THE DIVERSITY AND ABUNDANCE OF PASSERIFORMES IN THE SEKULMUN WETLAND, YUKON TERRITORY

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Research funded in part by:

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1.0 INTRODUCTION

This study examines the Passeriforme (perching bird) population within the Sekulman wetland complex, located in the Yukon Plateau Mountain Range of south-western Yukon Territory. Field work was conducted from June 1 to July 4, 1996 under the supervision of David Mossop of Yukon College and the Renewable Resources Department of the Yukon Territorial Government. The study is intended as a contribution to the overall biological database being compiled by Mossop in his efforts to achieve a better understanding of the ecological systems at work in this wetland. Although the study concentrates on the Passeriforme population, all field observations have been included.

1.1 STUDY SITE: SEKULMAN WETLAND

The Sekulman wetland complex is in the Aishihik Lake area (see map 1.0), bordering the eastern edge of the Ruby Mountain Range of the Yukon Plateau in southwestern Yukon (61 26'N lat. and 137 15' long). Straddling the Tahgah River (also known as Sekulman River and Link Creek), the wetland is part of the Aishihik Lake Environmentally Significant Area, identified as such in the Yukon Environmentally Significant Areas Series, published by the President's Committee on Northern Studies, University of Waterloo (Bastedo et al., 1986)

1.1.1 Abiotic Aspects

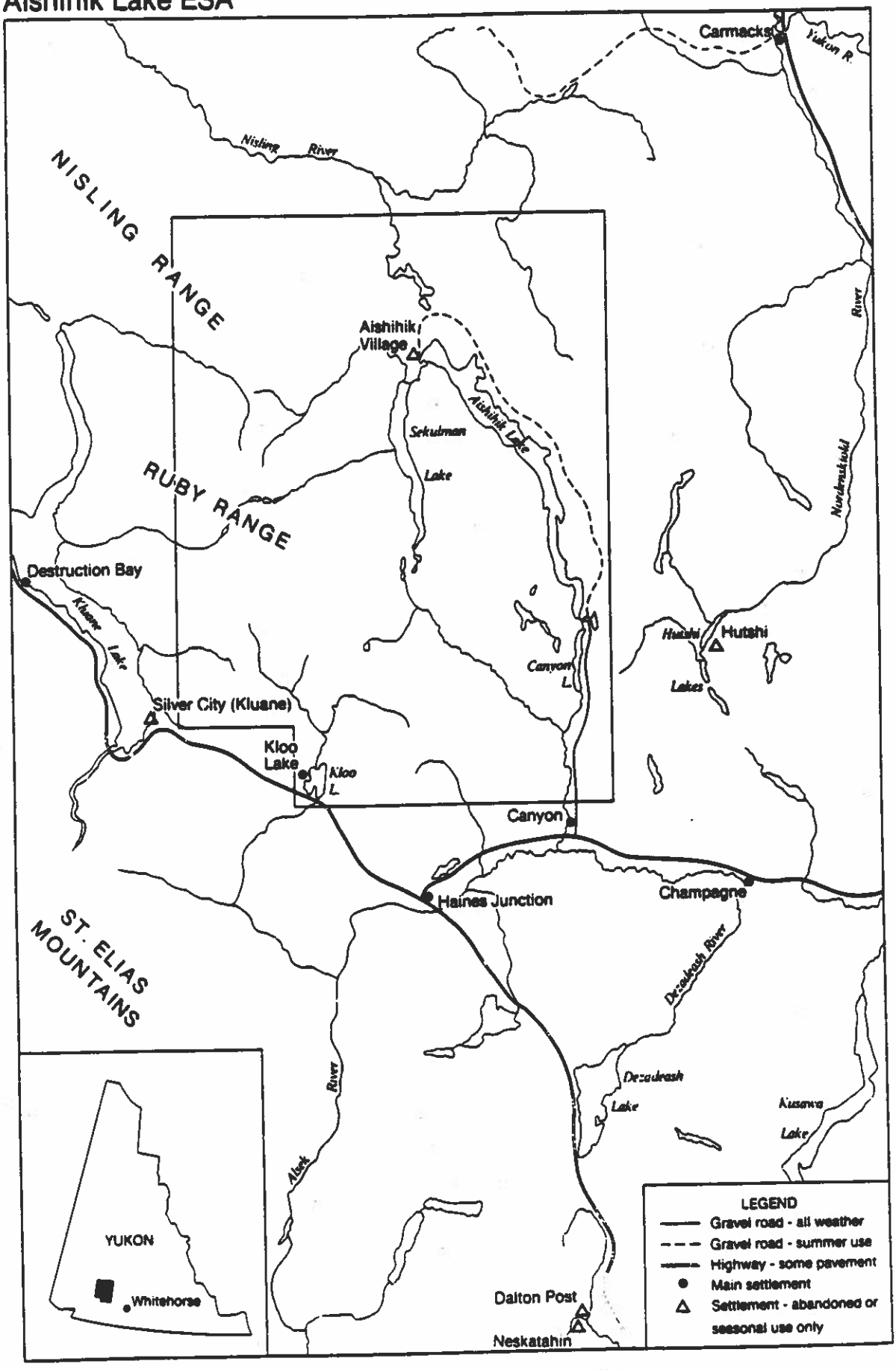
Physiography: The study site lies within the Ruby mountain range, an older range softened by glacier action in the Pleistocene era (Sauchyn, 1986) and by streams in modern times. Water drains from the north end of Sekulman Lake (51 sq. km) in the west, through the Tahgah River system into Aishihik Lake (150 sq km) to the east. These lakes form the headwaters for the Alsek River which then flows south into the Pacific Ocean at the Gulf of Alaska.

There are approximately 90 waterbodies within the wetland complex (see map 1.1) About half of these are riparian and the other half are isolated from the river system by permafrost conditions or uplands. Many of the isolated waterbodies are glacial kettle lakes or thermokarst ponds (Sauchyn, 1986).

Water levels in the river are artificially controlled by a rock weir constructed near the delta into Aishihik Lake. This weir partially maintains river levels during times of extreme drawdown on Aishihik Lake for hydroelectrical purposes. Water levels in late June and early July are affected by snowmelt emptying into Sekulman Lake, increasing the velocity and volume of flow through the Tahgah River. In 1973, records show that Sekulman Lake rose by over 1 metre in July. (Sauchyn, 1986)

Map 1:0

Physical and Cultural Setting of Aishihik Lake ESA



Map 1.1

Source:
Yukon Energy
Corporation,
1994.

Climate
The Aishihik region is one of the dryest in the Yukon (see map 1.2) despite its close proximity to the Pacific Ocean. Described as continental and semi-arid (Sauchyn, 1986), the area receives approximately 250 mm of rain annually. The daily mean annual temperature is -4.8 C with a July average of 12.1 C (Sauchyn, 1986). Weather records from the Sekulman wetland field camp gave the following results for the month of June 1996.

- mean high temperature: 19.8C
- mean low temperature: 3.2C
- total precipitation: approximately 4mm

Geology
The Yukon ESA series states that the Sekulman wetland area is mostly lacustrine, with silty-clay sediments. The areas near Sekulman and Aishihik Lakes are identified as alluvial and are underlain by silt, sand and gravel. (Sauchyn, 1986)

1.1.2 Biotic Aspects

Vegetative Communities: Within the wetland there are three main types of vegetation communities. For a more complete analysis of the vegetation communities in the larger Aishihik ESA, see Appendix A.

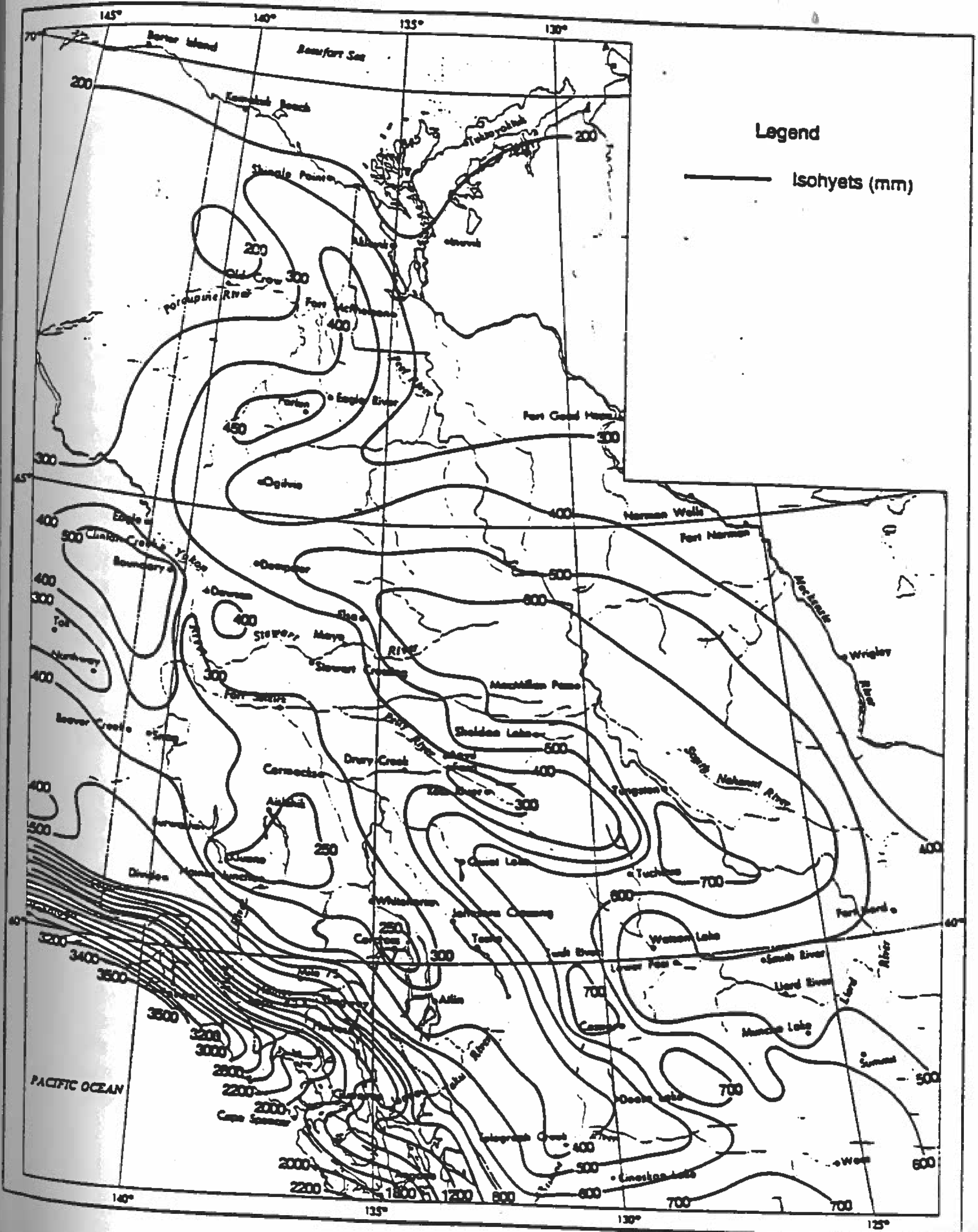
Aquatic
The first community is aquatic and includes the emergent vegetation, rooted aquatics and floating plantlife of the approximately ninety water bodies which are located within the wetland, as well as the Tahgah River. These vegetation communities were not a focus of this study because they are not Passiforme habitat. However they are of great importance to the Passiforme population as a water source and especially as insect breeding grounds.

Shoreline
The second vegetation community is the shoreline habitat consisting mainly of small willows (*Salix spp.*) and shrub birch (*Betula glandulosa*) with sedges (*Carex spp.*) and mastodon flower (*Senecio congestus*) occupying the mud flats. At the time of field observation, the mud flat areas had expanded considerably in the riparian waterbodies due to drawdown on Aishihik Lake (see Section 1.1.3). Therefore *Senecio* was an unusually dominant species this season.

Coniferous Forest
The third type of habitat is black spruce (*Piceamariana*) forest which is interspersed among the waterbodies and which surrounds the wetland as a whole. These are dry areas, dominated by black spruce with willow saplings and occasional patches of trembling aspen (*Populus tremuloides*). The herbaceous layer includes lichens

Map 1.2

Source: Yukon Electrical Company, Yukon Energy Corp., 1993.



(*Cladina spp., Cladonia spp., Cetraria spp.*) feathermoss (*Hypnum imponens*), labrador tea (*Ledum groenlandicum*), bearberry (*Arctostaphylos uva-ursi*), and lowbush cranberry (*Oxycoccus spp.*)

Fish and Wildlife: The wetland is home to a great diversity of fish and wildlife, although it is suspected that some species are in decline due to the drawdown of Aishihik Lake. In the 1986 Yukon ESA series, Bastedo and Theberge call the eastern part of Sekulman wetland...

> ...an especially productive land unit,... which contains wildlife habitat favourable to beaver, muskrat, bald eagles, waterfowl, and various shorebirds. This [area] contains an important spawning area for several species of fish, a riparian zone, and is adjacent to a waterfowl staging area at the outlet of Sekulman River.
>
> (Bastedo and Theberge, 1986 p21)

Furbearers
Wood bison (*Bison bison*), bear (*Ursus arctus horribilis, Ursus americanus*) moose (*Alces alces*), beaver (*Castor canadensis*), mink (*Mustela vison*) muskrat (*Ondatra zibethica*) and red squirrel (*Tamiasciurus hudsonicus*) were sighted within the wetland this season. Evidence of wolf and coyote (*Canis spp.*) and possibly caribou (*Rangifer tarandus.*) were also observed.

Birds
The extensive shoreline habitat in this area provides good breeding habitat for waterbirds, especially for shorebirds this year due to the expanded mudflats. Both diving and dabbling ducks also breed in the area as do some birds of prey (great horned owl, peregrine falcon, bald eagle). Passeriformes benefit from the relative diversity of vegetation communities within the area compared to the surrounding boreal forest. Details of the bird population are contained in the body of this report. (Scientific bird names are listed in Appendix B)

Fish
Northern pike, whitefish and arctic grayling were observed in the river and also in one of the larger waterbodies (waterbody #19).

1.1.3 Cultural Aspects

Champaigne and Aishihik First Nations
The Sekulman Wetland is located within the ancestral lands of the Southern Tuchone people, specifically the Champaigne and Aishihik communities. People of the Champaigne-Aishihik band reside periodically in the village of Aishihik at the north end of Aishihik Lake and continue to use the area for hunting, fishing and other culturally significant activities.

Recreational Uses
Both Aishihik and Sekulman Lakes offer excellent camping and fishing opportunities. There is a campground located at the south end of Aishihik Lake near Otter Falls. However strong winds on both lakes make travel difficult.

The Hydro-electric Situation
At present, the Sekulman wetland is being altered considerably by the drawdown of Aishihik Lake for hydro-electric purposes. Water levels within the lake normally fluctuate within a range of approximately 1.05 metres (3.5 feet). The current water license regulating the operation of the hydro-electirc turbine at the south end of Aishihik Lake allows fluctuations of approximately 2.7 metres (9 feet). As of May 19, 1996, the lake level was 898.8 metres (2996 feet), 0.9 metres (3 feet) below the normal low of 899.7 metres (2999.0 feet). (McRobb, 1996)

This drawdown is having visually evident impacts in the eastern half of the wetland as the water drains into the depleted lake. In the western portion of the wetland, toward Sekulman Lake, the river elevation is higher, so the levels are unaffected. Also, many of the waterbodies are isolated from the river system and these appear to be retaining normal water levels as well.

The affected areas of the wetland exhibit retreating shorelines and in some cases the waterbodies have dried up entirely leaving only mudflats. Much or all of the emergent vegetation in these waterbodies is exposed to air and areas previously under water are now dominated by Senecio and other mudflat species. Lower water depths are expected to have negative impacts for fish and diving ducks while the dabbling ducks and shorebirds will likely benefit from the expanded shoreline regions.

1.2 PURPOSE OF THE STUDY

The primary purpose of this study is to provide data on Passeriforme diversity and abundance in the Sekulman wetland. According to Yukon Government ornithologist David Mossop, very little is understood about Passerine populations within the Yukon.

Beyond this, the purposes of this study are threefold:

- to assess the value of this riparian ecosystem within the regional landscape as it relates to Passeriforme species
- to assess the effects of the drawdown of Aishihik lake on Passeriformes in the Sekulman wetland
- to develop a technique for studying Passeriforme diversity and abundance.

2.0 METHODS

Four different approaches were taken to gather data on the bird species in the wetland. These methods were designed to survey the diversity and abundance of Passeriformes in the wetland in relation to various habitats and to fluctuating water levels. Any incidental observations of other bird species or mammals were retained in the observations but not analysed.

2.1 POINT COUNTS

Point counts were used to collect data on the diversity and abundance of songbirds within different habitat areas of the wetland. The method used is known as the single point survey method (Whitcomb et al, 1981 and Lynch and Whigham, 1984 in Askins et al., 1986). Although this sampling technique is less labour intensive and less exhaustive than full survey methods, such as a breeding bird grid or territory mapping, it was determined that this technique is "sufficient to discover about 90% of the species present in the local area." (Lynch and Whigham, 1984) The advantages of this method are that it does not restrict sampling to a defined physical boundary and that all bird activity observed is recorded. (Cheskey, 1981)

Six disparate habitats were chosen within the wetland to survey for the presence of breeding birds. Two of these were in upland habitats, two were in lowland areas near depleted water bodies and two were in lowland areas near waterbodies which were at full capacity. Vegetation was noted at each site and a brief discription of the vegetative community is included in the observations.

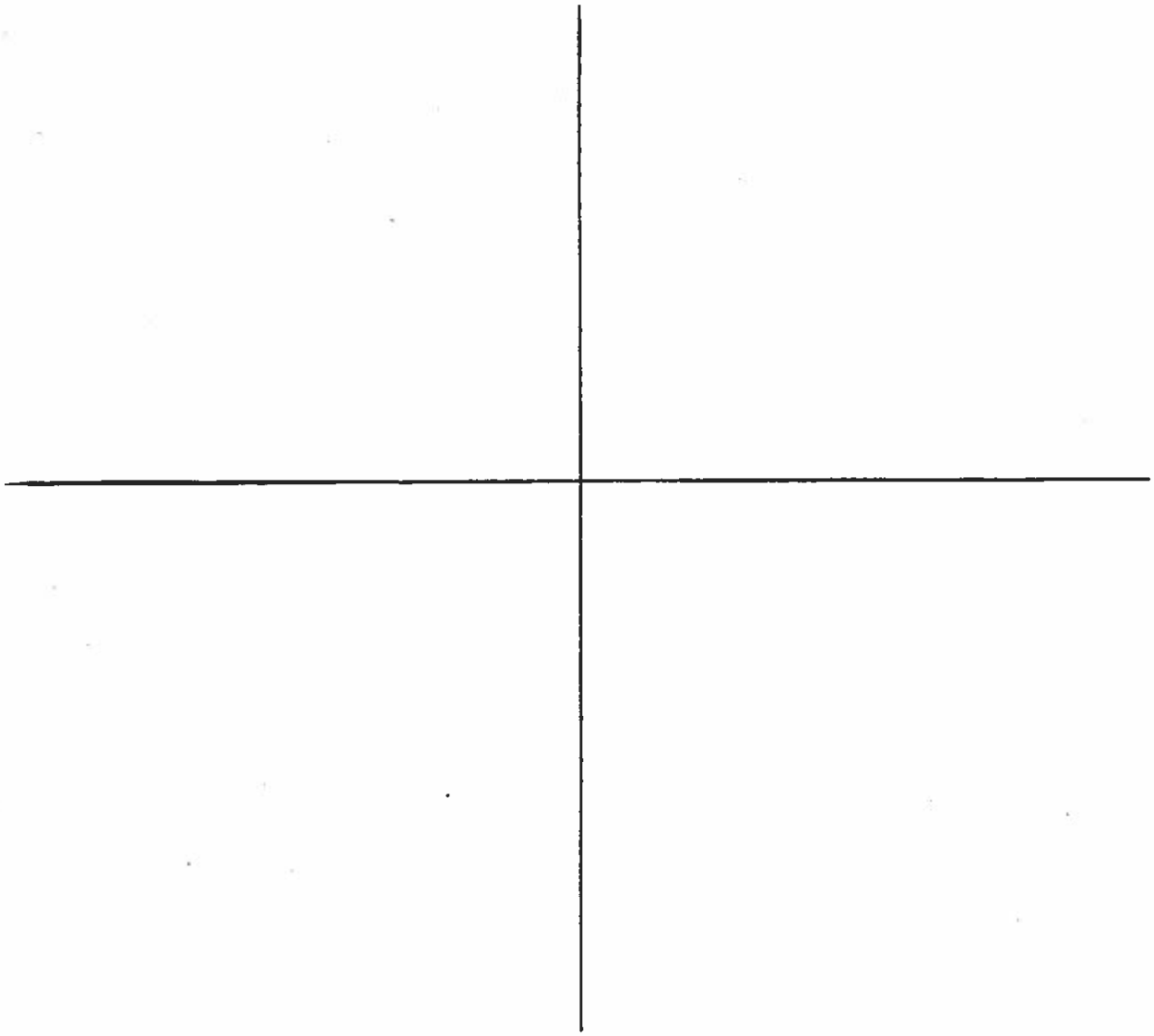
All survey sites were established in the first week of June. Each survey site consisted of a centre point, from which observations were made, and the entire surrounding area from which bird vocalizations were audible. For most species, vocalizations are audible for up to 100 metres (Whitcomb et al, 1981) so this was the average radius of the survey sites. However, many species are able to project their calls farther than 100 metres (Friesen, 1991) so sites were not restricted to this size.

Each point count consisted of a 15 minute session during which all breeding songs or other breeding behaviour were recorded. This time frame was suggested by Dave Mossop as an appropriate length of time to detect the majority of breeding males present in the survey area. Observations were recorded on field sheets (Fig. 2.0) using standard codes for birds species (Appendix B) and the following behaviour codes (Table 2.0).

Figure 2.0: Point Count Field Sheet

Single Point Songbird Survey

Location:_____ Observer(s):_____
Purpose:_____ Date:_____
Time start:_____Time finish:_____
Conditions,comments:_____
_____
_____



Evidence of other wildlife:_____
_____
Veg Community:_____
_____
_____
Nearest water:distance:(m)_____
waterlevel:high_____med_____low_____

Each of the six point count sites was surveyed at least once during each of the following four time periods: 0400-0700; 0700-1000; 1600-1900; and 1900-2200. These time periods were chosen to ensure that birds which sing at different times of the day would be detected. Point Counts were conducted throughout the month of June, concurrent with the Passeriforme breeding season.

Table 2.0 Field Codes for Behaviours observed

Behaviour	Field Code
male singing	(AMRO)
bird observed, not singing	(AMRO)
nesting activity	AMRO-N
bird calling	AMRO-C
bird circling overhead	HAHA cee
bird flying through site	AMRO →
bird landing on site	AMRO —x
other territorial behaviour	AMRO -T

Following the field season, data was analysed to establish whether observations were indicative of breeding activity on the site. For each point count site, the information from all observation maps was compiled and copied onto one map in order to reveal consistent breeding behaviour by individuals in a specific area. Codes, adapted from the Atlas of the Breeding Birds of Ontario (Cadman et al, 1987) were then used to assign breeding status. (Table 2.1)

2.2 TRANSECTS

The transect method was used in order to determine correlations between proximity to water and diversity and abundance of Passeriforme populations. This information is useful in assessing the value of the wetland within the surrounding boreal forest.

Using the map, three transect locations were chosen where it would be possible to begin at a waterbody and walk in a straight line away from the water for one kilometre without encountering another waterbody. The abundance of waterbodies in the area meant that suitable locations were limited.

Transects were then walked using a compass to maintain a straight path. Point counts were done, as per the method described above, along the transect. Six point counts were performed on each transect. The first count was done at the water's edge and then at 200 metre intervals along the transect up to 1 kilometre. Vegetation was also described at each point count location. One of the transects, (#22 East) was marked with flagging tape so that it could be repeated in the future for comparison.

Table 2.1 Breeding Evidence Codes

Breeding Evidence	Behaviour Code	Observation
Species Observed	X	species observed in its breeding season (no evidence of breeding)
Possible Breeding	SH	species observed in its breeding season in suitable nesting habitat
	SM	singing male present or breeding calls heard in suitable nesting habitat in breeding season
Probable Breeding	P	pair observed in suitable nesting habitat in nesting season
	T	permanent territory presumed through registration of territorial behaviour (song, etc.) on at least two days, a week or more apart, at the same place
	D	courtship or display, including interaction between a male and female or two males, including courtship feeding or copulation
	V	visiting probable nest site
	A	agitated behaviour or anxiety calls of an adult
	N	nest-building
Confirmed Breeding	DD	distraction display or injury feigning
	NU	used nest or egg shells found (occupied or laid within the period of the survey). Use only for unique or unmistakable nests or shells.
	FY	recently fledged young or downy young incapable of sustained flight.
	AE	adults leaving or entering nest sites indicating occupied nest (ie high nests)
	FS	adults carrying faecal sac or food for young
	NE	nest containing eggs
	NY	nest with young seen or heard

Source: Cadman et al., 1987

NOTE: *In retrospect, most of these codes could have been used in the field as well,eliminating the confusion of using two sets of codes.*

2.3 LAKE 19 SURVEYS

Lake 19 is a large lake situated roughly in the centre of the wetland complex. Previous songbird data existed from a total count survey done by canoe on this lake on June 5 1994. Attempts were made to repeat the 1994 method as closely as possible but lower water levels made boat access impossible in most areas.

The perimeter of this lake was surveyed (by boat in 1994, by foot in 1996) using a total count method. All passeriforme birds observed singing or displaying territorial behaviour were mapped on the field map (Fig. 2.1) using field codes as per Table 2.0. Two lake 19 surveys were performed, on June 1st and 30th, 1996.

2.4 DAILY OBSERVATION RECORDS

Daily observation records were kept for each day during the field observation period in order to expand the database for the area.

Using the Birds of the Yukon Field Check List, produced by the Yukon Department of Renewable Resources (Fig. 2.2), the field crew recorded the day's observations, including species and observed and numbers of individuals. Estimates were often used when exact numbers were unknown. Care was taken to ensure that individuals were not counted twice if observed by two people.

Nest records were also kept using the Renewable Resources nest record cards (Fig. 2.3).

Fig.2.3 Renewable Resources Nest Record Card

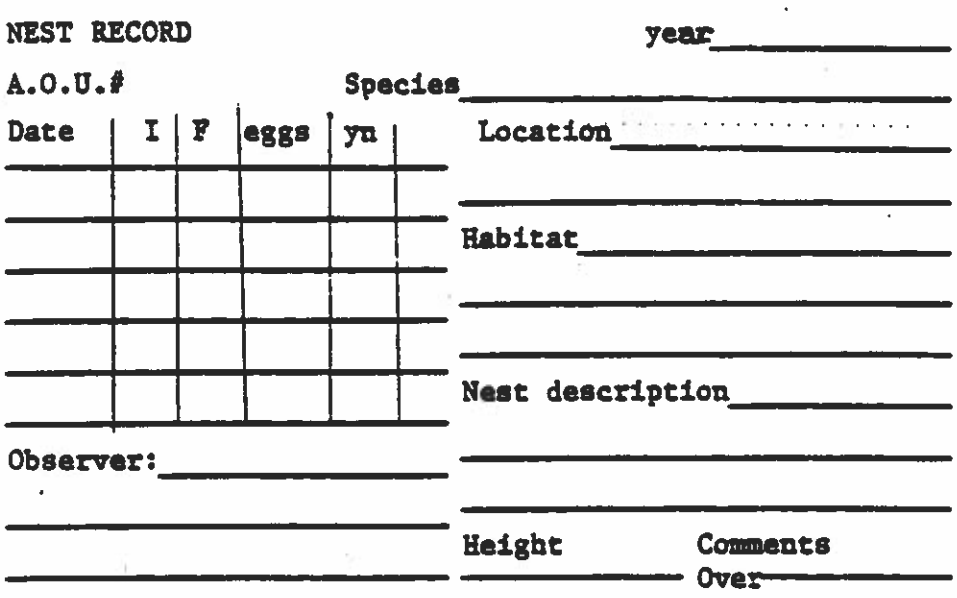
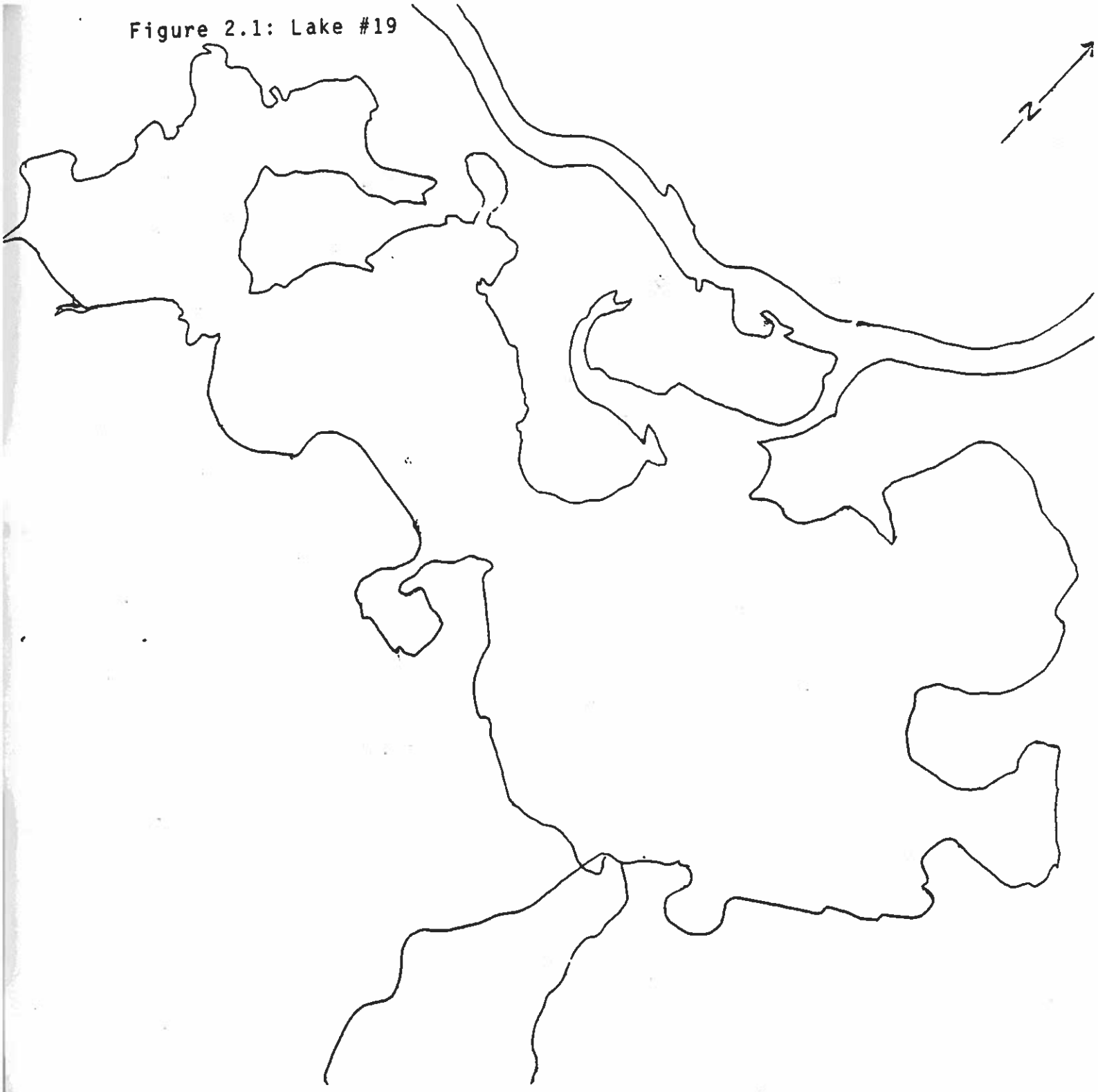


Figure 2.1: Lake #19



OBSERVER: _____

PURPOSE: _____

DATE: _____

TIME: _____

CONDITIONS: _____

SEKULMAN WETLAND
LAKE # 19

Notes and Observations

Source: Renewable Resources, YTG

Figure 2.2

Printed on Recycled Paper

For more information contact:

Yukon Department of Renewable Resources
P.O. Box 2703,
Whitehorse, Yukon
Y1A 2C6

Updated 1992

ISBN 1-55018-144-0

Birds of the Yukon

Field Check List

Date: .....

Time Afield: .....

Locality: .....

Weather: .....

Observers: .....

Yukon
Renewable Resources

2.5 FIELD EQUIPMENT REQUIRED

The following equipment was required to execute this study:

- binoculars
- compass
- field data sheets, clipboard, pencil
- field guides to birds and vegetation
- audio cassettes of bird songs
- flagging tape
- boat
- hip waders

3.1 POINT COUNTS

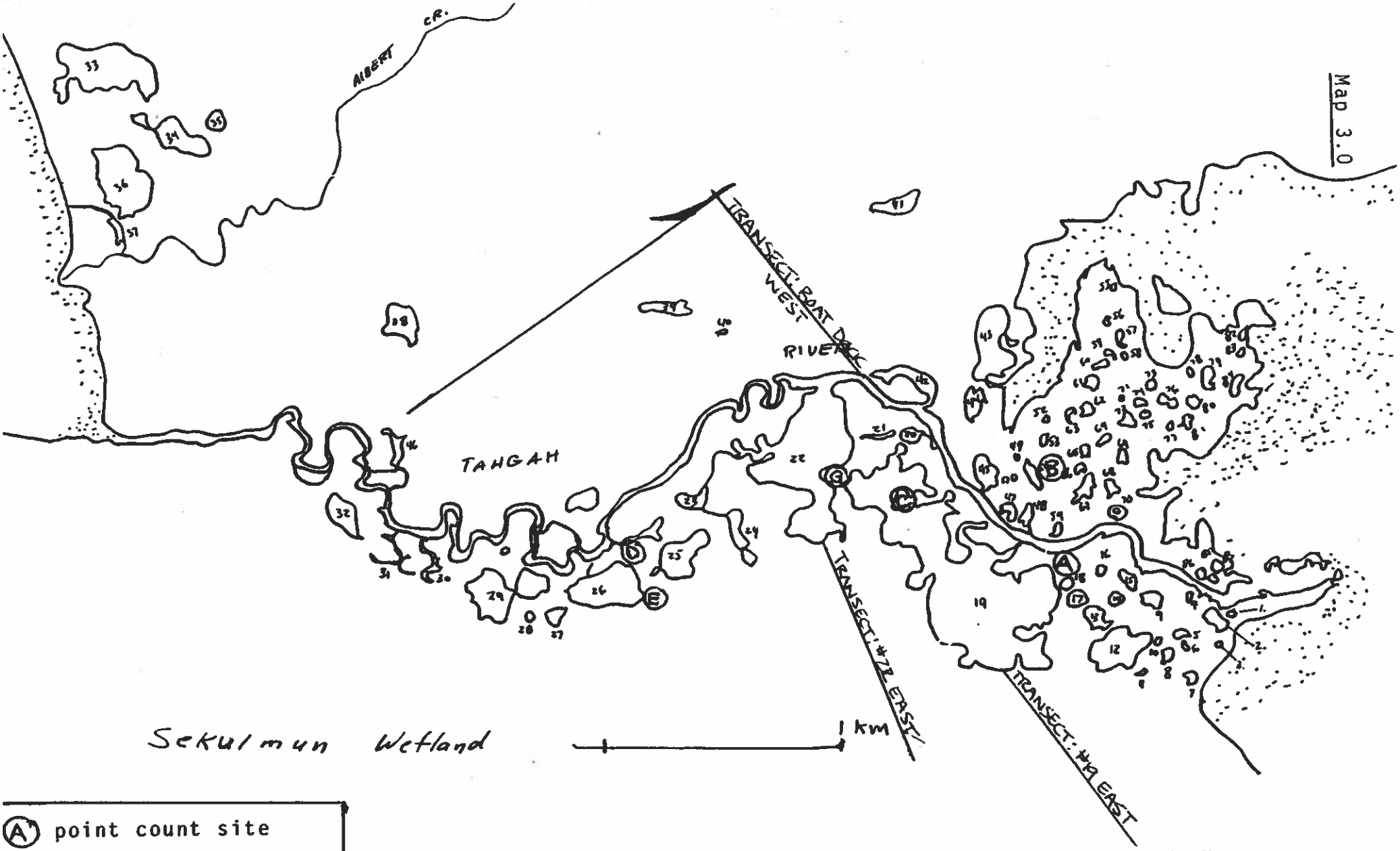
Fifteen minute point counts were performed throughout June 1996 at six vegetatively different sites throughout the wetland to examine the diversity and abundance of the songbird population. See map 3.0 for locations of point counts.

Field records of these point counts are contained in Appendix C. Observations have been compiled and coded here to show breeding evidence levels as per the codes listed in Table 2.1 with the following additions:

T* although the breeding evidence formula used in Cadman et al. indicates that these species have established territoriality (T) this may not be accurate due to the behaviours of this species.

S if both males and females sing or if it is difficult to identify whether the individual singing is male or female, this code was used to indicate a singing individual of either sex.

Site A: Upland, Dense Spruce Forest
This site was located in an upland section of dense black spruce forest. This forest community is typical of uplands throughout the wetland. The trees are almost exclusively black spruce and the herbaceous layer is dominated by labrador tea and lichens. Waterbody #19 is approximately 50 metres to the south-east of the point and Sekulman River flows approximately 50 metres to the north-west. Photo not available due to low lighting.


Map 3.0
ALBERT CR.
TRANSECT: BOAT DOCK WEST
RIVER
TAHGAH
TRANSECT: #22 EAST
TRANSECT: #19 EAST
Sekulmun Wetland
1 km
A point count site
ANS transect location
Source: David Mossop
Yukon Government

C

Table 3.1.0 Point Count Results, Site A

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
LEYE	X		T*	
COSN		SM		
NOFL		S		
OSFL		SM		
BASW	X X X			
GRJA		S S		
BBMA	X			
CORA			T*	
BOCH		SM		
SWTH			T	
HETH		SM		
AMRO		SM	T	
VATH		SM SM		
RCKI		SM	T	
YRWA			T T T	
BLWA		SM		
WIWA		SM SM		
CHSP		SM SM		
LISP		SM		
DEJU		SM SM		

Site B: Upland, Mixed Forest and Parkland

This site is located in an upland area on the north side of Sekulman River. It involves a diversity of microecosystems. This diversity is typical of many areas of the wetland. A wide horse trail and a cat trail have changed the natural habitat, creating edge communities within the spruce forest. Willows, lowbush cranberry and grasses dominate these edge zones. There is also a sloping meadow/parkland area dominated by grasses, willow shrubs and shrub birch and a small isolated pond, waterbody #50, which lies within the range of this site. See photo 3.0.

Table 3.1.1 Point Count Results, Site B

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
BAEA	X X X X			
LEYE		S S		
BEKI	X			
NOFL	X X X X X	S S		
GRJA		S		
CORA	X			
BOCH		SM SM SM	T	
RBNU		SM		
SWTH		SM SM SM SM		
AMRO		SM SM SM SM	T	
VATH		SM SM		
RCKI		SM SM SM	T	
BOWA	X X			
YEWA	X		P	
YRWA		SM SM	T T T T	
NOWA		SM		
WIWA		SM		
RUBL	X			
CHSP		SM	T P	
DEJU	X	SM SM SM SM		

PHOTO 3.0 SITE B - facing south

PHOTO 3.1 SITE C - facing north

Site C: Forested peninsula in large depleted waterbody
This site was surrounded on three sides by the largest waterbody in the wetland, waterbody #19, which is severely depleted due to the drawdown on Aishihik Lake. It was chosen as a sample of the shoreline habitat that is common in the wetland, consisting of spruce, willow, sedges, grasses, and senecio. Deadwood is also plentiful. The area is dominated by mudflats and water. See photo 3.1.

Table 3.1.2 Point Count Results, Site C

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
BAEA	X			
HAHA				NY
LEYE	X X X X X X	S S S S S		
SPSA		S S		NE NE
COSN		SM		
NOFL		S		
ALFL		SM		
BOCH		SM SM		
SWTH		SM SM		
AMRO	X	SM SM SM		
RCKI		SM SM		
YRWA		SM		
CHSP		SM SM		
DEJU		SM SM		

Site D: Willow thickets on dry grassland, near full waterbodies
This site consists of a long narrow grassy area with willow thickets. It appears to be a former river bed and now contains a small creek which flows into Sekulman River. Dry grass tussocks occupy much of the site. There are several areas like this in the wetland, indicating a dynamic water regime. This may be tied to fluctuating water levels in Aishihik Lake or to the retention of water in the permafrost. See photo3.2

Table 3.1.3 Point Count Results, Site D

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
BAEA	X X			
HAHA	X			
LEYE	X	S S S S S S S S	T T	NE
MEGU	X			
BEKI		S S S	T*	
GRJA		S S S		
CORA		S	T*	
BOCH		SM		
SWTH		SM		
AMRO		SM SM SM SM	T	
BOWA		SM		
NSHR	X?			
YRWA		SM SM		
BLWA		SM		
WIWA		SM		
RWBL	X		T	
RUBL	X	SM		
CHSP		SM SM		
SASP		SM		NE
LISP		SM		
DEJU		SM SM SM SM	T T T	

PHOTO 3.2 SITE D - facing north

PHOTO 3.3 SITE E - facing south

Site E: Willow thickets at shoreline of full waterbodies
This site was dominated by water with dense willow thickets lining the shores and dry spruce forest occupying the rest of the area. Unlike site C, the waterbodies at this site were full so that emergent vegetation was evident and mudflats were not. See photo3.3

Table 3.1.4 Point Count Results, Site E

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
falcon spp.	X			
LEYE	X	S S		
COSN		SM		
NOFL		S		
SAPH	X X			
GRJA		S		
CORA		S S		
BOCH		SM	T	
SWTH		SM SM		
AMRO		SM SM	T T	
RCKI		SM SM SM	T	
YEWA			P	
YRWA	X	SM SM SM	T P	
BLWA		SM		
COYE		SM	P	
RWBL			P T	
RUBL		SM SM SM	P	
CHSP			P	

Site G: Home Camp, surrounded by two large depleted lakes
This site was chosen primarily because it was possible to do frequent point counts. It is surrounded by two large depleted lakes, waterbodies #19 and #22. These provide extensive shoreline and edge communities of shrub birch, willow, senecio, and sedge. Mudflats are extensive in this area. Dry spruce forest stands intersperse the waterbodies. The area is slightly disturbed due to the human traffic and the shelters occupying the centre of the site. See photo 3.4

Table 3.1.5 Point Count Results, Site G

Species	Species Observed	Possible Breeding	Probable Breeding	Confirmed Breeding
HAHA*				NE
SEPL	X X X X X			NE
LEYE	X X X X X X		T T T	
SPSA	X			NE
COSN		SM		
BEKI	X			
NOFL		SM SM	T	
ALFL			T	
GRAJ	X X			
SWTH		SM	T T T	
AMRO		SM SM SM	T T T T T	
VATH			T	
RCKI		SM SM		
YRWA		SM SM SM	T T	
BLWA		SM SM		
NOWA		SM SM SM		
WIWA		SM	P	
RUBL		SM		
CHSP		SM SM SM SM		FY
SASP		SM		
DEJU		SM SM	T	FY

PHOTO 3.4 SITE G - facing south

* this is the same harlan's hawk as that observed nesting at point C.

Total Breeding Evidence

There are 37 Passeriforme species which were observed in the wetland during the study period. Of these, three species (savannah sparrow, chipping sparrow, junco) are confirmed breeders, fourteen species are probable breeders and six are possible breeders. The remainder were observed on site but no breeding behaviour was detected.

3.2 TRANSECTS

Bird populations were surveyed using the point count method, every 200 metres along three one kilometre transects, each of which began at a waterbody and extended into the surrounding forest. The goal was to observe how songbird populations changed with distance away from water. Notes were also taken on the vegetation community present at each point count location. See Map 3.0 for transect locations.

Field records of these transects are contained in Appendix D. Observations have been compiled in Tables 3.2.0, 3.2.1, 3.2.2, including breeding evidence levels where apparent. Codes are those listed in Table 2.1.

Table 3.2.0 Point Count Results from Transect 1

Name: Boat Dock West
Observer: David Mossop
Date: June 9, 1996
Time: 05:55 - 08:05
Weather: Mostly sunny, cold.
Description: This transect begins at our boat dock on the Sekulman River, 20 metres downstream from the inlet to waterbody #22 and extends west for 1 km.

	At water's edge	200 m from water	400 m from water	600 m from water	800 m from water	1000 m from water
	dry spruce, willow, grass, bearberry	dry spruce, willow, grass, mostly bare	dry spruce, willow, moss, bearberry	spruce,willow feathermoss	dry open spruce, lichen	dry open rolling country
HAHA						1 (nest)
LEYE	1	1		1		
SPSA	1					
COSN	1			1		
NOFL			1	1		
GRJA	1		1		1	1
CORA		1				
BOCH				1		
SWTH	1	1	1	3	1	1
AMRO	1	1		1		
RCKI	2	2	1	1		1
YRWA		1	3	1	1	
WIWA		1				
CORE		1				
LISP				1		
WCSP				1		
DEJU		1				

Table 3.2.1 Point Count Results from Transect 2

Name: #19 East
Observer: Marty Mossop, Jill Thompson
Dates: a)June 10 b)June 25, 1996
Times: a)07:49-09:35 b)05:10-07:20
Weather: a)calm, overcast b)windy, overcast
Description: This transect begins near the duck trap in the north-east end of waterbody #19 and extends to the east for1 km.

	at water's edge	200 m from water	400 m from water	600 m from water	800 m from water	1000 m from water
	spruce, willow, moss, grass	dense spruce, willow, dwarf birch, moss, labrador tea, bearberry, wintergreen	dense spruce, willow, lowbush cranberry, moss, lichen, crocus	open mature spruce,willowlichen, grass, moss, lupine bluebell, crowberry	bare hillside/ valley floor, dwarf birch, spruce lichen, siberian flox, kinnikinnick	deadwood, spruce, lichen, grasses, crowberry,
HAHA				1	1	1 (nest)
LEYE	3	T	1	1	2	
SPSA	1					
COSN	1		1			
TTWO			1			
NOFL	T			1		
OSFL		1		1	1	
GRJA	2	2		1		
BOCH	1	2		2		2
RBNU		1				
TOSO					1	1
SWTH	1					
AMRO	1+T	1+T	1		3	1
VATH	3	2	2			
RCKI	1+P	1			3	1
BOWA				1		
YRWA	T	3	2	3	2	1
RUBL				1		
CORE					1	
CHSP	2	2				
LISP	1					
DEJU	2	1		1	3	1

Table 3.2.2 Point Count Results from Transect 3

Name: #22 East
Observer: Jill Thompson, Donny Williams
Date: a)June 9, b)June 11, c)June 29, 1996
Time: a)07:40-09:05, b) 21:15-23:25 c)06:00-07:15
Weather: a)sunny, clear, b)clear, c)scattered cloud, no wind
Description: This transect begins at the eastern shore of lake #22, south of camp, and extends up the hill beyond for 1km.

	at water's edge	200 m from water	400 m from water	800 m from water	900 m from water	1000 m from water
	open mature spruce, lichens, bluebells	open spruce, willow patches, grass	open dry grass and willow saplings	spruce, labrador tea, lichen, moss, grass	spruce, dry birch, willow, deadwood, labrador tea, lichen	open, lots of deadwood, spruce, moss, labrador tea, grass, crocus
LEYE	1	1	3			
NOFL			1			
GRJA					1	1
BOCH			1			1
SWTH	2+T	3	1 + 1	1	1	
VATH	1	1				
RCKI	1	1				
BOWA	4					
YRWA	1	2	3		1	
CHSP	1					
DEJU			1			

3.3 LAKE #19 SURVEYS

The results from the two June 1996 total count surveys of lake #19 are combined with the results from 1994 below. (Table 3.3.0) Field records are contained in Appendix E.

Table 3.3.0 Lake #19 surveys

Species	June 5/94	June 1/96	June 30/96
Bald Eagle		2	1
Harlan's Hawk	1	1	1
Semipalmated Plover		1	
Killdeer		1	
Lesser Yellowlegs	15	10	14
Solitary Sandpiper		1	
Spotted Sandpiper	2	4	6
Common Snipe	1		2
Belted Kingfisher	1		
Northern Flicker	1		2
Western Wood-Pewee		1	
Alder Flycatcher		2	
Tree Swallow			2
Violet-green Swallow	3		
Gray Jay	7	3	4
Boreal Chickadee		1	2
Swainson's Thrush	4	1	3
American Robin	8	8	3
Varied Thrush	10	3	4
Ruby-crowned Kinglet	5	5	
Bohemian Waxwing	1		
Yellow Warbler		6	
Yellow-rumped Warbler	9	11	7
Blackpoll Warbler		7	
Northern Waterthrush		11	
Wilson's Warbler		2	
Red-Winged Blackbird	1		
Rusty Blackbird	1	2	
Chipping Sparrow	3	4	4
Savannah Sparrow	1	2	
Lincoln's Sparrow	1	1	1
White-crowned Sparrow	1		
Dark-eyed Junco	9	5	5

3.4 DAILY OBSERVATIONS

The results of the daily observations are contained in chart form in Appendix F. The field check lists from the entire observation period (33 days) have been compiled into 5 charts, each representing one week of field observations with dates as follows: June 1-7, June 8-14, June 15-21, June 22-28 (no data for June 24), and June 29 - July 4.

The Passeriforme information has been summarized below (Fig. 3.4.0) in the form of an annotated bird list. This method of summary was chosen because annotated bird lists already exist for other wetlands in the Yukon (Needlerock, Swan Lake) and it is hoped that this information will be useful for purposes of comparison. The terms used to indicate species abundance, "rare," "uncommon," or "common" are those used by Dave Mossop and they are defined as follows in his Needlerock Wetland report (Mossop, 1991)

- Rare: Seen on only one or two field days.
- Uncommon: Seen on less than half of days afield or with limited
- Common: Seen on most days afield (60-100%)

Fig. 3.4.0
Annotated List of the Passiforme birds of Sekulman Wetland, June 1996.

Olive-sided Flycatcher
Uncommon. Heard on 1/3 of days afield, usually from the same location (lake #19). Likely the same 1-2 birds.

Western Wood Pewee
Rare. Heard on 2 days.

Alder Flycatcher
Uncommon. Heard on 1/3 of days afield. Most observations were in late June. One individual often heard in the vicinity of camp.

Say's Phoebe
Uncommon. Heard on 3 days. One pair observed together once on the edge of lake #26.

Tree Swallow
Uncommon - common. Recorded on 1/3 of days afield, although observed to be common on June 2nd and 7th. One pair nested in a box at #25. One pair competed for a box at camp but lost to a red squirrel.

Violet-green Swallow
Uncommon. Observed on 3 days. Recorded as common June 7th.

Bank Swallow
Uncommon. Observed on 1/3 of days afield. Recorded as common June 2nd and 7th.

Cliff Swallow
Uncommon. Observed on 5 days. Common on June 2nd.

Gray Jay
Common. Observed throughout wetland in various habitats.

Black-billed Magpie
Uncommon. Occasionally observed flying through site.

Common Raven
Common. Usually observed alone with occasional group sitings. One group of 9 seen flying south near camp on June 30th.

Black-capped Chickadee
Rare. Seen on 2 days.
(Note: This number may be low due to researcher inexperience with distinguishing between black-capped and boreal chickadees.)

Boreal Chickadee
Common. Frequently observed in black spruce forests exhibiting territorial behaviour.

Red-breasted Nuthatch
Uncommon. One individual heard occasionally on lake #19.

Swainson's Thrush
Common. Observed throughout wetland, especially in riparian areas. Usually heard calling morning and night from territories in spruce forests near camp.

Hermit Thrush
Rare. One vocalization recorded near lake #19.

American Robin
Common. Observed throughout wetland. Two nests found.

Ruby-crowned Kinglet
Common. More commonly heard in early - mid June, rarely in late June. Observed exhibiting territorial behaviour in a variety of habitats.

Bohemian Waxwing
Uncommon. Observed on 6 days. Usually 2-3 birds flying together.

Northern Shrike
Rare. One probable sighting on the top of a spruce beside #25. No vocalization.

Orange-crowned Warbler
Rare. One observation.

Yellow Warbler
Common in early June, uncommon in late June. Recorded as common 5 days in first week in June. Pairs frequently seen in willow habitat.

Yellow-rumped Warbler
Very common. Observed throughout wetland in spruce habitat. Pairs observed together exhibiting territorial behaviour but no nests found.

Blackpoll Warbler
Common in early June. Observed on 14 days with 10 or more individuals recorded some days. Rare to absent in late June.

Northern Waterthrush
Common in first week and then rare for the rest of the study period,
(NOTE: This may be partly due to initial confusion in identifying the waterthrush song.)

Common Yellowthroat
Uncommon. Seven observations. One pair probably nesting in willow habitat on east shore of #26 but no nest found.

Wilson's Warbler
Common in early June in willow habitat. Pairs observed together. Uncommon in late June.

Red-winged Blackbird
Uncommon. One - two individuals observed on 1/3 of days afield, often in pairs, usually in sedges or shoreline near #25 and #26. Ten individuals observed June 3.

Rusty Blackbird
Fairly common. Seen on approximately 1/2 of days afield. Usually less than ten individuals seen on any day. Pairs observed together. Common on June 7.

Pine Grosbeak
Rare. One observation

Common Redpoll
Uncommon. Observed on 7 days. 15 individuals recorded on June 10.

Hoary Redpoll
Uncommon. 6 individuals observed on July 3.

Chipping Sparrow
Very common. Pairs observed exhibiting breeding behaviour. Fledged young observed in early July.

Savannah Sparrow
Common. Observed on 19 days afield, but usually just 1-2 individuals per day. One nest found but more suspected.

Lincoln's Sparrow
Common in mid to late June. Observed on 18 days afield, usually1-2 individuals per day.

White-crowned Sparrow
Uncommon. Observed on 3 days. Probably more common on the grassy parkland slopes surrounding the wetland than in the wetland itself.

Dark-eyed Junco
Very common. Many individuals observed daily. No nests found but fledged young observed near camp in early July. Juncos appeared to be entering a 2nd breeding stage in the first week of July.

4.0 VALUE OF THE STUDY

The ecosystem integrity of the Sekulman wetland is undoubtedly being affected by hydro operations on Aishihik Lake. Without sufficient understanding of normal ecosystem functions and processes in the area, it is impossible to determine the full impact of the water level changes, nor appropriate remediation. This study was valuable in that it contributed to our understanding of one biological aspect of the wetland ecosystem.

According to Yukon ornithologist Dave Mossop, relatively little is known about Passeriforme populations in the Yukon. Wildlife studies usually focus on fish, waterfowl and furbearers; animals with commercial and/or traditional game value. This is also the case in the Sekulman wetland. Previous to this study, very little Passeriforme data existed which was specific to the Sekulman wetland area.

Passeriforme data is valuable in monitoring ecosystem health and stability. Small birds are excellent indicators of ecosystem change because of their vulnerablility to environmental conditions. They are highly susceptible to environmental destruction. Therefore, like a canary in a coal mine, changes in songbird behaviour or demographics offer an important warning signal of environmental damage.

Previous data

Pearce-Bowden Economic Consultants did a cursory field examination of Aishihik Lake in 1972 , concluding that "there would be little impact on wildlife or the birds." (Pearce-Bowden, 1972) However, the validity of this report is in question and it was heavily criticised at the Northern Inland Waterways Act hearings held in Whitehorse, May 1972. According to Aishihik activist, Gary McRobb, all field work for the report was conducted within a scant four days. Canadian Wildlife Service members also criticised the work, calling it a "very superficial insight into the impact of this hydro-electric project on the plant communities." (McRobb, 1991) There was no mention of Passeriforme populations in this report.

One study exists, the Yukon Environmentally Significant Areas series (Bastedo and Theberge,1986), which pre-dates the current drawdown on Aishihik Lake and fortunately, it includes Passeriforme data. It documents observed and expected Passeriforme species in disparate habitats within the Aishihik Lake area, including a section on wetland populations. (Appendix A) However, this data draws from all wetlands in the large study area and it is impossible to determine which Passeriformes were occupying the Sekulman area at the time.

The results of the current study vary considerably from the afforementioned ESA report. In that study, seven bird species (excluding waterfowl) were observed in wetland areas. Of these, only four are also identified by this study. The other three were the short-eared owl, Traill's flycatcher, and the orange-crowned warbler. There are several possible explanations for this difference:

- differences between wetlands in the area - these species may live in another wetland within the Aishihik area
- low insect numbers this year may have decreased flycatcher and warbler populations
- drawdown or other environmental changes may be affecting food sources (insects, mice)
- differences in identification skills of field researchers.

4.1 THE VALUE OF THE RIPARIAN SYSTEM WITHIN BOREAL LANDSCAPE

One goal of this study was to determine the value of this riparian system within the surrounding boreal forest region. To do this would require a much more extensive and statistically founded study of both the Tahgah River and the boreal regions. However, the ESA series (Bastedo and Theberge, 1986, Table 2) offers one way of assessing values which is interesting. They came up with a measure of the value of different habitats to wildlife which they called a 'faunal dependence score'.

A faunal dependence % is calculated for various habitats in the Aishihik ESA, indicating how critical that habitat is for mammals and birds in the area. This table shows that out of all the communities documented in the Aishihik Lake ESA , wetlands have the highest faunal dependence score for birds. 70% of birds which occur in the wetlands occur in only 3 or fewer vegetation communities. However, this high score must be attributed largely to the needs of waterfowl, rather than Passiformes. If the Passiformes are analysed separately, only 4 of the 12 Passiforme species found in wetland areas are that selective, resulting in a faunal dependence score of approximately 33%

$$12 / 4 = 0.33 \times 100\% = 33\ \%$$

This score is still relatively high for the area. Of the 24 communities listed, 33% faunal dependence for birds is the 6th highest score. [Note: other scores include all bird species, not just Passiformes.]

Some indication of the value of the Tahgah river system can be gleaned from the results of the transect study. These show that the diversity and abundance of birds is generally higher near the river and decreases as one moves away from it. See Tables 4.0 and 4.1

Table 4.0 Species abundance - total number of individuals observed.

distance from waterbody	Boat Dock West Transect	#19 East Transect	#22 East Transect	Totals
0m	8	24	12	44
200m	10	18	8	36
400m	7	8	11	26
600m	12	13	1	26
800m	3	17	3	23
1km	4	8	2	14

Table 4.1 Species diversity - total number of species observed.

distance from waterbody	Boat Dock West Transect	#19 East Transect	#22 East Transect	Totals
0m	7	14	7	28
200m	9	11	5	25
400m	5	6	6	17
600m	10	10	1	21
800m	3	9	3	15
1km	4	7	2	13

4.2 EFFECT OF DRAWDOWN ON AISHIHIK LAKE

According to the 1986 Yukon ESA series,

> ...the biological productivity of...the Sekulman River has been reduced by drawdown effects associated with the hydro-electric development. Increased water level fluctuations and/or prolonged drawdown will further jeopardize populations of aquatic invertebrates, arctic grayling, lake whitefish, beaver, muskrat, and several species of waterfowl. Worth noting is the fact that some species such as the common snipe, arctic tern, and various shorebirds may have benefitted from the net increase in available nesting habitat.
>
> (Bastedo and Theberge, 1986 p22)

As discussed earlier, the lack of pre-drawdown Passeriforme data makes it impossible to assess the results of the drawdown, although general observations and discussions with local people would seem to support Bastedo and Theberge's predictions. (McRobb, 1996; Mossop, 1996)

The point count data was examined to determine whether there was a correlation between high diversity and abundance of birds and full waterbodies vs lower diversity and abundance and depleted waterbodies. (Table 4.2 and 4.3) The highest

abundance of individuals and the lowest abundance of individuals during any one count were calculated for each site and then these scores were averaged to give an abundance average for that site. The same procedure was carried out for diversity scores. A slight correlation exists but this is not conclusive.

Table 4.2 Abundance averages by point count site

	A: upland	B: upland	C: near depleted waterbody	D: near full waterbody	E: near full waterbody	G: near depleted waterbody
highest abundance score	12	17	9	17	12	15
lowest abundance score	4	6	5	2	4	0
average	8	11.5	7	9.5	8	7.5

Table 4.3 Diversity averages by point count site

	A: upland	B:upland	C: near depleted waterbody	D: near full waterbody	E:near full waterbody	G:near depleted waterbody
highest diversity score	10	12	8	10	9	8
lowest diversity score	4	4	3	2	3	0
average	7	8	6.5	10	6	4

4.3 SONGBIRD SURVEY METHODS

Another purpose of this study was to explore appropriate methods to survey songbirds for future Yukon studies. The appropriateness of any method depends on several factors such as:

- extent and duration of study
- budget
- **purpose of study**

This study has revealled some insight into this third variable, purpose of study. Different methods are suggested below with recommendations for improvements.

Purpose: building database
If the purpose of the study is to collect as much information as possible about the area, maintaining daily checklists seems to provide the most complete picture of what exists in the site (See 2.4) The more time spent in the field, the more complete these lists will be.

Purpose: comparison of songbird populations in different habitats
If the purpose is to compare bird populations in different habitats, point counts are a good option (See 2.1). They allow the researcher to determine the population at a localized site of approximately 200-400m diameter. This information can then be

compared to data from another similar sized site of a different habitat type.

Recommendation: add the following to section 2.1

- point counts should be taken weekly through June at each site in order to determine whether the individual is using the site over an extended period of time (territoriality)
- change time periods to 0330-0500; 0500-0630; 0630-0800 and 2000-2130; 2130-2300
- determine clearly which species will be included and which excluded from data before field season (ie include shorebirds, birds of prey, woodpeckers, etc. or just Passiformes) so that data is consistent

Purpose: comparison of songbird populations over distance

Transects are also valuable to compare between habitats if the habitats are adjoining (ie riparian system blending into boreal forest). The transect allows researchers to see how populations change in relation to changing habitats. (See 2.2)

Recommendation: add the following to section 2.2

- transects should be walked weekly throughout June, at different times of the morning and evening (as per time periods suggested above) in order to detect birds which sing at different hours of the day and different times of the month.

Purpose: comparison of songbird populations over time

Overall counts such as those performed on Lake #19 (see 2.3) are useful for studying how the bird population of an area changes over time. This is especially useful if a change is expected to due to outside influences (ie drawdown on Aishihik Lake).

Recommendation: add the following to section 2.3

- care should be taken to perform overall counts at the same time and same date each year (ie. June 5, 0530) in order to provide data which is useful for comparison.

CONCLUSIONS — Chapter 5

In conclusion, this study has been valuable in that it has established a reference point for further study. We now have a data set on Passiforme species in the Sekulman wetland. This can be used in comparison with other, similar wetlands to expose conspicuous absences or abundances of resident species. It can also be used to assess whether fluctuating water levels are in fact having an effect on songbird populations. In general, the data also helps us to further our understanding of wetland ecosystems and the birds that depend on them.

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