

THE CHANGING ECOLOGY OF THE CROW FLATS WETLAND

"The birds are telling us things"



YEAR TWO

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INTERIM REPORT

This work grew from concern expressed principally by elders of the Vuntut Gwitchin First Nation, that the wetlands of the Crow Flats upon which generations have depended, were showing distressing changes. The thought was that, remembering several citizens were involved in wetland research about 40 years ago, a new but similar effort could document and perhaps explain those changes. In 2012 the Vuntut Gwitchin government submitted funding proposals for a return to those earlier data sets to discover whether those changes could be substantiated analytically.

The Crow Flats Wetland is by far the largest wetland complex in the Yukon. Two major sources for understanding the ecology of natural areas like the flats suitable for producing long term management goals are technical wetland analysis, and local traditional knowledge of people who actually grew up on the land.

This report is focussed on trying to combine those two ways of knowing. Principally the idea was to use wetland birds, as 'indicator' species, -- a process that fits well with both traditional knowing and analytical processes of modern Conservation Biology. The Flats was the subject of initial reconnaissance research in the mid 1970's by the author (then in the employ of the Yukon Government) and members of the VGFN. At that time a series of data bases, mostly describing use of the area by wetland and riparian birds, were established. These turn out to be very usable as key ecological indicators of the functioning of the flats. (See Appendix 1 and Yukon Waterfowl Management Plan, 1985, 1990.)

OBJECT of FIELD WORK:

A strong objective of the elders was to make sure the young leaders of the community were directly exposed to the 'Flats' and involved in all the field work there. Student-aged Old Crow citizens, were to make up part of the field crew.

The basic field objective was to mirror as closely as possible the work done in the 1970's. Virtually all work was ground, and water - based in the area of the flats where that earlier work was conducted.

Far-northern systems are known to be experiencing dramatic, often alarming changes apparently due to global environmental trends. The water birds and all riparian species of the Flats potentially provide a powerful 'focus' for tracking these changes because they are totally dependant on the functioning of the wetland ecosystem. Understanding their relative abundance, productivity and general use of the area gives a good ecosystem-level tracking of the critical features of the area.

Key has been documenting timing of events -- breeding chronology in particular, but also species abundance and breeding status. Observations of plant phenology events and hydrological events have been important habitat components tracked. A running tally of species diversity similar to that collected earlier was also seen as essential.

FIELD METHODS:

A field camp was established in the wetland at Schaeffer Lake, the approximate centre of the Flats where the earlier work was also centered. There were two field sessions in 2012: (June 7-20 and July 4-17, and two in 2013: June 12-22 and July 8-19).

A 4-person crew on each session cycled six Old Crow students through the field work. Their assistance and enthusiasm quickly became an essential element.

Study team members:

	<u>June session</u>	<u>July session</u>
2012:	Erin Linklater David Frost	Darcie Josie C. Charlie
In both: The author and Yukon College student Shannon Harvey		
2013:	David Frost Tanner Able/Chlitzee	Briana Tetlichi David Frost
In both: The Author and Univ. of Victoria student Anne Aubin		

The area around base camp at Schaeffer Lake became the core study area for the first half of the study period; intensive survey of a more restrictive area. The second half involved a canoe and portage survey across the southern Flats to the village of Old Crow -- a more extensive coverage.



*"That's going to be hard
on her modeling career"
(D.Frost, 2013)*



*Repairing the roof of the 45 year old Schaeffer Cabin; base camp
of the core study area.*



By searching for nests and determining the age of young, the exact time of hatch was calculated. This is used to compare the breeding chronology between study periods, roughly 40 years apart.



Extensive survey was by canoe, portaging between lakes, counting all waterbirds, ageing young and recording all species encountered.

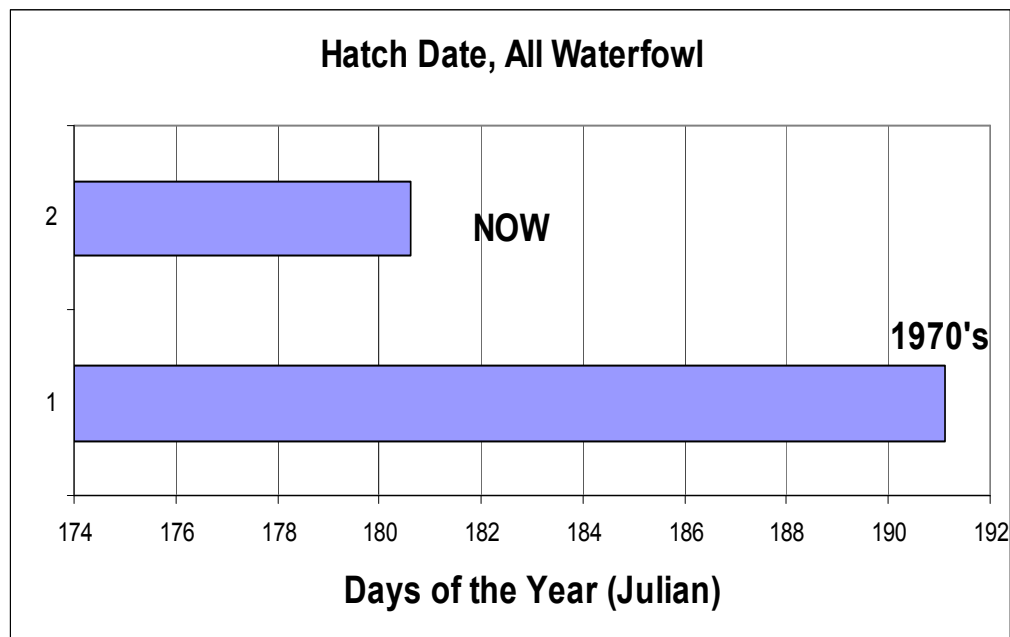
DATA, OBSERVATIONS

a) Focal species:

Waterfowl: By far the best historic counts and surveys are of the ducks, geese and swans of the Flats. The data set contains total counts, breeding pair surveys and a sample of 1,049 breeding records.

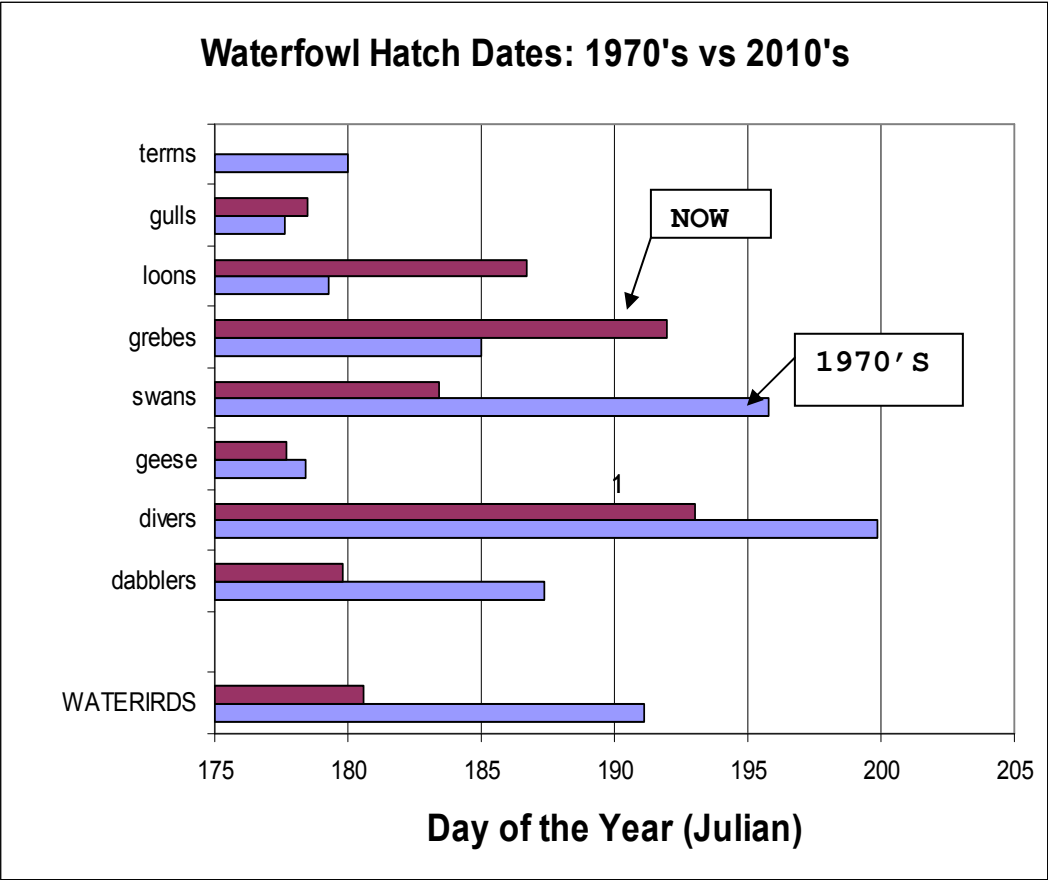
In 2012-13 ground counts of nesting habitat and extensive brood counts produced a sample of 60 breeding records that could be compared to earlier data. Total counts of breeding pairs produced very small sample sizes but some initial comparisons can be made.

Combining all waterfowl species it is clear that a significant change in timing of breeding has happened over the last 40 years: on average these birds are breeding about 10 days to two weeks earlier. (Interestingly this continued unchanged in 2013 -- in spite of that spring being obviously relatively late.)



Further sub-dividing the waterfowl by groups of species, it is starting to become clearer which groups are mostly responsible.

Swans in particular are apparently breeding over two weeks earlier. These and the duck species, (mostly the dabbling ducks - American Wigeon, Mallard, Green-winged teal) - seem to be responsible for most of the observation of advanced breeding. Other water birds (gulls, loons and grebes) have not significantly shown a change. They may even be breeding slightly later:



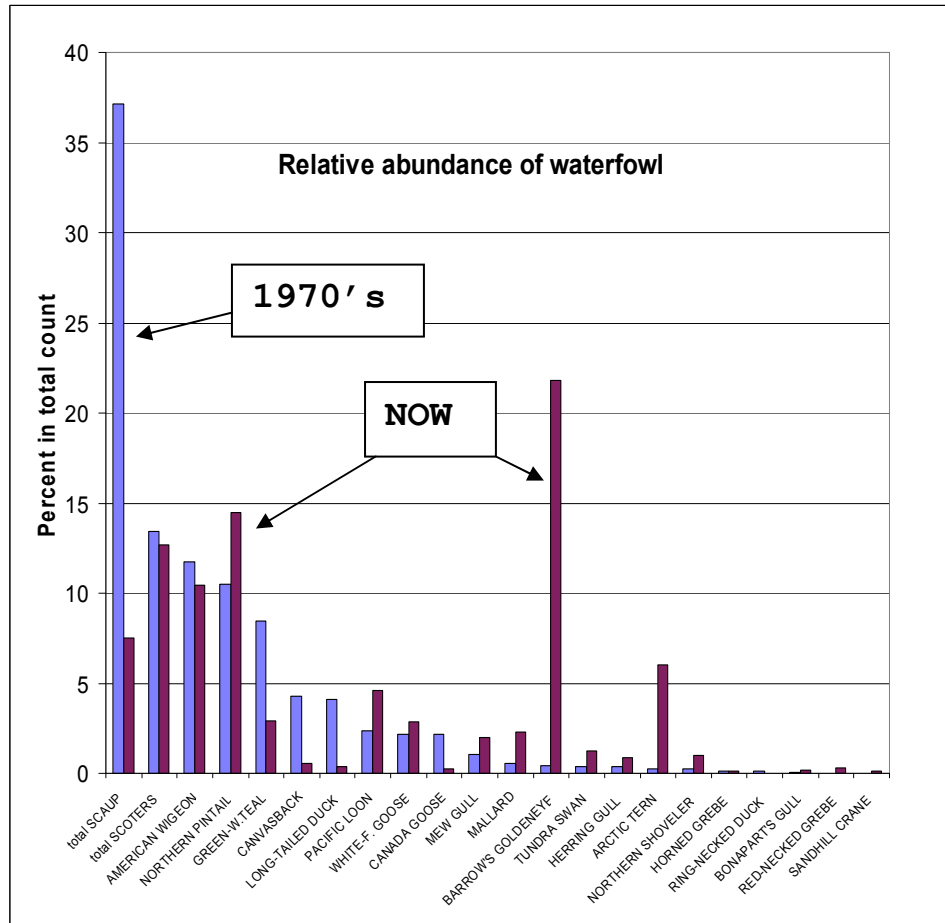


Tundra Swans on the Flats seem to be breeding up to two weeks earlier than 40 years ago.

Some of the most revealing observations are of the **relative abundance** of water birds on the Flats. Comparing counts from the 1970's the major changes in the ranking of species encountered on the flats:

The Scaup species have declined from almost 40% of all waterfowl on the flats to just about 7%. Others that have declined significantly but to a lesser extent are Green-winged teal, Canvasback and Long-tailed duck. Apparently increasing in relative abundance are: Barrow's goldeneye, Pacific loon, White-fronted goose, Mallard, Northern Shoveler, and Arctic tern.

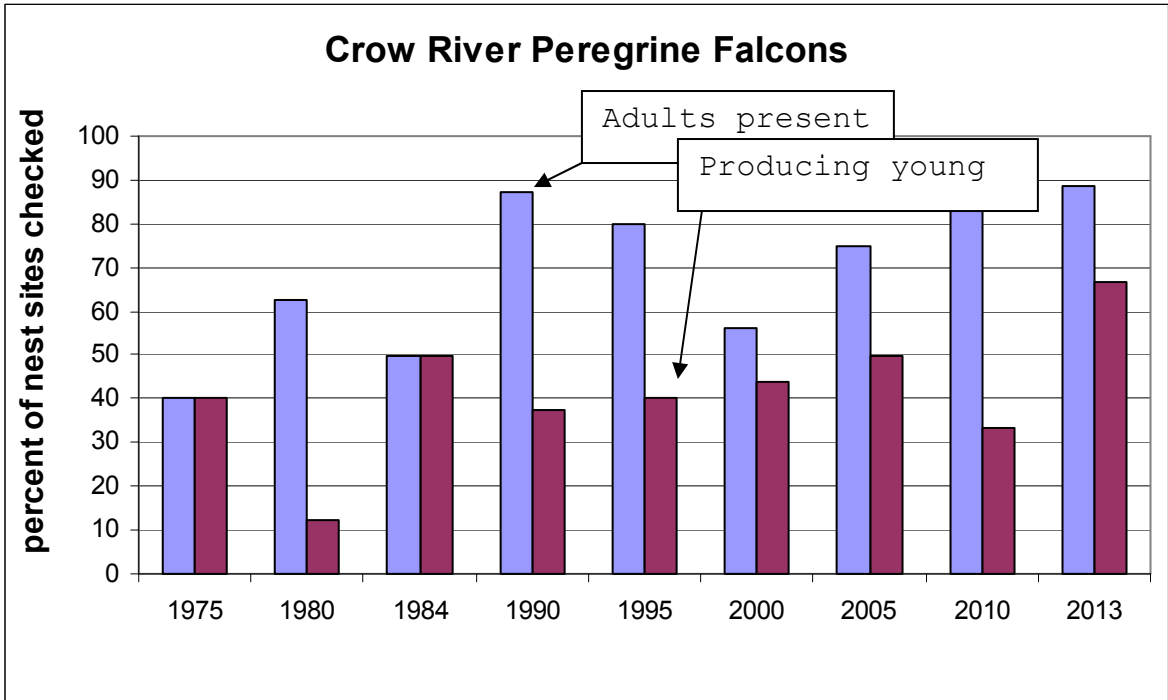
Several have stayed unchanged, among them Scoters that interestingly, are the most important duck harvested locally.



Birds of Prey: The best historic data among the birds of prey track the performance of the Peregrine Falcon that breed along the Crow River. Peregrine falcons are an excellent indicator species because they are very dependant on water birds - mostly shore-birds. Bald Eagle, and Osprey also use the flats but our current field work doesn't survey their numbers well enough. We have surveyed the Peregrine falcons of the Crow River from the water in both study periods. Occupancy and productivity data from a minimum of 10 nesting pairs has been the objective.

Over the last few decades the Peregrine has been showing a decided slump in its production of young. An average of 60% of pairs have been producing no young. Interestingly in our 2013 survey the situation was totally reversed: over 60% of pairs were in fact producing young. This could be a very important

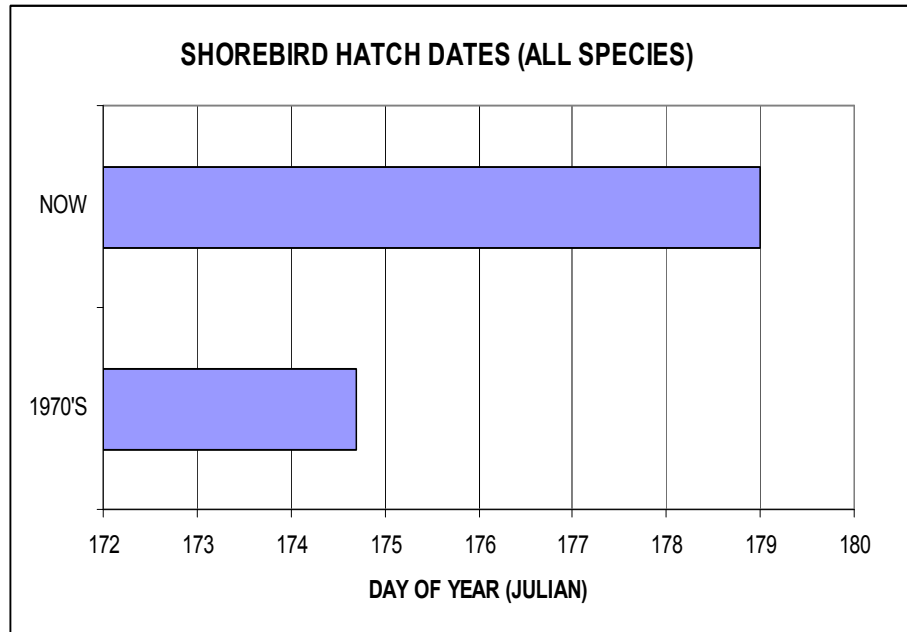
finding of our study as changing weather in early spring has been implemented as a suggested reason for poor falcon breeding. The spring of 2013 was very cold and late which more accurately mirrors the earlier weather regime for the region.



Peregrine falcons seemed to breed better in 2013 than in the last many years

Shorebirds: From the 1970's data there are about 42 breeding records. In 2012 and 2013 we recorded only 4 nesting records. This alone is significant; clearly it suggests a catastrophic decline in these important species.

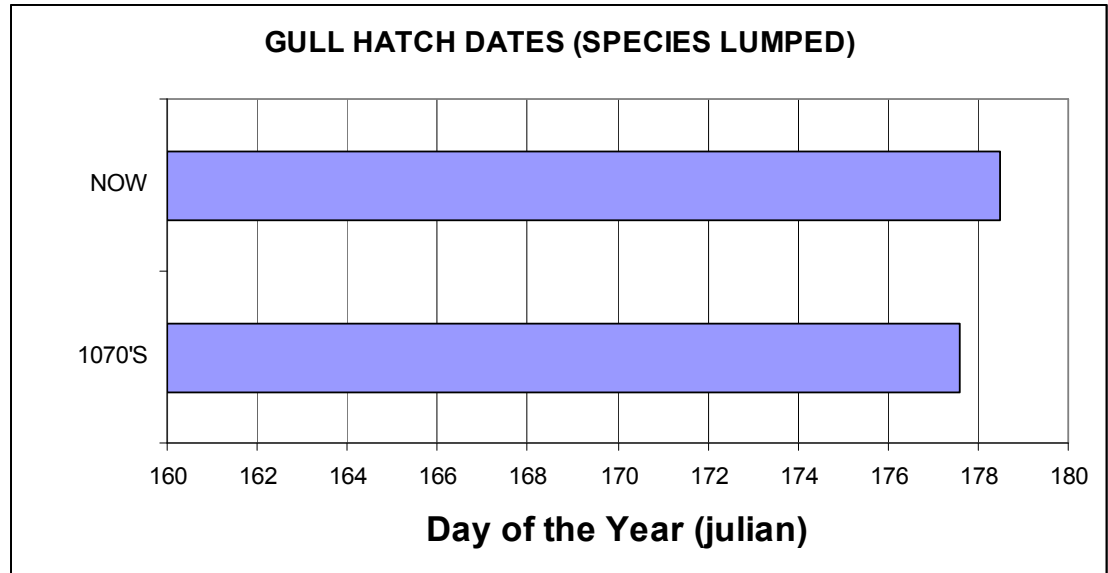
Initial analysis suggests no change in timing (or perhaps a later hatch) but Sample size is too small for definitive conclusions:



Gulls: There are 85 nesting records in the data base from the 1970's; in the current work there are 25.

Some observations suggest that Herring gull in particular may be a species that has increased in abundance on the Flats. One nesting colony seems to have increased by about 25% and it will be important to continue to track this possible trend. Herring gulls are known to be very effective predators of young water birds and are apparently being artificially benefited by humans in winter. (Wintering at garbage dumps is thought to be giving these birds a huge advantage.)

Interestingly in 2013 the one nesting colony surveyed (at Drowned Lake) had been visited by a bear earlier. It had apparently eaten all their eggs. The colony size had decreased significantly and it will be interesting to track its progress in the future. (Nest timing is really meaningless because of this.) In the gulls, there is no significant difference in hatch date between the 1970's and now.

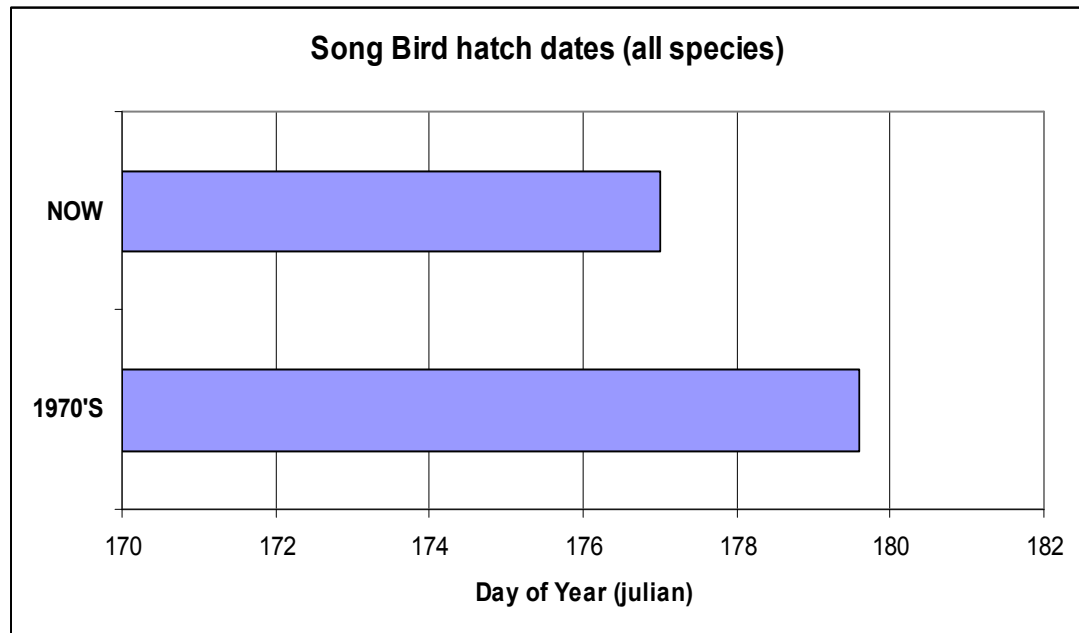


Herring gull nest at Drowned lake nesting colony, OCF, June 18, 2013. Incomplete clutch after earlier bear depredation.

Riparian song birds: The historic data set for song birds has a sample of 122 nests that provide an excellent view of basic nesting ecology on the Flats.

In 2012 and 13 we conducted a running count of species diversity, mapped the nesting pairs in the core area at the Schaeffer lake camp survey plot and accounted for a sample of 37 nest sites observed. Lumping all species, Initial analysis in 2012 suggested a significant change in nesting chronology toward an EARLIER hatch date. However in 2013 an obviously later nesting time (probably due to the unusual spring weather that year)

put the nesting time back almost the same as it was in the earlier years.



c) Bird Species diversity: Historically, a running count of all bird species encountered was maintained. In 2012-13 a similar log was kept. (Appendix 2 details the relative abundance of all species of birds encountered in the 2012-13 field season.)

Although it is too early to make definitive conclusions, several interesting and potentially alarming observations are evident: Some species that were recorded as 'common' historically are either missing completely or very rarely seen in the current study:

- Red-throated loon
- Greater scaup
- Long-tailed duck

d) Vegetation phenology: (Historic data on 9 key species.) The same species were followed in 2012-13:

(No clear conclusions are possible with this 2-year comparison, - 2013 was an obviously late spring - at least another year's observations needed.)

Strong observational evidence suggests that riparian shrubs and spruce seem to have been 'released', and now are in accelerated growth, standing significantly higher than historically.

PLANT CHROLOGY

(julian days of year)	2012		2013		
	FIRST BLOOM	FULL BLOOM	FIRST BLOOM	FULL BLOOM	SEED
Labrador tea	163	170		167	
Andromeda	160	164	167		
Dwarf Birch	160	163	170		
Spruce	164				
Cotton grass		160			167
Leather leaf	160		167		
Colt's foot	160	164	167		
Cloud berry	160	170	175		
Aquatic sedge	165		168		

d) Physical environment: (Historical data collection from research campsite was water temperature and water level changes over the summer period. A summer weather station was also operational. Recorded were: twice daily temperatures, maximum and minimum, precipitation and notes on cloud cover.)

Weather data: In 2012 and 13 during the two, 1-week periods at the Schaeffer site, the same standard weather data were taken. No clear conclusion about change is possible with the current data.

Hydrological observations: Observations of the level of water in key water bodies on the Flats strongly suggests that many seem overcharged with water as compared to the historic levels.

In particular Schaeffer Lake (and others such as Drowned Lake are obviously holding significantly more water than historically. From a strictly observational point of view, the shoreline emergent vegetation, so important to staging and feeding water birds is virtually all flooded. The shrub and treed shorelines are obviously eroding and collapsing. Potentially more disturbing, significant drainage channels

are building that should lead to catastrophic drainage in the near future.

FOCUS FOR ONGOING FIELD PROGRAM:

Clearly these initial years have suggested interesting ecological changes occurring on the Flats. The value of historic data in quantifying those changes is obvious. However, in all cases these initial years have produced only minimal sample sizes for drawing sound conclusions.

- Planning must be toward continuing this work and focussing on duplicating the best of those data sets. Timing of events, -- in particular breeding chronology of the various groups of bird species is a key focus. Plant phenology should probably be given more emphasis than in 2012-13.
- Waterfowl breeding data is one of the most powerful indicators of wetland ecosystem integrity. Pair counts and brood counts are standard in waterfowl management procedures and give a good method for comparing across time as well as between wetlands elsewhere. It will be important standardize those counts, targeting lakes that were best monitored in the historic field work. (Schaeffer Lake, D.Lord lake and Drowned Lake are key.)
- Simple species diversity data may be the best and easiest data set to maintain. Song bird diversity, in particular at the Schaeffer Camp, was a strong data set historically and should continue to be a focus.

MISSING SPECIES, SPECIES AT RISK: Building on the 2012 findings, one of the alarming observations was the almost complete disappearance of some of the common species historically. In particular, Greater Scaup, Long-tailed duck, Surf Scoter, and all the shorebirds have apparently declined significantly. Other species may also be found declining as the work continues.

- This has to lead to an increased focus on species becoming at 'risk'. It is known that some species in the area (notably Peregrine falcon) have in the past been 'in harms way' and almost extirpated completely.
- It is hard to know how to respond to species disappearance except to increase vigilance where those identified as declining are concerned. In continuing it will be important to revisit sites where it was known historically that, for example, long-tailed ducks and Greater Scaup were nesting. One of the best data sets of any bird is that for the Peregrine falcon. The Old Crow river breeding population, dependant as it undoubtedly, is on the water birds of the Flats, is an obvious key indicator species. A greater emphasis on its breeding ecology will be an easy addition to

the project. A general focussing on others known at risk: Rusty blackbird, Short-eared owl.

VEGEGATION CHANGES: A startling observation (supported locally) was the apparent 'release' of shrubs and stunted black spruce.

- Recover and locate on the ground, historic photographs of shoreline vegetation
- Make companion photos and measurement
- Record growth (ring and stem) growth

PHYSIOGRAPHY, POND DYNAMICS, HYDROLOGY: In 2012-13 it has become relatively clear that water level in many key lakes in the central flats are higher than historically. Why this may be the case and what the consequences will be is undoubtedly of major importance to the ecology of the area.

- Engage hydrological expertise in the project
- Design and implement monitoring protocols

COMMUNITY BASED MONITORING AND BASIC HABITAT MANAGEMENT: The importance of long term monitoring and care for ecological processes is central to the conclusions from work like this project. People on the land with clear, analytical protocols for tracking changes are in the best position to create the data sets necessary.

- In consultation, design clear, simple protocols for local people to track key focal indicators. In all cases of the focal species and processes the project identifies as key, thought must go into creating those protocols.
- Data bases need to be designed and maintained as a matter of course in the VGFN government processes.
- Co-ordination and cooperation with ecological monitoring already underway in the Parks Canada is essential
- A good practical, on-going addition to the field work on the Flats could be developing a process of dealing with debris and other garbage accumulating on the land. Earlier occupancy of field camps by a variety of 'external' visitors as well as local people, has left a fair amount of non-degradable debris.



A good practical learning and management addition to the field work can be developing a process for dealing with debris accumulating on the land.

APPENDICES



Grizzlies on the Old Crow Flats make field work interesting at times... "would you mind paddling that canoe out of here?... right now!?"

APPENDIX 1:

DATA SETS COLLECTED IN THE 1970'S

FOCAL SPECIES & Physical Env. For possible use in comparison from D. Mossop files

Useable data sets exist for:

Focal species:

- a) Birds of Prey: D. Mossop (published in several reports, some published papers, 1974, to present)
best data:
 - Peregrine Falcon
 - Bald Eagle
 - Osprey
- b) Gulls and shorebirds: (some reports 1974-77) and unpubl data
 - Herring gull
 - Mew gull
- c) Riparian song birds:
Basic community structure at center of Flats (1975-76)
- d) Waterfowl:
1974-76: (published in report form)
Plus: US Fish and Wildlife Service annual surveys (published in report form),
- e) Mammals:
Moose: 1974-78 Some fairly good counts that could be used to compare with recent counts to identify trend:

Caribou: 1976: Important documentation of calving on the flats by the Porcupine herd. (report form)

Physical environment:

Hydrology: 1975: Russell and D. Mossop (published)
1974-77 Water level and water temperature data set: Unpubl. data

Weather: 1975-78 Summer weather station: unpubl data

Plant phenology: 1975-7 unpublished notes on time of
blooming for several species

APPENDIX 2: .

Annotated List of Bird species, Crow Flats Wetland, June-July 2012 and 2013(comparison data from 1970's is in preparation).

SPECIES	TOTAL COUNTED	%OF TOTAL IN COUNTS	% OF COUNTS
NUMBER OF COUINTS	21		
RED-NECKED GREBE	15	0.3	23.8
HORNED GREBE	3	0.1	14.3
COMMON LOON	6	0.1	23.8
PACIFIC LOON	120	2.2	66.7
RED-THROATED LOON	10	0.2	23.8
HERRING GULL	92	1.7	66.7
RING-BILLED GULL	3	0.1	9.5
MEW GULL	138	2.5	52.4
BONAPART'S GULL	39	0.7	52.4
ARCTIC TERN	2	0.0	4.8
COMMON MERGANSER	5	0.1	9.5
RED-BR. MERGANSER	2	0.0	4.8
MALLARD	136	2.5	81.0
AMERICAN WIGEON	524	9.6	76.2
GREEN-W.TEAL	37	0.7	47.6

NORTHERN SHOVELER	69	1.3	52.4
NORTHERN PINTAIL	138	2.5	52.4
CANVASBACK	36	0.7	23.8
GREATER SCAUP	0	0.0	0.0
LESSER SCAUP	129	2.4	76.2
RING-NECKED DUCK	4	0.1	4.8
COMMON GOLDENEYE	0	0.0	0.0
BARROW'S GOLDENEYE	1086	19.8	42.9
BUFFLEHEAD	0	0.0	0.0
LONG-TAILED DUCK	13	0.2	28.6
HARLEQUIN DUCK	1	0.0	4.8
WHITE-WINGED SCOTER	358	6.5	61.9
SURF SCOTER	30	0.5	38.1
SNOW GOOSE	0	0.0	0.0
GR. WHITE-FR. GOOSE	436	8.0	61.9
CANADA GOOSE	35	0.6	28.6
BRANT	0	0.0	0.0
TUNDRA SWAN	59	1.1	61.9
SANDHILL CRANE	12	0.2	9.5
RED-NECKED PHALAROPE	9	0.2	14.3
WILSON'S SNIBE	15	0.3	38.1
LEAST SANDPIPER	18	0.3	23.8
SOLITARY SANDPIPER	1	0.0	4.8
LESSER YELLOWLEGS	43	0.8	61.9
UPLAND SANDPIPER	1	0.0	4.8
SPOTTED SANDPIPER	125	2.3	23.8
SEMIPALMATED PLOVER	2	0.0	4.8
SPRUCE GROUSE	0	0.0	0.0
RUFFED GROUSE	0	0.0	0.0
WILLOW PTARMIGAN	4	0.1	14.3
NORTHERN HARRIER	1	0.0	4.8
SHARP-SH. HAWK	1	0.0	4.8
GOSHAWK	0	0.0	0.0
NORTHERN GOSHAWK	0	0.0	0.0
RED-TAILED HAWK	0	0.0	0.0
HARLAN'S HAWK	5	0.1	9.5
ROUGH-LEGGED HAWK	0	0.0	0.0
GOLDEN EAGLE	1	0.0	4.8
BALD EAGLE	5	0.1	14.3
GYRFALCON	0	0.0	0.0
PEREGRINE FALCON	32	0.6	19.0
MERLIN	2	0.0	4.8
AMERICAN KESTREL	1	0.0	4.8
OSPREY	3	0.1	14.3

SHORT-EARED OWL	7	0.1	19.0
GREAT GRAY OWL	1	0.0	0.0
BOREAL OWL	0	0.0	0.0
GREAT HORNED OWL	2	0.0	4.8
SNOWY OWL	0	0.0	0.0
NORTHERN HAWK-OWL	0	0.0	0.0
BELTED KINGFISHER	1	0.0	4.8
			0.0
N.FLICKER	4	0.1	9.5
SAY'S PHOEBE	0	0.0	0.0
ALDER FLYCATCHER	1	0.0	4.8
GRAY JAY	51	0.9	52.4
COMMON RAVEN	72	1.3	57.1
RUSTY BLACKBIRD	114	2.1	81.0
PINE GROSBEAK	3	0.1	9.5
WHITE-W. CROSSBILL	5	0.1	4.8
COMMON REDPOLL	94	1.7	66.7
SNOW BUNTING	0	0.0	0.0
LAPLAND LONGSPUR	0	0.0	0.0
SMITH'S LONGSPUR	1	0.0	4.8
SAVANNAH SPARROW	41	0.7	66.7
WHITE-CRND SPARROW	78	1.4	66.7
GOLDEN-CRND SPARROW	0	0.0	0.0
AM. TREE SPARROW	110	2.0	71.4
DARK-EYED JUNCO	23	0.4	28.6
LINCOLN'S SPARROW	4	0.1	14.3
FOX SPARROW	156	2.8	85.7
CLIFF SWALLOW	2	0.0	4.8
TREE SWALLOW	0	0.0	0.0
VIOLET-GREEN SWALLOW	0	0.0	0.0
BANK SWALLOW	201	3.7	14.3
BOHEMIAN WAXWING	16	0.3	19.0
NORTHERN SHRIKE	1	0.0	4.8
ORANGE CRND WARLER	3	0.1	4.8
YELLOW WARBLER	121	2.2	71.4
YEL-RUMPED WARBLER	40	0.7	42.9
BLACKPOLL WARBLER	65	1.2	71.4
NORTHERN WATERTHRUSH	146	2.7	85.7
COMMON YELLOWTHROAT	0	0.0	0.0

WILSON WARBLER	6	0.1	14.3
AMERICAN PIPIT	0	0.0	0.0
AMERICAN DIPPER	0	0.0	0.0
BLACK C. CHICKADEE	0	0.0	0.0
BOREAL CHICKADEE	1	0.0	4.8
RUBY-CRND KINGLET	5	0.1	14.3
TOWNSEND'S SOLITAIRE	0	0.0	0.0
GRAY-CHEEKED THRUSH	113	2.1	76.2
SWAINSON'S THRUSH	12	0.2	23.8
HERMIT THRUSH	1	0.0	4.8
AMERICAN ROBIN	150	2.7	100.0
VARIED THRUSH	1	0.0	4.8
