration kit (Lamotte Co., Chestertown, MD). A standard Limnology Secchi Disc (Wildco, Saginaw, MI) was used to obtain turbidity measurements if necessary.

### 4.2.4 Digital Mapping

- GIS Interpretive Maps were produced by SRM-Levelton according to MELP *Standards for Fish and Fish Habitat Mapping Version 2.0* (BCMOF-FIS 1998).
- Digital 1:20,000 maps were created from the DFO/MOE Stream Survey Data Entry Tool database plotted on TRIM linework (Attachment 9).

## 5.0 Results and Discussion

### 5.1 Logistics

- Reach identification and numbers were not available for the Mohun Watershed when this survey was conducted. Reach breaks for the reaches adjacent to Morton Lake were established using TRIM maps and air photos, then verified in the field. The reach numbering however is independent of the rest of the watershed. The sample site furthest downstream (in this case the first reach of the outlet stream below Morton Lake) was labeled as Reach 1. The lake was therefore Reach 2 and the main inlet stream (outlet of Mohun Lake) was Reach 3. The remaining tributary of Morton Lake was labeled in the manner described in the Lake and Stream Inventory Standards and Procedures (BCMELP-FB-IU 1995). The Interpretive maps show the correct Reach numbering for the Mohun Watershed which is different from the numbering used in this report.
- The DFO/MOE Stream Survey Form and Data Entry Tool used in this survey were designed for use with the old 37 digit watershed code. However, the Data Entry Tool stores the watershed codes without the hyphens between the number sequences (Spence pers. com.). Since the 45 digit watershed codes were used for stream identification during this project, they were used on the field cards and entered into the DFO/MOE Stream Survey Data Entry Tool. The Stream Survey Reports in Appendix 1 appear to display 37 digit watershed codes, however, they contain the 45 digit watershed codes with the hyphens in the wrong places.

## 5.2 Summary of Data Collection

### 5.2.1 Site Sampling Summary

- All tributary streams noted on TRIM were assigned a site number for identification in order to avoid use of the unwieldy watershed codes (Figure 2).
- Morton Lake has 2 inlet streams and 1 outlet stream that are mapped on TRIM. DFO/MOE Site Survey Forms were completed for the first reach adjacent to the lake in all TRIM streams (Sites 2, 16).
- Stream sample sites are summarized in Table 3.

Table 3 Morton Lake tributary survey site descriptions and locations, April 11 - 16, 1997

| Watershed Code   | Site # | Reach # | Inlet/<br>Outlet | Order | Flow Regime               |
|------------------|--------|---------|------------------|-------|---------------------------|
| 920-643100       | 1      | 3       | Outlet           | 4     | Permanent                 |
| 920-643100-58800 | 2      | 1       | Inlet            | 2     | Intermittent <sup>1</sup> |
| 920-643100       | 3      | 1       | Inlet            | 4     | Permanent                 |

<sup>1</sup> Stream flowing during survey but probably intermittent during some years

### 5.2.2 Fish Sampling

- Although fish sampling was not conducted on tributary streams of Morton Lake, historical fish information and visual observations during the stream habitat survey confirmed that all these streams are fish bearing (BCMELP-FB-VIR 1998a)(Appendix1).
- Based on a subjective field evaluation of stream morphology and flows, the main inlet stream (Site 1) and the lake outlet stream (Site 3) of Morton Lake appear to be the most important for year round fish use.
- The remaining inlet stream flows from Loon Lake, a small waterbody 370 m upstream of Morton Lake. A lake reconnaissance survey conducted on Loon Lake in 1996 found that Loon Lake is inhabited by cutthroat trout (Lough and others 1999). The absence of fish barriers between Mohun Lake, Morton Lake and Loon Lake suggests that fish move freely between the 2 lakes. The Loon Lake system may therefore account for substantial additional recruitment to Morton Lake.
- Although spawning and rearing habitat are excellent throughout Site 2 (Loon Lake outlet), the possibility of intermittent flows during dry years may limit its juvenile rearing capability during the summer low flows.

### 5.2.3 Obstructions to Fish Passage

- No points of difficult passage for fish were identified during this survey.

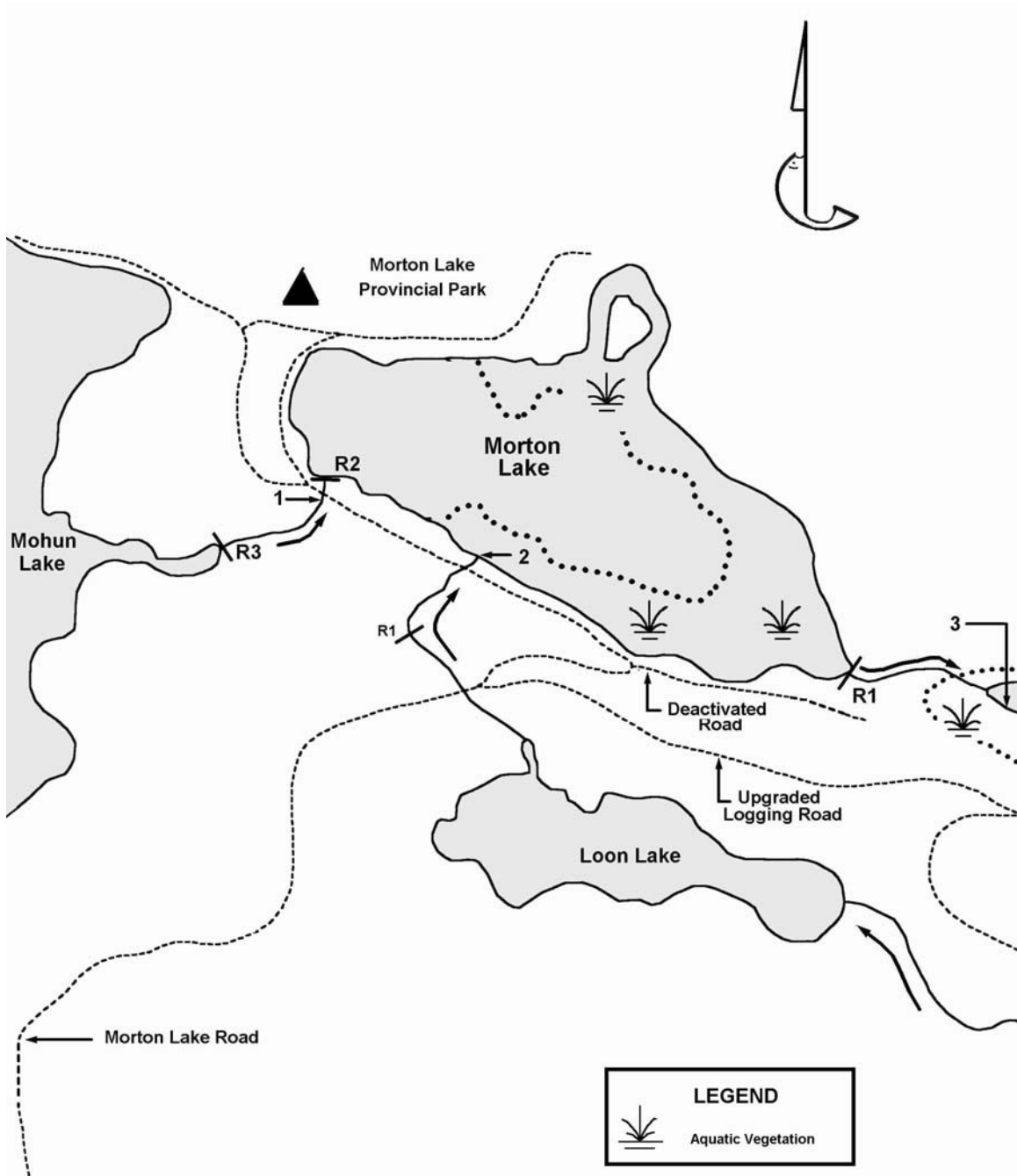


Figure 2 Location of stream sample sites and features at Morton Lake (scale 1:10,000)

## **5.3 Fish Habitat**

### **5.3.1 Fish Habitat Concerns**

- Stocking hatchery coho near the outlet of Morton Lake introduces a non-historical species upstream of the anadromous barrier, in habitat that has historically been utilized by resident cutthroat trout. It appears that this strategy may cause inter-specific competition for the habitat, with potential pressure and declines on the resident cutthroat trout population.

### **5.3.2 Restoration and Rehabilitation Opportunities**

- No restoration or rehabilitation opportunities were identified in the study area.

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## **Appendix 1**

### **DFO/MOE Stream Survey Reports for Morton Lake Tributaries and Site Photos**

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## **Appendix 2**

### **Site Photo Index**