Ka'a'gee Tu

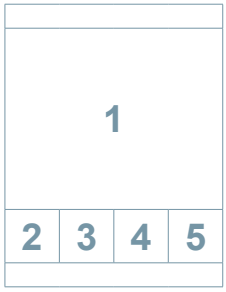
Ecological Assessment of the

Ka'a'gee Tu Candidate Protected Area: Phase II

February 2012

Northwest Territories
Protected Areas Strategy

Environment Canada Environnement Canada



Front Cover Photo Credits:

1 - **Ka'a'gee Tu landscape aerial view** - CWS
2 - **Lady Evelyn Falls** - CWS
3 - **Canada Warbler** - Kevin Kardynal (CWS)
4 - **Potentilla sp** - Donna Mulders (CWS)
5 - **Caribou** - Kevin Kardynal (CWS)

Ecological Assessment of the Ka'a'gee Tu Candidate Protected Area: Phase II

Prepared by:

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Yellowknife, NT

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Executive Summary

The Ka'a'gee Tu First Nation, with support from the Deh Gah Gotie, West Point, K'atl'odeechee and Dehcho First Nations, Northwest Territory Métis Nation, the Federal and Territorial governments and non governmental organizations are collaborating to advance the Ka'a'gee Tu Candidate Protected Area (CPA) through the Northwest Territories Protected Areas Strategy (PAS). This process is used to identify and protect areas with special ecological and cultural values, implemented through a cooperative approach. As part of Step 5 of this process, the Canadian Wildlife Service (CWS, Environment Canada) along with the Ka'a'gee Tu Working Group oversee the ecological assessment of the Ka'a'gee Tu CPA, which requires a detailed inventory of the area's key ecological components. This information is required to determine wildlife species richness, abundance and distribution to ensure that the CPA captures the full range of successional stages, wildlife habitat, and rare and At Risk species in the candidate area. This information also forms the baseline for the area's future ecological monitoring and management planning.

Data for this report were collected from several sources including targeted surveys, the Northwest Territories Wildlife Management Information System (WMIS), Environment and Natural Resources (ENR), and the NT/NU Bird Checklist Database. Waterfowl, songbird, Species At Risk and vegetation surveys were conducted over a five year period from 2007 – 2011 for the Ka'a'gee Tu CPA ecological assessment. The NWT Department of Environment and Natural Resources provided Boreal Woodland Caribou (*Rangifer tarandus caribou*) satellite collaring data, wildlife observation data from their Wildlife Management Information System (WMIS) and performed the representivity analysis.

The Ka'a'gee Tu CPA covers approximately 9 607 km^2 around the community of Kakisa in the Dehcho region of the Northwest Territories. This area of boreal forest falls within the Taiga Plains ecozone and includes a mosaic of lakes, vegetated and open-water wetlands, rivers and streams. A review of the available literature indicated two amphibian, 36 fish, 189 bird (breeders and migrants), and 45 mammal species likely occur within the Ka'a'gee Tu CPA. One amphibian species, 5 fish, 137 bird (breeders) and 16 mammal species were observed in the Ka'a'gee Tu CPA during field surveys. Eight species listed as Threatened (T) or Special Concern (SC) under Schedule 1 of the federal Species at Risk Act (SARA) were observed: six avian species, including Peregrine Falcon (*Falco peregrinus*, T), Common Nighthawk (*Chordeiles minor*, T), Olive-sided Flycatcher (*Contopus copperi*, T), Canada Warbler (*Cardellina canadensis*, T), Yellow Rail (*Coturnicops noveboracensis*, SC) and Rusty Blackbird (*Euphagus carolinus*, SC), and two mammal species, Wood Bison (*Bison bison athabascae*, T) and Boreal Woodland Caribou (T). Three avian species, Horned Grebe (*Podiceps auritus*), Barn Swallow (*Hirundo rustica*), Short-eared Owl (*Asio flammeus*) and three mammal species, Wolverine (*Gulo gulo*), Little Brown Myotis (*Myotis lucifugus)*, and Northern Myotis (*Myotis septentrionalis*) in have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being "at risk" and are eligible for addition to Schedule 1 of the federal SARA. The Shortjaw Cisco (*Coregonus zenithicus*) is also eligible for addition to Schedule 1 of SARA; however, its presence in the CPA is unconfirmed.

The ecological significance of the Ka'a'gee Tu CPA includes:

1. Supports 15 species listed under the federal SARA or assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2006).

2. Contains 41% of the West Great Slave Lake watershed. The area also captures small parts of two other watersheds including the Mackenzie – Mills Lake and Hay drainage basins.

3. The area contains nationally and internationally ecologically significant areas: Beaver Lake is designated as a Canadian Wildlife Service Key Migratory Bird Habitat Site and Important Bird Area (IBA Canada 2010) and Kakisa River, Heart Lake and Deep Bay – Mackenzie Bison Sanctuary are designated as Important Biological Programme (IBP) sites.

4. Occurs within the Taiga Plains ecozone and two ecoregions: the Northern Alberta Uplands and the Hay River Lowlands ecoregions (1% and 99% of the CPA, respectively).

5. Contains several highly representative areas which likely cannot be found in other protected areas, based on core representative area analysis results.

Acknowledgements

Many people contributed to the success of this project. This report was written and edited Kevin Kardynal and Marie Fast with contributions from Myra Robertson, Cindy Wood and Donna Mulders of the Canadian Wildlife Service (CWS), Environment Canada, Yellowknife, NT. EBA Engineering completed the Phase I and II vegetation assessments for the CPA of which portions are included in this Assessment. J. Charlwood (Ducks Unlimited Canada), George Simba and Jeremy Simba (Ka'a'gee Tu First Nation), Blake Bartzen, Kevin Kardynal, Mike Klazcek, Paul Latour, Lukas Madsen, Troy Marsh, Caroline Morissette, Myra Robertson, Mark Wasiuta and Paul Woodard (CWS) provided valuable assistance in the field. Allicia Kelly of GNWT/ENR, provided caribou satellite collaring and habitat data. The ecological representivity section of this document was completed through an analysis by the Northwest Territories Protected Areas Strategy (NWT PAS) and adapted for this assessment. Elders, members and staff of the Ka'a'gee Tu First Nation provided administration, advice, and support of this study along with immense knowledge of the area. Funding for field work was provided by Ducks Unlimited Canada and CWS.

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Introduction

The Ka'a'gee Tu Candidate Protected Area (CPA) is located in the southern Dehcho region of the Northwest Territories (NWT, Figure 1) and is proposed to become a National Wildlife Area (NWA) under the Canada Wildlife Act. In cooperation with the Ka'a'gee Tu CPA Working Group, the Canadian Wildlife Service (CWS; Environment Canada) led the ecological assessment of the Ka'a'gee Tu CPA as required in Step 5 of the NWT Protected Areas Strategy (NWT PAS Advisory Committee 1999). The purpose this ecological assessment is to provide a detailed inventory and evaluation of the key ecological features within the CPA. This information is critical for understanding the abundance, richness and distribution of species that occupy the area and for ensuring that the relevant information for the CPA is used in the final boundary selection. It also provides baseline data that will be used to evaluate future management decisions and population monitoring within the CPA. Field work in the Ka'a'gee Tu CPA was conducted over five years and included vegetation sampling, songbird bird point counts, aerial waterfowl surveys, avian Species at Risk playback surveys and nest searches, Boreal Woodland Caribou (*Rangifer tarandus caribou*) satellite collaring and incidental wildlife observations. Data from the Phase II Vegetation Assessment (EBA Engineering Consultants Ltd. 2007) along with ecological representivity analysis and Caribou satellite collaring data from Environment and Natural Resources (ENR, Government of the Northwest Territories) have been adapted for inclusion in this report.

Objectives

The purpose of the Phase II ecological assessment, as described in the NWT Protected Areas Strategy (NWT PAS Advisory Committee, 1999), is to determine the ecological values of CPAs and to evaluate their ability to meet the criteria set out in the Strategy along with meeting conservation goals set by the Government of Canada in the Canada Wildlife Act. National Wildlife Areas are established with the purpose of protecting Species at Risk, critical habitat and unique habitats. The ecological assessment guidelines (NWT PAS Advisory Committee 2002) outline the following objectives:

- Provide an effective evaluation of the species richness, abundance and habitat suitability of the CPAs
- Improve the state of knowledge of ecological processes for Candidate Protected Areas
- Provide a coordinated and consistent process for government agencies, communities and other stakeholders to plan and implement ecological assessment activities for CPAs
- Provide information for the consideration of social and economic implications of the ecological values, to be used along with other evaluation study results for CPAs

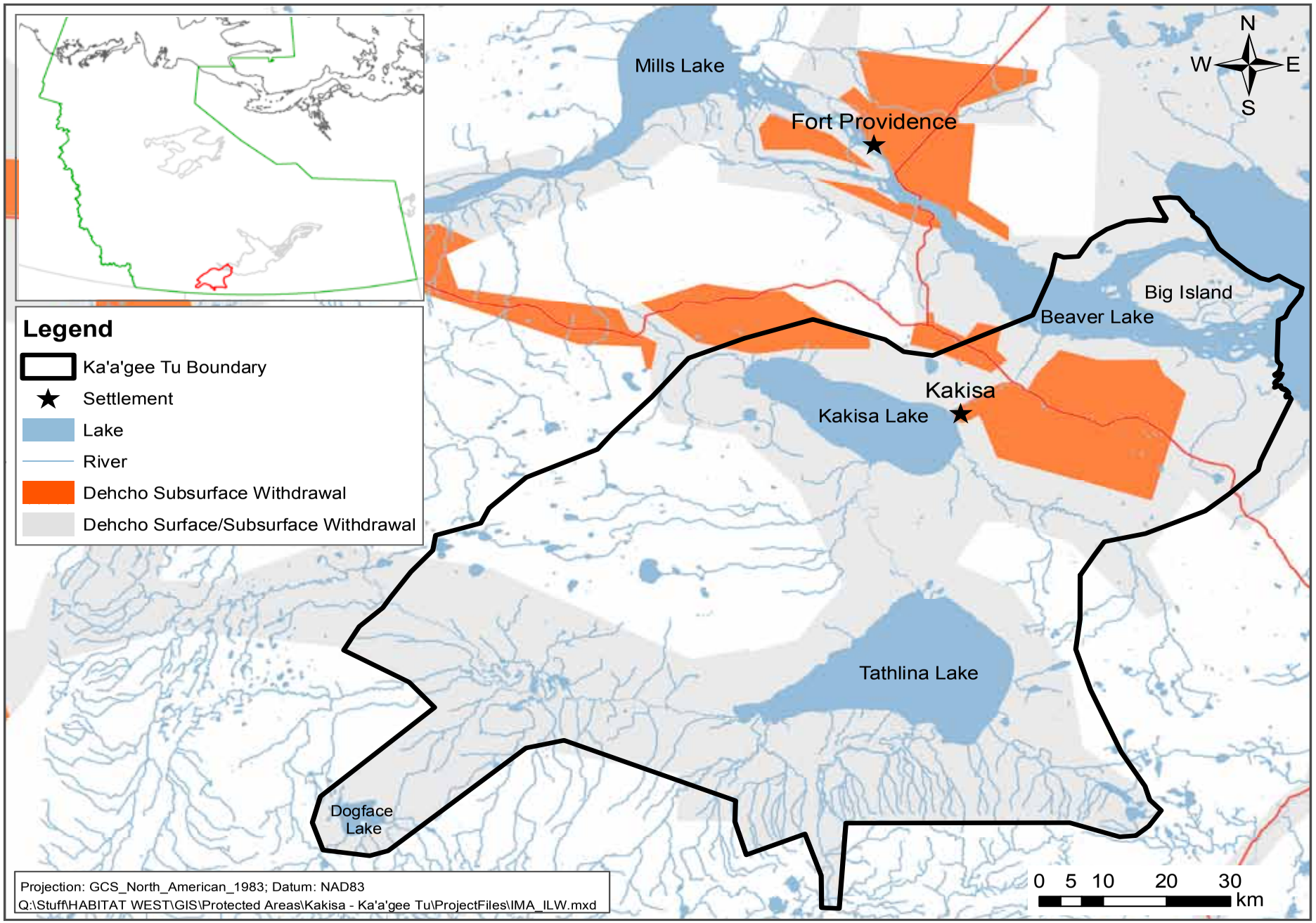

Figure 1: Location of the Ka'a'gee Tu Candidate Protected Area in the Northwest Territories and Interim Land Withdrawal areas under the Dehcho Interim Measures Agreement.

Study Area

The Ka'a'gee Tu CPA is located approximately 230 km southwest of Yellowknife, NT around the community of Kakisa, NT (60º 56' N, -117º 24' W). The CPA covers approximately 9 607 km^2 between the Mackenzie River to the north, the Cameron Hills to the south and Highway 1 to the east (Figure 1). It is named after the Ka'a'gee Tu people and Ka'a'gee Tu (Kakisa) Lake, which means 'between the willow water' in the Slavey language. A total of 7 605.1 km^2 (79.2%) of the CPA is temporarily protected from sub-surface (696.4 km^2; 7.2%) and surface/sub-surface (6 908.7 km^2; 72%) development under the Dehcho Interim Measures Agreement (IMA) through an interim land withdrawal (ILW) and expires in October, 2013 (Figure 1). The CPA is dominated by open, slow-growing conifer wetlands (bogs, fens and swamps) and an extensive network of wetlands, rivers and lakes (Ecological Stratification Working Group 1996). The main rivers are the Upper and Lower Kakisa, Tathlina, Muskeg, Cameron and Mackenzie (Beaver Lake) Rivers. The area contains four large lakes, including the Kakisa, Tathlina, Dogface and Beaver Lakes, and numerous smaller lakes and wetlands. The lakes are typically shallow seldom reaching depths greater than seven meters. The gently rolling terrain within the Ka'a'gee Tu CPA rises gradually from <200 m above sea level (asl) in the northern part of the CPA near Beaver Lake to of over 850 m asl in the southern and western portions of the area in the Cameron Hills (Figure 2).

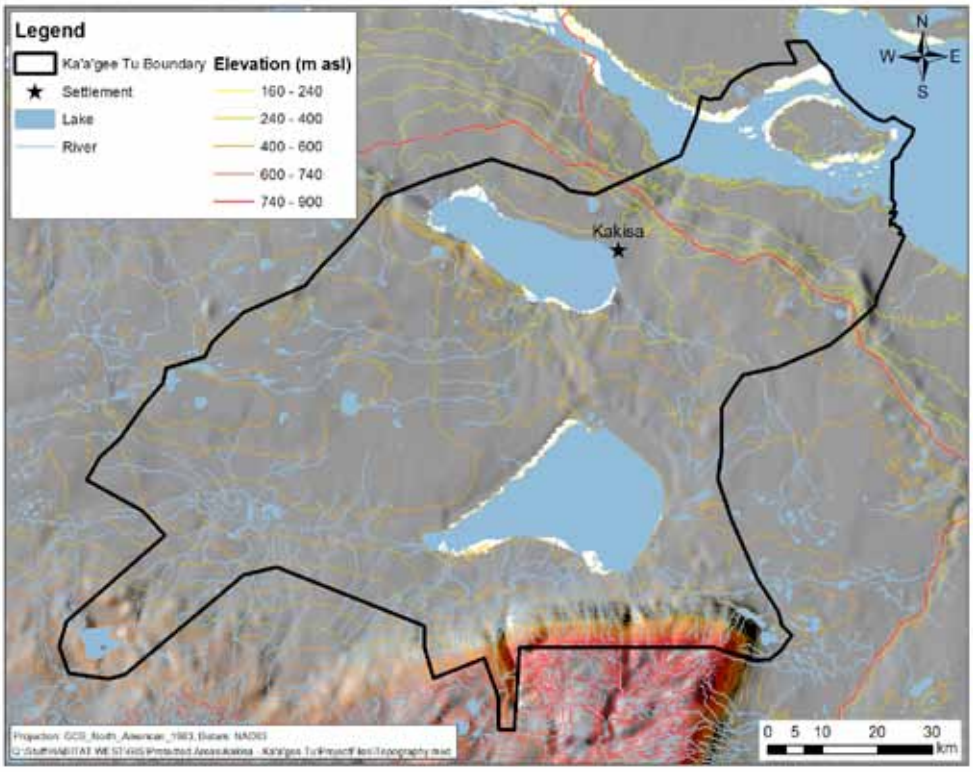

Figure 2: Topographic relief (meters above sea level, m asl) of the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Ecological Classification

The Ka'a'gee Tu CPA is located within the Taiga Plains ecozone (Wiken 1986) with the majority of the CPA within the Hay River Lowlands ecoregion (98.8% of the CPA) and the remaining area within the Northern Alberta Uplands ecoregion (1.2%; Figure 3). ENR revised these ecozones using additional information and analytical techniques, and developed updated ecosystem classifications. Under this updated classification, an area similar to the Hay River Lowlands ecoregion is identified as the Taiga Plains Mid-Boreal ecoregion (99.7%) with Low Subarctic (0.02%) and High Boreal (0.009%) classifications making up the remaining area of the CPA (Ecosystem Classification Group 2007). Approximately 50-70% of the surface of the Hay River Lowlands ecoregion is covered by shrubby, treed or open-water wetlands. Surficial geology of the Ka'a'gee Tu CPA was largely formed by glacial action from the Wisconsin Glacial Episode. In lowland areas, deposits of organic materials overlay rolling morainal surfaces and surface materials are primarily peat-covered clayey latchstring and glacial till on gently rolling terrain. Upland areas are primarily loamy glacial till that support mixedwood forests composed of white spruce (*Picea glauca*) and aspen (*Populus* spp.). Drier lowland plain sites support closed mixed stands of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), white spruce and black spruce.

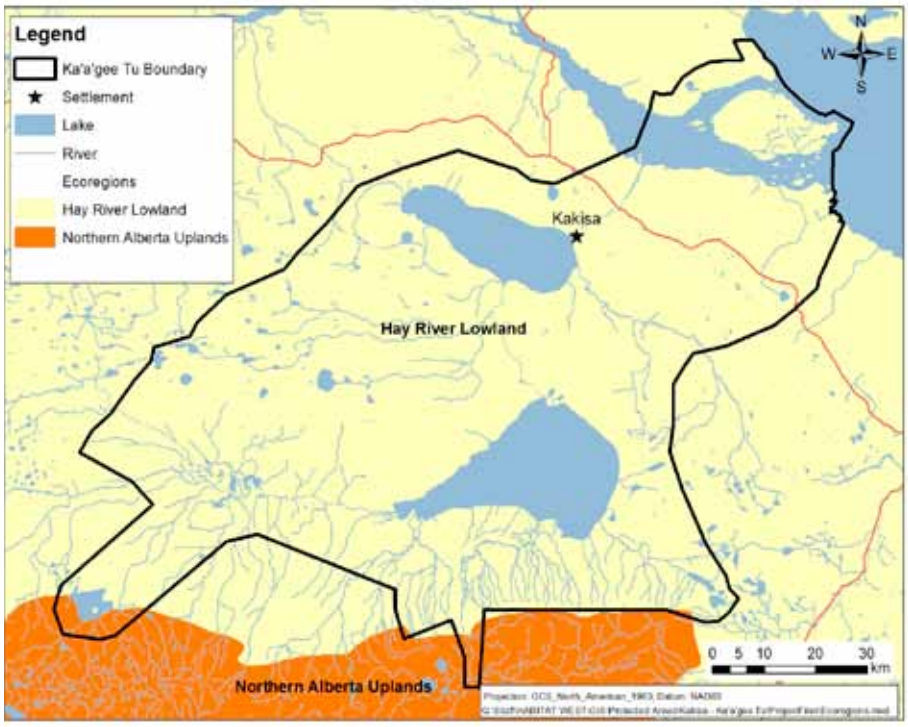

Figure 3: Ecoregions of the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Climate

The climate in the Hay River Lowlands ecoregion of the CPA is categorized as a sub-humid high boreal ecoclimate which is similar to the Northern Alberta Uplands ecoregion (Ecological Stratification Working Group 1996). In general, the region has short, cool summers and long, cold winters. Mean annual temperatures range from -2.0 to -2.5°C with mean summer temperatures ranging from 13.0 to 14.0°C and mean winter temperatures ranging from -18.0 to -20.5°C. Snow and ice are present for six to seven months of the year and permafrost is discontinuous. Mean annual precipitation varies between 350 and 500 mm

Watersheds

Lakes and rivers within the Ka'a'gee Tu CPA are drained by three watersheds: the West Great Slave Lake (97.7% of Ka'a'gee Tu CPA), Upper Mackenzie (1.9%) and Hay watersheds (0.3%; Figure 4). The West Great Slave Lake watershed drains a 15 598 km^2 area of which the CPA covers 41.3% (Table 1). This watershed drains almost entirely into Beaver Lake (Great Slave Lake) through the Lower Kakisa River. Protection of this CPA would provide a high level of watershed protection, particularly for the West Great Slave Lake watershed.

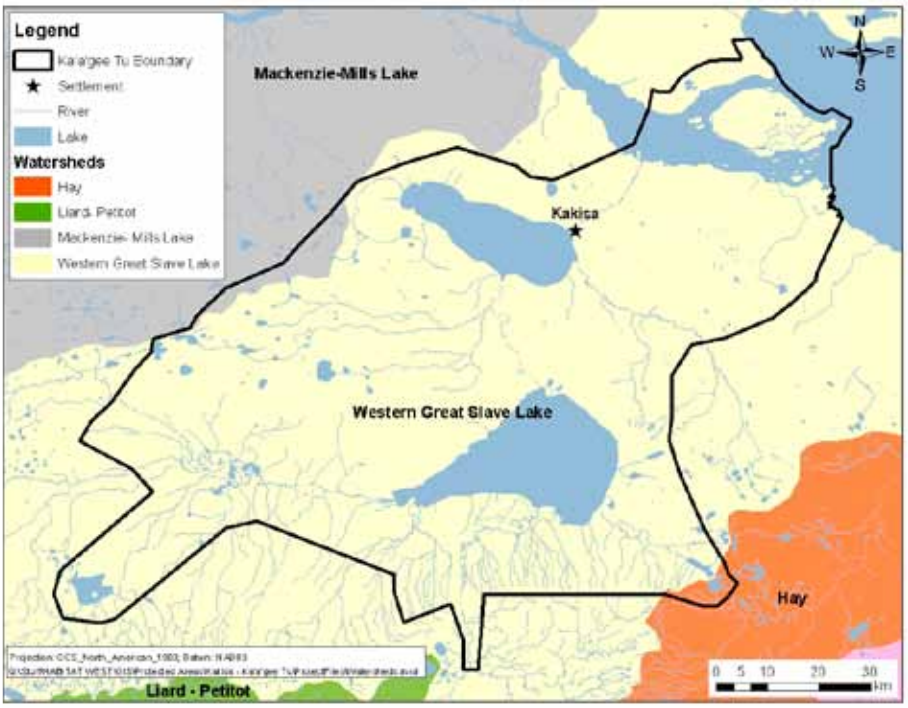

Figure 4: Watersheds within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Table 1: Watersheds within the Ka'a'gee Tu Candidate Protected Area (CPA) including their total size, area and percentage within the CPA and the percent of the CPA covered by each watershed.

Watershed Name	Total Size (km^2)	Area of watershed in CPA*	% of watershed in CPA	% of CPA*
Upper Mackenzie - Mills Lake	51 024.3	155.4	0.3%	1.6%
West Great Slave Lake	21 872.0	9 035.4	41.3%	94.1%
Hay	51 390.4	52.9	0.1%	0.6%

***Remaining area is water.**

Fire History

Fires occurring in the Ka'a'gee Tu CPA were mapped from 1965 - 2007 by the Forest Management Division of the GNWT (Environment and Natural Resources 2007). A total of 34 fires have burned in the CPA between 1969 and 2007 (Figure 5; Environment and Natural Resources, 2007) with some areas experiencing several burns in multiple years. The total burned area in the CPA during that time period was 1 732.8 km^2 (Table 2). The largest burn in the CPA occurred in 1980 and covered 1 056.2 km^2.

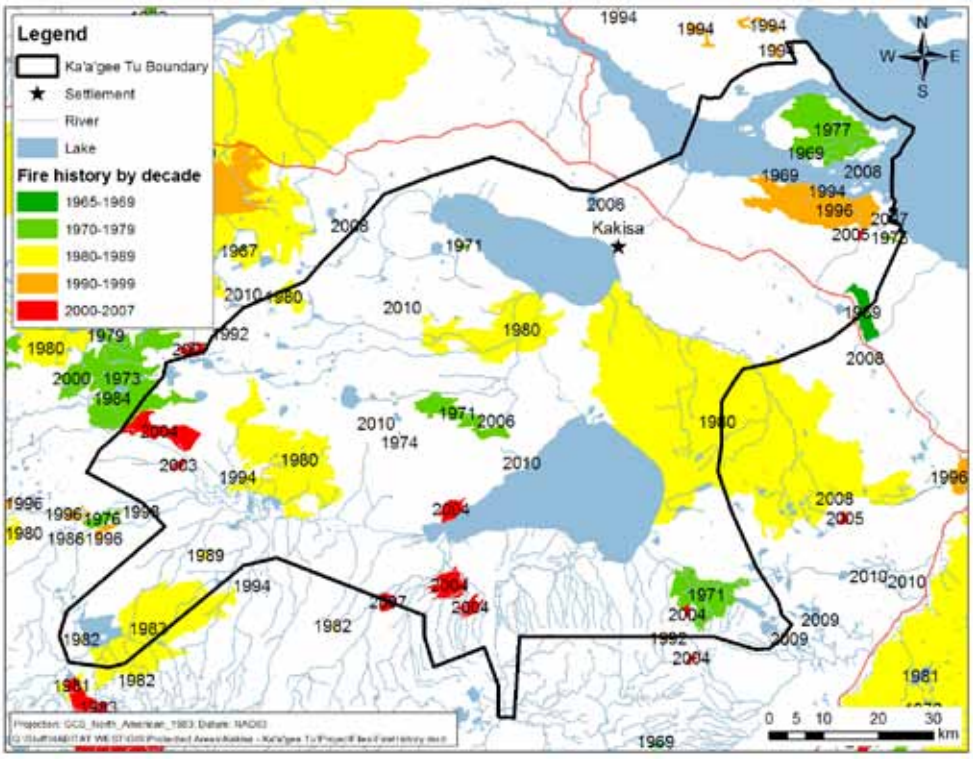

Figure 5: Fires occurring within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, 1965 - 2007.

Aerial photo of Ka'a'gee Tu CPA - CWS

Table 2: Area (km^2) of fires that have occurred within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, 1965 to 2007.

Year	Total Area Burned (km^2)	Year	Total Area Burned (km^2)
1965	0	1986	0
1966	0	1987	0
1967	0	1988	0
1968	0	1989	2.7
1969	16.9	1990	0
1970	0	1991	0
1971	129.1	1992	0.1
1972	0	1993	0.2
1973	22.9	1994	0.04
1974	0.2	1995	0
1975	2.0	1996	133.7
1976	0	1997	0
1977	130.2	1998	0
1978	0	1999	0
1979	0	2000	0
1980	1 056.2	2001	0
1981	0	2002	0
1982	0.3	2003	3.3
1983	139.6	2004	89.2
1984	0	2005	1.5
1985	0	2006	0.04
		2007	4.8
		Total	1 732.8

Rusty Blackbird nestlings within Ka'a'gee Tu CPA - CWS

Methods

Existing Biological Information

Prior to fieldwork, a literature search was conducted to identify and consolidate existing biological information relevant to the Ka'a'gee Tu CPA. Based on this literature review, a preliminary list of plant and wildlife species for an area within 150 km of the CPA was developed. A plant species list was generated based on Porsild and Cody (1980) and McJannet et al. (1995). The mammal species list was generated using Burt and Grossenheider (1980) and the bird species list was generated using the NWT/NU Bird Checklist database (Canadian Wildlife Service 2006).

Plant Communities

The distribution and abundance of plant species and plant communities in the Ka'a'gee Tu CPA is not well known. The list generated prior to field work indicated that 533 different plant species occur, or potentially occur, in the Ka'a'gee Tu CPA (Appendix 1). A search of the Canadian Biodiversity Information Facility portal for specimens in the Canadian Museum of Nature's herbarium database revealed only 16 collection records, representing 12 species, within the Ka'a'gee Tu study area boundary (Government of Canada 2006). Therefore, a vegetation survey was performed to better understand the plant species composition and distribution in the CPA.

Sample Site Selection

Vegetation survey sites were located within a distinct plant community type and attempts were made to sample each community proportionally to their coverage within Ka'a'gee Tu CPA based on the Canadian Forest Service's Earth Observation for the Sustainable Development of Forests digital land classification (EOSD 2006; 25 m pixel resolution; Figure 6). Each vegetation sampling site was surveyed by walking in gradually increasing circles, until no new plant species were found (EBA Engineering Consultants Ltd. 2007). Close-up photos of the dominant plant species and photos characterizing the community type were taken at each sampling site. Drainage class, slope, elevation, aspect, wetland class (where relevant), forest classification, and miscellaneous site notes (e.g., animal sign), were recorded at each sampling site. Percent coverage of trees and shrubs were visually estimated. Select tree heights were estimated with a clinometer and their diameter at breast height (dbh) measured at each sampling site. All vascular plants were identified and plant specimens were collected for species that were difficult to identify in the field such as willows (*Slaix* spp.), sedges (*Carex* spp.) and grasses (family *Poaceae*), which were identified in the lab with the aid of taxonomic guides (Argus 1973, Cobb 1963, Cody 2000, Corns and Annas 1986,

Ka'agee Tu CPA - CWS

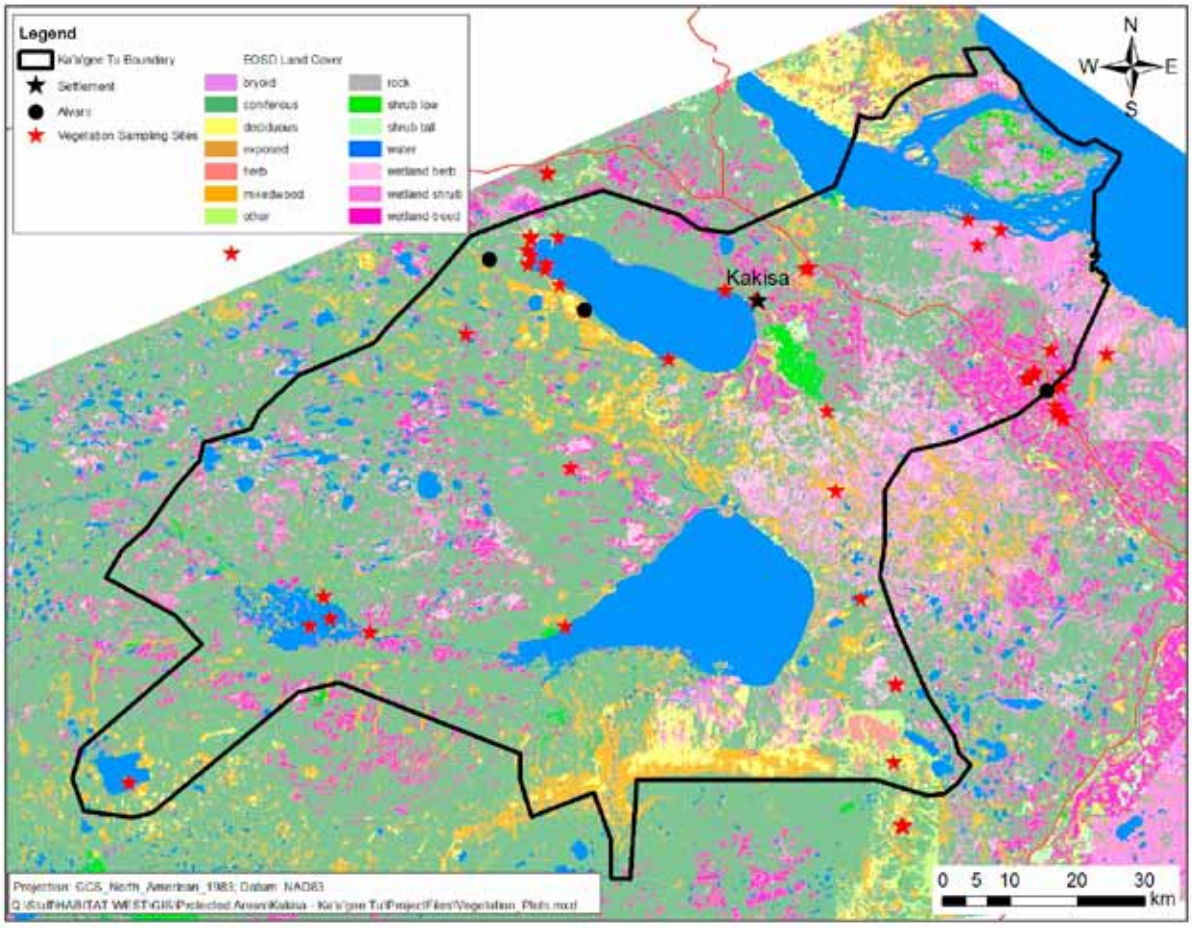

Figure 6: Locations of alvars and vegetation plots sampled within and near Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Courtenay and Zimmerman 1972, Douglas 1995, Johnson et al. 1995, Moss 1977, Porsild and Cody 1980, Scotter and Flygare 1986, Trelawny 1983). Evidence of animal presence (e.g., observation, tracks, browsing sign, and scat) was recorded incidentally during plant surveys and while traveling by helicopter or on foot.

Amphibians and Fish

Amphibians were not targeted for surveys for this assessment; however, their presence was noted incidentally on avian surveys. Additional amphibian data from the NWT WMIS is also included in this report.

Fish studies were not conducted for this assessment; however, commercial fishing takes place on Kakisa Lake and the Department of Fisheries and Oceans (DFO) monitors walleye stocks in Kakisa and Tahlina lakes in association with the Aboriginal Aquatic Resource and Oceans Management (AAROM) program and the Ka'a'gee Tu First Nation. Several studies have assessed fish population structure, diet and species' distributions in the CPA. These studies have focused on commercial fish species and fisheries in Kakisa, Tathlina and Beaver Lakes (Roberge et al.

1986, 1988) and the Kakisa River (Read and Roberge 1989). In addition to Northern Land Use Information Series (NLUIS) information on fish and fisheries (Department of Environment 1975), several baseline studies were conducted in the Dehcho region in association with a review of pipeline development in the 1970s, although only a few sampled lakes and streams were within the Ka'a'gee Tu CPA (Shotton 1971, 1973, Hatfield et al. 1972; Dryden et al. 1973, Jessop et al., 1974). Stewart and Low (2000) provide fish stock and harvest information for the Dehcho area, including information for several lakes and rivers in the CPA.

Birds

Previous data on birds inhabiting the Ka'a'gee Tu area is limited, with most surveys concentrating on waterfowl in the Beaver Lake area (Salter et al. 1974, Salter 1974, Sirois et al. 1995, Canadian Wildlife Service, unpublished data). Prior to field work, a list comprising bird species potentially breeding in the Ka'a'gee Tu CPA was generated based on published range maps and included bird species occurring within 150 km of the study area (Appendix 2).

Waterfowl Surveys

In order to assess abundance and species composition of waterfowl and other waterbird species during spring and autumn migration, and to determine summer use, aerial surveys were performed on the Beaver Lake area of the Ka'a'gee Tu CPA from 27 August – 16 October, 2008 (11 surveys) and 6 May – 30 October, 2009 (26 surveys). A single-engine Turbo Beaver was used to fly the surveys. Each aerial survey consisted of six transects that covered shorelines and open water regions of the lake (Figure 7). All transects were flown at a speed of 150 km/hr at a height of 60 m above the water surface. Two observers, one situated in the front right seat and one situated in rear-left seat, recorded observations of birds within 250 m of their side of the aircraft.

The time of observation, identity of the species (if known), and number of birds were recorded. Observers also noted if the bird was seen flying to or from the opposite side of the aircraft to reduce the probability of double-counting birds. For swans (*Cygnus* spp.), the number of young, if present, was also recorded. When identification of birds to species level was not possible, birds were identified and recorded by their common descriptions including 'dark goose'; genus, such as 'scoter'; or by their typical feeding behavior (i.e., 'dabbler' or 'diver' for ducks). If birds could not be classified to these levels, birds were recorded under their broadest classification, 'duck' or 'unidentified bird'. Observations were geo-referenced, enabling density and distribution mapping throughout the survey area. More detail on the waterfowl surveys and results from the surveys will be provided in a CWS Technical Report (CWS, in prep.).

A boat survey was also done on 29 July 2009 to verify some unusual bird observations noted during the aerial surveys.

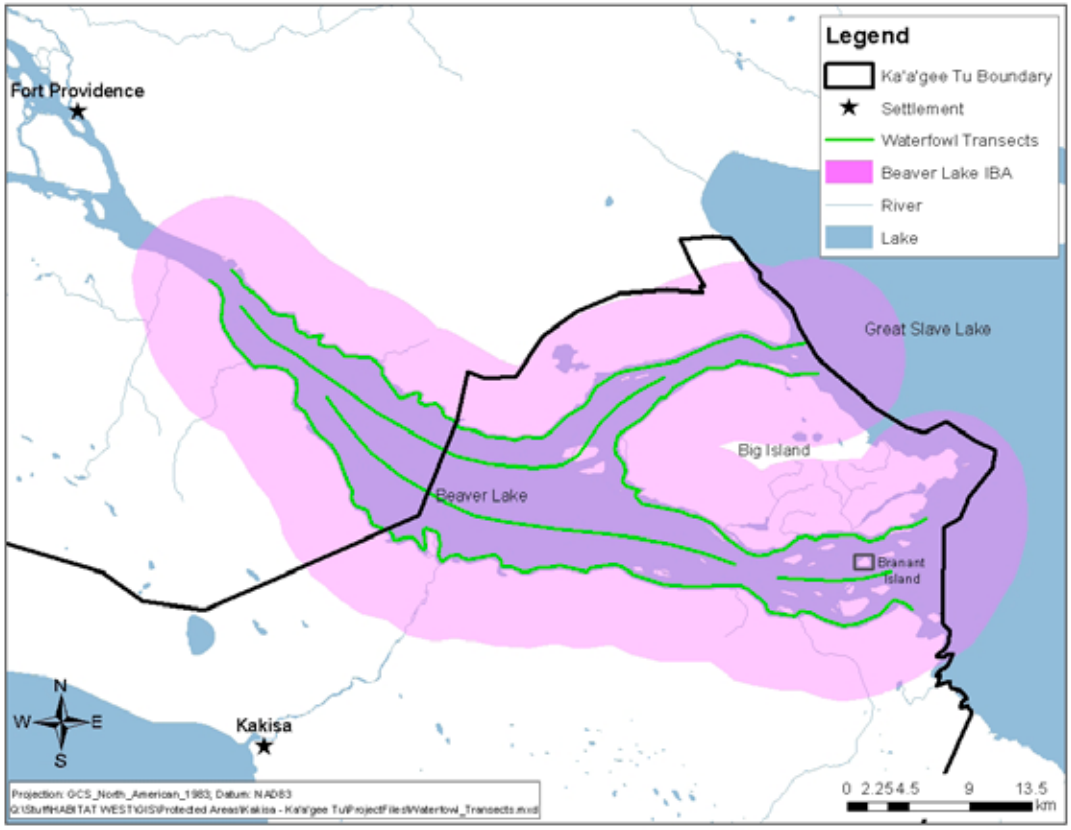

Figure 7: Transects used for aerial waterfowl surveys in the Beaver Lake area of the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, 2008, 2009 (IBA – Important Bird Area).

Waterfowl Species Density and Distribution Analysis

A series of maps were created to illustrate the spatial distribution and abundance of waterfowl in Ka'a'gee Tu. The kernel density function of the Spatial Analyst extension for ArcGIS 9.3 (Environmental Research Systems Institute 2009) was used to calculate densities from the number of individual birds located during aerial surveys (birds/km^2). In all cases cell size was set to 50 m, and bandwidth (the size of the neighbourhood in which features have influence on each other when calculating cell densities) was set to 1 000 m. This bandwidth setting fit within the ArcGIS suggested value based on the minimum dimension of the extent of our data.

Results were mapped using five varying density classes to account for variation across species, using the Geometrical Interval classification method available in ArcGIS 9.3 software (Environmental Research Systems Institute 2009).

Passerine Surveys

Passerine birds represent a significant proportion of the vertebrate fauna in the boreal forest; however, their distribution and abundance in many parts of the Northwest Territories is not well known. Therefore, passerine surveys were completed in June 2009 and 2010 to determine their abundance, richness and distribution in the CPA. Surveys followed a protocol similar to the Canadian Wildlife Service Candidate Protected Area Ecological Assessment Field Manual (AMEC 2005). Prior to field work, potential sampling sites were generated within the Ka'a'gee Tu CPA boundary using the random points generator within Hawth's Tools version 3.27 (Beyer 2004) for ArcGIS 9.3.1 (Environmental Research Systems Institute 2009) and attempts were made to sample habitats in proportion to their availability on the landscape based on the Canadian Forest Service's EOSD (2006; 25 m pixel resolution) digital land classification for the Ka'a'gee Tu CPA (Figure 8). Surveys were conducted in six general habitat types including conifer forest, deciduous/mixedwood forest, treed wetland (e.g., fen, bog), shrub (tall, short) and riparian to include the greatest range of habitats available. Tall shrubs were considered > 1 m in height and short shrubs were considered ≤ 1 m in height.

Observers accessed sampling sites by helicopter due to the remote locations of the field sites and to increase the numbers of sites surveyed. If no suitable landing site was found within a reasonable distance from the random survey point, a new survey point was located by the observers close to the original site in the same habitat type as the random point with a suitable landing area. Observers then walked at least 100 m from the drop off location to a point-count sampling station and waited 10 minutes to allow birds to resume normal behaviour (e.g., singing, foraging). At each site, three point-count stations, representing a sample unit, were

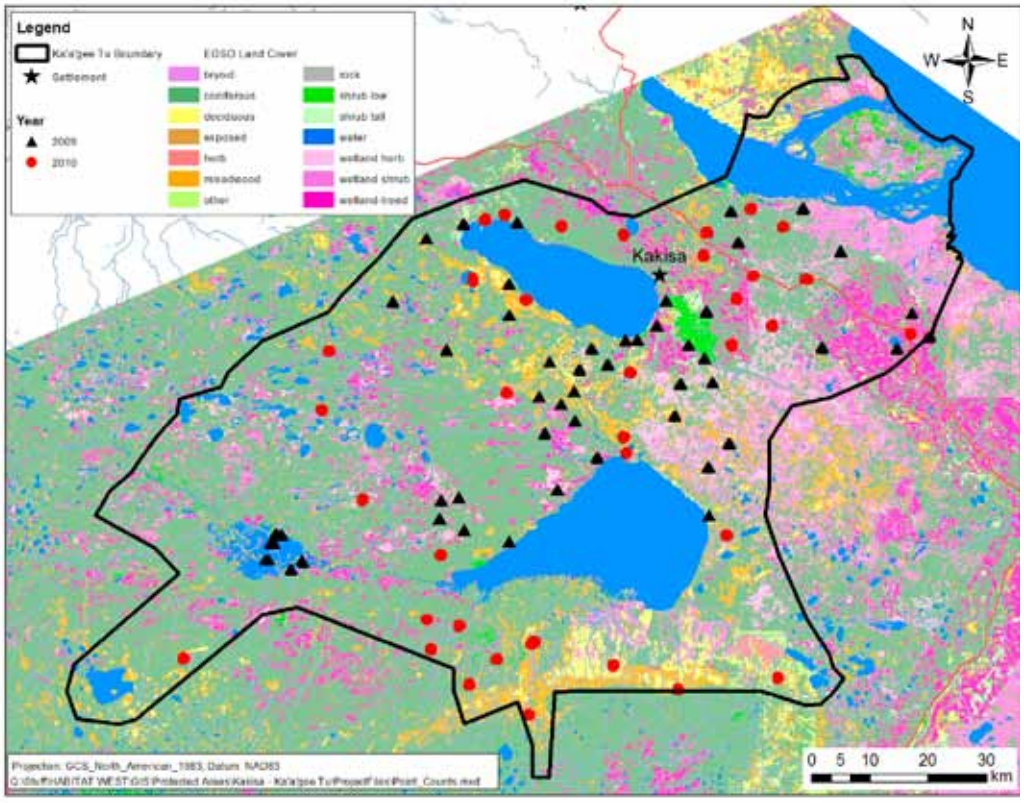

Figure 8: Locations of songbird point counts in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, 2009 and 2010. EOSD: Earth Observation for the Sustainable Development of Forests. Three point counts 300 m apart were performed at each location.

located within a homogenous habitat type, at least 300 m from each other and 100 m from the habitat edge except when adjacent to wetlands (riparian areas) where they were located closer to the wetland edge. All crews used omni-directional microphones (Earthsong Series E3 Biomonitoring System CZM microphones (Riverforks Research Corp.; Hobson et al. 2002)) to digitally record point counts.

Avian point count surveys were conducted 10 – 21 June, 2009 and 3 - 13 June, 2010 when most songbird species exhibit territorial behavior (e.g., singing) and between 0330 and 0930 when territorial behaviour is greatest (Ralph et al. 1993; Figure 8). Birds were surveyed in habitat types at various times of the day and survey periods to reduce bias associated with singing rates of species within each habitat. Surveys were only conducted in favourable weather conditions (winds ≤3 on the Beaufort scale, no precipitation). Surveys were stopped when conditions became inadequate for sampling (e.g., winds > 3, rain, fog). The date, location (in UTMs from Geographic Positioning Units), weather conditions (wind, cloud cover), basic habitat characteristics, and start time of each point-count was recorded. One experienced observer performed point counts in the field along with recording point counts in 2010. Recordings were analyzed by expert observers allowing identification of unknown vocalizations. All species and their abundance during a ten minute, variable-radius point-count (Ralph et al. 1993) were recorded. Species, sex and behaviour (e.g., territorial display, calling, flyover) were also recorded for each bird observation when possible.

Playback surveys and Species at Risk nest searches

Playback surveys and nest searches were conducted in June 2011 to determine the distribution of avian Species at Risk and to confirm their breeding (e.g., nesting) within the Ka'a'gee Tu CPA. Survey locations were concentrated in areas where Species at Risk were detected during point count surveys in 2009 or 2010 or in areas where these species were expected to be present (e.g., in suitable habitat). Marsh bird playbacks were included in the surveys to increase our knowledge of their occurrence and distribution in the Ka'a'gee Tu CPA and because other passive survey methods are not sufficient to census these species (Lor and Malecki 2002). Survey sites were accessed via helicopter or by road. Surveys began after a 10 minute settling period, with a three minute listening period followed by one minute calls/songs, in order, of Rusty Blackbird (*Euphagus carolinus*), Common Nighthawk (*Chordeiles minor*), Canada Warbler (*Cardellina canadensis*), Olive-sided Flycatcher (*Contopus cooperi*), Yellow Rail (*Coturnicops noveboracensis*), Sora (*Porzana carolina*), American Bittern (*Botaurus lentiginosus*), Horned Grebe (*Podiceps auritus*), American Coot (*Fulica americana*) and Pied-billed Grebe (*Podilymbus podiceps*). Abundance of each species and their direction (i.e., bearing) from the observer was recorded at each playback station. Playback stations were located 300 m apart along grid transects at each survey location. For all Canada Warblers, Olive-sided Flycatchers and Rusty Blackbirds detected we attempted to locate the territorial (calling/singing) individual and any evidence of breeding including nests, juveniles or females associated with the male. Nest searches were performed by observing adult behaviour (e.g., delivering food) and trying to locate the nest. Once a nest was located, nest-site and local (≤ 5 m from nest) characteristics were measured (Table 3). Incidental bird observations made during surveys were also recorded.

Table 3: **Variables measured at nests of three Species at Risk during searches in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.**

Nest and Nest-site Vegetation Characteristics	Description
Stage	Nesting stage: Building, laying, incubation, fledgling, other
# of eggs	Number of eggs observed
# of young	Number of young observed
Age of young	Estimated age of young: 2 days (eyes closed); 4 - 5 days (base skin w/ some down); < 1 week (mostly down); 2 weeks (fully feathered)
# of adults	Number of adults observed at/near nest
Shells/fecal matter	Presence of egg shell fragments or fecal matter
Adult behavior	Very shy; shy; conspicuous; very conspicuous
How nest located	Parent behavior; adult flushed from nest; non-behavior cue; search; young behavior
Nest height	Height of nest (m)
# support branches	Number of branches supporting the nest
Diameter	Diameter of support branches
% nest concealed	Percent of the nest concealed as observed from 0.25 m above the nest
Substrate health	Health of nest substrate (i.e., tree/shrub): live, partly dead, dead
Distance to water	Distance to nearest open water
Water type	Type of nearest water: pond; lake; river; stream; marsh; saturated soil; other
Local-scale vegetation (5 m)	**Description**
Dominant habitat	Hardwood; mixedwood; conifer; treed bog; treed fen; shrubby bog; shrubby fen; graminoid; marsh; other
Canopy height	Estimated height of canopy (m)
% closure	Canopy closure in 5 m radius
Dominant tree spp.	Dominant (>75%) tree species
Ground cover	Dominant ground cover: grass; sedge; moss; barren; other
Drainage class	Soil drainage class: Rapid; well; imperfect; poor; inundated
Wetland cover	Percent of open water

Mammals

Mammals are important to the ecology of the boreal forest and also to the livelihood of both aboriginal and non-aboriginal inhabitants. Though mammal surveys were not performed specifically for the ecological assessment, incidental observations of mammals were noted during vegetation and bird surveys and a mammal species list was developed from existing literature. As part of another study, the Department of Environment and Natural Resources (ENR) of the Government of the Northwest Territories (GNWT) began collecting data on Boreal Woodland Caribou population demographics, animal condition and habitat selection in the southern Dehcho region in 2003 (Kelly and Cox 2011). These data are used to: 1) determine

Caribou population trends and viability of this species and its habitat, 2) assess responses of Caribou to development pressures associated mainly with oil and gas (e.g., seismic exploration, oil production), 3) understand potential implications of climate change on Caribou and, to 4) inform management decisions for the conservation of Boreal Woodland Caribou. Data for this assessment are from ENR's Hay River Lowlands and Cameron Hills study areas.

Results and Discussion

General Vegetation Description

Forty-eight vegetation plots were surveyed within and near the Ka'a'gee Tu CPA in 2007 as part of this ecological assessment. Two hundred and ninety-three vascular plant species, representing 64 plant families, were observed (Appendix 1). Plant species names follow current nomenclature (Working Group on General Status of NWT Species (ENR 2006); however, when plant names were not listed, Cody (2000), or Porsild and Cody (1980) were used. Thirty rare plant species potentially occur within or adjacent to the Ka'a'gee Tu CPA and five of these species were found during 2007 fieldwork. These species include Slender Naiad (*Najas flexilis*), Canada Nodding Wild Rye (*Elymus Canadensis*), Rat Root (Acorus americanus), Northern Pitcher Plant (*Sarracenia purpurea*) and Macoun's Gentian (*Gentianopsis macounii* formerly *Gentiana macounii*; Appendix 1). The plant community within Ka'a'gee Tu CPA is dominated by native species; however, several alien species may occur in the CPA mostly in developed areas (e.g., village of Kakisa, along Highway 1). These species include Lamb's Quarters (*Chenopodium album*), Nodding Chickweed (*Cerastium arvense*), White Sweet-clover (*Melilotus albus*), Yellow Sweet-Clover (*Melilotus officinalis*), Alsike Clover (*Trifolium hybridum*), Greater Plantain (*Plantago major*) and Dandelion (*Taraxacum officinale*). Alvars are areas where limestone is exposed at the surface with little or no soil development and often contain rare plant species; three such areas were found within the CPA. For more detail on the vegetation assessment, see EBA Engineering Ltd. (2007).

Table 4: Area of land cover types within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, from the Earth Observation for the Sustainable Development of forests land classification (EOSD 2006).

Land Cover Classification	Area (km2)	Percent Cover
Coniferous	5 071.97	52.79
Water	1 597.44	16.63
Wetland-treed	715.32	7.45
Mixedwood	679.25	7.07
Wetland shrub	540.01	5.62
Wetland herb	413.03	4.3
Deciduous	312.31	3.25
Shrub low	121.43	1.26
Herb	44.3	0.46
Bryoid	37	0.39
Other	34.31	0.36
Shrub tall	30.47	0.32
Roadway	7.34	0.08
Exposed	3.04	0.03
Total	9 607.23	100.00

The Earth Observation for the Sustainable Development of forests (EOSD 2006) digital land classification identified 14 land cover types within the CPA (Table 4). Coniferous forest (5 071.97 km^2), water (1 597.44 km^2) and treed wetland (715.32 km^2) are the dominant land cover types with mixedwood forest (679.25 km^2) and shrubby wetland (540.01 km^2) combined making up 89.6% of the area.

Amphibians

Targeted surveys for amphibians were not performed; however, their presence was noted incidentally during field work in the CPA. Based on species range extents, two amphibian species potentially occur in the Ka'a'gee Tu CPA, the Boreal Chorus Frog (*Pseudacris maculata*) and Wood Frog (*Rana sylvatica*; Fournier 1997; Table 5). Both species are considered "Secure" under the GNWT species General Status Ranking Program (Working Group on General Status of NWT Species 2011) and do not have a status assigned by COSEWIC. The only amphibian detected in Ka'a'gee Tu incidentally during surveys was the Wood Frog, which inhabits forests with ephemeral or permanent freshwater wetlands and lakes and hibernates within the frost zone. Twenty-three Wood Frogs were detected in the Ka'a'gee Tu CPA in 2010 along with three records from ENR's WMIS database. Since amphibians were only recorded incidentally, the number of frogs detected is an underestimation of their population in the Ka'a'gee Tu CPA. Targeted amphibian surveys would provide valuable data on the abundance and distribution of these two species, particularly within the hardwood or mixedwood forests of the CPA.

Table 5: Amphibian species occurring or potentially occurring within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Common Name	Species	NWT Status	COSEWIC
Anura- Hylidae			
Boreal Chorus Frog	*Pseudacris maculata*	**Secure**	-
Anura- Ranidae			
Wood Frog	*Rana sylvatica*	**Secure**	-

Fish and Fish Habitat

A total of 36 fish species occur or potentially occur in the Ka'a'gee Tu CPA (Appendix 3). Fish inhabit most lakes and rivers throughout the study area that are deep enough to provide sufficient oxygenated water. Limited information exists on fish habitat and species' distributions within the CPA with the most data available for Kakisa, Tathlina and Beaver Lakes. There are many important areas for fish habitat in the Ka'a'gee Tu CPA, including several known spawning sites (in the upper Kakisa River, lower Kakisa River, Muskeg River, Kakisa Lake, Tathlina Lake and Dogface Lake) and two known migration areas (middle and lower Kakisa River). Species such as Arctic Grayling (*Stenodus leucichthys*) and Inconnu (*Thymallus arcticus*) are only known in the lower Kakisa River up to Lady Evelyn Falls which is a significant barrier to fish migration upstream from Beaver Lake (Roberge and Read 1986). Additionally, a series of rapids occur in

the middle Kakisa River (~4 km upstream of Kakisa Lake) which inhibits fish movement between the two lakes (Roberge et al. 1988). Some species including the Shortjaw Cisco (*Coregonus zenithicus*), assessed as being at risk and eligible for addition to Schedule 1 of the federal Species at Risk Act (COSEWIC 2003), may be present in parts of the CPA; however, they have not been confirmed within the CPA.

Kakisa and Tathlina lakes have supported commercial Walleye (*Sander vitreus*) and Whitefish (*Coregonus clupeaformis*, *C. nasus,* and *C. pidschian*) fisheries since the late 1940s and 1954, respectively, along with a domestic and sport fishery (Roberge et al. 1986, 1988). The commercial fisheries have been closed at various times to allow for the recovery of fish stocks with a current limit set at 20 000 kg annually for Walleye from Kakisa Lake (Golder Associates 2010). The Walleye stock in Tathlina Lake has been depleted since 2001 and recovery has been hampered by historic fishery over-exploitation and spawning failure; however, there is currently a 5 000 kg annual catch limit for a commercial Walleye fishery on Tathlina Lake (Golder Associates 2010). Since 2009, the commercial fishery and fish stocks have been monitored by the Ka'a'gee Tu First Nation and the Department of Fisheries and Oceans (DFO) through the Dehcho Aboriginal Aquatic Resources and Ocean Management (AAROM) program. A commercial fishery also operated at Dogface Lake in the 1960s and early 1970s (Stewart and Low 2000) but has since been inoperable because of the costs of transporting fish to markets (i.e., air access only).

Kakisa River, Kakisa Lake and Beaver Lake are considered good sport fishing areas for Arctic Grayling, Walleye, Northern Pike (*Esox lucius*), Inconnu, and Lake Cisco (*Coregonus artedi*). Sport fishing for Arctic Grayling occurs primarily along the Kakisa River downstream of Lady Evelyn Falls to the Kakisa River Bridge (Highway 1). Additionally, sport fishing lodges operate on Brabant Island (Brabant Lodge, see Figure 7 for location of island) on Beaver Lake and at Dogface Lake (Deeghani Lake Lodge, see Figure 1 for location of lake). Arctic Grayling and Northern Pike, and Walleye and Northern Pike are the species most targeted at Brabant (Falk and Gillman 1980) and Deeghani Lake (Stewart and Low 2000) Lodges, respectively.

Aerial view of Ka'a'gee Tu CPA - CWS

Habitat characteristics of the waters in Ka'a'gee Tu CPA influence species distributions and fish stocks. Tathlina Lake has a silt and black organic matter benthic substrate with generally shallow waters (1.5 – 3 m) that has resulted in periodic fish winter-kills (Roberge et al. 1988). The last reported major winter-kill event in Tathlina Lake was during the winter of 1942 - 1943 as a result of a major forest fire in the area which contaminated the water (Stewart and Low 2000, K'ágee Tu First Nation 2006). Traditional knowledge indicates that due to its shallow depth Tathlina Lake is highly susceptible to water contamination from both human and natural disturbances (K'ágee Tu First Nation 2006). Kakisa Lake reaches a depth of 7 m and is dominated by silt, except at the western end which is dominated by black organic material (Roberge et al. 1986; Lamoureux 1973). Shoreline habitats include boulders, gravel, sand and wetland vegetation (Roberge et al. 1986). Aquatic vegetation dominates the west and east ends of Kakisa Lake, covering approximately 13% of the entire lake surface (Lamoureux 1973).

Near Brabant Island within Beaver Lake (Mackenzie River), the main channel of the river is shallow (2 – 4 m) and swift flowing with substrate dominated by medium to large rocks, and gravel bars with sparse aquatic vegetation (Falk and Gillman 1980). This area as well as near other islands with similar habitat attributes within Beaver Lake, provides suitable Arctic Grayling spawning habitat (Stewart and Low 2000). Shallow bays along Brabant Island, characterized by slower moving water, silt/clay substrates and abundant aquatic vegetation (Falk and Gillman 1980), are important habitat for a number of fish species, particularly Northern Pike.

Birds

A total of 189 bird species were detected during surveys or have ranges overlapping the Ka'a'gee Tu CPA, either as breeders or during migration (Appendix 2). Approximately 161 species likely breed in the CPA and evidence of breeding was found for 137 species.

Waterfowl

Forty-eight different species of birds were seen at Beaver Lake during the 2008 and 2009 aerial surveys, including 20 waterfowl species (ducks, geese and swans). The greatest concentrations of birds recorded during the aerial surveys were located adjacent to the groups of small islands between Big Island and the mainland, and surrounding the islands adjacent to the Kakisa River delta (see below for density and distribution maps for various waterfowl groups).

In the 2009 spring surveys, a mean of 6 982 birds were observed per survey. Peak abundance occurred on 19 May with 16 123 birds (Figure 9). Thirty-two different species were seen, including 18 waterfowl species. The majority of the observations were ducks (47%), swans (24%), and geese (22%).

In the summer (July) surveys in 2009, a mean of 3 575 birds were observed per survey. Peak abundance occurred on 13 July with 4 559 birds and then decreased to lower numbers at the end of July (only 2 494 birds on 27 July). Twenty-nine different species were seen, including 14 waterfowl species. The majority of the observations were ducks (76%), gulls (12%), and terns (8%).

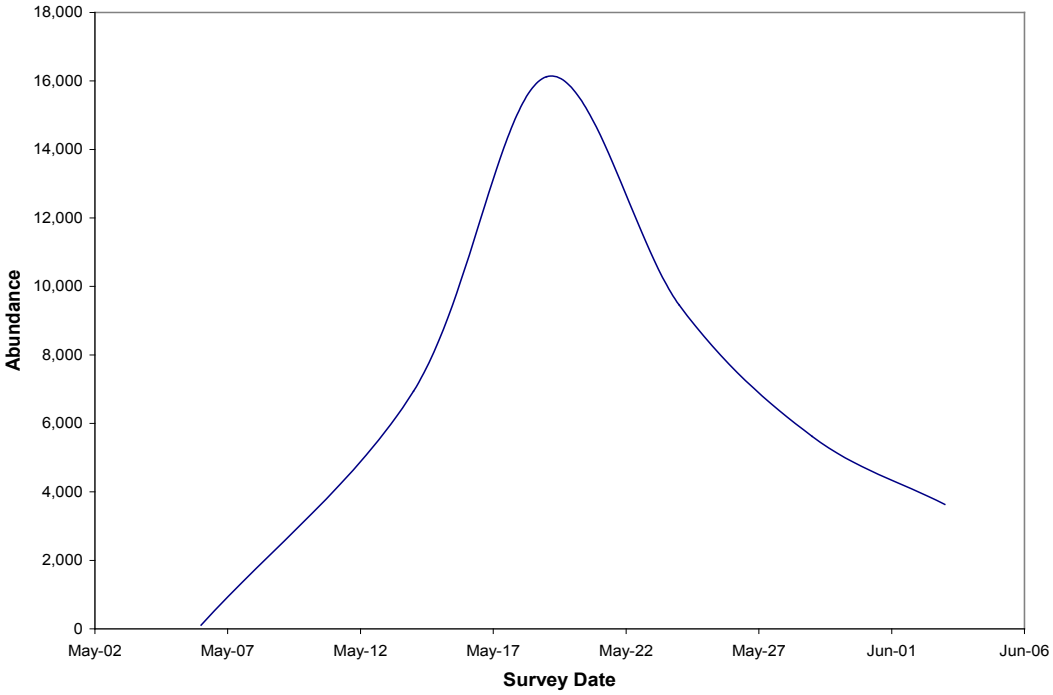

Figure 9: Waterfowl abundance in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

Alvar in Ka'a'gee Tu CPA - CWS

In the autumn surveys, a mean of 6 520 birds were observed per survey in 2008 and a mean of 4 777 in 2009. In 2008, peak bird abundance occurred during the first survey (10 160 birds observed on 27 August) with a lower peak also occurring on 21 September (9 062) (Figure 10). In 2009, peak abundance of birds occurred on 5 October (7 990). Forty-seven different species were seen, including 20 waterfowl species. The majority of the observations were ducks (83%) and swans (12%).

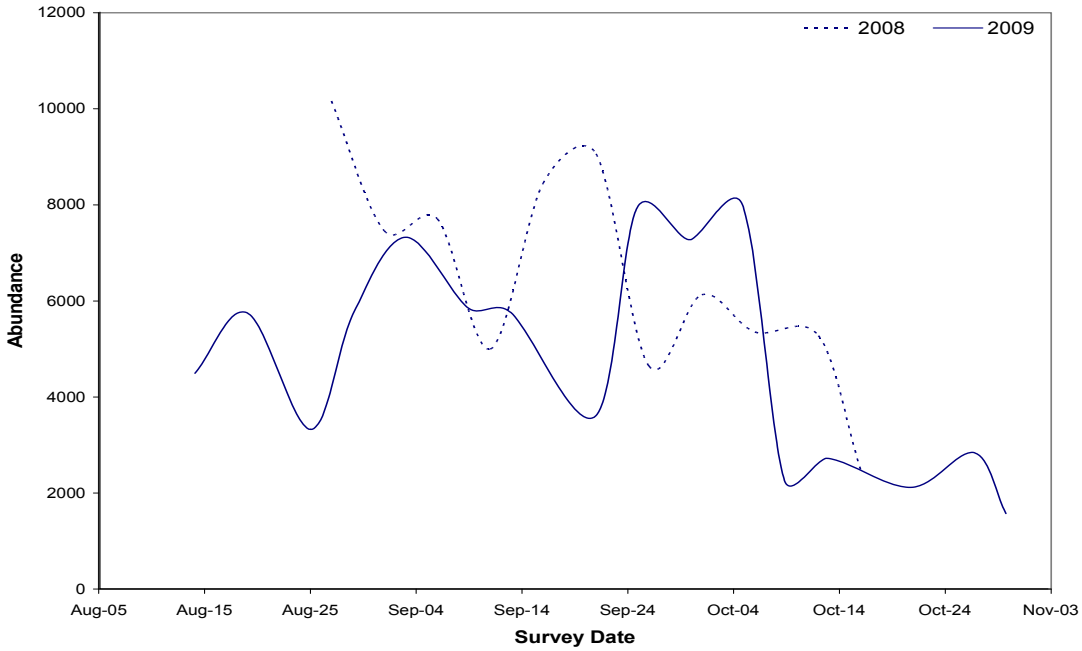

Figure 10: Total waterfowl abundance in the Ka'a'gee Tu Candidate Protected Area, autumn 2008 and autumn 2009.

Northern Shoverler - Lisa Pirie (CWS)

Ducks

During the spring surveys, 74% of the ducks recorded were diving ducks, 10% were dabbling ducks and the remainder could only be identified generally as ducks. Numbers of ducks peaked in the latter part of May with 5 866 ducks observed on 24 May (Figure 11). Numbers of divers peaked on 24 May (4 535 divers, Figure 12), whereas dabblers peaked on 19 May (706 dabblers). Diving ducks were found in all survey locations, concentrating along the south east shoreline (Figure 13), while dabbling ducks were most frequently between Big Island and the northern shoreline (Figure 14). Scoter spp. (*Melanitta* spp.) and Canvasback (*Aythya valisineria*) were the most abundant divers, followed by scaup spp. (*Aythya* spp.), merganser spp. (mostly *Mergus* spp.), Bufflehead (*Bucephala alberola*), goldeneye spp. (*Bucephala* spp.), Ring-necked Duck (*Aythya collaris*), and Long-tailed Duck (*Clangula hyemalis*). Mallard (*Anas platyrhynchos*) was the most common dabbler, followed by American Wigeon (*A. Americana*), Blue-winged Teal (*A. discors*), Northern Shoveler (*A. clypeata*), Green-winged Teal (*A. crecca*), and Northern Pintail (*A. acuta*).

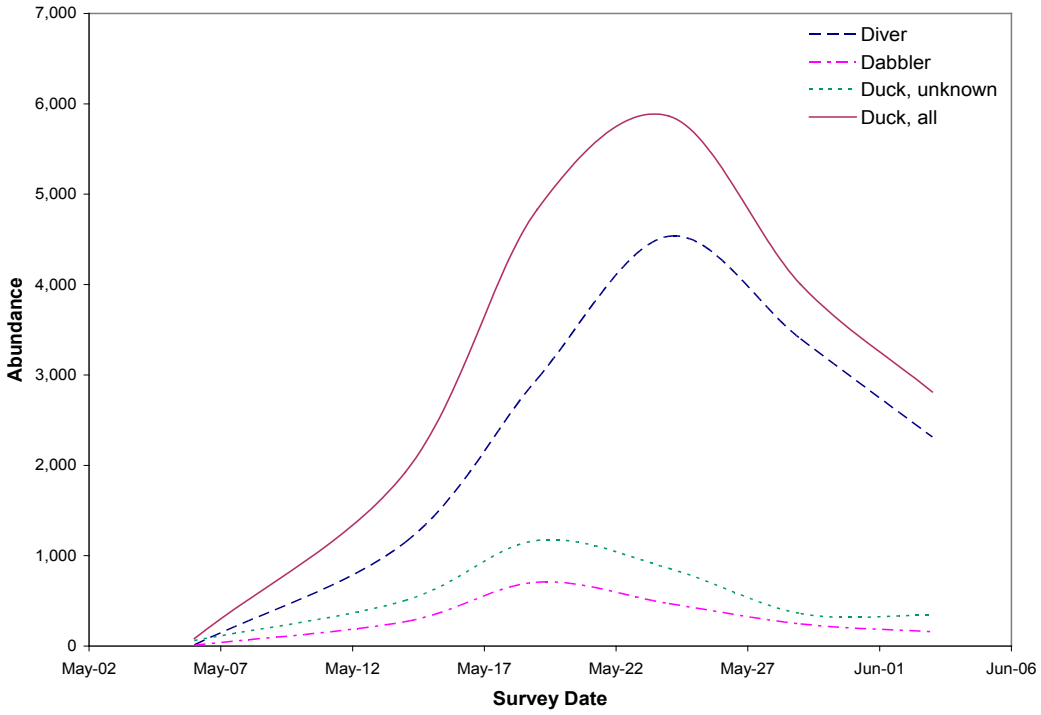

Figure 11: Duck abundance in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

During the summer surveys, 87% of the ducks were diving ducks, 3% were dabbling ducks and the remainder could only be identified as ducks. A mean number of 2 717 ducks were observed per survey with a maximum of 3 599 ducks observed during the first summer survey on 6 July. Scoter spp. was the most abundant diver, followed by merganser spp., Canvasback, goldeneye spp., Bufflehead, scaup spp. and Ring-necked Duck. Mallard, American Wigeon, and Green-winged Teal were the only dabblers identified during the summer surveys.

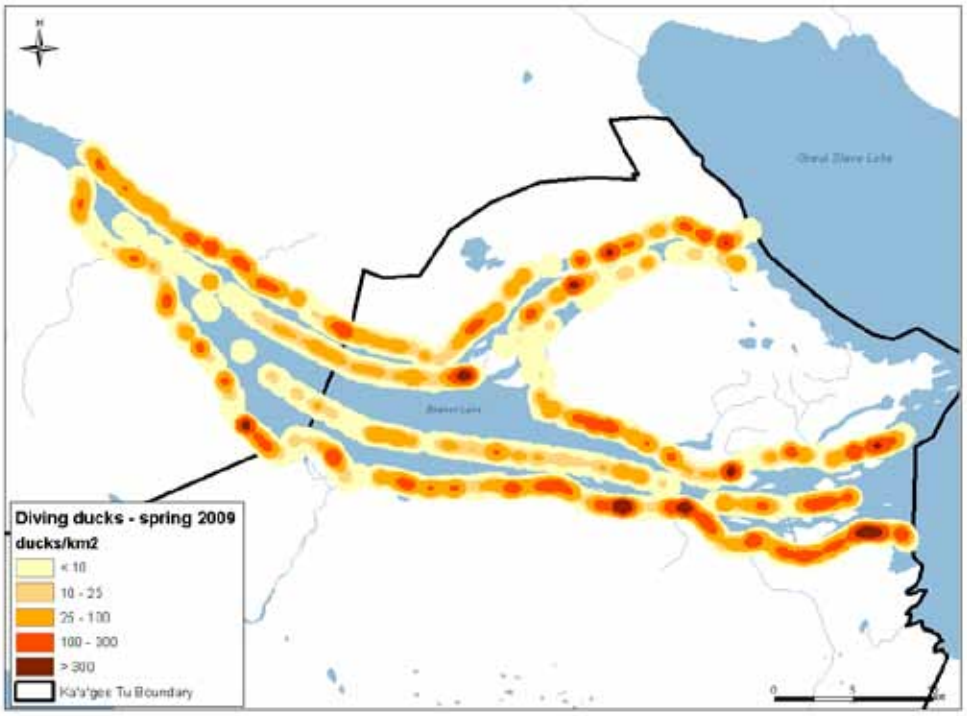

Figure 12: Density and distribution of diving ducks in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

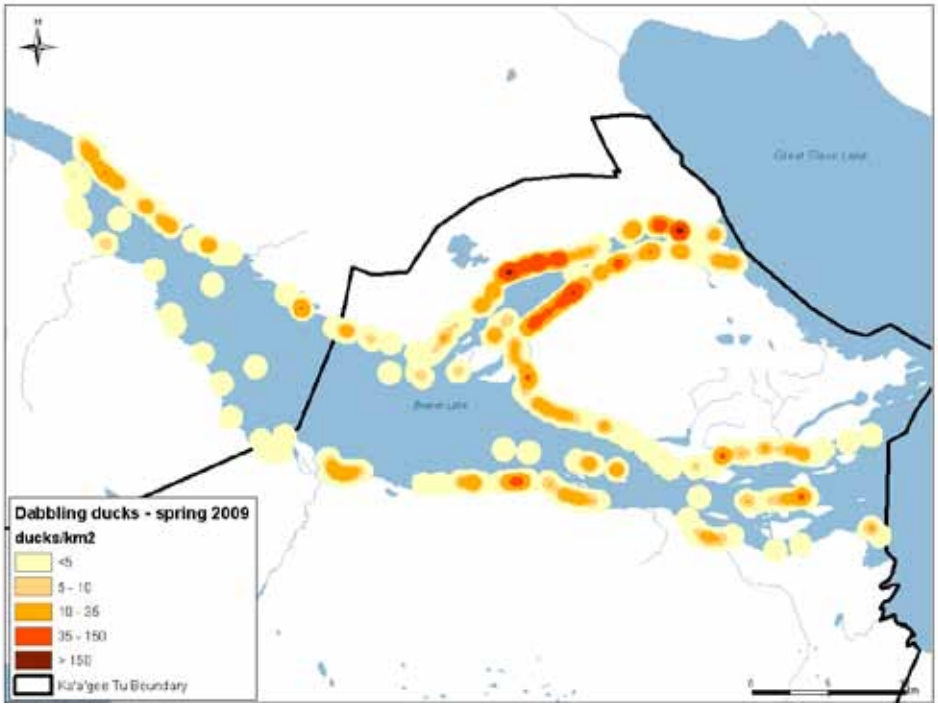

Figure 13: Density and distribution of dabbling ducks in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

During the autumn surveys, 63% of the ducks were diving ducks, 16% were dabbling ducks and the remainder could only be identified as ducks. In 2008, an average number of 5 465 ducks were observed per survey, with peak numbers of ducks seen on 27 August (9 536) and 21 September (8 525) (Figure 14). In 2009, a mean of 3 932 ducks were observed per survey, with the peak number of ducks seen on 3 September (7,037) (Figure 14). In both years, diving ducks were found in high frequencies in those transects around Big Island and along the south shoreline (Figure 15, Figure 16). Dabbling ducks tended to be located between Big Island and the north shoreline, and along the south shore (Figure 17, Figure 18). Merganser spp., goldeneye spp., Bufflehead, and scaup spp. were the most abundant divers in both years; other divers observed were Canvasback, scoter spp. Ring-necked Duck and, in 2009 only, Long-tailed Duck. Mallard was the most abundant dabbler in both years; American Wigeon, Northern Pintail, Green-winged Teal, Northern Shoveler, and Blue-winged Teal were also observed in both years.

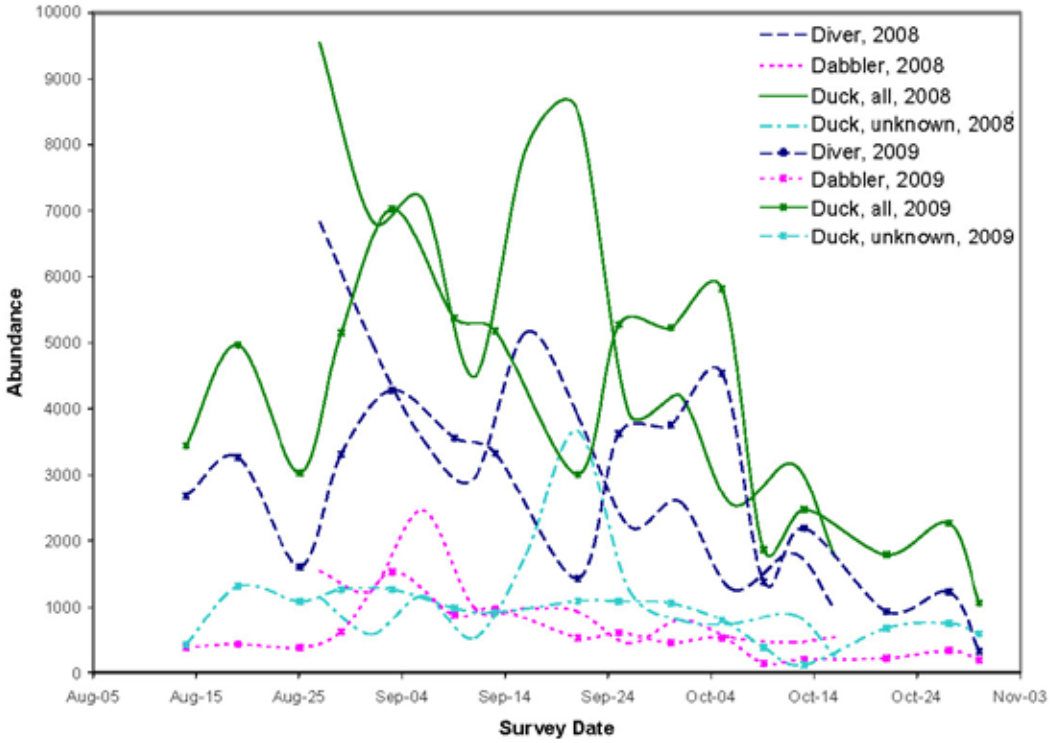

Figure 14: Duck abundance in the Ka'a'gee Tu Candidate Protected Area, autumn 2008 and autumn 2009.

Aerial surveys were conducted at Beaver Lake in spring, 1-17 May 1973 (Salter et al. 1974) and in autumn, 14 September -10 October 1972 (Salter 1974). Similar to the 2009 spring surveys, high numbers of ducks were observed in mid-May; over 5,000 ducks were seen on 17 May, 1973. In the autumn surveys, Salter (1974) also observed high numbers of ducks, with a peak of over 10 000 ducks on 22 September 1972. Since the 1970s, there may have been changes in the proportions of different species using Beaver Lake. The most common species on the 1972 autumn surveys were American Wigeon, scaup spp., and Mallard (Salter 1974). In contrast, during the 2008 and 2009 surveys, merganser spp., goldeneye spp., and Bufflehead were commonly seen (as well as scaup spp. and Mallard) and American Wigeon was seen less frequently.

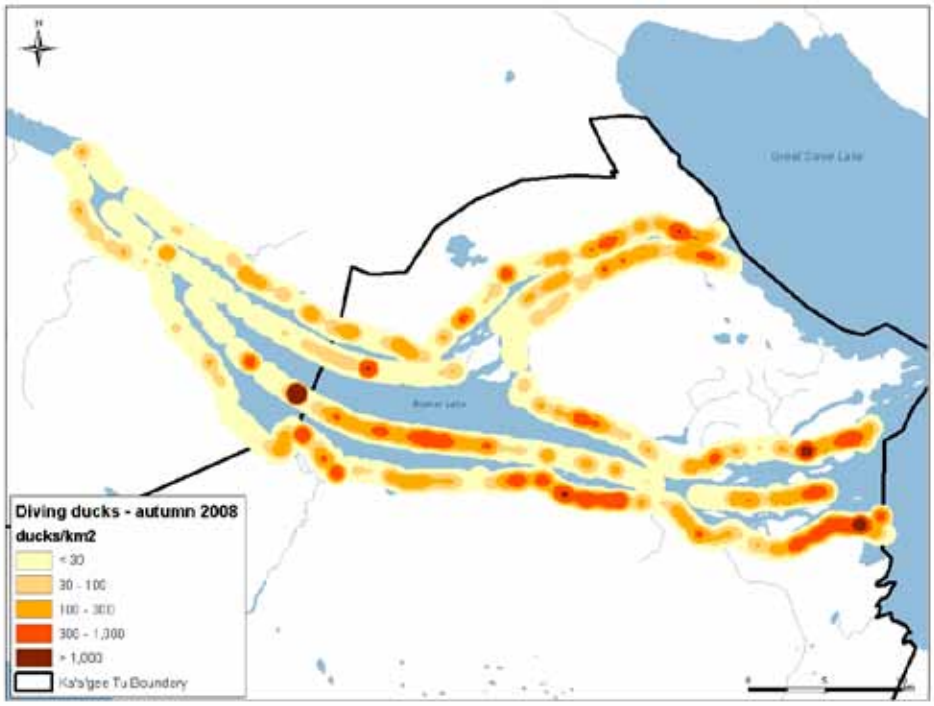

Figure 15: Density and distribution of diving ducks in the Ka'a'gee Tu Candidate Protected Area, autumn 2008.

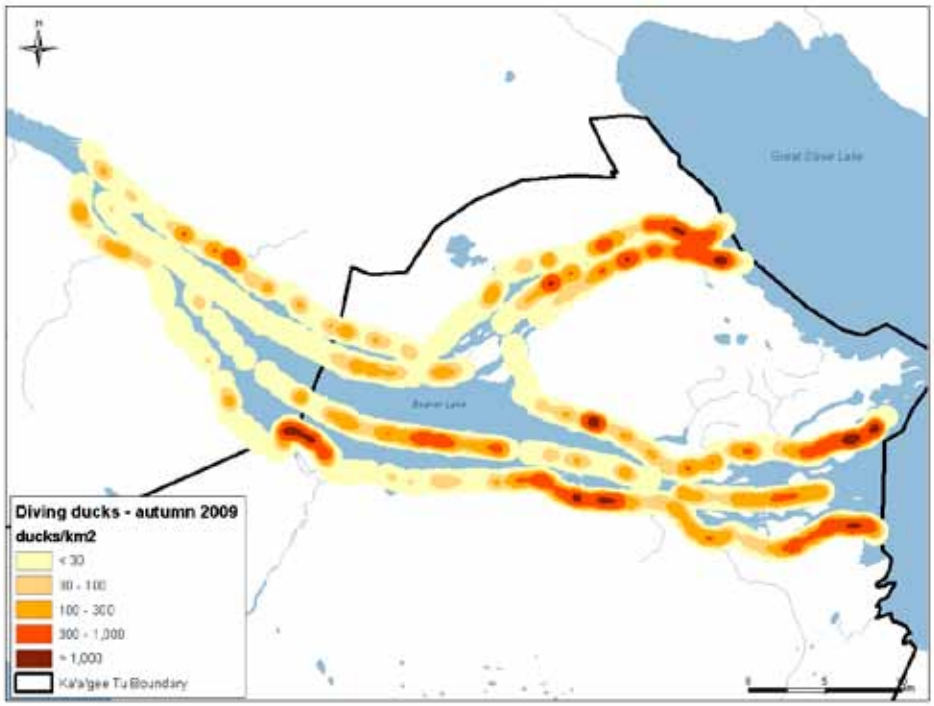

Figure 16: Density and distribution of diving ducks in the Ka'a'gee Tu Candidate Protected Area, autumn 2009.

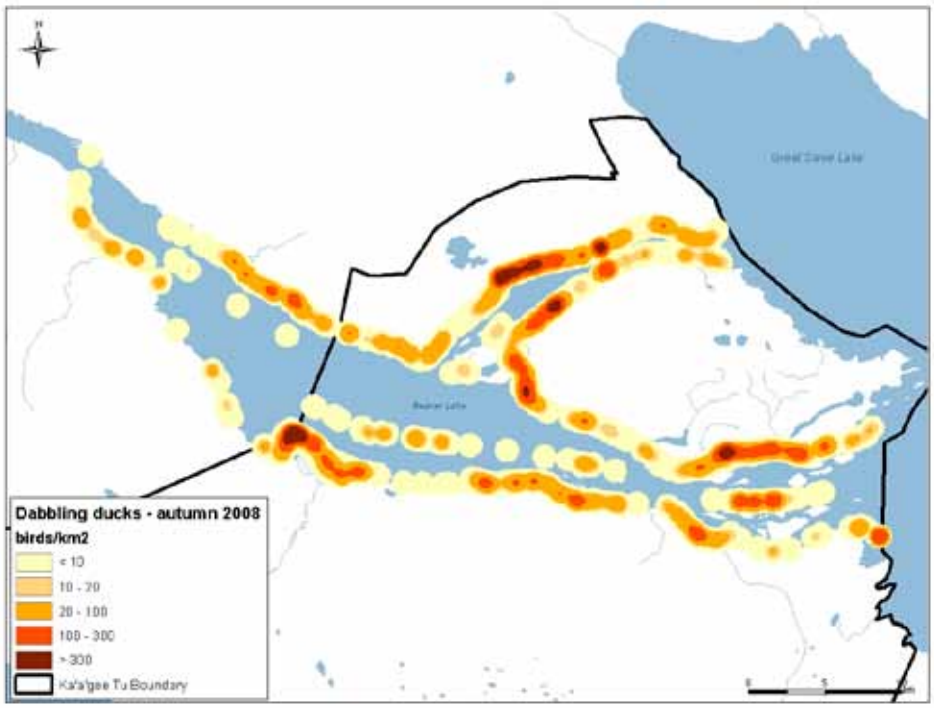

Figure 17: Density and distribution of dabbling ducks in the Ka'a'gee Tu Candidate Protected Area, autumn 2008.

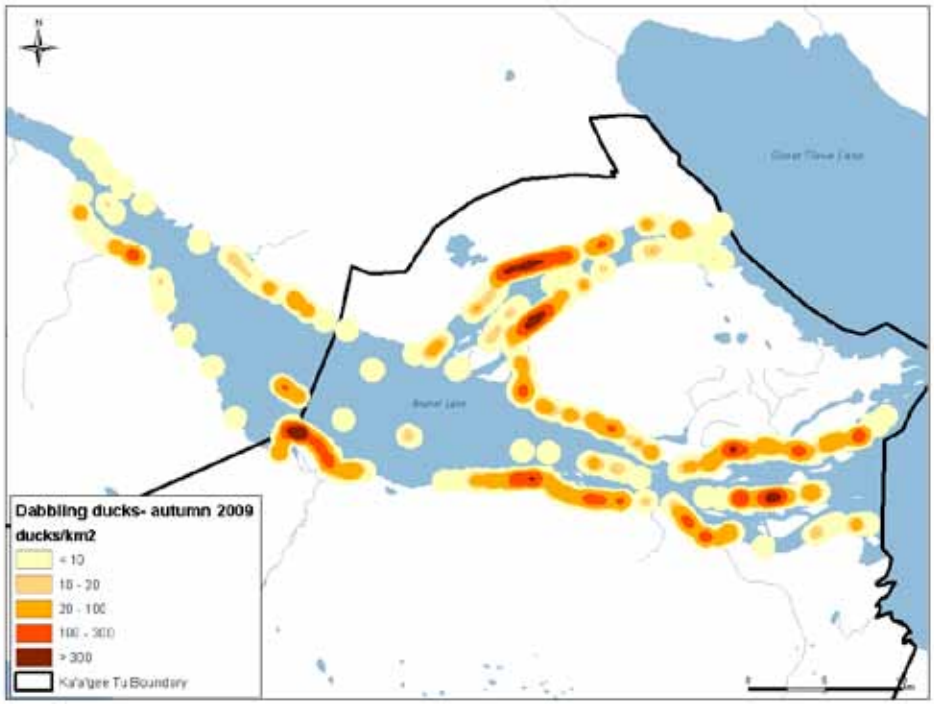

Figure 18: Density and distribution of dabbling ducks in the Ka'a'gee Tu Candidate Protected Area, autumn 2009.

Geese

During the spring surveys, Canada Goose (*Branta canadensis*) and Snow Goose (*Chen caerulescens*) were the two goose species observed. A number of unidentified "dark-coloured" geese were also observed (likely Canada Geese). The highest peak occurred on 19 May, when 7 609 geese were observed (Figure 19). Geese tended to be located between Big Island and the north shoreline (Figure 20). Salter et al. (1974) also observed Canada and Snow geese during spring surveys in 1973, as well as Greater White-fronted Geese (*Anser albifrons*).

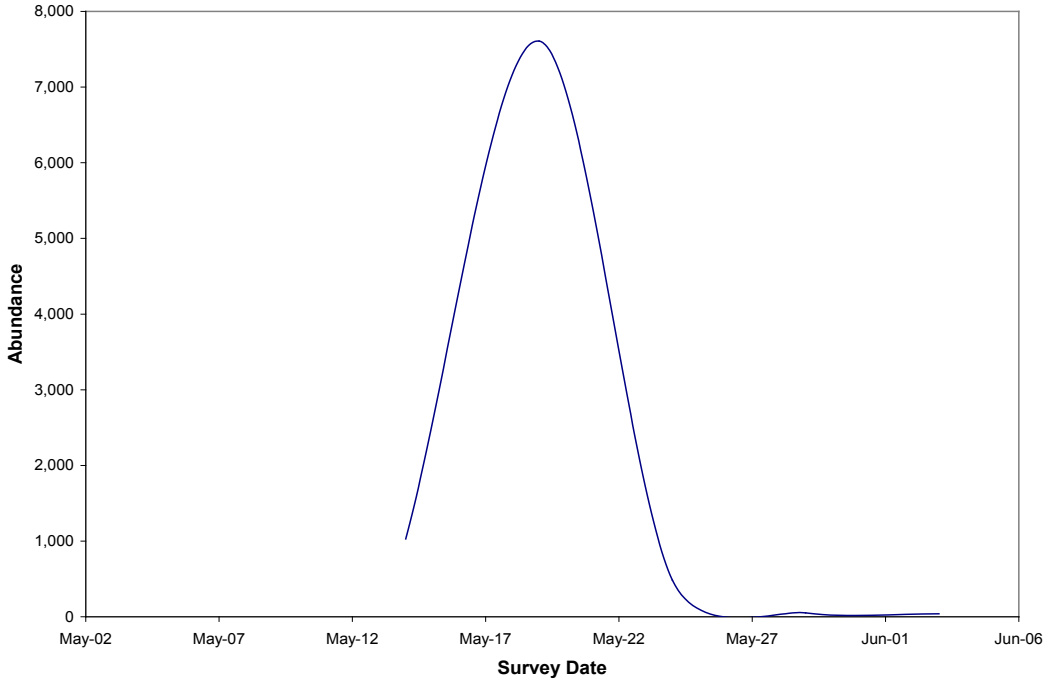

Figure 19: Goose (all species) abundance in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

In the summer surveys, low numbers of Canada Geese (≤24 birds/survey) and one unidentified "dark-coloured" goose were observed.

During the autumn surveys, Canada Goose was the most abundant goose species. Greater White-fronted Geese and Snow Geese were also observed in both years. A number of unidentified "dark-coloured" geese were also counted (likely Greater White-fronted or Canada Geese). In 2008, geese numbers fluctuated over the course of surveys and peaked on 6 September (169) (Figure 21). In 2009, there was no significant peak observed during the autumn; the largest numbers of geese observed were on 13 September (106) and on 25 September (205). Geese were located in groups between Big Island and the north shoreline, along the south side of Big Island and at the mouth of the Kakisa River during both years (Figure 22, Figure 23). Salter (1974) observed low numbers of Canada and Greater White-fronted geese during the 1972 autumn surveys, but no Snow Geese.

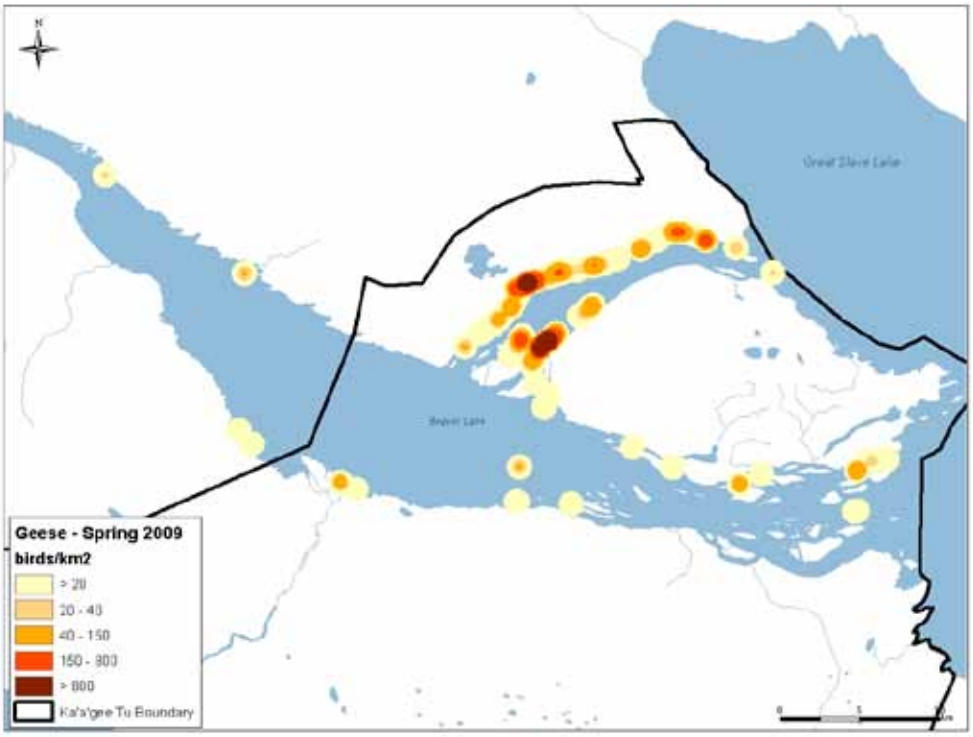

Figure 20: Density and distribution of geese in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

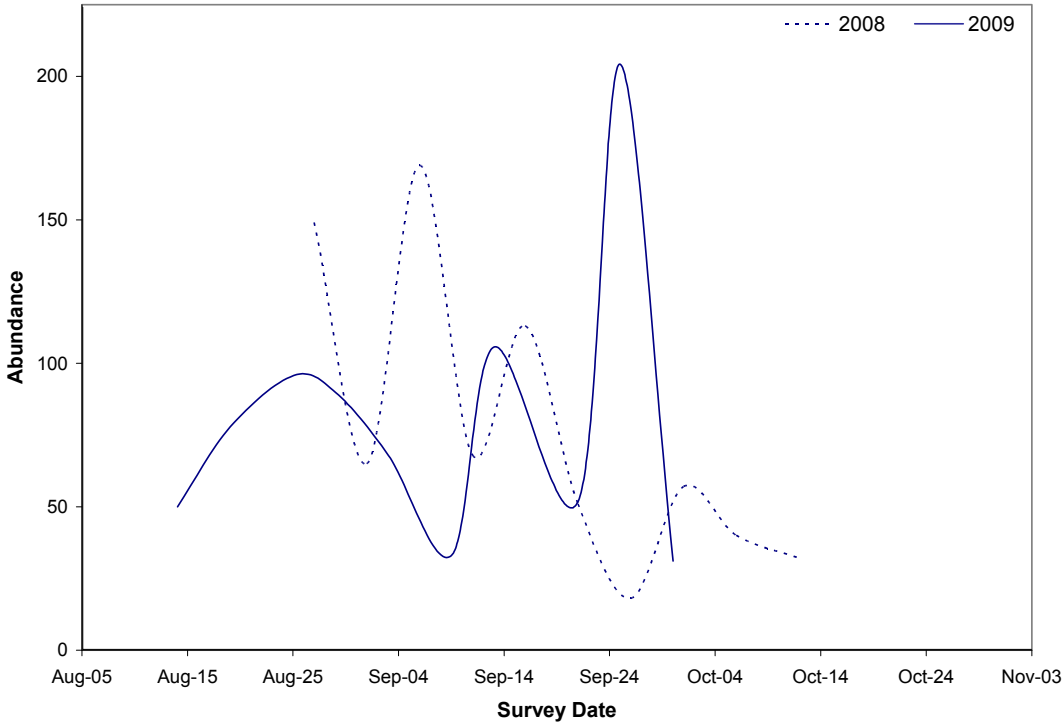

Figure 21: Goose abundance in the Ka'a'gee Tu Candidate Protected Area, autumn 2008 and autumn 2009.

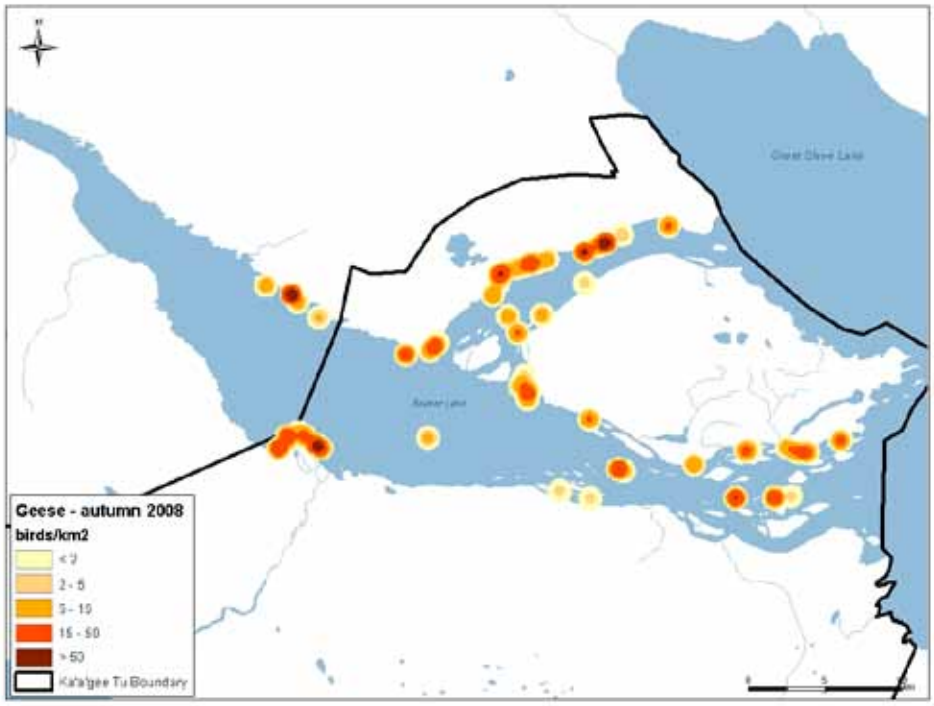

Figure 22: Density and distribution of geese in the Ka'a'gee Tu Candidate Protected Area, autumn 2008.

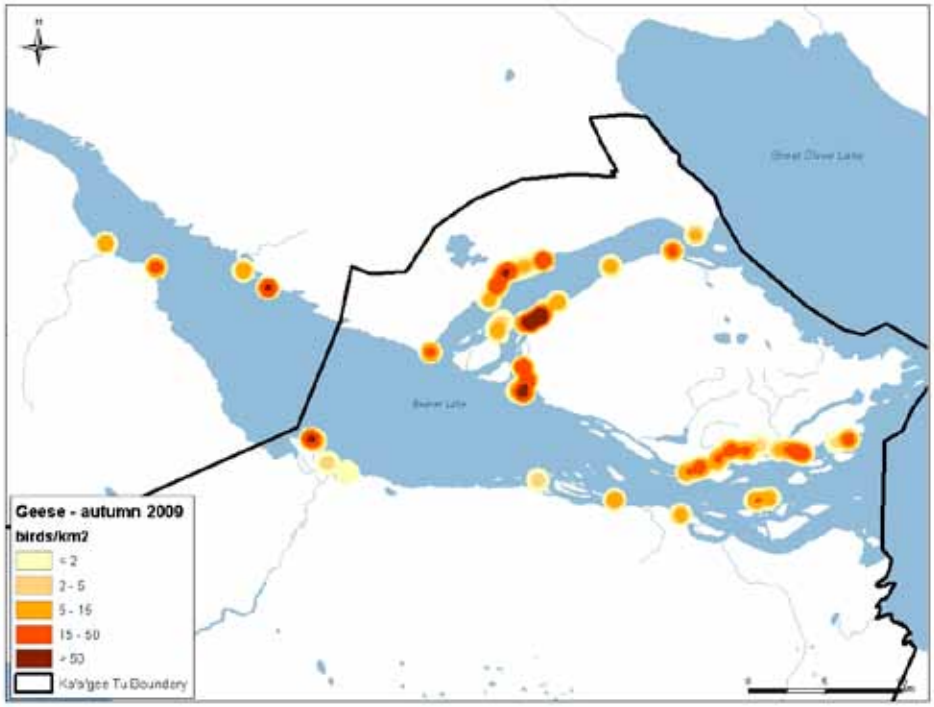

Figure 23: Density and distribution of geese in the Ka'a'gee Tu Candidate Protected Area, autumn 2009.

Swans

The greatest number of swans was observed during the first spring survey on 14 May (3 852) in 2009 and then numbers steadily declined (Figure 24). Densities of swans were highest between the Big Island and the north shoreline (Figure 25). During spring surveys in 1973, Salter et al. (1974) observed a peak of 1 175 swans on 17 May.

Low numbers of swans were observed throughout the summer and a swan brood was seen on each of the July surveys. Tundra Swans (*Cygnus columbianus*) are on their arctic tundra breeding grounds in summer, and, especially in July, are not likely to be migrating south through Beaver Lake. Trumpeter Swans (*Cygnus buccinator*) have been seen in summer throughout the southwest portion of Dehcho Region, along the Liard and Mackenzie Rivers (Beyersbergen 2007). An attempt was made to visually identify these swans to species on the July boat survey; one adult swan was seen during the boat survey that was likely a Trumpeter Swan. Although unconfirmed, it is likely that the swans with young were Trumpeter Swans.

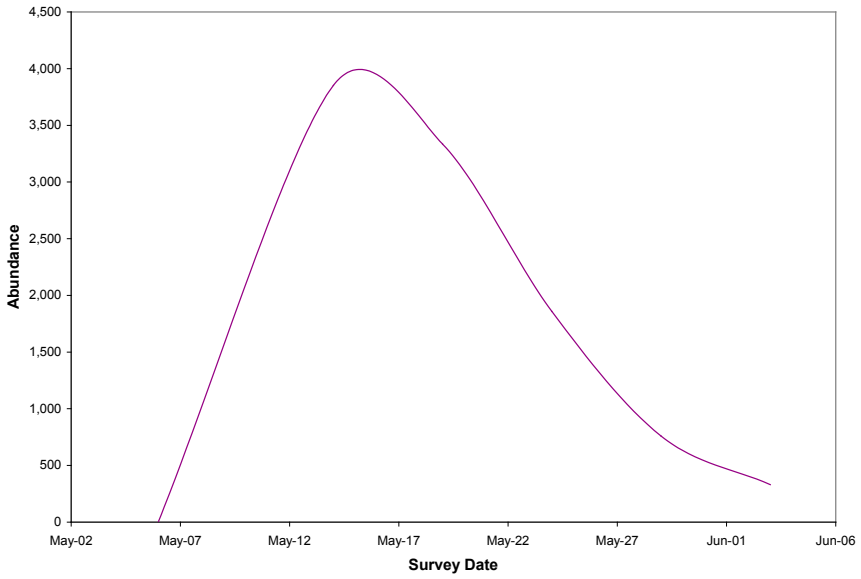

Figure 24: Swan abundance in the Ka'a'gee Tu Candidate Protected Area, spring 2008.

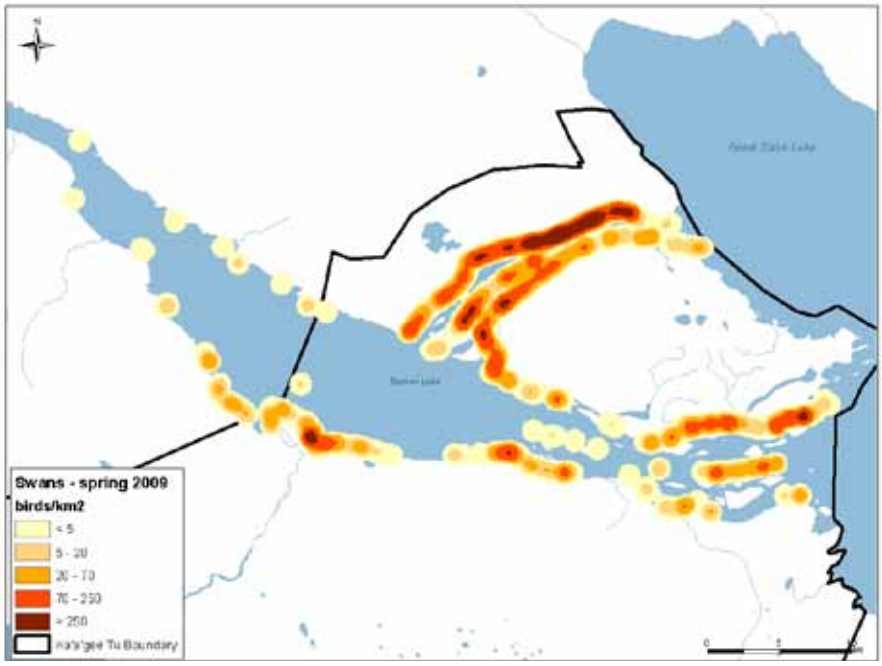

Figure 25: Density and distribution of swans in the Ka'a'gee Tu Candidate Protected Area, spring 2009.

During the autumn surveys, swans were observed on all surveys during both years. In 2008, the peak occurred on 6 October with a total of 2 725 individuals (adult and juveniles) and juvenile swans peaked at 518 on 6 October (Figure 26). In 2009, the peak occurred on 25 September (2 411 individuals) and the peak of juveniles occurred on 5 October (348 juveniles). During both years, densities were highest along the south shoreline, particularly at the mouth of the Kakisa River (Figure 27, Figure 28). During autumn surveys in 1972, Salter et al. (1974) observed a peak of 4 470 swans on 22 September.

The majority of swans using the Beaver Lake area during migration are likely Tundra Swans that are part of the Eastern Population. The 2010 mid-winter survey of the Eastern Population of Tundra Swans observed 97 300 swans (U.S. Fish and Wildlife Service 2010). Thus, likely greater than 2% of Tundra Swans (Eastern Population) use the area during spring migration and greater than 3% during autumn migration.

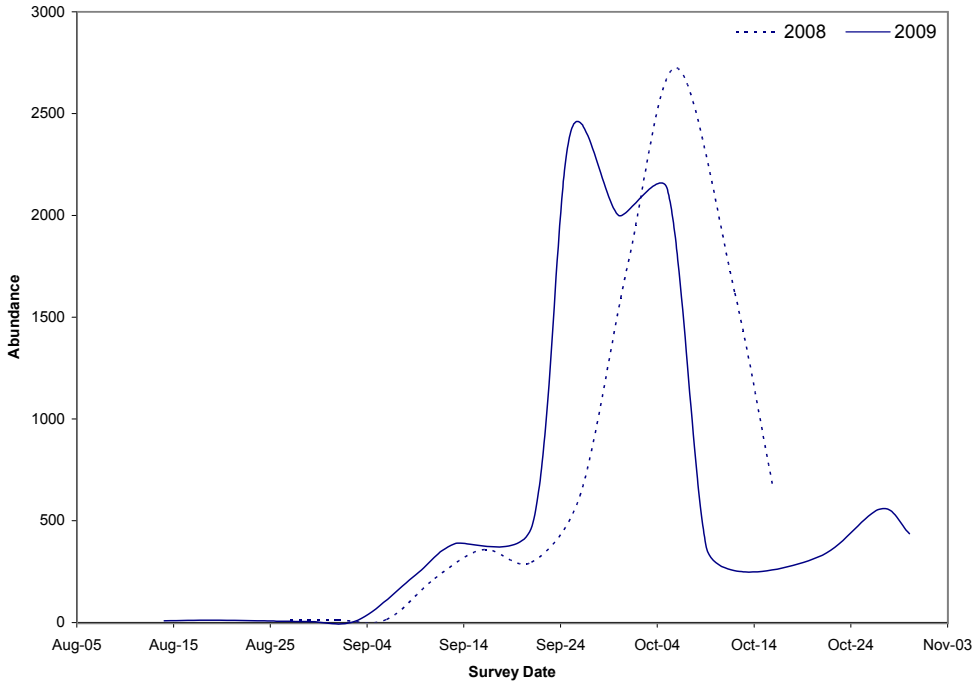

Figure 26: Swan abundance in the Ka'a'gee Tu Candidate Protected Area, autumn 2008 and autumn 2009.

Ka'a'gee Tu CPA - CWS

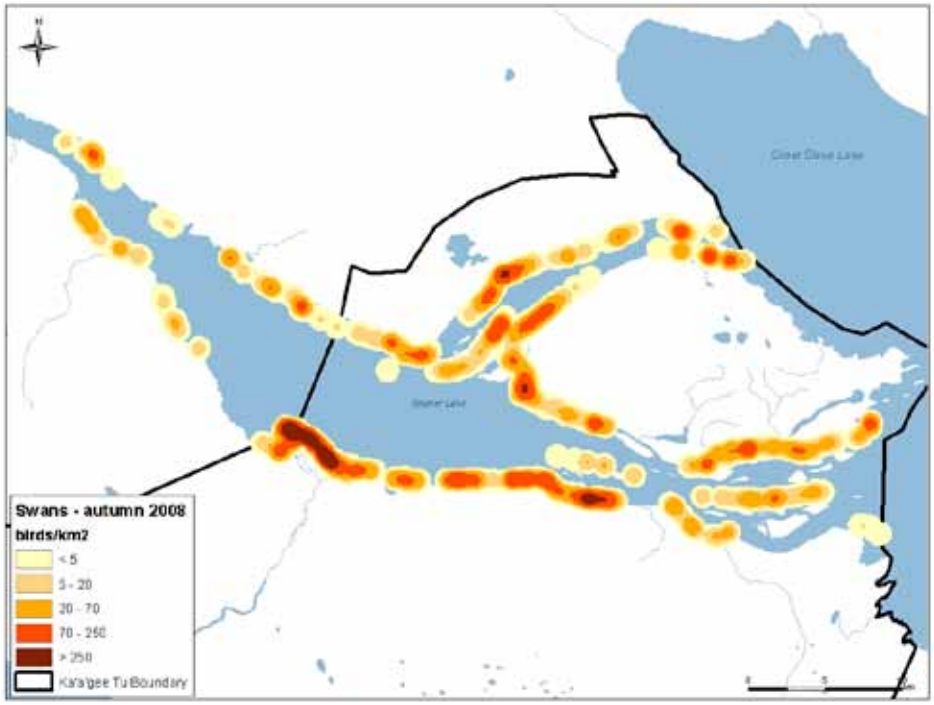

Figure 27: Density and distribution of swans in the Ka'a'gee Tu Candidate Protected Area, autumn 2008.

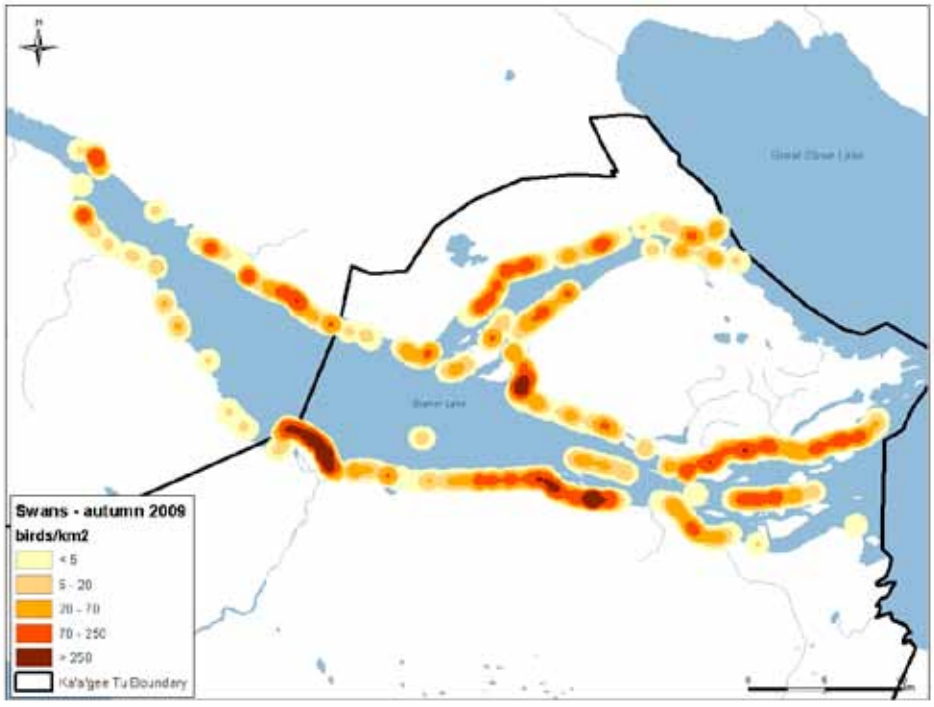

Figure 28: Density and distribution of swans in the Ka'a'gee Tu Candidate Protected Area, autumn 2009.

Other Birds

Gulls, terns, and shorebirds were the most common non-waterfowl birds observed during the aerial surveys. In most cases, these birds were unidentifiable to species level from the air. Gulls were seen on all aerial surveys. The highest numbers of gulls were recorded in summer; 865 gulls were observed on 13 July 2009. Terns were seen on every survey from 27 August to 16 September, 2008 and from 14 May until 3 September, 2009; no terns were observed on the surveys after 16 September. The highest number of terns were observed near the end of May; 661 and 545 terns were observed on 14 May and 29 May, respectively. Shorebirds were observed on every survey from 14 May until 13 September.

Caspian Terns (*Sterna caspia*) were observed in low numbers on several of the spring, summer and autumn surveys in 2009. The highest number observed was 13 birds on 3 June 2009.

During the boat survey on 29 July 2009, several groups of Black Terns (*Chlidonias niger*) were observed, including a large group of 200 - 300 terns flying over marshy areas near the southern shore of Big Island. Black Terns were also observed on the aerial surveys in 2009 on 1 May (1 individual), 27 July (36) and 14 August (115).

American White Pelicans (*Pelecanus erthrorhynchos*) were observed in 2008 and 2009; pelicans were seen on 19 May 2009, in July 2009, and on every autumn survey up to and including 13 September. The greatest number of pelicans observed during the aerial surveys was 104 on 29 August 2009, although even more birds may have been present during the boat survey on 29 July 2009. During aerial surveys, pelicans were found in open water between Big Island and the south shore (Figure 29). No evidence of breeding (i.e., nests, young) for pelicans was observed during either the aerial surveys or the boat survey.

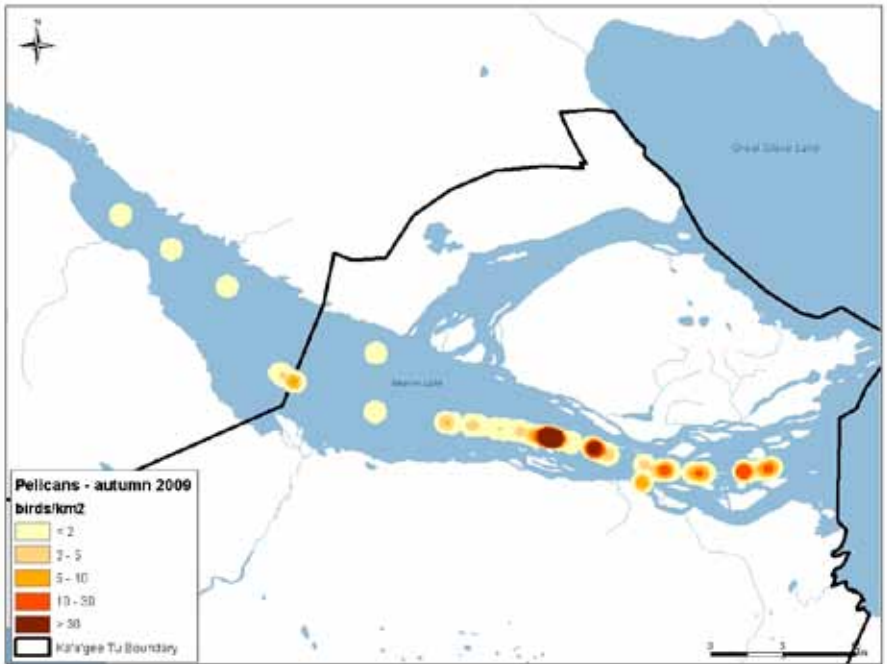

Figure 29: Density and distribution of American White Pelican in the Ka'a'gee Tu Candidate Protected Area, autumn 2009.

Raptors were also seen on every survey. Bald Eagles (*Haliaeetus leucocephalus*) were the most common raptor and were seen from 14 May until the end of October with a mean of 8 birds per

survey. The highest number of Bald Eagles seen was 16 birds on 16 October 2008. Other raptors observed were American Kestrel (*Falco sparverius*), Golden Eagle (*Aquila chrysaetos*), Northern Harrier (*Circus cyaneus*), Osprey (*Pandion haliaetus*) and Red-tailed Hawk (*Buteo jamaicensis*). During the boat survey on 29 July, two Osprey pairs were seen using navigation towers for nesting.

Pelicans, Beaver Lake - Paul Woodard (CWS)

Common Ravens (*Corvus corax*) were seen on most surveys. A mean of 4 ravens per survey were recorded with 44 ravens observed on 29 August 2009.

Other noteworthy observations include two cormorants (likely Double-crested, *Phalacrocorax auritus*) on 1 September 2008 and a Short-Eared Owl (*Asio flammeus*) on 27 August 2008. Sandhill Cranes (*Grus canadensis*), Common and Pacific loons (*Gavia imme*r and *G. pacifica*, respectfully), Red-necked Grebes (*Podiceps grisegena*), American Coots, and jaegers (*Stercorarius* spp.) were also seen on the surveys.

Passerines

A total of 264 point counts at 88 sites were surveyed in 2009 (50 sites; 150 point counts) and 2010 (38 sites; 114 point counts). The ten most abundant species detected on avian surveys in 2009 and 2010 were Chipping Sparrow (*Spizella passerina*; 177), Swainson's Thrush (*Catharus guttatus*; 148), Yellow-rumped Warbler (*Setophaga coronata*; 148), Palm Warbler (*Setophaga palmarum*; 140), Ruby-crowned Kinglet (*Regulus calendula*, 133), Tennessee Warbler (*Oreothlypis peregrina*; 118), Hermit Thrush (*Catharus guttatus*, 114), White-throated Sparrow (*Zonotrichia albicollis*,101), Gray Jay (*Perisoreus canadensis*; 76) and Alder Flycatcher (*Empidonax alnorum*; 72). Species that were detected on surveys but considered rare for this area include Short-billed Dowitcher (*Limnodromus griseus*, 2), Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*, 1) and American Coot (1). Numerous Species at Risk were also detected including Common Nighthawk (2), Olive-sided Flycatcher (13), Canada Warbler (4) and Rusty Blackbird (17).

Marsh bird surveys and Species at Risk searches

Twenty-eight sites were visited in 2011 with a total of 125 Species at Risk and marsh bird playback stations surveyed. The number of playback stations surveyed depended on several factors including weather (which affected start times) and if a species of interest was detected after which nest searches were conducted. A total of 951 birds representing 81 species were detected including incidental observations. Fifty-three individual Species at Risk were detected during the 2011 surveys including Horned Grebe (4), Short-eared Owl (1), Olive-sided flycatcher (10), Canada Warbler (5), and Rusty Blackbird (33; Figure 30). Nest searches resulted in five active Rusty

Blackbird nests being located. Two nests contained eggs and three nests contained chicks (mean 4.2 eggs or chicks/nest). In addition, numerous Rusty Blackbird fledglings were also seen. Searches for Canada Warbler and Olive-sided Flycatcher nests were unsuccessful due to their breeding behaviors (i.e., secretive nesting, large territory size); however, we found significant evidence that these species are breeding in Ka'a'gee Tu (e.g., exhibiting territory defense). One female Canada Warbler was observed with a male Canada Warbler likely representing a breeding pair.

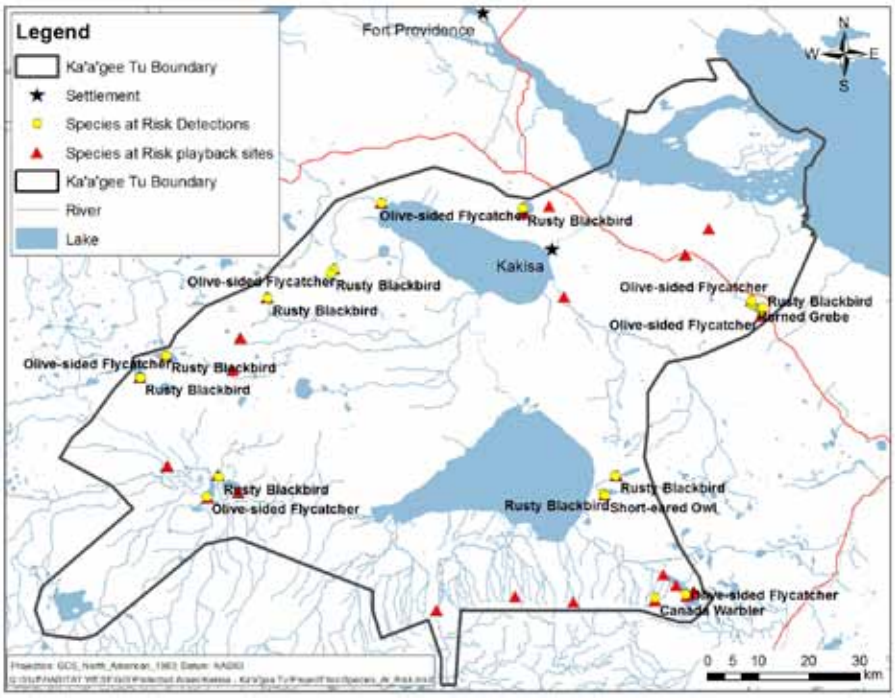

Figure 30: Species at Risk and marsh bird playback survey sites and locations of Species at Risk detected at playback stations in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories, 2011.

Rusty Blackbirds were observed mostly in bog or fen habitat with open conifer canopies. Nests were typically observed within 100 m of open water and near open (treeless) areas where Blackbirds were seen foraging on the ground. Olive-sided Flycatchers were also found in open conifer forest with some tall trees used as perches for singing. Canada Warblers were detected only in the Cameron Hills, specifically in old (>70 years) hardwood or mixedwood forests on slopes with a dense understory of shrubs dominated by Alder spp. (*Alnus* spp.). The observations of Canada Warblers in 2010 and 2011 are the first know records for the Cameron Hills and represent a significant northern range extension for this species.

The three most abundant bird species observed from incidental observations during 2011 surveys were Black Tern (63), Chipping Sparrow (53) and Palm Warbler (39). Observations of marsh bird species included Sora (7), Marsh Wren (*Cistothorus palustris*, 2) and Pied-billed Grebe (1). All observations from this research are entered into the NWT/NU Bird Checklist Database currently stored in Yellowknife, NT. These data are uploaded into and are availble from teh eBird database (www.eBird.org).

Mammals

All incidental wildlife observations and any evidence of wildlife presence (e.g., scat, tracks, browsing) encountered during helicopter flights, between sampling sites, at point count stations and at vegetation sampling plots were recorded. Data from ENR's Wildlife Management Information System (WMIS) were also used to identify wildlife species present in the CPA. Forty-

five mammal species potentially occur within the Ka'a'gee Tu CPA (Appendix 4) and 15 mammal species were recorded during field studies conducted from August 2007 to June 2011, including animal sightings or sign.

Boreal Woodland Caribou

One hundred and eleven Boreal Woodland Caribou were equipped with either VHF or GPS transmitter collars, in 2003-2005 and 2006-2010, respectively (Kelly and Cox 2011). Individuals were marked in the Hay River Lowlands study area (60 individuals) and the Cameron Hills study area (51 individuals). Collars were programmed to release from the animal on a pre-determined date (typically 3.5 years after collar deployment). Mean home range size of Caribou collared in the Hay River Lowlands from 2008 – 2010 was 2 847 km^2 compared to 4 140 km^2 for Caribou in the Cameron Hills study area. Adult female annual survival rates for each study area were estimated to range from 76 – 91% from 2004 – 2010 in the Hay River Lowlands and 71 – 91% from 2006 in the Cameron Hills (Kelly and Cox 2011). Recruitment of calves (at 9 or 10 months old) into the breeding population (i.e., become adults) is critical to population stability. Calf recruitment is expressed as the ratio of calves per 100 adult cows, where a ratio of 29:100 or 0.29 is typical of stable populations and values below this are indicative of declining populations (see Environment Canada 2008). Recruitment ratios in both study areas ranged from ~0.13 to 0.22 from 2004 to 2009; in 2010 a higher ratio of 0.5 was reported for the Hay River Lowlands, compared to a low of 0.1 for Cameron Hills. Recruitment ratios for the Cameron Hills study area were generally lower than those for the Hay River Lowlands. Caribou populations appear to be declining in both the Hay River Lowlands (10% decrease) and Cameron Hills (50% decrease) over the study period.

Analyses of Boreal Woodland Caribou movement and habitat use data from the Northwest Territories indicates that Caribou, fitted with GPS transmitter collars, use old (≥ 100 years) conifer forest stands with open canopies preferentially over younger conifer forests (Nagy et al, unpublished data). These data also indicate that Caribou show a high degree of fidelity to summer ranges but not to calving sites. Additionally, Caribou in these areas avoided seismic lines during critical pre-calving, calving and summer periods. Specifically, in the Hay River Lowlands study area, Caribou typically avoided areas within 400 m of seismic lines, whereas those in the Cameron Hills avoided areas within 100 m of seismic lines which is likely due to a higher density of seismic lines in the Cameron Hills. Caribou also crossed seismic lines less than expected (e.g., random) and when they did cross seismic lines they crossed at a faster rate than they traveled in other habitat types. This suggests that Caribou may use more energy when travelling on or near seismic lines and likely use more energy while doing so during critical periods of the year (e.g., calving). Habitat patches ≥ 500 km^2 are important for Caribou survival, calf recruitment and for maintaining stable populations. Therefore, areas with older forest habitat which contain fewer seismic lines and other oil and gas disturbances are valuable for conservation of Boreal Woodland Caribou. According to this analysis, 52% of the Hay River Lowlands and 16% of Cameron Hills study areas are currently considered "secure habitat" for Boreal Woodland Caribou (Figure 31), though this amount drops considerably if limited to those patches 500 km^2 in size and larger (Hay River Lowlands; 15%, Cameron Hills, 0%; Nagy et al, unpublished). The total area of secure Caribou habitat in the Ka'a'gee Tu CPA boundary is 52% (4 952.8 km^2) when all patch sizes are considered.

To monitor the health of Boreal Woodland Caribou, between March 2003 and February 2006, Caribou were captured in the area surrounding Kakisa, Trout Lake and southeast of Wrigley; blood samples were taken from 104 adult females and fecal samples were collected from 149 Caribou (Johnson et al. 2010). Overall, low parasites loads and antibodies were found; however, some previously unreported parasites and diseases in Caribou, including *Eimeria* sp., *Cryptosporidium* spp., and *Giardia* spp. *Trypanosome* spp., the most common parasite, were also found in 80% of the animals sampled. All samples tested negative for Johne's disease, bovine viral diarrhea virus (BVDV), parainfluenza (PI3), and Brucella (diseases that are found in other deer species or other places in Canada, Johnson et al. 2010).

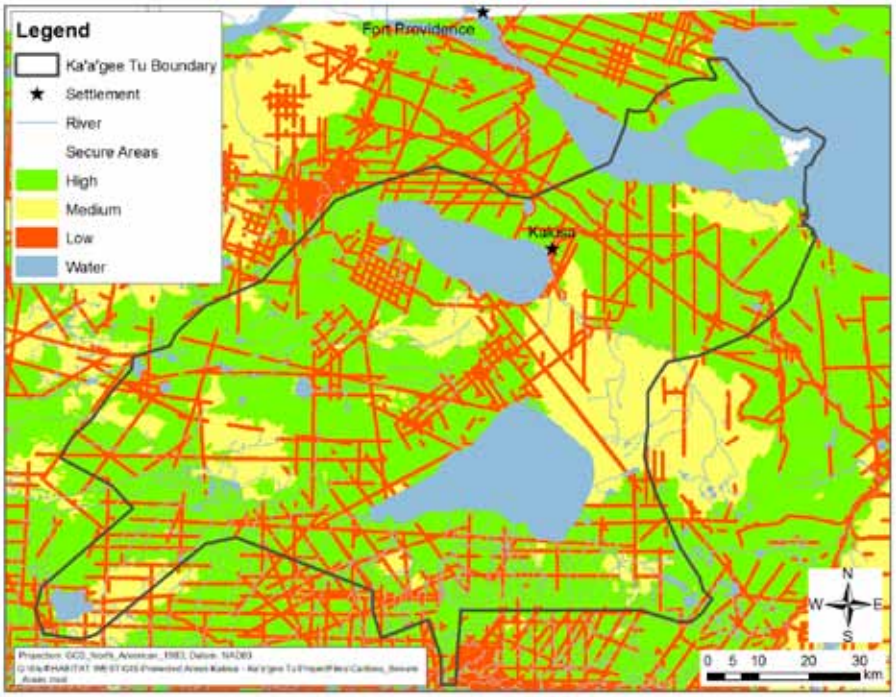

Figure 31: Rank of Boreal Woodland Caribou habitat in and near the Ka'a'gee Tu Candidate Protected Area, Northwest Territories (data analyzed and provided by GNWT – ENR).

Cutlines evident within Ka'a'gee Tu CPA - Kevin Kardynal (CWS)

Other Mammal Species

A total of 125 Moose (*Alces alces*) were observed incidentally during field work (2007 – 2011) or were found in ENR's WMIS database for the Ka'a'gee Tu CPA (Figure 32). Moose are distributed throughout the study area and are strongly associated with wetlands with dense forbs and shrubs and generally prefer early successional forests, especially when associated with rivers, 11 to 30 years after a disturbance (e.g., forest fire; Kelsall et al. 1977, Loranger et al. 1991). No Moose surveys have been conducted in the Ka'a'gee Tu CPA; however, surveys conducted near Fort Providence just north of the CPA indicate Moose densities of 3.0 Moose/ 100 km^2 in 1997 with a ratio of 16 calves to 100 cows (Bradley and Johnson 1998). Aerial surveys conducted by ENR in the Mackenzie Valley in 2003 and in the Liard Valley in 2004 estimated densities of 4.4 Moose/100 km^2 and 4.9 Moose/100 km^2, respectively (Larter 2009). Calf/cow ratios were similar between these two areas at approximately 35 calves:100 cows.

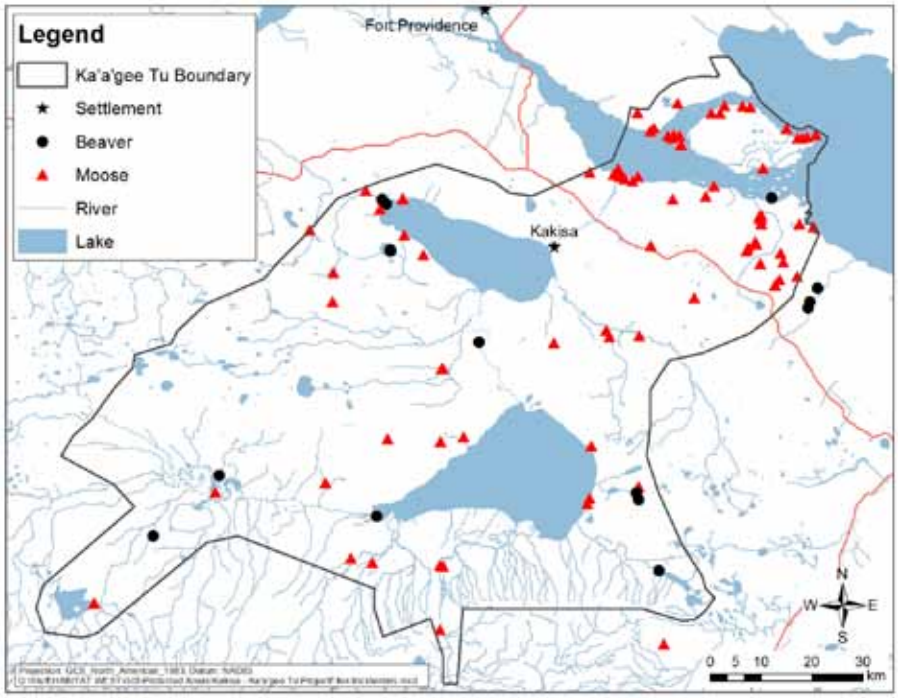

Figure 32: Beaver and Moose incidental observations in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Beavers (*Castor canadensis*) are found throughout the CPA in close association with creeks, rivers and lakes (Figure 32). Beavers are an important part of the boreal ecosystem and influence local and regional hydrology and forest composition which influences wildlife and plant abundance and richness (Wright et al. 2002, Aznar and Desrochers 2008).

Carnivores and omnivores are important predators that regulate populations of ungulates (e.g., Moose, Caribou) and small mammals (e.g., Snowshoe Hare *Lepus americanus*). Except for a few recent studies on wildlife diseases in the Dehcho (Johnson et al. 2010, Larter et al. 2011), published studies related to carnivores are limited for the Ka'a'gee Tu CPA. American Marten (*Martes americana*) harvest, based on fur returns, indicates that they are present in the area; harvest records indicate 412, 350 and 393 Martins were harvested in the Kakisa Lake area (1986-87, 1987-88 and 1988-98, respectively) (Poole 1989a, 1990a). Limited data are also available for Canada Lynx (*Lynx canadensis*), with annual numbers of trapped furs reported from the Kakisa Lake area between fall 1986 to spring 1992 ranging from 11 to 75 (Poole 1989b, 1990b, 1991, 1992), additionaly they were observed four times during field surveys (Figure 33). Evidence of Gray Wolves (*Canis lupus*) was observed nine times during field surveys (Figure 33) and there presence was recorded in the ENR WMIS database. Wolverine (*Gulo gulo*), listed by COSEWIC as

"Special Concern," were not observed during field surveys and no records were found in the ENR WMIS database, though they are reported to have a relatively high density in the CPA (COSEWIC 2003b). Black bear (*Ursus americanus*) are also present in the CPA (Figure 33).

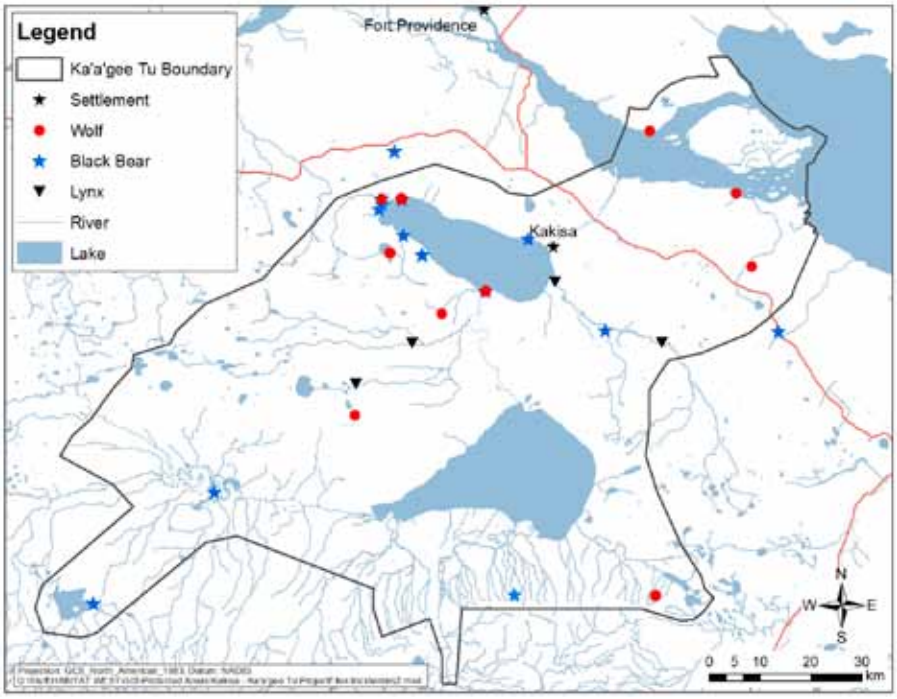

Figure 33: Wolf, Black Bear and Canada Lynx incidental observations in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

The Ka'a'gee Tu CPA is outside the core range of Cougars (*Puma concolor*); however, several reports of this species have been made near the community of Kakisa and at the Kakisa River bridge on Highway 1 since 2009. Observations include tracks, several lone individuals and a female with two cubs at a creek within the Ka'a'gee Tu CPA along Highway 1 (L. Chicot, pers. comm.). Previous sightings of Cougars have been made near the Ka'a'gee Tu CPA in 1997, 1998 and 2000 (Gau et al. 2001).

Observations of other mammal or mammal sign include Snowshoe Hare (6), Woodchuck (*Marmota monax*, 4), Least Chipmunk (*Neotamias minimus*, 2), Red Squirrel (*Tamiasciurus hudsonicus*, 33), Muskrat (*Ondatra zibethicus*, 3), Porcupine (*Erethizon dorsatum*, 3) Red Fox (*Vulpes vulpes*, 1), American Marten (1), Wood Bison (*Bison bison athabascae*, 146) and Woodland Caribou (116).

Baseline research is currently being conducted on bats (order: Chiropteran) within the community of Kakisa and at the Lady Evelyn Falls Territorial Park (J. Riemer, pers. comm.). The purpose of this research is to estimate their population size and health, foraging behavior and hibernaculum use. Two species of bats, Northern Myotis (*Myotis septentrionalis*) and Little Brown Myotis (*M. lucifugus*), were recently assessed by COSEWIC as "Endangered" following emergency assessments (COSEWIC 2012a, b) and are eligible for emergency listing under the *Species at Risk Act*. In 2010, a total of 103 Northern Myotis and Little Brown Myotis were captured in Kakisa and at Lady Evelyn Falls Territorial Park. Recapture rates and population structure suggests that a large population of Little Brown Myotis and a smaller number of Northern Myotis inhabit the area. Baseline data and continued monitoring will examine possible cumulative effects of climate change on the northern limits of these bat species and the spread of white nose syndrome (identified by the presence of a visible white fungus, *Geomyces destructans*). White nose syndrome is currently present in 17 US states and two eastern Canadian provinces and continues to spread which has resulted in population declines between 75-99% in some hibernacula of the Little Brown Myotis (Blehert et al. 2009, Dzal et al. 2010, Frick et al. 2010).

Further work is required to determine if a hibernacula is present in the area, possibly on the southwest side of Kakisa Lake, or if the region is used primarily as summer breeding grounds.

Ecological Significance of Ka'a'gee Tu Candidate Protected Area

Species at Risk

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent, expert committee which assesses the level of extinction risk to wildlife species. Their assessments are based on the best available science and aboriginal traditional and community knowledge. Once a species has been assessed by COSEWIC those species are eligible for addition to Schedule 1 or the List of Wildlife Species at Risk under the Federal Species at Risk Act (SARA). Fifteen species that occur in the Ka'a'gee Tu CPA have been assessed as being at risk by COSEWIC; six are designated under SARA as 'Threatened' and three are of 'Special Concern' (Table 6). Species listed on Schedule 1 as 'Endangered' or 'Threatened' benefit from protection of SARA's prohibitions against killing, harming, harassing, or capture and from recovery planning and identification and protection of critical habitat from destruction. Species designated as 'Special Concern' on Schedule 1 benefit from SARA's management planning. Under SARA, critical habitat for 'Threatened' species such as Boreal Woodland Caribou must be protected by territorial/provincial or federal governments (Government of Canada, 2006) once the Recovery Strategy has been approved. Permanent protection of the Ka'a'gee Tu CPA as a National Wildlife Area under the Canada Wildlife Act would help secure critical habitat (once the Recovery Strategy was approved) in advance of large scale development in the Mackenzie Valley (e.g., oil and gas, Mackenzie Valley pipeline).

Table 6: Species at Risk Act and COSEWIC statuses for those species occurring in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

Species	SAR Status	COSEWIC Status	Schedule
Peregrine Falcon (anatum)	Threatened		1
Horned Grebe	-	Special Concern	-
Yellow Rail*	Special Concern	Special Concern	1
Short-eared Owl	Special Concern	Special Concern	3
Rusty Blackbird	Special Concern	Special Concern	1
Common Nighthawk	Threatened	Threatened	1
Barn Swallow	-	Threatened	-
Olive-sided Flycatcher	Threatened	Threatened	1
Canada Warbler	Threatened	Threatened	1
Wood Bison	Threatened	Threatened	1
Wolverine	-	Special Concern	-
Boreal Woodland Caribou	Threatened	Threatened	1
Northern Myotis	-	Endangered	-
Little Brown Myotis	-	Endangered	-
Shortjaw Cisco*	Threatened	Threatened	2

*Presence unconfirmed

Peregrine Falcon is designated as Threatened (Schedule 1) under SARA. This species experienced major declines in the 1970s due to the widespread use of dichlorodiphenyl-trichloroethane (DDT) in North America (White et al. 2002). Peregrine Falcons typically nest on cliffs but will also re-use Common Raven nests or human structures (e.g., tall buildings, communication towers). One Peregrine Falcon nesting area is known in the Ka'a'gee Tu CPA located on a cliff near the Heart Lake fire tower and there is another unconfirmed nest located west of Kakisa Lake. Peregrine Falcons have also been observed hunting along the shores of Beaver Lake.

Common Nighthawk is designated as Threatened (Schedule 1) under SARA. In the boreal forest, Nighthawks inhabit open forests (including burned forest) and nest on bare ground or rock (Brigham et al. 2011). This species breeds across most of North America and spends the non-breeding season in South America. Threats to this species include vehicle collisions and reductions in insect prey. Eight Common Nighthawks were detected during the field studies conducted in Ka'a'gee Tu CPA.

Olive-sided Flycatcher is designated as Threatened (Schedule 1) under SARA. Breeding Bird Survey data indicate widespread declines (-3.9% annually) in Canada (Downes and Collins, 2008). Long-term declines (COSEWIC 2008) may be linked to reductions in flying insects or habitat degradation and destruction in the southern part of its breeding range or on its wintering grounds, although the exact cause of the decline is unclear. Within the boreal forest, this species is most often associated with forest openings, forest edges near natural openings (e.g., meadows, rivers), or recently burned forests and is dependent on the availability of snags for foraging and singing perches (Altman and Sallabanks, 2000). Olive-sided Flycatchers range across the boreal forest of Canada and winter in Central and Southern America. Twenty-nine Olive-sided Flycatchers were detected during field studies from 2007 - 2011.

The **Rusty Blackbird** is designated as Special Concern (Schedule 1) under SARA. This species was designated due to breeding population declines in the southern boreal forest over the last 40 years (COSEWIC 2008). It is also on the Watch List of the North American Landbird Conservation Plan (Rich et al., 2004). Rusty Blackbirds inhabit treed conifer wetlands (e.g., bog, fen) with open canopies typically near open water. Populations in the Northwest Territories are likely stable but continental declines may be the result of habitat destruction and Blackbird removal programs targeted at other species in the United States.

Rusty Blackbird within Ka'a'gee Tu CPA - Kevin Kardynal (CWS)

Canada Warbler is designated as Threatened (Schedule 1) under the federal SARA. Canada Warblers breed in deciduous or mixedwood forests with a well-developed shrubby understory (Reitsma et al. 2010). Eight male Canada Warblers were detected singing on the 2010 avian point counts and 2011 Species at Risk playback surveys only in the Cameron Hills. Threats to Canada Warblers include habitat loss in more southern breeding and non-breeding areas. Although we were unable to locate any Canada Warbler nests, males were found defending territories and were present at the same location after several visits indicating that these individuals were likely breeding. This species was previously unknown from the Cameron Hills which is one of the most northern populations of this species.

Yellow Rail is listed as a species of Special Concern (Schedule 1) under SARA. During the breeding season this species inhabits dense marsh vegetation that borders rivers, wetlands and lakes (Bookhout 1995). The Ka'a'gee Tu CPA is near the northern limit of this species' range. No Yellow Rails were detected during surveys but several wetland areas likely provide suitable habitat for this species (e.g., Kakisa River Delta).

Short-eared Owl is listed as Special Concern (Schedule 3) under SARA. Short-eared Owls hunt and nest in grassland-like habitats (e.g., marshlands) in the boreal forest (Wiggins et al. 2006) and migrate to the central and southern United States and Central America during the non-breeding season. This nomadic species moves to new breeding areas that support large populations of small mammals making populations of this species difficult to monitor. Threats to this species are likely limited in the Northwest Territories; however, reductions in small mammal abundance due to climate change may affect populations nesting in the Ka'a'gee Tu CPA over time. Two Short-eared Owls were observed during field studies.

Horned Grebe was recently assessed by COSEWIC as Special Concern (no Schedule listing). This species breeds in shallow open-water wetlands with dense emergent vegetation on the shoreline (Stedman 2000). A total of five Horned Grebes were observed during field surveys and more likely inhabit wetland habitats with marshy shorelines in the CPA.

Canada Warbler - Kevin Kardynal (CWS)

Barn Swallows (*Hirundo rustica*) are assessed by COSEWIC as Threatened but are currently not listed under SARA. Barn Swallows range across North America and also occur in Eurasia and are typically associated with human structures for nesting (e.g., barns, houses, bridges). North American birds over-winter in Central and South America. Threats to populations of this species include removal of old buildings where they build nests and reductions in insect prey populations. Nine Barn Swallow observations from the Beaver Lake area were found in the NT/NU Bird Checklist Database; however, this species is also likely present in Kakisa and near other human structures (e.g., bridges, roadside restrooms) within the CPA.

Wood Bison are designated as Threatened (Schedule 1) under the SARA. This species uses various habitat types throughout the year but rely on grasses and sedges as forage. Areas of the Ka'a'gee Tu CPA south of the Mackenzie River are within the "Bison control area" where Bison are harvested to ensure animals infected by brucellosis or tuberculosis near Wood Buffalo National Park do not infect disease-free animals to the west and north. The main threats to this species are brucellosis, tuberculosis and vehicle collisions. Wood Bison were only observed on the north side of the Mackenzie River on the northwest side of Beaver Lake in the Mackenzie Bison Sanctuary.

Boreal Woodland Caribou are listed under SARA as Threatened (Schedule 1). The Woodland Caribou population in the Northwest Territories is estimated to be between 6 000 and 7 000 animals (Environment and Natural Resources 2008). Boreal Woodland Caribou are sensitive to human activities, habitat alteration and destruction, predators, human hunting pressures, and climate change (COSEWIC 2002). Population declines of this species are associated with industrial development (e.g., seismic lines, compressor stations, agriculture, forestry, roads), which typically results in the increased abundance of moose and deer which attract predators such as wolves. Overharvesting of Caribou may also be causing declines in some regions. The establishment of the CPA would provide valuable, relatively undisturbed habitat for Caribou and ensure the persistence of their populations in the area (Vors et al. 2007).

Wolverine are designated as Special Concern (COSEWIC 2008). They have large home ranges and population densities are typically low. Although the population size of Wolverine in the NWT is unknown, it is thought to be stable but sparsely distributed, numbering in the thousands (GNWT Environment and Natural Resources 2005). Wolverines inhabit old-growth forests and are very sensitive to anthropogenic disturbances including noise and habitat alterations (e.g., forestry, seismic lines).

Wood Bison - Kevin Kardynal (CWS)

Northern Myotis and **Little Brown Myotis** are designated as Endangered following an emergency assessment by COSEWIC and are eligible for emergency listing under SARA. Anticipated dramatic declines and functional extirpation (<1% of existing population) is anticipated as a result of White-nose Syndrome (WNS), caused by a fungus. WNS is currently recorded in four eastern provinces, expanding at 200-400km/yr and it is assumed that within 20 years most of the Canadian population will be impacted (COSEWIC 2012a, b). Both Northern Myotis and Little Brown Myotis occur within the CPA during the breeding season, however further work is needed to determine if a hibernacula is present in the CPA.

Shortjaw Cisco are considered Threatened in Canada by COSEWIC. Shortjaw Ciscos are found in lakes with deep waters (up to 180 m) and inhabit Great Slave Lake. In the Ka'a'gee Tu Candidate Protected Area, this species would most likely be found in Beaver Lake; however, its presence is unconfirmed for the area.

Watershed Protection

The Ka'a'gee Tu CPA contains ~41% of the West Great Slave Lake drainage. Water in this watershed drains mostly through the Lower Kakisa River and disturbances within the watershed eventually concentrate through this river which flows into Beaver Lake at the mouth of the Mackenzie River. Small portions of two other drainage basins are with the CPA including the Upper-Mackenzie-Mills Lake and Hay watersheds.

Ecological Representivity

One goal of the NWT PAS is to protect representative areas of all ecoregions within the NWT (NWT PAS Advisory Committee 1999, Gah et al. 2008). Representative areas contain the highest diversity of flora, fauna, and landscapes within each ecoregion. Using the computer software MARXAN (Ball and Possingham 2000), the NWT PAS completed analyses to identify representative areas within NWT ecoregions to assist with selecting potential areas for protection (NWT PAS Ecological Working Group 2006). The analysis incorporated biological and physical diversity based on three broad features: vegetation types, landscape units, and physiographic

Kakisa River west of the Kakisa River Delta within Ka'a'gee Tu CPA - Kevin Kardynal (CWS)

units. Vegetation types consisted of distinct associations of plant species such as spruce forest, deciduous forest, mixedwood forest, tall shrub, and wetland habitats. Landscape units consisted of areas with similar surficial geological formations, soil and terrain, and physiographic units consisted of areas with similar elevation, climate, slope, aspect and landforms. It was assumed that these features account for almost all the biotic and abiotic factors that determine biodiversity (e.g., flora and fauna) in an ecoregion.

The goal of the analysis was to ensure that 30% of each of the broad features within each ecoregion was identified. The types/units within each feature were represented on the basis of their total area (size) within each ecoregion. Proportional representation targets ranged from 10 - 25% for most type/unit components, and 100% for rare types/unit components (NWT Protected Area Strategy Ecological Working Group 2006). The analysis was run on all ecoregions within the Mackenzie Valley and Mackenzie Mountains and presumed that protecting representative portions of identified conservation features would aid in protecting a functional, resilient and ecologically representative sample of each ecoregion.

Open and closed scenarios were used to describe the ecological representation of the Ka'a'gee Tu CPA. In an open scenario representative areas based on the broad features and their components are determined and mapped for each ecoregion within the NWT without CPAs identified in the analysis. CPA boundaries are then overlaid on the map to assess each protected area's ability to attain representivity. In an open scenario (Figure 34), all areas have an equal chance of being selected in the solution. This scenario shows a theoretical result, indicating the most ecologically representative areas, regardless of their location. In the closed scenario (Figure 35), the Ka'a'gee Tu CPA is "locked in" and is considered a core representative area. Areas outside of the boundary will only be selected if they contain conservation features not found within the CPA. This allows for determination of the influence of CPA in capturing ecoregion representivity.

Areas with high industrial development potential were "locked out" of the closed scenario analysis (i.e., proposed Mackenzie Gas Project corridor, oil and gas production licenses and significant discovery licenses). This scenario shows how representative the Ka'a'gee Tu CPA is compared to adjacent areas. However, all existing and proposed protected areas together contribute to representation targets, so decisions about protection of one area affects representativity of other sites. In the closed scenario, few areas to the northwest and southwest of Ka'a'gee Tu are required to meet representation targets indicating that the Ka'a'gee Tu CPA provides good representation of the conservation features in the region. Areas along the CPA's southern border are potential core representative areas in both the open and closed scenarios and would be valuable in conserving those core areas.

Output maps from the analysis indicate areas which are considered highly representative (dark green) and should be considered as priority areas for protection, whereas other areas (light green) contain more common features found elsewhere. However; protecting only irreplaceable features does not guarantee capturing representative portions of the more common features; therefore, the core representative areas indicate both irreplaceable and common features which are required to fully meet the representation targets most efficiently.

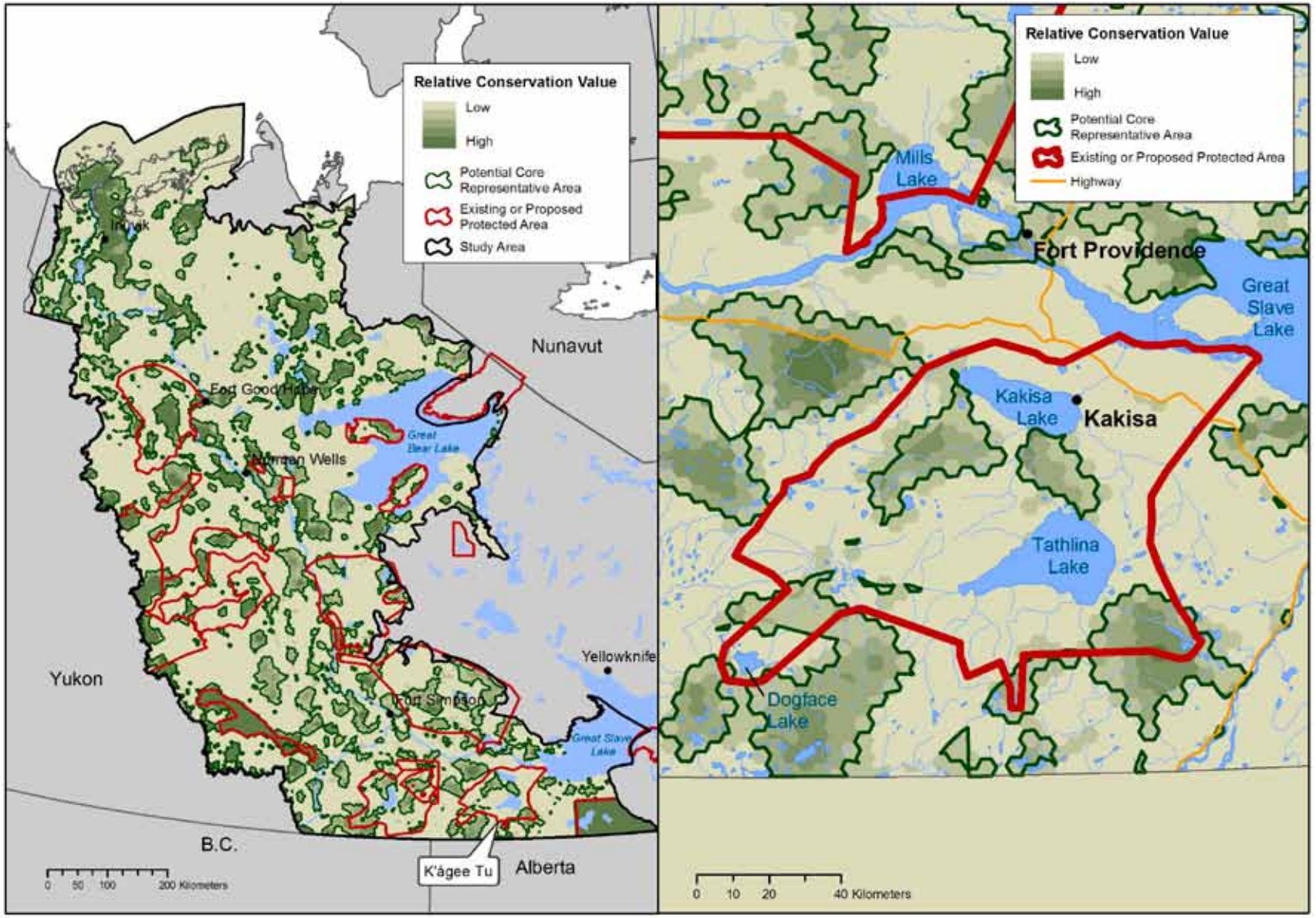

Figure 34: Open scenario results from representivity analysis for ecoregions in the Mackenzie Valley and Mackenzie Mountains (left), including a close-up of the original boundary of the Ka'a'gee Tu Candidate Protected Area (right), Northwest Territories (figures provided by GNWT – ENR).

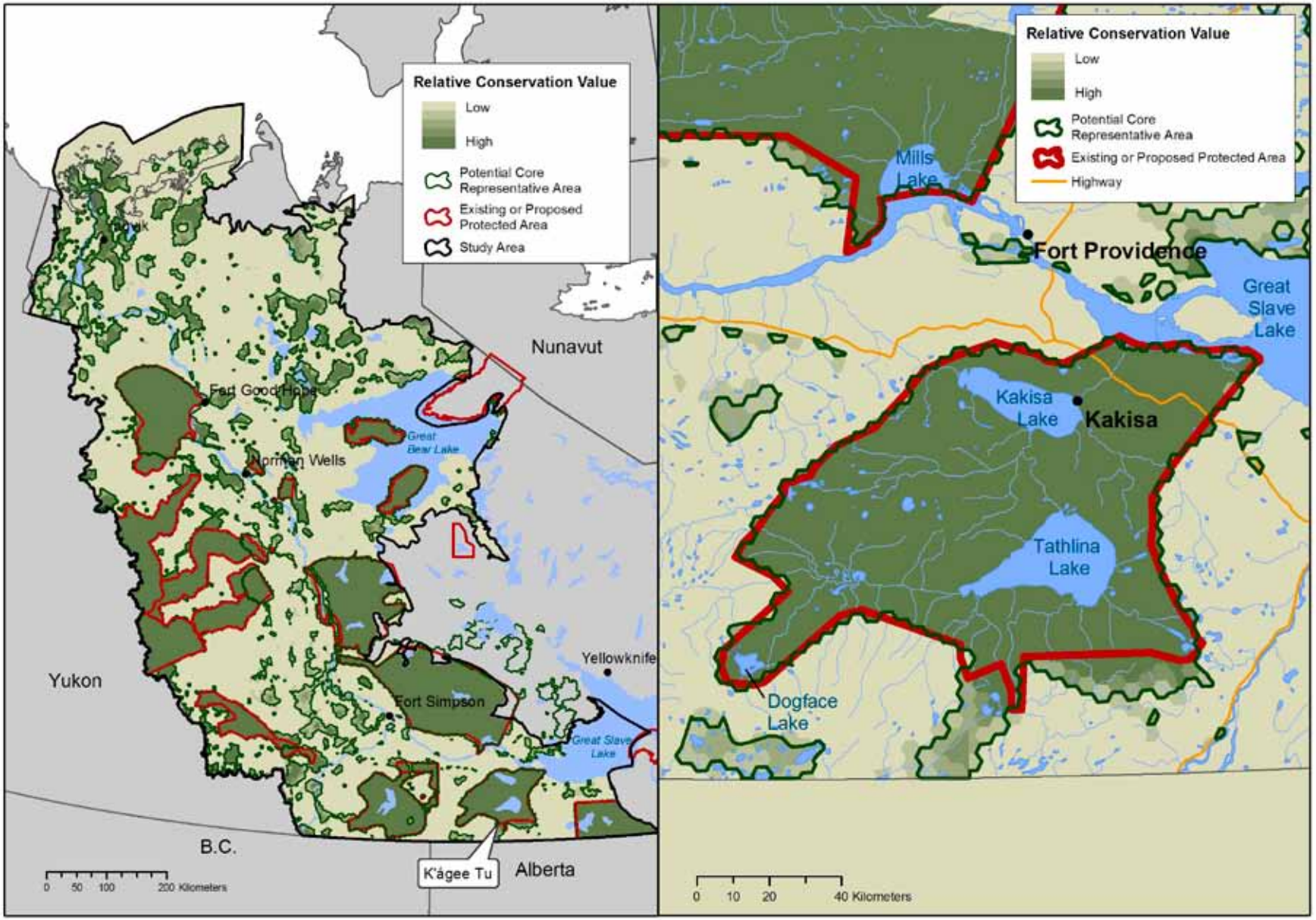

Figure 35: Closed scenario results from representivity analysis for ecoregions in the Mackenzie Valley and Mackenzie Mountains (left), including a close-up of the Ka'a'gee Tu Candidate Protected Area (right), Northwest Territories (figures provided by GNWT – ENR)..

Existing Conservation Designations

Key Migratory Bird Terrestrial Habitat Site

Key migratory bird terrestrial habitat sites are identified by CWS as areas, which for any portion of the year, support ≥ 1% of the Canadian population of a migratory bird species or subspecies (Latour et al. 2008). Beaver Lake, a widening of the Mackenzie River at the outlet of Great Slave Lake is considered a key migratory bird terrestrial habitat site (Figure 36). The north shores of both channels around Big Island are low with extensive sedge-grass marsh along alluvial flats and the south shores have a narrower margin of marsh before the transition to spruce-poplar forest (Latour et al. 2008). The islands at the outlet of the North Channel are low and marshy whereas those in the South Channel are higher and more forested. This key migratory bird site is used by approximately 6% of the Canadian population of Tundra Swans during spring and autumn migration. Along with waterfowl, Double-crested Cormorants, shorebirds, Bald and Golden Eagles and the northern-most observations of American White Pelicans also use this area (Sirois et al. 1995, Alexander et al. 1991; McCormick et al. 1984; McCormick and Adams 1984).

Important Bird Area – Beaver Lake

Important Bird Areas (IBA Canada 2010), identified by BirdLife International and Bird Studies Canada, are considered important areas for the long-term viability of bird populations (Bird Studies Canada et al. 2007). These sites are often chosen because they support threatened species, large proportions of one or more species, or species with restricted ranges. Although IBAs are not legally protected, their designation highlights their importance and these areas are often monitored to determine bird and habitat trends. Beaver Lake is the only IBA within the Ka'a'gee Tu CPA and is globally and nationally significant as a stopover site for migratory birds, particularly waterfowl (e.g., ducks, geese, swans) during spring and autumn migrations (Bird Studies Canada et al. 2007, Latour et al. 2008).

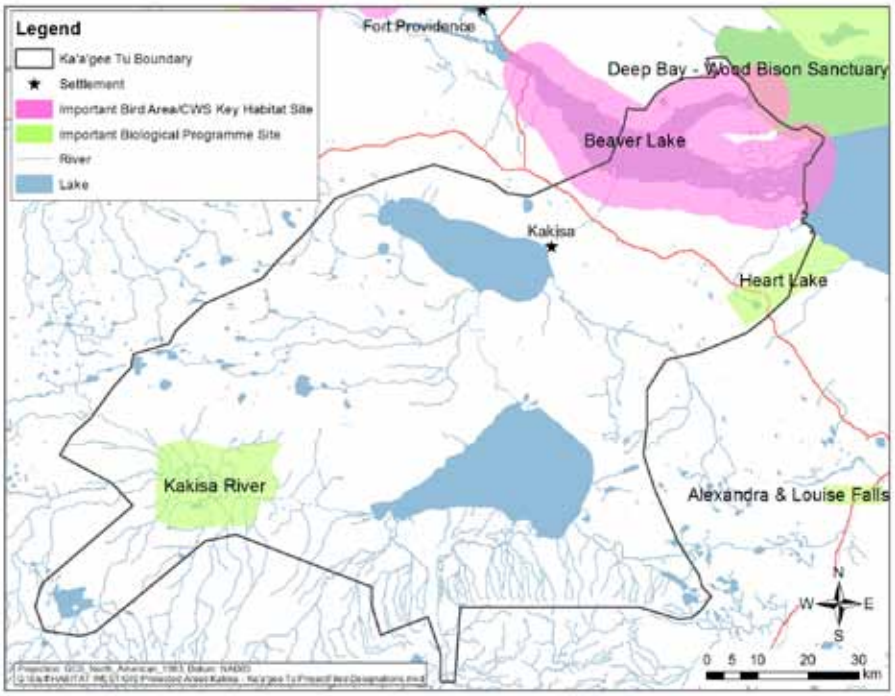

Figure 36: Areas with special conservation designation within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

International Biological Programme Sites

The International Biological Programme (IBP; 1964-1974) was established through an agreement with the International Council of Scientific Unions (ICSU) and various countries to identify sites considered important for migratory birds and areas that contain significant archaeological or geomorphological value and/or unique flora and fauna. IBP sites do not provide any formal legal protection; however, their designation highlights their ecological or geomorphological importance. Many areas listed as an IBP contain relict or endangered populations, unique plant communities, breeding areas, critical range for wildlife, pristine lakes, and/or mineral springs. The Kakisa River delta, Heart Lake and the Deep Bay – Wood Bison Sanctuary are identified as IBP sites within or partially within the boundaries of the CPA (Figure 36).

i. Kakisa River (Etaáhdlîî)

The Kakisa River delta IBP site (known locally as Etaáhdlîî), is located on the Upper Kakisa River and some of its tributaries approximately 24 km west of Tathlina Lake and covers an area of 365 km^2 (Eng et al. 1989). This area is a broad inland floodplain that contains floating bogs and numerous shallow lakes and ponds. It provides important habitat for many species of waterfowl, Beaver, Muskrat and Moose (Beckel 1975) and is also culturally significant to the Ka'a'gee Tu people. Several species that are rare in the region of the NWT or in the Ka'a'gee Tu CPA occur here including Pied-billed Grebe, Marsh Wren, and Black Tern.

ii. Heart Lake

The Heart Lake IBP area includes a multitude of habitat types including unique landscapes such as alvars, escarpments, canyons, ancient coral reef outcrops, and talus slopes. These habitat types contribute to regional biodiversity and often support rare plants. The World Wildlife Fund (2000) lists 13 rare vascular plants occurring in the area of Heart Lake. A Peregrine Falcon nesting territory was documented within the Heart Lake IBP site during the 2007 field program, which is listed as "Threatened" by SARA and "Sensitive" by ENR.

iii. Deep Bay - Wood Bison Sanctuary

Both Beaver Lake and Big Island are partially within the Deep Bay - Wood Bison Sanctuary IBP site at the northern end of the CPA. Deep Bay is noted for its importance for swans and diving ducks (Beckel 1975). Parts of this site are also within the Mackenzie Bison Sanctuary and contain a bison herd that is free of brucellosis and tuberculosis. This site overlaps slightly with the Beaver Lake IBA.

Potential Threats

A number of potential threats exist for Ka'a'gee Tu CPA. Industrial development has obvious effects on habitat and wildlife. Similarly, climate change can result in altered ecosystem structures. Often linked with these large scale threats are other less obvious ones, including increased hunting and fishing pressure, and smaller scale habitat alterations. Cumulatively, these threats represent a considerable strain on ecological integrity of the CPA.

Anthropogenic pressures on the boreal forest associated with exploitation of its resources (e.g., oil/gas development, forestry, agriculture) and the associated infrastructure (e.g., roads, pipelines) has increased in the past 40 years. This disturbance has disrupted ecological processes (e.g., fires, carbon cycling), caused population declines of some species and reduced the value of ecosystem services provided by the boreal forest (Schindler and Lee 2010). The Ka'a'gee Tu CPA is a relatively pristine area with limited industrial or anthropogenic disturbance compared to other areas of the boreal forest. Oil and gas exploration has occurred within Ka'a'gee Tu CPA beginning in the 1950s with limited positive results (i.e., financially viable discoveries) and currently there are no wells producing hydrocarbons within the Ka'a'gee Tu CPA boundary. Seismic lines and well pads from exploration activities are still evident and they have resulted in habitat loss and fragmentation which has impacts on sensitive wildlife and on the hydrology of the area (Figure 37). Similar to oil and gas development, forestry and the associated infrastructure adjacent to or within Ka'a'gee Tu would have long-lasting impacts on the CPA's wildlife, plants and water. Currently, there is one operator with a commercial forestry license that harvests in the Cameron Hills. However, interest in forestry for bio-mass (e.g., wood pellet) production has increased in the Dehcho region and a pellet plant has been proposed for the village of Enterprise, NT. The suggested forestry supply region would encompass a 300 km radius from the plant, including Ka'a'gee Tu CPA. However, forestry potential in Ka'a'gee Tu is considered low due to the slow growth rate of the trees. Some wildlife species including Boreal Woodland Caribou and several bird species (Dyer et al. 2001, Cooper et al. 2004, Machtans 2006, Wittmer et al. 2007) are sensitive to anthropogenic alterations to the landscape (e.g., high densities of linear features, forestry). Other wildlife species (e.g., Moose, Gray Wolf) increase in abundance in response to these perturbations; links between increasing seismic line density and ungulate (e.g., Moose, Deer) and Wolf abundance have been made to decreases in Caribou survival in other areas

Cameron Hills- CWS

(reviewed in Festa-Bianchet et al, 2011). Mitigating these effects may be important for the conservation of Boreal Woodland Caribou populations in Canada (James and Stuart-Smith 2000, Latham et al. 2011).

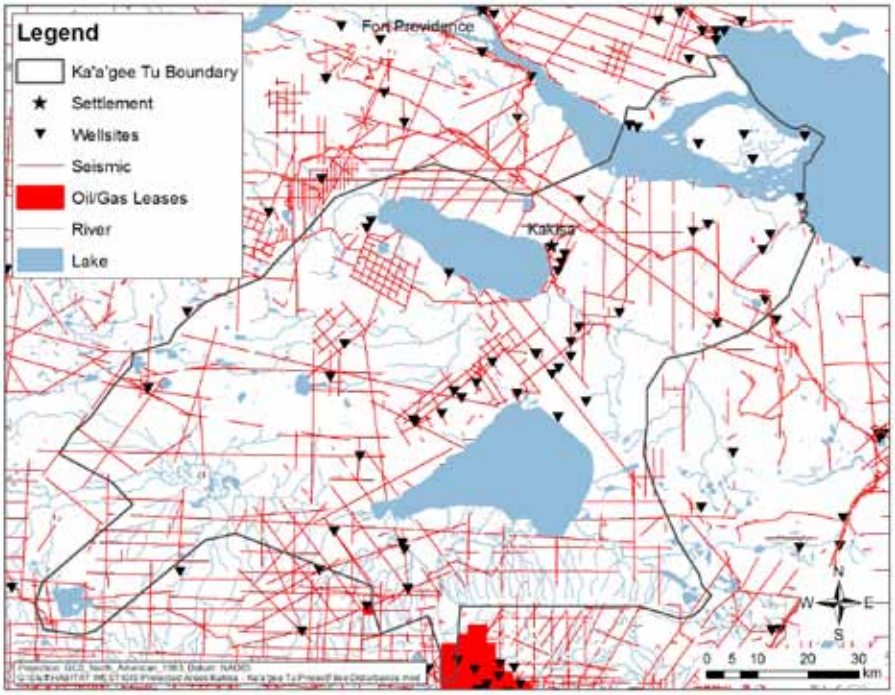

Figure 37: Historic seismic lines, well sites and oil and gas leases within and near the Ka'a'gee Tu Candidate Protected Area, Northwest Territories.

An increase in linear disturbances and associated infrastructure can also result in easier access and increased harvest pressure on wildlife. Many of the historic seismic lines within Ka'a'gee Tu have overgrown with shrubs, but others remain open and are used as travel corridors to access the land and water. Currently, where river access is easy, there is high pressure on Arctic Grayling populations. Locals have indicated that Grayling populations have declined severely in the Lower Kakisa River because of sport fishing that occurs during spawning season along Highway 1 at the bridge over this river. Sport fishers also use Kakisa Lake to catch Walleye, which are abundant there; however, Walleye populations are closely monitored in Kakisa Lake and population declines should be detected quickly allowing authorities to adjust harvest rates. Sport-fishing catch limits are regulated by GNWT's Environment and Natural Resource department who set limits for the Northwest Territories. Access to most other fishing areas in the Ka'a'gee Tu CPA is more difficult and fishing pressure is less likely to be an issue in those areas.

Cut lines, or other decreases in tree canopy cover in boreal forest peatlands are another threat to the CPA which can result in frost table depression from increased solar radiation, followed by increased water drainage towards this depression and elevated soil moisture. This landscape alteration is exacerbated by further loss of tree-cover and expansion of bogs due to water-logged soil which can lead to a local loss of permafrost (Quinton et al. 2009). Seismic lines, particularly in lowland black spruce habitats, do not recover to pre-disturbance composition and structure and have lasting effects on the landscape (Lee and Boutin 2006).

Habitat and wildlife in northern Canada are also being critically affected by climate change. Over the last century, the Mackenzie Region has experienced the greatest warming in Canada with winters expected to warm by 4 - 6°C by 2050 (+1.7°C overall annual average increase; Environment Canada 1995). A study assessing the effects of climate change over several decades examined 1 700 species and reported an average range shift of 6.1 km/decade towards the poles (Parmesan and Yohe 2003) indicating that plant and wildlife species composition within the Ka'a'gee Tu CPA may change over the coming decades. Another study of the Mackenzie Region using current

climate models reported that permafrost will partially or completely disappear over large areas in this region (Dyke and Brooks 2000). Permafrost is ground (either rock or soil) that remains at or below zero degrees Celsius (°C) for at least two years. Therefore, the formation, persistence and disappearance of permafrost are highly dependent on climate. Permafrost distribution within the study area is considered sporadic discontinuous (<10%) permafrost with a low (<10%) ice content (Ecological Stratification Working Group 1996, Geological Survey of Canada and Natural Resources Canada 2006). Many areas with underlying discontinuous permafrost are thought to be in disequilibrium with current climate conditions and are likely still responding to changes in climate of the last century (Natural Resources Canada 2011). Additionally, surface disturbances (e.g. vegetation clearing, organic layer removal, forest fires, river channel migration, and shoreline erosion) may modify the ground thermal regime and result in permafrost melt (Natural Resources Canada 2011). Melting permafrost can alter the physical stability of the terrain and may result in thaw settlement, ground instability, changes in drainage patterns and increased stream turbidity due to high suspended solid concentrations (SENES 2005).

Any further industrial development in the CPA, in addition to climate change and its cascading effects, could result in large landscape alterations that would have lasting negative impacts on species sensitive to disturbances (e.g., Caribou) and to the ecological integrity of the area. Since disturbances near the boundary of the Ka’a’gee Tu CPA would also affect the ecological value and processes of the protected area, future land-use planning should incorporate conservation buffers around the CPA to ensure the area maintains its high conservation value.

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Appendices

Appendix 1: Plant species observed or potentially occurring within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories. This plant species list was generated from range maps in Vascular Plants of Continental Northwest Territories (Porsild and Cody, 1980) and in Rare Plants of Northwest Territories (McJannet et al., 1995). Species in bold were observed in Ka'a'gee Tu during the study.

Family/ Scientific Name [1]	Common Name
DRYOPTERIDACEAE [1]	
Cystopteris fragilis	**Fragile Fern**
Woodsia glabella	**Smooth Cliff-fern (Smooth Woodsia)**
Woodsia ilvensis	**Rusty Cliff-fern (Rusty Woodsia)**
OPHIOGLOSSACEAE	
Botrychium virginianum	**Rattlesnake Fern**
Botrychium lunaria ssp. lunaria	Common Moonwort (Grape-fern)
Botrychium lunaria ssp. minganense	Common Moonwort (Grape-fern)
Botrychium multifidum	Leathery Grape-fern
Botrychium virginianum ssp. europaeum	Rattlesnake Fern
PTERIDACEAE	
Cryptogramma acrostichoides (crispa)	Rock-brake
POLYPODIACEAE	
Polypodium sibiricum (Polypodium vulgare)	**Polypody**
Polypodium vulgare ssp. virginianum	Polypody
EQUISETACEAE	
Equisetum arvense	**Field Horsetail**
Equisetum fluviatile	**Water Horsetail**
Equisetum hyemale var. affine	**Scouring Rush**
Equisetum palustre	**Marsh Horsetail**
Equisetum pratense	Meadow Horsetail
Equisetum scirpoides	**Dwarf Scouring Rush**
Equisetum sylvaticum	**Woodland Horsetail**
Equisetum variegatum	**Variegated Horsetail**
LYCOPODIACEAE	
Diphasiastrum complanatum (Lycopodium complanatum)	Trailing Clubmoss
Lycopodium annotinum	Bristly Clubmoss
Lycopodium complanatum	Trailing Clubmoss
Lycopodium lagopus (L. clavatum)	One-cone Clubmoss
SELAGINELLACEAE	
Selaginella selaginoides	**Low Spikemoss**
CUPRESSACEAE [1]	
Juniperus communis	**Common Juniper (ground juniper)**
Juniperus horizontalis	**Creeping Juniper**
PINACEAE	
Larix laricina	**American Larch (Tamarack)**
Picea glauca	**White Spruce**
Picea mariana	**Black Spruce**
Pinus banksiana (P. divaricata)	**Jack Pine**
Pinus contorta var. latifolia	**Lodgepole Pine**

Family/ Scientific Name [1]	Common Name
TYPHACEAE	
Typha latifolia	**Broad -leaf Cat-tail**
SPARAGANIACEAE	
Sparganium angustifolium	**Narrow-leaf Bur-reed**
Sparganium eurycarpum	Giant Bur-reed
Sparganium hyperboreum	**Northern Bur-reed**
Sparganium minimum	Small bur-reed
NAJADACEAE	
Najas flexilis	**Slender Naiad**
SCHEUCHZERIACEAE	
Scheuchzeria palustris	**Pod Grass**
Triglochin maritima	**Seaside Arrowgrass**
Triglochin palustre	**Arrow-grass**
ALISMACEAE	
Sagittaria cuneata	**Arrowhead**
POACEAE	
Agrostis mertensii (A. borealis)	**Northern Bentgrass**
Agrostis scabra	**Rough Bentgrass**
Alopecurus aequalis	**Short-Awn Meadow-Foxtail**
Arctagrostis arundinacea (See A. latifolia ssp. arundinacea)	**Broad-leaf Arctic-bent**
Arctagrostis latifolia	**Broad-leaf Arctic-bent**
Beckmannia syzigachne	**American Sloughgrass**
Bromus ciliatus	Fringed Brome
Bromus pumpellianus var. pumpellianus	Pumpelly Brome
Calamagrostis canadensis	**Blue-Joint**
Calamagrostis inexpansa	Slim-stem Reed Grass
Calamagrostis lapponica var. nearctica	Lapland Reedgrass
Calamagrostis stricta (C. inexpansa, C. neglecta and C. chordorrhiza)	**Slim-Stem Reed Grass**
Cinna latifolia	Slender Wood Reedgrass
Deschampsia cespitosa (D. caespitosa, D. glauca)	**Tufted Hair Grass**
Elymus alaskanus [ssp. latiglumis] (Agropyron violaceum; A. boreale)	**Alaska Wild Rye**
Elymus arenarius ssp. mollis	American Lyme Grass
Elymus canadensis	**Nodding Wild-Rye**
Elymus innovatus	Downy Lyme Grass
Elymus sericeus (Agropyron sericeum)	Wheat Grass
Elymus trachycaulus (Agropyron trachycaulum)	**Slender Wild Rye**
Festuca brachyphylla	**Short-leaved Fescue**
Festuca saximontana	Rocky Mountain Fescue
Glyceria borealis	Small Floating Manna Grass
Glyceria grandis	**American Manna Grass**
Glyceria striata	Fowl Manna Grass
Helictotrichon hookeri	Hooker's Alpine Oat Grass
Hierochloe odorata	Sweet Grass

Family/ Scientific Name [1]	Common Name
Hordeum jubatum	**Fox-Tail Barley**
Koeleria macrantha (K. cristata; K. yukonensis)	Prairie Koeler's Grass
Leymus innovatus (Elymus innovatus)	**Downy Lyme Grass**
Muhlenbergia glomerata	Spiked Muhly
Muhlenbergia richardsonis	Matted Muhly
Oryzopsis asperifolia	White-Grained Mountain-Ricegrass
Phalaris arundinacea	**Reed Canary Grass**
Piptatherum pungens (Oryzopsis pungens)	Short-Awn Mountain-Rice Grass
Poa alpigena (see P. pratensis)	**Kentucky Bluegrass**
Poa glauca	**White Bluegrass**
Poa juncifolia	-
Poa palustris	**Fowl Bluegrass**
Poa pratensis (incl. Poa alpigena; P. pratensis ssp. pratensis and ssp. colpodea)	**Kentucky Bluegrass**
Poa scabrella	Curly Bluegrass
Spartina gracilis	Alkali Cord Grass
Spartina pectinata	-
Sphenopholis intermedia	Slender Wedgescale Grass
Stipa comata	-
Stipa viridula	Green Tussock Grass (Feather Grass)
Trisetum spicatum	Narrow False Oat
CYPERACEAE	
Carex aenea	**Sedge**
Carex albonigra	**Black-and-White-Scale Sedge**
Carex aquatilis var. aquatilis	**Water Sedge**
Carex atherodes	**Wheat Sedge**
Carex atratiformis (Carex raymondis)	Sedge
Carex aurea	**Golden Fruit Sedge**
Carex bebbii	Brownish Sedge
Carex bonanzensis	Buxbaum's Sedge
Carex brunnescens	Hoary Sedge
Carex buxbaumii	**Buxbaum's Sedge**
Carex canescens	**Silvery Sedge**
Carex capillaris	**Hair-like Sedge**
Carex capitata	Capitate Sedge
Carex chordorrhiza	Creeping Sedge
Carex concinna	Beautiful sedge
Carex crawfordii	Crawford sedge
Carex deflexa	Short-stemmed Sedge
Carex diandra	**Lesser Panicled Sedge**
Carex disperma	**Softleaf Sedge**
Carex eburnea	Ebony Sedge
Carex filifolia (C. elyniformis)	Thread-leaved Sedge
Carex foenea	Dryspike Sedge
Carex franklinii	Rock Dwelling Sedge

Family/ Scientific Name [1]	Common Name
Carex garberi	Elk sedge
Carex gynocrates	**Northern Bog Sedge**
Carex interior	Inland Sedge
Carex lapponica (C. canescens ssp. subloliacea)	Sedge
Carex lasiocaropa var. americana	Slender Sedge
Carex leptalea	**Bristly-stalk Sedge**
Carex limosa	**Mud Sedge**
Carex livida	**Livid Sedge**
Carex loliacea	Sedge
Carex macloviana (incl. C. soperi)	**Falkland Island Sedge**
Carex magellanica (C. paupercula)	**Boreal Bog Sedge (Magellan's Carex)**
Carex media (C. norvegica)	Sedge
Carex membranacea	Sedge
Carex obtusata	Boreal Bog Sedge (Magellan's Carex)
Carex oligosperma	**Few-seeded Sedge**
Carex paupercula	Boreal Bog Sedge (Magellan's Carex)
Carex physocarpa	Sedge
Carex praticola	Northern Meadow Sedge
Carex retrorsa	Retorse Sedge
Carex richardsonii	Richardson Sedge
Carex rossii	Short Sedge
Carex rostrata	**Retorse Sedge**
Carex sartwellii	Sarwell's Sedge
Carex saxatilis (C. physocarpa)	Russet Sedge
Carex scirpoidea	**Bulrush Sedge**
Carex siccata	**Dry-spike Sedge**
Carex scirpoidea	Bulrush Sedge
Carex siccata	Dry-spike Sedge
Carex stenophylla	Needle-leaved Sedge
Carex sychnocephala	Many-headed Sedge
Carex tenuiflora	Sparse- Flowered Sedge
Carex utriculata	**Northwest Territory Sedge**
Carex vaginata	Sheathed Sedge
Carex virudula (C. oederi)	Little Green Sedge
Carex williamsii	Sedge
Eleocharis acicularis	**Least Spike Rush**
Eleocharis compressa	Flat-Stemmed Spike Rush
Eleocharis palustris	Creeping Spike Rush
Eleocharis quinqueflora (E. pauciflora)	Spike Rush
Eleocharis uniglumis (E. macrostachya)	One-Glume Spike-Rush
Eriophorum angustifolium (incl. E. triste)	**Narrow-leaved Cotton-grass**
Eriophorum brachyantherum (E. opacum)	Short-Antler Cotton Grass
Eriophorum chamissonis (E. russeolum var. albindum)	Russet Cotton Grass
Eriophorum vaginatum	**Tussock Cotton Grass**

Family/ Scientific Name [1]	Common Name
Eriophorum viridi-carinatum	Green Keeled Cotton Grass
Juncus alpinoarticulatus (J. alpinus ssp. nodulosus)	**Northern Green (Bog) Rush**
Juncus arcticus (J. arcticus ssp. alaskanus; J. balticus var. alaskanus)	**Arctic Rush**
Juncus bufonius	**Toad Rush**
Kobresia simpliciuscula	Simple Kobresia
Rhynchospora alba	White Beakrush
Schoenoplectus tabernaemontani (Scirpus validus)	**Soft-stem Bulrush**
Scirpus caespitosus ssp. austriacus	Tufted Bulrush
Scirpus hudsonianus	Alpine Bulrush
Scirpus microcarpus (S. rubrotinctus)	Small-Fruit Bulrush
Scirpus validus	Soft-stem Bulrush
Trichophorum alpinum (Scirpus hudsonianus and Eriophorum alpinum)	Bulrush
Trichophorum caespitosum (Scirpus caespitosus)	Tufted Club-Rush
ACORACEAE	
Acorus americanus (A. calamus)	**Several Vein Sweetflag (Rat Root)**
ARACEAE	
Calla palustris	**Wild Calla (Water Dragon)**
Acorus calamus	Sweetflag
LEMNACEAE	
Lemna trisulca	Star Duckweed
Lemna turionifera (L. minor)	Turion Duckweed
JUNCACEAE	
Juncus albescens (J. triglumis ssp. albescens)	Northern White Rush
Juncus alpinoarticulatus (J. alpinus ssp. nodulosus)	**Northern Green (Bog) Rush**
Juncus alpinus	Northern Green Rush
Juncus arcticus (J. arcticus ssp. alaskanus; J. balticus var. alaskanus)	**Arctic Rush**
Juncus bufonius	**Toad Rush**
Juncus castaneus	Chestnut Rush
Juncus filiformis	Thread Rush
Juncus nodosus	Knotted Rush
Juncus stygius (J. stygius ssp. americanus)	Moor Rush
Luzula parviflora	Small-Flowered Wood Rush
Triglochin maritima	Common Bog Arrow Grass
Triglochin palustre	Slender Bog Arrow Grass
LILACEAE	
Allium schoenoprasum	Wild Chives
Maianthemum canadense var. interius	Slender Bog Arrow Grass
Maianthemum stellatum (Smilacina stellata)	**Starry False Solomon's Seal**
Maianthemum trifolium (Smilacina trifolia)	**Three-leaf False Solomon's Seal**
Streptopus amplexifolius var. americanus	**Clasping Twisted Stalk**
Tofieldia (Triantha) glutinosa (T. occidentalis)	**Sticky False Asphodel**
Tofieldia coccinea	Northern False Asphodel

Family/ Scientific Name [1]	Common Name
Tofieldia pusilla (T. palustris)	**Scotch False Asphodel**
Veratrum eschscholtzii	American False Hellebore
Zigadenus elegans	**Death-Camas**
IRIDACEAE	
Sissyrinchium montanum	Strict Blue-eyed Grass
ORCHIDACEAE	
Calypso bulbosa	**Caypso**
Corallorhiza trifida	**Early Coral Root**
Cypridedium guttatum	Early (Pale or Yellow) Coral Root
Cypridedium guttatum	Spotted Lady's-slipper
Cypridedium parviflorum (C. calceolus)	Small Yellow Lady's-slipper
Cypripedium passerinum	Small (Sparrow's-egg) Lady's-slipper
Goodyera repens	**Dwarf Rattlesnake plantain**
Habenaria viridis var. bracteata	Long-bract Orchid
Listera borealis	Northern Tway-blade
Listera cordata	Heart-leaved Twayblade
Orchis rotundifolia	Small Round-leaved Orchis
Platanthera (Habenaria) hyperborea (aquilonis)	**Leafy Northern Green Orchid**
Platanthera (Habenaria) obtusata	**Small Northern Bog Orchid**
Spiranthes romanzoffiana	**Hooded Ladies' -tresses**
SALICACEAE	
Populus balsamifera	**Balsam Poplar**
Populus tremuloides	**Quaking Aspen**
Salix arbusculoides	**Littletree Willow**
Salix athabascensis	Athabasca Willow
Salix bebbiana	**Bebb Willow (long-beaked willow)**
Salix brachycarpa	**Short-fruit Willow**
Salix candida	**Hoary Willow**
Salix discolor	Pussy Willow
Salix glauca (S. cordiflora ssp callicarpea; S. glauca ssp stenolepsis)	**Gray willow**
Salix interior	Sandbar Willow
Salix lucida (S. lasiandra)	**Shining Willow (yellow willow, western black willow)**
Salix lutea	**Yellow Willow**
Salix maccalliana	**Mccall"s Willow**
Salix myrtillifolia	**Myrtle-Leaf Willow**
Salix padophylla (S. monticola)	Mountain Willow
Salix pedicellaris	**Bog Willow**
Salix plantifolia	**Tea - leaved Willow**
Salix prolixa (S. mackenzieana, S. eriocephala mackenzieana, S. rigida mackenzieana]	**Mackenzie Willow**
Salix pseudomonticola	**False Mountain Willow**
Salix pyrifolia (S. balsamifera)	**Balsam Willow**
Salix scouleriana	**Scouler Willow (Mountain Willow)**

Family/ Scientific Name [1]	Common Name
Salix serissima	Autumn Willow
MYRICACEAE	
Myrica gale	**Sweet Bayberry**
BETULACEAE	
Alnus crispa	**Green Alder**
Alnus incana	**Speckled Alder (mountain alder, gray alder, hoary alder)**
Betula nana (B. glandulosa)	**Ground Birch (dwarf birch)**
Betula occidentalis	Spring Birch
Betula papyrifera	Paper birch (white birch)
Betula pumila	Bog Birch
URTICACEAE	
Urtica dioica ssp gracilis (U. gracilis ssp. gracilis)	**Stinging Nettle**
SANTALACEAE	
Geocaulon lividum	**Northern Comandra**
BRASSICACEAE	
Arabis divaricarpa	**Limestone Rockcress**
Arabis hirsute	Western Hairy Rock Cress
Arabis holboellii	Holboell Rock Cress
Barbarea orthoceras	American Winter Cress
Cardamine pensylvanica	Pennsylvania Bitter Cress
Descurainia incana (D. richardsonii)	Tansy Mustard
Draba aurea	**Golden Draba**
Draba breweri (D. breweri var. cana, D. cana, D. lanceolata)	**Brewer's Whitlow-grass**
Draba glabella (D. daurica; D. hirta)	Rock Whitlow-Grass
Draba nemorosa (D. nemorosa var. leiocarpa)	**Wood Whitlow-grass**
Draba oligosperma	Few seeded Whitlow-Grass
Erysimum cheiranthoides	Worm-seed Wallflower
Erysimum inconspicuum (E. coarctatum)	**Shy Wallflower**
Lepidium ramosissimum (L. bourgeauanum)	Bourgeau's Pepper-Grass
Rorippa islandica	**Bog Yellowcress**
Rorippa palustris (R. islandica)	**Bog Yellowcress**
SANTALACEAE	
Geocaulon lividum	Northern Comandra
POLYGONACEAE	
Persicaria amphibia (P. amphibium)	**Water Smartweed**
Polygonum amphibium (coccineum) var emerson	**Water Smartweed**
Polygonum humifusum ssp caurianum (P. caurianum)	**Alaska Knotweed**
Polygonum lapathifolium (P. scabrum)	Dock-Leaf Smartweed
Polygonum viviparium	**Viviparious Knotweed**
Rumex fueginus (R. maritimus var fueginus)	Tierra del Fuego Dock
Rumex maritimus	**Sea-Side Dock**
Rumex occidentalis (R. aquaticus)	Western Dock
Rumex salicifolius (R. triangulivalvis)	Dock

Family/ Scientific Name [1]	Common Name
CHENOPODIACEAE	
Chenopodium album	**Lamb's Quarters**
Chenopodium berlandieri	Pit-Seed Goosefoot
Chenopodium capitatum	Strawberry Goosefoot
Chenopodium glaucum	Goosefoot
Chenopodium gigantospermum	Maple-leaved Goosefoot
Salicornia rubra	-
Suaeda calceoliformis	Horned Sea-blite
CARYOPHYLLACEAE	
Arenaria humifusa	Creeping Sandwort
Cerastium arvense	Mouse-ear chickweed
Cerastium beeringianum	**Bering Sea Chickweed**
Cerastium nutans	Nodding Chickweed
Eremogone capillaris (Arenaria capillaris)	**Slender Mountain Sandwort**
Melandrium ostenfeldii	**Taimy Campion**
Minuartia dawsonensis (Arenaria dawsonensis)	Rock Stitchwort
Minuartia rubella (Arenaria rubella; A. verna)	Boreal Stitchwort
Moehringia lateriflora (Arenaria laterifolia)	**Blunt-leaved Sandwort**
Sagina nodosa	Knotted Pearlwort
Silene involucrata (syn Melandrium affine, M. furcatum, Lychnis brachycalyx, L. gillettii, Silene tayloriae (as S. involucrata ssp tenella)	**Arctic Campion**
Silene Menziesii	Menzies Pink
Stellaria calycantha (S. borealis)	Northern Stichwort
Stellaria longifolia (S. atrata)	**Longleaf Stichwort**
Stellaria longipes (S. edwardsii; S. laeta; S. monantha; S. stricta; S. subvestita)	**Long-stalked Stitchwort**
CERATOPHYLLACEAE	
Ceratophyllum demersum	Common Hornwort
NYMPHACEAE	
Nuphar variegata (N. variegatum, N. lutea ssp. variegata)	**Small Yellow Pond Lily**
Nymphaea leibergii (N. tetragona ssp. leibergii)	Dwarf Water-lily
RANUNCULACEAE	
Actaea rubra	**Red Baneberry**
Anemone canadensis	**Canada Anemone**
Anemone multifida	**Cut-leaved Anemone (Hudson Bay Anemone)**
Anemone parviflora	Small- Flower Anemone
Anemone richardsonii	**Yellow Anemone**
Aquilegia brevistyla	**Small-Flower Columbine**
Caltha natans	**Floating Marsh Marigold**
Caltha palustris	Marsh marigold
Delphinium glaucum	**Pale Larkspur**
Pulsatilla patens ssp. multifida (P. ludoviciana; Anemone patens ssp. multifida)	Pasque-flower

Family/ Scientific Name [1]	Common Name
Ranunculus abortivus	Kidney Leaved Buttercup
Ranunculus cymbalaria	Northern Seaside Crowfoot
Ranunculus flammula (R. filiformis; R. reptans)	**Lesser Spearwort**
Ranunculus gmelinii (R. purshii)	**Small Yellow Water- Crowfoot**
Ranunculus lapponicus	**Lapland Buttercup**
Ranunculus macounii	Macoun Buttercup
Ranunculus pensylvanicus	Bristly Crowfoot
Ranunculus sceleratus (R. sceleratus var. multifidus; R. sceleratus ssp. multifidus)	Cursed Crowfoot
Ranunculus trichophyllus (R. aquatilis var. eradicatus)	White Water buttercup
Thalictrum venulosum	**Veined Meadow Rue**
FUMARIACEAE	
Corydalis aurea	Golden Corydalis
Corydalis sempervirens	**Pale Corydalis**
SARRACENIACEAE	
Sarracenia purpurea	**Northern Pitcher Plant**
DROSERACEAE	
Drosera anglica	**English Sundew**
Drosera linearis	Slenderleaf Sundew
Drosera rotundifolia	**Round-leaved Sundew**
SAXIFRAGACEAE	
Chrysosplenium tetrandrum	**Northern Golden-Carpet**
Heuchera richardsonii	Richardson Alumroot
Mitella nuda	**Naked Bishop's Cap**
Parnassia palustris (P. palustris var. montanensis)	**Marsh Grass-of-Parnassus**
Saxifraga tricuspidata	**Prickly Saxifrage**
GROSSULARIACEAE [1]	
Ribes glandulosum	**Skunk Currant**
Ribes hudsonianum	**Northern Black Currant**
Ribes lacustre	**Bristly Black Current**
Ribes oxyacanthoides	**Canada Gooseberry**
Ribes triste	**Swamp Red Currant**
ROSACEAE	
Amelanchier alnifolia	**Saskatoon Serviceberry**
Comarum palustre (Potentilla palustris)	**Marsh Cinquefoil**
Dasiphora fruticosa (Potentilla fruticosa)	**Shrubby Cinquefoil**
Dryas drummondii	Yellow Mountain Avens
Dryas integrifolia ssp. crenulata	Mountain Avens
Fragaria virginiana	**Virginia Strawberry**
Geum aleppicum	Yellow Avens
Geum macrophyllum	**Large-Leaved Avens**
Geum triflorum	**Prairie-smoke**
Potentilla anserina	Silverweed
Potentilla arguta	Tall Cinquefoil
Potentilla bimundorum (P. multifida)	**Staghorn Cinquefoil**

Family/ Scientific Name [1]	Common Name
Potentilla fruticosa	**Shrubby Cinquefoil**
Potentilla nivea	Snow Cinqefoil
Potentilla norvegica	**Norwegian Cinqefoil**
Potentilla palustris	**Marsh Cinquefoil**
Potentilla pensylvanica	**Pennsylvania Cinquefoil**
Potentilla rubricaulis	**Rocky Mountain Cinquefoil**
Potentilla uniflora (P. ledebouriana)	One-Flower Cinqefoil
Potentilla virginiana	-
Prunus pensylvanica	Pin Cherry
Rosa acicularis	**Prickly Rose**
Rosa woodsii	**Woods rose**
Rubus acaulis	Raspberry
Rubus arcticus (incl. R. acaulis and R. stellatus)	**Raspberry**
Rubus chamaemorus	**Cloudberry**
Rubus idaeus (R. idaeus ssp. strigosus)	**Red Raspberry**
Rubus pubescens var. pubescens	**Dwarf Red Raspberry**
Rubus strigosus (R. idaeus)	**Wild Red Raspberry**
Sibbaldiopsis tridentata (P. tridentata)	**Three-toothed Cinquefoil**
FABACEAE [1]	
Astragalus agrestis	Don Meadow Milk Vetch
Astragalus alpinus	Alpine Milk-Vetch
Astragalus americanus	**American Milk-Vetch**
Astragalus bodinii (A. yukonis)	Bodin Milk Vetch
Astragalus eucosmus	**Pretty Milk Vetch**
Astragalus tenellus	Loose-Flower Milk Vetch
Hedysarum alpinum	Alpine Sweet-Vetch
Hedysarum boreale (H. boreale ssp. mackenziei; H. mackenziei)	Mackenzie Boreal Sweetvetch
Lathyrus ochroleucus	**Pale Vetchling Peavine**
Melilotus alba	**White Sweet-clover**
Melilotus officinalis	**Yellow Sweet-clover**
Oxytropis campestris (O. campestris var. varians, and var. roaldii, O. hyperborea, O. jordalii, O. sericea var. spicata)	**Field Locoweed**
Oxytropis deflexa (O. deflexa var. foliolosa, var. parviflora, var. sericea)	**Pendent-pod Locoweed**
Oxytropis splendens	Showy Point-Vetch
Oxytropis varians (See O. campestris)	**Oxytrope spp**
Oxytropis viscida	Sticky Locoweed
Trifolium hybridum	**Alsike Clover**
Vicia americana	American Purple Vetch
GERANIACEAE	
Geranium bicknellii	Bicknell Northen Cranesbill
LINACEAE	
Linum lewisii	**Lewis Blue Flax**

Family/ Scientific Name [1]	Common Name
EMPETRACEAE	
Empetrum nigrum	**Black Crowberry**
VIOLACEAE	
Viola adunca	**Sand Violet**
Viola nephrophylla	**Northern Bog Violet**
Viola renifolia	**Kidney-Leaf White Violet**
Viola rugulosa	Canada Violet
ELAEAGNACEAE	
Elaeagnus commutata	American Silverberry
Shepherdia canadensis	**Canda Buffalo-Berry**
ONAGRACEAE	
Chamerion angustifolium (E. angustifolium)	**Fireweed**
Epilobium ciliatum (E. glandulosum)	**Hairy Willowherb**
Epilobium latifolium (Chamerion latifolium)	River Beauty
Epilobium palustre	**Marsh Willow Herb**
HIPPURIDACEAE [1]	
Hippuris vulgaris	**Common Mare's Tail**
HALORAGACEAE	
Myriophyllum sibiricum (M. exalbescens)	**Water Milfoil**
Myriophyllum verticillatum	**Whorled Water Milfoil**
ARALIACEAE	
Aralia nudicaulis	Wild Sarsaparilla
APIACEAE [1]	
Cicuta bulbifera	Bulbous Water-hemlock
Cicuta maculata (C. maculata var. angustifolia)	**Spotted Water Hemlock**
Cicuta virosa (C. mackenzieana)	Water Hemlock
Heracleum maximum (H. lanatum)	Cow Parsnip
Sium suave	**Hemlock Water Parsnip**
CORNACEAE	
Cornus canadensis	Dwarf Dogwood
Cornus sericea (C. stolonifera)	Red Osier Dogwood
PYROLACEAE	
Moneses uniflora	**One-flowered Wintergreen**
Orthilia secunda (P. secunda)	**One-sided Wintergreen**
Pyrola asarifolia	**Pink Pyrola**
Pyrola chlorantha (P. virens)	**Greenish-flowered Pyrola**
Pyrola grandiflora	**Arctic Wintergreen**
Pyrola minor	**Lesser Wintergreen**
ERICACEAE	
Andromeda polifolia	**Bog Rosemary**
Arctostaphylos rubra	**Red Manzanita**
Arctostaphylos uva-ursi	**Bear Berry**
Chamaedaphne calyculata	**Leather leaf**
Kalmia polifolia	**Pale Laurel**

Family/ Scientific Name [1]	Common Name
Ledum groenlandicum	**Common Labrador Tea**
Ledum palustre ssp decumbens (L. decumbens)	**Labrador Tea**
Vaccinium oxycoccos (O. microcarpus,O. quadripetalus)	Small bog cranberry
Vaccinium uliginosum	**Alpine Blueberry**
Vaccinium vitis-idaea	**Mountain Cranberry**
PRIMULACEAE	
Androsace chamaejasme	Sweet-Flower Rock-Jasmine
Androsace septentrionalis	**Pygmy-flower Rock-jasmine**
Dodecatheon pulchellum	Few-Flower Shooting-Star
Lysimachia thyrsiflora	Water Loosestrife
Primula incana	Jones Primrose
Primula mistassinica	Bird's Eye Primrose
Primula stricta	Stiff Primrose
HYDROPHYLLACEAE	
Phacelia franklinii	Franklin's Phacelia
MENYANTHACEAE	
Menyanthes trifoliata	**Bog Buckbean**
POLEMONIACEAE	
Collomia linearis	**Narrow-Leaved Collomia**
BORAGINACEAE	
Hackelia deflexa (H. deflexa var. americana)	Stickseed or Beggar's lice
Lappula occidentalis (L. redowskii)	Stickseed
Mertensia paniculata	**Northern Bluebell**
Minuartia dawsonensis (Arenaria dawsonensis)	**Rock Stitchwort**
LAMIACEAE [1]	
Agastache foeniculum	-
Dracocephalum parviflorum (Moldavica parviflora)	American Dragonhead
Mentha arvensis	**Corn Mint**
Scutellaria galericulata	**Hooded Skullcap**
Stachys pilosa (S. palustris)	Marsh Hedge Nettle
SCROPHULARIACEAE	
Castilleja raupii	**Ruap Indian-Paintbrush**
Pedicularis capitata	Capitate Lousewort
Pedicularis flammea	**Red-tip Lousewort**
Pedicularis labradorica	**Labrador Lousewort**
Pedicularis lanata	Woolly Lousewort
Pedicularis macrodonta (P. parviflora)	Muskeg Lousewort
Rhinanthus minor (R. borealis)	**Yellow Rattle**
Veronica peregrina	Purslane Speedwell
Veronica scutellata	Marsh Speedwell
OROBANCHACEAE	
Boschniakia rossica	Northern Groundcone
LENTIBULARIACEAE	
Pinguicula villosa	Hairy Butterwort

Family/ Scientific Name [1]	Common Name
Pinguicula vulgaris	**Common Butterwort**
Utricularia intermedia	**Flatleaf Bladderwort**
Utricularia macrorhiza (U. vulgaris)	**Bladderwort**
Utricularia minor	**Lesser Bladderwort**
Utricularia ochroleuca	Northern Bladderwort
PLANTAGINACEAE	
Plantago canescens (Plantago septata)	**Plantain**
Plantago eriopoda	Saline Plantain
Plantago major	**Nipple-seed Plantain**
GENTIANACEAE	
Gentiana affinis	Prairie Gentian
Gentianella amarella (Gentiana acuta)	**Northern Gentian**
Gentianopsis detonsa ssp. Raupii (see G. detonsa)	**Sheared Gentian**
Gentianopsis macounii (Gentiana macounii)	**Macoun's Gentian**
Lomatogonium rotatum	Marsh Felwort
RUBIACEAE	
Galium boreale	**Northern Bedstraw**
Galium labradoricum	Bog Bedstraw
Galium trifidum (G. brandegei; G. tinctorium)	**Small Bedstraw**
Galium triflorum	Sweet-scented Bedstraw
CAPRIFOLIACEAE	
Linnaea borealis	**Twinflower**
Lonicera dioica	Mountain Honeysuckle
Symphoricarpos occidentalis	Northern Snowberry
Viburnum edule	**Squashberry (Low-bush cranberry)**
CAMPANULACEAE	
Campanula lasiocarpa	Common Alaska Harebell
Campanula rotundifolia	**American Harebell**
LOBELIACEAE	
Lobelia kalmii	**Kalm's Lobelia**
ASTERACEAE	
Achillea lanulosa	Yarrow
Achillea millefolium (Includes A. lanulosa & A. nigrescens)	**Common Yarrow**
Achillea nigrescens	Common Yarrow
Achillea scabra	---
Achillea sibirica	**Siberian Yarrow**
Antennaria microphylla (A. nitida)	Everlasting
Antennaria neglecta (A. campestris)	Everlasting
Antennaria oxyphylla	Everlasting
Antennaria pulcherrima	**Handsome Pussytoes**
Antennaria rosea (incl alborosea & elegans & incamata & isolepis & oxyphylla & subviscosa)	**Rosy Pussytoes**
Argentina anserina (Potentilla anserina)	**Silverweed**
Arnica angustifolia (A. alpina)	Aster
Arnica chamissonis	Leafy Arnica

Family/ Scientific Name [1]	Common Name
Artemisia borealis	Field Sagebrush
Artemisia campestris (incl A. borealis, A. canadensis) ssp borealis	**Field Sagebrush**
Artemisia frigida	Prairie Sageworst
Artemisia furcata (A. hyperborea)	**Three-fork Sagebrush**
Artemisia ludoviciana var. gnaphalodes	White Sagebrush
Artemisia tilesii	**Tilesius Wormwood**
Aster alpinus	Alpine Aster
Aster brachyactis	Alkali Aster
Aster ciliolatus	**Fringed aster**
Aster falcatus	White Prairie Aster
Aster franklinianus	Boreal Aster
Aster junciformis	Aster
Aster pansus	White Heath Aster
Aster pauciflorus	-
Aster sibiricus	Siberian Aster
Bidens cernua	Nodding Begger-ticks
Cirsium drummondii	Drummond Thistle
Cirsium foliosum	Thistle
Crepis elegans	Elegant Hawksbeard
Erigeron acris	Fleabane
Erigeron elatus	**Fleabane**
Erigeron glabellus ssp. pubescens	Smooth Fleabane
Erigeron hyssopifolius	Daisy Fleabane
Erigeron lonchophyllus	Fleabane
Erigeron philadelphicus	Philadelphia Fleabane
Eurybia (Aster) sibiricus	Siberian Aster
Grindelia squarrosa	-
Helenium autumnale	Common Sneezeweed
Hieracium umbellatum (H. scabriusculum)	**Narrow-leaved Hawkweed**
Lactuca tatarica (L. pulchella)	Blue Lettuce
Matricaria matricarioides	**Pineapple Weed**
Petasites frigidus (P. palmatus)	**Sweet Coltsfoot**
Petasites frigidus (P. sagittatus) var sagittatus	**Arrow-Leaved Sweet-Coltsfoot**
Petasites vitifolius	Sweet Coltsfoot spp
Solidago canadensis (lepida subspp)	**Canada Goldenrod**
Senecio atropurpures	Dark Purple Groundsel
Senecio congestus	Marsh Ragwort
Senecio indecorus	Rayless Mountain Groundsel
Senecio lugens	Black-Tip Groundsel
Senecio pauperculus	Balsam Groundsel
Senecio streptanthifolius	Rocky Mountain Groundsel (Cleftleaf Ragwort)
Solidago decumbens	**Goldenrod**
Solidago multiradiata	**Alpine Multiray Goldenrod**
Solidago simplex (var. nana = S. decumbens)	**Sticky Goldenrod**

Family/ Scientific Name [1]	Common Name
Symphyotrichum boreale (Aster junciformis and A. franklinianus)	Aster
Symphyotrichum ciliolatum (Aster ciliolatus)	**Lindley's Aster**
Symphyotrichum spathulatum (Aster spathulatus)	**Western Mountain Aster**
Taraxacum officinale (including T. carthamopsis; T. maurolepium; T. lapponicum; T. lacerum; T. pellianum; T. pseudonorvegicum; T. integratum; T. dumentorum; T. hyperboreum)	**Dandelion**

[1] Plants are grouped according to their respective family and arranged in phylogenetic order. Those families marked with a superscript "1" are families whose phylogenetic orders are being re-examined by taxonomists. However, their placement is a matter of best guess based on prior placement in a former classification (Cody 2000).

[2] Common name not available.

Appendix 2: Abundance of bird species occuring in the Ka'a'gee Tu Candidate Protected Area, Northwest Territories in 2008 - 2011 as incidentals and on survey plots. Total refers to all individuals seen during all surveys of the area.

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Gaviidae					
Red-throated Loon	*Gavia stellata*	Secure	-	-	0
Pacific Loon	*Gavia pacifica*	Secure	-	-	0
Common Loon	***Gavia immer***	**Secure**	**Not At Risk**	**0.1**	**43**
Podicipedidae					
Red-necked Grebe	***Podiceps grisegena***	**Secure**	**Not At Risk**	**-**	**104**
Horned Grebe	***Podiceps auritus***	**Secure**	**Special Concern**	**-**	**5**
Pied-billed Grebe	***Podilymbus podiceps***	**Secure**	**-**	**-**	**1**
Pelicanidae					
American White Pelican	***Pelicanus erythrorhynchos***	**Secure**	**Not At Risk**	**-**	**56**
Double-crested Cormorant	***Phalacrocorax auritus***	**Undetermined**	**Not At Risk**	**-**	**1**
Ardeidae					
American Bittern	***Botaurus lentiginosus***	**Sensitive**	**-**	**0.03**	**4**
Great Blue Heron	*Ardea herodias*	Vagrant	-	-	0
Anatidae					
Greater White-fronted Goose*	*Anser albifrons*	Secure	-	-	0
Snow Goose*	*Chen caerulescens*	Secure	-	-	0
Trumpeter Swan	***Cygnus buccinator***	**Sensitive**	**Not At Risk**	**-**	**2**
Tundra Swan**	***Cygnus columbianus***	**Secure**	**-**	**-**	**8**
Canada Goose	***Branta canadensis***	**Secure**	**-**	**0.11**	**82**
Mallard	***Anas platyrhynchos***	**Secure**	**-**	**0.01**	**1019**
Gadwall	***Anas strepera***	**Undetermined**	**-**	**-**	**1**
Northern Pintail	***Anas acuta***	**Sensitive**	**-**	**-**	**201**
American Wigeon	***Anas americana***	**Secure**	**-**	**0.03**	**2020**
Northern Shoveler	***Anas clypeata***	**Secure**	**-**	**-**	**200**
Blue-winged Teal	***Anas discors***	**Secure**	**-**	**-**	**2**
Green-winged Teal	***Anas crecca***	**Secure**	**-**	**-**	**102**
Canvasback*	***Aythya valisineria***	**Secure**	**-**	**-**	**5**
Redhead	*Aythya americana*	Secure	-	-	0
Ring-necked Duck	***Aythya collaris***	**Secure**	**-**	**-**	**3**
Greater Scaup	***Aythya marila***	**Secure**	**-**	**-**	**1**
Lesser Scaup	***Aythya affinis***	**Sensitive**	**-**	**-**	**37**
Surf Scoter	***Melanitta perspicillata***	**Sensitive**	**-**	**-**	**5001**
White-winged Scoter	***Melanitta fusca***	**Sensitive**	**-**	**-**	**24**
Long-tailed Duck*	*Clangula hyemalis*	Sensitive	-	-	0
Bufflehead	***Bucephala albeola***	**Secure**	**-**	**-**	**64**
Common Goldeneye	***Bucephala clangula***	**Secure**	**-**	**-**	**3018**

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Red-breasted Merganser	***Mergus serrator***	**Secure**	**-**	**-**	**2**
Hooded Merganser*	***Lophodytes cucullatus***	**Secure**	**-**	**-**	**2**
Common Merganser	***Mergus merganser***	**Secure**	**-**	**-**	**4**
Ruddy Duck	*Oxyura jamaicensis*	Secure	-	-	0
Accipitridae					
Northern Harrier	***Circus cyaneus***	**Secure**	**Not At Risk**	**-**	**5**
Sharp-shinned Hawk	*Accipiter striatus*	Secure	Not At Risk	-	0
Northern Goshawk	***Accipiter gentilis***	**Secure**	**Not At Risk**	**-**	**2**
Red-tailed Hawk	*Buteo jamaicensis*	Secure	Not At Risk	-	0
Golden Eagle	*Aquila chrysaetos*	Secure	Not At Risk	-	0
Bald Eagle	***Haliaeetus leucocephalus***	**Secure**	**Not At Risk**	**-**	**76**
Osprey	***Pandion haliaetus***	**Secure**	**-**	**-**	**1**
Falconidae					
Merlin	***Falco columbarius***	**Secure**	**Not At Risk**	**-**	**7**
American Kestrel	***Falco sparverius***	**Secure**	**-**	**0.02**	**5**
Peregrine Falcon**	***Falco peregrinus anatum/ tundrius***	**Sensitive**	**Special Concern**	**-**	**4**
Gyrfalcon*	*Falco rusticolus*	Secure	Not At Risk	-	0
Phasianidae					
Spruce Grouse	***Dendragapus canadensis***	**Secure**	**-**	**-**	**14**
Ruffed Grouse	***Bonasa umbellus***	**Secure**	**-**	**0.23**	**25**
Rock Ptarmigan*	*Lagopus muta*	Secure	-	-	0
Willow Ptarmigan*	*Lagopus lagopus*	Secure	-	-	0
Sharp-tailed Grouse	***Tympanuchus phasianellus***	**Secure**	**-**	**-**	**5**
Rallidae					
American Coot	***Fulica Americana***	**Secure**	**Not At Risk**	**0.01**	**1**
Sora	***Porzana carolina***	**Secure**	**-**	**0.09**	**16**
Yellow Rail**	*Coturnicops noveboracensis*	May Be At Risk	Special Concern	-	0
Sandhill Crane	***Grus canadensis***	**Secure**	**-**	**0.26**	**59**
Charadriidae					
Black-bellied Plover*	*Pluvialis squatarola*	Sensitive	-	-	0
American Golden Plover*	*Pluvialis dominica*	Sensitive	-	-	0
Semipalmated Plover	*Charadrius semipalmatus*	Secure	-	-	0
Scolopacidae					
Killdeer	***Charadruis vociferus***	**Secure**	**-**	**-**	**5**
Lesser Yellowlegs	***Tringa flavipes***	**Sensitive**	**-**	**0.4**	**73**
Greater Yellowlegs	***Tringa melancoleuca***	**Undetermined**	**-**	**0.02**	**2**
Solitary Sandpiper	***Tringa solitaria***	**Undetermined**	**-**	**0.05**	**8**
Spotted Sandpiper	***Actitis macularius***	**Secure**	**-**	**0.52**	**63**
Upland Sandpiper	***Bartramia longicauda***	**Undetermined**	**-**	**0.08**	**7**

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Semipalmated Sandpiper*	*Calidris pusilla*	Sensitive	-	-	0
Least Sandpiper	*Calidris minutilla*	Sensitive	-	-	0
White-rumped Sandpiper*	*Calidris fuscicollis*	Secure	-	-	0
Pectoral Sandpiper*	*Calidris melanotos*	Secure	-	-	0
Stilt Sandpiper*	*Calidris himantopus*	Secure	-	-	0
Short-billed Dowitcher**	***Limnodromus griseus***	**Undetermined**	**-**	**0.02**	**4**
Wilson's Snipe	***Gallinago delicata***	**Undetermined**	**-**	**0.76**	**105**
Wilson's Phalarope	*Phalaropus tricolor*	Undetermined	-	-	0
Red-necked Phalarope	*Phalaropus lobatus*	Sensitive	-	-	0
Laridae					
Bonaparte's Gull	***Larus philadelphia***	**Secure**	**-**	**0.19**	**87**
Franklin's Gull	***Larus pipixcan***	**Undetermined**	**-**	**-**	**25**
Mew Gull	***Larus canus***	**Secure**	**-**	**0.01**	**25**
Ring-billed Gull	***Larus delawarensis***	**Secure**	**-**	**-**	**18**
California Gull	*Larus californicus*	Secure	-	-	0
Herring Gull	***Larus argentatus***	**Secure**	**-**	**-**	**49**
Caspian Tern	***Sterna caspia***	**Sensitive**	**Not At Risk**	**-**	**3**
Common Tern	***Sterna hirundo***	**Secure**	**Not At Risk**	**-**	**6**
Arctic Tern	***Sterna paradisaea***	**Secure**	**-**	**-**	**33**
Black Tern	***Chlidonias niger***	**Sensitive**	**Not At Risk**	**0.05**	**72**
Strigidae					
Short-eared Owl**	***Asio flammeus***	**Sensitive**	**Special Concern**	**-**	**1**
Long-eared Owl	*Asio otus*	Undetermined	-	-	0
Great Horned Owl	***Bubo virginianus***	**Secure**	**-**	**-**	**3**
Great Gray Owl	*Strix nebulosa*	Secure	Not At Risk	-	0
Snowy Owl*	*Bubo scandiacus*	Secure	Not At Risk	-	0
Barred Owl	*Strix varia*	Undetermined	-	-	0
Boreal Owl	*Aegolius funereus*	Secure	Not At Risk	-	0
Northern Hawk Owl	*Surnia ulula*	Secure	Not At Risk	-	0
Caprimulgidae					
Common Nighthawk	***Chordeiles minor***	**Secure**	**Threatened**	**0.02**	**8**
Alcedinidae					
Belted Kingfisher	***Ceryle alcyon***	**Secure**	**-**	**0.01**	**9**
Picidae					
Yellow-bellied Sapsucker	***Sphyrapicus varius***	**Secure**	**-**	**0.06**	**10**
Downy Woodpecker	*Picoides pubescens*	Secure	-	-	0
Hairy Woodpecker	***Picoides villosus***	**Secure**	**-**	**0.08**	**10**
Three-toed Woodpecker	***Picoides dorsalis***	**Secure**	**-**	**-**	**1**

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Black-backed Woodpecker	***Picoides arcticus***	**Secure**	**-**	**0.01**	**1**
Northern Flicker	***Colaptes auratus***	**Secure**	**-**	**0.17**	**30**
Pileated Woodpecker	***Dryocopus pileatus***	**Secure**	**-**	**0.03**	**4**
Tyrannidae					
Olive-sided Flycatcher**	***Contopus cooperi***	**Sensitive**	**Threatened**	**0.15**	**29**
Western Wood-pewee	***Contopus sordidulus***	**Secure**	**-**	**0.01**	**5**
Yellow-bellied Flycatcher	***Empidonax flaviventris***	**Secure**	**-**	**0.25**	**24**
Alder Flycatcher	***Empidonax alnorum***	**Secure**	**-**	**0.82**	**88**
Least Flycatcher	***Empidonax minimus***	**Secure**	**-**	**0.27**	**29**
Eastern Phoebe	***Sayornis phoebe***	**Secure**	**-**	**-**	**1**
Say's Phoebe	*Sayornis saya*	Undetermined	-	-	0
Eastern Kingbird	***Tyrannus tyrannus***	**Secure**	**-**	**0.01**	**5**
Northern Shrike	*Lanius excubitor*	Secure	-	-	0
Vireonidae					
Red-eyed Vireo	***Vireo olivaceus***	**Secure**	**-**	**0.44**	**48**
Warbling Vireo	***Vireo gilvus***	**Secure**	**-**	**0.07**	**15**
Philadelphia Vireo	***Vireo philadelphicus***	**Undetermined**		**0.01**	**2**
Blue-headed Vireo	***Vireo solitarius***	**Secure**	**-**	**0.22**	**24**
Corvidae					
Gray Jay	***Perisoreus canadensis***	**Secure**	**-**	**0.86**	**141**
Black-billed Magpie	***Pica hudsonia***	**Secure**	**-**	**-**	**3**
Common Raven	***Corvus corax***	**Secure**	**-**	**0.2**	**63**
American Crow	*Corvus brachyrhynchos*	Secure	-	-	0
Alaudidae					
Horned Lark	*Eremophila alpestris*	Secure	-	-	0
Hirundinidae					
Bank Swallow	***Riparia riparia***	**Secure**	**-**	**-**	**14**
Tree Swallow	***Tachycineta bicolor***	**Secure**	**-**	**0.03**	**15**
Cliff Swallow	***Petrochelidon phyrrhonota***	**Secure**	**-**	**-**	**70**
Barn Swallow	***Hirundo rustica***	**Sensitive**	**Threatened**	**-**	**10**
Boreal Chickadee	***Poecile hudsonica***	**Sensitive**	**-**	**0.09**	**35**
Sittidae					
Red-breasted Nuthatch	***Sitta canadensis***	**Secure**	**-**	**0.06**	**7**
Troglodytida					
House Wren	*Troglodytes aedon*		-	-	0
Winter Wren	***Troglodytes troglodytes***	**Secure**	**-**	**-**	**2**
Marsh Wren	***Cistothorus palustris***	**Undetermined**	**-**	**0**	**2**
Regulidae					
Golden-crowned Kinglet	***Regulus satrapa***	**Undetermined**	**-**	**0.01**	**1**

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Ruby-crowned Kinglet	***Regulus calendula***	**Secure**	**-**	**1.51**	**158**
Turdidae					
Mountain Bluebird*	*Sialia currucoides*	Undetermined	-	-	0
American Robin	***Turdus migratorius***	**Secure**	**-**	**0.27**	**65**
Swainson's Thrush	***Catharus ustulatus***	**Secure**	**-**	**1.68**	**176**
Gray-cheeked Thrush	*Catharus minimus*	Secure	-	-	0
Hermit Thrush	***Catharus guttatus***	**Secure**	**-**	**1.3**	**131**
Motacillidae					
American Pipit*	*Anthus rubescens*	Sensitive	-	-	0
Bombycillidae					
Bohemian Waxwing	***Bombycilla garrulus***	**Secure**	**-**	**-**	**13**
Cedar Waxwing	***Bombycilla cedrorum***	**Secure**	**-**	**0.02**	**3**
Parulidae					
Ovenbird	***Seiurus aurocapilla***	**Secure**	**-**	**0.39**	**35**
Northern Waterthrush	***Parkesia noveboracensis***	**Secure**	**-**	**0.34**	**39**
Black-and-white Warbler	***Mniotilta varia***	**Secure**	**-**	**0.14**	**12**
Tennessee Warbler	***Oreothlypis peregrina***	**Secure**	**-**	**1.34**	**173**
Orange-crowned Warbler	***Oreothlypis celata***	**Secure**	**-**	**0.09**	**10**
Mourning Warbler	***Geothlypis philadelphia***	**Undetermined**		**0.01**	**1**
Common Yellowthroat	***Geothlypis trichas***	**Secure**	**-**	**0.32**	**36**
American Redstart	***Setophaga ruticilla***	**Secure**	**-**	**0.02**	**2**
Cape May Warbler	***Setohpaga tigrinum***	**Secure**	**-**	**0.03**	**13**
Magnolia Warbler	***Setohpaga magnolia***	**Secure**	**-**	**0.36**	**34**
Bay-breasted Warbler**	*Setophaga castanea*	Secure	-	-	0
Yellow Warbler	***Setohpaga petechia***	**Secure**	**-**	**0.13**	**42**
Blackpoll Warbler	***Setophaga striata***	**Sensitive**	**-**	**0.05**	**7**
Palm Warbler	***Setophaga palmarum***	**Secure**	**-**	**1.59**	**179**
Yellow-rumped Warbler	***Setophaga coronata***	**Secure**	**-**	**1.68**	**215**
Thraupidae					
Western Tanager	***Piranga ludovicana***	**Secure**	**-**	**0.15**	**28**
Cardinalidae					
Rose-breasted Grosbeak	***Pheucticus ludovicianus***	**Secure**	**-**	**0.045**	**8**
Emberizidae					
American Tree Sparrow	*Spizella arborea*	Sensitive	-	-	0
Clay-coloured Sparrow**	***Spizella pallida***	**Undetermined**	**-**	**0.05**	**11**
Chipping Sparrow	***Spizella passerina***	**Secure**	**-**	**2.01**	**275**
Le Conte's Sparrow	***Ammodramus leconteii***	**Secure**	**-**	**0.25**	**23**
Nelson's Sharp-tailed Sparrow**	***Ammodramus nelsoni***	**Undetermined**	**Not At Risk**	**-**	**1**

Common Name	Scientific Name	NWT Status	COSEWIC / SARA Status	2009/2010 Number of birds/point count station	Total
Savannah Sparrow	***Passerculus sandwichensis***	**Secure**	**-**	**0.01**	**6**
Vesper Sparrow	*Pooecetes gramineus*	Undetermined	-	-	0
White-throated Sparrow	***Zonotrichia albicollis***	**Sensitive**	**-**	**1.15**	**127**
White-crowned Sparrow	***Zonotrichia leucophrys***	**Secure**	**-**	**-**	**3**
Fox Sparrow	***Passerella iliaca***	**Secure**	**-**	**0.24**	**23**
Song Sparrow	***Melospiza melodia***	**Undetermined**	**-**	**-**	**1**
Lincoln's Sparrow	***Melospiza lincolnii***	**Secure**	**-**	**0.73**	**94**
Swamp Sparrow	***Melospiza Georgiana***	**Secure**	**-**	**0.14**	**27**
Harris' Sparrow	*Zonotrichia querula*	Sensitive		-	0
Dark-eyed Junco	***Junco hyemalis***	**Secure**	**-**	**0.75**	**87**
Calcariidae					**0**
Smith's Longspur*	*Calcarius pictus*	Undetermined	-	-	0
Lapland Longspur*	*Calcarius lapponicus*	Secure	-	-	0
Snow Bunting*	*Plectrophenax nivalis*	Secure	-	-	0
Icteridae					
Brown-headed Cowbird	*Molothrus ater*	Secure		-	0
Red-winged Blackbird	***Agelaius phoeniceus***	**Secure**	**-**	**0.14**	**81**
Brewer's Blackbird	*Euphagus cyanocephalus*	Secure	-	-	0
Rusty Blackbird**	***Euphagus carolinus***	**May Be At Risk**	**Special Concern**	**0.19**	**66**
Common Grackle	*Quiscalus quiscula*	Secure	-	-	0
Fringillidae					
Pine Grosbeak	*Pinicola enucleator*	Secure	-	-	0
Purple Finch	*Carpodacus purpureus*	Secure	-	-	0
Red Crossbill	***Loxia curvirostra***	**Secure**	**-**	**0.38**	**3**
Hoary Redpoll	***Carduelis hornemanni***	**Undetermined**	**-**	**-**	**4**
Evening Grosbeak	*Coccothraustes vespertinus*	Secure	-	-	0
Pine Siskin*	***Carduelis pinus***	**Secure**	**-**	**-**	**10**

* Species that migrate through the area.

** Species classified by COSEWIC and/or are listed under SARA

Appendix 3: Fish species likely occurring within the Ka'a'gee Tu Candidate Protected Area, Northwest Territories (Scott and Crossman, 1973).

Common Name	Species	NWT Status	COSEWIC
Cypriniformes- Catostomidae			
Longnose Sucker	*Catostomus commersoni*	Secure	
White Sucker	*Catostomus commersoni*	Secure	
Lake Chub	*Couesius plumbeus*	Undetermined	
Pearl Dace	*Margariscus margarita*	Sensitive	
Emerald Shiner	*Notropis atherinoides*	Undetermined	
Spottail Shiner	*Notropis hudsonius*	Undetermined	
Northern Redbelly Dace	*Phoxinus eos*	Undetermined	
Finescale Dace	*Phoxinus neogaues*	Undetermined	
Fathead Minnow	*Pimephales promelas*	Undetermined	
Flathead Chub	*Platygobio gracilis*	Undetermined	
Longnose Dace	*Rhinichthys cataractae*	Secure	
Gadiformes-Gadidae			
Burbot	*Lota lota*	Secure	
Gasterosteiformes – Gasterosteidae			
Brook Stickleback	*Culaea inconstans*	Sensitive	
Three-spined Stickleback	*Gasterosteus aculeatus*	Vagrant	
Ninespine Stickleback	*Pungitius pungitius*	Secure	
Osteoglossiformes – Hiodontidae			
Goldeye	*Hiodon alosoides*	Secure	
Perciformes – Percidae			
Iowa Darter	*Etheostoma exile*	Presence unknown	
Yellow Perch	*Perca flavescens*	Undetermined	
Walleye	*Sander vitreus vitreus*	Sensitive	
Percopsiformes – Percopsidae			
Trout-perch	*Percopsis omiscomaycus*		
Percopsiformes – Percopsidae			
Arctic Lamprey	*Lethenteron camtschatichum*	Undetermined	
Salmoniformes – Esocidae			
Northern Pike	*Esox lucius*	Secure	
Salmoniformes – Salmonidae			
Lake Cisco	*Coregonus artedi*	Secure	
Lake Whitefish	*Coregonus clupeaformis*	Secure	
Broad Whitefish	*Coregonus nasus*	Secure	
Humpback Whitefish	*Coregonus pidschian*	Undetermined	
Least Cisco	*Coregonus sardinella*	Secure	
Shortjaw Cisco	*Coregonus zenithicus*	At Risk	Threatened
Pigmy Whitefish	*Prosopium coulterii*	Undetermined	
Round Whitefish	*Prosopium cylindraceum*	Secure	
Rainbow Trout	*Salmo gairdneri*	Alien	
Lake Trout	*Salvelinus namaycush*	Secure	
Inconnu	*Stenodus leucichthys*	Sensitive	
Arctic Grayling	*Thymallus arcticus*	Sensitive	

Common Name	Species	NWT Status	COSEWIC
Scorpaeniformes – Cottidae			
Slimy Sculpin	*Cottus cognatus*	Undetermined	
Spoonhead Sculpin	*Cottus ricei*	Undetermined	
Fourhorn Sculpin	*Myoxocephalus quadricornis*	Undetermined	

Appendix 4: Mammal species observed or potentially occurring within 150 km of the Ka'a'gee Tu Candidate Protected Area, Northwest Territories. Species in bold were observed during field work in June 2007-2011

Common Name	Species	NWT Status	COSEWIC Status
Masked Shrew	*Sorex cinereus*	Secure	
Dusky Shrew	*Sorex monticolus*	Secure	
Arctic Shrew	*Sorex arcticus*	Secure	
Pygmy Shrew	*Sorex hoyi*	Secure	
Northern Water Shrew	*Sorex palustris*		
Meadow Jumping Mouse	*Zapus hudsonius*	Undetermined	
Meadow Vole	*Microtus pennsylvanicus*	Secure	
Yellow-cheeked Vole	*Microtus xanthognathus*	Secure	
Eastern Heather Vole	*Phenacomys ungava*	Secure	
Northern red-backed vole	*Clethrionomys rutilus*	Secure	
Southern (Boreal) red-backed vole	*Clethrionomys gapperi*		
Heather Vole	*Phenacomys intermedius*		
Chestnut-cheeked Vole	*Microtus xanthognathus*		
Boreal Red-backed Vole	*Clethrionomys gapperi*	Secure	
Northern Water Shrew	*Sorex palustris*	Secure	
Snowshoe Hare	***Lepus americanus***	**Secure**	
Woodchuck	***Marmota monax***	**Secure**	
Least Chipmunk	***Neotamias minimus***	**Secure**	
Red Squirrel	***Tamiasciurus hudsonicus***	**Secure**	
Northern Flying Squirrel	*Glaucomys sabrinus*	Secure	
Beaver	***Castor canadensis***	**Secure**	
Deer Mouse	*Peromyscus maniculatus*	Secure	
Brown Lemming	*Lemmus trimucronatus*	Secure	
Northern Bog Lemming	*Synaptomys borealis borealis*	Secure	
Muskrat	***Ondatra zibethicus***	**Secure**	
Porcupine	***Erethizon dorsatum***	**Secure**	
Striped skunk	*Mephitis mephitis*		
Coyote	*Canis latrans*	Secure	
Gray Wolf	***Canis lupus***	**Secure**	**Not at risk**
Red Fox	***Vulpes vulpes***	**Secure**	
Arctic Fox	*Alopex lagopus*		
Black Bear	***Ursus americanus***	**Secure**	**Not at risk**
American marten	***Martes americana***	**Secure**	
Fisher	*Martes americana*	Sensitive	
Ermine	*Mustela erminea*	Secure	
Least Weasel	*Mustela nivalis*	Secure	
Mink	*Mustela vison*	Secure	
Wolverine	*Gulo gulo*	Secure	Special concern
River Otter	***Lontra canadensis***	**Sensitive**	
Lynx	*Lynx canadensis*	Secure	Not at risk

Common Name	Species	NWT Status	COSEWIC Status
Cougar	*Puma concolor*	Undetermined	
Moose	***Alces alces***	**Secure**	
Wood Bison	***Bison bison athabascae***		**Threatened**
Woodland Caribou (boreal)	***Rangifer tarandus caribou***	**Sensitive**	**Threatened**
Little Brown Myotis	**Myotis lucifugus**	**Sensitive**	**Endangered**
Northern Long-eared Myotis	**Myotis septentrionalis**	**Undetermined**	**Endangered**