Ecological Reconnaissance of the

Chappie Lake Wetlands

1-7 July 2002

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Summary

- We conducted the first ground-based ecological reconnaissance of the Chappie Lake wetlands on July 1-7, 2002. We focused on assessing the relative abundance and species richness of lichens, plants, birds, and small mammals.

- Black spruce is the dominant forest species in the wetlands, occurring in pure stands or mixed with white spruce and paper birch. The dominant forest types are black spruce/feathermoss-sphagnum and black spruce/Labrador tea/sphagnum-lichen. Large burns occurred in the wetlands in 1969 and 1989. Permafrost underlies most of the area.

- The abundant wetlands in the area include lacustrine marshes, shallow open water, riparian shrub swamps, bogs, and fens. Bogs and fens occur in the many thermokarst depressions. We characterised the vegetation and soil in each of the wetland types identified.

- We identified 25 species of lichens, 17 species of bryophytes, 1 species of liverwort, and 108 species of vascular plants in the wetlands. Five species of vascular plants found in the wetland are considered rare in the Yukon. One species, arrowhead (*Sagittaria cuneata*), had only previously been found in the southern Yukon.

- The wetlands have a good variety of bird habitats. We identified 58 species of birds, including 22 species of waterbirds and 5 species of birds of prey.

- We observed waterbirds using the wetlands for brood rearing, moulting, and pre-migration staging. Lesser Scaup, American Wigeon, Northern Pintail, Northern Shoveler, and Green-winged Teal were the most abundant species. Large flocks of ducks flying into Chappie Lake indicated it provides key staging habitat.

- The songbird community was characterised by Yellow-rumped Warblers, Ruby-crowned Kinglets, American Robins, Savannah Sparrows and White-crowned Sparrows. Most birds were no longer singing due to the timing of our visit, so more species are likely present.

- We identified 2 species of small mammals, northern red-backed voles and chestnut-cheeked voles. Populations of both species were very high in spruce and open habitats, respectively.

- We identified 5 species of butterflies. One species, the Silver-bordered Fritillary, had only been recorded south of the Stewart River in the Yukon before.

- Moose were abundant in the wetlands. Chappie Lake is very shallow, and aquatic species such as pike, beavers, and muskrats were not using the lake, but they were common elsewhere in the wetlands. We did not find any fish in Chappie Lake.

Contents

Acknowledgements

This work was funded by the Yukon Department of Environment, the Canadian Parks and Wilderness Society, and Yukon College. We thank Ernie from Blacksheep Aviation for getting us safely into the wetlands despite the shallow water, and Jim Healy with Alpine Aviation for coming to pick us up again when nobody else could get back in. Woody Elias generously shared his extensive knowledge of the area with us, and helped us all maintain good humour despite the rain and swarms of mosquitoes.

Credits

All photos are by Rhonda Rosie, except for those on Pages 1, 14, and 26 by Mark O'Donoghue, and those on Pages 15, 17, and 27 by Dave Mossop. Rhonda Rosie wrote the text for the sections on landforms and vegetation, Dave Mossop wrote the text for the sections on birds, and Mark O'Donoghue wrote the text for the sections on mammals, fish, and butterflies, and edited the survey report.

This report should be cited as:

Mossop, D. H., R. Rosie, M. O'Donoghue, K. Sinnott, & W. Elias. 2002. Ecological reconnaissance of the Chappie Lake wetlands. File Report, Yukon College and Yukon Fish & Wildlife Branch, Whitehorse, Yukon.

Woody Elias at his cabin on the west side of Chappie Lake

Introduction

The Chappie Lake wetlands are recognised as being one of the 52 most important wetland areas in the Yukon as habitat for waterfowl and other wildlife (Hayes 2002). This assessment was based mostly on brief reconnaissance surveys over the area, during which it was noted that the wetlands were used during breeding and moulting seasons by swans and diving ducks (Dennington 1985). Until this year, however, there were no detailed data collected from ground surveys in the area.

The 5-year Bonnet Plume Heritage River Management Plan (Yukon Renewable Resources 1998) committed the Yukon Territorial Government and the Mayo District Renewable Resources Council to collecting baseline information on wildlife in the watershed. During a community planning meeting in Mayo in April, 1999, the Chappie Lake wetlands were identified as a priority area for data collection.

This report summarises the results of a week-long ground-based ecological assessment of the Chappie Lake wetlands conducted from 1-7 July 2002. The purpose of this work was to provide baseline data on the vegetation and wildlife in the wetlands during the summer. We focussed our work on the vegetation, birds, and small mammals of the area, but recorded observations of all wildlife and wildlife sign.

A crew of 4 flew into the wetland from Mayo on July 1st, and we set up a base camp on the northeast shore of Chappie Lake. Dave Mossop was in charge of surveying the bird life of the wetlands, Rhonda Rosie conducted the botanical work, Mark O'Donoghue conducted the small mammal surveys, and Kent Sinnott provided technical support. Woody Elias, from Fort McPherson, who has trapped in the Chappie Lake area for many years and has extensive knowledge of the area, joined us the next day.

General Description of the Area

Chappie Lake lies about 15 km south of the Peel River, at an elevation of about 296 m, in the rolling uplands of the Peel Plateau between the Wind and the Bonnet Plume Rivers (see map on Page 4). It is the largest lake in the area, roughly circular-shaped, with a diameter of about 2 km. It is very shallow, only about 60 cm deep at the time of our visit. Wetlands, including numerous smaller lakes, ponds, bogs, and fens, occupy topographic and thermokarst depressions throughout the uplands. Most wetlands on the east and south sides of Chappie Lake ultimately drain into the lake, although some drain directly east to the Bonnet Plume River. Wetlands lying close to the lake to the west and north, as well as Chappie Lake itself, drain northeastward via small creeks into the Bonnet Plume River. Wetlands farther west and south of Chappie Lake drain southwestward, westward, and northward into the Wind and Peel Rivers.

Fire is common on the Peel Plateau, and two large fires have affected the area around Chappie Lake (DIAND 2001 fire history database). A fire burned a large area around the southern half of the lake in 1989, and most of the rest of the area west to the Wind River was burned in 1969. Recent fires have so far spared the area north and northeast of Chappie Lake, as well as scattered small and large patches in the burn.

The upland morainal deposits form low rounded hills throughout the area, with the highest reaching to about 360 m. Black spruce, with a thick blanket of sphagnum and/or feathermoss, forms the dominant forest cover on unburned upland sites, while white spruce and paper birch, with narrow bands of willow and alder, commonly border the shores of Chappie Lake and some of the other lakes in the area. One aspen tree was seen in the uplands (D. Mossop, personal communication) and stands of aspen were seen during a later flight over the area near the Wind River, southwest of Chappie Lake, but the species otherwise appears to be scarce. Balsam poplar was not seen in the uplands during this investigation, but it is abundant along the floodplains of the major rivers.

Permafrost underlies most of the area, in morainal deposits (Turbic Cryosols) and in organic wetland complexes (Organic Cryosols) (Canadian Parks and Wilderness Society 2000). It is absent under open water and in wet fens, although it does occur in bog forms associated with fens, such as palsas (Zoltai and Tarnocai, 1975). Broad low earth hummocks, formed by upward soil displacement resulting from cryostatic pressure, characterize the upland mineral soils (Zoltai and Pettapiece, 1973). These are overgrown with mosses and other vegetation at forested sites, but they were very obvious in the 1989 burn at the south end of the lake, where bare soil was visible or only a thin layer of mostly dead moss overlaid the mounds. Frozen soil was found in an undisturbed mature black spruce/feathermoss forest on the northeast side of Chappie Lake, in mineral soil at 18 cm below a 14 cm-thick layer of living and decomposing feathermoss. It was not encountered, however, in a hole dug to 40 cm, in mineral soil below a thin layer of charred and decomposing moss in a similar upland site in the 1989 burn south of the lake. This may indicate an increase in thickness of the active layer since the fire removed the insulating moss cover. Small wet depressions, which are infilling with sphagnum moss

and graminoids, occur in parts of this burn, and also appear to be the result of localised thawing of permafrost since the fire. Active thawing is common at the edges of the thermokarst depressions in the wetlands, in both the burned and unburned areas.

Chappie Lake (upper left) and wetlands to the south.
The Bonnet Plume River is in the upper right.

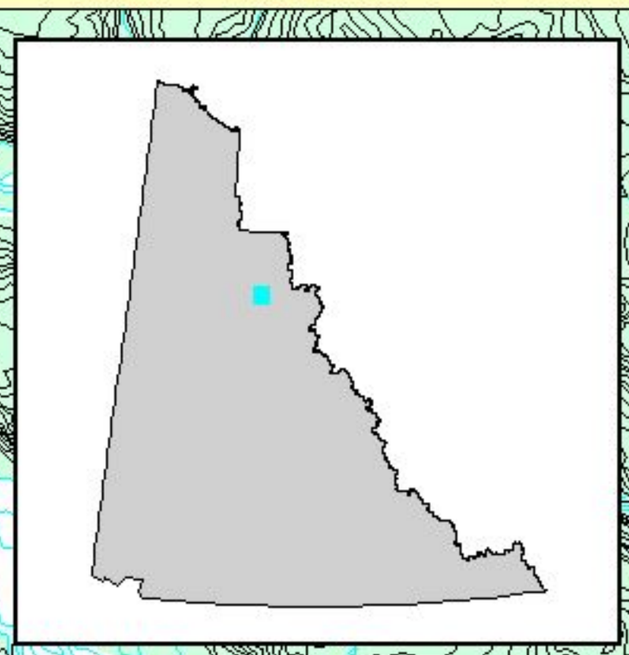
Peat mound (lower right) and palsa (upper left) in a fen

Chappie Lake Wetlands

Scale 1:100,000

2 0 2 Kilometers

Albers Equal Area projection (standard parallels: 61°40'N & 68°00'N)



135°00'

134°50'

65°50'

Chappie Lake

Basin Creek

BONNET PLUME RIVER

DIGITAL DATA SOURCES AND DISCLAIMERS

National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Reproduced under license from Her Majesty the Queen in Right of Canada, with permission of Natural Resources Canada.

Map Compiled By:
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24 January 2003

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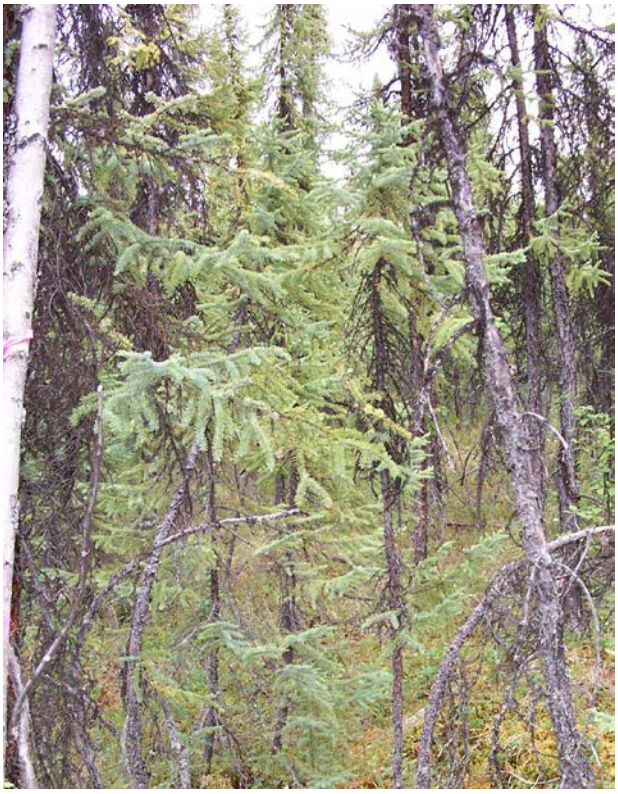
Vegetation

Methods

Rhonda Rosie placed plots in common vegetation types, including forests and wetlands, surrounding the lake, and detailed site conditions, species composition and percent cover. Sites visited during this survey lay within 2.5 km around Chappie Lake. She also used aerial photos, notes, and photos taken from the air during the flight to and from Chappie Lake to describe physical features and interpret the terrain and vegetation relationships. She noted all plants seen during the survey, and collected many to document their presence in the area. A list of vascular plants, bryophytes, and lichens identified to date, with their scientific names, is included in this report in Appendix A.

Forest Types

Black spruce is the dominant forest species in the Chappie Lake area, occurring in pure stands or mixed with white spruce, paper birch, or both. On the unburned low hills on the northeast side of Chappie Lake, **Black Spruce/Feathermoss-Sphagnum** covers a large area. In one stand investigated, the open black spruce canopy reaches to over 16 m, with diameters up to 20 cm. Most of these old trees are leaning slightly at various



Black Spruce/Feathermoss-Spagnum Forest Type

angles, and some dead or dying trees, as well as younger trees of all ages, are common in the stand. Overmature, dead, and occasional young paper birch trees are also scattered throughout. Labrador tea forms an open shrub layer with occasional rose, spiraea, green alder, and water birch. Lowbush cranberry, cloudberry, woodland horsetail and lichens form an open layer over a thick undulating carpet of feathermoss (mainly *Hylocomium splendens*), with scattered low broad hummocks of sphagnum moss. A hole dug in this stand revealed a thin layer of living feathermoss above about 12 cm of fibric decomposing moss over silty loam, which was frozen at 32 cm below the moss surface. Some free water was seen at the bottom of the hole.

On a west-facing slope adjacent to this stand, paper birch and green alder become more abundant, while sphagnum moss decreases. A few tall white spruce are also present. This stand grades into a small, open, **Paper Birch**-dominated forest, with scattered tall white and black spruce, abundant rose, red currant, tall green alder, scattered willows, lowbush cranberry, patchy feathermoss, and abundant leaf litter.

Paper Birch-dominated Forest Type

Another common and often extensive forest type on the unburned hills is **Black Spruce/Labrador Tea/Sphagnum-Lichen**. Trees in these veneer bogs form open to dense canopies of usually small scraggly, leaning trees of all ages, including scattered tamarack. Open to dense Labrador tea is the dominant shrub, with occasional green alder, rose, shrub birch, and willow. Lowbush cranberry, cloudberry, and sometimes woodland horsetail and coltsfoot form an open to dense layer over continuous hummocky sphagnum moss. Reindeer, *Cladonia*, and *Cetraria* lichens grow abundantly over the moss layer.

Black Spruce/Labrador Tea/Sphagnum-Lichen Forest Type

Similar stands occur on **Peat Plateaus** (level, perennially frozen peat deposits elevated about 1 m above the surrounding area), with an open shrub layer of low Labrador tea, and open herb and dwarf shrub layers dominated by cloudberry and lowbush cranberry, respectively. Reindeer, *Cladonia*, and *Cetraria* lichens often form a continuous carpet over sphagnum moss.

A few small stands of **Black Spruce/Labrador Tea/Lichen** were also encountered on several well-drained sites. These stands lack a thick moss layer and mineral soil lays close to the surface.

Mature **White Spruce**, usually with some paper birch, forms narrow stands on short slopes bordering much of the shore of Chappie Lake. On lower slopes on the northeast end of the lake, mature white spruce reaches to about 20 m, with diameters over 30 cm. Dead leaning snags and logs on the ground are abundant. Green alder, rose, Labrador tea, and willow form a dense shrub layer over an open layer of lowbush cranberry and a continuous carpet of feathermoss.

White Spruce and Paper Birch stands along shore of Chappie Lake

Regeneration in the 1989 Burn on the low hills, formerly dominated by black spruce stands, consists of abundant Labrador tea, with scattered young paper birch, white spruce, shrub birch, blueberry, spiraea, and willow. Herbs such as woodland horsetail, cloudberry, fireweed and coltsfoot are typical of this habitat, along with bluejoint grass, scattered lowbush cranberry, *Cladonia* lichens, and small clumps of mosses such as sphagnum, *Polytrichum* sp., and feathermoss. Patches of charred sphagnum moss hummocks and occasional bare ground are also present. Dead, charred, thin and leaning snags and logs on the ground are abundant. A hole dug in one of the charred hummocks revealed 5 cm of dead fibric moss remains over more than 35 cm of moist heavy clay, with traces of free water at the bottom. No frozen ground was encountered at this depth.

Regeneration in the 1989 burn on the southwest side of Chappie Lake

Regeneration in the 1969 burn west of Chappie Lake was seen only from the air. It appeared to be similar to that of the 1989 burn, except that cover of shrubs and young trees was denser and taller.

A narrow, low, level terrace at the south end of Chappie Lake supports lush shrub-grass-herb vegetation, dominated by bluejoint, scattered willow, young paper birch, red currant, raspberry, fireweed and other herbs. A hole dug at this site revealed about 35 cm of red-brown fibric humus (probably derived from former shore vegetation) over gray sandy silt. Farther along this terrace is an open stand of paper birch burned in the 1989 fire, with a grassy understory. Similar stands were not seen elsewhere in the areas investigated.

Wetlands

The abundant wetlands in the area include lacustrine marshes, shallow open water, riparian shrub swamps, and bogs and fens. Marshes occur along the shores of Chappie Lake and other lakes in the area with mineral substrates, and support grasses, sedges, and various forbs. Shallow open water along lake shores and in ponds supports aquatic and emergent species such as pondweeds, bur-reed, pond-lilies, and water horsetail. Riparian swamps are common along creeks and small drainage ways, and support thickets of willow and sometimes shrub birch. Bogs and fens occur in the many thermokarst depressions in the area, forming wetland complexes with peat plateaus, ponds and small lakes.

Nomenclature for the wetland types discussed in this report is according to The Canadian Wetland Classification System (National Wetlands Working Group 1997).

Wetland Types – Marshes and Shallow Open Water

Chappie Lake has an exposed marshy shoreline which slopes very gently to open water from the break in slope at the base of the surrounding low hills. The shoreline varies in width from several meters to more than 30 m in places. No sand, gravel or rocks were seen along the shoreline, which was densely vegetated except at the south end, where partially-vegetated reddish-brown muck and grayish mud were exposed at the water's edge. Soft sediments also cover the lake bottom, but a solid base was felt with the end of a paddle.

Chappie Lake is very shallow throughout its expanse, being only 60 cm deep at the time of our visit. (However, it was somewhat higher when seen from the air in mid-July, after several days of rain). The lake water is brownish in colour and turbid, with abundant algal plankton. Aquatics such as pondweed and bur-reed are abundant throughout the lake, with small patches of pond-lilies in some parts. Arrowhead (*Sagittaria cuneata*) is also present, and this constitutes a significant range extension from the nearest known Yukon location along the Nordenskiold River. Arrowhead is considered to be a rare species in the Yukon (Cody et al. 2000). Water horsetail forms large stands at the lake edge, as well as occurring intermixed with other shore vegetation.

The shoreline vegetation forms more or less parallel bands of variable widths inland from the shallow open water. Water horsetail, grasses and sedges (mainly *Arctophila fulva*, *Carex aquatilis* and *C. utriculata*) dominate the wettest parts of the shores, with bluejoint and herbs such as large-leaved avens, marsh fivefinger, fireweed, chickweed, and others, intermixed farther in on drier ground..

Water Horsetails along the shore of Chappie Lake

Other Lakes with mineral substrates were visited south of Chappie Lake and support similar shoreline and aquatic vegetation. Sand and small rounded and flat rocks were seen along the shore of one of the larger lakes. Some of the lakes, as well as some larger ponds in the organic wetland complexes, had sign of past and present beaver activity, including chewed trees and flooded areas with many standing dead trees and stubs.

Wetland Types – Bogs and Fens

Most of the many ponds, bogs and fens in the wetlands surrounding Chappie Lake are of thermokarst origin, i.e. more or less circular subsidence of localized areas resulting from the melting of permafrost. Many of these collapse scars are isolated basins surrounded by burned or unburned Black Spruce/Labrador Tea/Sphagnum veneer bogs on mineral soil, or by peat plateaus supporting burned or unburned open stands of scraggly small Black Spruce/Labrador Tea/Sphagnum-Lichen. Others are connected to neighboring collapse scars and ponds by small sluggish drainage channels choked with willows, and are surrounded by similar forests on mineral soil and peat plateaus. The banks of the collapse scars rise 1-2 m above the level surface of the depressions. Many are actively thawing, as evidenced by trees at the edges leaning toward or falling into the depression, broken-off and slumping peat on the banks, and by visible trickles of muddy water from melting permafrost where mineral soil is exposed.

Slumping bank and moat on thermokarst pond caused by permafrost melting

Collapse scars with little or no mineral soil contact hold small bogs and fens. At the edge of a typical **Collapse Scar Bog** in a peat plateau is a narrow "moat"of water, infilling with yellow-green *Sphagnum recurvum*. Inward towards the center of the bog is a wet, semi-consolidated "quaking" mat of red and red-brown *Sphagnum spp.*, which gives the bog a characteristic reddish appearance both on the ground and from the air. Scattered over the sphagnum mat are sedges (usually *Carex aquatilis* and *C. limosa*), cottongrass, bulrush, sundew, the dwarf shrubs bog rosemary and bog cranberry, and, where the substrate is somewhat more solid, the low shrubs bog laurel and leatherleaf. Occasionally, low hummocks of *Sphagnum fuscum*, supporting a few small stunted black spruce and tamarack, may be present. Pools of open water of variable size, supporting buckbean and marsh fivefinger, are also common in the bog pools.

Collapse Scar Fens are common features in the veneer bogs, and they generally have varying amounts of thawing mineral soil, as well as peat, at the edges of the scars. Species characteristic of bogs are present in these fens, but sedges are more abundant and tamarack may be present along the edges, as well as low willow (*Salix fuscescens*) and sweet gale, leatherleaf, and other ericaceous shrubs in more consolidated parts. Pools of open water are usually present, in which buckbean and marsh fivefinger grow.

Carex-Sphagnum Fen north of Chappie Lake

Other Fens occur around ponds and are more influenced by the surrounding thawing mineral soil. They are usually connected with other fens and ponds via small sluggish drainage channels, and are usually more irregular in outline. They sometimes contain low "fen hummocks" (low mounds of peat) and palsas (mounds of peat with a frozen peat or mineral core, which rise to several meters or more above the surrounding area). These may support open black spruce, shrub birch, Labrador tea and other ericaceous shrubs, sphagnum, and lichens. These fens often have a narrow moat of water

and sphagnum moss along parts of the edges, as well as shore fens extending out from the edges as consolidated mats of peat, and floating fens of wet, "quaking" peat mats over shallow water. The dominant mosses underlying the dense cover of sedges and bluejoint are mainly brown mosses (*Calliergon*, *Drepanocladus*, etc.). Large pools of shallow open water are usually present, with water horsetail, buckbean, marsh fivefinger, pond-lily, and sometimes pondweeds and *Calla palustris* growing in or around them. Willow, shrub birch, shrubby cinquefoil, and ericaceous shrubs are common on the drier parts of the fens.

A number of **String Fens** (fens with low peat ridges oriented in a netlike or ladder-like pattern), west and northwest of Chappie Lake, were seen on aerial photos and from the air, but were not visited.

Wetland Types – Riparian Shrub Swamps

Riparian Shrub Swamps are common along small slow drainage channels between wetlands, and along larger creeks draining wetland areas. They typically support closed medium-height thickets of willows and sometimes shrub birch. Areas of sedges, bluejoint, and various herbs are often present at the edges, and mosses such as *Rhizomnium*, *Drepanocladus*, and *Sphagnum spp*. may be present beneath the shrubs.

Willow Swamp along a drainage way on the east side of Chappie Lake

Butterflies

We captured butterflies incidentally as we conducted our other field work. We were able to capture at least one specimen of all the species we saw. In all, we identified 5 species of butterflies (Table 1). Our observation of the Silver-bordered Fritillary represents a significant range extension north in the Yukon—previous observations reported in Layberry et al. (1998) were all south of the Stewart River. Philip's Arctic is a species restricted to a Beringean distribution.

Table 1. Butterflies identified in the Chappie Lake Wetlands (taxonomy as per Layberry et al. 1998).

Family	Species	Common Name	Habitat Observed
Pieridae	*Pieris angelika*	Arctic White	Grass-sedge marsh
	Colias pelidne	Pelidne Sulphur	Grass-sedge marsh
Nymphalidae	*Boloria selene atrocostalis*	Silver-bordered Fritillary	Grass-sedge marsh
	Limenitis arthemis	White Admiral	Grass-sedge marsh
	Oeneis rosovi	Philip's Arctic	Black spruce bog

Silver-bordered Fritillary

Philip's Arctic

Fish

We brought in nets, minnow traps, and angling gear, intending to survey the fish in Chappie Lake and the surrounding area. However, it soon became apparent that Chappie Lake did not have any fish in it. We observed no fish or signs of fish feeding in the lake. Given its very shallow depth, the lake likely freezes to the bottom in winter. We set minnow traps baited with salmon eggs for 8 trap days on the northern outlet and northeastern inlet creeks, and did not catch any fish. We did, however, observe northern pike (*Esox lucius*) on two of the small lakes south of Chappie Lake (labeled #23 and #26 on the map in Appendix C). We did not net these lakes to look for the presence of other species of fish. This is consistent with the experience of Woody Elias—he had never found any fish in Chappie Lake, but had caught pike in several of the smaller lakes to the south.

Birds

Methods

The objective of the bird work was to conduct a broad inventory of wetland and forest birds (comparable to inventories carried out at the Nisutlin Lake basin, the Red River Lakes and the Hyland River; see Mossop, 1999, 2000, 2001). Generally, the Chappie Lake basin was the area surveyed. Systematic bird surveys involved standardized point and transect counts of singing birds, standardized total counts of waterbirds, as well as broad reconnaissance by canoe and foot. A list of the scientific names of the birds observed is given in Appendix B.

Diving ducks like Buffleheads and sea ducks were the most abundant waterbirds

General Results

A good variety of bird habitats were identified: a) the extensive emergent sedge marshes extending off the lake and nearby ponds, b) riparian shrub communities, c) many small water bodies isolated from the large lake, d) at least three stream valleys connected to the lake, d) open spruce forest habitats off the wetlands (much of which had been burned in the recent past), and e) the surface of the large shallow (Chappie) lake itself. With the mix of wetlands, wet boreal forest, ponds, and the larger lake, the basin showed a good mix of bird habitats. Breeding birds were unfortunately well into brood rearing by the time of the survey; there was virtually no singing to aid in inventory.

On first impression, a key feature of the area was the larger lake, obviously providing major staging habitat for waterbirds. Fairly healthy use of the area by top-of-the-food-chain predators was evident (suggesting a relatively diverse community). The songbird community on first impression was typical-to-low in diversity compared to similar habitat in the northern Yukon such as the Old Crow Flats and the nearby Caribou Lakes wetland (Mossop, 1977, 2001).

Birds of Prey

Top predators are some of the most powerful indicators of ecosystem diversity and productivity. As noted, the field observations suggest a relatively rich fauna of raptors: 5 species, 8 observations in 5 days afield. Bald Eagles were actively hunting waterbirds virtually all the time. Adult Peregrine Falcons were seen making at least two hunting flights and, on one occasion, a successful falcon was seen being pursued by a Bald Eagle. The 'center' of this activity was apparently the large shallow lake basin of Chappie Lake itself, suggesting a keystone resource. Many of the natural processes of the wetland in general seem to be dependent, at least in part, upon the lake (moulting waterfowl, brood rearing etc).

Predatory Herring Gulls were also observed hunting the shoreline, apparently for young ducklings. One adult gull was observed capturing and eating all of the ducklings of a Mallard brood (at least 6 young). No Herring Gulls were found nesting in the immediate area; the birds were apparently travelling from a nesting site specifically to hunt the shores of Chappie Lake.

Waterbirds –Water Bodies Surveyed

Waterbirds are excellent indicator species of the productivity of a region's wetlands. The relatively flat topography of the lake basin has created a good mix of water bodies throughout the area. Immediately accessible from the lake itself, we found 25 ponds that we could visit.

Ponds visited ranged from a single hectare in size to one that was about 50 hectares (excluding the large Chappie Lake, which was about 400 ha). Most appeared to be either fens or bogs. Of the 25, ten were advanced bogs, completely covered over with

floating mats into which shrubs and trees (*Larix laricina*) were invading. The average pond was about 2.1 hectares. Several of the ponds (5) were obviously actively thermokarsting. The ponds showed a relatively high degree of emergent vegetation community development. (Over 94% of shorelines displayed emergent vegetation and 12 of the 25 either had islands of emergent vegetation or were completely covered.) Only 44% of the total water body surfaces visited was open water (42.5 ha of 96.5 ha). Emergent vegetation was a mix of sedge species and aquatic grasses that often formed floating mats over the edges of the ponds. Yellow water lily (spatter dock) occurred in seven ponds (see Appendix C).

Other indicators of wetland productivity noted were fresh moose (*Alces alces*) sign at all of the ponds (observations of moose at two ponds); sign or observations of muskrat (*Ondatra zibethicus*) and beaver (*Castor canadensis*) at 8 ponds; wood frogs (*Rana sylvaticus*) at 2 of 25 ponds, and dense hatches of midges (Caronamid species) and other aquatic insects (notably mosquitoes) noted at most.

Scaup and other divers were in the first stages of hatching during the early July field work

Waterbirds – Waterbird Populations

Complete counts of the waterbirds were taken at each water body. Twenty-two species of waterbirds were found in the basin (20 were found at the nearby Caribou Lakes wetland in 1979).

A total of 1,003 waterbirds were counted, including those on the surface of Chappie Lake, or approximately 2.3 birds per ha of water surface. Of the waterbird species recorded, Lesser Scaup (33% of observations), American Wigeon, Northern Pintail and Northern Shoveler were the most commonly encountered, accounting for 79% of observations (Table 2). As at the Caribou Lakes the number of waterbirds is lower than on most low elevation wetlands in the Southern Yukon. The species mix was typical—Lesser Scaup are the most common breeding waterbird in most Yukon wetlands. Canada Geese were heard calling from the Bonnet Plume River valley to the east, where they are known to nest. Pacific Loons were found to be fairly common, breeding on the smaller ponds (4 territorial pairs).

Table 2. The relative abundance of waterbirds recorded from standardized ground counts in the Chappie Lake wetlands, July 2002.

Species	Percent in Count
Lesser Scaup	32.9
American Wigeon	21.0
Northern Pintail	15.0
Northern Shoveller	10.0
Green-winged Teal	8.0
Ring-necked Duck	1.8
Surf Scoter	1.5
White-winged Scoter	1.5
Mew Gull	1.3
Mallard	1.1
Pacific Loon	0.7
Bufflehead	0.7
Canvasback	0.5
Redhead	0.5
Blue-winged Teal	0.3
Tundra Swan	0.2
Herring Gull	0.1
Oldsquaw	0.1
Gadwall	0.1

Our estimate of breeding is weak and minimum; most divers were not hatched, and virtually no species were still in pairs. We found 34 obviously breeding pairs, broods, or nests (see Table 3; nest and brood data are given in Appendix D). Eliminating the basins filled by bog, we calculated a density of 1 pair per 14.3 ha of water surface, or 1 pair per 1.23 ha if Chappie Lake is eliminated.

Table 3. Breeding pairs of waterbirds on ponds in the Chappie Wetland basin, 2002. Twenty-five ponds, totaling 440 ha of water surface were surveyed.

Species	# of Defending Pairs, Nests, or Broody Females	# of Pairs per Pond	# of Pairs per Hectare (including Chappie Lake)	# of Pairs per Hectare (not including Chappie Lake)
Pacific Loon	4	0.16	0.009	0.09
Tundra Swan	1	0.04	0.002	0.02
Mallard	5	0.20	0.010	0.10
Green-winged Teal	5	0.20	0.010	0.10
American Wigeon	7	0.28	0.020	0.16
Northern Pintail	2	0.08	0.004	0.05
Ring-necked Duck	1	0.04	0.002	0.02
Lesser Scaup	8	0.32	0.020	0.19
White-winged Scoter	1	0.04	0.002	0.02
TOTAL	**34**	**1.36**	**0.070**	**0.81**

Waterbirds – Staging Waterbirds

The surface of Chappie Lake itself was being used by flocks of waterbirds throughout our stay. Arriving (and perhaps departing) flocks were heard and observed every evening and night. It is likely the site was being used by more birds than were actually counted during our daily counts (see Table 4).

The surface of the lake (the largest lake in the immediate area), its shallow aquatic beds, and its emergent community covering the entire shoreline is clearly providing a key resource to the wetland community. Moulting, pre-migrational staging, and brood rearing were all observed. (It is likely that most, if not all, broods end up moving to the lake from the surrounding wetlands as they mature.) The numbers of waterbirds accumulating on the lake even at this early date suggests a fairly large area of northern Yukon waterbirds being 'served' by this valuable staging habitat.

Table 4. Average of three counts of waterbirds using the surface of Chappie Lake, July 1-6, 2002.

Species	Average Count
Tundra Swan	12
Mallard	100
Green-winged Teal	75
American Wigeon	200
Northern Pintail	150
Northern Shoveler	100
Blue-winged Teal	3
Canvasback	5
Redhead	5
Ring-necked Duck	15
Greater Scaup	25
Lesser Scaup	300
White-winged Scoter	15
Surf Scoter	15
Bufflehead	5
Mew Gull	12
Herring Gull	1

Songbirds and Avian Species Richness

Most songbirds were not singing, and most encountered were apparently on breeding territories feeding young. The area is wetland, open shrub and open boreal forest; wet meadows, riparian shrub and open burned boreal forest were the apparent hot spots.

Five daily 'list' counts were made. Point counts and listening transects proved unproductive, simply because singing was well past its peak. We recorded an average of 20 species (excluding waterbirds) in each count, and a total of 27 species (Table 5). The area was characterized by Yellow-rumped Warblers, Ruby-crowned Kinglets, American Robins, Savannah Sparrows and White-crowned Sparrows.

We cannot calculate a breeding density from our data. The diversity of species is difficult to compare to other similar sites because few of these birds were singing and they were therefore were 'invisible' to normal birding technique.

A complete list of our observations of birds in the wetlands is given in Table 6.

Table 5. The relative abundance of bird species from daily list counts in the Chappie Lake basin, 2002.

Species	Number of Counts Recorded (of 5)
Savannah Sparrow	5
American Robin	4
Yellow-rumped Warbler	4
White-crowned Sparrow	4
White-winged Crossbill	4
Lesser Yellowlegs	3
Gray Jay	3
Ruby-crowned Kinglet	3
Northern Waterthrush	3
Fox Sparrow	3
Semipalmated Plover	2
Common Snipe	2
Alder Flycatcher	2
Hammond's Flycatcher	2
Common Raven	2
Gray-cheeked Thrush	2
Swainson's Thrush	2
Yellow Warbler	2

Table 5 (continued). The relative abundance of bird species from daily list counts in the Chappie Lake basin, 2002.

Species	Number of Counts Recorded (of 5)
American Tree Sparrow	2
Dark-eyed Junco	2
Solitary Sandpiper	1
Red-necked Phalarope	1
Boreal Chickadee	1
Hermit Thrush	1
Bohemian Waxwing	1
Blackpoll Warbler	1
Lincoln's Sparrow	1

Table 6. Observations of birds in the Chappie Lake wetlands, 2002 (C = common, seen most days in appropriate habitat; AB = abundant, seen virtually every observation session; B = breeding records exist). Three days of field work logged 58 species, including observations in addition to the standardised counts.

Group	Species	# Jul. 1	# Jul. 2	# Jul. 3	# Jul. 4	# Jul. 5	Comments
Loons	Pacific Loon			2	2	2	Ad. w/ 2 yn
Grebes	Horned Grebe	1			1		
Waterfowl	Tundra Swan	6	11	9	9		
	Canada Goose			5			Heard only
	Mallard	5	10	5	5	10	4 broods
	Gadwall		4		5		
	Green-winged Teal	10	3	4	4		4 broods
	American Wigeon	C	C	C	C	C	Several broods
	Northern Pintail	5	15	150	50	5	1 brood
	Northern Shoveler	100	2	200	100	5	Flocks, mostly male

Table 6 (continued). Observations of birds in the Chappie Lake wetlands, 2002 (C = common, seen most days in appropriate habitat; AB = abundant, seen virtually every observation session; B = breeding records exist). Three days of field work logged 70 species, including observations in addition to the standardised counts.

Group	Species	# Jul. 1	# Jul. 2	# Jul. 3	# Jul. 4	# Jul. 5	Comments
Waterfowl	Blue-winged Teal	1			3		All males
	Canvasback	5					1F, 4M
	Redhead	3					All males
	Ring-necked Duck	3			5		
	Greater Scaup	20	2		30		
	Lesser Scaup	300	2	C	C		Sev. broods
	White-winged Scoter	15					
	Surf Scoter	15					
	Oldsquaw				1	4	
	Bufflehead	2		5			
Birds of Prey	Northern Harrier					1	
	Bald Eagle			1	1	1	Adults
	Northern Goshawk				1		
	Red-tailed Hawk			1			
	Peregrine Falcon				1	1	Ad., hunting
Cranes	Sandhill Crane		2				
Shorebirds	Semipalmated Plover			2		2	
	Lesser Yellowlegs		3	3	3		
	Solitary Sandpiper		1				Breeding, w/ young
	Common Snipe		1		1		
	Red-necked Phalarope			1			

Table 6 (continued). Observations of birds in the Chappie Lake wetlands, 2002 (C = common, seen most days in appropriate habitat; AB = abundant, seen virtually every observation session; B = breeding records exist). Three days of field work logged 70 species, including observations in addition to the standardised counts.

Group	Species	# Jul. 1	# Jul. 2	# Jul. 3	# Jul. 4	# Jul. 5	Comments
Gulls	Mew Gull	10	15	1	11	8	B, defending
	Herring Gull	1	2				
Woodpeckers	Yellow-bellied Sapsucker						Bore holes only
Flycatchers	Alder Flycatcher				1	1	
	Hammond's Flycatcher			1		1	
Ravens, Jays	Gray Jay		2		3	1	
	Common Raven		1	1			
Chickadees	Boreal Chickadee					1	
Kinglets	Ruby-crowned Kinglet		3	2			
Thrushes	Gray-cheeked Thrush		1			2	
	Swainson's Thrush		3		2		
	Hermit Thrush	1					
	American Robin	1	2	1	5	3	Feeding young
Waxwings	Bohemian Waxwing			1			

Table 6 (continued). Observations of birds in the Chappie Lake wetlands, 2002 (C = common, seen most days in appropriate habitat; AB = abundant, seen virtually every observation session; B = breeding records exist). Three days of field work logged 70 species, including observations in addition to the standardised counts.

Group	Species	# Jul. 1	# Jul. 2	# Jul. 3	# Jul. 4	# Jul. 5	Comments
Wood Warblers	Yellow-rumped Warbler		5	2	5	5	
	Blackpoll Warbler				1		
	Yellow Warbler				1	1	
	Northern Waterthrush		1	1	3		
Sparrows	American Tree Sparrow		1	7	10	C	
	Fox Sparrow			1	2	2	
	Savannah Sparrow	1	3	1	1	1	Feeding young
	Lincoln's Sparrow					1	
	White-crowned Sparrow		1	1	1	5	
	Dark-eyed Junco				1	2	Feeding young
Blackbirds	Rusty Blackbird		5		3		
Finches	White-winged Crossbill			2	10	5	
	Common Redpoll			1		5	

Mammals

Small Mammals

We collected data on species of small rodents (mice and voles) present by setting live traps baited with oats and peanut butter. We used Ugglan Lemming Special traps, and checked them 3 times daily. We set traps in a variety of habitats near Chappie Lake: 6 trap days in the horsetails on the shore of Chappie Lake, 10 trap days on the horsetail-willow edge along the lake, 4 trap days in paper birch forest, 8 trap days in mixed paper birch-white spruce forest, 12 trap days in white spruce forest, 8 trap days in black spruce/feathermoss/sphagnum forest, 12 trap days in sedge marsh, and 10 trap days in the 1989 burn.

We caught 2 species of voles, the northern red-backed vole (*Clethrionomys rutilus*; 26 captures), and the chestnut-cheeked vole (*Microtus xanthognathus*; 21 captures). Red-backed voles were abundant in all spruce habitats and in the 1989 burn; they were not captured in open habitats. In contrast, chestnut-cheeked voles were very abundant in the lake shore and edge habitats with horsetails, and in the 1989 burn. Details of voles captured are given in Appendix E.

Tunnels of Chestnut-cheeked Voles through lake-shore horsetails

The abundance of these two species is consistent with regionally high numbers of both species this year. Populations of red-backed voles typically reach peak numbers 2-3 years after 10-year cyclical peaks in numbers of snowshoe hares (*Lepus americanus*; Boonstra et al. 2001). Little is known about the population dynamics of chestnut-cheeked voles, a species restricted to northwestern North America, but irruptions in numbers of these voles may occur about every 20 years (Conroy & Cook 1999).

Other Mammals

Moose were apparently abundant in these wetlands. As mentioned above, signs of moose were seen at all ponds visited. There were at least 1 single cow, 1 cow-and-calf pair, 1 yearling cow, and 1 young bull moose seen feeding in Chappie Lake while we were camped there. Woody Elias confirmed that he regularly saw and hunted moose in the wetlands.

We did not see any sign of caribou (*Rangifer rangifer*) in the area, but it is a part of the winter range of the Porcupine herd (Porcupine Caribou Technical Committee 1993). Tracks of caribou were seen along the Bonnet Plume River immediately to the east of the wetlands during an aerial reconnaissance in March 2002 (Sinnott 2002).

Beavers and muskrats were common in the wetlands, but were not using Chappie Lake itself. Woody Elias noted that both species used to use Chappie Lake—he last stayed at the lake in the mid-1980's—when the water level in the lake was higher.

Red squirrels (*Tamiasciurus hudsonicus*) were common in spruce forest habitats, and we also saw pellets from snowshoe hares at several sites. As was the case elsewhere in the Yukon, numbers of hares are apparently at a cyclical low here.

Moose and signs of moose were observed throughout the Chappie Lake wetlands

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Appendix A

List of Lichens and Plants found in the Chappie Lake Wetlands

Lichens (taxonomy as per Brodo et al. 2001)

Bryoria sp.
Cetraria cucullata (Bell.) Ach.
Cetraria islandica (L.) Ach.
Cladina mitis (Sandst.) Hale & W. Culb.
Cladina rangiferina (L.) Harm.
Cladina stellaris (Opiz) Brodo
Cladina stygia (Fr.) Ahti
Cladonia spp.
Cladonia amaurocraea (Florke) Schaer.
Cladonia botrytes (Hag.) Willd.
Cladonia cornuta L. Hoffm.
Cladonia deformis (L.) Hoffm.
Cladonia fimbriata (L.) Fr.
Cladonia gracilis s.l.
Cladonia verticillata (Hoffm.) Schaer.
Hypogymnia spp.
Icmadophila ericetorum (L.) Zahlbr.
Nephroma arcticum (L.) Torss.
Parmelia sulcata (L.) Ach.
Peltigera spp.
Peltigera aphthosa (L.) Willd.
Ramalina sp.
Stereocaulon sp.
Usnea spp.
Vulpicida pinastri Scop.

Bryophytes (taxonomy as per Vitt et al. 1993)

Aulacomnium palustre (Hedw.)
Brachythecium sp.
Calliergon sp.
Dicranum sp.
Hylocomium splendens (Hedw.) B.S.G.
Hypnum sp.
Pleurozium schreberi (Brid.) Mitt.
Polytrichum commune Hedw.
Polytrichum juniperinum Hedw.
Polytrichum strictum Brid.
Ptilidium sp.
Ptilium crista-castrensis
Sphagnum spp.
Sphagnum fuscum (Schimp.) Klinggr.
Shhagnum recurvum s. l.
Splachnum sp.
Tomenthypnum nitens (Hedw.) Loeske

Liverworts (taxonomy as per Vitt et al. 1998)

Marchantia polymorpha L.

Vascular Plants (taxonomy as per Cody 1996)

Growth Form	Family	Genus and Species	Common Name	Status
TREES	BETULACEAE	*Betula neoalaskana*	Paper Birch	
	PINACEAE	*Larix laricina*	Tamarack	
		Picea glauca s.l.	White Spruce	
		Picea mariana	Black Spruce	
	SALICACEAE	*Populus tremuloides*	Aspen	
SHRUBS AND DWARF SHRUBS	BETULACEAE	*Alnus crispa* s.l.	Green Alder	
		Alnus incana ssp. *tenuifolia*	Grey Alder	
		Betula glandulosa	Shrub Birch	
		Betula occidentalis	Water Birch	
	ERICACEAE	*Andromeda polifolia*	Bog Rosemary	
		Arctostaphylos rubra	Red Bearberry	
		Chamaedaphne calyculata	Leatherleaf	
		Kalmia polifolia	Bog-laurel	
		Ledum decumbens	Labrador Tea	
		Ledum groenlandicum	LabradorTea	
		Oxycoccus microcarpus	Bog Cranberry	
		Vaccinium uliginosum	Blueberry	
		Vaccinium vitis-idaea ssp.*minus*	Lowbush Cranberry	
	LYCOPODIACEAE	*Lycopodium annotinum* s.l.	Bristly Clubmoss	
	MYRICACEAE	*Myrica gale*	Sweet Gale	
	SALICACEAE	*Salix alaxensis* s.l.	Willow	
		Salix barratiana	Willow	
		Salix bebbiana	Long-beaked Willow	
		Salix fuscescens	Willow	Rare in YT
		Salix glauca	Blue-green Willow	
		Salix planifolia ssp.*planifolia*	Willow	
		Salix scouleriana	Scouler's Willow	

Growth Form	Family	Genus and Species	Common Name	Status
GRASSES	POACEAE	*Arctagrostis latifolia* s.l.		
		Arctophila fulva		
		Calamagrostis canadensis	Bluejoint	
		Poa sp.	Bluegrass	
SEDGES	CYPERACEAE	*Carex aquatilis*	Sedge	
		Carex canescens	Sedge	
		Carex limosa	Sedge	
		Carex livida	Sedge	Rare in YT
		Carex lugens	Sedge	
		Carex media	Sedge	
		Carex tenuiflora	Sedge	
		Carex utriculata	Sedge	
		Eleocharis acicularis	Slender Spikerush	
		Eleocharis palustris	Spikerush	
		Eriophorum sp.	Cottongrass	
		Eriophorum angustifolium	Cottongrass	
		Eriophorum scheuchzeri	Cottongrass	
		Scirpus caespitosus ssp. *austriacus*	Bulrush	
AQUATICS AND EMERGENTS	ALISMATACEAE	*Sagittaria cuneata*	Arrowhead	Rare in YT
	EQUISETACEAE	*Equisetum fluviatile*	Water Horsetail	
			Water Horsetail	
	LENTIBULARI-ACEAE	*Utricularia vulgaris* ssp. m*acrorhiza*	Bladderwort	
	MENYANTH-ACEAE	*Menyanthes trifoliata*	Buckbean	
	NYMPHAEACEAE	*Nuphar polysepalum*	Yellow Pondlily	Not sure which *Nuphar* spp.
		Nuphar variegatum	Bullhead Lily	
	POTAMOGETON-ACEAE	*Potamogeton alpinus* ssp. *tenuifolius*	Pondweed	
		Potamogeton gramineus	Variable-Leaved Pondweed	
		Potamogeton praelongus	White-Stemmed Pondweed	
		Potamogeton richardsonii	Pondweed	

Growth Form	Family	Genus and Species	Common Name	Status
AQUATICS AND EMERGENTS	POTAMOGETON-ACEAE	*Potamogeton zosteriformis*	Flat-Stemmed Pondweed	Rare in YT
	RANUNCUL-ACEAE	*Ranunculus gmelinii* s.l.	Buttercup	
	ROSACEAE	*Potentilla palustris*	Marsh Fivefinger	
	SPARGANIACEAE	*Sparganium* sp.	Bur-reed	
MARSH AND DRYLAND HERBS	APIACEAE	*Cicuta virosa*	Water Hemlock	
	ARACEAE	*Calla palustris*	Wild Calla	
	BRASSICACEAE	*Draba* sp.		
		Rorippa palustris s.l.	Yellow Cress	
	CALLITRICH-ACEAE	*Callitriche verna*	Water Starwort	
	CARYOPHYLL-ACEAE	*Moehringia lateriflora*		
		Stellaria borealis	Chickweed	
		Stellaria crassifolia	Chickweed	
		Stellaria longifolia	Chickweed	
		Stellaria longipes	Chickweed	
	COMPOSITAE	*Petasites frigidus* ssp. *nivalis*	Coltsfoot	
		Senecio sp.	Groundsel	
		Senecio congestus	Groundsel	
	DROSERACEAE	*Drosera anglica*	Sundew	Rare in YT
		Drosera rotundifolia	Sundew	
	EMPETRACEAE	*Empetrum nigrum* ssp. *hermaphroditicum*	Crowberry	
	EQUISETACEAE	*Equisetum arvense*	Field Horsetail	
		Equisetum sylvaticum	Woodland Horsetail	
		Equisetum fluviatile	Water Horsetail	
	ONAGRACEAE	*Epilobium angustifolium*	Fireweed	
		Epilobium ciliatum		
		Epilobium palustre		

Growth Form	Family	Genus and Species	Common Name	Status
MARSH AND DRYLAND HERBS	ORCHIDACEAE	*Platanthera hyperborea*	Northern Green Orchid	
	POLEMONIACEAE	*Polemonium acutiflorum*	Jacob's-ladder	
	POLYGONACEAE	*Polygonum alaskanum*	Wild Rhubarb	
		Rumex arcticus	Arctic Dock	
	PYROLACEAE	*Orthilia secunda*	One-sided Wintergreen	
		Pyrola asarifolia	Pink Pyrola	
		Pyrola grandiflora	Arctic Wintergreen	
	RANUNCUL-ACEAE	*Ranunculus hyperboreas*	Arctic Buttercup	
		Ranunculus sceleratus ssp. *multifidus*	Celery-Leaved Buttercup	
	ROSACEAE	*Geum macrophyllum* ssp. *perincisum*	Large-leaved Avens	
		Potentilla fruticosa ssp.*floribunda*	Shrubby Cinquefoil	
		Potentilla norvegica		
		Potentilla palustris	Marsh Fivefinger	
		Rosa acicularis	Prickly Rose	
		Rubus arcticus s.l.	Dwarf Raspberry	
		Rubus chamaemorus	Cloudberry	
		Rubus idaeus	Wild Red Raspberry	
		Spiraea beauverdiana	Spiraea	
	RUBIACEAE	*Galium boreale*	Bedstraw	
		Galium trifidum	Bedstraw	
	SANTALACEAE	*Geocaulon lividum*	Northern Commandra	

Growth Form	Family	Genus and Species	Common Name	Status
MARSH AND DRYLAND HERBS	SAXIFRAGACEAE	*Chrysosplenium tetrandrum*	Golden Saxifrage	
		Parnassia palustris var.*neogaea*	Grass-of-Parnassus	
		Ribes glandulosum	Skunk Currant	
		Ribes triste	Red Currant	
	SCROPHULARI-ACEAE	*Pedicularis labradorica*	Labrador Lousewort	
	VIOLACEAE	*Viola* sp.	Violet	

Appendix B

Scientific Names of Birds Observed in the Chappie Lake Wetlands

(Taxonomy as per National Geographic Society 1987)

Group	Family	Scientific Name	Common Name
Loons	Gaviidae	*Gavia pacifica*	Pacific Loon
Grebes	Podicipedidae	*Podiceps auritus*	Horned Grebe
Waterfowl	Anatidae	*Cygnus columbianus*	Tundra Swan
		Branta canadensis	Canada Goose
		Anas platyrhynchos	Mallard
		Anas strepera	Gadwall
		Anas crecca	Green-winged Teal
		Anas americana	American Wigeon
		Anas acuta	Northern Pintail
		Anas clypeata	Northern Shoveler
		Anas discors	Blue-winged Teal
		Aythya valisineria	Canvasback
		Aythya americana	Redhead
		Aythya collaris	Ring-necked Duck
		Aythya marila	Greater Scaup
		Aythya affinis	Lesser Scaup
		Melanitta fusca	White-winged Scoter
		Melanitta perspicillata	Surf Scoter
		Clangula hyemalis	Oldsquaw
		Bucephala albeola	Bufflehead
Birds of Prey	Accipitridae	*Circus cyaneus*	Northern Harrier
		Haliaeetus leucocephalus	Bald Eagle
		Accipiter gentilis	Northern Goshawk
		Buteo jamaicensis	Red-tailed Hawk
	Falconidae	*Falco peregrinus*	Peregrine Falcon

Group	Family	Scientific Name	Common Name
Cranes	Gruidae	*Grus canadensis*	Sandhill Crane
Shorebirds	Charadriidae	*Charadrius semipalmatus*	Semipalmated Plover
	Scolopacidae	*Tringa flavipes*	Lesser Yellowlegs
		Tringa solitaria	Solitary Sandpiper
		Gallinago gallinago	Common Snipe
		Phalaropus lobatus	Red-necked Phalarope
Gulls	Laridae	*Larus canus*	Mew Gull
		Larus argentatus	Herring Gull
Woodpeckers	Picidae	*Sphyrapicus varius*	Yellow-bellied Sapsucker
Flycatchers	Tyrannidae	*Empidonax alnorum*	Alder Flycatcher
		Empidonax hammondii	Hammond's Flycatcher
Ravens, Jays	Corvidae	*Perisoreus canadensis*	Gray Jay
		Corvus corax	Common Raven
Chickadees	Paridae	*Poecile hudsonicus*	Boreal Chickadee
Kinglets	Regulidae	*Regulus calendula*	Ruby-crowned Kinglet
Thrushes	Turdidae	*Catharus minimus*	Gray-cheeked Thrush
		Catharus ustulatus	Swainson's Thrush
		Catharus guttatus	Hermit Thrush
		Turdus migratorius	American Robin
Waxwings	Bombycillidae	*Bombycilla garrulus*	Bohemian Waxwing

Group	Family	Scientific Name	Common Name
Wood Warblers	Parulidae	*Dendroica coronata*	Yellow-rumped Warbler
		Dendroica striata	Blackpoll Warbler
		Dendroica petechia	Yellow Warbler
		Seiurus noveboracensis	Northern Waterthrush
Sparrows	Emberizidae	*Spizella arborea*	American Tree Sparrow
		Passerella iliaca	Fox Sparrow
		Passerculus sandwichensis	Savannah Sparrow
		Melospiza lincolnii	Lincoln's Sparrow
		Zonotrichia leucophrys	White-crowned Sparrow
		Junco hyemalis	Dark-eyed Junco
Blackbirds	Icteridae	*Euphagus carolinus*	Rusty Blackbird
Finches	Fringillidae	*Loxia leucoptera*	White-winged Crossbill
		Carduelis flammea	Common Redpoll

Appendix C

Characteristics of Ponds Surveyed for Waterfowl

No.	Class	Shape[1]	Size (ha)	% Shore with Emerg. Veg.	Width of Emerg. Veg. Band (m)	% of Pond Covered with Emerg. Veg.	# of Islands	% of Shore with Shrubs	Karst[2]	Spatter Dock Present? [3]
1	Chappie Lake									
2	Bog	2.5	3	100	- -	100	0	100	0	
3	Bog	1	1	100	- -	100	0	100	0	
4	Bog	3	2	100	- -	100	0	100	0	
5	Bog	1	2	100	- -	100	0	100	1	
6	Bog	3	2	100	- -	75	0	100	0	
7	Fen	1	2	100	30	50	0	100	0	
8	Fen	3	2	95	3	50	0	100	0	Yes
9	Fen	1	2	100	30	50	0	100	1	
10	Bog	2	4	- -	- -	- -	0	100	0	
11	Fen	1	2	99	20	40	2	100	1	Yes
12	Fen	2	50	100	20	10	0	50	1	Yes
13	Fen	1	2	100	30	10	0	80	- -	Yes
14	Fen	1	5	5	5	5	0	80	0	
15	Bog	1	1	100	- -	100	0	100	0	
16	Bog	1	2	100	- -	100	0	100	0	
17	Fen	1	4	75	3	5	0	80	5	
18	Fen	2	3	100	15	70	0	10	0	Yes
19	Bog	1	0.5	100	- -	100	0	- -	0	
20	Bog	1	0.5	100	- -	100	0	- -	0	
21	Bog	1	0.5	100	- -	100	0	- -	0	
22	Fen	2	2	100	10	50	0	- -	0	Yes
23	Fen	1	4	100	15	50	1	- -	0	
24	Fen	2	3	100	30	50	5	- -	0	Yes
25	Bog	1	1	100	- -	50	0	- -	0	

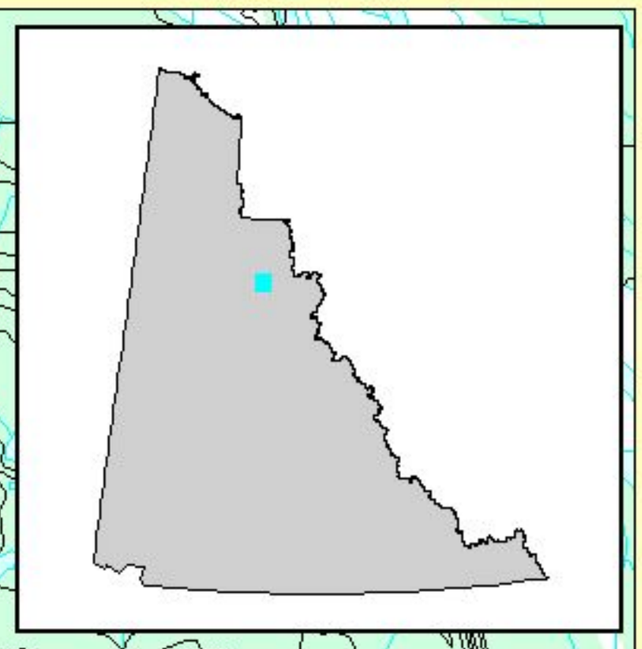
[1] Scale from 1 (round pond with no shoreline irregularities) to 4 (very convoluted shorelines).
[2] Percentage of shoreline with thermokarst holes and slumping.
[3] Spatter dock takes a long time to establish, so its presence is an indication of well-developed, stable waterbodies.

Chappie Lake Wetlands

Scale 1:50,000

500 0 500 1000 1500 Meters

Albers Equal Area projection (standard parallels: 61°40'N & 68°00'N)



135°00'

65°50'

65°50'

Chappie Lake

BONNET PLUME RIVER

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

DIGITAL DATA SOURCES AND DISCLAIMERS

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Box 310
Mayo, Yukon Y0B 1M0
16 January 2003

135°00'

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Appendix D

Nests and Broods of Waterbirds in the Chappie Lake Wetlands

Species	Nest or Brood?	Observation[1]	Date
Pacific Loon	Brood	1yn + 2ad	July 4
Tundra Swan	Brood	7(1b) + 2ad	July 1-5
Mallard	Brood	6(1a) + F	July 2
	Brood	5(1b) + F	July 4
	Brood	7(1b) + F	July 4
	Brood	5(1c) + F	July 5
Green-winged Teal	Brood	7(1a) + F	July 3
	Brood	7(1a) + F	July 5
American Wigeon	Brood	7(1a) + F	July 3
	Brood	7(1a) + F	July 5
Northern Pintail	Brood	5(2a) + F	July 5
	Brood	7(1b) + F	July 5
Lesser Scaup	Nest	9e + F	July 2
	Nest	10e + F	July 2
	Nest	9e + F	July 4

[1]Abbreviations as follows:

ad = adult
e = egg
F = adult female
yn = young
(1a) = chicks, approx. 1-6 days old
(1b) = chicks, approx. 6-12 days old
(1c) = chicks, approx. 13-18 days old
(2a) = chicks, approx. 19-25 days old

Appendix E

Captures of Small Mammals in the Chappie Lake Wetlands

	Red-backed Vole	Chestnut-cheeked Vole
Captures		
Total[1]	26	21
Males	10	9
Females	13	7
Body Size		
Weight (g) (Median, Range)	21 (13-43)	29 (22-88)[2]
Total Length (mm) (Median, Range)	109 (102-137)	120 (106-216)
Tail Length (mm) (Median, Range)	26 (24-32)	30 (26-45)
Habitat		
Horsetails	0	5
Horsetail-Willow Edge	0	7
Sedge Marsh	0	0
1989 Burn	5	6
Paper Birch	0	3
Mixed Paper Birch-White Spruce	11	0
White Spruce	8	0
Black Spruce/ Feathermoss/ Sphagnum	2	0

[1]The sexes of 3 red-backed voles and 5 chestnut-cheeked voles were not determined.
[2]All chestnut-cheeked voles captured weighed less than 40 g except for one 88-g male, and another very large animal that escaped before being weighed. Chestnut-cheeked voles are one of the largest species of voles, and large adults may reach 170 g (Conroy & Cole 1999).