REPORT ON

BASELINE VEGETATION AND WILDLIFE STUDIES FOR THE FORT A LA CORNE JOINT VENTURE ADVANCED EXPLORATION PROGRAM 2004 - 2005

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1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) is in the advanced exploration phase of the Joint Venture (JV) Fort a la Corne Project in central Saskatchewan. Currently, the JV expects that continued advanced exploration and evaluation activities will occur from January 2005 through December 2008. A prefeasibility study will be initiated in January 2008 and continue until January 2010, with the final feasibility and production decision completed in January 2011. Assuming that the production decision is positive and the JV will begin construction of the mine in 2011/2012, then the environmental assessment and permitting process needs to begin in August 2009. This means that an Environmental Assessment Report must be submitted to provincial and federal agencies by August 2010.

The JV and Golder Associates Ltd. developed a draft work plan for a "Global Permitting and Environmental Strategy" for the Project. The strategy involved initiating some baseline work in 2005 with the majority of baseline studies being initiated in 2007. In addition, operating studies during the advanced exploration and evaluation phase have been completed in 2004 and 2005 (*e.g.*, heritage and sensitive plant and wildlife species assessments). The purpose of this report is to provide a summary of the vegetation and wildlife data collected during operating and baseline studies. A summary of archaeology and hydrology studies are provided in separate documents.

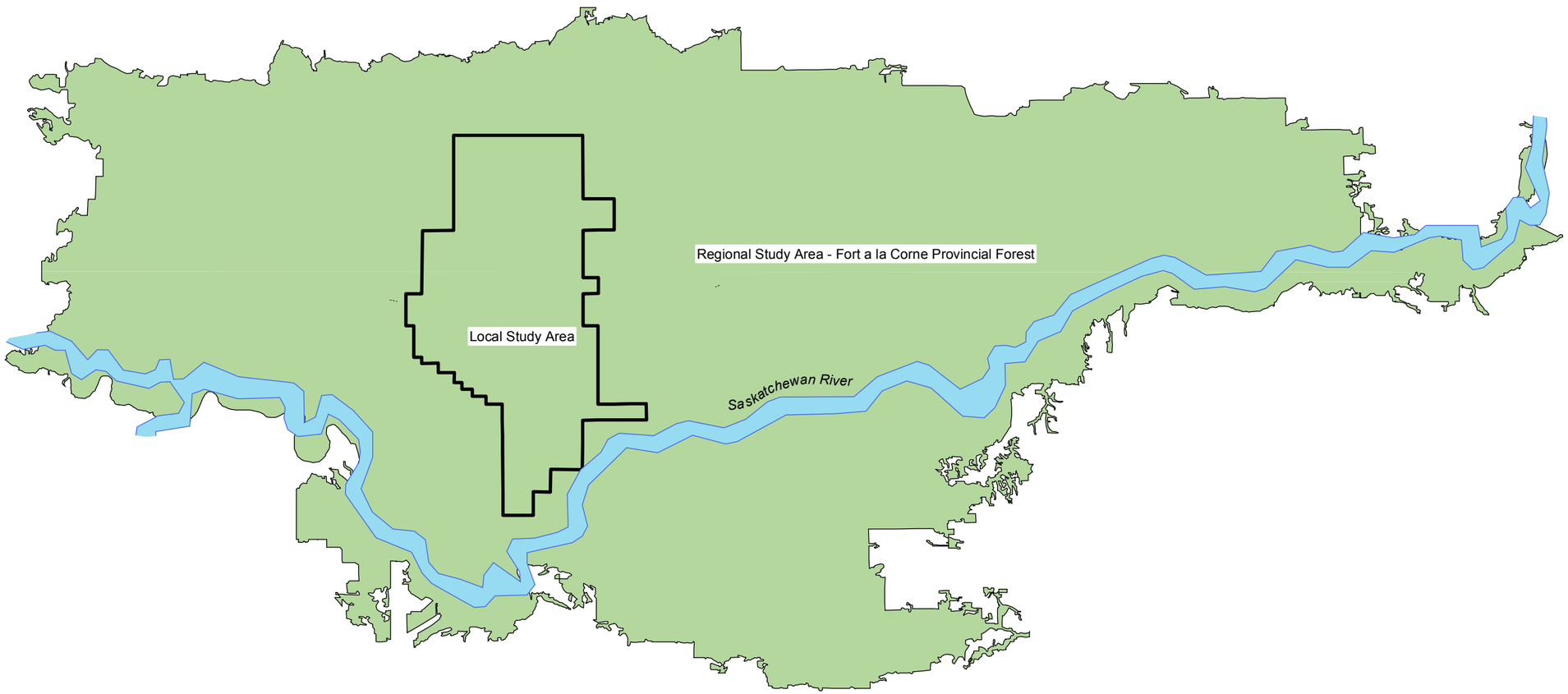
2.0 STUDY AREA

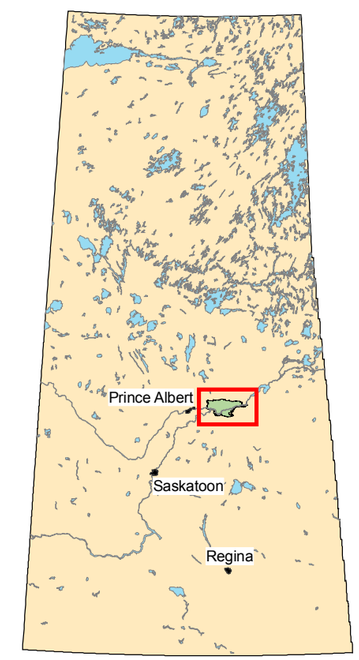
The JV advanced exploration program is located on Crown land within the Fort a la Corne Provincial Forest, which is administered by Saskatchewan Environment (SE). All project components are located in a geographic area encompassed by the Fort a la Corne Integrated Forest Land Use Plan sited within a landscape that is designated as Resource Management and Resource Conservation Areas under the Plan (SE 1999). Furthermore, the Fort a la Corne Provincial Forest is designated as a Wildlife Management Unit to preserve and protect wildlife and wildlife habitat within its boundaries. Specifically, the project is located in Townships 48 and 49, Range 20 W3M, approximately 55 km east of Prince Albert.

The Regional Study Area (RSA) for the project is defined as the Fort a la Corne Provincial Forest and comprises 137,750 ha (Figure 2-1). Within the RSA, the JV Lease boundary or Local Study Area (LSA) containing the kimberlite sites is 12,985 ha, centrally located in the Forest (Figure 2-1). The RSA is an island forest surrounded by open agricultural land with pockets of forested land and pastures that provides suitable habitat for a wide variety of wildlife species. This area lies within the Boreal Transition Ecoregion of central Saskatchewan. The Boreal Transition Ecoregion is characterized as the southern advance of the boreal forest and the northern limit of airable agriculture. The occurrence of a number of species in the RSA is largely due to the proximity of the Saskatchewan River, and its associated drainages and riparian habitats that provide travel corridors for wildlife.

The forest community within the RSA has been influenced by both natural and anthropogenic disturbances. Fires have occurred periodically throughout the area during the past several decades, and one of the most recent fires burned a large area in 1989 (*i.e.*, Henderson fire). In addition, small scale forestry activities, such as cutovers and silviculture plantations, have been conducted since the turn of the century, and primary access roads have been constructed. Diamond exploration was initiated in 1989 and has generated a number of access trails and drill pads. These natural and human-related disturbances have resulted in a patchwork of forest stand types in various stages of succession. The current land base of the Fort a la Corne Provincial Forest comprises approximately 79,493 ha (60%) timber producing land, 33,861 ha (25.5%) productive non-forest, 18,038 ha (13.5%) non-timber producing land, and 1,110 ha (1%) water.

The RSA offers a diversity of habitats for a wide variety of mammalian species, including a number of economically important game species such as elk, moose, white-tailed deer, black bears, and furbearers such as beaver and muskrat (SE 1999). Other mammals that may be found include red fox, raccoon, coyote, red squirrel, and the northern short-tailed shrew (Acton *et al.* 1998).





Key Map

5 0 5
SCALE 1:250,000 KM

NAD 27 Zone 13

PROJECT
JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE
LOCATION OF THE REGIONAL AND LOCAL STUDY AREA FOR THE JOINT VENTURE ADVANCED EXPLORATION PROGRAM

Golder Associates
Saskatoon, Saskatchewan

PROJECT		06-1361-278	FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	**FIGURE: 2-1**
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REVIEW			

G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers Regional and Local Study Area_Fig2-1

Land within the RSA is classified as having high capability for the production of ungulates (CLI 1974) and limitations for the production of waterfowl (CLI 1976). Based on ungulate aerial surveys during 1987-88, the number of moose in the Fort a la Corne Forest Reserve (1,401 km^2) was approximately 427 animals (0.3 moose per km^2) (SE 1996). Although aerial surveys have not recently been completed, field reports suggest that the Fort a la Corne moose population is stable (Arsenault 2005).

Long-term Breeding Bird Survey routes are conducted annually in the boreal forest fringe of the Canadian prairies. A route surveyed in the forest fringe of Saskatchewan has historically recorded the highest species richness for routes in Canada (Cumming *et al.* 2001). "Breeding birds" is the term used to refer to songbirds from the Order Passeriformes (also know as passerines). Of the 26 species of warblers that breed or probably breed in Saskatchewan, 23 are suspected to nest in the southern boreal region (Smith 1996), which likely includes the Fort a la Corne Forest. Such species diversity may be a result of the wide variety of habitat niches in the Fort a la Corne forest stands and wetlands, peat bog/fen habitats, and riparian areas within the watershed of the North Saskatchewan River.

3.0 VEGETATION

3.1 Objectives

The objectives of the vegetation studies were to:

- classify coarse-scale vegetation communities within the RSA and LSA; and,
- determine the presence of federal and territorial listed plant species within the LSA, and potential rare plant habitat.

3.2 Methods

3.2.1 Coarse-scale Vegetation Classification

A landscape satellite (LandSat) image for 1988 (*i.e.*, pre-exploration period) was obtained for the RSA and surrounding area (pixel size = 25 m), and geo-referenced using existing roads, rivers, and streams from the 1:50,000 NTDB map sheets (73H/2, 73H/7). The image was then incorporated into the ArcView Geographical Information System (GIS) platform, and the Henderson burn was overlaid on the LandSat image. An image processing software program was used to generate an unsupervised classification of the broad land cover (vegetation or habitat) types. In the future, training areas will be acquired to provide a supervised vegetation classification of the RSA (which includes the LSA).

The boundary for the RSA was digitally delineated on the LandSat image by referring to the 1:250,000 NTS map sheet and approximating the boundary of the Fort a la Corne Provincial Forest. The boundaries for the LSA and kimberlite target sites were digitally mapped from survey information and incorporated into the GIS database as separate themes. Primary access roads within the RSA (*e.g.*, Division Road West, Shipman Trail, Torch Trail, and Lars Road) were assumed to have a right-of-way of 30 m. Using the GIS program, the area of each land cover type was calculated for the RSA and LSA.

3.2.2 Vegetation and Rare Plant Surveys

The Saskatchewan Conservation Data Center (SCDC) has developed a list of sensitive plant species in the province. This list incorporates both a tracking list for provincial listed sensitive species, as well as the national list produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA).

The SCDC database was reviewed to determine the potential for sensitive plant species occurrences in the RSA (which includes the LSA and associated kimberlite sites). No documented plant records for the RSA were produced. There are no COSEWIC (2005), or associated SARA-listed plant species recorded for the area, nor are there any plant species listed in the regulations of *The Wildlife Act* (1997) or the Saskatchewan Activity Restriction Guidelines for Sensitive Species in Natural Habitats (SE 2003) that have ranges that may be encountered.

However, a habitat-based assessment of the Fort a La Corne Provincial Forest area produced a provincial list of potential, vulnerable, and threatened plant species for the LSA (Table 3-1). The majority of the plant species that may potentially be found are associated with wetland habitats such as bogs, fens, wet meadows, and riparian areas. The remaining species are associated with pine forest, mixed woods, or open habitats. No COSEWIC listed plant species are likely to occur in the LSA.

Table 3-1
Potential Sensitive Vascular Plant Species in the Local Study Area

Scientific Name[(a)]	Common Name	Status[(b)]		Habitat
Andromeda glacophyllla	Glaucous Leaved Bog Rosemary	VUL	S2	Bog
Canadanthus modestus	Large Northern Aster	THR	S2	Moist Woods
Botrychium lunaria	Common Moonwort	THR	S1	Meadow
Cardamine pratensis	Cuckoo Flower	THR	S2	Bog
Carex buxbaumii	Brown Sedge	VUL	S2	Bog/Fen
Carex echinata ssp echinata	Prickly Sedge	THR	S1	Bog/Marsh
Carex eburnea	Bristle Leaved Sedge	VUL	S2	Wet woods
Carex garberi	Garber's Sedge	VUL	S2	Bog/Marsh
Cirsium muticum	Swamp Thistle	VUL	S2	Wet woods
Corallorrhiza striata	Stripped Coralroot	VUL	S2S3	Woods
Cypripedium arietinum	Ram's Head Lady's Slipper	END	S1	Pinewoods
Drosera linearis	Narrow-Leaved Sundew	VUL	S1	Bog/Fen
Eleocharis elliptica	Slender Spike-Rush	THR	S2	Bog/Fen
Elymus diversiglumis	Texas Wild-Rye	THR	S2	Woods
Erigeron hyssopifolius	Hyssop-Leaved Fleabane	THR	S2	Fen
Erigeron strigosus var strigosus	Daisy Fleabane	THR	S2S3	Clearings
Liparis loeselii	Bog Twayblade	VUL	S1S2	Fen
Listera borealis	Northern Twayblade	THR	S1	Seep/Bog
Lomatogonium rotatum	Marsh Felwort	VUL	S2	Meadow
Lonicera oblongfolia	Swampfly Honeysuckle	THR	S2	Wet woods
Luzula acuminate var acuminata	Hairy Wood-Rush	THR	S1S2	Fen
Luzula multiflora	Many Flowered Wood-Rush	VUL	S2T[2]	Meadow
Malaxis brachypoda	White Bog Adder's Mouth Orchid	VUL	S1S2	Bog
Nymphaea tetragona var leibergii	Small White Water Lily	THR	S2T[2]	Calm water
Parnassia glauca	Glaucous Grass-of-Parnassus	VUL	S2	Fen
Pedicularis macrodonta	Purple Swamp Lousewort	VUL	S2	Bog/Fen
Pinguicula vulgaris	Common Butterwort	VUL	S2S3	Fen
Polygala paucifolia	Fringed Milkwort	VUL	S2	Bog/Fen
Potentilla nivea ssp subquinata	Five-Foliate Cinquefoil	VUL	S2	Pinewoods
Potamogeton strictifolius	Upright Narrow Leaved Pondweed	THR	S2	Calm water
Rhynchospora alba	White Beaked Rush	VUL	S2S3	Bog/Fen
Rhynchospora capillacea	Hair-Like Beaked Rush	THR	S2	Fen/Bog
Rosa blanda var blanda	Smooth Wild Rose	THR	S1S2	Woods
Selaginella selaginoides	Northern Spike Moss	THR	S2	Bog/Fen
Taraxacum ceratophorum	Horned Dandelion	VUL	S2	Meadow

Note: a = Based on Harms 2003

b = S2T - status uncertain due to recent taxonomy updates

Since August 2004, seven vegetation surveys have been completed within the LSA. Surveys included site evaluations for rare plant potential, presence of listed plant species, and collection of vegetation variables such as canopy height and closure, and canopy and understorey composition. Surveyed sites included proposed drill pads, access trails and laydown areas, and habitat adjacent to constructed drill pads (Table 3-2). Surveys followed guidelines established by the Saskatchewan Native Plant Society, which are accepted by SE, and were completed during spring, summer, and autumn.

Table 3-2
List of Vegetation Surveys Completed During 2004 and 2005 in the Local Study Area

Date	Number and Type of Sites
August 16, 2004	4 drill pad sites
August 18-20, 2004	36 drill pad sites
September 9-10, 2004	15 infrastructure sites, road right-of-ways, and existing drill pads
November 3-5, 2004	12 ore bodies, 4 exploratory bore hole pads and extension to already approved drill pad
June 6-11, 2005	3 priority sites with high rare plant potential habitat, 7 ore bodies with “wet” conditions, and random sites in different habitats
July 11-15, 2005	3 priority sites with high rare plant potential habitat, 7 ore bodies with “wet” conditions, and random sites in different habitats
12-October, 2005	New proposed activity sites in ore body 147

3.3 Results

3.3.1 Coarse-scale Vegetation Classification

In general, the majority of the forest in the RSA is short in stature between 5 m to 10 m in height comprised of a mix of regenerating jack pine and trembling aspen as well as stocked silviculture plantations. Mature stands of trees are typically restricted to the margins of drainages and wetlands, and isolated patches of upland. Drainages and depressions in the RSA support a mix of bogs and fens, which are composed of black spruce, tamarack, and shrubs (*e.g.*, alder and willow species). Riparian and wetland areas support vegetation that ranges from treed areas of trembling aspen and balsam poplar with dense tall shrubs such as willows and alder to open graminoid meadows dominated by sedges and grasses. Marsh areas are typically composed of cattails, bulrushes, reeds, and submergent vegetation. Natural springs and seeps may also occur in the region (Acton *et al.* 1998). Also present are small and isolated open areas or clearings, which support grassland areas.

Results from the LandSat classification generated the following coarse-scale land cover classes.

Conifer: consisting of jack pine with an under story dominated by bearberry, rose and lichen, or black spruce with an understorey of Labrador tea, dry ground cranberry, and feather moss.

Deciduous: consisting of aspen and poplar with an under story of alder, bedstraw, and feather moss.

Mixed wood: consisting of jack pine and aspen (and poplar) with an under story which includes bunchberry, snowberry, feather moss and lichen, or aspen (and poplar) and white spruce with alder, willow, twinflower, and feather moss.

Agriculture or cutovers: recent timber harvest or silviculture areas.

Wetlands: includes bogs, fens, and marshes.

Burn: recent Henderson burn.

Water: includes lakes, rivers, and streams.

Roads: includes all primary and secondary roads wide enough to be classified with a 25 m resolution.

At the scale of the RSA, conifer and mixed wood accounted for over 70% of the land cover types (Table 3-3; Figure 3-1). Deciduous stands accounted for 10%, while the Henderson burn and wetlands comprised approximately 8% and 6%, respectively. Lakes, streams, and rivers made up 3% of the Fort a la Corne Forest. Within the LSA, conifer and mixed wood stands made up 63% of the broad land cover types, while deciduous stands accounted for 5%, and the Henderson burn accounted for about 22% (Table 3-3; Figure 3-2). Fens, bogs, and marshes comprised 8% of the LSA, and water bodies constituted less than 0.5%. For both the RSA and LSA, recent cutovers, agriculture, and roads comprised less than 3% of land cover types.

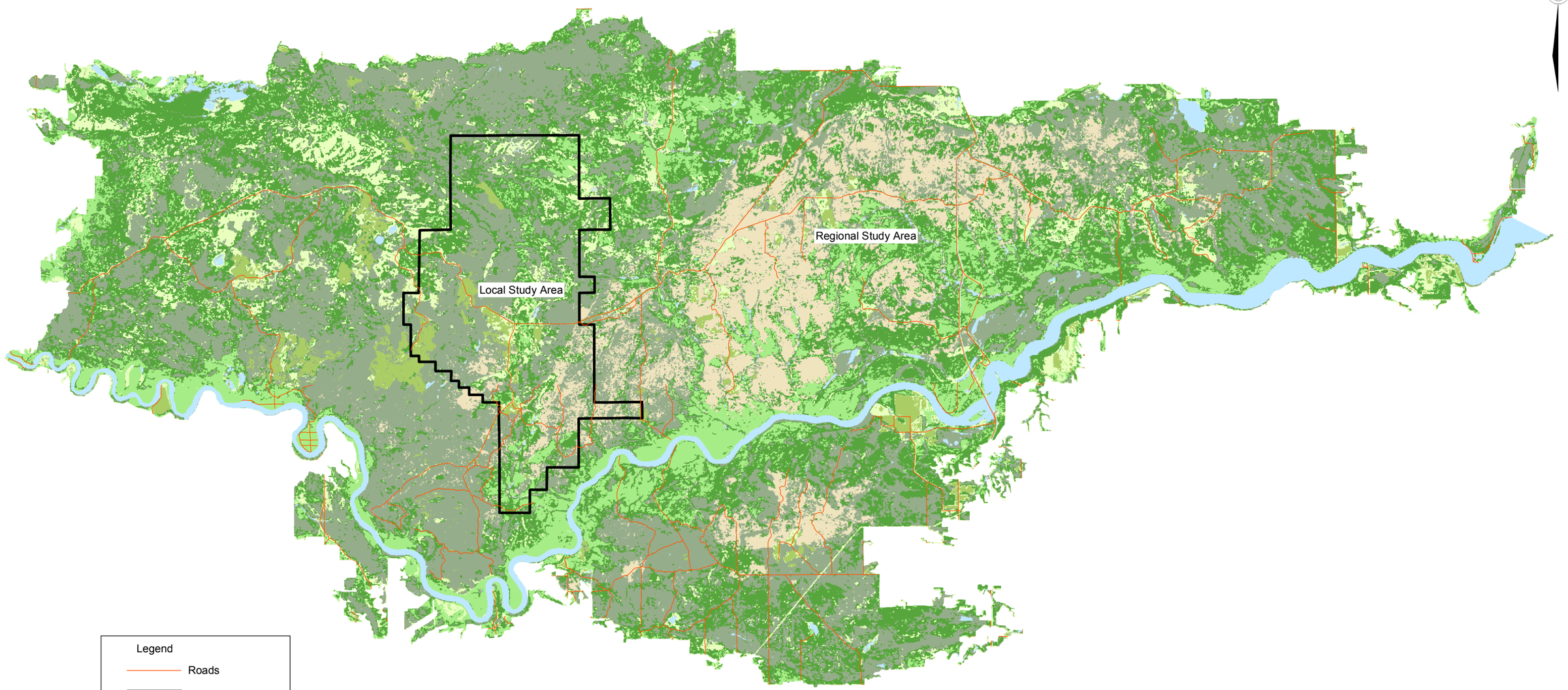
Table 3-3
Area and Percentage of Land Cover Types in the Regional Study Area and Local Study Area

Land Cover Class	Regional Study Area (ha)	Percentage of Regional Study Area	Local Study Area (ha)	Percentage of Local Study Area
Recent Burn	10557.8	7.7	2789.3	21.5
Conifer	55951.2	40.6	5330.3	41.0
Deciduous	14172.3	10.3	607.7	4.7
Mixed wood	42420.7	30.8	2821.8	21.7
Agriculture or Cutover	1420.6	1.0	293.4	2.3
Water	3831.2	2.8	27.4	0.2
Wetland	9117.7	6.6	1087.8	8.4
Road	278.6	0.2	27.6	0.2
Total	**137750**	**100**	**12985**	**100**

3.3.2 Vegetation and Rare Plant Surveys

The LSA consists of a mosaic of forest types in various successional stages that are dominated by jack pine, black spruce, and trembling aspen, and interspersed with tamarack and balsam poplar. While there are patches of undisturbed mature stands, the forest community has largely been disturbed as a result of forest harvesting and replanting, fires, and previous mineral exploration. Habitat types in the LSA are considered to have low to moderate potential for supporting listed vegetation species. Wetlands and riparian areas are considered to have moderate potential. However, because these areas were avoided during planning for the proposed drill pads and infrastructure sites, the potential for encountering listed vegetation species was low. A complete list of sites visited and vegetation descriptions are provided in Appendix I.

Surveys identified three provincial-tracked species in the LSA. A number of individuals of Broad Leaf (Leathery) Grape Fern (*Botrychium multifidum*) were observed in a meadow on and adjacent to kimberlite body 147 (Figure 3-3). This fern species, while on the provincial tracking list, is classified as an S3 ranked species (rare to uncommon) and is considered as “borderline” rare since Harms *et al.* (1992) have excluded it from their listing of Rare and Endangered Native Vascular Plants of Saskatchewan, as well as his Checklist of the Vascular Plants of Saskatchewan and the Provincially and Nationally Rare Native Plants in Saskatchewan (Harms 2003). While the plant is considered uncommon, it is broadly distributed across the province (Figure 3-4). It was advised that the JV plan to leave an undisturbed portion of the meadow habitat that support the local fern population.



Legend

- Roads
- Water
- Wetland
- Agriculture/Cutover
- Burn
- Conifer
- Deciduous
- Mixed Wood

4 0 4
SCALE 1:200,000 KM

NAD 27 Zone 13

PROJECT
JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE
LANDCOVER CLASSIFICATION FOR THE REGIONAL STUDY AREA

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	**FIGURE: 3-1**
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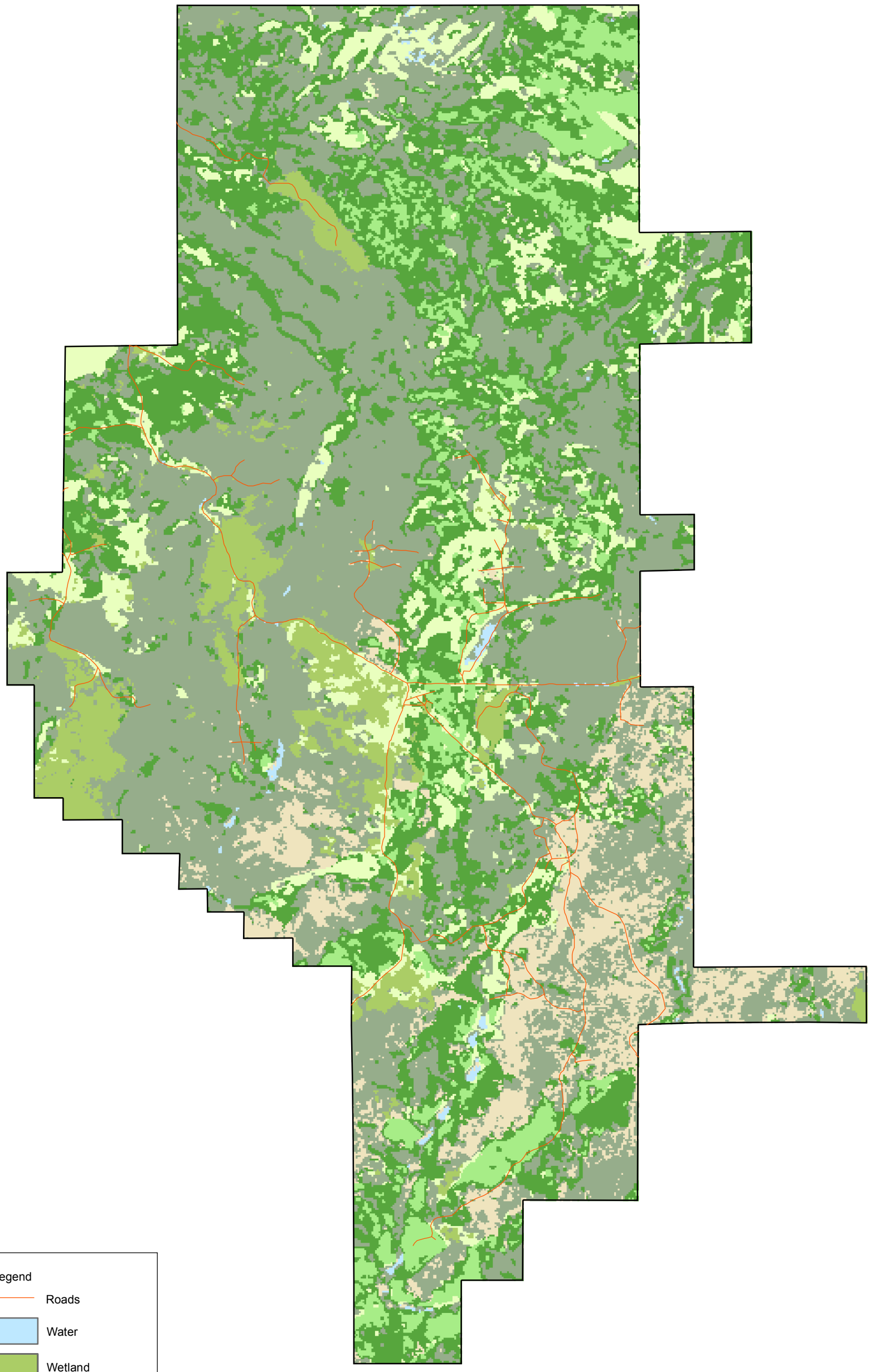
G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers 2006 Landcover Classification for the Regional Study Area Fig3-1.mxd

G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers Landcover classification for the local study area Fig3-2.mxd



Legend

- Roads
- Water
- Wetland
- Agriculture/Cutover
- Burn
- Conifer
- Deciduous
- Mixed Wood

1,500 0 1,500

SCALE 1:60,000 METRES

NAD 27 Zone 13

PROJECT

JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE

LANDCOVER CLASSIFICATION WITHIN THE LOCAL STUDY AREA

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	**FIGURE: 3-2**
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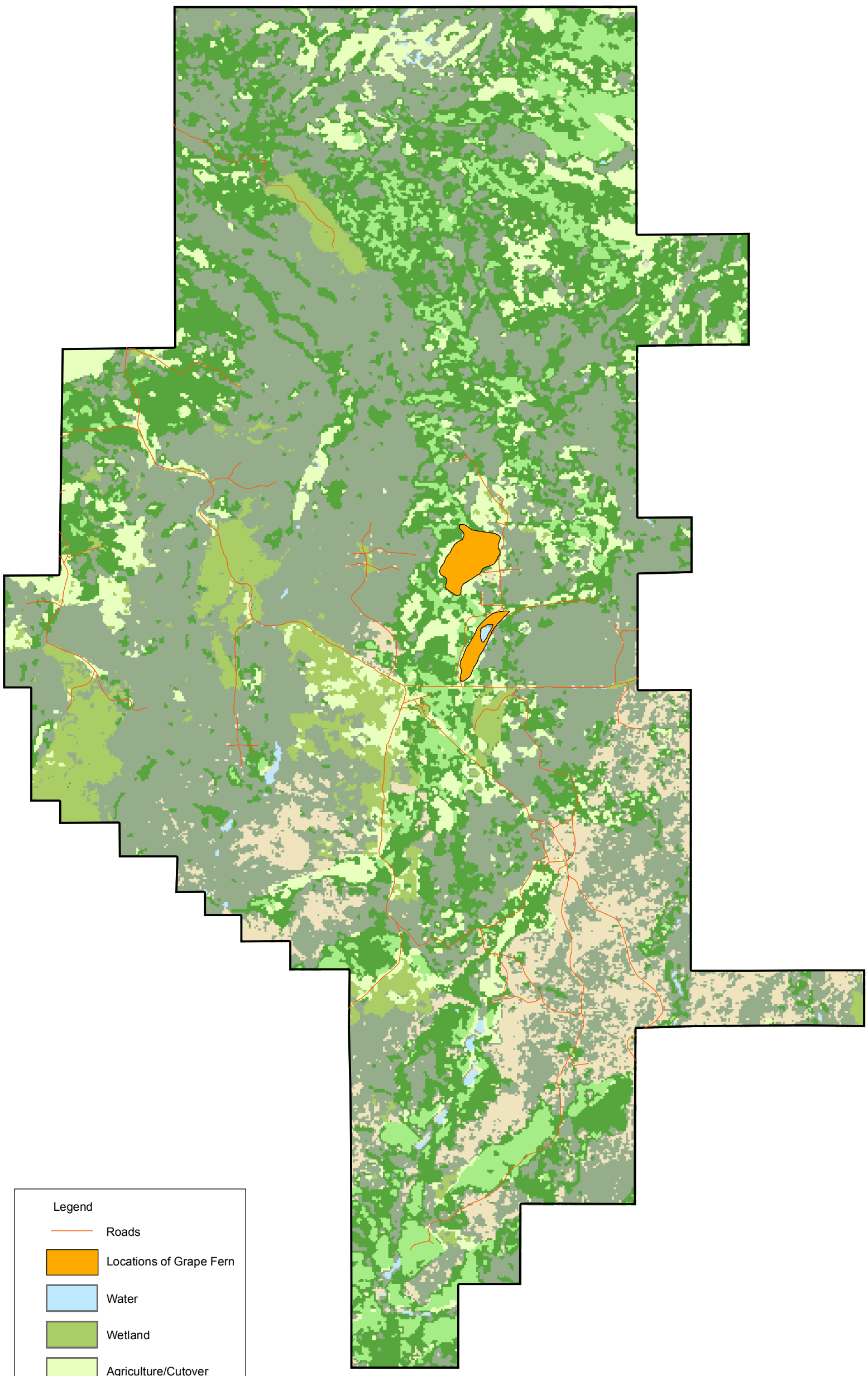
G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers 2006 Locations of the Grape Fern in the Local Study Area Fig3-3.mxd



Legend

- Roads
- Locations of Grape Fern
- Water
- Wetland
- Agriculture/Cutover
- Burn
- Conifer
- Deciduous
- Mixed Wood

1,500 0 1,500

SCALE 1:60,000 METRES

PROJECT

JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE

LOCATIONS OF THE GRAPE FERN IN THE LOCAL STUDY AREA

NAD 27 Zone 13

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
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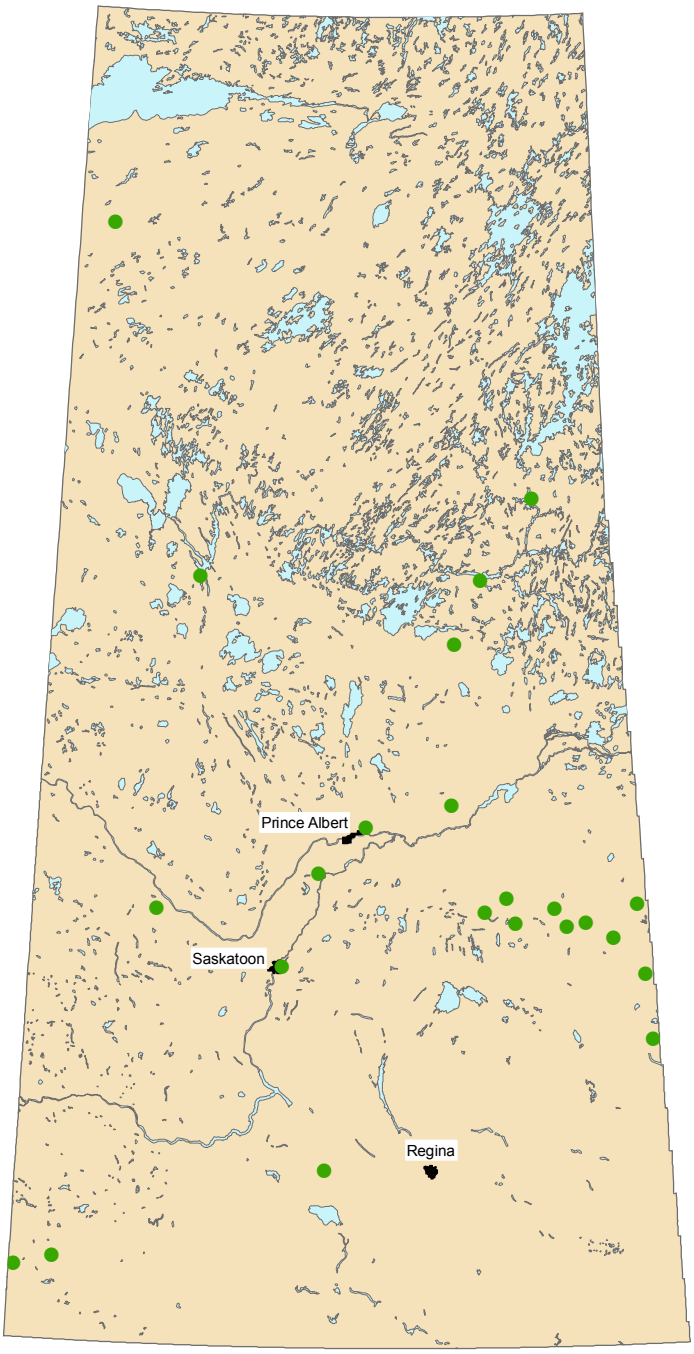

100 0 100

SCALE 1:5,000,000 KM

Legend

● Locations of the Grape Fern

PROJECT

JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE

LOCATION OF THE GRAPE FERN IN SASKATCHEWAN

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	**FIGURE: 3-4**
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REVIEW			

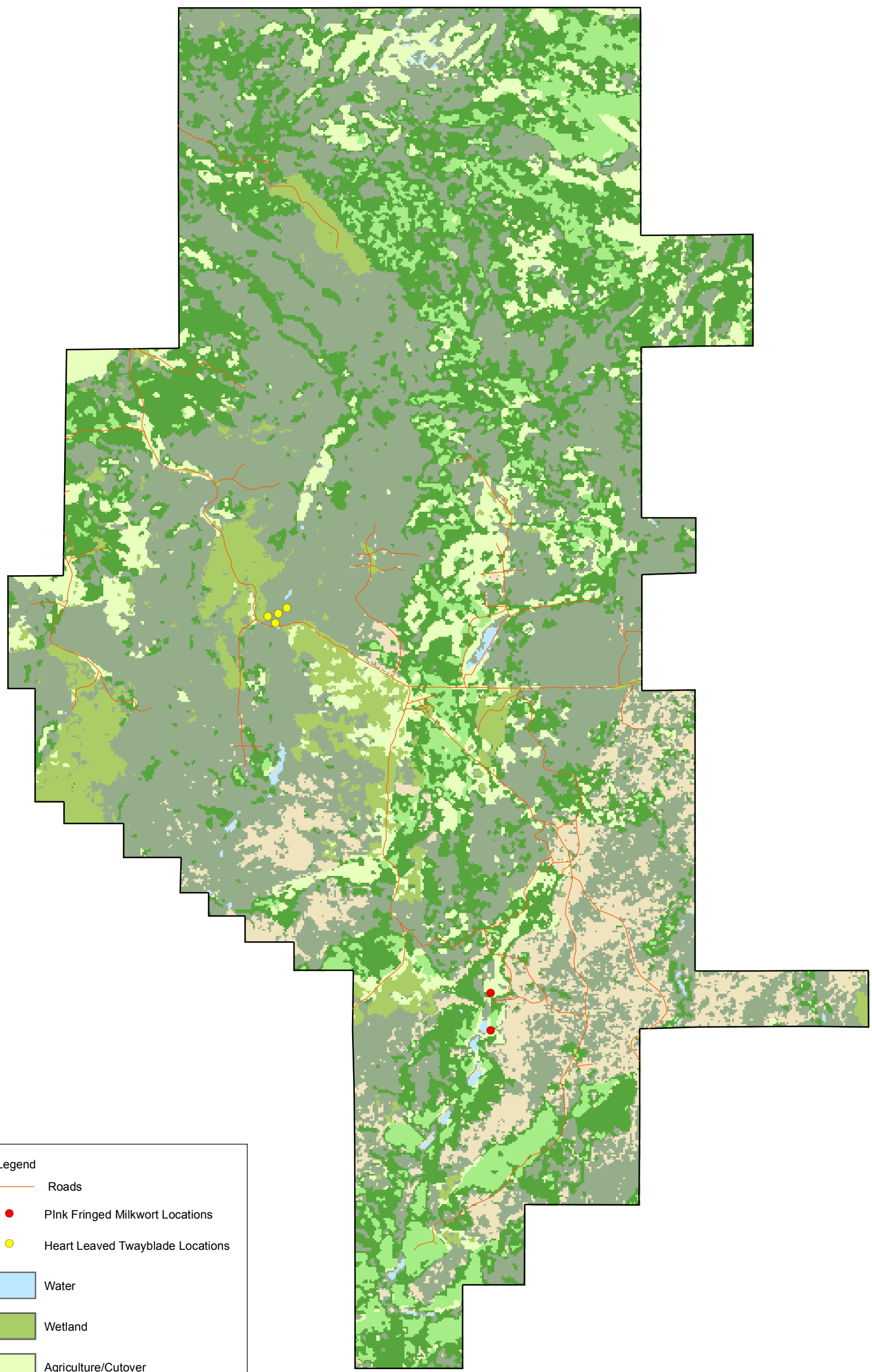
NAD 27 Zone 13

G:\ 2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers 2006 Locations of the Grape Ferns in Saskatchewan Fig3-4

Two other provincial-tracked plant species were observed during the 2005 field surveys. Pink fringed milkwort (*Polygala paucifolia*) was located in two locations and is designated as an S2S3 species by SCDC (Table 3-1). At one location, two clumps consisting of several hundred individuals and 20 individuals were identified at the margin of the 116 kimberlite body (Figure 3-5). The plants were located in a wet area with an open canopy of regenerating trembling aspen and balsam poplar. The second location consisted of 500 individuals distributed in an open area between regenerating trembling aspen and a discontinuous fringe of willows around a wetland. None of the plants were in conflict with current proposed drilling locations.

The heart leaved twayblade (*Listera cordata*) was located at four sites and is designated as an S2 species by SCDC (Table 3-1). A total of 34 individuals were identified within a wet black spruce habitat on the west side of Caution Creek (Figure 3-5). None of the plants were in conflict with current proposed drilling locations.

G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers 2006 Locations of Pink Fringed Milkwort and Heart Leaved Twayblade in the Local Study AreaFig3-5.mxd



Legend

- Roads
- PInk Fringed Milkwort Locations
- Heart Leaved Twayblade Locations
- Water
- Wetland
- Agriculture/Cutover
- Burn
- Conifer
- Deciduous
- Mixed Wood

1,500 0 1,500

SCALE 1:60,000 METRES

NAD 27 Zone 13

PROJECT

JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE

LOCATIONS OF PINK FRINGED MILKWORT AND HEART LEAVED TWAYBLADE IN THE LOCAL STUDY AREA

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	FIGURE: 3-5
CHECK			
REVIEW			

4.0 WILDLIFE

4.1 Objectives

The objectives of the wildlife studies were to:

- identify rare or sensitive species within the LSA;
- develop a list of species that occur in the LSA and RSA; and,
- collect baseline information on the abundance and distribution songbirds and water birds in the LSA.

4.2 Methods

Site-specific surveys were completed at a number of proposed drill pads, infrastructure sites, and road right-of-ways in 2004 and 2005 (Table 4-1). Furthermore, a breeding bird survey was conducted throughout the LSA in June 2005 to determine baseline values for community species abundance and richness among habitats (Table 4-1). All wildlife sightings and sign were recorded throughout the LSA when incidentally encountered during field work and by De Beers site staff (recorded in a wildlife log).

Table 4-1
List of Wildlife Surveys Completed During 2004 and 2005 in the Local Study Area

Date	Description of Survey	Number of Samples
March 10, 2004	site specific	4 to 5 ore-bodies visited within LSA
August 16, 2004	site specific	4 drill pad sites within LSA
August 18-20, 2004	site specific	36 drill pad sites visited within LSA
September 9-10, 2004	site specific	15 infrastructure sites, road right-of-way, and drill pads visited within LSA
November 3-5, 2004	site specific	6 ore-body/drill sites visited within LSA
May 17-18, 2005	site specific	8 ore-bodies visited within LSA
June 6-10, 2005	Breeding Bird Survey throughout LSA	70 point count plots completed within 11 habitat types

4.2.1 Mammals

4.2.1.1 Site-Specific Surveys

Rapid assessment surveys for wildlife and wildlife sign were completed at proposed drill pads, infrastructure sites, and road right-of-ways. The area surveyed included the proposed footprint and a 50 m buffer. All sign (*e.g.*, tracks, dens, pellets, scat, nests, and nest cavities) and sightings of wildlife were recorded. In addition, a brief description of vegetation species, height, percent canopy cover, and landscape features were recorded.

4.2.2 Birds

4.2.2.1 Site-Specific Surveys

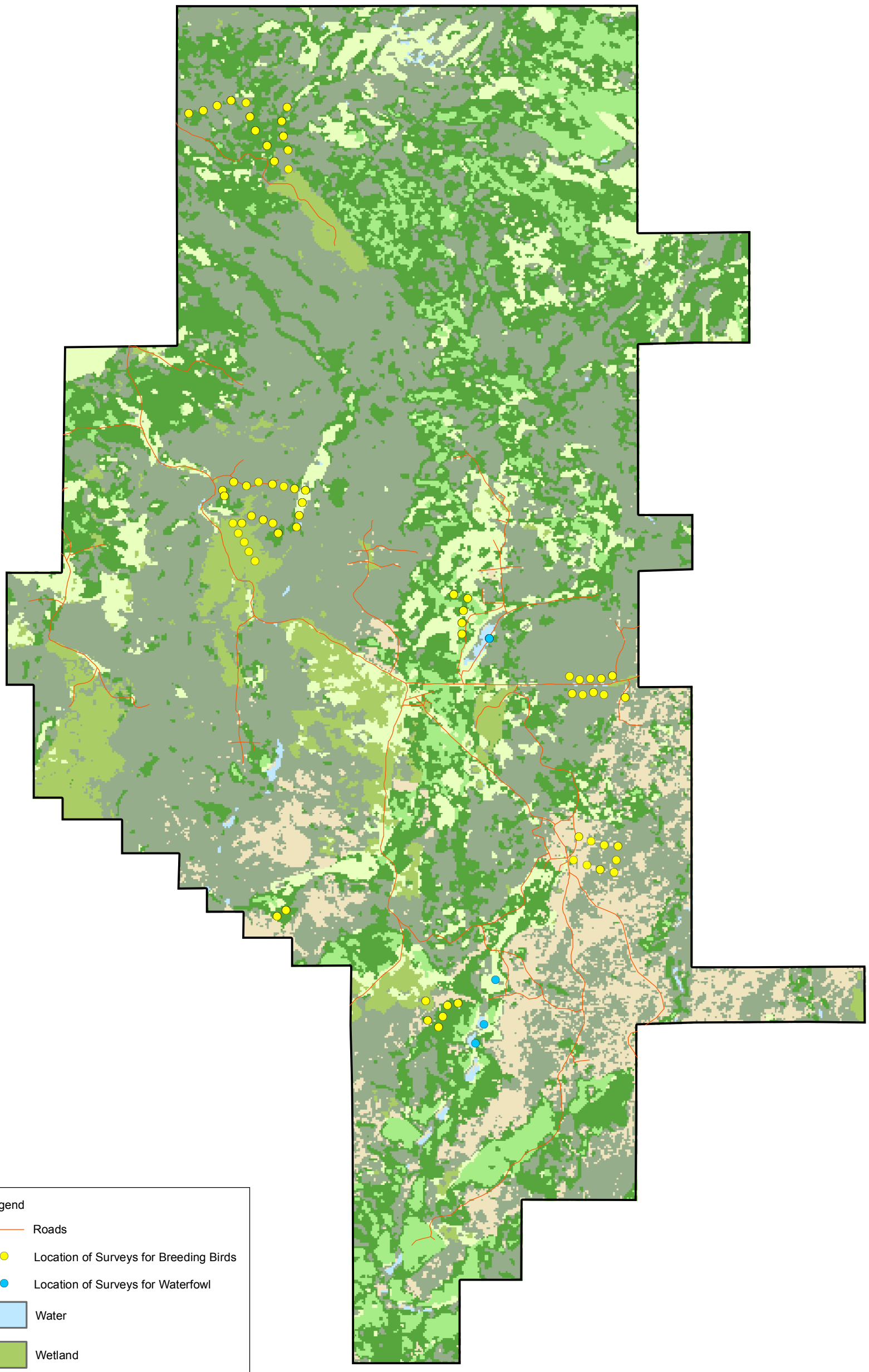
Site-specific surveys for birds within proposed drill pads and infrastructure followed the same method and protocols used for mammals (Section 4.2.1.1).

4.2.2.2 Upland Breeding Bird Survey

The upland breeding bird survey was conducted from June 7 to June 10, 2005 to determine species occurrence, relative abundance, and species richness of songbirds and other bird species within the various habitat types of the LSA. Seventy point count stations (plots) were surveyed among habitat types that would most likely be affected by the project (Figure 4-1).

Surveys were conducted using standard point count methods (Ralph 1993), commencing approximately one half-hour before sunrise until no later than 1300 hours. The method is consistent with the North American Breeding Bird Survey to allow comparison and exchange of data (USGS 2004). Point count stations were established at least 200 m apart along transects within each habitat type. A compass was used to navigate along a pre-determined bearing to subsequent point count stations. A combination of pacing and use of a Global Position System (GPS) unit was used to determine distance. At each point count station, the two observers waited two minutes to allow the birds to adjust to the observer's presence. In the following five-minute period, all species heard or observed within 50 m of the observer were recorded. Observations were divided into those heard within the first three minutes and those heard in the following two minutes.

G:\2005\1361\05-1361-156\GIS\06-1361-278 EPP DeBeers 2006 Location of Survey for Breeding Birds and Waterfowl Fig4-1.mxd



Legend

- Roads
- Location of Surveys for Breeding Birds
- Location of Surveys for Waterfowl
- Water
- Wetland
- Agriculture/Cutover
- Burn
- Conifer
- Deciduous
- Mixed Wood

1,500 0 1,500

SCALE 1:60,000 METRES

NAD 27 Zone 13

PROJECT

JOINT VENTURE ADVANCED EXPLORATION PROGRAM

TITLE

LOCATION OF SURVEYS FOR UPLAND BREEDING BIRDS AND WATERFOWL

Golder Associates
Saskatoon, Saskatchewan

PROJECT	06-1361-278		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	CRP	24/05/06	**FIGURE: 4-1**
CHECK			
REVIEW			

At each point count station, the date, time, observer, plot number, weather condition, wind speed, and GPS location were recorded. The habitat type was determined by the dominant vegetation community association. The approximate position of each individual bird in relation to the observers was illustrated on a sketch map. In addition, the movements of individual birds around the point count station were monitored to avoid double counting. The survey was not conducted during periods of high winds (*e.g.*, Beaufort Scale greater than five; trees in leaf sway) or inclement weather that would reduce the likelihood of identifying species.

Only observations recorded within a 50 m radius of the observer were used in the analysis of the data. Observations recorded at greater than 50 m, or of birds flying through the plot were used to generate a species list for the LSA. The movements individuals flying through the plot were carefully monitored to minimize the probability of recounting the birds within the same or adjacent plot. The total number of detections for the observation period (*i.e.*, five minutes) were used in the statistical analysis. Point count observations were pooled according to 11 habitat types (Table 4-2).

Table 4-2
Habitat Types Surveyed During the Upland Breeding Bird Survey in the Local Study Area

Habitat Types	Description
BS mature	Mature black spruce
JP regen	Regenerating jack pine in burn
JP mature	Mature jack pine
JP/TA	Jack Pine/Trembling Aspen
JP/TA/BP	Jack Pine/Trembling Aspen/Balsam Poplar
TA mature	Mature trembling aspen
TA regen	Regenerating trembling aspen in burn
Willow spp.	Willow shrubs in grassy lowland
Cutover grassland	Grassland in clear-cut opening
Open riparian	Creek waterway with no canopy layer
Treed bog	Bog/wetland with canopy layer

Species richness and relative abundance of the upland bird community were calculated for each habitat using observations collected during the five minute time interval and within 50 m of the observer. Relative abundance was calculated as the number of individuals per area surveyed (*i.e.*, within the 50 m radius of the observer, 0.785 ha.). All bird species detected (except waterfowl and raptors) were used to calculate cumulative species richness for each habitat type.

4.2.2.3 Waterfowl Reconnaissance Survey

Ground reconnaissance visits were completed for waterfowl species presence at four ponds within the LSA (Figure 4-1). Observers recorded the number and waterfowl species present. No statistical analysis was completed as data were too sparse.

4.3 Results

4.3.1 Mammals

Within the LSA, 16 mammal species have been identified by observations or sign during site-specific surveys, and through wildlife logs maintained by De Beers site staff (Table 4-3).

Table 4-3
List of Mammal Species Identified in the Local Study Area

Mammal Species	
Moose	Beaver
Elk	Raccoon
Black bear	Weasel
White-tailed deer	Red squirrel
Wolf	Northern pocket gopher
Lynx	Snowshoe hare
Coyote	Least chipmunk
Porcupine	Northern meadow jumping mouse

4.3.2 Birds

Rapid assessment and point count surveys during 2004 and 2005 have identified 87 bird species within the LSA (Appendix II). No federal listed species were observed during the surveys (COSEWIC 2005 and SARA 2006). However, the sign of two provincial listed (SCDC 2006) wildlife species (*i.e.*, pileated woodpecker and great grey owl) were identified during site-specific surveys in autumn 2004. In addition, three other provincial listed species (great blue heron, whip-poor will, and Connecticut warbler) were recorded during point count surveys in Jun 2005.

Thirty four bird species were detected within the 70 point count stations (*i.e.*, within a 50 m radius) among the 11 habitat types that were sampled in the LSA. These observations consisted of one waterbird species (sora rail), two woodpecker species (hairy and black-backed woodpeckers), and 31 song bird species. The most frequently detected species are presented in Table 4-4.

Table 4-4
Most Frequently Detected Bird Species During the June 2005 Upland Breeding Bird Survey in the Local Study Area

Species	Habitat Type[(a)]	Number of Individuals Observed[(b)]
Yellow-rumped warbler	JP mature, TA mature, BS mature	13
Chipping sparrow	BS mature, Treed bog, JP/TA	9
Swamp sparrow	Open riparian, Willow spp.	8
Ruby-crowned kinglet	BS mature, JP/TA, Treed bog	8
Ovenbird	TA mature, JP/TA, JP/TA/bP	6
Red-eyed vireo	JP/TA/bP, TA mature, TA regen	6
White-throated sparrow	TA regen, JP/TA/BP, Treed bog	6

Note: a = See Table 4-2 for definition of habitat types
b = Number of individuals detected within 50 m

A summary of species richness for general groups of the eleven habitat types include:

- 22 species were detected in hardwood dominant forest (TA mature, TA regen, JP/TA, JP/TA/BP);
- 13 species in the open habitats (Open riparian, Willow spp., Cutover grassland, Treed bog); and,
- 9 species were detected in the softwood forest (BS mature, JP regen, JP mature).

Analysis indicates that the open riparian habitat had the highest relative abundance and species richness Table 4-5. This habitat occurs along the creek, which flows under Division Road about 2.5 km west of the JV field headquarters. Although the willow habitat had the highest relative abundance, a sample size of one is not enough to make any conclusions. It is a unique habitat with relatively low abundance in the LSA. Mature forest stands of black spruce, hardwood, and hardwood/softwood had moderate relative abundance, followed by the treed bog habitat. Hardwood forest consisted primarily of trembling aspen and balsam poplar. Mature jack pine, jack pine regen, and cutover grassland had the lowest relative abundance. Although no breeding song birds were detected in the cutover grassland habitat, other species such as kestrels and sharp-tail grouse were incidentally observed in this habitat.

Table 4-5
Relative Abundance (birds/ha) and Species Richness of Upland Birds Among Habitats in the Local Study Area, June 2005

Habitat Type	Number of Plots	Relative Abundance		Species Richness	
		Mean ± 1SE	Min – Max[(a)]	Mean ± 1SE	Min – Max
BS mature	7	2.2 ± 0.4	1.3 – 3.8	1.7 ± 0.3	1 – 3
JP regen	9	0.7 ± 0.2	0 – 1.3	0.6 ± 0.2	0 – 1
JP mature	11	0.7 ± 0.3	0 – 2.5	0.5 ± 0.2	0 – 2
JP/TA	8	2.4 ± 0.6	1.3 – 5.1	1.9 ± 0.4	1 – 4
JP/TA/BP	5	2.5 ± 0.4	1.3 – 3.8	2.0 ± 0.3	1 – 3
TA mature	8	2.5 ± 0.6	1.3 – 6.4	2.0 ± 0.5	1 – 5
TA regen	6	2.5 ± 0.6	1.3 – 5.1	1.7 ± 0.5	1 – 4
Willow spp	1	5.1	--	3.0	--
Cutover grassland	5	0	0	0	0
Open riparian	5	4.8 ± 0.5	3.8 – 6.4	3.2 ± 0.4	2 – 4
Treed bog	5	1.8 ± 0.6	0 – 3.8	1.4 ± 0.5	0 – 3

Note: a = Minimum and maximum recorded

Similar to the patterns observed for relative abundance, species richness was highest in the open riparian habitat and lowest in the jack pine and cutover grassland habitats (Table 4-5). High species richness in the riparian habitat is likely due to the diversity of vegetation types, structure, and productivity found along the transition between water and land. Mature forest stands of black spruce, hardwood, and hardwood/softwood had moderate species richness.

Overall, results of the 2005 upland breeding bird survey indicate relatively even species richness among most habitats and low domination by one or a few species of birds. Many species of warblers, flycatchers, and sparrows were identified suggesting that in the LSA, the structural diversity of the riparian, mature hardwood, mixed wood, and coniferous forest provides a variety of niches for a large number of song bird species. Specifically, 15 of the 23 species of warblers suspected to nest in the southern boreal region (Smith 1996) were observed during surveys in the LSA. Future surveys should increase the sampling effort among and within habitats to provide more robust estimates for species richness and relative abundance in the LSA.

Five species of waterfowl were recorded during surveys of the four ponds in the LSA (Table 4-6). Pond 2 was visited on three different days and bufflehead were observed on all three visits (Figure 4-1) . Ponds 1, 3, and 4 were visited once and ring-necked ducks, blue-winged teal and green-winged teal were observed. The Canada geese were flocked as one group and were not nesting in the area.

Table 4-6
Waterfowl Species Observed on Four Ponds in the Local Study Area, June 2005

Waterfowl Species	Number Observed
Bufflehead	7
Ring-necked	2
Blue-winged teal	2
Green-winged teal	1
Canada geese	80

5.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or or require additional details, please contact the undersigned.

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APPENDIX I

Sites Assessed for Rare Plants and Rare Plant Potential in the Local Study Area During 2004 Surveys

Site	Date	Habitat Description
118-005	Aug. 20, 2004	Wet riparian (dropped from program)
118-006	Aug. 20, 2004	D density trembling aspen with white and black spruce sub canopy/rose/northern snowberry/sarsaparilla/bunchberry/ dewberry
118-007	Aug. 20, 2004	D density 10 m tall black spruce/feather moss with trembling aspen/rose/colt's foot gaps
118-008	Aug. 20, 2004	A density jack pine (dieoff due to Mistletoe) /pincherry/raspberry/bearberry/purple oat grass/reed grass/lichen (access up mature jack pine steep slope)
118-009	Aug. 20, 2004	B density 20 m tall jack pine/green alder/blueberry/running clubmoss/bunchberry/feathermoss
118-010	Aug. 20, 2004	D density mature trembling aspen white spruce with black and white spruce subcanopy/sarsaparilla/feathermoss
118-011	Aug. 20, 2004	D density 15 m tall black spruce/feathermoss with trembling aspen and balsam poplar gaps/raspberry
118-012	Aug. 20, 2004	A density trembling aspen/rough alder/balsam poplar/raspberry/rose
118-013	Aug. 20, 2004	A density trembling aspen/beaked hazelnut/raspberry/marsh reed grass
120-021	Aug. 19, 2004	B density 15 m tall jack pine trembling aspen/green alder beaked hazelnut/raspberry rose/sarsaparilla/hairy wild rye
120-022	Aug. 19, 2004	B/C density 20 m tall jack pine/green alder/rose/spreading dogbane/ purple oat grass
120-023	Aug. 19, 2004	Cutover jack pine/chokecherry/pincherry/Saskatoon/bearberry/sedge
120-024	Aug. 19, 2004	C density 15 m tall jack pine/green alder/blueberry/bearberry/purple oat grass/feather moss
120-025	Aug. 19, 2004	C density 15 m tall jack pine/green alder/two leaved solomon's seal/rice grass/feathermoss
120-026	Aug. 19, 2004	Cutover jack pine/balsam poplar/raspberry rose/goldenrod/awned wheat grass sedges
120-027	Aug. 19, 2004	Cutover jack pine/green alder/chokecherry/Saskatoon/rose/goldenrod/ sedge/reed grass
120-028	Aug. 19, 2004	C density mature black spruce larch jack pine/ledum/bunchberry/ feathermoss
121-009	Aug. 18, 2004	Cleared pads reed grass/sedges/Canada wild rye on either side C density 7 m tall jack pine in center/rose/Saskatoon/two leaved solomon's seal/lichen
121-010	Aug. 18, 2004	C density 7 m tall jack pine/pincherry/rice grass/lichen
121-011	Aug. 18, 2004	C density 7 m tall jack pine/green alder/buffaloberry/spreading dogbane/two leaved solomon's seal/lichen
121-012	Aug. 18, 2004	C/D density 7m tall jack pine/buffalo berry/blueberry/rose/ bearberry/lichen
121-013	Aug. 18, 2004	B/C density 7 m tall jack pine/chokecherry/ two leaved solomon's seal/rice grass/lichen
140-048	Aug. 19, 2004	C density 7 m tall balsam poplar trembling aspen white spruce/rose/ fireweed strawberry/marsh reed grass purple oatgrass
147-006	Aug. 19, 2004	Clearing Saskatoon/meadow sweet/wheat grass and C density 7 m tall jack pine
147-007	Aug. 19, 2004	Willow/meadow sweet/sedge/marsh hedgenettle
147-008	Aug. 18, 2004	B density 7 m tall jack pine/green alder/rose meadow sweet Saskatoon/ two leaved solomon's seal/purple oat grass/ lichen
147-009	Aug. 18, 2004	C density 7 m tall jack pine regen/green alder/rose Saskatoon/two leaved solomon's seal/rice grass and B density 15 m tall jack pine
147-010	Aug. 19, 2004	Willow trembling aspen/meadowsweet/marsh hedgenettle/bluegrass/ sedge
147-011	Aug. 18, 2004	C/D density jack pine 7 m tall (mature 15 m tall edge strip)/green alder/rose meadow sweet Saskatoon/ two leaved solomon's seal/purple oat grass/
147-012	Aug. 18, 2004	Open clearing rose/meadow sweet and B density jack pine 10 m tall/green alder (moved to new location due to heritage concerns)
147-013	Aug. 18, 2004	C density mature jack pine/green alder/blueberry/two leaved solomon's seal/purple oat grass/feather moss
150 anom	Aug. 19, 2004	C density 7 m tall jack pine/pincherry/two leaved solomon's seal/lichen
221-002	Aug. 18, 2004	C density 10 m tall jack pine/green alder/buffaloberry/blueberry/bearberry/two leaved solomon's seal/rice grass/lichen
221-003	Aug. 18, 2004	Willow/meadow sweet/wheat grass/reed grass and trembling aspen/green alder/Canada hawkweed/fowl bluegrass
221-04	Aug. 18, 2004	C density 15 m tall jack pine/trembling aspen with green alder/blue berry/two leaved solomon's seal and feather moss
284-001	Aug. 19, 2004	B/C density mature jack pine/green alder/blueberry/two leaved solomon's seal/purple oat grass
285-001	Aug. 19, 2004	B density jack pine/green alder/rose snowberry/two leaved solomon's seal/purple oat grass

Sites Assessed for Rare Plants and Rare Plant Potential in the Local Study Area During 2004 Surveys Continued

Site	Date	Habitat Description
Fuel depot	Sep. 09, 2004	Clearing to A density jack pine/rose/meadow sweet/long leaved starwort/sedge
Camp Bypass access	Sep. 09, 2004	Old clearing rose/raspberry/meadow sweet/sedges/awned wheat grass/reed grass/
221 New Access	Sep. 09, 2004	Majority of access follows old haul road green alder/meadow sweet blueberry/bearberry/goldenrod/purple oat grass
120-027 100 m Re-route	Sep. 09, 2004	Cutover scattered jack pine regen/pincherry chokecherry/bearberry/sedges
122 Mud Pits	Sep. 09, 2004	Clearing scattered jack pine/rose raspberry/sedges
122-012 Pad Expansion	Sep. 09, 2004	15 m expansion of bore hole pad contained within already cleared area
Pad Expansion	Sep. 09, 2004	Clearing green alder/trembling aspen /rose/Saskatoon/sedges/awned wheat grass
Pad Expansion	Sep. 09, 2004	Open clearing scattered jack pine regen/green alder/meadow sweet/sedge
140/141 Mud Pits	Sep. 10, 2004	Open clearing poor planted jack pine seedling establishment/wheat grass sedges/rose/meadow sweet
140/141 Mud Pits Optional	Sep. 10, 2004	Reclaimed pad exposed soil/pigweed/hemp nettle/scorpion weed/rose
121 Mud Pits	Sep. 10, 2004	Cutover, planted jack pine less than 20 cm high/ wheat grass/sedge/buffaloberry/goldenrod Lindly's aster
147 Mud Pits	Sep. 10, 2004	Cutover sedges/wheat grass/raspberry
New 147-012 Location	Sep. 10, 2004	B/C density 10 m tall jack pine/green alder/Saskatoon/rose/blueberry/ northern bedstraw/purple oat grass
148 Water Pits	Sep. 10, 2004	Clearing wheat grass/sedges/rose/northern bedstraw/long leaved starwort
120 Mud Pits	Sep. 10, 2004	Cutover A density jack pine regen 2 m tall /green alder/chokecherry/pincherry/bearberry/sedge/wheat grass
101	Nov. 5, 2004	Access: through undulating terrain/jack pine plantation/mature trembling aspen stands; at site is balsam poplar saplings/rose/western snowberry/chokecherry/ strawberry/aster/bunchberry/graminoids. NW: Pond with standing water/beaver lodge; marsh area with standing water/alder/willow/cattails/marsh reed grass/sedge spp; white spruce/black spruce separating marsh and trembling aspen stand; transition area between old burn and marsh area contains balsam poplar/red osier dogwood/strawberry/beaked hazel/willow/white birch saplings/western snowberry/tiger lily/orchid/crème vetch/ northern bedstraw. NE: D density 6m to 8 m tall trembling aspen/beaked hazel/choke cherry/low bush cranberry/rose/bunchberry/ sarsasparilla/aster/awned wheat grass; 25% slope to the west beginning 25 m from marsh/pond areas. SW: Pond with standing water/beaver lodge; marsh area with standing water/alder/willow/cattails/marsh reed grass/ sedge spp; white spruce/black spruce separating marsh and trembling aspen stand; transition area between old burn and marsh area contains balsam poplar/red osier dogwood/strawberry/beaked hazel/willow/white birch saplings/ western snowberry/tiger lily/orchid/crème vetch/ northern bedstraw. SE: D density 6 m to 8 m tall trembling aspen/beaked hazel/choke cherry/low bush cranberry/rose/bunchberry/ sarsasparilla/aster/awned wheat grass; 25% slope to the west beginning 25 m from the marsh/pond areas.
116	Nov. 3, 2004	Access: through old burn area ranging from shrub land to open mature jack pine to immature trembling aspen/ moderately undulating terrain. NW: Old burn area/B density 3 m tall trembling aspen/alder/rose/blueberry/ bunchberry/fireweed/narrow leaved meadow sweet/graminoid spp/sedge spp. NE: shrub wetland/standing water/old tamarack snags/black spruce seedlings (<0.5 m tall)/white birch saplings/bog birch/willow/lab tea/blueberry/graminoid spp/sedge spp/sphagnum spp/polytrichum spp. SW: Old burn area/D density 5 m tall trembling aspen canopy/alder/rose/blueberry/ bunchberry/fireweed; old drill pad 116-1 contains exposed soil/graminoid spp/fireweed/peppergrass/golden rod/blueberry/rose/narrow leaved meadow sweet/trembling aspen saplings (<1 m tall);shrub wetland/standing water /willow/white birch saplings/lab tea/horsetail/ graminoid spp/sedge spp. SE: Pond/standing water/sedge spp/graminoid spp./willow/bog birch.
119	Nov. 4, 2004	Access: undulating terrain through old burn area. NW: 3 m to 8 m tall jack pine regeneration (patchy)/bearberry/fireweed/reindeer lichen/polytrichum spp/graminoid spp. NE: 3 m to 8 m tall jack pine regeneration (patchy)/bearberry/fireweed/reindeer lichen/polytrichum spp/graminoid spp. SW: 3 m to 8 m tall jack pine regeneration (patchy)/bearberry/fireweed/reindeer lichen/polytrichum spp/graminoid spp. SE: 3 m to 8 m tall jack pine regeneration (patchy)/bearberry/fireweed/reindeer lichen/polytrichum spp/graminoid spp.

Sites Assessed for Rare Plants and Rare Plant Potential in the Local Study Area During 2004 Surveys Continued

Site	Date	Habitat Description
123	Nov. 4, 2004	Access: Winter road/standing water/sedge spp/willow. NW: B density 15 m tall tamarack/standing water/alder/bog birch/willow/common horsetail/sphagnum spp/sedge spp; treed bog with B density 15 m tall tamarack (dead/dying)/standing water/willow/sedge spp/black spruce seedlings/sphagnum spp/bog birch. NE: B density 15 m tall tamarack/standing water/alder/bog birch/willow/common horsetail/sphagnum spp/sedge spp; treed bog with B density 15 m tall tamarack (dead/dying)/standing water/willow/sedge spp/black spruce seedlings/ sphagnum spp/bog birch. SW: D density 15 m tall black spruce/lab tea/horsetail/bog cranberry/sphagnum spp/sedge spp/graminoid spp/black spruce and tamarack seedlings. SE: B density 15 m tall tamarack/standing water/alder/bog birch/willow/common horsetail/sphagnum spp/sedge spp; D density 15 m tall black spruce/lab tea/horsetail/bog cranberry/sphagnum spp/sedge spp/graminoid spp/black spruce and tamarack seedlings.
134	Nov. 3, 2004	Access: through undulating terrain/jack pine plantation/trembling aspen stands. NW: Old burn with jack pine/alder/rose/bearberry/aster/golden rod/graminoid spp.; 10% slope to the south. NE: Old burn with jack pine/alder/rose/bearberry/aster/golden rod/graminoid spp.; 10% slope to the south. SW: Old burn with jack pine/alder/rose/bearberry/aster/golden rod/graminoid spp.; south end of plot dominated by D density 5 m to 10 m tall trembling aspen/alder/rose/bunchberry. SE: Old burn with jack pine/alder/rose/bearberry/aster/golden rod/graminoid spp.; south end of plot dominated by D density 5 m to 10 m tall trembling aspen/alder/rose/bunchberry.
145	Nov. 3, 2004	Access: Off main road from camp. NW: most was harvested and then site prepared for artificial regeneration/leave patches of mature trembling aspen; shrub area containing willow and jack pine; furthest corner to the north is a D density 17 m tall trembling aspen stand. NE: A to B density (patchy) 8 m tall jack pine plantation/various trails throughout/ /bearberry/long leaved star wort/ meadow blazing star/blueberry/rose/western snowberry/willow/graminoid spp. SW: B to C density (patchy) 8 m tall jack pine plantation/ alder/rose/blueberry/bog cranberry/bearberry/fireweed/ graminoid spp./reindeer lichen; small portion harvested and site prepared for artificial regeneration; furthest SW corner is B density 11 m tall trembling aspen stand (25 m wide)/alder/pincherry/white birch saplings/willow/rose/blueberry/ fireweed/bog cranberry/bearberry/golden rod/strawberry/awned wheat grass/rice grass/purple oat grass; 270 m from site center is shrub/marsh area/dry/willow/narrow leaved meadow sweet/marsh reed grass/sedge spp/aster/ mustard. SE: B to C density (patchy) 8 m tall jack pine plantation/ various trails throughout/ remnants of old cabin (old stove found)/ alder/rose/blueberry/bog cranberry/bearberry/fireweed/graminoid spp/reindeer lichen.
152	Nov. 4, 2004	Access: Winter road/standing water/sedge spp/willow. NW: B density 11 m to 15 m tamarack (90%) and black spruce (10%)/standing water/alder/bog birch/willow/common horsetail/wintergreen/bog rosemary/sphagnum spp/sedge spp; treed bog/standing water/A to B density 8 m to 12 m tall tamarack/black spruce and tamarack seedlings/common horsetail/pitcher plants/bog rosemary/small bog cranberry/bog birch/willow/fringed brome/sedge spp/sphagnum spp. NE: B density 11 m to 15 m tamarack (90%) and black spruce (10%)/standing water/alder/bog birch/willow/common horsetail/wintergreen/bog rosemary/sphagnum spp/sedge spp; treed bog/standing water/A to B density 8 m to 12 m tall tamarack/black spruce and tamarack seedlings/common horsetail/bog rosemary/small bog cranberry/bog birch/willow/fringed brome/sedge spp/sphagnum spp; standing water/willow/marsh reed grass. SW: B density 11 m to 15 m tamarack (90%) and black spruce (10%)/standing water/alder/bog birch/willow/common horsetail/wintergreen/bog rosemary/sphagnum spp/sedge spp; treed bog/standing water/A to B density 8 m to 12 m tall tamarack/black spruce and tamarack seedlings/common horsetail/bog rosemary/small bog cranberry/bog birch/willow/fringed brome/sedge spp/sphagnum spp. SE: C density 17 m tall black spruce (80%) and jack pine (20%)/black spruce understory/lab tea/rose/blueberry/common horsetail/bunchberry/dwarf horsetail/bog cranberry/stair step moss/feather moss/sedge spp; C density 18 m tall jack pine/blueberry/rose/alder/willow/bearberry/bog cranberry/twin flower/; standing water/willow/marsh reed grass.
158	Nov. 4, 2004	Access: Access was through jack pine currently being harvested. NW: C to D density jack pine plantation (1920's)/alder/graminoid spp/reindeer lichen/very gently undulating terrain. NE: C to D density jack pine plantation (1920's)/alder/graminoid spp/reindeer lichen/very gently undulating terrain; mature trembling aspen/alder/willow/bunchberry/horsetail/graminoid spp. SW: C to D density jack pine plantation (1920's)/alder/graminoid spp/reindeer lichen/very gently undulating terrain. SE: C to D density jack pine plantation (1920's)/alder/graminoid spp/reindeer lichen/very gently undulating terrain.

Sites Assessed for Rare Plants and Rare Plant Potential in the Local Study Area During 2004 Surveys Continued

Site	Date	Habitat Description
216	Nov. 4, 2004	Access: through old burn ranging from mature jack pine, immature trembling aspen, and shrub land. NW: 19% slope to the northwest/B density 10 m tall jack pine plantation/alder/bearberry/bog cranberry/golden rod/ rose/blueberry/reindeer lichen/feather moss/graminoid spp/tiger lily; small shrub land area with mature trembling aspen along margins/willow/graminoid spp/sedge spp; small pocket of D density 8 m tall trembling aspen to the north/alder/rose/blueberry/golden rod/bunchberry; pockets of C density 15 m tall mature trembling aspen/alder/rose/ blueberry/bunchberry/feather moss/reindeer lichen/graminoid spp. NE: Old burn/gently undulating/gentle slope east towards bog/open/regenerating jack pine 0.5 m to 1 m tall/rose/ alder/golden rod/aster/bearberry/reed grass/sedge spp/alum root. SW: Old burn/gently slope southeast towards bog/regenerating jack pine 0.5 m to 1 m tall/rose/alder/golden rod/aster/ bearberry/sedge spp; edge of bog had a D density 6 m tall trembling aspen margin (approx. 50 m wide)/alder/willow/ rose/blueberry/strawberry/bunchberry/aster/graminiod spp; then moves into small pocket of regenerating jack pine; then moves into the treed bog which is actually white birch and tamarack/little standing water/alder/willow/lab tea/ sphagnum spp; pocket of C density 13 m black spruce furthest south. SE: treed bog which is actually white birch and tamarack/little standing water/alder/willow/lab tea/sphagnum spp; approx. 15 m wide channel where standing water is substantial/tamarack/willow/bog birch/sedge spp; stand of D density 15 m tall tamarack; which leads into small pocket of mature jack pine.
218	Nov. 4, 2004	Access: Moderately undulating; if accessed through the plantation (sporadic regeneration, many are unhealthy); winter road if accessed from site 152. NW: Moderately undulating; C to D density 17 m tall jack pine/bearberry/twin flower/golden rod/rose/blueberry/alder/ reindeer lichen/feather moss; 0.5 m to 1 m tall jack pine plantation (planted approx. 1990); small stand of C density 8 m tall trembling aspen/willow/alder/rose/bunchberry/aster. NE: Moderately undulating; C to D density 17 m tall jack pine/bearberry/twin flower/golden rod/rose/blueberry/alder/ reindeer lichen/feather moss; small section of A density 5 m to 11 m tall jack pine plantation (1970's)/bearberry/aster/ golden rod/rose/reindeer lichen. SW: Moderately undulating; D density 17 m tall jack pine/bearberry/twin flower/golden rod/rose/blueberry/alder/ reindeer lichen/feather moss. SE: Moderately undulating; D density 17 m tall jack pine/bearberry/twin flower/golden rod/rose/blueberry/alder/ reindeer lichen/feather moss; 0.5 m to 1 m tall jack pine plantation (planted approx. 1990).
219	Nov. 3, 2004	Access: Off Division road. NW: Jack pine plantation (1920's)/alder/rose/blueberry/bog cranberry/bearberry /fireweed/graminoid spp/reindeer lichen; small portion of harvested area with site preparation for regeneration. NE: Jack pine plantation (1920's)/alder/rose/blueberry/bog cranberry/bearberry/ fireweed/graminoid spp/reindeer lichen; small patch of trembling aspen/alder/ pincherry/white birch saplings/willow/rose/blueberry/fireweed/bog cranberry/ graminoid spp. SW: Jack pine plantation (1920's)/alder/rose/blueberry/bog cranberry/bearberry/ fireweed/graminoid spp./reindeer lichen; small open shrub land (alder) area; patch of trembling aspen/alder/pincherry/white birch saplings/willow/rose/blueberry/fireweed/ bog cranberry/graminoid spp. SE: Jack pine plantation (1920's)/alder/rose/blueberry/bog cranberry/bearberry/ fireweed/graminoid spp./reindeer lichen; larger open area with alder/graminoid spp/forbs; larger area containing mixture of jack pine and trembling aspen/alder/fireweed/bog cranberry/rose/blueberry.
223	Nov. 4, 2005	Access: Winter road/standing water/willow/sedge spp. NW: Tamarack and black spruce bog/standing water/tamarack and black spruce seedlings/alder/willow/sedge spp/sphagnum spp/horsetail. NE: Tamarack and black spruce bog/standing water/tamarack and black spruce seedlings/alder/willow/sedge spp/sphagnum spp/horsetail. SW: Black spruce bog/some standing water/black spruce seedlings/willow/horsetail/ sedge spp/lab tea/sphagnum spp. SE: Black spruce bog/some standing water/black spruce seedlings/willow/horsetail/ sedge spp/lab tea/sphagnum spp.; tamarack and black spruce bog/standing water/tamarack and black spruce seedlings/alder/willow/sedge spp/sphagnum spp/horsetail.
FAC 300	Nov. 5, 2004	Access: Level terrain/willow/alder/white spruce and black spruce regeneration; mature white spruce and jack pine; alder/willow clearing. Level terrain; C density 10 m tall trembling aspen with few mature jack pine and white spruce/alder/rose/lab tea/snowberry/narrow leaved meadow sweet/raspberry/ northern bedstraw; mature 20 m tall jack pine to the S and E/alder/rose; shrub area to the N/snowberry/rose/lab tea/balsam poplar/blueberry/marsh reed grass.
FAC 292	Nov. 5, 2004	Access: Mature tamarack stand as noted below; 15 m strip of black spruce at toe of slope (25%)/sphagnum spp/horsetail/bunchberry; jack pine plantation (0.25 m to 1 m tall)/awned wheat grass/aster/northern bedstraw/bearberry/reindeer lichen/reed grass. B to C density 15 m to 18 m tall mature tamarack stand (lots of dead/dying trees)/standing water/black spruce regeneration/horsetail/sedge spp/pink wintergreen/marsh marigold/naked miterwort; north section of plot is A density 8 m tall tamarack/standing water/bog birch/willow/sedge spp.
FAC 287	Nov. 5, 2004	Access: Jack pine plantation (0.25 m to 1.0 m tall); mature black spruce; mature tamarack as described below. C density 20 m tall tamarack/standing water/black spruce seedlings/lab tea/sedge spp/naked miterwort/beaked hazel/sarsaparilla/dwarf raspberry/fireweed/spinulose shield fern/twinflower/marsh marigold/lesser pyrola/chickweed/horsetail.

Sites Assessed for Rare Plants and Rare Plant Potential in the Local Study Area During 2004 Surveys Continued

Site	Date	Habitat Description
FAC 291	Nov. 5, 2004	Access: Through old cutover on already existing trail/would need to remove few mature jack pine. Center is located in 15 m x 30 m opening/trembling aspen saplings/reindeer lichen/white grained rice grass/june grass/snowberry/golden rod/alum root/two leaved Solomon seal; opening is in mature C to D density 20 m tall jack pine stand/blueberry/lab tea/snowberry/low bush cranberry/stair step moss /schreber's moss/purple oat grass/green alder.
122-18	Nov. 5, 2004	D density 7 m tall trembling aspen/green alder/lab tea/rose/willow/strawberry/beaked hazel/aster/bunchberry/pink wintergreen/marsh reed grass/fireweed.

APPENDIX II

List of Bird Species Identified Within the Local Study Area During 2004 and 2005 Surveys

Species	Scientific Name	Comments
Common Loon	*Gavia immer*	
Pied-billed Grebe	*Podilymbus podiceps*	heard and seen at beaver ponds
Horned Grebe	*Podiceps auritus*	1pair at pond north of camp
Great Blue Heron	*Ardea herodias*	1 over Caution Creek. 1 @ beaver pond
Canada Goose	*Branta canadensis*	80+ staging on beaver pond
American Wigeon	*Anas americana*	seen at beaver ponds
Mallard	*Anas platyrhychos*	at beaver ponds and Caution Creek
Blue-winged Teal	*Anas disors*	at beaver ponds
Green-winged Teal	*Anas crecca*	at beaver ponds
Ring-necked Duck	*Aythya collaris*	1pair at pond north of camp
Bufflehead	*Bucephala albeola*	at beaver ponds and north of camp
Common Merganser	*Mergus merganser*	Flying near English Camp tower
Broad-winged Hawk	*Buteo platypterus*	1 near Caution Creek
Red-tailed Hawk	*Buteo jamaicensis*	in cutover, aspen stands
American Kestrel	*Falco sparverius*	in cutovers with standing snags
Ruffed Grouse	*Bonasa umbellus*	several heard in aspen regen
Spruce Grouse	*Dendragopus canadensis*	1 crossed Division road west of camp
Sharp-tailed Grouse	*Tympanuchus phasianellus*	
Sora	*Porzana carolina*	heard at beaver ponds
American Coot	*Fulica americana*	1 seen at beaver ponds
Sandhill Crane	*Grus canadensis*	1pair seen near Caution Creek
Killdeer	*Charadrius vociferus*	1 at mud pits, Shore Road
Lesser Yellowlegs	*Tringa flavipes*	1 at beaver ponds
Common Snipe	*Gallinago gallinago*	heard adjacent to creeks; nest with 4 eggs
Mourning Dove	*Zenaida macroura*	heard south of English Cabin tower
Great Gray Owl	*Strix nebulosa*	feathers found
Common Nighthawk	*Chordeiles minor*	heard and seen over cutovers
Yellow-bellied Sapsucker	*Sphyrapicus varius*	aspen stands
Hairy Woodpecker	*Picoides villosus*	several in aspen and cutovers
Three-toed Woodpecker	*Picoides tridactylus*	Near English Cabin tower, pine
Black-backed Woodpecker	*Picoides arcticus*	1 in mature softwood, near 158
Northern Flicker	*Colaptes auratus*	cutovers
Pileated Woodpecker	*Dryocopus pileatus*	heard near camp and north
Olive-sided Flycatcher	*Contopus borealis*	1 heard south of English Cabin tower
Alder Flycatcher	*Empidonax alnorum*	common near riparian
Least Flycatcher	*Empidonax minimus*	aspen stands
Eastern Kingbird	*Tyrannus tyrannus*	1 pair at beaver ponds
Blue-headed Vireo	*Vireo solitarius*	heard in mixedwood

List of Bird Species Identified Within the Local Study Area During 2004 and 2005 Surveys Continued

Species	Scientific Name	Comments
Red-eyed Vireo	*Vireo olivaceus*	heard in aspen
Gray Jay	*Perisoreus canadensis*	
Blue Jay	*Cyanocitta cristata*	
Common Raven	*Corvus corax*	
Tree Swallow	*Tachycineta bicolor*	at beaver ponds and camp
Barn Swallow	*Hirundo rustica*	at camp
Black-capped Chickadee	*Parus atricapillus*	
Boreal Chickadee	*Parus hudsonicus*	mature softwood
Red-breasted Nuthatch	*Sitta canadensis*	fmature softwood
Brown Creeper	*Certhia americana*	mature softwood
Winter Wren	*Troglodytes troglodytes*	black spruce tamarack
Marsh Wren	*Cistothorus palustris*	riparian, Caution Creek
Golden-crowned Kinglet	*Regulus satrapa*	mature softwood
Ruby-crowned Kinglet	*Regulus calendula*	
Mountain Bluebird	*Sialia currucoides*	1 male, cutover; 1 male old burn
Swainson's Thrush	*Catharus ustulatus*	several heard
Hermit Thrush	*Catharus guttatus*	
Gray Catbird	*Dumetella carolinensis*	heard near riparian
Cedar Waxwing	*Bombycilla cedrorum*	
Tennessee Warbler	*Vermivora peregrina*	heard in aspen
Orange-crowned Warbler	*Vermivora celata*	heard in aspen regen/edge
Nashville Warbler	*Vermivora ruficapilla*	heard in mixedwood edge
Chestnut-sided Warbler	*Dendroica pensylvanica*	aspen understory
Magnolia Warbler	*Dendroica magnolia*	1 along Division Road
Cape May Warbler	*Dendroica tigrina*	mature mixedwood
Yellow-rumped Warbler	*Dendroica coronata*	pine and mixedwood
Black-throated Green Warbler	*Dendroica virens*	mature mixedwood
Blackburnian Warbler	*Dendroica fusca*	mature mixedwood
Palm Warbler	*Dendroica palmarum*	jack pine regen, riparian edge
American Redstart	*Setophaga ruticilla*	aspen understory
Ovenbird	*Seiurus aurocapillus*	aspen
Connecticut Warbler	*Oporornis agilis*	mature aspen, black spruce
Mourning Warbler	*Oporornis philaelphia*	aspen edge, south of camp
Common Yellowthroat	*Geothlypis trichas*	along riparian
Chipping Sparrow	*Spizella passerina*	pine and mixedwood
Clay-coloured Sparrow	*Spizella pallida*	cutover, shrub areas
Vesper Sparrow	*Pooectes gramineus*	cutover, nest 4 eggs
Le Conte's Sparrow	*Ammodramus leconteii*	Caution Creek

List of Bird Species Identified Within the Local Study Area During 2004 and 2005 Surveys Continued

Species	Scientific Name	Comments
Song Sparrow	*Melospiza melodia*	riparian areas
Lincoln's Sparrow	*Melospiza lincolnii*	shrub bogs
White-throated Sparrow	*Zonotrichia albicollis*	aspen, cutover edge
Dark-eyed Junco	*Junco hyemalis*	pine and mixedwood
Rose-breasted Grosbeak	*Pheucticus ludovicinus*	mature aspen
Red-winged Blackbird	*Agelaius phoeniceus*	at beaver ponds
Purple Finch	*Carpodacus purpureus*	pine at camp
White-winged Crossbill	*Loxia leucoptera*	mature mixedwood
Pine Siskin	*Carduelis pinus*	pine
American Goldfinch	*Carduelis tristis*	riparian, cutovers
Whip-poor will	*Caprimulgus ociferus*	