Tamerlane Ventures Inc.




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TAMERLANE PINE POINT PROJECT
2006 WILDLIFE SURVEYS
PINE POINT, NT

1740149.001

October 2006

CREATING AND DELIVERING BETTER SOLUTIONS

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EXECUTIVE SUMMARY

Tamerlane Ventures Inc. (Tamerlane) retained EBA Engineering Consultants Ltd. (EBA) to complete environmental baseline surveys at the Pine Point Project Property, Northwest Territories (NWT). In September 2005, environmental baseline surveys were designed to document existing biophysical conditions including wildlife, ecosystem classification, fish habitat characterization, and surface water quality within a 36,153 hectares (ha) Regional Study Area. Based on species occurrences, species and habitat sensitivities, and species conservation status reported in the 2005 report (EBA 2005), additional baseline surveys were recommended in 2006 to focus around the proposed Pilot Plant footprint. To support future anticipated regulatory applications for the proposed Pilot Plant Project additional baseline surveys were recommended in 2006 including owl, amphibian, breeding bird, rare plant, and water quality surveys within a 16,551 ha Wildlife Study Area. This report summarizes wildlife and observed habitat utilization data collected during the 2005 field program (EBA 2005a), as well as details 2006 wildlife program results.

2005 Ecological Land Classification

Results of the 2005 Ecological Land Classification (ELC) identified four upland, one riparian, and three lowland habitats within the Regional Study Area. Mapping was completed at a 1:50,000 scale during the 2005 ELC program. All eight community types described in the 2005 ELC program occur within the 2006 Wildlife Study Area, include bearberry – jack pine, Canada buffalo-berry – green alder, Labrador tea – mesic, Labrador tea – subhygric, willow – horsetail, treed fen, shrubby fen, and graminoid fen.

2005 Wildlife Survey

The presence of wildlife (based on actual observation, or inferred from tracks, burrows, browse and droppings or scat) was recorded at each ELC plot during the 2005 wildlife survey. Additional information was also noted in relation to the associated habitat and how a specific animal was surmised to have been interacting with the habitat, such as browsing or digging. Incidental wildlife observations recorded to and from survey plots were also documented. During the 2005 wildlife field survey, a total of 80 different bird observations were recorded, comprising of 32 different species. These observations included actual sightings, bird calls, or sign. In addition, a total of 104 mammal observations, including actual sightings or sign, were recorded. Of the 104 observations, evidence of 13 different mammal species were documented as occurring within the Regional Study Area. The most notable mammal observations during the September 2005 survey included observations of woodland caribou and wood bison sign (hair, pellets, tracks, and feeding areas).

Community types that exhibited the highest species diversity include treed Ffn and Labrador-tea - subhygric habitat units. These community types covered 24% and 15% of the Regional Study Area, respectively. Species that appeared to occupy multiple community types included moose, black bear, and woodpecker species. In contrast, Whooping Crane, Peregrine Falcon, Bald Eagle, beaver, lynx, woodland caribou, and wood bison appeared to be restricted to a few specific communities within the Regional Study Area.

2006 Owl Survey

The purpose of the 2006 owl survey was to identify species presence and distributions of breeding territories within the 2006 Wildlife Study Area (16,551 ha). Pre-selected owl stations were surveyed on April 24 and 25, and the same stations were re-surveyed May 17 and 18. Both owl surveys included a broadcast-call program, which targeted five owl species including Boreal, Long-Eared, Barred, Great Grey, and Great Horned owls. Three additional owl species that may occur in the study area, Snowy Owl, Northern Hawk Owl (a diurnal owl), and the Short-eared Owl; were surveyed following visual detection methods.

In total, five Great Horned, one Great Grey, one Long-eared, and seven Boreal owls were recorded at the 2006 survey stations (a total of 14 owls). Based on observed distances between intra-species territorial calls, it is assumed there were three Great Horned Owl occupied territories, one Great Grey, one Long-eared, and six possibly seven Boreal Owl occupied territories at the survey stations. Barred, Snowy, Short-eared, and Northern Hawk owls were not detected within the study area; however, this does not represent the absence of these species.

2006 Breeding Bird Survey

A single breeding bird survey was recommended within the 2006 Wildlife Study Area to document species presence and evidence of breeding territories that can be referenced in future baseline and monitoring programs. A point count survey, a common protocol used throughout North America, was recommended to focus on passerines. The breeding bird survey focused primarily on passerines, also known as "Perching" birds, which make up the largest and most diverse group of birds occurring in the Wildlife Study Area. Although passerines were the focus of this breeding bird survey, upland nesting birds (*i.e.* Grouse and Ptarmigan), and shorebirds (*i.e.* Gulls, Sandpipers, and Plovers) were also recorded.

Potential survey station locations were pre-selected prior to fieldwork and refined while on-site. Nineteen breeding bird stations were pre-selected in each community type, proportional to available habitat in the Regional Study Area, and were surveyed from June 3– 5, 2006. Surveys commenced at 4:10 am and continued until 10:00 am, except on the June 5 when the survey was terminated due to rain.

During the breeding bird survey, a total of 195 birds were recorded at the point count stations, including 31 different passerine species, one upland nesting bird, and four shorebird species. White-winged Crossbill, Ruby-crowned Kinglet, Hermit Thrush, White-throated Sparrow, Yellow-rumped Warbler, Palm Warbler, and Chipping Sparrow were the most common species. The number of individual birds that were recorded in each habitat type and the species richness was calculated. Results from these analyses must be interpreted with caution since sample sizes are low, particularly for bearberry – Jack pine, graminoid fen, and human disturbed/upland complex habitats.

Bearberry – Jack pine habitat had the highest average number of birds and the Labrador-tea – subhygric habitat had the lowest average number of bird observations.

The highest average number of species (species richness) was found in graminoid fens. Treed fen habitats had the lowest average species richness.

2006 Amphibian Survey

Four amphibian species hypothetically occur within the Regional Study Area: Boreal Chorus, Wood, and Northern Leopard frog, and Canadian Toad. To accommodate for limited information on amphibian distribution and breeding behaviour within the NWT, a Pilot Survey was completed in order to better understand breeding and/or calling phenology of the four amphibian species hypothetically occurring in the Wildlife Study Area. This Pilot Survey included a single auditory survey at selected habitats in May, as well as documenting incidental amphibian observations and calling indexes in conjunction with owl surveys in April and May, and the breeding bird Survey in June.

Infrequent calls of both Wood and Boreal Chorus frogs were heard during the April owl survey. In April, Wood Frogs were reported at five sites (calling frequency ranged from 1 – 3 at these five sites; average 1.6) and Boreal Chorus Frogs were recorded at four sites (calling indexes reported as 1 and 3; average 1.2). During the May owl survey, Boreal Chorus Frogs were the most commonly heard amphibian species. During the May owl survey, Wood Frogs were not heard; however, a single Wood Frog was observed within a treed fen. Boreal Chorus Frogs were heard at eight sites during the May Owl survey. Calling indexes of the Boreal Chorus Frogs appeared higher during the May Owl survey, than compared to the April Owl survey (calling indexes ranged between 1 and 3; average 2.5).

During the auditory survey, a total of 12 stations were surveyed between May 16 – 18 in the 2006 Wildlife Study Area (16,551 ha). Auditory stations included a variety of breeding habitats, including: roadside ditches, temporary pools, wetlands, ponds, streams, and lakes that were accessible from the highway, cut-lines, and trails. During the auditory surveys, Boreal Chorus Frogs were documented at all of the twelve auditory stations, and a Wood Frog was recorded at two auditory stations (total of two Wood frogs). Boreal Chorus Frog calling indexes at eleven of the stations was at a level where individual frogs could not be counted (calling level 3), and at one station calling indexes were at a level where individuals are distinguishable, but overlap slightly (level 2). Calls from the Boreal Chorus Frogs were frequent and high in pitch, and may have concealed other calling species. The Northern Leopard Frog and Canadian Toad were not documented in the study area during the 2006 surveys.

Amphibians were also documented while conducting the breeding bird survey from June 3 – 5. Boreal Chorus Frogs were recorded at three breeding bird stations, and a single Wood Frog was observed in a treed fen within the Wildlife Study Area (Photograph 4). Calling frequencies of Boreal Chorus Frogs ranged between level 1 and 2 during the breeding bird survey (average 1.3).

From the Pilot survey, peak breeding for Wood Frogs either occurred immediately prior to the April Owl event (April 24 - 25), or sometime between the April Owl survey event and the Pilot amphibian survey (May 16 - 18). Since spring arrived earlier than normal in 2006, peak Wood Frog breeding was predicted to have occurred prior to April 24. Although, since peak Wood Frog breeding continues for a short week or two, it can be difficult to time surveys sufficiently to target peak levels. In addition, since Northern Leopard Frogs also over-winter in ponds and may begin calling prior to complete ice melt (similar to Wood Frogs), it is assumed the peak breeding time of the Northern Leopard Frog (if any in the study area) occurred prior to April 24 (probably due to the early spring

arrival). The period of time when the Canadian Toad breeding intensity was at its peak was undetermined. However, it is believed the May 16 – 18 survey event corresponded to the peak breeding time of Boreal Chorus Frogs, or in close proximity.

Breeding behaviour of Boreal Chorus Frogs (*i.e.* males calling) was documented in many different habitat types within the Wildlife Study Area including: roadside ditches, old borrow pits, riparian zones, shrubby and treed fens, lakes, and a small graminoid fen within a larger shrubby fen. Wood Frogs were reported calling in roadside ditches, shrubby fens, and lakes. Two visual detections of Wood Frogs occurred in treed fens; however, both individuals did not exhibit breeding behaviour.

2006 Incidental Wildlife

Other wildlife observations were recorded incidentally during the 2006 owl, breeding bird, and amphibian surveys. Six mammal species were recorded within the Wildlife Study Area including woodland caribou, black bear, red fox, wolf, beaver, and snowshoe hare. Of particular interest, fresh woodland caribou tracks were recorded approximately 1.5 km northwest of Polar Lake during the June breeding bird survey.

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1.0 INTRODUCTION

Tamerlane Ventures Inc. (Tamerlane) retained EBA Engineering Consultants Ltd. (EBA) to complete environmental baseline surveys at the Pine Point Project Property, Northwest Territories (NWT). In September 2005, environmental baseline surveys were designed to document existing biophysical conditions including wildlife, ecosystem classification, fish habitat characterization, and surface water quality within a 36,153 hectares (ha) Regional Study Area (Figure 1). Based on species occurrences, species and habitat sensitivities, and species conservation status reported in the 2005 report (EBA 2005), additional baseline surveys were recommended in 2006 to focus around the proposed Pilot Plant footprint (Figure 1). To support future anticipated regulatory applications for the proposed Pilot Plant Project additional baseline surveys were recommended in 2006 including owl, amphibian, breeding bird, rare plant, and water quality surveys within a 16,551 ha Wildlife Study Area (Figure 1).

This report summarizes wildlife and observed habitat utilization data collected during the 2005 field program (EBA 2005a), as well as details 2006 wildlife program results. Two primary purposes of these wildlife surveys were to document and characterize wildlife and wildlife habitat within the project area and to establish baseline conditions for the anticipated Pilot Plant development. In addition, these surveys form a basis for future monitoring programs associated with Project implementation and operation. Additional results from the 2005 and 2006 environmental baseline surveys (including the 2005 ecological land classification, 2006 rare plant, and the 2005 and 2006 water quality sampling programs) are reported in separate documents (EBA 2005b; EBA 2006c, EBA 2005d; EBA 2006e).

1.1 BACKGROUND

Both the 2005 Regional Study Area and the 2006 Wildlife Study Area lie within the Slave River and Hay River Lowland Ecoregions, which are characterized by flat, low relief plains. Based on the Ecological Land Classification (ELC)[1] program completed in 2005 (EBA 2005b), just over 50% of the Regional Study Area consisted of lowland habitats and 47% were upland habitats. Most of the Regional Study Area had forest cover. Habitats dominated by shrubs commonly occurred in low-lying areas that had some evidence of fire. These same shrub units made up the majority of mixed wood habitats. Broadleaf and graminoid units were not common within the Regional Study Area. In the Regional Study Area, the most common habitat was upland, Labrador tea – mesic ecosites (28%), with shrubby fens and treed fens second and third, respectively (25% and 24%).

[1] Ecological land classification is a mapping process that involves the integration of site, soil and vegetation information. This information is used to organize ecological data into units that respond to disturbance in a similar and predictable manner.

The majority of the 2006 Wildlife Study Area lies within the Regional Study Area, which was analysed through the ELC program in 2005. Boundaries of the 2006 Wildlife Study Area were chosen to encompass the proposed Pilot Plant footprint, representative habitat types within the Regional Study Area, and sufficient access routes.

2.0 2005 HABITAT ASSESSMENT AND WIDLIFE SURVEY SUMMARY

Prior to undertaking the 2005 field program, recent Quickbird satellite imagery was obtained for the entire 36,153 ha Regional Study Area. This satellite imagery was carefully assessed and key community features for wildlife were noted prior to field mobilization. This information formed the basis for the 2005 and 2006 wildlife field programs, including habitat work conducted by the EBA wildlife team in September 2005. During the 2005 field program, plot surveys were used to classify the ecological environment, and document baseline wildlife diversity and observed habitat utilization throughout the 36,153 ha Regional Study Area. Plot assessments were an extension of the ecological land classification and were collected concurrently.

2.1 2005 ECOLOGICAL LAND CLASSIFICATION

Results of the 2005 Ecological Land Classification identified several different upland and lowland habitats. Although, mapping was completed at a 1:50,000 scale, eight different community types were described within the Regional Study Area. Since the 2005 ELC communities was delineated using course resolution satellite imagery, smaller habitats were grouped into larger communities, and consequently, communities described by the ELC program may be made up of a complex of smaller uncommon habitat types.

Community types occurring within the 2006 Wildlife Study Area include bearberry – jack pine, Canada buffalo-berry – green alder, Labrador tea – mesic, Labrador tea – subhygric, willow – horsetail, treed fen, shrubby fen, and graminoid fen (Table 1), and are summarized below.

TABLE 1. SUMMARY OF COMMUNITY TYPES IN THE WILDLIFE STUDY AREA

Landscape Unit	Community Type	Percentage of Regional Study Area (%)
Upland Units	Bearberry – Jack Pine	< 1
	Canada Buffalo-Berry – Green Alder	< 2
	Labrador Tea - Mesic	28
	Labrador Tea - Subhygric	15
Riparian Units	Willow - Horsetail	<1
Lowland Units	Treed Fen	24
	Shrubby Fen	25
	Graminoid Fen	1

2.1.1 Upland Units

Fire has been documented as the primary disturbance factor disrupting successional processes in the boreal forest (Rowe and Scotter 1973), contributing to the presence of fire induced habitat known as seral communities. Upland ecosystems were dominated by seral communities consisting of jack pine (*Pinus banksiana)*, aspen (*Populus tremuloides)*, and paper birch (*Betula papyrifera)*, and climax communities dominated by black (*Picea mariana)* and white spruce (*Picea glauca)*. Immediately after fire, these communities were dominated by fast growing deciduous seral species, such as paper birch and alder (*Alnus* spp.), and the slower growing jack pine became the dominant species a few years after fire. In the Regional Study Area, there were numerous successional stages observed as a result of several fire regimes. Upland units cover approximately 47 % of the Regional Study Area.

2.1.1.1 Bearberry – Jack Pine

The bearberry – Jack pine community type was not sampled during the 2005 ELC field program (referred to as Bearberry – Pj in the 2005 ELC report); however it was described based on Beckingham and Archibald (1996). This community type was characterized as a dry site, with rapidly drained soils on coarse textured glaciofluvial surficial material. It has a poor to very poor nutrient regime. Jack pine and bearberry (*Arctostaphylos uva-ursi*) were the dominant tree and shrub species, respectively. Cushion mosses (*Dicranum* spp.) and haircap mosses (*Polytrichum* spp.) were common, as well as numerous reindeer lichens (*Cladina* spp.). This community type covered less than one percent of the 2005 Regional Study Area.

2.1.1.2 Canada Buffalo-Berry – Green Alder

This forest ecosite was generally found on lower slopes or at toe positions in the landscape and along Buffalo River. This ecosystem had a moderate nutrient regime with a submesic to subhygric moisture regime. White spruce was the climax species, but seral communities contained varying amounts of pine, aspen, and paper birch. Canada buffalo berry (*Shepherdia canadensis*), common juniper (*Juniperus communis*), saskatoon (*Amelanchier alnifolia*), and rose (*Rosa acicularis*) were common shrubs. Bearberry, false toadflax (*Geocaulum lividum*), twinflower (*Linnaea borealis*), and northern bedstraw (*Galium boreale*) were common in the herb layer. This community type accounted for less than two percent of the Regional Study Area.

2.1.1.3 Labrador Tea - Mesic

This community type was and covered approximately 28 % of the Regional Study Area. It was found on upland sites that had shallow organic deposits. This community has a very poor to medium nutrient regime with a mesic to submesic moisture regime. Black spruce was common in mature stands and jack pine dominated mature seral communities. Common juniper, rose, and bog cranberry (*Vaccinium vitis-idaea*) were common shrubs.

2.1.1.4 Labrador Tea - Subhygric

This community type covered 15 % of the Regional Study Area and occurred in transitional zones between treed fens and upland Labrador Tea – Mesic sites. The soils were typically moist, leading to a well-developed moss layer. The nutrient regime in this ecosite typically ranged from poor to medium. Black spruce and jack pine were common tree species, while Labrador tea (*Ledum groenlandicum*), black spruce, and creeping juniper (*Juniperus horizontalis*) were found in the shrub layer. Stair-step moss (*Hylocomium splendens*), red-stemmed feather moss (*Pleurozium schreberi*) and reindeer lichens were a common ground cover.

2.1.2 Riparian Units

Riparian habitats were uncommon in the Regional Study Area, and occurred adjacent to streams and rivers.

2.1.2.1 Willow - Horsetail

The willow - horsetail community type covered less than one percent of the Regional Study Area. However, this riparian ecosystem was likely more common than the mapping indicated. Within fens, there was usually a drainage network that directs water into channels, draining the area. In air photo or satellite interpretation, it was often difficult to identify these channels if they were narrow, unless the vegetation along the channel varied significantly from the surrounding vegetation. This community type was characterized by poor drainage, frequent flooding, and a rich nutrient regime. Common species were willow (*Salix* spp.), river alder (*Alnus incana*), balsam poplar (*Populus balsamifera)*, and red-osier dogwood (*Cornus stolonifera*). The herb layer was dominated by horsetail *(Equisetum* spp.), reed grass (*Calamagrostis canadensis*), and sedges (*Carex* spp.).

2.1.3 Lowland Units

Wetland ecosystems included treed, shrubby, and graminoid fens. These fens were generally restricted to areas of poorly drained organic soils, in which the soils tended to be nutrient rich. Stand composition varied due to fire regimes; early successional stands were dominated by an open canopy of bog birch, while mature stands had a closed canopy of black spruce and tamarack (*Larix laricina).* Wetland ecosystems represented less than 50 % of the Regional Study Area.

2.1.3.1 Treed Fen

This community type occurred in areas with some water movement. It had a rich to very rich nutrient regime and a subhydric to hydric moisture regime. Black spruce and tamarack formed an open canopy with willow, bog birch, sweet gale (*Myrica gale*), and shrubby cinquefoil (*Pentaphylloides floribunda*) common in the shrub layer. The herb layer was diverse, with sedges, three-leaf false Solomon's seal (*Maianthemum trifolium*), small bedstraw (*Galium trifidum*), and bog cranberry being most common. This community type was the second most common wetland unit, covering approximately 24 % of the Regional Study Area.

2.1.3.2 Shrubby Fen

Shrubby fens were found throughout the Regional Study Area and were commonly located near open water within larger fen complexes or drainage areas where there was water movement. This community type was characterized by a medium to rich nutrient regime and a subhydric to hydric moisture regime. Shrubby fens were typically dominated by a bog birch or willow canopy and an understory of tamarack or black spruce. This was a result of past fires in the area. Sweet gale and sedges were common. This community type accounted for approximately 25 % of the Regional Study Area.

2.1.3.3 Graminoid Fen

Graminoid fens accounted for one percent of the Regional Study Area, characterized by poorly drained sites with a hydric moisture regime and a medium nutrient regime. Sedges, reed grass, and bulrushes (*Scirpus* spp.) were common. Graminoid fens were often associated with shallow open water and shrubby fens. Within the Regional Study Area, there were a number of polygons that contained both graminoid and shrubby fen community types. The shrubby fen community type typically dominated the graminoid fens and, consequently, graminoid fen may be under represented in the Regional Study Area.

2.2 2005 WILDLIFE SURVEY

The presence of wildlife (based on actual observation, or inferred from tracks, burrows, browse and droppings or scat) was recorded at each ELC plot. Additional information was also noted in relation to the associated habitat and how a specific animal was surmised to have been interacting with the habitat, such as browsing or digging. Incidental wildlife observations recorded to and from survey plots were also documented. Based on Sibley (2003) and government reports, a total of 210 bird species were identified as confirmed or potentially occurring in the study area, either as breeders or migrants. During the 2005 wildlife field survey, a total of 80 different bird observations were recorded, comprising of 32 different species. These observations included actual sightings, bird calls, or sign. Ten of the most frequently recorded bird species included the following: American Robin, Tundra Swan, White-winged Scoter, Gray Jay, Common Raven, Spruce Grouse, and Bohemian Waxwing. The most notable bird observations during the September survey included visual observations of a Whooping Crane and Peregrine Falcons.

A preliminary list of all mammal species known or suspected to occur in the study area (*i.e.* within 200 km of the study area) was generated using Banfield (1977) Mammals of Canada. A total of 40 mammal species were known or suspected to occur within the Regional Study Area. During the 2005 Wildlife field study, a total of 104 mammal observations, including actual sightings or sign, were recorded. Of the 104 observations, evidence of 13 different mammal species were documented as occurring within the Regional Study Area during the field program, including snowshoe hare, woodland caribou, wood bison, moose, red fox, black bear, wolf, coyote, lynx, beaver, mink, ermine, red squirrel, and common porcupine.

The most notable mammal observations during the September 2005 survey included observations of woodland caribou and wood bison sign (hair, pellets, tracks, and feeding areas).

Community types that exhibited the highest species diversity include treed fen and Labrador-tea - subhygric habitat units. These community types covered 24% and 15% of the Regional Study Area, respectively. Species that appeared to occupy multiple community types included moose, black bear, and woodpecker species. In contrast, Whooping Crane, Peregrine Falcon, Bald Eagle, beaver, lynx, woodland caribou, and wood bison appeared to be restricted to a few specific communities within the Regional Study Area.

3.0 2006 BIRD SURVEYS

Two different bird surveys were completed in the 2006 Wildlife field studies, including owl and breeding bird surveys. Results of both bird surveys are detailed below.

3.1 2006 OWL SURVEY

3.1.1 Introduction

The purpose of the 2006 owl survey was to identify species presence and distributions of breeding territories within the 2006 Wildlife Study Area (16,551 ha). Eight owl species hypothetically occur within the study area (as breeders, winter residents, and migrants) including the Great Horned, Great Grey, Snowy, Barred, Long-eared, Short-eared, Northern Hawk, and Boreal owls.

All owl species are protected under the NWT Wildlife Act, and the Short-eared Owl is federally classified as a species of Special Concern. However, a reassessment of the Short-eared Owl is required to qualify for full federal protection under the Species at Risk Act (SARA).

Great Horned, Great Grey, Long-eared, Northern Hawk, and Boreal owls are considered breeders and year-round residents to the regional area. Snowy and Short-eared owls are considered seasonal residents only. Barred owls have an undetermined status in the Northwest Territories since there is insufficient information to determine their distribution, abundance, or population trends. Scientific evidence suggests owl populations naturally fluctuate with prey populations (*i.e.* snowshoe hare, mice, and vole) (Parmelee 1992; Alexander *et al.* 2003).

Snowy Owls are potentially winter residents within the study area, and some evidence suggests that they have a tendency to return to the same winter territories (Parmelee 1992). Winter feeding territories are commonly defended, and evidence suggests adult female Snowy Owls typically over-winter in the most northern portion of the species' winter range (which includes the study area) (Parmelee 1992). Snowy Owls arrive on the breeding grounds in the high Arctic by late April to late May (Parmelee 1992); therefore Snowy Owls were expected to have departed for their breeding range prior to the onset of this survey.

Although many field guides indicate Short-eared owls are summer residents to the regional area (Sibley 2003) and probably breed in the region, they are considered "partial" migrants[2] and some individual Short-eared owls may remain in the region year-round (Wiggins 2006). Short-eared owls have been recorded as year-round residents near Caribou Mountains, Alberta (approximately 200 km south of the study area), near Claire Lake, Wood Buffalo National Park (approximately 280 km southeast of the study area), as well as Fort Vermillion, Alberta (approximately 260 km south of the study area) (Clayton 2000). Some Short-eared owls may also occupy the Regional Study Area during winter months.

Barred owls are believed to occur within the Northwest Territories; however they have rarely been documented (Environment Canada 2002, Sibley 2003). In Alberta, Barred owls are year round residents and are known to nest in old growth forests and swamps, and tend to hunt in more open habitats (SRD 2006). Barred owls have been known to re-use old hawk nests (SRD 2006).

3.1.2 Methods

Two owl survey events were completed in 2006 within the Wildlife Study Area. Pre-selected owl stations were surveyed on April 24 and 25, and the same stations were re-surveyed May 17 and 18. Both owl surveys included broadcast-call program that commenced 0.5 hours after sundown and continued to 0.5 hours before sunrise (21:53 to 5:23 in April and 22:51 to 4:20 in May). Pre-selected stations were chosen based on existing community type (as described by the 2005 ELC program), site access, and were equally spaced 1.6 km apart along trails, access roads, and highway. This spacing distance was selected as being close enough to provide appropriate coverage of the survey areas, yet far enough apart to minimize the potential for double-counting owls.

At each station, a series of playback calls were broadcasted using a CD player connected to a megaphone (Photograph 1). Five owl species were targeted during the broadcast-call survey including: the Boreal, Long-Eared, Barred, Great Grey, and Great Horned owls. Three additional owl species that may occur in the study area, Snowy Owl, Northern Hawk Owl (a diurnal owl), and the Short-eared Owl; were surveyed following visual detection methods. Northern Hawk and Short-eared owls do not respond well to broadcast surveys and typical survey methodologies to document the presence of these species is by visual confirmation. The territorial calls of each of the five species were broadcasted for 20 seconds, followed by 60 seconds of listening. This was repeated three times for each species (with a megaphone directed 0, 120 and 240 cardinal degrees from station centre), starting from the smallest owl species (Boreal Owl) to the largest (Great Horned Owl). The total time at each station was approximately 30 minutes. This included a two-minute listening period at the beginning of the survey to listen for owls calling spontaneously.

[2] Some individual Short-eared Owls do not migrate. Current research indicates a tendency of individual Short-eared Owls occupying the northern part of their species range (*i.e.* the NWT) to migrate south more frequently than individuals occupying the southern part of the species range (*i.e.* southern Alberta) (Wiggins 2006).

All owl calls were recorded, along with the approximate direction and distance of the caller from station centre. The sex of the owl was reported when differentiation was clear. Environmental conditions were also recorded at each owl station, including: habitat type, snow cover, snow depth, air temperature, cloud cover, wind conditions, precipitation, and surrounding noise. All owl and other wildlife sightings while traveling throughout the Regional Study Area were recorded.

3.1.3 Results and Discussion

A total of 16 owl stations were surveyed during the April event, and all 16 owl stations were re-surveyed in May, except one (Figure 2). One owl station was omitted from the May field program due to time restrictions as a result of longer daylight hours. Survey dates were timed to coincide with the period of most frequent calling activity (breeding/nesting). At each station, all owl calls were broadcasted, except during the May event. If an owl territory was already recorded during the April survey that species call was not broadcasted again during the May event to help reduce stress to breeding and nesting owls.

Plant communities delineated by the 2005 ELC program were used to define owl habitat within the Wildlife Study Area. Community types described by the ELC program were used in assessing habitat type at each owl observation. A micro-scale habitat evaluation by the field crew was not feasible at all recorded owl observation sites since access was restricted (particularly during the dark), and human presence may stress territorial owls.

Survey conditions varied between the April and May events. During the April event, air temperatures varied throughout the evenings (between 1° to 14°C), snow cover and snow depth differed with habitat type (snow cover ranged between 90% to less than 1%, snow depth ranged between 0 to 10 cm), cloud cover ranged between clear to complete overcast, and wind velocities were commonly low with some wind gusts. Surrounding noise, most notably calling Boreal Chorus frogs and the flow of Buffalo River were documented at four owl stations but were considered negligible. Similarly, environmental conditions during the May survey event fluctuated throughout both evenings. Air temperatures ranged between 0° to 10° C, cloud cover changed from partial to full coverage, and mist conditions were present at five owl stations; however wind velocities remained low, and snow cover was nil. Surrounding noise levels increased from the April survey event. Surrounding noise, predominantly from Boreal Chorus frogs, Sandhill Cranes, and the Buffalo River were evident at seven owl stations.

During the April survey event, eight owl observations were recorded at five different stations (Table 2). Three Great Horned Owls, one Great Grey Owl, three Boreal Owls, and one Long-eared Owl were heard calling at the survey stations (Figure 2).

During the May survey event, a total of six owl observations were recorded including four Boreal Owls and two Great Horned Owls (Figure 2). These six owl observations were documented at five different stations (Table 2).

TABLE 2. SUMMARY OF OWL SURVEY RESULTS, APRIL AND MAY 2006		
Station Number	Owl Species Recorded on Station	
	April 24-25	May 17-18
Station 4	Long-eared Owl	Boreal Owl
Station 5	-	Boreal Owls **x 2**
Station 6	-	-
Station 7	-	-
Station 8	-	-
Station 9	Great Grey Owl	-
Station 10	Great Horned Owls **x 2 (territory)**	Not surveyed[1]
Station 11	-	-
Station 23	-	-
Station 24	-	-
Station 25	Boreal Owl	Great Horned Owl
Station 27	-	-
Station 28	-	Great Horned Owl
Station 29	-	Boreal Owl
Station 30	Great Horned Owl Boreal Owls **x 2**	-
Station 31	-	-

" – " indicates no owls detected.

1. Station 10 was not surveyed during the May event due to timing restrictions by the increase in daylight hours.

In total, five Great Horned, one Great Grey, one Long-eared, and seven Boreal owls were recorded at the 2006 survey stations (a total of 14 owls) (Figure 2). Based on observed distances between intra-species territorial calls, it is assumed there were three Great Horned Owl occupied territories, one Great Grey, one Long-eared, and six possibly seven Boreal Owl occupied territories at the survey stations. Barred, Snowy, Short-eared, and Northern Hawk owls were not detected within the study area; however, this does not represent the absence of these species.

Great Horned Owls typically nest in mature spruce forests, but have also been documented wherever sufficient prey populations exist, particularly snowshoe hare, including open spruce (such as treed bogs), mixed forests, and old burned areas (Alexander *et al.* 2003). Within the Wildlife Study Area, Great Horned Owls were recorded in a treed fen, Labrador tea - mesic, and Labrador tea - subhygric communities (Table 3). The response rate of territorial Great Horned Owls to broadcast calls were determined in 1990 in southern Yukon (Alexander *et al.* 2003). According to Alexander *et al.* 2003, 70.8% of territorial Great Horned Owl males respond to broadcast calls. During a peak population year in southwestern Yukon, a breeding pair of Great Horned Owls were present every 4 km^2 (Alexander *et al.* 2003).

Great Grey Owls nest throughout the boreal forest, favoring areas with a network of wetlands and open areas. In central Yukon, Great Grey Owls commonly use Northern Goshawk and Red-tailed Hawk nests, as well as the tops of broken snags (Bull *et al.* 1993; Alexander *et al.* 2003). Great Grey Owls were also found to nest in or near riparian forests and treed wetlands (Bull *et al.* 1993; Alexander *et al.* 2003). Dry Pine forests and treeless areas were typically avoided as nesting habitats (Bull *et al.* 1993). Within the Wildlife Study Area, a Great Grey Owl was detected in a Labrador tea - mesic community immediately adjacent to a shrubby fen (Table 3). Breeding pairs have been documented to nest within 0.5 km of another pair (Bull *et al.* 1993). Intra-specific territorial behaviour tends to occur only in the immediate vicinity of nest site (Bull *et al.* 1993). Great Grey Owls are typically observed hunting in coniferous or mixed forests, wetlands, and roadsides.

Within the Wildlife Study Area, a single Long-eared Owl was recorded in a Labrador tea - mesic community immediately adjacent to a shrubby fen and Labrador tea - subhygric stand (Table 3). Favored nesting substrates of Long-eared Owls vary throughout the species breeding range, and may include trees in open and close coniferous and deciduous forests, willows, and other shrubs. However, nests are predominantly constructed near open meadows, grasslands, shrublands, wetlands, and farmland (Marks *et al.* 1994). Scientific evidence suggests Long-eared Owls do not defend territories outside the immediate vicinity of the nest, and colonial nesting may occur depending on the quality of nesting habitat (Marks *et al.* 1994).

Boreal Owls are known cavity nesters, and commonly favor white spruce snags for cavities. Nests can be found in both open and closed canopy forests (Alexander *et al.* 2003). In the Wildlife Study Area, Boreal Owls were detected in four community types including: both treed and shrubby fens, Labrador tea - mesic, and Canada buffalo-berry - green alder (Table 3). The highest recorded male Boreal Owl density in southwestern Yukon was a territorial male every 2.2 km^2 (Alexander *et al.* 2003).

TABLE 3. SUMMARY OF OWL OBSERVATIONS IN ASSOCIATED COMMUNITY TYPES

Community Type	Number of Owl Observations[1]	Total Owl Observations
Labrador Tea - Mesic	Great Horned Owl (x 2) Great Grey Owl (x 1) Long-eared Owl (x 1) Boreal Owl (x 2)	6
Treed Fen	Great Horned Owl (x 1) Boreal Owl (x 3)	4
Labrador Tea - Subhygric	Great Horned Owl (x 2)	2
Shrubby Fen	Boreal Owl (x 1)	1
Canada Buffalo-berry - Green Alder	Boreal Owl (x 1)	1

1. Includes owls detected at survey stations only.

The ability to detect owls varies annually and nightly in response to weather, other environmental conditions, and prey numbers. To discern long-term trends of owls within a given area, multiple survey events at each broadcast station over multiple years is recommended.

3.2 2006 BREEDING BIRD SURVEY

3.2.1 Introduction

Birds are commonly used in baseline inventories and monitoring programs as they represent an abundant and diverse group that are relatively easy to observe and monitor, particularly during peak breeding times.

A single breeding bird survey was recommended within the 2006 Wildlife Study Area to document species presence and evidence of breeding territories that can be referenced in future baseline and monitoring programs. A point count survey, a common protocol used throughout North America, was recommended to focus on passerines. The breeding bird survey focused primarily on passerines, also known as "Perching" birds, which make up the largest and most diverse group of birds occurring in the Wildlife Study Area. Passerines include a variety of species including the Common Raven, Kinglets, Warblers, and Sparrows. Although passerines were the focus of this breeding bird survey, upland nesting birds (*i.e.* Grouse, Ptarmigan, and Common Nighthawk), and shorebirds (*i.e.* Gulls, Sandpipers, and Plovers) were also recorded.

The majority of bird species occurring in the Wildlife Study Area are migratory and are present only during their reproductive phase; however, some are year-round residents. Bird species are widely distributed throughout all terrestrial habitat types present within the Wildlife Study Area.

3.2.2 Methods

A fixed-radius point count survey was selected for the breeding bird survey. Point counts are a widely used survey method for estimating songbird abundance. The application of this survey methodology can be used for future monitoring population changes. The benefit of using point counts is the ability to identify a variety of bird species within the 2006 Wildlife Study Area.

Potential survey station locations were pre-selected prior to fieldwork and refined while on-site. Station locations were placed in each community type, proportional to available habitat in the Regional Study Area (where ever access allowed). As a result, common communities had a greater level of sampling than less common communities.

According to standard protocols, the breeding bird survey was conducted during the breeding season, when most species of songbirds are exhibiting breeding/territorial behaviour (Photograph 2). Singing rate is thought to be highest just before official sunrise and then declines slowly for the next few hours. During the breeding season, this time

period represents a time when birds are most visual and vocal. However, surveys were terminated when observation conditions became unsatisfactory due to weather, such as high winds and rain.

Effort was made to place the point count station a minimum of 100 m from habitat edges. Prior to surveying a given point count station, surveyors recorded the date, station location, weather conditions (including air temperature, wind conditions, and precipitation), basic habitat characteristics, crewmembers, and start time. Each survey commenced following 2 – 5 minutes of silence to allow birds to resume normal behaviour.

Bird species were identified visually and/or by territorial call during the survey event. Bird presence was recorded at spatial (0 – 50 m, 50 – 100 m, and greater than 100 m from station centre) and temporal intervals (first 5 minute and second 5 minute intervals). In addition, the cardinal direction of each observation from station centre was documented. Individual territories were recorded when typical territorial behaviour was observed. In addition to recording the temporal and spatial location of each observation, three additional types of information were recorded including the species, sex where possible, and behavioural activity (flushed, territorial display, etc.). Once the survey was completed, data sheets were reviewed as part of an internal quality assurance and quality control program, and any additional observations were discussed amongst the two biologists and documented on data sheets and in field notebooks.

Although the breeding bird surveys were not designed to detect or inventory the Yellow Rail, Whooping Crane, and the White Pelican, all incidental birds and wildlife were recorded on and off the point count stations throughout the Regional Study Area.

3.2.3 Results and Discussion

Nineteen breeding bird stations within the 2006 Wildlife Study Area were surveyed from June 3 – 5, 2006 (Figure 3). Surveys commenced at 4:10 am and continued until 10:00 am, except on the June 5 when the survey was terminated due to rain.

During the breeding bird survey, a total of 195 birds were recorded at the point count stations, including 31 different passerine species, one upland nesting bird, and four shorebird species. Table 4 list the species observed during the breeding bird survey in phylogenetic order. White-winged Crossbill, Ruby-crowned Kinglet, Hermit Thrush, White-throated Sparrow, Yellow-rumped Warbler, Palm Warbler, and Chipping Sparrow were the most common species.

TABLE 4. BIRD SPECIES OBSERVATIONS DURING THE BREEDING BIRD SURVEY			
Species	Number of Observations	Species	Number of Observations
Lesser Yellowlegs	6	Orange-crowned Warbler	3
Solitary Sandpiper	1	Yellow Warbler	1
Wilson's Snipe	1	Magnolia Warbler	1
Mew Gull	1	Yellow-rumped Warbler	13
Common Nighthawk	1	Palm Warbler	12
Yellow-bellied Sapsucker	1	Blackpoll Warbler	1
Woodpecker species	1	Northern Waterthrush	1
Olive-sided Flycatcher	8	Common Yellowthroat	4
Western Wood Peewee	1	Chipping Sparrow	12
Alder Flycatcher	4	Clay-colored Sparrow	2
Least Flycatcher	3	Le Conte's Sparrow	1
Blue-headed Vireo	1	Nelson's Sharp-tailed Sparrow	1
Gray Jay	1	Lincolns Sparrow	3
Bank Swallow	1	Swamp Sparrow	2
Ruby-crowned Kinglet	24	White-throated Sparrow	15
Swainson's Thrush	1	Dark-eyed Junco	10
Hermit Thrush	18	Rose-breasted Grosbeak	1
American Robin	2	White-winged Crossbill	30
Tennessee Warbler	6		

ELC defined community types were not used to describe breeding bird habitat since individual bird territories and habitat use are generally at a finer spatial scale than what the ELC community mapping defines. Therefore, habitats were characterized at each of the breeding bird stations. The majority of breeding bird stations were located within Labrador-tea – mesic and treed fen habitats. There were two stations located in each Labrador-tea – Subhygric, shrubby fen, and a complex[3] of upland and lowland habitat. Another breeding bird station was located within an area disturbed by a gravel pit, plus two upland habitats (Labrador-tea – mesic and Labrador-tea Subhygric) complex habitat. There was also a single survey station at each bearberry – Jack pine and graminoid fen habitats.

Table 5 indicates species observations in each habitat type

[3] Complex habitats are areas that contained more than one habitat type.

TABLE 5. BIRD SPECIES RECORDED IN EACH HABITAT TYPE

Species	Habitat (Number of Survey Stations in Each Habitat Type)							
	Labrador-Tea – Mesic (5)	Labrador-Tea – Subhygric (2)	Bearberry – Jack pine (1)	Treed Fen (5)	Shrubby Fen (2)	Graminoid Fen (1)	Complex of Uplands and Lowlands (2)	Complex of Human Disturbed[1] and Two Separate Uplands (1)
Lesser Yellowlegs	2		1	1		1	1	
Solitary Sandpiper							1	
Wilson's Snipe						1		
Mew Gull						1		
Common Nighthawk		1						
Yellow-bellied Sapsucker	1							
Woodpecker species		1						
Olive-sided Flycatcher	4		1	1		1	1	
Western Wood Peewee		1						
Alder Flycatcher					3		1	
Least Flycatcher	2			1				
Blue-headed Vireo	1							
Gray Jay							1	
Bank Swallow								1
Ruby-crowned Kinglet	6	4	2	6	1	1	3	1
Swainson's Thrush							1	
Hermit Thrush	7	1		2	3		2	3
American Robin	1			1				
Tennessee Warbler	2			3			1	
Orange-crowned Warbler							3	
Yellow Warbler					1			
Magnolia Warbler					1			
Yellow-rumped Warbler	2		2	5	2		2	
Palm Warbler	3			5			2	2
Blackpoll Warbler	1							
Northern Waterthrush							1	
Common Yellowthroat				1	3			
Chipping Sparrow	2	1		7	1			1
Clay-colored Sparrow					2			
Le Conte's Sparrow					1			
Nelson's Sharp-tailed Sparrow						1		

TABLE 5. BIRD SPECIES RECORDED IN EACH HABITAT TYPE

Species	Habitat (Number of Survey Stations in Each Habitat Type)							
	Labrador-Tea – Mesic (5)	Labrador-Tea – Subhygric (2)	Bearberry – Jack pine (1)	Treed Fen (5)	Shrubby Fen (2)	Graminoid Fen (1)	Complex of Uplands and Lowlands (2)	Complex of Human Disturbed[1] and Two Separate Uplands (1)
Lincoln's Sparrow				1	1	1		
Swamp Sparrow						1	1	
White-throated Sparrow	2			5	4	1	3	
Dark-eyed Junco	1		3	3	3			
Rose-breasted Grosbeak								1
White-winged Crossbill			30					
Total	**37**	**9**	**39**	**42**	**26**	**9**	**24**	**9**

1. Altered by human disturbances. The breeding bird station includes a portion of a gravel pit.

The number of individual birds that were recorded in each habitat type and the species richness was calculated (Table 6). Species richness is the number of bird species occurring in each habitat type. Results from these analyses must be interpreted with caution since sample sizes are low, particularly for bearberry – Jack pine, graminoid fen, and human disturbed/upland complex habitats.

Bearberry – Jack pine habitat had the highest average number of birds, followed by shrubby fens, upland/lowland complex, graminoid fen and disturbed/upland complex, treed fen, and Labrador-tea – mesic (Table 6). The Labrador-tea – subhygric habitat had the lowest average number of bird observations (Table 6).

The highest average number of species (species richness) was found in graminoid fens, followed by upland/lowland complex, shrubby fen, bearberry – Jack pine and disturbed/upland complex, Labrador-tea – mesic and Labrador-tea – subhygric (Table 6). Treed fen habitats had the lowest average species richness (Table 6).

TABLE 6. ANALYSIS OF BREEDING BIRD OBSERVATIONS IN EACH HABITAT TYPE

Habitat (Number of Survey Stations in Each Habitat Type)	Total Number of Observations per Station	Average Number of Observations per Station	Total Species Richness per Station	Average Species Richness per Station
Labrador-tea – Mesic (5)	37	7.4	15	3
Labrador-tea – Subhygric (2)	9	4.5	6	3
Bear-berry – Jack Pine (1)	39	39	6	6
Treed Fen (5)	42	8.4	14	2.8
Shrubby Fen (2)	26	13	13	6.5
Graminoid Fen (1)	9	9	9	9
Upland and Lowland Complex (2)	24	12	15	7.5
Human Disturbed and Two Different Uplands Complex (1)	9	9	6	6

3.3 2006 INCIDENTAL BIRD OBSERVATIONS

Birds were also recorded separate from the breeding bird survey while en-route to and from survey stations, during the survey but beyond the plot-sampling radius (> 100 m), and within plots but not within the 10-minute sampling time interval. A total of 136 incidental bird observations were recorded. Observed incidental bird species are listed in phylogenetic order in Table 7. Those species observed outside the owl and breeding bird survey stations are listed here. Although these observations cannot be used in the same quantitative way as those within the owl and breeding bird surveys; however, they do contribute to the list of bird species known to occur in the Wildlife Study Area and the region.

TABLE 7. INCIDENTAL BIRD OBSERVATIONS, 2006

Species	Species
Canada Goose	Pileated Woodpecker
Ruffed Grouse	Olive-sided Flycatcher
Spruce Grouse	Blue-headed Vireo
Ptarmigan species	Gray Jay
Common Loon	Bank Swallow
Bald Eagle	Swainson's Thrush
Northern Harrier	Hermit Thrush
Red-tailed Hawk	American Robin
Rough-legged Hawk	Bohemian Waxwing
American Kestrel	Tennessee Warbler
Merlin	Orange-crowned Warbler
Sandhill Crane	Cape May Warbler
Lesser Yellowlegs	Yellow-rumped Warbler
Solitary Sandpiper	Palm Warbler
Wilson's Snipe	Wilson's Warbler
Tern species	Chipping Sparrow
Great Horned Owl	Swamp Sparrow
Great Grey Owl	White-throated Sparrow
Common Nighthawk	Dark-eyed Junco
Belted Kingfisher	Snow Bunting
Yellow-bellied Sapsucker	

3.3.1 Owls and Raptors

While traveling in the regional area, four additional owls were observed outside the designated Owl Survey stations. During the April owl survey event, a Great Grey Owl was observed along the Highway, approximately 1.9 km east of Station 8 (Figure 2). Another

incidental owl observation was either a Great Horned or Great Grey Owl. This unknown owl observation was recorded 3.5 km west of Station 10. Two additional owls were observed well outside the Wildlife Study Area, and are therefore not documented in Figure 2. One Great Grey Owl was observed along the Highway within the Hay River Indian Reserve, and one Great Horned Owl was observed along the Highway, approximately 1.7 km east of Birch Creek. These incidental owl observations may represent either territorial or non-territorial (floater) individuals.

Although raptors were not deliberately surveyed, all raptor observations were documented. At each raptor observation, the species, sex (if possible), and location were recorded. A total of 19 raptor observations were recorded in the Regional Study Area. These 19 observations include five different raptor species. Ninety-five percent of these raptor observations were recorded in April along the Highway. A total of two American Kestrels, one Bald Eagle, four Northern Harriers, five Rough-legged Hawks, six Red-tailed Hawks, and one unknown raptor species were documented.

3.3.2 Passerines and Other Upland Nesting Birds

Seventy six passerines and other upland nesting birds were documented as incidentals within the Wildlife Study Area. Ten of these species were not documented in the breeding bird survey, including: Cliff Swallows, Bohemian Waxwing, Cape May Warbler, Wilson's Warbler, Snow Bunting, Kingfisher, Pileated Woodpecker, Ptarmigan species, Ruffed Grouse (Photograph 3), and Spruce Grouse. These incidental species were either observed while traveling through the Wildlife Study Area, during the breeding bird survey but beyond the station boundaries (> 100 m from plot centre), or inside sampling stations but outside the 10-minute survey interval.

3.3.3 Shorebirds and Waterfowl

Incidental observations of four different species of shorebirds and four species of waterfowl were recorded. Of these incidental observations, six were not documented during the breeding bird survey including: Tern species, Sandhill Crane, Common Loon, Canada Geese, Northern Pintail, and Teal species.

4.0 2006 PILOT AMPHIBIAN SURVEY

4.1 INTRODUCTION

The NWT lies in the extreme northern limit of amphibian species ranges. Four amphibian species hypothetically occur within the Regional Study Area: Boreal Chorus, Wood, and Northern Leopard frog, and Canadian Toad. Throughout much of the world, amphibian populations have been in decline or have disappeared due to habitat loss, pollution of aquatic environments, other human disturbances, or other unknown causes. Little information currently exists on amphibian populations within the NWT; however, there is particular interest in Northern Leopard Frog and Canadian Toad populations due to their

uncommon occurrence and restricted distributions within the NWT and southern Canada. Northern Leopard Frogs are classified as a species of Special Concern by SARA and Sensitive in the NWT. The Canadian Toad is listed under the NWT as May Be At Risk.

Boreal Chorus and Wood frogs are the most commonly observed frogs within the NWT. These species occur in shallow areas of lakes, rivers, ponds, wetlands, woodlands, and even temporary waterbodies, including roadside ditches and open meadows. In Alberta, Boreal Chorus Frogs may breed from mid April to mid June in small ponds or temporary pools, and Wood Frogs may breed in a short week to two week period from mid April to June in shallow, clear, permanent or temporary ponds (SRD 2005).

Northern Leopard Frogs are predominantly found in or near permanent waterbodies including lakes, rivers, streams, and wetlands, although they can be found a long distance from water, particularly after a rain. After hibernating at the bottom of ponds, Northern Leopard Frogs emerge and begin mating in early spring; some years prior to complete ice-melt. In Alberta, breeding may occur from early April to early June (SRD 2005). Northern Leopard frogs have been documented along the Slave River near Fort Resolution, NWT (Ecology North ND).

In Alberta, the Canadian Toad is active during the day typically from April to September, and burrows in soil at night. Canadian Toads hibernate in burrows. In the spring, toads migrate to breeding ponds, which include shallow areas in lakes, ponds, and even temporary bodies of water. In Alberta, breeding may takes place between early May to early July. The Canadian Toad can be found far from water; however, in Alberta the Canadian Toad is most commonly found in river valleys and along sandy lake margins (SRD 2005). Although Canadian Toad surveys have been limited in the north, Canadian Toads have been documented in southern NWT (Ecology North ND). Since there is limited information available on Canadian Toad distributions in the north, it is assumed Canadian Toads may occur in the Regional Study Area.

Amphibian surveys were recommended due to the sensitivities of amphibians to terrestrial and aquatic modifications, most notably habitat and water quality and quantity changes. The purpose of these amphibian surveys were to document species presence, in particular the Northern Leopard Frog and the Canadian Toad, within the local footprint area of the proposed Pilot Plant and within the Wildlife Study Area.

4.2 METHODS

To increase the chances of species detection, amphibian surveys were to be conducted during a time that would likely coincide with peak breeding of focal species. Auditory surveys were conducted following established survey protocol, where observers document the presence of amphibians based on identification of calling males. The auditory survey was conducted at various stations that were accessible by trails, cutlines, and the highway, and represented a variety of breeding habitat. All amphibian observations were documented, including calls, and visual observations including egg masses.

Established amphibian calling categories were used to estimate general species abundance indexes. The following calling index categories were used:

0 = no amphibians calling

1 = individuals can be counted (no overlapping calls).

2 = calls of individuals are distinguishable, but some calls overlap.

3 = full chorus, or continuous calls, where individuals cannot be distinguished.

Weather and habitat conditions were recorded at each survey station, including: precipitation, barometer, air temperature, water temperature, Beaufort wind scale, cloud cover, habitat type, emergent and submergent vegetation, bottom substrate, and surrounding vegetation community.

4.3 RESULTS AND DISCUSSION

Although auditory surveys are commonly used to determine the presence of amphibian species in a given area, sampling can be biased toward species with higher population abundances, or those that call more frequently, have louder calls, and vocalize over a wide range of climatic conditions. For example, male Canadian Toads produce a soft trill which lasts a few seconds and can easily be lost in the chorus of louder calling species. In addition, since peak breeding times vary between species, and are highly dependent upon environmental conditions (*i.e.* air and water temperature, spring melt, and rain events), species presence and abundance indices from auditory surveys can be misleading. To compound the issues of auditory surveys, little information currently exists on amphibian breeding phenology within the NWT and particularly within the local area. For example, Canadian toad behaviour and cues for calling initiation are not well known (Takats and Preistley 2002), particularly in the NWT; therefore timing surveys to correspond directly with peak breeding times are difficult.

To accommodate for limited information, a Pilot Survey was completed as an alternative to three auditory surveys in order to better understand breeding and/or calling phenology of the four amphibian species hypothetically occurring in the Wildlife Study Area. This Pilot Survey included a single auditory survey at selected habitats in May, as well as documenting incidental amphibian observations and calling indexes in conjunction with owl surveys in April and May, and the breeding bird survey in June (Figure 4).

During the owl surveys in April and May, incidental amphibian observations and calling indexes were recorded. During the April owl survey, air temperatures varied throughout the evenings (between 1° to 14°C), and snow cover and snow depth differed with habitat type (snow cover ranged between 90% to less than 1%, and snow depth ranged between 0 to 10 cm). Infrequent calls of both Wood and Boreal Chorus frogs were heard during the April owl survey. In April, Wood Frogs were reported at five sites (calling frequency ranged from 1 – 3 at these five sites; average 1.6) and Boreal Chorus Frogs were recorded at four sites (calling indexes reported as 1 and 3; average 1.2). During the May owl survey, air

temperatures ranged between 0° to 10° C. Boreal Chorus Frogs were the most commonly heard amphibian species. During the May owl survey, Wood Frogs were not heard; however, a single Wood Frog was observed within a treed fen. Boreal Chorus Frogs were heard at eight sites during the May Owl survey. Calling indexes of the Boreal Chorus Frogs appeared higher during the May Owl survey, than compared to the April Owl survey (calling indexes ranged between 1 and 3; average 2.5).

In addition to incidental amphibian observations during Owl surveys, a total of 12 auditory stations were surveyed between May 16 – 18 in the 2006 Wildlife Study Area (16,551 ha) (Figure 4). Auditory stations included a variety of breeding habitats, including: roadside ditches, temporary pools, wetlands, ponds, streams, and lakes that were accessible from the highway, cutlines, and trails. Although protocol indicated surveys should be conducted half hour before dusk and continue for two to three hours, the survey was conducted between 10 pm to 2:45 am since amphibian calling frequencies remained high. However in Alberta, current evidence suggests temperature is one of the most important factors influencing amphibian activity. In Alberta, the ability to detect amphibians was most accurate when the temperature ranged between 13 to 21° C (Takats and Priestley 2002). During the May amphibian survey within the Wildlife Study Area, air temperature ranged between 8 to 13°C, and the water temperature ranged between 11 to 15°C. However, male Canadian Toads are known to begin calling at 5°C (ACA and SRD 2001).

During the auditory surveys, Boreal Chorus Frogs were documented at all of the twelve auditory stations, and a Wood Frog was recorded at two auditory stations (total of two Wood frogs) (Figure 4). Boreal Chorus Frog calling indexes at eleven of the stations was at a level where individual frogs could not be counted (calling level 3), and at one station calling indexes were at a level where individuals are distinguishable, but overlap slightly (level 2). Calls from the Boreal Chorus Frogs were frequent and high in pitch, and may have concealed other calling species. The Northern Leopard Frog and Canadian Toad were not documented in the study area during the 2006 surveys.

Amphibians were also documented while conducting the breeding bird survey from June 3 – 5. Boreal Chorus Frogs were recorded at three breeding bird stations, and a single Wood Frog was observed in a treed fen within the Wildlife Study Area (Photograph 4). Calling frequencies of Boreal Chorus Frogs ranged between level 1 and 2 during the breeding bird survey (average 1.3).

From the Pilot survey, peak breeding for Wood Frogs either occurred immediately prior to the April Owl event (April 24 - 25), or sometime between the April Owl survey event and the Pilot amphibian survey (May 16 –- 18). Since spring arrived earlier than normal in 2006, peak Wood Frog breeding was predicted to have occurred prior to April 24. Although, since peak Wood Frog breeding continues for a short week or two, it can be difficult to time surveys sufficiently to target peak levels. In addition, since Northern Leopard Frogs also over-winter in ponds and may begin calling prior to complete ice melt (similar to Wood Frogs), it is assumed the peak breeding time of the Northern Leopard Frog (if any in the study area) occurred prior to April 24. The period of time when the Canadian Toad

breeding intensity was at its peak was undetermined. However, it is believed the May 16 - 18 survey event corresponded to the peak breeding time of Boreal Chorus Frogs, or in close proximity.

Breeding behaviour of Boreal Chorus Frogs (*i.e.* males calling) was documented in many different habitat types within the Wildlife Study Area including: roadside ditches, old borrow pits, riparian zones, shrubby and treed fens, lakes, and a small graminoid fen within a larger shrubby fen. Wood Frogs were reported calling in roadside ditches, shrubby fens, and lakes. Two visual detections of Wood Frogs occurred in treed fens; however, both individuals did not exhibit breeding behaviour.

5.0 OTHER WILDLIFE OBSERVATIONS

Other wildlife observations were recorded incidentally during the 2006 owl, breeding bird, and amphibian surveys. Six mammal species were recorded within the Wildlife Study Area in 2006 (Table 8). Of particular interest, fresh woodland caribou tracks were recorded approximately 1.5 km northwest of Polar Lake during the June breeding bird survey (Photograph 5).

TABLE 8. INCIDENTAL WILDLIFE OBSERVATIONS, 2006

Species	Observation
Woodland Caribou	Fresh tracks
Black Bear	Visual and Scat
Red Fox	Scat
Wolf	Auditory (call) and Scats
Snowshoe Hare	Visual and Pellets
Beaver	Visual and Lodges/Dams

6.0 CLOSURE

EBA is pleased to present Tamerlane Ventures Inc. with this 2006 Wildlife Survey report for the Pine Point Project. We trust everything is found to be satisfactory. If EBA can be of further assistance, please do not hesitate to contact us.

Respectfully submitted,
EBA Engineering Consultants Ltd.

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FIGURES

118°0'W 117°0'W 116°0'W 115°0'W 114°0'W 113°0'W 112°0'W 111°0'W

62°0'N

61°0'N

N W E S

Great Slave Lake

Fort Providence

Kakisa

Hay River

Buffalo Rocks

Hay River

Sandy River

Twin Creek

Buffalo River

Little Buffalo River

Slave River

Fort Resolution

Local Study Area

Polar Lake

0 5 10
Kilometers

117°0'W 116°0'W 115°0'W 114°0'W 113°0'W 112°0'W 111°0'W

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LEGEND

- Local Study Area (LSA)
- Regional Study Area (RSA)
- Wildlife Study Area

NOTES

Base data source:
Landsat, Google Earth

DRAFT

PINE POINT PROJECT

Pine Point Area Location Map

PROJECTION	DATUM
UTM Zone 11	NAD83

Scale: 1:1,000,000

20 10 0 20

Kilometres

FILE NO.
1740149-Wild_Map003

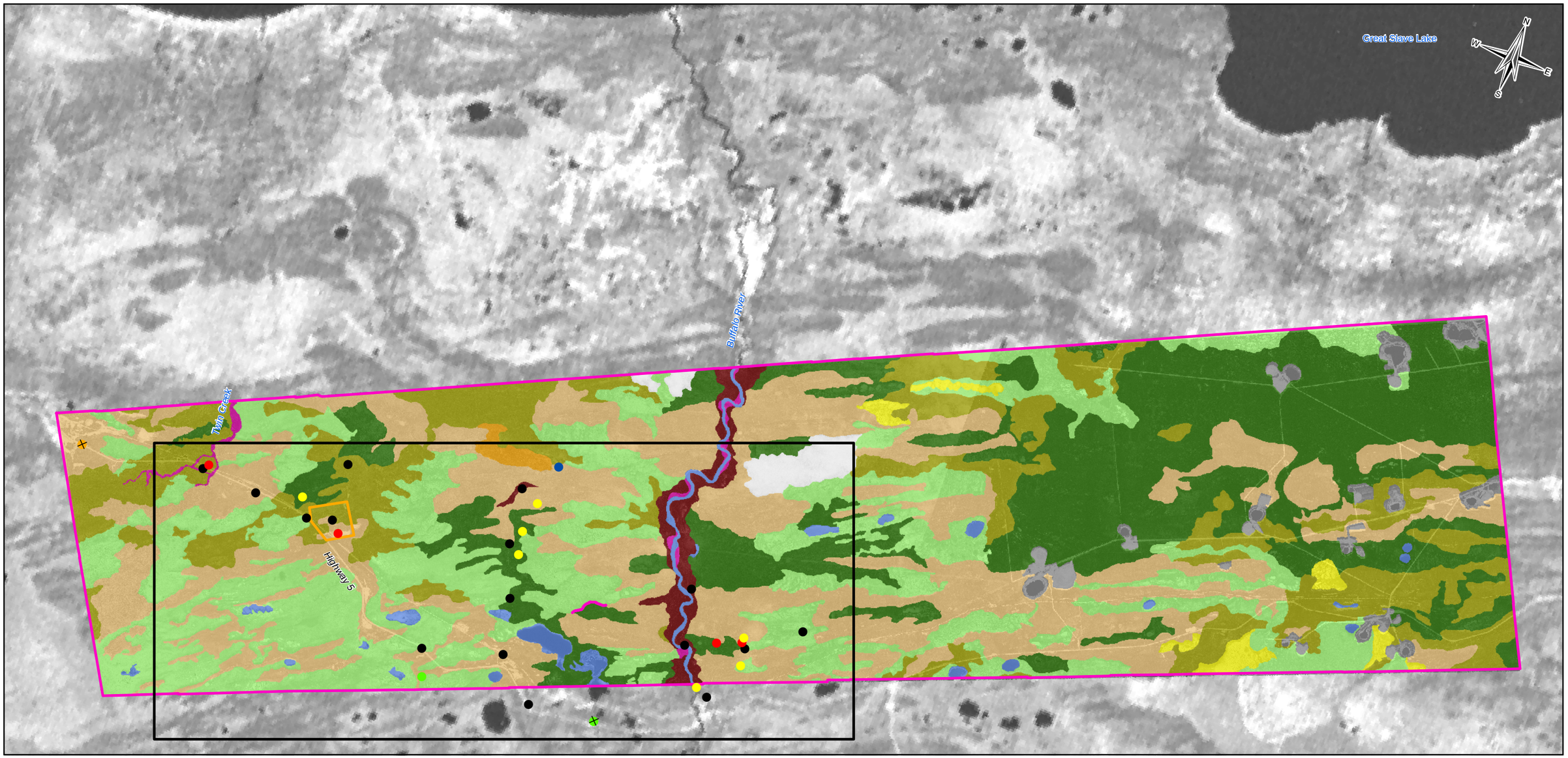
PROJECT NO.	DWN	CKD	REV
1740208	BGP	RH	2

OFFICE	DATE
EBA-VANC	October 12, 2006

Tamerlane Ventures Inc.

EBA Engineering Consultants Ltd. eba

Figure 1



LEGEND

- Local Study Area (LSA)
- Regional Study Area (RSA)
- 2006 Wildlife Study Area
- Owl Station

Owl Species Observations

- Boreal Owl
- Great Horned Owl
- Long-eared Owl
- Unknown
- Great Grey Owl
- Unknown (incidental observation)
- Great Grey Owl (incidental observation)

UPLAND

- Bearberry Pj
- Canada Buffalo-Berry-Green Alder
- Labrador Tea-Mesic
- Labrador Tea-Subhygric

LOWLAND

- Treed Fen
- Shrubby Fen
- Graminoid Fen

RIPARIAN

- Willow/Horsetail

OTHER

- Water
- Disturbed
- Unknown (cloud cover)

NOTES

Base data source:
Landsat TM bands 7,4,1 (GLFC)
Quickbird, Pacific GeoAnalytic

DRAFT

PINE POINT PROJECT

April to June 2006 Owl Observations and Associated Habitats

PROJECTION: UTM Zone 11			DATUM: NAD83	
Scale: 1:110,000 (2 1 0 2 Kilometres)				
FILE NO.: 1740149-Wild_Map001				
PROJECT NO.: 1740149.001	DWN: KMW	CKD: KL	1: 0	
OFFICE: EBA-VANC	DATE: October 10, 2006			

Tamerlane Ventures Inc.
EBA Engineering Consultants Ltd.

Figure 2

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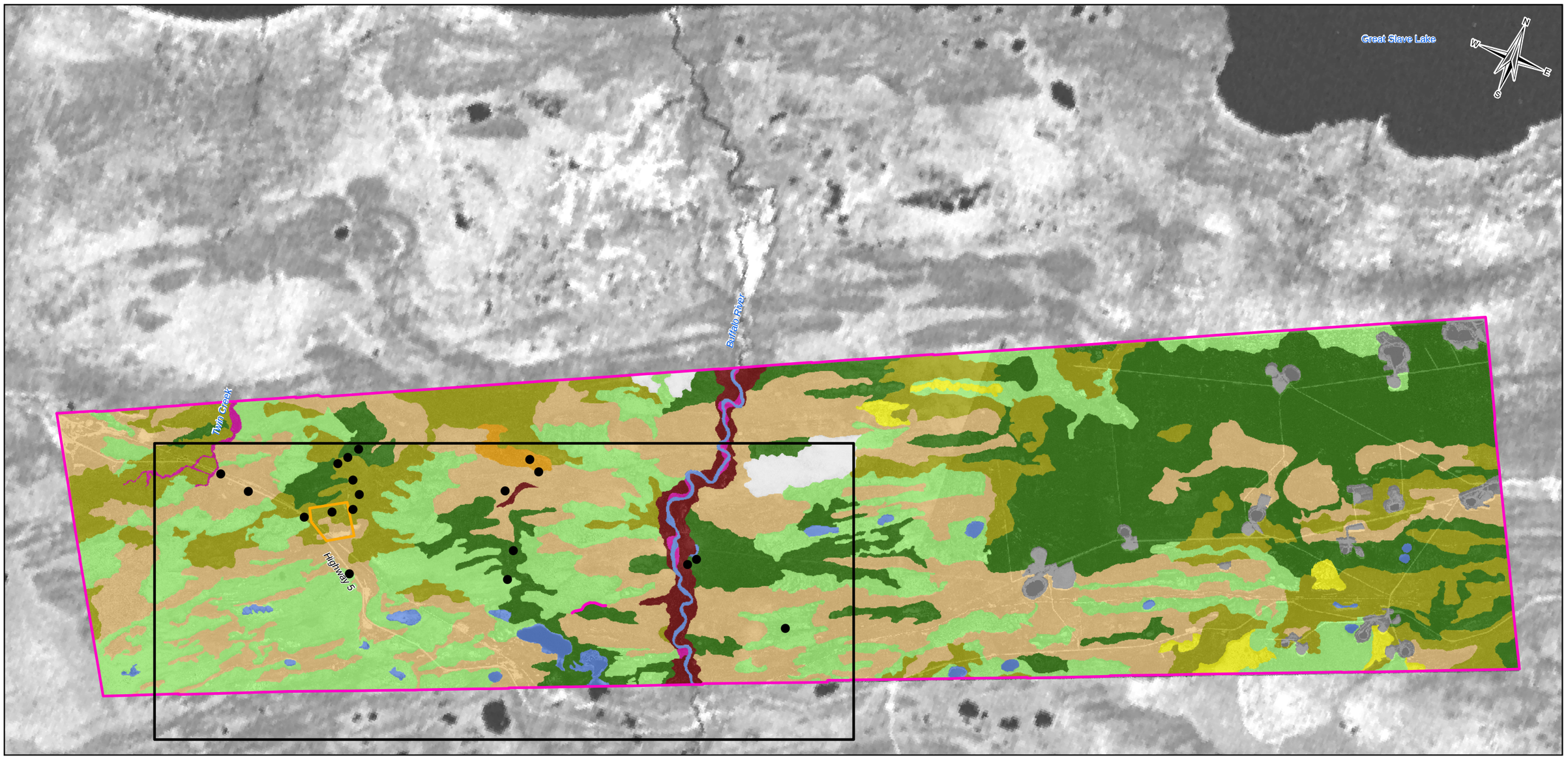

LEGEND

- Local Study Area (LSA)
- Regional Study Area (RSA)
- 2006 Wildlife Study Area
- Breeding Bird Station

UPLAND
- Bearberry Pj
- Canada Buffalo-Berry-Green Alder
- Labrador Tea-Mesic
- Labrador Tea-Subhygric

LOWLAND
- Treed Fen
- Shrubby Fen
- Graminoid Fen

RIPARIAN
- Willow/Horsetail

OTHER
- Water
- Disturbed
- Unknown (cloud cover)

DRAFT

NOTES

Base data source:
Landsat TM bands 7,4,1 (GLFC)
Quickbird, Pacific GeoAnalytic

PINE POINT PROJECT

2006 Breeding Bird Station Locations

PROJECTION: UTM Zone 11	DATUM: NAD83
Scale: 1:110,000 (2 1 0 2 Kilometres)	
FILE NO.: 1740149-Wild_Map004	
PROJECT NO.: 1740149.001	DWN: KMW / CKD: KL / 1: 1
OFFICE: EBA-VANC	DATE: October 13, 2006

Tamerlane Ventures Inc.
EBA Engineering Consultants Ltd.

Figure 3

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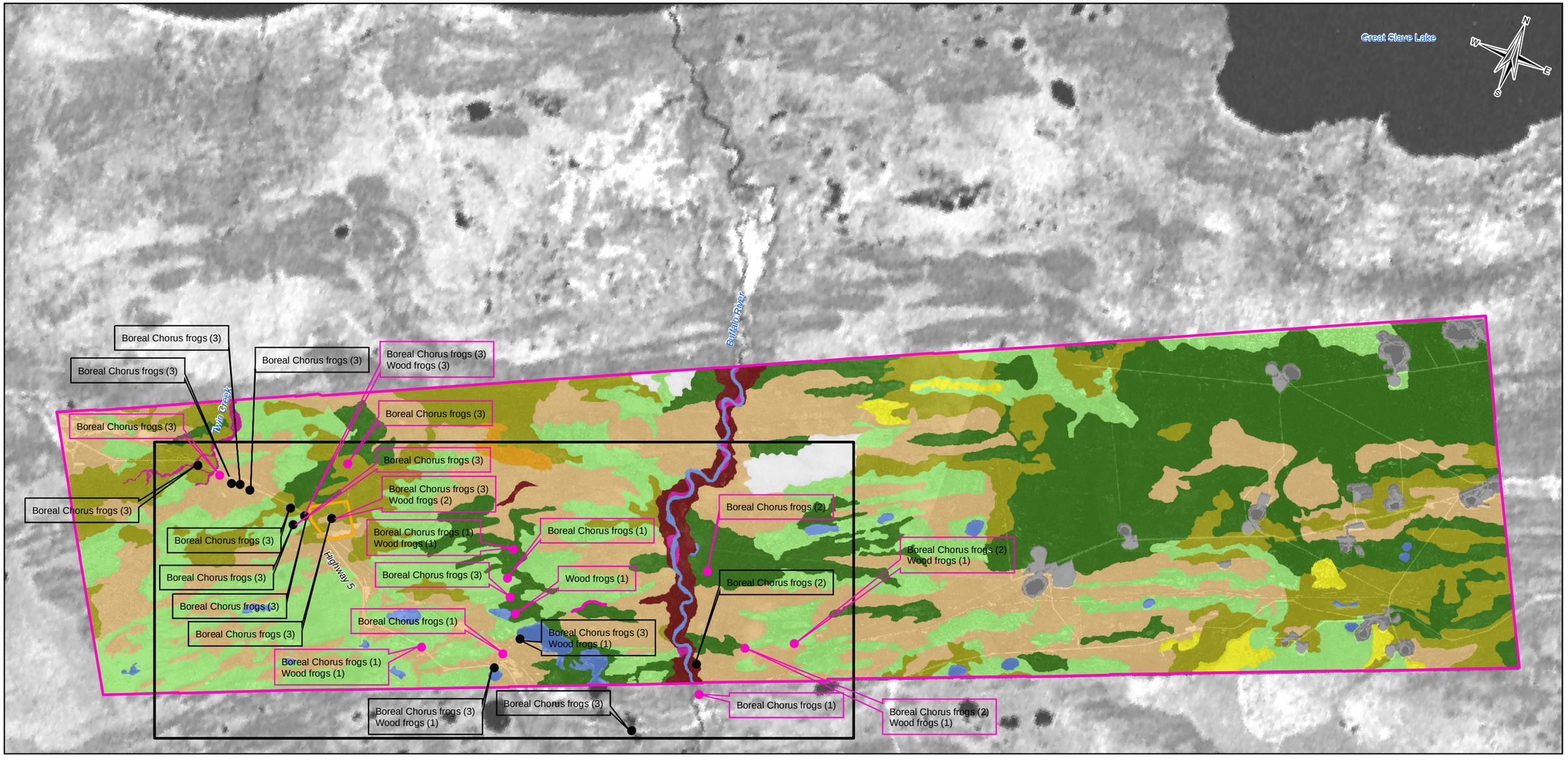

LEGEND

- Local Study Area (LSA)
- Regional Study Area (RSA)
- 2006 Wildlife Study Area
- Amphibian Station
- Incidental Amphibian Observations [1]

UPLAND
- Bearberry Pj
- Canada Buffalo-Berry-Green Alder
- Labrador Tea-Mesic
- Labrador Tea-Subhygric

LOWLAND
- Treed Fen
- Shrubby Fen
- Graminoid Fen

RIPARIAN
- Willow/Horsetail

OTHER
- Water
- Disturbed
- Unknown (cloud cover)

Calling Index Categories (#)

(1) = individual frogs can be counted (no overlapping calls)

(2) = calls of individual frogs are distinguishable, but some calls overlap.

(3) = full chorus, or continuous calls, where individual frogs cannot be distinguished.

DRAFT

NOTES

[1] Incidental Amphibian Observations during the Owl (April and May) and Breeding Bird (June) Surveys.

Base data source:
Landsat TM bands 7,4,1 (GLFC)
Quickbird, Pacific GeoAnalytic

PINE POINT PROJECT

April to June 2006 Amphibian Observations

PROJECTION	UTM Zone 11
DATUM	NAD83
Scale:	1:110,000
	2 1 0 2 Kilometres
FILE NO.	1740149-Wild_Map002
PROJECT NO.	1740149.001
DWN	KMW
CKD	KL
REV	3
OFFICE	EBA-VANC
DATE	October 13, 2006

Tamerlane Ventures Inc.

EBA Engineering Consultants Ltd.

Figure 4

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PHOTOGRAPHS

Photograph 1
Performing owl broadcast surveys within the Wildlife Study Area.

Photograph 2
Performing the breeding bird survey within the Wildlife Study Area.

Photograph 3
Male Ruffed Grouse observed within the Wildlife Study Area.

Photograph 4
Wood Frog observed in a treed fen within the Wildlife Study Area.

Photograph 5
Fresh woodland caribou track documented within the Wildlife Study Area.