EDI ENVIRONMENTAL DYNAMICS INC
Natural Resource Consultants

MAYO B PROJECT: TERRESTRIAL WILDLIFE REPORT

PREPARED FOR:

YUKON ENERGY CORPORATION

#2 MILES CANYON ROAD

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EDI PROJECT NO.: 08-YC-0037

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EXECUTIVE SUMMARY

The proposed Mayo-B project is a hydroelectric enhancement project that will increase the capacity of the existing Mayo hydroelectric power generation facilities near Mayo, Yukon. The project can include additional drawdown on Mayo Lake during the winter, construction of a new powerhouse downstream of the existing powerhouse, and the construction of new water conveyance including a tunnel, buried penstocks, open channel, or a combination of the three. The project will also include associated activities such as construction of a short all-season access road, power transmission right-of-way clearing, and temporary operation of a construction camp.

Terrestrial studies conducted in 2008 included a habitat assessment in an area within and adjacent to the proposed construction footprint, a waterfowl brood and raptor nest survey, rare plants, continual incidental observations, and information review of other terrestrial wildlife use of the area. The forested habitat surrounding the proposed construction footprint of the project was primarily mixed spruce/aspen that was generally less than 90 years old. The habitat was generally typical of what is found in the broader region. Rare and listed plants were not observed in the 2008 survey, but sites that potentially provide habitat for those species were identified. Waterfowl broods were mostly found in the upper Mayo River in the wetland area above Wareham Lake, and Na-Cho Nyak Dun (NND) individuals identified a section of the Mayo River below the Mayo Lake control structure as suitable waterfowl habitat. Raptor nests (Bald Eagle and Osprey) were found in an area previously indentified as a raptor key wildlife areas (upper Mayo River) and along the north shoreline of Mayo Lake. No raptor nesting activity was noted within the proposed construction footprint of the project. The terrestrial local and regional study areas may contain some breeding habitat for two birds (Common Nighthawk and Olive-sided Flycatcher) that are considered federally as "Species at Risk." Wetland habitats in the broader project area may provide habitat for another "Species at Risk" — Rusty Blackbird. Wolverine and Grizzly Bear are additional species of conservation concern that may be found in the area. Beaver food caches and some lodges were noted along the shoreline at the eastern end of Mayo Lake (Roop and Nelson Arms). The Roop Lakes area was not included in the terrestrial survey work.

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ACKNOWLEDGEMENTS

Numerous individuals contributed to the completion of this project. Travis Ritchie and Hector Campbell, Yukon Energy Corp., provided direction, advice, data and logistical support. Patrick Bowman and Nancy LeBlond, Intergroup Consultants Ltd. helped manage the larger project and provided direction and advice. The project was completed in the Na-Cho Nyak Dun Traditional Territory. The Lands Branch provided advice and feedback with various components of the project.

Michael Setterington was the Project Manager, chief editor and prepared many sections of the report. The following identifies the remaining team members and their contributions:

Matt Power.....Habitat and Rare Plant Surveys, GIS database, Mapping

Ben Schonewille .....Waterfowl and Waterbird Surveys, Incidental Observation Summaries

Jake Duncan.....Field Technician

Darrell Lucas, Na-Cho Nyak Dun .....Field Technician

1 INTRODUCTION

The existing hydroelectric facility in Mayo Yukon supplied the loads of both the Keno mine and the community of Mayo from 1951 until the mine closed in 1988/1989. During that period, the plant typically operated at full capacity, and the storage range at Mayo Lake was largely used each year. After the closure of the mine and up until the Mayo-Dawson power transmission line was energized in 2003, the plant generated power only for local loads in Mayo and Keno. Since the Mayo-Dawson transmission line went into service, the plant has also provided power to Dawson and Stewart Crossing. The Mayo hydroelectric facility continues to operate below its full capability. The existing plant has an annual generation capability of approximately 40 gigawatt hours (GWh) each year. The Mayo facility is expected to return to operating to its full potential as load demand grows and new mines go into production, including using the full range of Mayo Lake storage.

To address the increasing demands for electricity in the Yukon, and to decrease the use of diesel to generate that electricity, Yukon Energy Corporation (YEC) has prioritized increasing the use of renewable energy through enhancements to existing hydro facilities. As such, YEC is looking at enhancing the existing Mayo hydro facilities via the Mayo B project. The proposed project approximately doubles the amount of energy that can be generated from the Mayo River. It involves construction of a new powerhouse about three kilometres downstream from the existing powerhouse, and enhancing the storage capacity of Mayo Lake by drawing the water level down an additional one metre (*i.e.*, from the current 2.59 metres to 3.59 metres). Drawdown would occur mostly in the winter to accommodate winter power requirements. Conveyance of water from Wareham Lake to the new powerhouse would be by either a tunnel, or combination of buried penstock and surface canal. Other terrestrial components of the project would be limited to a new all-weather access road to the new powerhouse, clearing for a power transmission line to the new powerhouse, stockpiling of waste rock (tunnel option), and construction of a temporary work camp for 50–75 people (maximum) for up to two years.

EDI Environmental Dynamics was retained by YEC to conduct terrestrial, aquatic and fish studies to support planning and effects assessment of the proposed Mayo B project. This report summarizes information collected for the terrestrial wildlife component of the proposed Mayo B project study and impact assessment. It identifies species of concern, the process used to assess their status in the project area, and identification of probable conflicts between the proposed Mayo B project and species and habitats of concern in the project area.

2 STATE OF KNOWLEDGE

There is little published information on the terrestrial wildlife ecology of the project area. There are general descriptions of the biophysical ecology of the Mayo area (*e.g.*, Smith et al 2004), and a generalized description of the natural history of the area (*e.g.*, Bleiler et al 2006) but there is little information available for the area specific to the project. Some of the project area is included within a Breeding Bird Survey route conducted on an annual basis (M. O'Donoghue, pers. comm. 2008), and the area falls within a fairly regular but broad moose survey (*e.g.*, Ward et al 2006), but there has been little need for site-specific surveys within the relatively small footprint of the project. The Yukon Government's Wildlife Key Area database identified same raptor areas along the lower Mayo River and the Roop Lakes area off of the north arm of Mayo Lake (Yukon Department of Environment 2007). Fish and aquatic resources were assessed in an accompanying study and report completed by EDI.

2.1 ECOLOGICAL SETTING

The Mayo River watershed lies within the Yukon Plateau – North ecoregion of the Boreal Cordillera Ecozone of central Yukon. This ecoregion is characterized by a network of plateaus divided by a series of wide, deeply cut valleys (Smith et al. 2006). The climate of the region exhibits a high degree of seasonal variability to average January temperatures being in the range of -20°C to an average summer temperature of 15°C. The amount of precipitation is moderate, with areas of higher elevation receiving greater amounts of both rainfall and snowfall.

The ecoregion lies within the Interior Hydrologic Region of the Yukon. Mayo Lake is the largest lake within the region, with numerous intermediate and smaller sized lakes present. Extensive wetlands areas associated with the lower portion of large river valleys, such as the Stewart River valley. Annual stream flow within the region is characterized by rapid snowmelt during the spring and smaller spikes in flow throughout the summer as determined by frequency and intensity of rainfall events. Many of the small streams within the region receive a substantial portion of their stream flow from high intensity rainfall events during the summer months. Conversely, many of these smaller streams may have zero flow during February or March when the region experiences base flows.

The ecoregion lies within a zone of discontinuous permafrost where frozen soil conditions are influenced by a number of site specific characteristics. In the northern part of the region near Mayo, permafrost thicknesses of up to 40 m have been recorded in valley bottoms (Smith et al. 2006).

Typical northern boreal forest is present at elevations up to approximately 1,500 m with shrubs and lichen dominating in alpine areas (Smith et al. 2006). Extensive shrub lands are present at mid elevations and in valley bottoms due to cold air drainage. The most common forest type is comprised of open black spruce with a moist feathermoss understory or a drier understory

comprised of lichens. On warmer and better drained sites, white spruce (*Picea glauca*) and occasionally aspen (*Populus tremuloides*) or lodegpole pine (*Pinus contorta*) are present. White birch (*Betula papyrifera*) is found scattered throughout the region and is usually found in cooler locations. Due to the high frequency of thunderstorms within the region, forest fires are frequent and result in mixed canopy forests. The high incidence of fires often results in extensive stands of lodegpole pine and occasionally aspen. Steep, south facing slopes along the large rivers (including the Stewart River) within the ecoregion are inhabited by grassland communities which are remnants of the last glacial period.

2.2 HABITAT AND RARE PLANTS

The Mayo area has been fairly well explored for plants when compared to other less accessible areas of the Yukon (O'Donoghue 2006a). However, there are no known site-specific rare plants or other vegetation-based surveys in the project area. There are no existing habitat-type maps for the project area. Existing forest cover maps were unreliably typed, un-verified and potentially dated.

A list of potential plants that are either rare, of conservation concern (*e.g.*, potentially threatened or threatened habitats), or otherwise indicators of the presence of some of the rare plants was compiled based on *Flora of the Yukon Territory* (Cody 2000) and in consultation with Jennifer Line, Botanist and Bruce Bennett, Wildlife Viewing Biologist[1], Government of Yukon (Bennett, pers. comm. 2008, Table 1). There are 17 plants that are of potential conservation concern, and due to their generally infrequent observations, their occurrence, habitat requirements and general ecology in the Mayo region are not fully understood.

2.3 TERRESTRIAL WILDLIFE

Within the Mayo region, the Yukon's typical boreal forest mammals such as moose (*Alces alces*), woodland caribou, thinhorn sheep (*Ovis dalli*), grizzly bear and black bear (*Ursus americanus*) can be found in addition to a number of small mammal species. A variety of waterbirds, waterfowl and raptors breed within and migrate through the region. Songbirds are also quite common within the region with a number of species including Common Nighthawk, Hermit Thrush (*Catharus guttatus*) and Townsend's Warbler (*Dendroica townsendi*) reaching the northern extent of their breeding range within the ecoregion.

[1] Bruce Bennett is a recognized Yukon Government authority on vascular plants in the territory. The Yukon Government does not have a full-time botanist on staff.

Table 1. Vascular plants that are Rare or potential conservation concern in the Mayo region (Source: Bruce Bennett, Yukon Government[2]).

Family	Species	Common name	Habitat
INDICATORS OF HABITATS CONTAINING RARITIES			
Juncaceae	*Juncus stygius*	Moor Rush	Woodland bogs/seepage
Liliaceae	*Tofieldia glutinosa*	False Asphodel	Seepages/lakeshores
Potamogetonaceae	*Potamogeton zosteriformis*	Flat-stemmed pondweed	Aquatic: lakes >2m deep
RARE SPECIES			
Apiaceae	*Angelica lucida*	Wild celery	Subalpine meadows
Apiaceae	*Sium suave*	Water parsnip	Muddy shores
Asteraceae	*Antennaria media*	Dark Pussytoes	Rocky alpine tundra
Asteraceae	*Antennaria microphylla*	Littleleaf Pussytoes	Floodplains/alkaline basins
Caryophyllaceae	*Arenaria longipedunculata*	Longstem Sandwort	Moist subalpine gravel
Ceratophyllaceae	*Ceratophyllum demersum*	Hornwort	Aquatic: small lakes
Cyperaceae	*Carex lasiocarpa*	Slender Sedge	Peat bogs/ponds
Dryopteridaceae	*Woodsia ilvensis*	Oblong Woodsia	Sunny exposed cliffs
Fabaceae	*Astragalus robinsii*	Ribbins' Milkvetch	Stream banks/open woods
Fabaceae	*Lathyrus japonicus*	Beach pea	Sheltered riparian edges
Ophioglossaceae	*Botrychium multifidum*	Adder's Tongue	Prairie/Meadow
Poaceae	*Koelaeria macrantha*	Junegrass	Dry prairie/open woods
Polygonaceae	*Koenigia islandica*	Island Purslane	Damp stony / high elevation
Primulaceae	*Dodecatheon pulchellum*	Darkthroat Shootingstar	Wet meadows
Primulaceae	*Trientalis borealis*	Starflower	Moist woods
Salicaceae	*Salix farriae*	Farr's Willow	Wetland
Salicaceae	*Salix pedicellaris*	Bog Willow	Wetland
Salicaceae	*Salix pyrifolia*	Balsam Willow	Prairie/meadow/lakeshore
Scheuchzeriaceae	*Scheuchzeria palustris*		Bogs/sphagnum
Typhaceae	*Typha latifolia*	Cattail	Shallow water/marsh
POTENTIAL CONSERVATION CONCERN			
Asplenaceae	*Asplenium trichomanes-ramosum*	Spleenwort	Talus / limestone crevices
Asteraceae	*Haplopappus macleanii*	Brandegee	Stony/shaly slopes
Cyperaceae	*Carex lapponica*		Wet woodland meadows and bogs
Cyperaceae	*Carex laxa*	Weak sedge	Wet meadows and marshes
Cyperaceae	*Carex heleonastes*		
Cyperaceae	*Carex marina*		Wet bogs
Cyperaceae	*Carex oligosperma*		
Ophioglossaceae	*Botrychium alaskense*		
Ophoiglossaceae	*Potamogeton strictifolius*	Narrow-leaved pondweed	
Ophoiglossaceae	*Potamogeton subsibiricus*		Shallow water
Orchidaceae	*Cypripedium guttatum*	Spotted lady's slipper	Open mossy woods / calcareous soils
Orchidaceae	*Malaxis paludosa*	Bog Adder's-mouth	Sphagnum in black spruce muskeg
Poaceae	*Koelaria asiatica*		Dry/moist tundra
Poaceae	*Puccinellia hauptiana*	Spreading alkali grass	
Poaceae	*Scolochloa festucacea*	Sprangletop	Shallow water / marshes
Polypodiaceae	*Polypodium sibiricum*	Siberian Polypody	
Pteridaceae	*Cryptogramma stelleri*	Fragile Rockbrake	Moist wooded slopes/rock outcrops

[2] The Yukon Government does not maintain an "official" list of rare and threatened plant species. This list is a compilation of plants that are known to be rare or may be an indicator of particular habitat types.

There are several terrestrial wildlife species of conservation concern that may be found within the proposed project area. The species of concern are considered at some level of risk as determined by a formal assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or by a broader generalized assessment as part of the national General Status Assessment (CESCC 2006). There are 26 listed species, eight of which are listed by COSEWIC primarily due to information on declining populations at the national scale (Table 2).

Of the listed birds, there are several General Status "Sensitive" waterbird and waterfowl species, based on early indications of population declines, but have yet to be formally assessed by COSEWIC. American Kestrel is listed as "May Be At Risk" due to declining numbers of birds observed using nest boxes in the Yukon (S. Cannings, pers. comm. 2008). Several other raptors (i.e., hawks, owls, falcons) are included in the General Status list because of relatively infrequent occurrence in parts of the Yukon or potential population declines. Peregrine Falcons nest on cliffs, usually near water, conditions which exist in the proposed project area along the lower sections of the Mayo River. Short-eared Owl is most commonly found in open alpine or arctic tundra, but may nest in open wetlands at lower elevations (Sinclair et al. 2003). Short-eared owls are generally not expected to be found nesting in the proposed project area, and its occurrence was not recorded in the Birds of the Yukon database (Canadian Wildlife Service 2008). Common Nighthawk commonly nests in open forest cover types such as lodgepole pine (*Pinus contorta*), old burned areas, and open mixed forests (Sinclair et al. 2003) — habitats that are not generally found in the proposed project area. There were four Common Nighthawk records in the Mayo area in the Birds of the Yukon database (Canadian Wildlife Service 2008), and they are observed regularly during the breeding season (O'Donoghue 2006c, M. O'Donoghue, pers. comm. 2009). Olive-sided Flycatchers occur in black and white spruce, lodgepole pine and mixed forests often at the edges of wetlands perching or singing from dead trees (Sinclair et al. 2003) — habitat conditions that may exist in the proposed project area. There were no Olive-sided Flycatcher records in the Birds of the Yukon database (Canadian Wildlife Service 2008), but there was one record on the Mayo Landing BBS route (O'Donoghue pers. comm. 2008; USGS 2009), several point of which are located within the project area. Rusty Blackbird breeds in wetlands along the edges of ponds or lakes with dense grasses, shrubs, and scattered dead trees (Sinclair et al. 2003). There were two Rusty Blackbird records in the Birds of the Yukon database (Canadian Wildlife Service, 2008), two individuals were recorded once (2004) on the Mayo Landing BBS route (O'Donoghue pers. comm. 2008; USGS 2009), and they are considered as regular occurrences in the Mayo area (Appendix of O'Donoghue 2006c).

Of the listed mammals, mule deer in the region are found along the Silver Trail from Wareham Lake to Stewart Crossing and prefer open south-facing bluffs and open areas such as the Mayo airport (O'Donoghue 2006d). Their limited numbers in the Yukon at the northern extent of their range are some of the reasons for a General Status rank of "Sensitive," but there is generally no local concern for the species in the region (O'Donoghue pers. comm. 2008). White-tailed deer are uncommon in the Mayo area, and a resident population in the area is unlikely (O'Donoghue 2006d). Caribou may be found in the area, but the range of the Ethel Lake caribou herd is recognized as being south of

the Stewart River, and the Clear Creek herd as north and west of the McQuesten River (O'Donoghue 2006d).

Grizzly bear are common in the Mayo area, but generally den at higher altitude south-facing slopes. Wolverine may be in the area but are seldom seen. Both wolverine and grizzly bear have very large home ranges, and if the project area is included within the range of individuals of either species, it is expected to comprise only a small portion of those ranges. Both species are unlikely to be seen on a regular basis close to an urban area, but may occur infrequently in or near the proposed project area.

Additional to the species of conservation concern, community members identified moose and beaver (*Castor canadensis*) as species of local interest because of their value for meat and fur. Because the project could have indirect impacts on moose (*e.g.*, potential changes to wetland foraging habitats, effects on movement corridors), and direct impacts on beaver (*e.g.*, changing water levels in winter at beaver lodges), both species were considered for the terrestrial assessment. While previous surveys for moose were noted above, there is no known inventory of beaver in the Mayo area (M. O'Donoghue and T. Jung, Yukon Environment, pers. comm. 2008).

The Yukon Government's Wildlife Key Areas Database (2007) identifies two key wildlife areas within the project footprint, both of which were identified as raptor areas (Figure 1). Along the Mayo River from the Stewart River to approximately 6 km upstream of Wareham Lake there is a key area for unspecified raptors (WKA ID 2726). The second key area is identified as summer nesting for Bald Eagle, and is located at the eastern end of Roop Arm on Mayo Lake (WKA ID 2734).

The Yukon Government Fish and Wildlife Branch has monitored moose populations in the Mayo area since the mid 1970s (Ward et al 2006). The 2006 survey was conducted in mid-November when moose are at higher elevation areas in subalpine willow flats and creek draws with abundant willows (Ward et al 2006), so in November it is not unexpected that moose density is low to very low in the low-lying project area. Later in winter, moose are likely to move to forested lowlands and lower-elevation slopes that are more characteristic of the study area.

In late June and early September 1998, Mossop and Sinnott (1998) conducted a waterfowl survey of wetlands in the Mayo area. Wetlands to be surveyed were identified by aerial reconnaissance surveys and by interviews with local elders. They identified the Roop Lake area as "an early candidate for planning attention" because parts of the area were seen to be under the influence of the managed water regime of Mayo Lake. A number of species were observed, the majority of which were Scaup, Mallard (*Anas platyrhynchos*), Northern Pintail and American Wigeon. They determined that Roop Lakes diversity and ecological importance relative to the wetlands in the Mayo area was medium-high, with other wetlands such as Frog Ponds, Horseshoe Slough and McQuesten wetlands as very high.

Table 2. Terrestrial wildlife species of potential conservation concern that may be found in the Mayo B study area.

Common name	Scientific name	General Status[1]	COSEWIC status
BIRDS			
Common Loon	*Gavia immer*	Sensitive	
Trumpeter Swan	*Cygnus buccinator*	Sensitive	
Northern Pintail	*Anas acuta*	Sensitive	
American Wigeon	*Anas americana*	Sensitive	
Lesser Scaup	*Aythya affinis*	Sensitive	
Harlequin Duck	*Histrionicus histrionicus*	Sensitive	
Surf Scoter	*Melanitta perspicillata*	Sensitive	
White-winged Scoter	*Melanitta fusca*	Sensitive	
Osprey	*Pandion haliaetus*	Sensitive	
Golden Eagle	*Aquila chrysaetos*	Sensitive	
American Kestrel	*Falco sparverius*	May Be At Risk	
Peregrine Falcon	*Falco peregrinus*	Sensitive	Special Concern
American Golden-Plover	*Pluvialis dominica*	Sensitive	
Lesser Yellowlegs	*Tringa flavipes*	Sensitive	
Semipalmated Sandpiper	*Calidris pusilla*	Sensitive	
Great Gray Owl	*Strix nebulosa*	Sensitive	
Short-eared Owl	*Asio flammeus*	Sensitive	Special Concern
Common Nighthawk	*Chordeiles minor*	Secure	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Sensitive	Threatened
Northern Shrike	*Lanius excubitor*	Sensitive	
Rusty Blackbird	*Euphagus carolinus*	Sensitive	Special Concern
MAMMALS			
Mule Deer	*Odocoileus hemionus*	Sensitive	
White-tailed Deer	*Odocoileus virginianus*	May Be At Risk	
Caribou	*Rangifer tarandus*	Sensitive	Special Concern
Wolverine	*Gulo gulo*	Sensitive	Special Concern
Grizzly Bear	*Ursus arctos*	Sensitive	Special Concern

[1]General Status Ranks (Canadian Endangered Species Conservation Council 2006): May Be at Risk — May be at risk of extirpation or extinction and are therefore candidates for a detailed assessment; Sensitive — Species not believed to be at risk of immediate extirpation or extinction but may require special attention to prevent becoming at risk; Secure — Species not believed to be extirpated, extinct, at risk, may be at risk or sensitive. May include declining species which are widespread.

3 TERRESTRIAL STUDIES

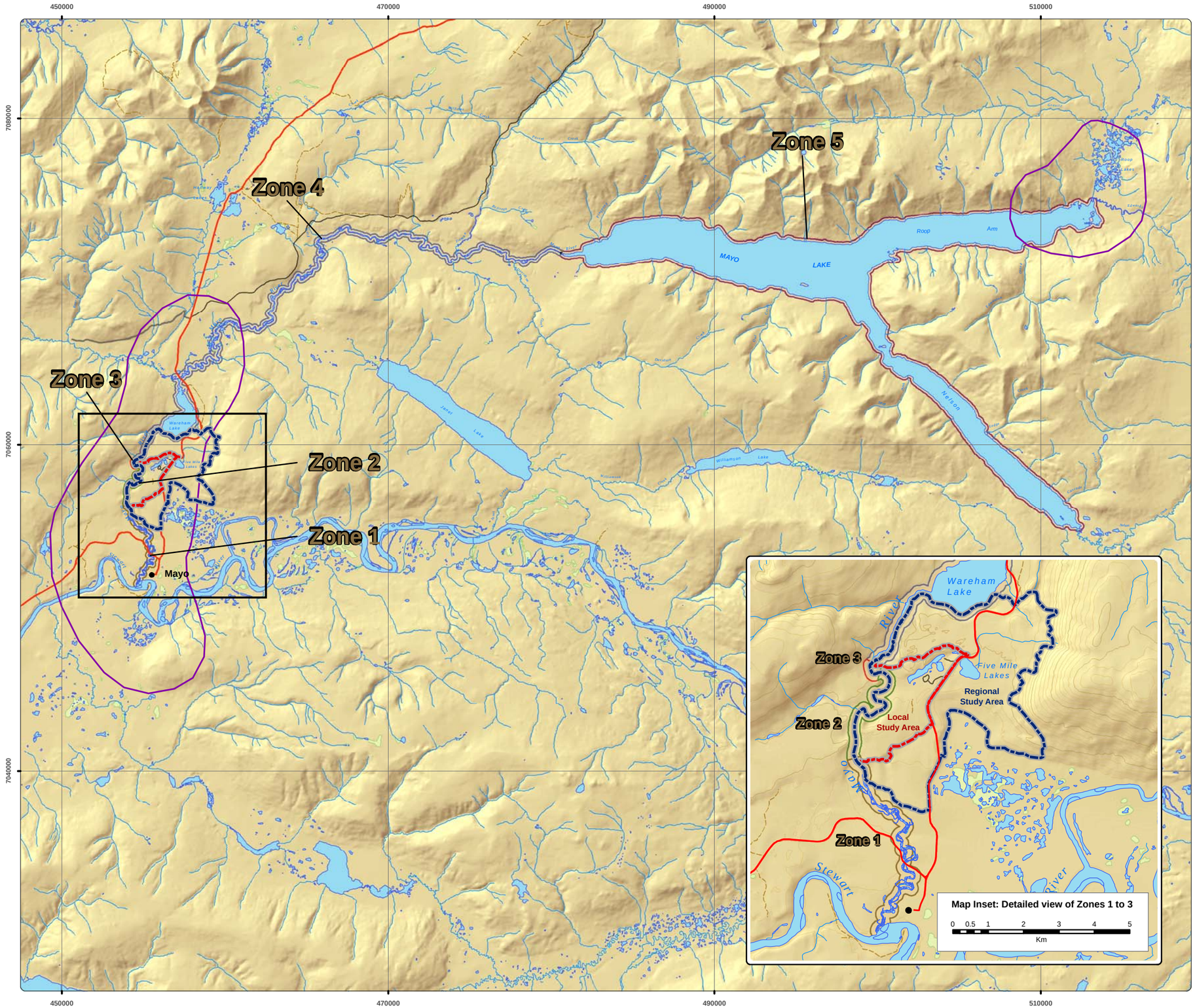
To supplement available and to provide project-specific information on terrestrial wildlife and vegetation in the Mayo-B project area, terrestrial field surveys were conducted in the summer of 2008. The surveys focused on terrestrial components most likely to be affected by the project including effects on waterbirds and waterfowl, raptor nests, terrestrial habitat, and rare plants. The forest cover/habitat mapping was conducted in an area surrounding the proposed footprint options of the project, and the wildlife surveys focused on the aquatic/terrestrial overlap with the project (below Wareham dam to the proposed new powerhouse), the upper Mayo River (above Wareham dam) and Mayo Lake, with an investigation of adjacent areas for comparative purposes. The purpose of the rare plant survey was to determine the presence and map the location of indicator, rare, and plants of conservation concern (Table 1) so that the subsequent assessment exercise could consider the potential for significant adverse effects to accrue to this environmental component.

Waterfowl were a focus of the wildlife surveys because of the potential for the project to have direct effects on nesting and foraging habitats, particularly in early spring as birds arrive in breeding areas. Particular importance was on waterfowl that forage and nest along shallow shoreline habitat (*e.g.*, the puddle ducks). Raptor nests were also identified as a focal species for inventory because of the Key Wildlife Areas identified within the region.

3.1 STUDY AREA

The study areas were defined by the aquatic and terrestrial ecosystems most likely to be directly impacted by the proposed Project. The *Waterfowl and Raptor Nest Study Area* included the Mayo River and shoreline from where it meets the Stewart River, upstream to the upper reaches of Mayo Lake including the Roop Lakes and Nelson Creek areas (Figure 1). The area was split into five zones for separate study, related mostly to aquatic studies. Zone 1 includes the area from the confluence of the Mayo River with the Stewart River upstream to the location of the proposed new powerhouse. Zone 2 is the area between the proposed new powerhouse and the existing powerhouse. Zone 3 is the area from the existing powerhouse to the dam on Wareham Lake. Zone 4 is from Wareham Lake to the Mayo Lake control structure, and Zone 5 includes all of Mayo Lake.

Specific for the terrestrial investigation, the *Terrestrial Local Study Area* (LSA) included ~489 hectares encompassing all construction-based project activities including three conveyance options (open channel, penstock, and tunnel routes), proposed access trails, transmission line right-of-way, and the new powerhouse location (Figure 2). The *Terrestrial Regional Study Area* (RSA) was an expansion to the east and south of the LSA, limited by elevation gradients to the east, and to the south by the Mayo airport and the community (~ 1511 hectares, Figure 2). The terrestrial wildlife RSA did not include wetland areas north of the Mayo airport because those habitats were not comparable to that which could be disturbed by the proposed project.



Legend

Aquatic Zone Classification

- .....Zone 1- Downstream of New Powerhouse
- .....Zone 2 - Between Existing to New Powerhouse
- .....Zone 3 - Spillway to Existing Powerhouse
- .....Zone 4 - Wareham Lake to Mayo Lake
- .....Zone 5 - Mayo Lake

- .....Wildlife Key Areas

Topographic Features

- .....Silver Trail
- .....Secondary Road
- .....Watercourse
- .....Contours
- .....Village of Mayo
- .....Wetlands
- .....Waterbody

0 2.5 5 10 15
Kilometres

Drawn By: M. Power
Checked By: M. Setterington
Date: 24 February 2009

Projection: NAD 1983 UTM Zone 8
EDI Project #: 08-YC-0037

N

Digital Data Sources:

1:50,000 Topographic Spatial Data: Canvec and National Topographic Database (NTDB) Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved. Data obtained October 2008.

Revisions to the 1:50,000 Canvec (Waterbody) were made using aerial photography from 1996 (YG) and 2008 (YEC).

Digital Elevation Model of the Mayo region provided by Geomatics - Yukon Government; acquired Summer 2008

Yukon Department of Environment (May 31, 2007). Yukon Wildlife Key Area Inventory. Digital database and software produced by Habitat and Regional Management Section, Fish and Wildlife Branch, Department of Environment Government of Yukon, Whitehorse.

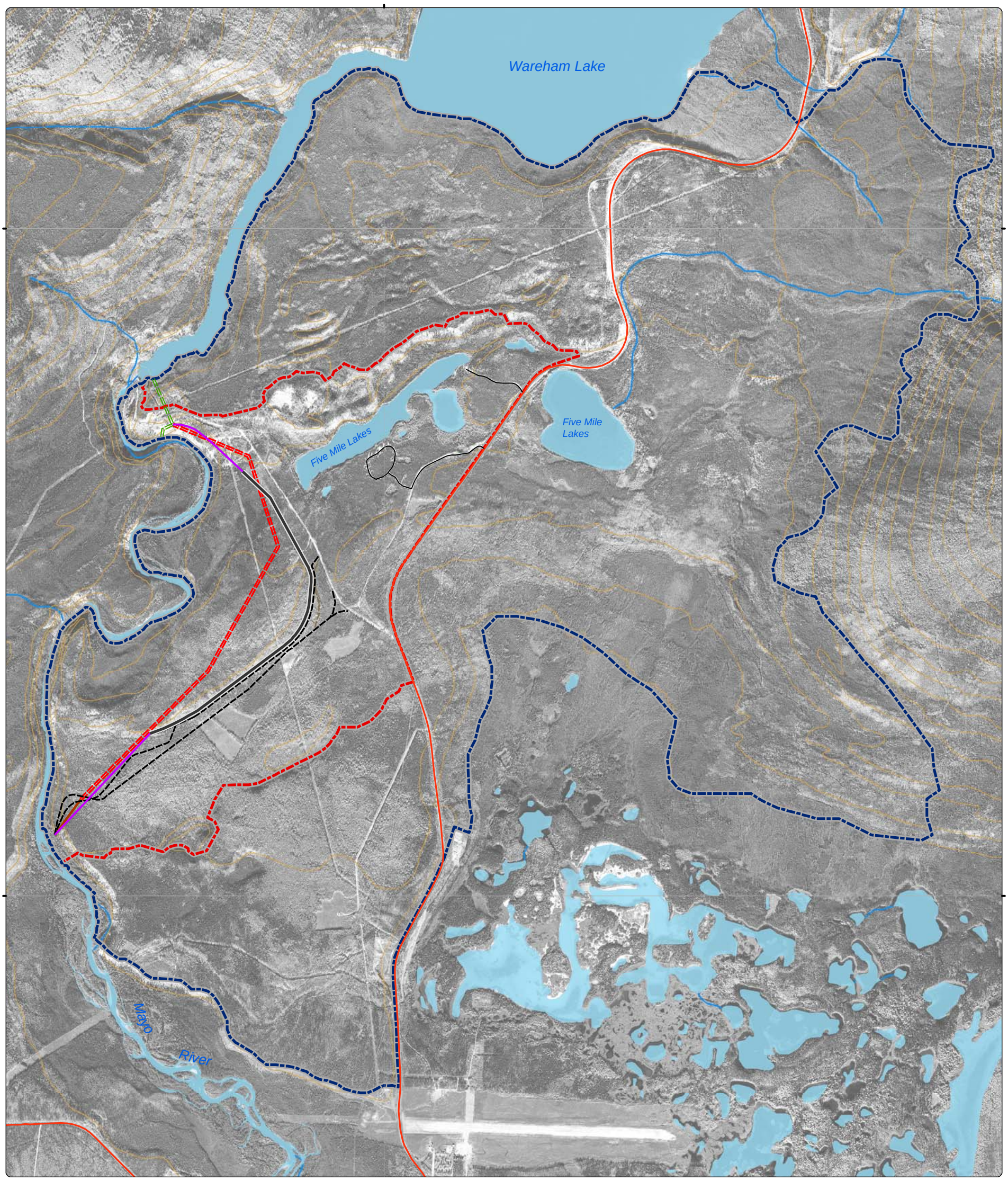
Disclaimer:

This document is not an official land survey and is presented without prejudice. The spatial data presented on the map is subject to change without any notice.

Figure 1:
Overview Map of Terrestrial Study Area

Prepared for: YUKON ENERGY

Prepared by: EDI ENVIRONMENTAL DYNAMICS INC.



Legend

Terrestrial Study - Site Specifics

- .....Regional Study Area
- .....Local Study Area

Proposed Infrastructure

Option 1 - Canal

- .....Canal
- .....Penstock
- .....Access Road

Option 2 - Tunnel

- .....Proposed Tunnel
- .....Existing Tunnel
- .....Penstock
- .....Access Road

Topographic Features

- .....Roads
- .....Contours
- .....Watercourse
- .....Village of Mayo
- .....Wetlands
- .....Waterbody

Map Scale: 0 125 250 500 750 1,000
Metres

Drawn By/Data Input:	M. Power
Checked By:	M. Setterington
Date:	24 February 2009
Projection:	NAD 1983 UTM Zone 8
EDI Project #:	08-YC-0037

N

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Revisions to the 1:50,000 Canvec (Waterbody) were made using aerial photography from 1996 (YG) and 2008 (YEC).

Digital Elevation Model and orthophto (1996) of the Mayo region provided by Geomatics Yukon Government; acquired Summer 2008

Proposed new development data provided by KGS (January 27, 2008). This data is not finalized and is considered an unofficial rendering.

Disclaimer:

This document is not an official land survey and is presented without prejudice. The spatial data presented on the map is subject to change without any notice.

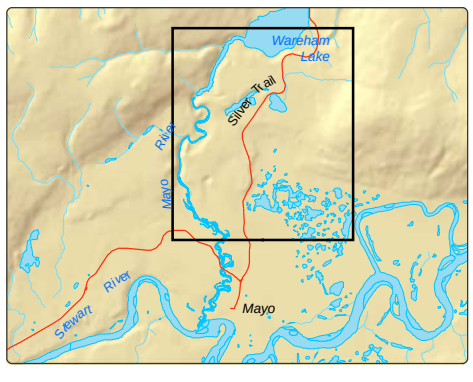

Figure 2. Terrestrial Local and Regional Study Areas

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3.2 METHODS

3.2.1 HABITAT AND RARE PLANTS

Terrestrial habitat mapping and rare plant surveys were conducted concurrently on August 20–23, 2008. Prior to fieldwork, preliminary forest cover/habitat maps were developed using existing digital forest cover data (Yukon Government EMR, no date, accessed July 2008) with corrections based on available and recent orthophotographs. To quantify vegetation characteristics, twelve (12) 5 m x 5 m plots were sampled in a variety of representative areas distributed throughout the LSA and RSA. The plots were selected to represent the vegetation cover classes distributed throughout the LSA and RSA. Information collected included tree species and heights, ground vegetation characteristics and crown closure. Photographs were used to document vegetation and other features of interest. Indications of animal presence were also recorded. An aerial (Bell 206B Jet Ranger) reconnaissance flight of the RSA was used to confirm cover type delineation on August 23rd.

Searching for listed plants occurred during the ground work that confirmed forest cover/habitat types. Aside from continual scanning of ground vegetation for the listed species, there were focused searches in areas that provided the most likely habitats for listed plants (Table 1), especially those areas that were within the proposed footprint of the development within the LSA. Searching comprised wandering transects in potential habitats while field personnel continually scanned and identified all species while walking the transects. Eight sites were investigated. Three of the sites were dry south-facing slopes, two were in a cleared field, two were at wetland/shoreline habitats, and one was in a wetland draw-type habitat (Figure 2). Approximately 0.5–0.75 hours were investigated per site. Plants that were not readily identified in the field were either photodocumented for lab identification, or where sufficient quantities of the plant existed, samples were collected. Where the plants could not be confirmed by the project botanist, photographs were distributed to local botanists for identification. Location coordinates were recorded using a handheld GPS unit.

3.2.2 WILDLIFE

A waterfowl brood and raptor nest survey was conducted on July 21–25, 2008. An overview survey of the broad study area was conducted by helicopter (Bell 206B Jet Ranger) flying ~150m above ground level and covered the entire perimeter of the Mayo River from the confluence with the Stewart River, Wareham Lake, and Mayo Lake, and portions of the terrestrial LSA. Observers were in the front left and right rear of the helicopter recording all wildlife and significant habitat observations.

The upper Mayo River was surveyed by boat on July 22–25 with stops to observe side channels and adjoining wetlands using a spotting scope and other means of visual observations. Incidental observations of all terrestrial wildlife and wildlife features were recorded on an opportunistic basis by field crew during the entire time on site (July–October 2008) while conducting aquatic-related work. All wildlife observations

were documented and coordinates were recorded using a handheld GPS unit and key sightings and habitat features were photodocumented when required and pertinent details recorded. Incidental observation of beaver activity was supplemented by video analysis of the Mayo Lake shoreline to determine locations of food caches and lodges.

3.3 RESULTS AND DISCUSSION

3.3.1 HABITAT AND RARE PLANTS

The terrestrial local and regional study areas are comprised of pure and mixed stands of trembling aspen, paper birch, and black and white spruce. The predominant cover was black spruce (60–90 years old), stands of mixed aspen/spruce or birch/spruce, and stands of mixed white and black spruce (Table 3, Figure 3). The northern and northwestern sections were primarily composed of pure and mixed stands of black spruce, and small pockets of black spruce were found in areas close to the Mayo River. Black spruce appeared to be associated with upland sites or wetter draws throughout the region. The terrain undulated in much of the northern area (south of and adjacent to Wareham Lake). Groundcover consisted of a thick layer of feathermoss/stepmosses (*e.g.*, *Pleurozium schreberi* and *Hylocomium splendens*), and Bastard toad-flax (*Geocaulon lividum*) and soapberry (*Shepherdia canadensis*) also occurred in most areas. White spruce was found throughout the region and was commonly associated with dry, upland sites, prevalent in the southern portions of the LSA and RSA. Large stems of white spruce were encountered east of the Silver Trail. Narrow bands of white spruce were found along the crests of south facing slopes. In general, the more mature white spruce stands occurred in the southern section of the RSA. Trembling aspen and white birch were prevalent in the southern sections of the RSA and was associated with south facing slopes. Large aspen stems were found throughout this area and mixed with both birch and white spruce. White birch was found in proximity to the proposed new powerhouse. Birch was generally scattered in low densities mixed with the other tree species. In general, the southern section was mixed-wood consisting mostly of aspen, white spruce or birch as a dominant species (Figure 3). Ground cover in these deciduous stands consisted mainly of arctic lupine (*Lupinus arcticus*), rose (*Rosa acicularis*), and moss species. Leaf litter was substantial in the birch stands. Productivity (an index of site productivity for tree growth) ranges from poor to medium, with about 52% of the area rated medium, and 37% rated poor to low productivity (the remainder unclassified or in disturbed areas).

The forest cover in the LSA was generally similar to what was found in the larger RSA. There was slightly greater representation of aspen/birch-leading stands mixed with spruce (119 ha, 24% of the LSA) versus what was found in the RSA (91 ha, 6%); and an absence of older white/black spruce-leading stands mixed with aspen/birch (17% of the RSA, absent in the LSA for black-spruce leading; 11% of the RSA, 2% of the LSA for white-spruce leading; Table 3).

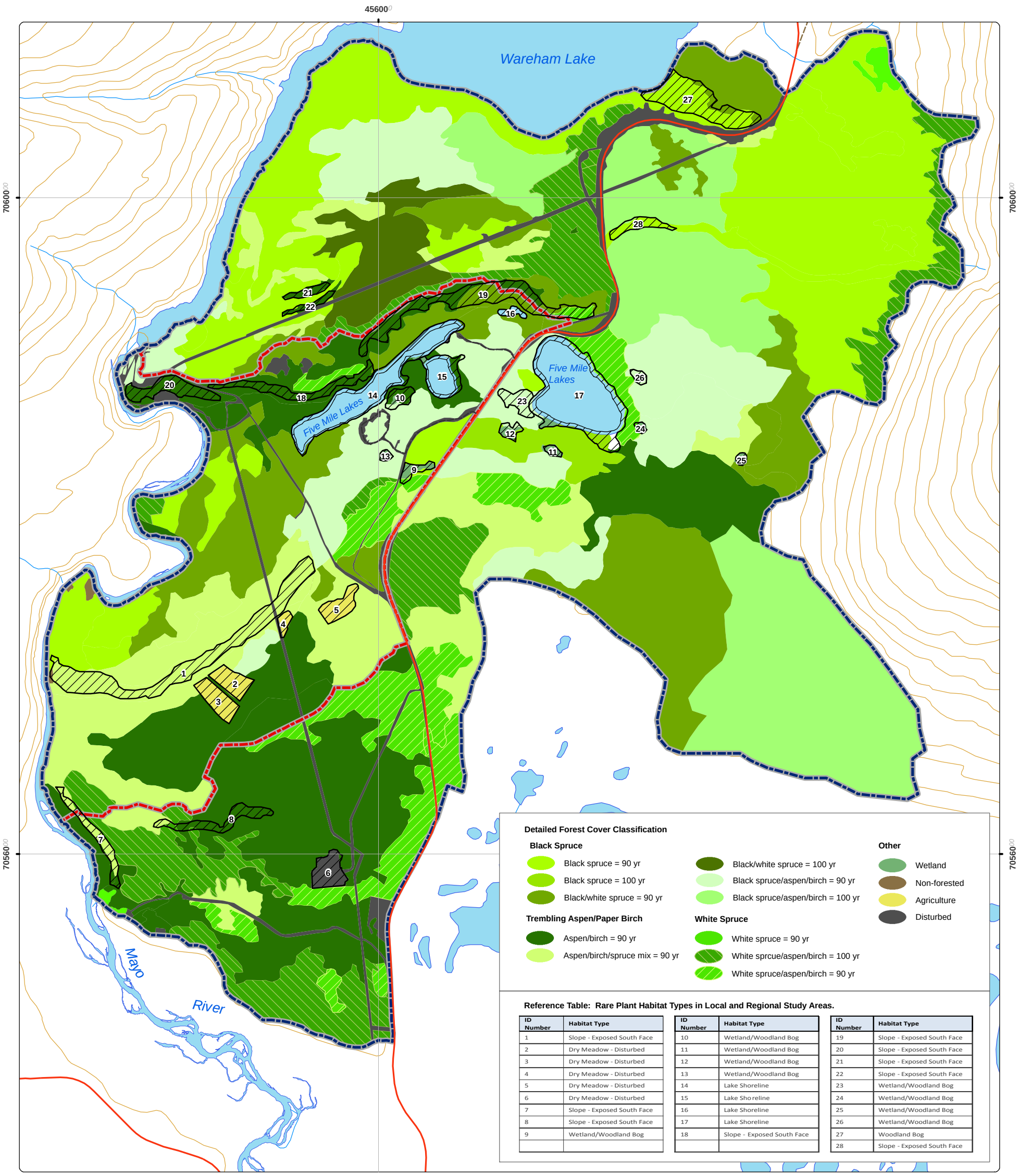
Table 3. The amount of general habitat types by broadly defined forest cover and non-vegetated areas in the Mayo-B terrestrial local (LSA) and regional (RSA) study area.

Leading species	Secondary species	Age	LSA ha (%)	RSA ha (%)	Total area ha (%)
Aspen and/or birch	Pure or mixed aspen/birch	≤ 90	111.9 (0.23)	196.0 (0.13)	307.9 (0.15)
	mixed black & white spruce	≤ 90	118.6 (0.24)	90.8 (0.06)	209.4 (0.10)
Black spruce	pure	≤ 90	43.3 (0.09)	303.4 (0.20)	346.7 (0.17)
		≥ 100		18.2 (0.01)	18.2 (0.01)
	white spruce mixed	≤ 90	87.2 (0.18)	152.8 (0.10)	240.1 (0.12)
		≥ 100		37.4 (0.02)	37.4 (0.02)
	mixed with aspen and birch	≤ 90	51.5 (0.11)	134.0 (0.09)	185.5 (0.09)
		≥ 100		252.8 (0.17)	252.8 (0.13)
White spruce	pure	≤ 90		5.2 (0)	5.2 (0)
	mixed with aspen & birch	≤ 90	13.0 (0.03)	88.5 (0.06)	101.5 (0.05)
		≥ 100	9.9 (0.02)	161.9 (0.11)	171.8 (0.09)
Non-forested (*e.g.*, rocky slope)			1.8 (0)		1.8 (0)
Waterbodies			20.1 (0.04)	22.4 (0.01)	42.5 (0.02)
Wetlands			1.7 (0)	2.4 (0)	4.1 (0)
Agriculture			9.5 (0.02)		9.5 (0)
Disturbed (roads, trails, mining)			20.2 (0.04)	44.8 (0.03)	65.0 (0.03)
Total area (ha)			**488.7**	**1510.6**	**1999.3**

Forest Cover/Habitat Descriptions by Leading Tree Species

Trembling Aspen — Stands of almost pure trembling aspen (≥ 80% leading species) were typically 12–16 m tall with a mean height of approximately 15 m, and a mean crown closure of approximately 75%. White spruce was sparsely distributed in portions of this stand type (Figure 4). No trembling aspen were aged because suitable cores could not be collected. Groundcover in these stands consisted of a significant shrub layer of soapberry approximately 0.5 m high, with significant abundances of rose and arctic lupine (Figure 5). Establishment of smaller forbs was limited by the significant leaf litter on the forest floor, but some hardier species were found, including lowbush cranberry (*Vaccinium vitis-idaea*) and some various species of mushroom. Some willow (*Salix* sp.) was also present.

White Birch — A white birch stand was located in the southwest section of the RSA. This birch stand had an approximate mean height of 16 m and a crown closure of approximately 80%. There were minor occurrences of white spruce and trembling aspen within the stand (Figure 6). The shrub layer consisted of soapberry and rose (0.5 m). Groundcover consisted of feathermoss, arctic lupine and various grasses. Due to the substantial amount of leaf litter on the forest floor, forbs were not abundant and occurred in clusters (Figure 7).



Detailed Forest Cover Classification

Black Spruce

- Black spruce = 90 yr
- Black spruce = 100 yr
- Black/white spruce = 90 yr
- Black/white spruce = 100 yr
- Black spruce/aspen/birch = 90 yr
- Black spruce/aspen/birch = 100 yr

Trembling Aspen/Paper Birch

- Aspen/birch = 90 yr
- Aspen/birch/spruce mix = 90 yr

White Spruce

- White spruce = 90 yr
- White sprcue/aspen/birch = 100 yr
- White spruce/aspen/birch = 90 yr

Other

- Wetland
- Non-forested
- Agriculture
- Disturbed

Reference Table: Rare Plant Habitat Types in Local and Regional Study Areas.

ID Number	Habitat Type
1	Slope - Exposed South Face
2	Dry Meadow - Disturbed
3	Dry Meadow - Disturbed
4	Dry Meadow - Disturbed
5	Dry Meadow - Disturbed
6	Dry Meadow - Disturbed
7	Slope - Exposed South Face
8	Slope - Exposed South Face
9	Wetland/Woodland Bog

ID Number	Habitat Type
10	Wetland/Woodland Bog
11	Wetland/Woodland Bog
12	Wetland/Woodland Bog
13	Wetland/Woodland Bog
14	Lake Shoreline
15	Lake Shoreline
16	Lake Shoreline
17	Lake Shoreline
18	Slope - Exposed South Face

ID Number	Habitat Type
19	Slope - Exposed South Face
20	Slope - Exposed South Face
21	Slope - Exposed South Face
22	Slope - Exposed South Face
23	Wetland/Woodland Bog
24	Wetland/Woodland Bog
25	Wetland/Woodland Bog
26	Wetland/Woodland Bog
27	Woodland Bog
28	Slope - Exposed South Face

Legend

Terrestrial Study - Site Specifics

- .....Local Study Area
- .....Regional Study Area
- .....Potential Rare Plant Habitat

Topographic Features

- .....Silver Trail
- .....Contours
- .....Watercourse
- .....Village of Mayo
- .....Wetlands
- .....Waterbody

Map Scale: 0 125 250 500 750 1,000 Metres

Drawn By: M. Power
Checked By: M. Setterington
Date: 24 February 09

Projection: NAD 1983 UTM Zone 8
EDI Project #: 08-YC-0037

N

Digital Data Sources:

1:50,000 Topographic Spatial Data: Canvec and National Topographic Database (NTDB) Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved. Data obtained October 2008.

Revisions to the 1:50,000 Canvec (Waterbody) were made using aerial photography from 1996 (YG) and 2008 (YEC).

Digital Elevation Model of the Mayo region provided by Geomatics - Yukon Government; acquired Summer 2008

Disclaimer:

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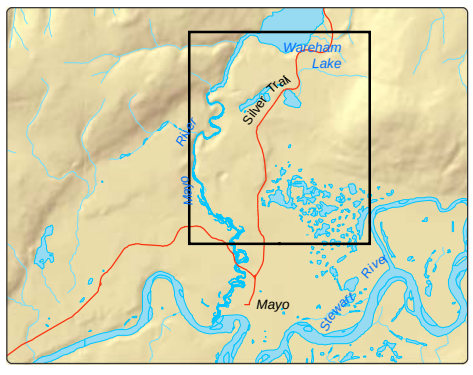


Figure 3. Regional Study Area Forest Cover & Potential Rare Plant Habitat

Prepared for: YUKON ENERGY

Prepared by: EDI ENVIRONMENTAL DYNAMICS INC. Natural Resource Consultants

Black Spruce — Black spruce dominated stands ranging in height from 2–15 m were found throughout the northern section of the LSA and RSA (Figure 8). Characteristics of the stands were site specific (*e.g.*, shorter stems were present in wet, lowland locations with low crown closure (*e.g.*, 5%) and taller stems were found in upland, drier sites with greater crown closure (*e.g.*, 40%). Predominant groundcover in all these stands included feathermoss/step moss, lichens, bastard toad-flax and Labrador tea (*Ledum groenlandicum*; Figure 9).

White Spruce — Most white spruce stands in the RSA were relatively small and showed some type of historical human disturbance. These stands ranged in height from 9–20 m with a mean height of 17 m. Crown closure varied with heights and ages of the stands encountered, but overall averaged 40% (older stands = 55% and younger stands = 30%). Ages ranged from 61–167 yrs (Figure 10). Groundcover consisted of a dense layer of feathermoss/step moss, and smaller portions of lowbush cranberry and bastard toad-flax (Figure 11).

For rare and indicator plants, several locations were searched for their presence, including cleared edges and clearings, wetlands and shorelines, and exposed and dry south-facing slopes (Figure 3). Several photographs were submitted to territorial authorities for assistance/confirmation of species identification. All were located in expected habitats, but all were excluded as potential listed species. There were no confirmed sightings of rare or indicator plants listed in Table 1.

Figure 4. Typical trembling aspen-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 5. Typical ground cover in the trembling aspen-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 6. Typical white birch-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 7. Typical ground cover in the white birch-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 8. Typical black spruce-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 9. Typical ground cover in the black spruce-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 10. Typical white spruce-dominated forest cover in the proposed Mayo-B project terrestrial study area.

Figure 11. Typical ground cover in the white spruce-dominated forest cover in the proposed Mayo-B project terrestrial study area.

3.3.2 WILDLIFE

One nest each of Osprey and Bald Eagle were located at the northern extent (above Wareham Lake) of Wildlife Key Area 2726. The Osprey nest was located during the waterfowl boat survey on July 22, and occupancy was determined by the presence of an agitated adult. The Bald Eagle nest was documented during the aerial survey on July 21 and had one nestling. Two other Osprey nests were observed in the upper Mayo River and on the north shoreline of Mayo Lake. Both nests contained two nestlings. Raptor nests (either large stick nests or cliff-nesting raptors) were not found in Key Wildlife Area 2734 at the eastern end of Roop Arm. However, two juvenile and one adult Bald Eagle were observed in that area from October 7–9. The cliff area adjacent to the proposed new powerhouse in Zone 2 did not contain any cliff nests or sign of recent cliff-nesting activity. Additional incidental observations include that of a juvenile Northern Goshawk (*Accipiter gentilis*) near the confluence of Davidson Creek and the Mayo River on July 23rd, and a Sharp-shinned Hawk (*A. striatus*) upstream of Wareham Lake on July 22nd.

Aside from one unconfirmed diving duck observation at the east end of Roop Arm, all waterfowl observations during the waterfowl survey in July were from the upper Mayo River. Thirteen broods of seven waterfowl species were observed including three broods each of Merganser (*Mergus* sp.) and American Wigeon; two broods of Mallard and Canada Goose (*Branta canadensis*); and one brood each of Common Goldeneye (*Bucephala clangula*), Northern Pintail and Ring-necked Duck. Other waterfowl observations included one Trumpeter Swan (*Cygnus buccinator*). Three Red-throated Loons (*Gavia stellata*) were observed near Anderson Creek in early October, and numerous waterfowl were observed at the eastern end of Roop Arm and south end of Nelson Arm as incidental observations during fish telemetry

work in September and October. From all surveys and incidental sightings, three General Status "sensitive" species that were observed included Trumpeter Swan, American Wigeon and Northern Pintail.

The Wareham Lake headwaters (Reach 7 of the aquatic studies) contained the highest quality waterfowl habitat within the broad study area. Information from the public indicated that an area of the upper Mayo River below the control structure on Mayo Lake (Reach 11 of the aquatic studies) contains similar habitat for waterfowl, although significant waterfowl use of that area was not observed during the surveys (Figure 12).

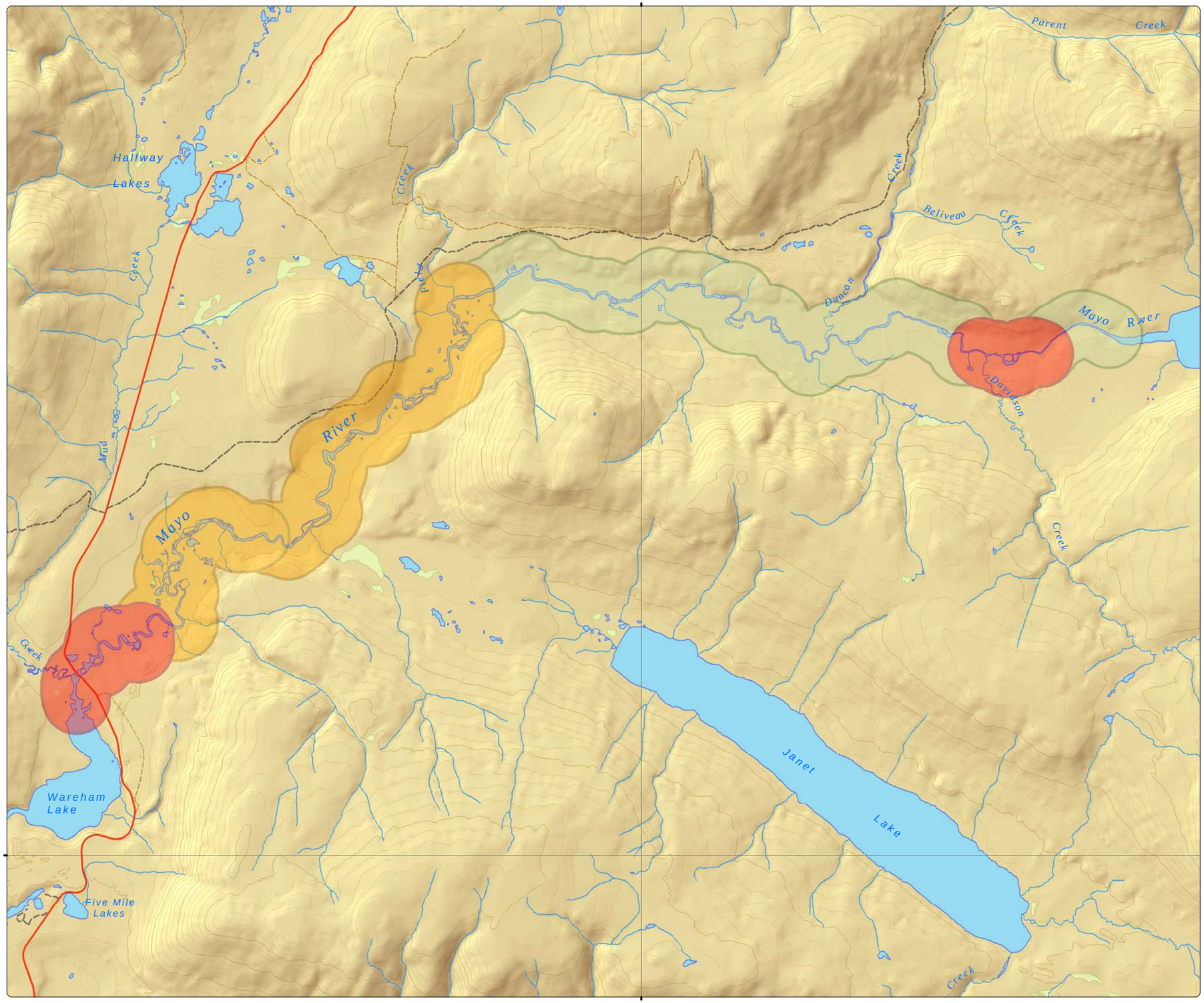
As noted in Section 2.3 there are no nest records for COSEWIC/SARA listed species in the terrestrial study area. Songbird surveys were not a component of this study. However, there is potential nesting habitat for two listed species in the terrestrial study area: Common Nighthawk and Olive-sided Flycatcher. The may be suitable nesting habitat for Common Nighthawk in some of the open mixed forests in the LSA/RSA, or at wetlands in the broad study a, habitats similar to which they are known to nest (Sinclair et al 2003). The Olive-sided Flycatcher occurs often in white and black spruce stands, often at the edges of wetlands or bogs (Sinclair et al 2003). That open spruce-leading with some standing dead tree habitat is found in the middle of the western portion of the LSA near the Mayo River. Rusty Blackbird can nest in wetland habitats in the broad study area along the Mayo River and Mayo Lake shorelines, or in the Five Mile Lakes wetland areas in the terrestrial LSA and RSA (Figure 3).

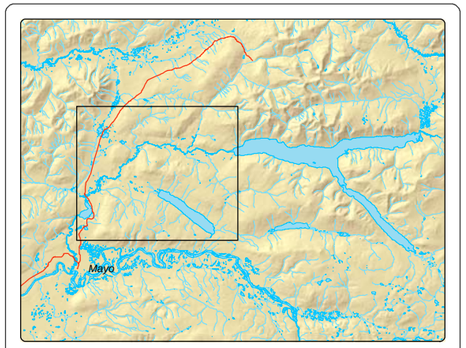
Two potential den sites (one black bear and one coyote/fox den) were located in the terrestrial study area. The black bear den located in the western portion of the LSA appeared active with fresh scat found in the vicinity of the den. The other den appeared to be inactive and that of a mid-sized carnivore. Black bear scat and tracks were observed in the northern and western portions of the RSA. A black bear was encountered by a geotechnical drilling crew while working at the proposed location of the new powerhouse in August (T. Ritchie, YEC, pers. comm.). That observation coincides with sightings of numerous tracks and scat of black bear and moose in the floodplain bench area downstream of the proposed new powerhouse location.

Moose were observed on a number of occasions. Along the lower Mayo River, a cow moose was encountered near the airport and a cow and calf were also observed along the river approximately 1 km downstream of Wareham Dam. The highest numbers of moose were observed along the upper Mayo River from the Minto Bridge upstream to Mayo Lake (Zone 4). Both bulls and cows with calves were seen frequently along the section of the river including three individuals during late August feeding on aquatic plants in the portion of the river directly downstream of the Mayo Lake control structure (identified as upper Reach 12 of the aquatic studies). On Mayo Lake, one moose (mature bull) was observed along the lakeshore during mid September. During fisheries related overflights within the RSA during mid December, the highest numbers of incidental observations of moose were in the high elevation habitats east of the Upper Mayo River. In addition, the portion of the river flowing through the burn area (Aquatic Study reaches 8 and 9) also contain a number of moose based on direct observation of individuals and sign (e.g., trails). Moose trails were observed travelling in all directions on the upper Mayo River in the same burn area on a February 24th overflight of the Mayo River, indicating that the area is used in the winter by moose. Within the Edwards Creek and Roop Lakes area, no moose were observed during the December

overflights (related to aquatic work) and very little sign (few tracks) were observed. However, what appeared to be a wolf killed moose was observed on Roop Lakes near the mouth of Granite Creek.

While not specifically inventoried, several areas of beaver activity were noted along the Mayo Lake shoreline at the eastern edge of the lake. Lodges and food caches were noted along the shoreline on the north shore of Roop Arm, at the northwest end of Nelson Arm, and at the mouth of Nelson Creek (Figure 13). There was also beaver activity along most of the Mayo River between Mayo Lake and Wareham Lake (Zone 4), including dams on several tributary streams and back channels flowing into that portion of the river.





Legend

Waterfowl Habitat Classification

- .....High
- .....Moderate
- .....Low

Topographic Features

- .....Silver Trail
- .....Secondary Road
- .....Trail
- .....Contours
- .....Watercourse
- .....Waterbody
- .....Wetlands

0 0.5 1 2 3 4 5
Kilometres

Drawn By:	M. Power
Checked By:	M. Setterington
Date:	24 February 2009
Projection:	NAD 1983 UTM Zone 8
EDI Project #:	08-YC-0037

N

Digital Data Sources:

1:50,000 Topographic Spatial Data: Canvec and National Topographic Database (NTDB) Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved. Data obtained October 2008.

Revisions to the 1:50,000 Canvec (Waterbody) were made using aerial photography from 1996 (YG) and 2008 (YEC).

Digital Elevation Model of the Mayo region provided by Geomatics - Yukon Government; acquired Summer 2008

Disclaimer:

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Figure 12:
Waterfowl Habitat within Zone 4

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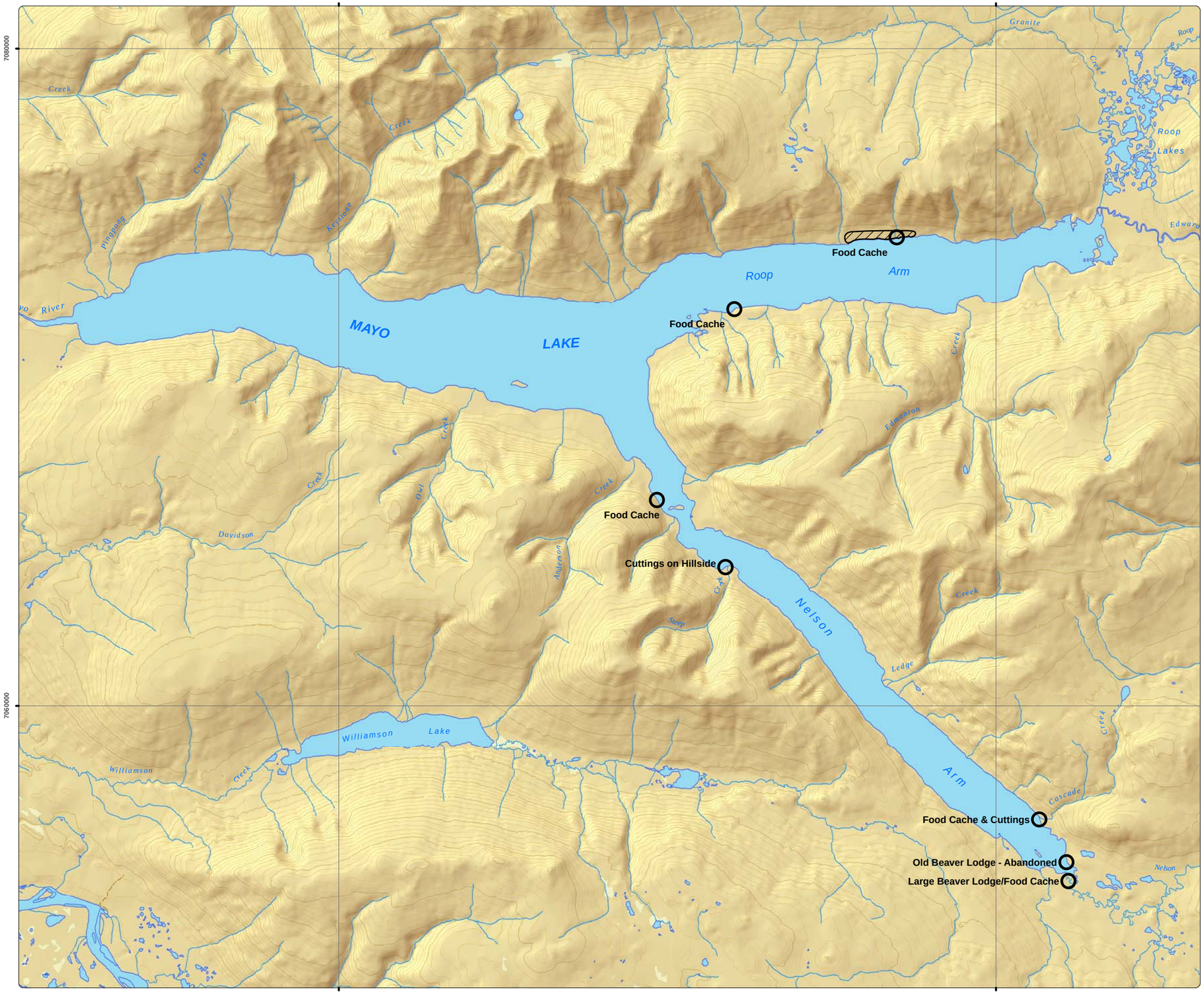
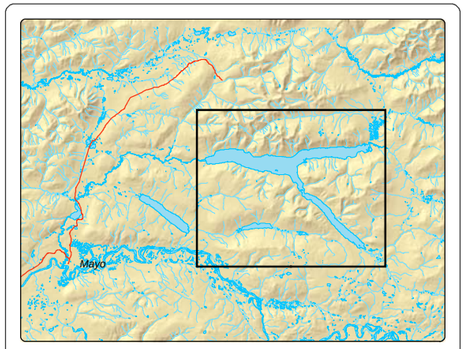
Prepared by: EDI ENVIRONMENTAL DYNAMICS INC.





Legend

Beaver Activity

- .....Beaver Activity Site
- .....Beaver Activity Area

Topographic Features

- .....Silver Trail
- .....Secondary Road
- .....Trail
- .....Contours
- .....Watercourse
- .....Waterbody
- .....Wetlands

Map Scale: 0 0.5 1 2 3 4 5 Kilometres

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Figure 13:
Beaver Activity on Mayo Lake

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Prepared by: EDI ENVIRONMENTAL DYNAMICS INC.

4 SUMMARY OF FINDINGS

Forest cover habitats in the terrestrial study area are typical of lower elevation valley bottom habitats in the Mayo region when compared to the general habitat types found in the Yukon Plateau–North ecoregion (Smith et al 2004). Much of the area has been recently disturbed (within the last century) and there are cleared areas and trails for current agricultural use in the LSA. While rare/listed plant species were not located within the proposed terrestrial footprint of the project, their absence could not be confirmed and there are some small areas that provide potential habitat for those species. The presence or absence of listed plant species could not be confirmed either way (*i.e.*, listed species may exist on site). For purposes of impact mitigation, the locations of likely rare plant habitats were identified (Figure 3) and will be considered for avoidance by construction activities.

The three Osprey and one Bald Eagle nests were located along the shoreline of the upper Mayo River and Mayo Lake. The activities of the project are not likely to overlap or interact with raptor nesting in the region. None of the nests were located within the terrestrial footprint area of the proposed project, and the nests will not be affected by changes to water levels because they appeared to be located at or above the current high water level.

Changes to water level management may result in an interaction between operation of the project and early season shoreline-nesting waterfowl and waterbirds. Species that could be affected by low water levels early in the nesting season include loons, American Wigeon, Mallard and Ring-necked Duck. Proper modeling of water levels on a seasonal basis will be required to determine impacts to and mitigate options for nesting waterbirds and waterfowl.

There are eight COSEWIC/SARA-listed species that potentially occur in the broad study area (Table 2). Although not all species are formally designated under the federal Species at Risk Act, they may all be considered as Valued Components for impact assessment purposes (Lynch-Stewart 2004). Of the eight COSEWIC-listed species that may occur in the project area, the area may provide breeding habitat for Olive-sided Flycatcher, Common Nighthawk, and Rusty Blackbird. Wolverine and grizzly bear may use terrestrial habitats in the project area, but based on their large home ranges and typical use of higher elevation area, breeding/denning in the project area is unlikely. Peregrine Falcon and Short-eared owl nesting in areas disturbed by the project is unlikely (lack of observed Peregrine Falcon cliff nests based on surveys; and lack of open marsh habitat for nesting Short-eared Owls). Occurrence of caribou in the project area is unlikely because the ranges for the Clear Creek and Ethel Lake caribou herds do not overlap with the project area.

Beaver were located in the Upper Mayo River, along the Mayo Lake shoreline, at the mouth of Nelson Creek, and although not investigated in this study, they are known to occur in portions of the Roop Lakes area that are influenced by water levels in Mayo Lake.

Most moose observations within the broad study area were within the upper Mayo River area between Wareham Lake and Mayo Lake. Moose sign was observed within the footprint area of the proposed project, so construction and operation may have some localized effects on moose distribution and

habitat use when they are in the area. Greater water flows in the Mayo River in winter may affect ice conditions and have impacts on moose movement through the Mayo River valley. Moose use of the burn area in the upper Mayo River (aquatic study Reaches 8 and 9) during the fall was noted (NND Lands and Resources Use Workshop 2008, O'Donoghue pers. comm. 2008).

Considering the relatively small terrestrial footprint of the proposed Mayo B project, the terrestrial studies focused on specific areas of investigation including: 1) the footprint of the project, and 2) the wetland areas potentially affected by changing winter and spring water levels. Animal use was noted in most of the area, but there were no sightings that would be considered unique to the region. For purposes of impact mitigation, operation timing "windows" (*e.g.*, clearing prior to/following forest bird breeding and nesting season) to minimize disturbance to localized wildlife can be considered.

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