APPENDIX B

EBA BASELINE AND OTHER REPORTS

Appendix B.1 2010 Vegetation and Wildlife Baseline Studies, Nechalacho Rare Earth Elements Project, Thor Lake, Northwest Territories.

Appendix B.2 2010 Baseline Wildlife Habitat Assessment – Proposed Haul Road and Hydrometallurgical Plant Area, Pine Point, Northwest Territories.

Appendix B.3 Water Quality Modeling for the Thor Lake Project – Technical Memorandum. March 2011

Appendix B.4 Nutrient Modeling for the Thor Lake Project – Technical Memorandum. May 2011

Appendix B.1

2010 Vegetation and Wildlife Baseline Studies, Nechalacho Rare Earth Elements Project, Thor Lake, Northwest Territories.

AVALON
RARE METALS INC

2010 VEGETATION AND WILDLIFE BASELINE STUDIES
NECHALACHO RARE EARTH ELEMENTS PROJECT
THOR LAKE, NORTHWEST TERRITORIES





November 2010
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Avalon Rare Metals Inc.

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2010 VEGETATION AND WILDLIFE BASELINE STUDIES
NECHALACHO RARE EARTH ELEMENTS PROJECT
THOR LAKE, NORTHWEST TERRITORIES

V15101007.007

November 2010

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EXECUTIVE SUMMARY

Wildlife and vegetation studies carried out in 2010 serve to fill information gaps in the local study area (LSA) resulting from changes to the proposed project footprint. The 2010 program included breeding bird surveys, waterfowl surveys, wildlife habitat assessments, a rare plant survey, and the extension of the ecosystem mapping that covered the local study area.

A total of 62 polygons covering approximately 380 hectares (ha) were added to the local study area, which now covers a total of 2,181.5 ha. No new ecosystem units were identified during the mapping exercise. Field surveys resulted in the description of ecosystems at 95 sties throughout the local study area, with wetland and upland forest types being described most often.

The rare plant survey was conducted from July 19-22, 2010. A total of 29 plots were systematically surveyed, with meander searches carried out during traverses between plot locations. No rare plants were identified.

During the June and July waterfowl surveys, a total of 319 waterfowl were observed, with an additional 495 documented as incidentals. In June, waterfowl were surveyed on 21 lakes and ponds (or portions thereof); 18 of which were surveyed on foot, and seven were first surveyed or re-surveyed from a helicopter. In July, a total of six lakes and ponds were re-surveyed on foot. In total, 58 waterfowl, representing seven species, were recorded. Scaup species were by far the most common. Two species, Blue-winged Teal and Horned Grebe were only observed in July.

Breeding bird surveys conducted in June resulted in the assessment of 39 stations within the study area. A total of 199 breeding birds were recorded and an additional 138 birds were recorded as incidentals (either outside the survey station or outside the survey time). A total of 23 bird species were detected and an additional seven species (plus unknown grouse species, ptarmigan species, and woodpecker species) were detected as incidentals.

Ten broad habitat types available within the local study area were assessed for their ability to support wildlife indicator species for specific life requisites and seasons. Indicator species selected for the wildlife habitat assessment possess inherently high conservation values for local stakeholders, have been previously identified as being important in other northern studies, are important harvestable species, are a representative species to local habitats, or are species with special conservation status know to occur within the local study area. The indicator species considered include moose, barren-ground caribou, Olive-sided Flycatcher, Rusty Blackbird, and Common Nighthawk.

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1.0 INTRODUCTION

The Nechalacho Deposit at Thor Lake (the Project) is located north of the Hearne Channel of Great Slave Lake, approximately 100 km southeast of Yellowknife (Figure 1-1). The area has been explored for its mineral potential since the 1970's and was acquired by Avalon Rare Metals Inc. (Avalon) in 2005.

Baseline studies for various biophysical components were initiated in 2008 and are ongoing for some key disciplines. The wildlife and vegetation studies carried out in 2010, and described in this report, serve to fill information gaps in the local study area (LSA) resulting from changes to the proposed project footprint. The 2010 program included breeding bird surveys, waterfowl surveys, wildlife habitat assessments, a rare plant survey, and the extension of the ecosystem mapping that covered the local study area.

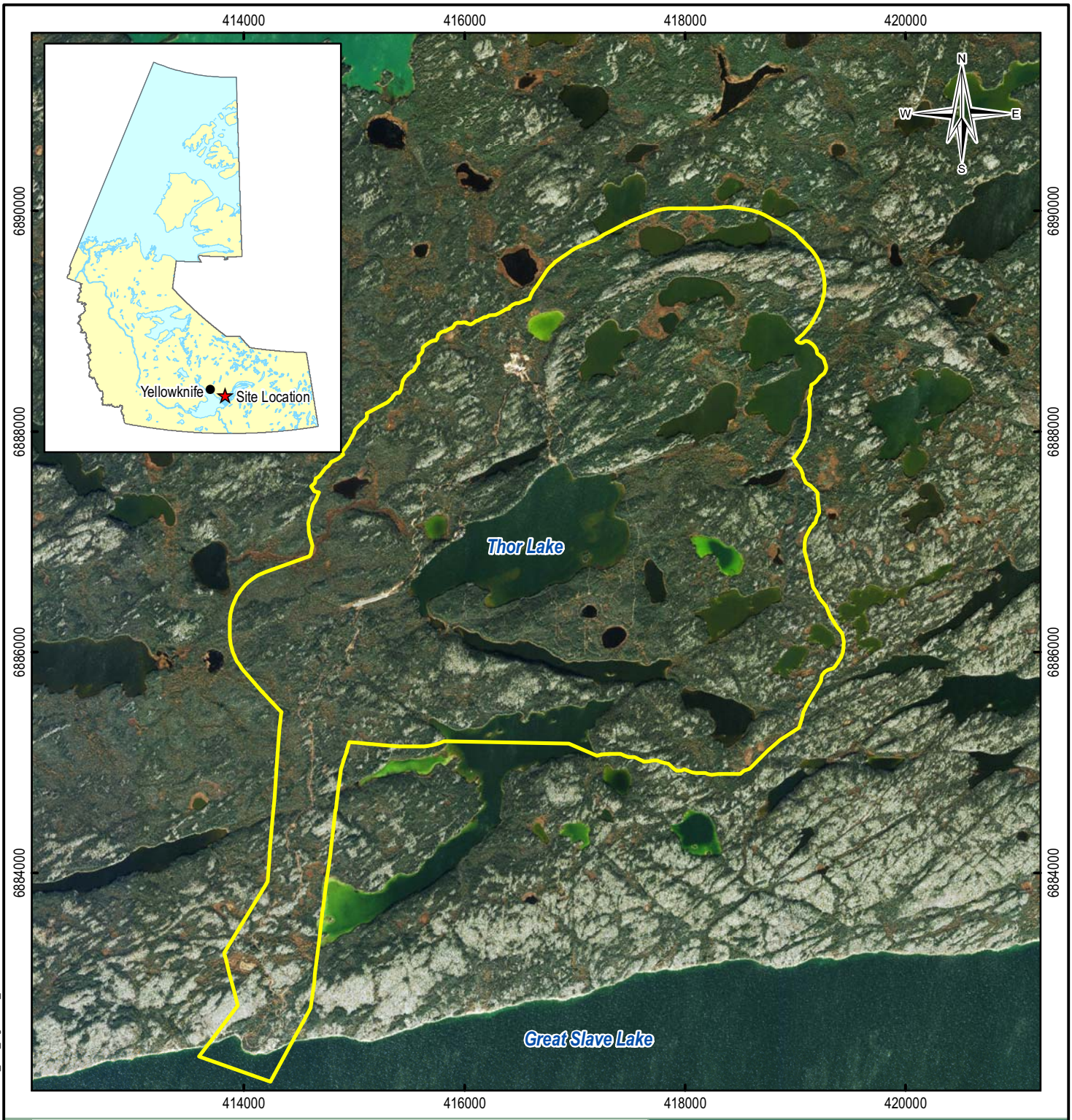
2.0 METHODS

Two field sampling events were carried out in 2010; the first in June and the second in July. The June field team consisted of two EBA biologists, Steve Moore and Karla Langlois, along with trainee assistant Denecho Catholic from Lutsel K'e. The July field team consisted of Tania Perzoff and Karla Langlois, along with trainee assistant Fred Marlowe from Lutsel K'e (July 19), Sheldon Boucher from Ft Resolution (July 20 -21) and Denecho Catholic from Lutsel K'e (July 22-23).

Surveys conducted in June focussed on breeding birds and waterfowl as well as ecosystem and wildlife habitat assessments throughout the LSA. July field work targeted the northern portion of the study area where new project infrastructure is proposed and included waterfowl surveys, ecosystem and wildlife habitat assessments, and a rare plant and invasive/weedy plant survey.

2.1 WATERFOWL SURVEY

Objectives of the waterfowl surveys were to identify waterfowl occupying the local study area during the breeding season. To do so, waterfowl were surveyed in June and July using the "Look-See" method. This is an appropriate methodology for counting birds, such as waterfowl, breeding at low densities in remote areas. This technique involves selecting lakes and ponds prior to conducting fieldwork and setting up observation stations at the predetermined water bodies. Observation stations are the standard approach for the "Look-See" method for surveying breeding (mated pairs) and non-breeding waterfowl during mid-summer. This technique is useful for surveying birds in all lifecycle stages, and is the preferred method for counting breeding pairs and broods for all but the most elusive waterfowl species.



LEGEND

Local Study Area

NOTES

Base data source:
Imagery provided by Avalon (October, 2010)

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THOR LAKE PROJECT

Study Area

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:50,000 (1 0.5 0 1 Kilometers)	
FILE NO.: V15101007_007_Figure1-1_SA.mxd	
PROJECT NO.: V15101007.007	DWN: MEZ / CKD: KL / REV: 1
OFFICE: EBA-VANC	DATE: November 9, 2010

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Figure 1-1

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An opportunity to utilize a helicopter for a half hour waterfowl survey during the June field event was presented. During this aerial waterfowl survey, several larger lakes where it was difficult to survey the entire waterbody using the "Look-See" method, and those lakes and ponds that were more remote, were flown. Several of the lakes surveyed using the ground based "Look-See" method were also surveyed using the helicopter.

Surveys were designed to determine waterfowl species present and territories, where possible. Generally, lakes and ponds were surveyed on foot (ground surveys); however, a boat was used to survey Thor Lake. The boat allowed for a greater area to be covered in a shorter period of time than from the ground, plus it allowed a closer view of birds. For larger lakes that were more difficult to access, only portions of the lake were surveyed for waterfowl.

At each observation station, the entire lake, or portions there-of, were slowly scanned using binoculars. Scanning continued at each station for a minimum of 15 minutes to provide ample time to spot birds that may have been diving or hiding.

The following data was recorded at each observation station: date, UTM coordinates, weather parameters, waterfowl species seen, numbers of birds seen, behavioural notes, and any predators of waterfowl (e.g., raptors). Breeding territories were assumed based on one of the following two criteria: a pair of adults on the lake during the June field event, or one adult with a brood.

2.2 BREEDING BIRD SURVEY

Objectives of the breeding bird survey were to document species presence and species diversity within available habitat types. To promote proportional sampling among available habitat types, ecosystem mapping previously classified in the local and regional study area were used to plan the location of breeding bird survey stations (Stantec 2010b).

Breeding bird surveys were conducted from June 8 to 13, when most songbird species are on territory and are most conspicuous. By June, most breeding birds occupy and defend their nesting territories. This is the time when birds are most easily detected by surveyors.

Bird species, including passerines and other upland birds were identified visually and/or by territorial calls. Fixed radius point count stations were surveyed between 0400 – 1000 hours when singing was considered most concentrated, and was discontinued when observation conditions became unsatisfactory due to weather (e.g., wind and steady rain). All point count stations were accessed on foot and were positioned at least 100 m from a habitat edge, wherever possible.

Once on station, observers waited at least 2 minutes (min) prior to starting the survey to allow birds to resume their normal behaviour. At each point count station, all birds heard and seen were recorded as either within 0 – 50 m, 50 – 100 m, or greater than 100 m from station centre, as well as at temporal intervals of 0 – 5 min and 5 – 10 min after the survey commenced.

Birds identified more than 100 m from the station centre and those detected outside the 10 min survey interval were recorded as incidentals. In addition, any birds observed flying over the station during the survey time were also recorded as incidentals. These incidental observations were not used in the species diversity and relative abundance calculations; however, incidental species were added to the comprehensive list of species present.

Six types of data were recorded for each bird observation. These include: an observation number, time of observation, number of individual birds, species (sex where possible), habitat type, and behavioural activity.

Once the survey was completed, data sheets were reviewed as part of the internal quality assurance and quality control program, and any additional observations were discussed amongst the biologists and documented on data sheets.

The Shannon-Weiner Diversity Index was used to calculate diversity within each habitat type.

2.3 WILDLIFE HABITAT ASSESSMENT

For the purposes of this baseline assessment, the objectives of a wildlife habitat assessment were to document wildlife and wildlife sign within each habitat type and describe how well the habitat in its current condition provides select species life requisites[1]. Ecosystem mapping was used as the basis for this wildlife habitat assessment.

It is difficult for an analysis to address all potential wildlife in the area (Beanlands and Duinker 1983); therefore, an essential step at the beginning of any project is the selection of ecological components with high conservation values. This process requires selecting cultural and ecological components that are regarded as being valuable to stakeholders (*i.e.* Aboriginal groups, researchers, governments, and the public) to serve as indicator species.

In the field, representative habitat types across the local study area were surveyed at each breeding bird survey station and while traversing within the local study area. All wildlife species observed and their sign were documented in relation to the corresponding habitat types and unique landscape features, if any, during the June and July 2010 field events.

During the analysis, the ecosystem mapping was divided into ten broad habitat units and were ascribed a rank regarding its ability to support life requisites for each indicator species for a specified season and life requisite. A rank is a comparison of wildlife habitat to the best habitat available for that species in the local study area (based on the ecological mapping). Habitats were ranked using published species-habitat relationships, and from previous wildlife habitat assessments completed in the region. A four-class ranking scheme was used to describe each broad habitat type: high (H), moderate (M), low (L), and nil (N) for defined seasons and life requisites. Habitat rankings were developed using published knowledge of species-habitat relationships, and from previous wildlife habitat assessments

[1] A "life requisite" is an attribute that is necessary for a species' reproduction and survival and is associated with the time of year. For example, life requisites include feeding, over-wintering, migration, and reproduction.

completed in the region. An overall habitat rank was then assigned using numerical averaging, where a high rank (H) was given a value 3, moderate rank = 2, low rank = 1, nil rank = 0.

2.4 ECOSYSTEM MAPPING

Changes to the proposed Project footprint resulted in the placement of facilities beyond the original LSA boundary which identified the need to extend the ecosystem mapping coverage. The new LSA was determined by adding a 500 m buffer to the outer edge of the new project footprint (Figure 2.4-1).

The mapping approach was based generally on the methods and ecosystem unit descriptions outlined in Stantec (2010a) which are founded on the mapping standards of the BC Resources Inventory Committee (RIC) (1998) but modified for ecosystem units and landscapes of the Northwest Territories.

Ecosystem mapping according to RIC (1998) is conducted primarily through the interpretation of aerial photographs. Black and white aerial photographs from 1996 at a scale of 1:20,000 were available for the area, however, Avalon had recently (in 2008) acquired high resolution (1 m pixel size) IKONOS satellite imagery for their property. Due to the higher quality of the satellite imagery, it was used as the ecosystem mapping base. Topographic information (2 m contours and a digital elevation model) and data collected during the 2010 field programs was also used in the delineation of ecosystem unit boundaries. Ecosystem polygons were digitized for use in a Geographic Information System (GIS) and were subsequently merged with the original ecosystem mapping produced by Stantec (2010a).

2.5 ECOSYSTEM UNIT CHARACTERIZATION

Ecosystem descriptions were included as a component of all of the 2010 field surveys. Detailed descriptions were carried out more often in areas where the potential to support rare plants was higher and when ecosystems that were judged to be relatively uncommon in the area were encountered. Field data collection generally followed the guidelines established for BC (e.g., the BC Ministry of Environment, Lands, and Parks and the BC Ministry of Forests 1998). Ecosystem units and descriptions developed by Stantec (2010a) were used as a guide.

LEGEND

- Local Study Area
- 2010 Extension of Local Study Area
- Proposed Project Footprint

NOTES

Base data sources:
- Imagery supplied by Avalon (October, 2010)

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2010 Extension of Local Study Area

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:50,000

1 0.5 0 1

Kilometers

FILE NO.
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PROJECT NO.	DWN	CKD	REV
V15101007.007	MEZ	KL	1

OFFICE	DATE
EBA-VANC	November 9, 2010

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Figure 2.4-1

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2.6 RARE PLANT SURVEY

The rare plant survey was conducted from July 19-22, 2010. The survey protocol generally followed the guidelines developed by the Alberta Native Plant Council (ANPC 2000) and was conducted at a presence/not detected level. Both systematic and meander search patterns were used. Areas targeted for survey included potential development areas, particularly those within the expanded LSA, and areas thought to have a higher chance of supporting rare plant habitat (e.g., unique landscape and habitat features). The list developed by Stantec (2010a) that identifies rare plant species potentially occurring within the study area was used as a guide (Table 2.6-1).

TABLE 2.6-1: POTENTIAL RARE PLANTS OF THE TAIGA SHIELD AND NECHALACHO PROJECT AREA[1]

Scientific Name	Common Name	Family	NWT Status Rank[2]
Acorus americanus (Acorus calamus)	Several vein sweetflag	*Acoraceae*	May Be At Risk
Atriplex dioica (Atriplex patula)	Thick-leaved orache	*Chenopodiaceae*	May Be At Risk
Callitriche heterophylla (Callitriche anceps)	Large water starwort	*Callitrichaceae*	Undetermined
Cardamine parviflora	Small-flower bitter cress	*Brassicaceae*	May Be At Risk
Carex arcta	Northern clustered sedge	*Cyperaceae*	May Be At Risk
Carex trisperma	Three-seed sedge	*Cyperaceae*	May Be At Risk
Cirsium foliosum	Leafy thistle	*Asteraceae*	May Be At Risk
Cornus suecica	Swedish dwarf dogwood	*Cornaceae*	May Be At Risk
Crassula aquatica	Water pigmy-weed	*Crassulaceae*	May Be At Risk
Cypridedium acaule	Pink lady's-slipper	*Orchidaceae*	Undetermined
Elatine triandra	Long-stemmed waterwort	*Elatinaceae*	Undetermined
Lobelia dortmanna	Water lobelia	*Campanulaceae*	May Be At Risk
Lycopus uniflorus	Northern bugleweed	*Lamiaceae*	Undetermined
Malaxis monophyllos (Malaxis brachypoda)	White adder's mouth	*Orchidaceae*	May Be At Risk
Moehringia macrophylla (Arenaria macrophylla)	Large-leaved sandwort	*Caryophyllaceae*	Sensitive
Nymphaea tetragona	Pygmy white waterlily	*Nymphaeaceae*	Sensitive
Orthocarpus luteus	Yellow owl's clover	*Scrophulariaceae*	May Be At Risk
Polydodium virginianum	Rock polypody	*Polypodiaceae*	Undetermined
Salix pyrifolia	Balsam willow	*Salicaceae*	Secure
Scirpus atrocinctus	Blackgirdled bulrush	*Cyperaceae*	Presence Expected
Senecio eremophilus	Desert groundsel	*Asteraceae*	Sensitive
Sibbaldiopsis tridentata (Potentilla tridentata)	Three-toothed cinquefoil	*Rosaceae*	Sensitive
Silene drummondii (Melandrium drummondii)	Drummond's campion	*Caryophyllaceae*	Undetermined
Trientalis borealis	Northern starflower	*Primulaceae*	Undetermined
Vaccinium myrtilloides	Velvetleaf blueberry	*Ericaceae*	May Be At Risk

[1]As compiled by Stantec (2010a)
[2]NWT Status Ranks (Working Group on General Status of NWT Species 2006):

At Risk: Species for which a detailed assessment has already been completed (e.g., by COSEWIC or jurisdictional status reports) that determined the species to be at risk of extirpation or extinction. This is a special category that may be used only for species that have been assessed as "Endangered" or "Threatened" according to COSEWIC, or according to a similar future committee in the NWT

May Be At Risk: Species that may be at risk of extinction or extirpation, and are therefore candidates for detailed risk assessment. This is the highest rank that can be given to a species using the General Status Ranking system independent of a more detailed assessment as noted in the At Risk category

Sensitive: Species that are not at risk of extinction or extirpation but may require special attention or protection to prevent them from becoming at risk. These species are ranked with a medium priority for a detailed assessment

Secure: Species which are not at risk or sensitive. These species have the lowest priority for a detailed assessment

Undetermined: Species for which insufficient information, knowledge, or data is available to reliably evaluate their general status

Presence Expected: Species not yet recorded in the NWT, but are expected to be present. These species are expected in the NWT due to their presence in adjacent jurisdiction(s), the presence of appropriate habitat in the NWT, and other evidence. The status rank forms a "Look For" species list

All potential rare plants located in the field were photographed and marked with a GPS coordinate. Detailed habitat descriptions were also documented. Specimens that could not be identified definitively in the field were collected for identification back at camp or were pressed and transported to Vancouver for identification in the office. Specimens were only collected if it was thought the plant population was large enough to sustain the loss of individual plants (e.g., greater than 20 individuals present).

2.7 INVASIVE / WEEDY PLANT SURVEY

A reconnaissance-level survey for invasive, weedy, and/or non-native (alien) plant species was conducted July 23 and targeted areas of existing disturbance (e.g., roads, trails, remnant mine workings). Weedy plant species were also searched for when lists of plant species were being compiled during the characterization of ecosystem units.

3.0 RESULTS

3.1 ECOSYSTEM MAPPING

The ecosystem mapping was extended in the northern and southernmost portions of the LSA (Figure 2.4-1). A total of 62 polygons covering approximately 380 hectares (ha) were added. The expanded LSA now covers a total of 2,181.5 ha. The ecosystem units and descriptions developed by Stantec (2010a) were maintained, however, a generalized ecosite type was assigned to each one to simplify data summarization (Table 3.1-1). No new ecosystem units were identified during the mapping exercise. Appendix B provides a full breakdown of the ecosystem units mapped, the associated generalized ecosite type, and total hectares mapped.

Upland forest is the dominant ecosite type within the LSA (Figure 3.1-1), and is composed primarily of the SP, WA, and BF map units (Appendix B). Black spruce dominated wetland forests, various water bodies, and woodland forest are also common across the landscape. These ecosystem types combined characterize approximately 90% of the LSA.

TABLE 3.1-1: LIST OF ECOSYSTEMS MAPPED WITHIN THE LOCAL STUDY AREA			
Generalized Ecosite	Map Unit[1]	Description[1]	Drainage[1]
Anthropogenic	ES	Exposed soil	N/A
Anthropogenic	MI	Existing mine workings	N/A
Anthropogenic	RW	Rural/camp	N/A
Anthropogenic	RZ	Road	N/A
Riparian shrub	SW	Scrub birch – willow – water sedge riparian shrub	imperfect-poor
Rock	RO	Rock	very rapid
Wetland shrub	LL	Labrador tea – reindeer lichen – black spruce bog	poor
Wetland shrub	SS	Scrub birch – sweet gale – bog rosemary fen	very poor
Sparsely vegetated	RL	Bedrock - lichen - juniper - saxifrage complex	very rapid
Upland forest	BF	Black spruce – feathermoss – crowberry upland forest	moderate-well
Upland forest	PA	Paper birch – aspen – willow forest	well
Upland forest	SP	Spruce – paper birch – toadflax forest	moderate-well
Upland forest	WA	White spruce – green alder – prickly rose forest	well
Woodland forest	LW	Lichen – bearberry woodland	rapid-well
Water body	LA	Lake	N/A
Water body	OW	Open water	N/A
Water body	PD	Pond	N/A
Wetland forest	BG	Black spruce – cloudberry – Sphagnum moss bog forest	imperfect-poor
Wetland forest	BT	Black spruce – tamarack – water sedge fen	poor
Wetland forest	WH	White spruce – horsetail – glow moss forest	imperfect-poor
Wetland herb	SH	Swamp horsetail marsh	very poor
Wetland herb	WB	Water sedge – buckbean – arrow grass fen	very poor

[1]As per Stantec (2010a).

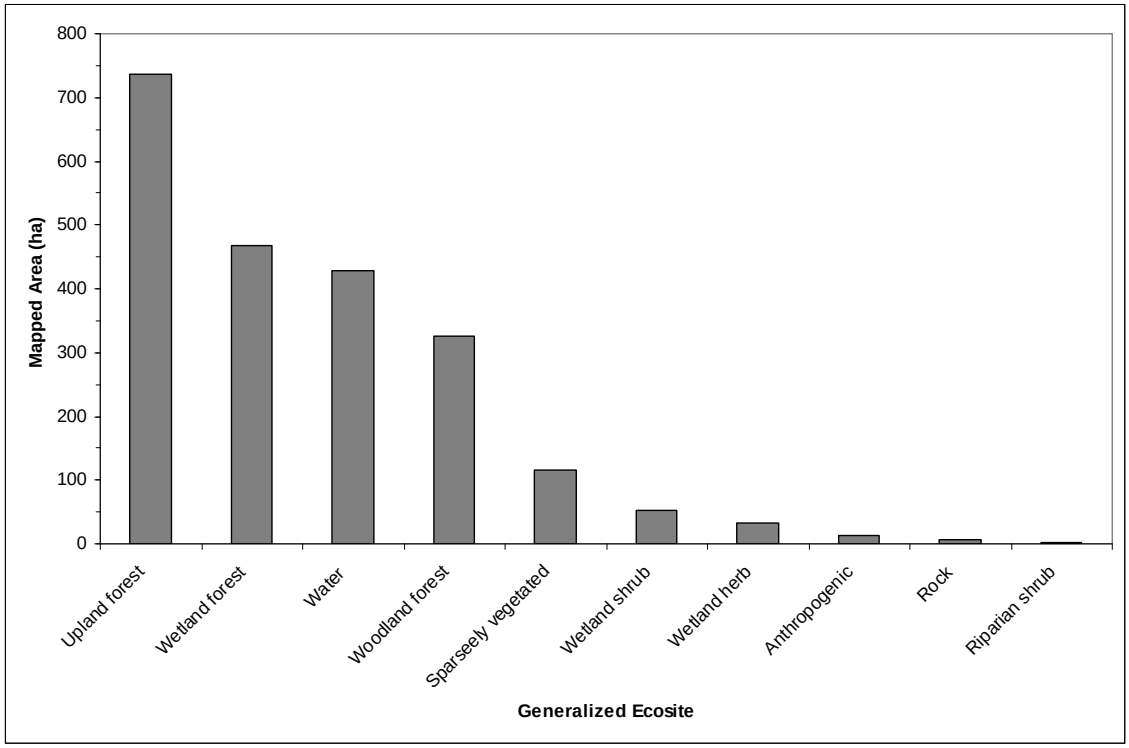

Figure 3.1-1 Distribution of Generalized Ecosites Mapped within the Local Study Area

3.2 ECOSYSTEM UNIT CHARACTERIZATION

Field surveys carried out in 2010 resulted in the description of ecosystems at 95 sites throughout the LSA (Figure 3.2-1). Wetland and upland forest types were assessed most often, at 32 and 30 plots, respectively (Figure 3.2-2; Appendix C).

It should be noted that many of the ecosystems assessed in the northern portion of the LSA in particular were found to fit imperfectly to the descriptions developed by Stantec (2010a). However, the limited amount of sampling conducted in each ecosystem unit precluded the development of new units. As such, the 2010 surveys represent the best approximation to the Stantec (2010a) units in some cases.

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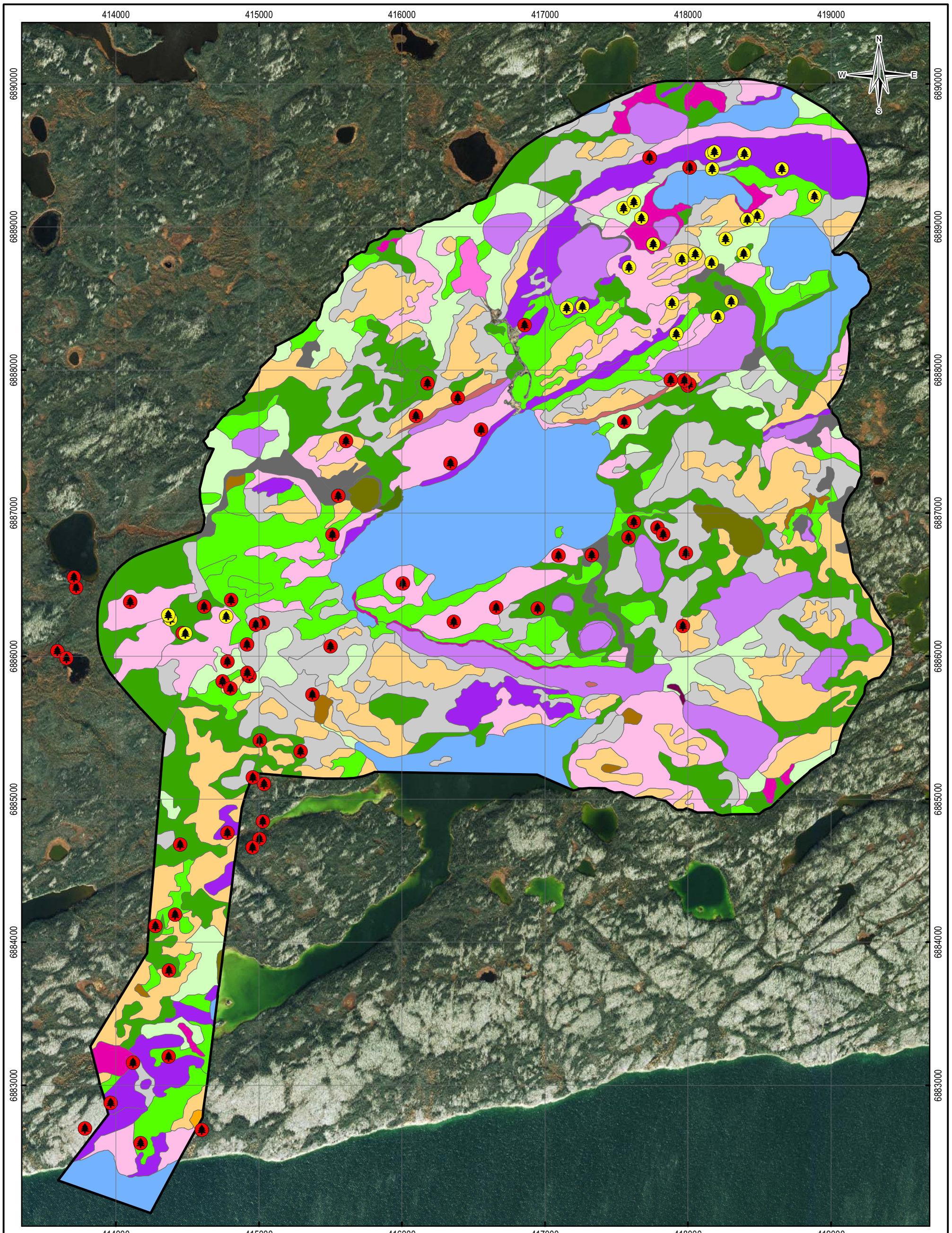

LEGEND

- Local Study Area
- Ecosystem Characterization Survey Locations
- Ecosystem Characterization and Rare Plant Survey Locations

Ecosystem Map Unit

- BF - black spruce-feathermoss-crowberry upland forest
- BG - black spruce-cloudberry-sphagnum moss bog forest
- BT - black spruce-tamarack-water sedge fen
- LA - lake
- LL - labrador tea-reindeer lichen-black spruce bog
- LW - lichen-bearberry woodland
- MI - mine
- OW - shallow open water
- PA - paper birch-aspen-willow forest
- PD - pond
- RL - bedrock-lichen-juniper-saxifrage
- RO - bedrock
- RW - rural/camp
- RZ - road surface
- SP - spruce-paper birch-toadflax forest
- SS - scrub birch-sweet gale-bog
- WA white spruce-green alder-prickly rose forest
- WB - water sedge-buckbean-arrow grass fen
- WH - white spruce-horsetail-glow moss forest

NOTES

Base data sources:
Stantec (2009) with additional areas mapped by EBA (2010),
Imagery supplied by Avalon (October, 2010)

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2010 Ecosystem Characterization and Rare Plan Survey Locations

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:25,000
500 250 0 500
Meters

FILE NO.
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PROJECT NO.	DWN	CKD	REV
V15101007.007	MEZ	KL	1

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EBA-VANC	November 9, 2010

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Figure 3.2-1

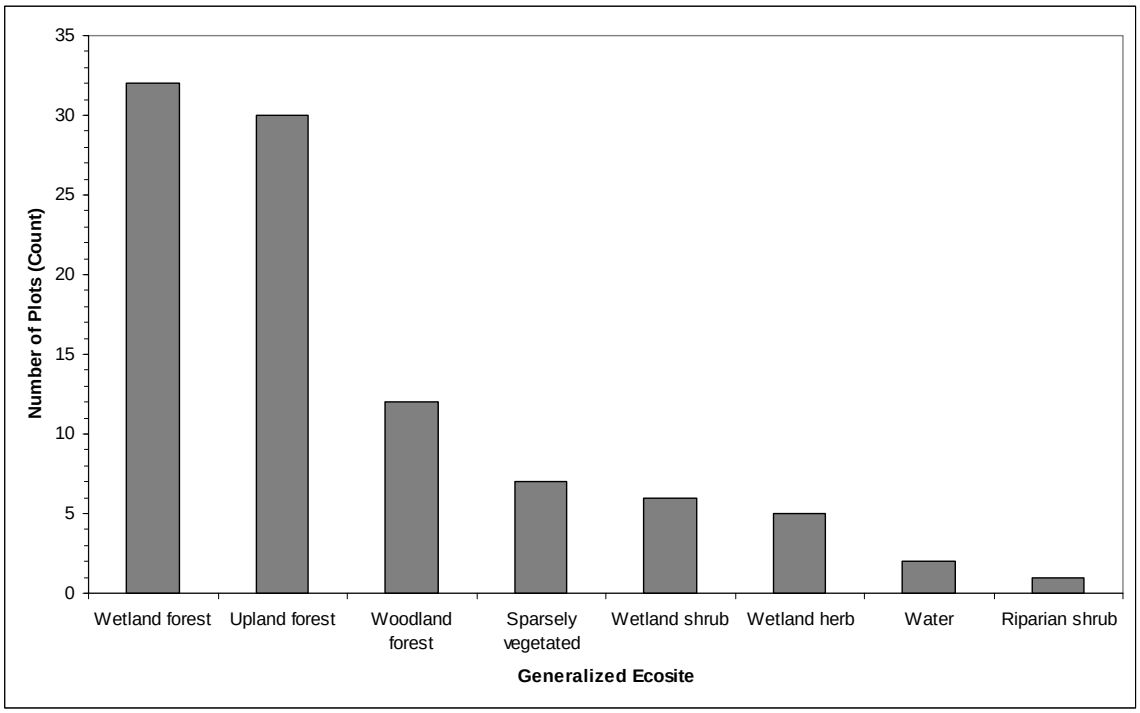

Figure 3.2-2 Generalized Ecosites Assessed within the Local Study Area

3.3 RARE PLANT SURVEY

The rare plant survey was conducted from July 19-22, 2010. A total of 29 plots were systematically surveyed (Figure 3.2-1) and ranged in size from 10 m x 10 m to 20 m x 20 m, depending on site variability. Meander searches were also carried out during traverses between plot locations, particularly when unique landscape and habitat features were encountered. These features included steeper rock outcrops (Photo 3.3-1) and seepage areas (Photo 3.3-2).

No rare plants were identified during the July 2010 survey. Several plant species had finished blooming for the season; it is likely the survey was too late in the season to adequately capture potentially rare species with earlier flowering times (e.g., orchids).

Photo 3.3-1
Rock Outcrops (foreground) Providing Unique Microhabitats for Plants

Photo 3.3-2
Horsetail-dominated Seepage Site, not Commonly Encountered within the Northern Portion of the Local Study Area in Particular.

3.4 INVASIVE / WEEDY PLANT SURVEY

A reconnaissance-level survey for invasive, weedy, and/or non-native (alien) plant species was conducted in areas of existing disturbance (e.g., roads, trails, remnant mine workings). The low incidence of such plants within the Arctic has often been attributed to the harsher climate and relatively limited land development, however, recent studies from Alaska indicate that invasions by non-native plants may just be delayed and in fact could be on the rise (Carlson and Shephard 2007).

Several weedy and non-native plant species were identified within the LSA and were located primarily along roadsides and trails, as well as at the camp. The species identified include (but are not limited to):

- Shepherd's purse (*Capsella bursa-pastoris*)
- Lamb's-quarters (*Chenopodium album*)
- Foxtail barley (*Hordeum jubatum*)
- Pineapple weed (*Matricaria matricarioides* or *M. discoidea*)
- Dandelion (*Taraxacum officianale*)

The species listed above are not specifically tracked by the GNWT however many are considered nuisance weeds in other jurisdictions to the south (e.g., BC and Alberta). There are currently no known highly invasive alien plant species within the NWT (GNWT 2010). Alien plant species are present in the NWT but tend to be localized along roads, pipelines, cut-lines, and other disturbed areas such as communities and mine sites.

3.5 BASELINE WILDLIFE STUDIES

Based on species range maps, 111 bird species occur or potentially occur within the study area (Sibley 2003; Cornell Lab of Ornithology and the American Ornithologists' Union 2010) providing suitable habitat exists (Appendix D). Of these bird species, six species have special conservation status: Horned Grebe, Peregrine Falcon, Short-eared Owl, Common Nighthawk, Olive-sided Flycatcher, and Rusty Blackbird (Table 3.5-1).

In addition, 29 species of mammals and 1 amphibian occur or potentially occur within the study area based on species range maps (Banfield 1977; ENR 2010). Of these species, only the wolverine has special conservation status (assessed by COSEWIC as Special Concern [May 2003]).

TABLE 3.5-1: WILDLIFE SPECIES WITH SPECIAL CONSERVATION STATUS[1]				
Common Name	Scientific Name	Conservation Status		
		NWT	SARA	COSEWIC
Short-eared Owl	*Asio flammeus*	Sensitive	Special Concern (Schedule 3)	Special Concern
Peregrine Falcon	*Falco peregrinus anatum/tundrius*	Sensitive	No Status	Special Concern
Horned Grebe	*Podiceps auritus*	Secure	No Status	Special Concern
Common Nighthawk	*Chordeiles minor*	At Risk	Threatened (Schedule 1)	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	At Risk	Threatened (Schedule 1)	Threatened
Rusty Blackbird	*Euphagus carolinus*	May Be At Risk	Special Concern (Schedule 1)	Special Concern

1. Species ranked as Sensitive in the NWT are not listed (refer to Appendix D).

3.6 WATERFOWL SURVEYS

For the purpose of this report, all loons, grebes, ducks, swans, and geese are considered waterfowl species.

A total of 319 waterfowl were observed during the June and July waterfowl surveys, and an additional 495 were documented as incidentals. In June, waterfowl were surveyed on 21 lakes and ponds (or portions thereof); 18 of which were surveyed on foot, and seven were first surveyed or re-surveyed from a helicopter (Figure 3.6-1). A total of 261 waterfowl were observed during the June waterfowl survey (190 waterfowl observed during the ground survey, and 71 during the aerial survey) (Table 3.6-1). A total of 11 waterfowl species were recorded during the June waterfowl surveys. Of the 11 species documented, Scaup species (either Lesser or Greater Scaup) were the most common waterfowl species, followed by white-winged Scoter, Bufflehead, and scoter species (either Surf or White-winged Scoter).

In July, a total of six lakes and ponds were re-surveyed on foot. Fifty-eight waterfowl, representing seven species were recorded during the July ground survey (Table 3.6-1). Scaup species were by far the most common. Two species, Blue-winged Teal and Horned Grebe were only observed in July.

The majority of the incidental observations (474 observations) were flocks of Canada Geese flying north during the June field event. All observations of Canada Geese were of individuals migrating and none were documented occupying lakes or wetlands within the study area. These flocks are considered to comprise sub-adults, non-breeding adults, and failed breeders during molt migration (Mowbray 2002).

LEGEND

- Local Study Area
- Waterfowl Survey Location

NOTES

Base data sources:
- NTS 1:50,000 (Sheets 85I01 & 85I02)
- Imagery supplied by Avalon (October, 2010)

ISSUED FOR USE

THOR LAKE PROJECT

2010 Waterfowl Survey Locations

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:50,000 (1 0.5 0 1 Kilometers)	
FILE NO.: V15101007_007_Figure3_6-1_WaterfowlSurvey.mxd	
PROJECT NO.: V15101007.007	DWN: MEZ / CKD: KL / REV: 1
OFFICE: EBA-VANC	DATE: November 9, 2010

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Figure 3.6-1

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TABLE 3.6-1: WATERFOWL OBSERVATIONS DURING THE WATERFOWL SURVEYS, JUNE AND JULY, 2010		
Lake Name	Survey Results	
	June	July
Buck Lake	2 Pacific Loons	Not surveyed
Cressy Lake	1 Bufflehead, 2 Common Loons, 2 Red-necked Grebes, 2 Scaup species, 2 Surf Scoters	Not surveyed
Den Lake	5 Buffleheads, 29 Scaup species, 17 White-winged Scoters	Not surveyed
Drizzle Lake	2 Common Loons**, 15 Scaup species**, 12 Scoter species**, 4 Surf Scoters**, 10 White-winged Scoters**, 1 Bufflehead**, 1 Mallard**	1 Common Loon
Egg Lake^	5 Surf Scoters**, 1 White-winged Scoter**, 2 Scaup species**	Not surveyed
Elbow Lake	2 Scaup species	Not surveyed
Fred Lake	5 Buffleheads, 2 Mallards, 19 Scaup species	No waterfowl observed
Long Lake	2 Common Loons, 2 Common Mergansers, 1 Common Loon**	Not surveyed
Megan Lake	2 Common Loons	Not surveyed
Murky Lake	37 White-winged Scoters, 4 Scaup species**, 8 Scoter species**	5 Buffleheads, 1 Horned Grebe, 2 Red-breasted Mergansers, 40 Scaup species, 3 White-winged scoters
North Tardiff Lake	1 American Wigeon, 14 Buffleheads 7 Ring-necked Duck, 7 Scaup species, 2 Surf Scoters	Not surveyed
Ring Lake	3 Scaup species	2 Common Loons
South Tardiff Lake	2 Scaup species	Not surveyed
Thor Lake	9 Common Mergansers, 2 Common Loons (plus active nest with eggs), 1 White-winged Scoter, 1 Bufflehead	1 Blue-winged Teal, 2 Scoter species, 1 Surf Scoter
Thorn Lake	2 Pacific Loons, 2 Scaup species	Not surveyed
Unknown Pond 1 north of Buck Lake	1 Pacific Loon	No waterfowl observed
Unknown Pond 2 east of Megan Lake	1 Unknown duck species**	Not surveyed

TABLE 3.6-1: WATERFOWL OBSERVATIONS DURING THE WATERFOWL SURVEYS, JUNE AND JULY, 2010		
Lake Name	Survey Results	
	June	July
Unknown Pond 3 east of Megan Lake	1 Mallard**, 2 Scaup species**	Not surveyed
Unknown Pond 4 west of Thor Lake^	1 Mallard	Not surveyed
Unknown Pond 5 west of Thor Lake ^	No waterfowl	Not surveyed
Wasp Lake	2 Common Loons, 1 Scaup species**	Not surveyed
Total	**261**	**58**

** observations recorded during the aerial survey
^ indicates lake outside the Local Study Area

In addition, an active Common Loon nest (with two eggs) was observed along the shoreline of Thor Lake in June (Photo 3.6-1), and an unknown waterfowl nest (with broken egg shells) was recorded at the edge of a rock outcrop near Murky Lake in July. No broods were documented occupying the lakes and ponds during the waterfowl surveys.

Photo 3.6-1
Common Loon Nest Documented along the Shoreline of Thor Lake

3.6.1 Horned Grebe

One Horned Grebe was observed on Murky Lake during the July field program. The Horned Grebe has been assessed by COSEWIC as Special Concern (as of April 2009). This conservation status is imparted upon species whose inherent characteristics (e.g., low reproductive rates) make them sensitive to human activities or natural events. To date, the Horned Grebe is ranked by ENR as Secure and is not listed by SARA.

Horned Grebes occupy small ponds, wetlands, shallow lakeshores and protected bays, and other natural or man-made permanent or semi-permanent waterbodies (ENR 2010b; Government of Canada 2010). In the Yellowknife area, Horned Grebes were found to prefer lakes less than 1 hectare (ha) in size, although breeding also occurred on larger lakes as well (Fournier and Hines 1999). Favourable breeding ponds include areas of open water and emergent vegetation. Applicable habitat occurs within the local study area.

Horned Grebes are expected to arrive within the study area in May and depart by mid-August to early September (ENR 2010b). Due to the conservation status of Horned Grebes, occupied habitats are considered sensitive to disturbance.

3.7 BREEDING BIRD SURVEYS

A total of 39 breeding bird stations were surveyed within the study area from June 8 to 13 (Figure 3.7-1). A total of 199 breeding birds were recorded and an additional 138 birds were recorded as incidentals (either outside the survey station or outside the survey time) (Table 3.7-1). A total of 23 bird species were detected during the breeding bird survey, and an additional seven species (plus unknown grouse species, ptarmigan species, and woodpecker species) were detected as incidentals (Table 3.7-1). Of the species recorded during the breeding bird survey, the Yellow-rumped Warbler was by far the most common breeding bird detected (Photo 3.7-1), followed by Swainson's Thrush, Chipping Sparrow, and American Robin (Table 3.7-1).

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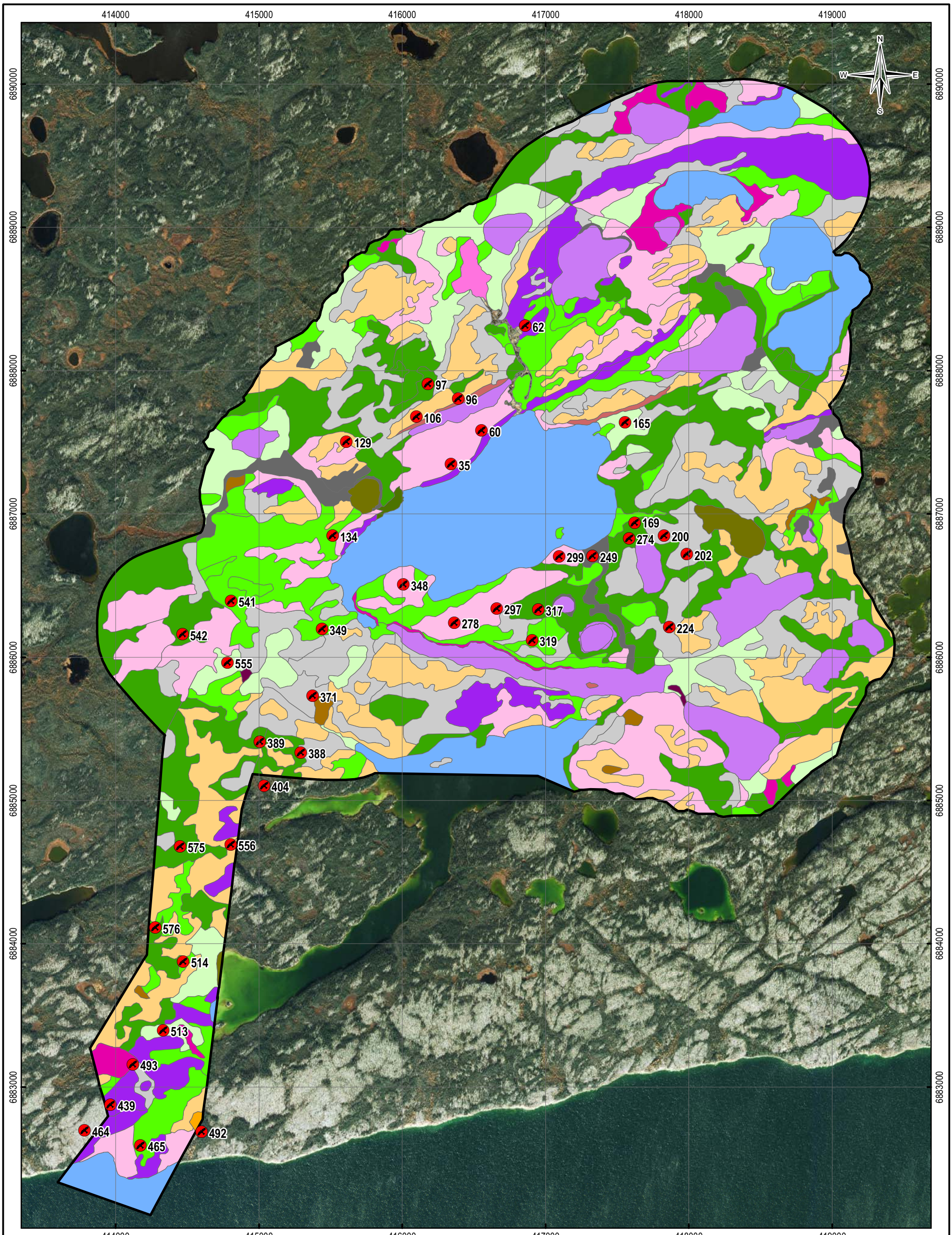

LEGEND

- Breeding Bird Station Location
- Local Study Area

Ecosystem Map Unit

- BF - black spruce-feathermoss-crowberry upland forest
- BG - black spruce-cloudberry-sphagnum moss bog forest
- BT - black spruce-tamarack-water sedge fen
- LA - lake
- LL - labrador tea-reindeer lichen-black spruce bog
- LW - lichen-bearberry woodland
- MI - mine
- OW - shallow open water
- PA - paper birch-aspen-willow forest
- PD - pond
- RL - bedrock-lichen-juniper-saxifrage
- RO - bedrock
- RW - rural/camp
- RZ - road surface
- SP - spruce-paper birch-toadflax forest
- SS - scrub birch-sweet gale-bog
- WA white spruce-green alder-prickly rose forest
- WB - water sedge-buckbean-arrow grass fen
- WH - white spruce-horsetail-glow moss forest

NOTES

Base data sources:
Stantec (2009) with additional areas mapped by EBA (2010),
Imagery supplied by Avalon (October, 2010)

THOR LAKE PROJECT

Breeding Bird Survey Locations

PROJECTION: UTM Zone 12	DATUM: NAD83		
Scale: 1:25,000 (500 250 0 500 Meters)			
FILE NO.: V15101007_007_Figure3_7-1_BreedingBird.mxd			
PROJECT NO.: V15101007.007	DWN: MEZ	CKD: KL	REV: 1
OFFICE: EBA-VANC	DATE: November 9, 2010		

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Figure 3.7-1

Photo 3.7-1
Yellow-rumped Warblers were the Most Common Bird Recorded During the Breeding Bird Surveys

TABLE 3.7-1: SUMMARY OF BIRD OBSERVATIONS DURING THE BREEDING BIRD SURVEY, JUNE 8-13, 2010

Species	Number of Observations during the Breeding Bird Survey	Number of Incidental Observations during the Breeding Bird Survey	Total Number of Observations
Alder Flycatcher	0	2	2
American Robin	18	21	39
Blackpoll Warbler	5	0	5
Bohemian Waxwing	4	1	5
Cape May Warbler	2	0	2
Chipping Sparrow	25	6	31
Common Redpoll	0	3	3
Common Yellowthroat	1	0	1

TABLE 3.7-1: SUMMARY OF BIRD OBSERVATIONS DURING THE BREEDING BIRD SURVEY, JUNE 8-13, 2010			
Species	Number of Observations during the Breeding Bird Survey	Number of Incidental Observations during the Breeding Bird Survey	Total Number of Observations
Dark-eyed Junco	9	3	12
Gray Jay	3	2	5
Grouse Species	0	4	4
Hairy Woodpecker	1	0	1
Lincoln's Sparrow	9	1	10
Northern Flicker	0	2	2
Northern Waterthrush	2	0	2
Olive-sided Flycatcher	8	7	15
Orange-crowned Warbler	2	0	2
Palm Warbler	12	1	13
Pine Grosbeak	1	0	1
Ptarmigan species	0	14	14
Ruby-crowned Kinglet	6	12	18
Spruce Grouse	1	0	1
Swainson's Thrush	39	24	63
Swamp Sparrow	1	0	1
American Tree Swallow	0	1	1
White-crowned Sparrow	0	1	1
White-throated Sparrow	0	4	4
Wilson's Snipe	4	3	7
Woodpecker species	1	16	17
Yellow Warbler	2	0	2
Yellow-bellied Sapsucker	0	4	4
Yellow-rumped Warbler	42	7	49
Total Observations	**199**	**138**	**337**

An additional 124 breeding birds (including sign) were recorded during other wildlife surveys conducted during the June and July field events. In particular, seven additional species not recorded during breeding bird surveys were documented including Eastern Phoebe, Rusty Blackbird, American Three-toed Woodpecker, Boreal Chickadee, Common Nighthawk, Least Flycatcher, and Pine Siskin.

Large homogeneous habitats were targeted for the breeding bird survey; however, some habitats exist throughout the landscape as small polygons within these larger habitats. Due to the scale of ELC mapping, these small polygons may have been included within the larger habitat. Therefore, Breeding Bird survey locations within these small habitat polygons may be mapped as the larger habitat in the ELC. Since birds occupy habitats at a scale smaller than the ELC mapping, the habitat type described at the breeding bird station

during the field investigation were used in the data analysis. Therefore, the habitat type at the breeding bird station may not correspond to the mapped ELC habitats presented in Figure 3.7-1.

Based on the ELC classification, a total of 13 different habitat types (excluding lakes, ponds, shallow open water, and camp/mine related infrastructure) were mapped within the local study area. Of these different habitat types, the study area is dominated by Lichen-Bearberry Woodland (LW), Spruce-Paper Birch-Toadflax Forest (SP), and Black Spruce-Cloudberry-Sphagnum Moss Bog Forest (BG) habitats. A total of eight habitat types were surveyed during the 2010 breeding bird surveys (Table 3.7-2). During the breeding bird surveys, Black Spruce-Cloudberry-Sphagnum Moss Bog Forest (BG), White Spruce-Green Alder-Prickly Rose Forest (WA), and Black Spruce-Tamarack-Water Sedge Fen (BT) were the most surveyed habitats (Table 3.7-2).

Of the available habitats surveyed during the breeding bird survey, excluding habitats with only a single survey station (e.g., Water Sedge-Buckbean-Arrow Grass-Fen [WB]), the Black Spruce-Feathermoss-Crowberry Upland Forest (BF) and White Spruce-Green Alder-Prickly Rose Forest (WA) habitats had the highest average number of birds detected per station (Table 3.7-2). While the Lichen-Bearberry Woodland (LW) and Bedrock-Lichen-Juniper-Saxifrage (RL) habitats had the lowest average number of detections (Table 3.7-2).

In addition, species diversity (the number of species and their total abundance in a community) amongst habitats was calculated. Communities with a large number of species that are evenly distributed (community is not dominated by one or a few species) are the most diverse. Using the Shannon-Wiener Index, habitat types with the highest species diversity included the Black Spruce-Tamarack-Water Sedge Fen (BT) and the Black Spruce-Cloudberry-Sphagnum Moss Bog Forest (BG) (Table 3.7-2). Bedrock-Lichen-Juniper-Saxifrage (RL) and Lichen-Bearberry Woodland (LW) habitats exhibited the lowest species diversity (Table 3.7-2).

TABLE 3.7-2: SUMMARY OF BREEDING BIRD SURVEY RESULTS, JUNE 2010

Habitat Type	Total Number Surveyed	Total No. of Birds Detected (Total Abundance)	Average No. of Birds Detected per Station	Total No. of Species Detected (Species Richness)	Diversity Index (Shannon-Wiener Index)
Black Spruce-Feathermoss-Crowberry Upland Forest (BF)	4	25	6.25	10	2.04
Black Spruce-Cloudberry-Sphagnum Moss Bog Forest (BG)	9	48	5.33	14	2.30
Black Spruce-Tamarack-Water Sedge Fen (BT)	6	29	4.83	12	2.32
Lichen-Bearberry Woodland (LW)	4	14	3.50	7	1.73

TABLE 3.7-2: SUMMARY OF BREEDING BIRD SURVEY RESULTS, JUNE 2010					
Habitat Type	Total Number Surveyed	Total No. of Birds Detected (Total Abundance)	Average No. of Birds Detected per Station	Total No. of Species Detected (Species Richness)	Diversity Index (Shannon-Wiener Index)
Bedrock-Lichen-Juniper-Saxifrage (RL)	3	12	4.00	7	1.70
Spruce-Paper Birch-Toadflax Forest (SP)	5	26	5.20	10	2.12
White Spruce-Green Alder-Prickly Rose Forest (WA)	7	39	5.57	9	1.97
Water Sedge-Buckbean-Arrow Grass Fen (WB)	1	6	-	5	1.56

Several bird species were recorded in multiple habitat types. The Swainson's Thrush, Chipping Sparrow, Yellow-rumped Warbler, and American Robin were recorded in six or more habitat types throughout the study area.

The Olive-sided Flycatcher, Rusty Blackbird, and Common Nighthawk are further discussed in Section 3.9 (Wildlife Habitat Assessment).

3.8 INCIDENTAL WILDLIFE OBSERVATIONS

Although the surveys conducted in the local study area focused on waterfowl and breeding birds (a survey suited primarily for the detection of passerines and other upland forest birds), all species and species sign observed during the 2010 field programs were recorded. Other species documented within the study area, particularly raptors, cranes and shorebirds, and mammals are presented here. All other incidental species observed during the June and July field programs are also expected breeders in the local and regional area.

3.8.1 Raptors

Two raptor species, Bald Eagle and Osprey were observed within the study area during the 2010 field programs. In addition, Common Raven, a functional raptor, were also documented. In total, eight observations of Bald Eagles, three observations of Ospreys, and five observations of Common Ravens were recorded at Thor, Long, and Fred lakes, the old mineral exploration site, and flying over inland areas. All three species are expected to be nesting in the local or regional area.

3.8.2 Cranes and Shorebirds

A total of four Sandhill Crane observations were recorded during the June and July field programs. Sandhill Cranes were observed along the shoreline of Thor Lake and at a small

pond between Ring and Buck lakes. In addition, Sandhill Cranes were heard vocalizing near Thorn and Cressy lakes.

In addition, 22 shorebirds were documented within the study area. These shorebirds were recorded as incidentals during the breeding bird, waterfowl, and/or wildlife habitat surveys. Of the 22 shorebirds documented, 14 Herring Gulls were recorded on multiple small and large lakes within the local study area. Six Lesser Yellowlegs (plus an active nest) were observed at small lakes, streams, and wetlands, 1 Solitary Sandpiper was observed at a small wetland, and 1 Spotted Sandpiper was recorded at a small lake within the study area.

3.8.3 Mammals

A total of 280 mammal observations, including 12 different species were recorded within the local study area (Table 3.8-1). Of these mammal observations, moose (Photo 3.8-1) were the most common species recorded, followed by snowshoe hare, black bear (Photo 3.8-2), and red squirrel.

Photo 3.8-1
Moose Sign as Willow Browse (shown here) Commonly Observed within the Study Area

Photo 3.8-2
Sign of Black Bear Foraging under Rocks to Feed on Ants/insects (foreground)

Moose and barren-ground caribou are further discussed in Section 3.9 (Wildlife Habitat Assessment).

TABLE 3.8-1: SUMMARY OF MAMMAL OBSERVATIONS, JUNE AND JULY, 2010

Species	Observations		
	Visual	Sign (tracks, pellet groups, etc.)	Total
Beaver	0	2 (lodges)	2
Black Bear	1	49 (tracks, feeding sign, scat)	50
Barren-ground Caribou	0	6 (antler shed, pellet groups)	6
Masked Shrew	1	0	1
Meadow Vole	1	0	1
Microtine species	0	4 (holes)	4
Moose	0	90	90
Northern River Otter	1*	0	1
Porcupine	0	8 (feeding sign areas)**	8
Red Fox	0	4 (scat)	4
Red Squirrel	4	37 (trails, middens, feeding sign)	41
Snowshoe Hare	3	61 (trails, pellet groups, feeding sign)	64
Wolf	0	8 (scat)	8

* Northern River Otter visual reported by Sheldon Boucher, Fort Resolution
** Porcupine feeding areas include areas with multiple trees showing debarking

3.9 WILDLIFE HABITAT ASSESSMENT

A total of ten broad habitat types available within the local study area were assessed for their ability to support the indicator species for specific life requisites and seasons (Table 3.9-1). These broad habitat types follow the regional vegetation mapping categories outlined by Stantec (2010a); however, for the purposes of classifying for wildlife habitat a few modifications were considered[2]. The wildlife habitat assessment relies on the characteristic vegetation species outlined for each ecosite by Stantec (2010a).

Indicator species selected for the wildlife habitat assessment possess inherently high conservation values for local stakeholders, have been previously identified as being important in other northern studies, are important harvestable species, are a representative species to local habitats, or are species with special conservation status know to occur within the local study area. Table 3.9-2 outlines the chosen indicator species.

TABLE 3.9-1: BROAD HABITAT TYPES WITHIN THE LOCAL STUDY AREA

Broad Habitat Type	Ecosite
Bedrock-Lichen	• Bedrock-Lichen-Juniper-Saxifrage • Lichen-Bearberry-Woodland
Spruce Upland	• Black Spruce-Feathermoss-Crowberry-Upland Forest • White Spruce-Green Alder-Prickly Rose-Upland Forest
Broadleaf Upland	• Paper Birch-Aspen-Willow-Forest
Mixed Upland	• Spruce-Paper Birch-Toadflax-Forest
Spruce Wet	• White Spruce-Horsetail-Glow Moss-Forest
Treed Fen	• Black Spruce-Tamarack-Water Sedge-Fen
Shrub Wet	• Labrador Tea-Reindeer Lichen-Black Spruce-Bog • Black Spruce-Cloudberry-Sphagnum Moss-Bog-Forest
Shrub Fen	• Scrub Birch-Sweet Gale-Bog Rosemary-Fen
Sedge Fen	• Water Sedge-Buckbean-Arrow Grass-Fen
Open Water	• Lake • Shallow Open Water • Pond

(Stantec 2010a)

[2] Stantec (2010b) categories both White Spruce-Horsetail-Gloss Moss-Forest (WH) and Black Spruce-Cloudberry-Sphagnum Moss-Bog-Forest (BG) into a single broad habitat type (Spruce Wet). However, for the purposes of the wildlife habitat assessment, these ecosites are considered separate and the Black Spruce-Cloudberry-Sphagnum Moss-Forest (BG) has been combined with the Labrador Tea-Reindeer Lichen-Black Spruce-Bog (LL) ecosite.

TABLE 3.9-2: SUMMARY OF INDICATOR SPECIES SELECTED FOR THE WILDLIFE HABITAT ASSESSMENT	
Indicator Species	Rationale
Moose	Important harvestable species and commonly assessed in other northern studies
Barren-ground Caribou	Important harvestable species and commonly assessed in other northern studies
Olive-sided Flycatcher	Species with special conservation status
Rusty Blackbird	Species with special conservation status and representative species for wetland and lake edges common in the local study area
Common Nighthawk	Species with special conservation status and representative species for open woodlands common in the local study area

Three main types of habitats provide for the life requisites of wildlife:

- Food Habitat: habitat that provides an animal the ability to obtain sufficient food to live and reproduce.
- Security Habitat: habitat that provides protection from predators or pests. This includes nesting and calving habitat.
- Over-wintering Habitat: habitat that provides protection from extreme cold or heat, and unrestricted movement within their range.

These habitat types are not necessarily mutually exclusive; the same area can, and often does, provide for more than one habitat need.

Based on the known indicator species – habitat interactions (see species summaries below), each broad habitat type was ranked on how well it provides select species life requisites. Each broad habitat wildlife assessment is summarized in Appendix E.

A summary of each indicator species important life requisites and seasons of use within the local study area are provided below.

3.9.1 Moose

In total, 90 moose pellet groups, tracks, and browse were documented throughout many of the habitat types present in the local study area. Moose are present throughout the year. Four seasons were defined for moose occurring within the local study area: spring (including calving), summer, fall, and winter.

Food Habitat

Moose are generally non-migratory and occupy habitats within the region throughout the year, including lakeshores, wetlands, and alder and willow stands. For feeding, moose prefer semi-open early successional habitats with an abundance of browse found on floodplains, wetlands, and regenerating burns and disturbance areas. Broad habitat types within the local study area that provide moderate to high levels of food habitat include: Broadleaf Upland, Mixed Upland, Spruce Wet, Shrub Fen, Sedge Fen, and Open Water

(refer to Appendix E). Preferred habitats, particularly during the fall and winter are those dominated by shrubs and deciduous trees (e.g., willow, aspen, balsam poplar, Saskatoon, chokecherry, Canada buffaloberry, rose, and red-osier dogwood); most conifer=dominated habitats provide sub-optimal moose feeding habitat.

During the spring and summer when forbs, grasses, and aquatic plants are available the use of browse material declines. The use of wet and aquatic habitats for food commonly occur during all non-winter months, but tend to peak during late June to early August when plant nutrition and digestibility are highest (Peek 1998).

Security Habitat

Moose require security from predators year-round and from insects in the summer. For security cover, moose seek forests or tall shrub stands to reduce detection from black bears and wolves. Shorelines and islands are also used to reduce predator encounters, particularly during calving (late May to early June (or spring under the wildlife habitat assessment)) (Van Ballenberghe 1987; ENR 2010). In addition, moose may use aquatic habitats (e.g., open water broad habitat types) or high, wind-exposed ridges from June to August to avoid insect harassment.

Over-wintering Habitat

Snow depth, food resources, and thermal cover are important factors limiting available moose over-wintering habitat. Areas with deep snow (greater than 60 cm) impede movement (Peel 1998). Particularly in the winter, moose travel along wind-exposed ridges to access feeding habitat (e.g., Bedrock-Lichen broad habitat types). Moose are exceptionally tolerant to cold, and show no affinity for particular thermal cover during winter, except during periods of intense blizzards when moose may seek shelter from the wind in forests.

3.9.2 Barren-ground Caribou

The study area lies at the border of the known Bathurst caribou herds' winter range. ENR (2010) indicates the Bathurst herd typically over-winter southeast of Great Bear Lake (between the communities of Wekweti, Wha Ti, and Gameti), but in some years the herd moves further south towards Yellowknife and Lutsel K'e. Winter (early November to mid April) was the only season of use assessed for caribou occurring within the local study area.

A total of six observations of caribou sign (antler shed and pellet groups) were documented within the study area during the June and July 2010 field programs (Photo 3.9-1). Sign was documented along the old mineral exploration road and within a Bedrock-Lichen habitat type.

Photo 3.9-1
Caribou Pellets Recorded Along the Old Mine Road

Feeding Habitat

Caribou from the Bathurst herd may occasionally over-winter within the study area. Occupied winter ranges are known to vary annually. Lichens are an important food for caribou all year, but especially during the winter. Sedges and evergreen leaves are also eaten during the winter (ENR 2010). Favourable winter foraging habitats include relatively open, mature spruce-lichen and pine-lichen forests. Bedrock-Lichen and Shrub Wet broad habitat types available within the local study area support moderate to high ranking winter forage resources for caribou.

However, ice crusted snow resulting from unseasonable thaws or freezing rain can make food unavailable and can stress caribou. During icing conditions, caribou will switch to arboreal lichens if available and/or will move to more favourable ranges. Arboreal lichens were documented within the study area primarily in the Black Spruce-Cloudberry-Sphagnum Moss-Bog Forests (Wet Shrub broad habitat type).

During times with low snowfall, caribou will also feed in richer valleys and low lying lakeshores and wetlands.

Security Habitat

In the winter, caribou require habitats that provide protection from predators. Wolves are the most important predator of caribou (ENR 2010) within the local study area. Caribou seek security from predators in the open such as frozen lakes (Carruthers et al. 1986).

Over-wintering Habitat

Barren-ground caribou are tolerant to cold temperatures, and can maintain body temperatures at air temperatures of at least -35 degrees Celsius without increasing their metabolic rates (Hart et al. 1961). However, at times of air lower temperatures and strong winds, caribou avoid lakes and other open areas and seek refuge in the forest (Kelsall 1968).

Caribou will often rest and travel in open habitat types (e.g., Open Water habitat types) where wind action has crusted and hardened the snow cover.

3.9.3 Olive-sided Flycatcher

A total of 22 Olive-sided Flycatchers were heard or seen within the local study area during the June and July field programs. Olive-sided Flycatchers were reported occupying seven different habitat types (or their edges).

Olive-sided Flycatchers are ranked by ENR as At Risk under the general status program and listed by SARA as Threatened (Schedule 1). By definition this species is likely to become endangered if the factors leading to its population decline are not reversed. Due to the conservation status of Olive-sided Flycatchers, occupied habitats are considered sensitive to disturbance.

A single season, non-winter, was defined for Olive-sided Flycatchers occurring within the local study area. This “non-winter” season of use includes nesting, fledging, and feeding.

Feeding Habitat

Typical Olive-sided Flycatcher habitat includes regenerating forests after a forest fire, edge habitats (including near man-made openings, bedrock outcrops, and lakeshores) with large trees and standing snags, and open to semi-open forest stands including treed bogs (Altman and Sallabanks 2000). Feeding occurs throughout all semi-open to open spaces, including over forest canopies, wherever flying insects occur. Olive-sided Flycatchers commonly forage from perches, snags or from dead-topped trees (Altmann and Sallabanks 2000). Therefore, for the purposes of the wildlife habitat assessment, broad habitat types were ranked based on the openness of the habitat. Habitat edges and the space above forest canopies were not considered, although these microhabitats are considered important for Olive-sided Flycatchers.

Within the local study area, Bedrock-Lichen, Shrub Wet, and Shrub Fen broad habitat types provide moderate to high habitat potential for feeding Olive-sided Flycatchers.

Security Habitat

Security habitat (*ie.* nesting habitat) for the Olive-sided Flycatcher is similar to its required feeding habitat. Olive-sided Flycatchers commonly construct nests in coniferous trees present within appropriate feeding habitat. Aspen and willow have also been used as nesting substrates (Altmann and Sallabanks 2000).

Moderate to High ranking security habitat available within the local study area for Olive-sided Flycatchers were Bedrock-Lichen and Shrub Wet. Shrub Fen habitat types likely do not include sufficient nesting substrates to provide secured nesting sites.

Over-wintering Habitat

Olive-sided Flycatchers are expected to arrive in the study area by late May or early June and depart in late July to early August (ENR 2010b). Olive-sided Flycatchers do not remain within the local study area during the winter.

3.9.4 Rusty Blackbird

One Rusty Blackbird was observed within the study area during the aerial waterfowl survey conducted in June. This Rusty Blackbird was detected at the edge of an unnamed pond.

Rusty Blackbirds are listed by SARA as Special Concern (Schedule 1) and ranked by ENR as May Be At Risk. By definition this species possesses inherent characteristics (e.g., specific habitat requirements) that make them sensitive to human activities or natural events. Rusty Blackbird habitat occurs throughout the study area. Due to the conservation status of Rusty Blackbirds, occupied habitats are considered sensitive to disturbance.

A single season, non-winter, was defined for Rusty Blackbirds occurring within the local study area. This "non-winter" season of use includes nesting, fledging, and feeding.

Feeding Habitat

Rusty Blackbirds forage primarily on the ground along the edges of ponds, wetlands, and streams for aquatic and terrestrial insects and plant materials (e.g., seeds and fruits) (Avery 1995). Typical feeding habitat consists of wet coniferous and mixed forests, such as fens, bogs, muskegs, beaver ponds, and swampy shores along lakes and streams (Avery 1995; ENR 2010b). Moderate and high ranking feeding habitats within the local study area include: Treed Fen, Shrub Fen, and Sedge Fen habitats adjacent to lakes, ponds, and other areas of open water.

Security Habitat

Nest sites are commonly located in dense and thick areas of vegetation, close to the water in either dead or alive trees or shrubs (Avery 1995). Typical trees and shrubs chosen for nesting substrates include: spruce, tamarack, willow, birch, and alder (Avery 1995). Similar to the feeding habitat, this species nests along bogs, swampy shorelines, beaver ponds, and

streams wherever appropriate nesting substrates exist (Avery 1995; ENR 2010b). Within the local study area Treed and Shrub fens broad habitat types provide appropriate nesting habitat.

Over-wintering Habitat

Rusty Blackbirds may arrive in the study area as early as April to early May and depart by mid-October (Bird Studies Canada et al. 2010; Bromley and Trauger ND).

3.9.5 Common Nighthawk

A single Common Nighthawk was recorded during the June and July field programs. This Common Nighthawk was incidentally heard at dusk near camp.

Common Nighthawks are listed by SARA as Threatened (Schedule 1) and ranked by ENR as At Risk. This conservation status is imparted upon species that are likely to become endangered if the factors leading to its population decline are not reversed. Due to the conservation status of Common Nighthawks, occupied habitats are considered sensitive to disturbance.

A single season, non-winter, was defined for Common Nighthawks occurring within the local study area. This "non-winter" season of use includes nesting, fledging, and feeding

Feeding Habitat

Common Nighthawks feed on flying insects at dawn and dusk. Their preferred feeding habitat includes areas with an abundance of insects, such as open forests (e.g., Bedrock-Lichen and Shrub Wet broad habitat types), forest clearings, recent burn and logged areas, rock outcrops, wetlands and marshes (e.g., Treed, Shrub, and Sedge fen broad habitat types) open water habitat types (including lakes and rivers), and gravel areas (including airstrips and roads).

For the purposes of the wildlife habitat assessment, broad habitat types were ranked based on the openness of the habitat. Habitat edges and the space above forest canopies were not considered, even though these microhabitats are considered important for Common Nighthawks.

Security Habitat

Nests are prepared directly on the bare soil, sand, gravel, and rock in open feeding habitats. Nests are typically in the open or near logs, boulders, grass clumps, or shrubs (Poulin et al. 1996). Appropriate Common Nighthawk nesting habitat exists within the Bedrock-Lichen broad habitat type, as well as at old mine or mineral exploration sites, roads, and airstrips not included within the wildlife habitat assessment.

Over-wintering Habitat

Common Nighthawks are one of the last migratory birds to arrive on their breeding sites and the earliest to depart (Poulin et al. 1996). They are thought to arrive in the study area by mid May to early June and depart by mid August to mid September (ENR 2010b). Common Nighthawk do not over-winter within the local study area.

4.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

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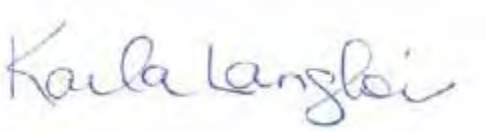

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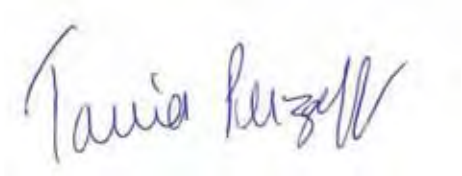

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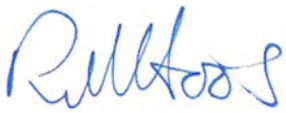

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