

NORMAN WELLS WATERBIRD INVENTORY PROJECT

YEAR 2001 SURVEY RESULTS

INTERIM REPORT – FEBRUARY 2001

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ACKNOWLEDGEMENTS

In addition to the authors, Alain Richard (DU Edmonton, AB), Sean Smyth (DU Edmonton, AB) and Dave Kay (DU Brooks, AB) participated in delineating and selecting the wetlands to be surveyed.

This study would not have been possible without the continued financial support provided by Ducks Unlimited Canada, Ducks Unlimited Inc. and USDA Forest Service, Office of International Programs, in kind helicopter fuel support provided by Resource, Wildlife and Economic Development (Government of Northwest Territories). Permission to carry out the research within the Sahtu Settlement Area provided by the Sahtu Renewable Resources Board, along with the Norman Wells and Tulita Renewable Resource Councils was greatly appreciated.

Appreciation is also extended to pilots Dwayne Hanson, Steve Thorne, Murray Douglas, Tim Simmons, Guy Thibault and Dale Simpson (Canadian Helicopters, Norman Wells, NT) and Perry Linton and Steve Kaiser (North-Wright Air, Norman Wells, NT) who very capably assisted in the survey program.

INTRODUCTION

An agreement between Ducks Unlimited Canada, Ducks Unlimited Inc., the Government of Northwest Territories, Sahtu Dene and Metis and USDA Forest Service, Office of International Programs was initiated in 1999 to conduct a landcover inventory and mapping project on a 32,000 km² LANDSAT TM scene, centered on Norman Wells, NT (65°17'3 N, 126°50' W). In addition, investigations of waterbird communities were initiated in 2000 (first of three year effort) to: 1) document waterbird assemblages within the northern Taiga Plain Ecozone, and 2) assess the relative importance of various wetland types to waterbird communities. Aerial surveys during breeding (spring), brooding (summer), and staging (early fall) periods were conducted on randomly selected wetlands within the same study area. Preliminary results indicate a diverse waterbird assemblage associated with wetlands in the region. Waterfowl communities were dominated by diving ducks, most notably lesser scaup, but had good representation of dabblers with mallard and American wigeon numbers being relatively high as well. Examination of pair to brood ratios suggests higher productivity than in 2000 among early nesters, such as mallard, but total abundance of the species over the study area is down from last year.

This report is a summary of waterbird inventories in 2001 documenting waterbird use on randomly-selected basins through a series of breeding, brood rearing, and staging periods. This study is part of the overall DUC investigations across the Western Boreal Forest of Canada.

METHODS

Within the Norman Wells study area, there are 10 Ecodistricts in 5 Ecoregions; Peel River Plateau (51), Great Bear Lake Plain (52), Norman Range (55), Mackenzie River Plain (56) and the Franklin Mountains (58).

An unsupervised classification was imported into ArcView (ver 3.2) and classes, which appeared to represent wetlands, were arbitrarily determined. Sites < 1.0 ha were excluded from the sample universe to deduce risks of misclassification (e.g., terrain shadow, misclassified single and small clusters of pixels, etc.). The total number of wetlands within each Ecodistrict was determined and, using a "proportional allocation protocol (a ratio of wetlands per Ecodistrict to total wetlands on the scene to represent the proportion), individual basins were randomly selected. Budgetary constraints limited the survey sample to \approx 150 wetlands. Sites > 300 ha were omitted from the IBP and brood survey sample due to survey constraints, and replaced by the next randomly selected site available. However, these large basins were still surveyed to document staging use. Although not part of the randomly chosen sample, specific sites may have been pre-selected due to their cultural significance (e.g., aboriginal use) and/or existing data were available and comparison was preferred.

Rotary-Wing Breeding Pair and Brood Survey Protocols

Two breeding pair surveys (May 22-25 and June 12-14) and two brood surveys (July 9-13 and August 5-8) were conducted throughout the summer to document waterbird productivity for early and late nesting species. Timing of surveys (Appendix I) was determined from preliminary inventories conducted between 1993-1998 (Kay pers. comm.) and review of existing Ducks Unlimited, US Fish & Wildlife Service (USFWS) and Canadian Wildlife Service (CWS) data (US F&W 1998). Surveys were conducted using a Bell 206B (and/or 206L) helicopter on skids equipped with bubble windows. The survey crew consisted of the pilot, with an observer / navigator seated beside the pilot in the front left and an observer seated in the rear right responsible for observations on opposite sides of the aircraft. Surveys consisted of a single or multiple transects flown across the long axis of each basin, with inter-transect distances corresponding to maximum estimated visibility to facilitate species identification. Observers

employed individual micro-cassette tape recorders to record data given the relatively high waterbird densities. Age of duck broods were estimated based on Gollop and Marshall (1954) and Wishart (1983). All waterbirds encountered were recorded .

Surveys were flown at a nominal altitude of 35 m, however the survey elevation was occasionally reduced to between 15 and 35 m above ground level (AGL) to confirm species or sex determination or as required due to shoreline complexity and vegetative cover conditions. Ground speeds did not exceed 100 km/h during the active survey effort; over areas with well-developed cover, a significantly slower ground speed (e.g. 30 km/h) was employed. Techniques employed were consistent with, and developed on, protocols developed by the Canadian Wildlife Service (CWS) for application in Eastern North America (Black Duck Joint Venture, 1996). A total of 148 basins were visited during the breeding and brood surveys (Figure 1 and Appendix II). Individual wetlands functioned as the unit of measure for recording of all observations. Global Positioning System (GPS) was used to ensure locations visited corresponded to pre-defined sites.

Breeding pair data were summarized by total observed ducks, Indicated Breeding Pairs (IBP) and Indicated Breeding Pairs conservative value (IBPc). IBP refers to the sum, by species, of pairs, lone drakes, 2:1 male-to-female groups, and 5 or less groups of males observed, whereas IBPc involves the sum, by species, of pairs and lone drakes only (Dzubin 1969). Waterfowl breeding population estimates were calculated for each complex for basin-specific surveys. Nest or clutch initiation dates were calculated using a brood back-dating formula and reference data from Wishart (1983) and Klett (1986). Such information was then used *post-hoc* to determine species-specific breeding chronology. The breeding pair survey most accurately reflecting the onset of breeding (i.e. optimal surveying time) was used for calculation of breeding effort for each waterfowl species observed. In instances where peak breeding effort occurring between dates of the two breeding pair surveys, an average of both surveys was calculated to determine the number of indicated breeding pairs (IBP) for each basin.

Brood data was summarized by total unique broods, total duck abundance and pair:brood ratio. Total unique brood numbers are obtained by assuming: 1) no inter-wetland movement; 2) broods from the latter survey have hatched (Gollop and Marshall 1954) after the first brood survey; or 3) were not observed during the first brood survey. Therefore, to avoid an over

estimate of the brood count, broods of the same species occurring on the same basin, of equal brood size and in which the difference in brood age observed on both surveys is equal to or close to the number of days between both brood surveys were removed from the analysis. In such instances the older brood was removed because brood age identification is more accurate when the brood is young (Gollop and Marshall 1954).

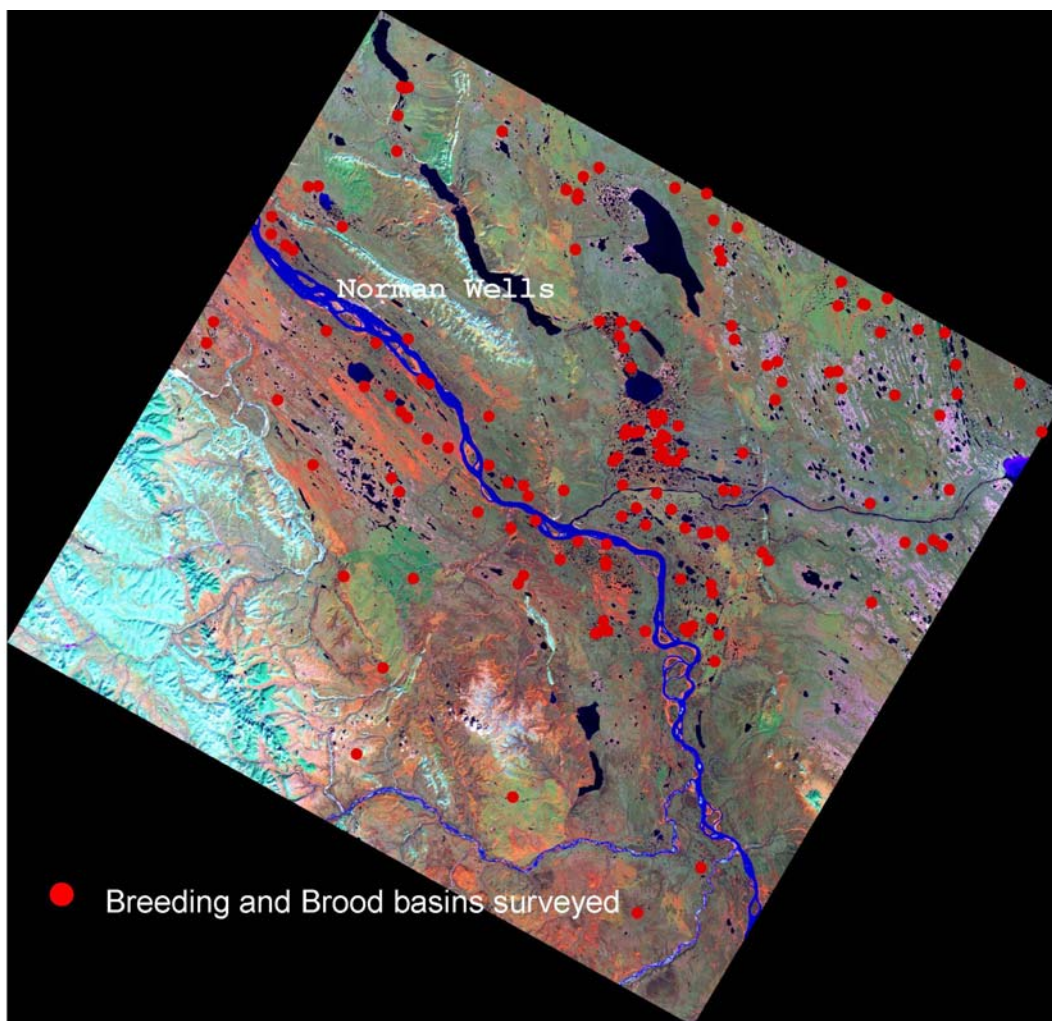


Figure 1: Selected Wetland Basins for 2001 Norman Wells Breeding and brood waterbird Surveys.

Fixed Wing Molting/Staging Survey Protocols

Two staging surveys were successfully flown during late August (25-27) and mid-September (24-26) using a high-wing Cessna 206 on wheels or floats based out of Norman Wells (North-Wright Aviation). An observer/navigator sat in the front right position of the aircraft

with a second observer seated on the opposite side in the rear of the aircraft (Appendix I). The aircraft was flown at approximately 100m AGL at a speed of 150 km/hr. The number of birds, by species where possible, was estimated for each wetland surveyed and recorded on micro-cassette tape recorders. A total of 154 basins were visited during the molting/staging surveys (Figure 2 and Appendix III). Small wetlands were surveyed in one pass, while larger wetlands required two or more passes.

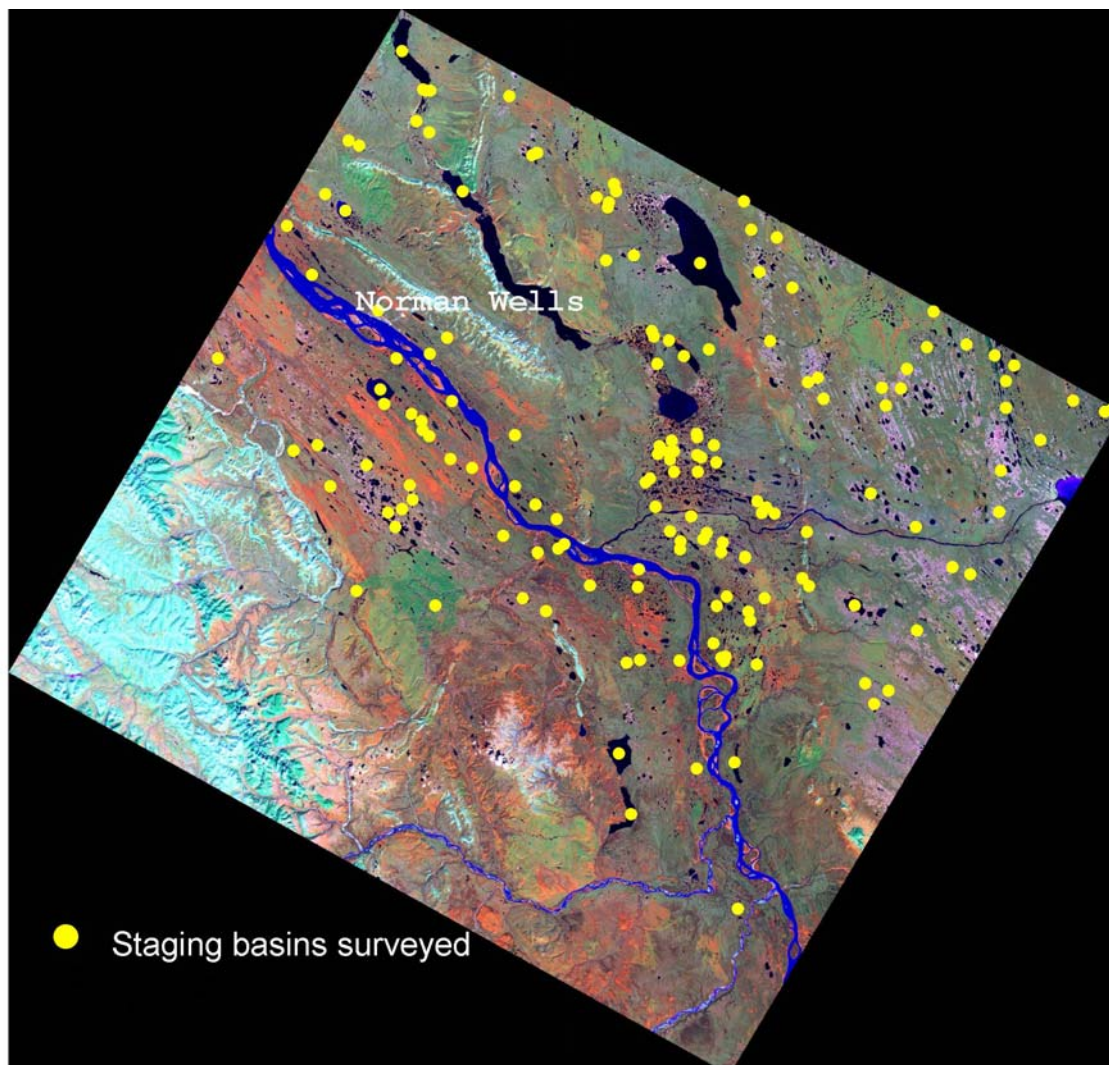


Figure 2: Selected Wetland Basins for 2001 Norman Wells Molting/Staging Waterbird Surveys.

Brackett Lake Fixed-Wing Molting and Staging Survey Protocols

A fixed-wing molting survey was flown in early August (10) and two staging surveys were flown in late August (27) and late September (24) over Brackett Lake (known locally as

Willow Lake). A series of east to west transects on 1 km intervals (representing 38.85% total coverage of the lake) were flown (Figure 3). An observer/navigator sat in the front right position of the aircraft with a second observer seated on the opposite side in the rear of the aircraft. Observers recorded all observations within 400 m of the aircraft flight path (200 m to each side) similar to USFWS protocol (U.S. Fish and Wildlife Service / Canadian Wildlife Service 1987). Specific observation locations were geo-referenced by linking observation interval (recorded to the nearest second) with latitude/longitude position generated by simultaneous GPS position identification as recorded using a PC based moving map display (ArcView Tracking Analyst software). This survey was flown using a Cessna 185 on floats at a ground speed of 160 km/hr at 40m above ground level. Fixed-wing total waterbird population estimates for Brackett Lake (approximately 55.17 km²) were derived by summing observations and multiplying our survey coverage totals by 2.57 (consistent with the extent of the survey coverage) to estimate numbers over the remainder of Brackett Lake.

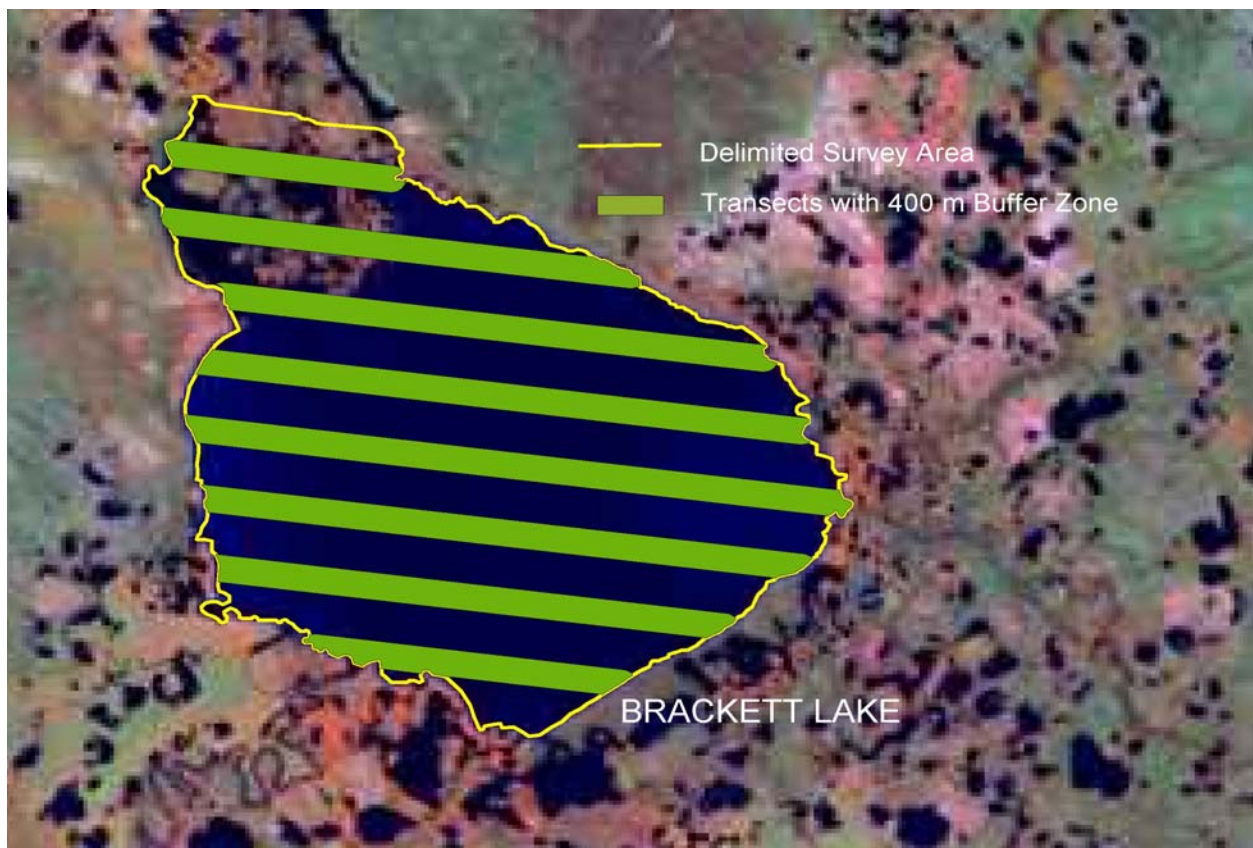


Figure 3: Brackett Lake Survey Area and transects with 400m buffer zone.

Water Quality Sampling Survey Protocol

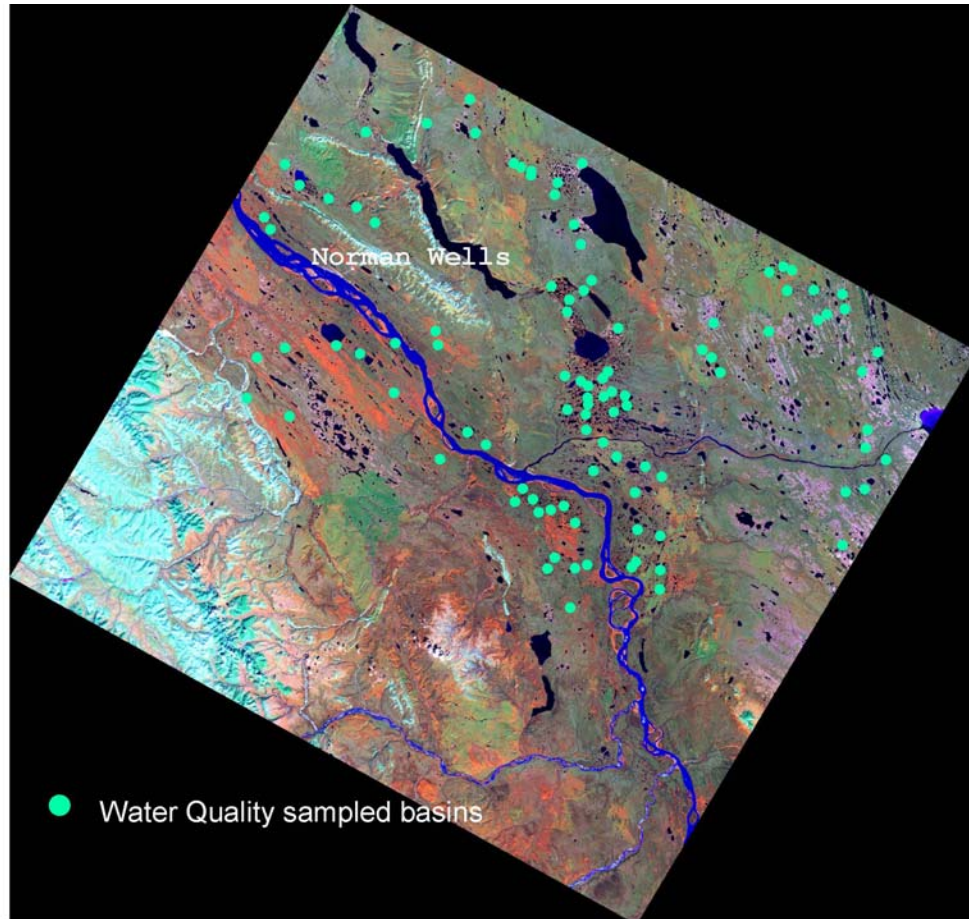


Figure 4: Selected Wetland basins for Water Chemistry sampling.

Water quality surveys were completed following the second brood survey (9-12 August). An analysis of the latter data set is still ongoing these results are not reported in detail in this document.

Water samples were collected using a Bell 206B helicopter (Canadian Helicopters, Norman Wells, NT) equipped with bubble windows and floats. The aircraft typically landed in mid-basin where upon sample were collected from the float by one member of the sampling crew. Samples were kept in the dark following collection, and returned to Norman Wells for pH and conductivity determination. Filtered (Whatman GF/C filters) and non-filtered sample aliquots were prepared and delivered to the University of Alberta for further analysis for nutrient

chemistry and major ion analysis. A total of 100 basins were randomly selected and sampled during the survey effort in 2001 (Figure 4 and Appendix IV).

Waterbird-Habitat Association Analysis

One of the main objectives of this study is to build a predictive model by associating waterbird use with habitat/wetland attributes derived from the landcover inventory/mapping component of this program. Such exercise will proceed pending acquisition of an accurate classified habitat classification of the study area.

RESULTS

Breeding Pair Surveys

Helicopter breeding waterbird surveys were successfully completed May 22-25 and June 12-14 as scheduled with basins surveyed illustrated in Figure 1. Based on back-calculated nest initiation dates (Table 1), breeding pair survey I was used to determine pair counts of Bufflehead, Mallard, Northern Pintail and Surf Scoter while breeding pair survey II was used to determine pair counts for scaup spp. and Ring-necked duck (Table 1). An average of both breeding pair surveys was used to determine the number of pairs of American Wigeon, American Green-winged Teal and Northern Shoveler (Table 1). Where small sample sizes from our data precluded accurate determination of clutch initiation dates for the study area (scoter spp., Common Goldeneye, Blue-winged Teal, Long-tailed duck (Oldsquaw), Canvasback, Common Merganser and White-winged Scoter), relative initiation dates from unpublished sources and/or southern populations were employed to estimate the appropriate IBP survey interval. Unknown divers, dabblers and ducks were averaged regardless of sample size (Table 1).

A total of 517.5 indicated breeding pairs (371 for IBPc), representing 14 different duck species, were calculated from observations made on 148 basins (Table 1). This results in an average of 3.5 breeding pairs/basin (2.5 IBPc/basin). Diving ducks consisted of 56% of all indicated breeding pairs of ducks recorded (Table 1). The most common species recorded were scaup (128), Mallard (116), Surf Scoter (84) and American Wigeon (47). Collectively, these four species represented 72% of all breeding pairs observed. Detailed results of species-specific

indicated pair counts per basin are provided in Appendix V to X. Relative species abundance (total ducks) followed a similar pattern to that of pair counts. A total of 2711 and 842 birds, representing 15 species, were recorded during surveys I and II respectively. Scaup, Mallard, American Wigeon and Surf Scoters were among the most frequent species observed during both surveys. Detailed results of basin and species-specific total duck abundance during each pair survey are provided in Appendix XI-XII. Other waterbirds observed during the first breeding survey include 273 shorebirds / Yellowlegs, 63 Pacific Loons, 42 Canada Geese and 24 Sandhill Cranes (Appendix XIX)

Table 1: Norman Wells rotary-wing waterfowl Indicted Breeding Pair survey results by species, spring 2001.

Species ¹	IBP interval	Total IBP	Total IBPc	Brood Sample size (n)	Median CID	Median HD
SCAU*	II	128	90	45	15-Jun	21-Jul
MALL	I	116	68	18	24-May	28-Jun
SUSC	I	84	52	7	21-May	30-Jun
AMWI*	AVG	47	40.5	16	01-Jun	04-Jul
NOPI	I	31	24	4	23-May	24-Jun
RNDU*	II	25	23	20	11-Jun	16-Jul
BUFF	I	24	22	6	23-May	06-Jul
COGO	I	18	10	0	n/a	n/a
AGWT*	AVG	15.5	15.5	6	16-Jun	19-Jul
NSHO*	AVG	13.5	11.5	6	06-Jun	10-Jul
CANV	I	10	10	0	n/a	n/a
BWTE*	AVG	2.5	1.5	0	n/a	n/a
WWSC	I	1	1	0	n/a	n/a
SCOT	I	1	1	0	n/a	n/a
COME*	AVG	1	1	0	n/a	n/a
UNDU*	AVG	0	0	9	n/a	n/a
UNDI*	AVG	0	0	8	n/a	n/a
UNDA*	AVG	0	0	5	n/a	n/a
RN/SC*	II	0	0	5	n/a	n/a
BU/GO	I	0	0	1	n/a	n/a
TOTAL		517.5	371	156		

¹see Appendix XXVII for species names

*incomplete data (back seat observer only for IBP II)

A general trend can be noticed in Table 2, all dabbling species have a lower IBP in 2001. Mallard, American Green-winged Teal, American Wigeon and Northern Shoveler have significantly lower IBP value compared to 2000. In contrast, diver IBP values rose from last year's results, with the exception of Bufflehead (down by 33%). Scaup and Surf Scoter breeding pair values almost doubled those of 2000, whereas Ring-necked duck numbers remained stable.

Table 2: Norman Wells 2001 IBP & IBPc values compared to 2000 values (in both years only back seat observer data for IBP II).

SPECIES ¹	IBP Interval	IBP			IBPc		
		2000	2001	% change	2000	2001	% change
AGWT*	AVG	60.5	15.5	-74	56	15.5	-72
AMWI*	AVG	94	47	-50	86	40.5	-53
BAGO	I	1	0	-100	1	0	-100
BUFF	I	36	24	-33	32	22	-31
BWTE*	AVG	7	2.5	-64	6	1.5	-75
CANV	I	1	10	900	1	10	900
COGO	I	8	18	125	8	10	25
COME*	AVG	0	1	-	0	1	-
COME/RBME*	AVG	0.5	0	-100	0.5	0	-100
LTDU	I	2	0	-100	2	0	-100
MALL	I	329	116	-65	254	68	-73
Merganser*	AVG	0.5	0	-100	0.5	0	-100
NOPI	I	50	31	-38	44	24	-45
NSHO*	AVG	39	13.5	-65	34.5	11.5	-67
REDH*	AVG	0.5	0	-100	0.5	0	-100
RN/SC*	II	1	0	-100	1	0	-100
RNDU*	II	29	25	-14	17	23	35
SCAU*	II	60	128	113	49	90	84
SCOT	I	9	1	-89	5	1	-80
SUSC	I	43	84	95	27	52	93
UNDA*	AVG	1	0	-100	1	0	-100
UNDI*	AVG	3	0	-100	3	0	-100
UNDU*	AVG	2.5	0	-100	2.5	0	-100
WWSC	I	0	1	-	0	1	-
Total		777.5	517.5	-33	631.5	371	-41

¹ see Appendix XXVII for species name

* incomplete data (back seat observer only for IBP II)

The significant difference over last years results resides in the first breeding pair survey (Table 3). Total IBP and IBPc values during the first breeding pair survey in 2001 are equal to approximately half of the values in 2000.

Table 3: Norman Wells 2001 Total IBP & IBPc values compared to 2000 values.

		2000	2001
IBP I	IBPc	927	441
	IBP	1159	644
IBP II*	IBPc	248	251
	IBP	327	351

*Incomplete data set for IBP II (back seat observer only)

A low percentage of total ducks were observed to be breeding on the study area (Table 4). With all species taken into account, only 36% of ducks initiated breeding during both surveys. Species with low IBP/Total Ducks included American Green-Winged Teal, American Wigeon, Northern Pintail, Ring-Necked Duck, Surf Scoter and White-Winged Scoter. In contrast, Common Goldeneye had a high percentage of breeders to total duck numbers (72%). Scaup, Mallard and Bufflehead all had decent percentages as well.

Table 4: Norman Wells 2001 species-specific Total Ducks, IBP/Total Ducks and Total Ducks/Basin.

SPECIES ¹	IBP Interval	IBP	Total Ducks	IBP / Total ducks	Total Ducks / Basin
AGWT*	AVG	15.5	48	0.323	0.324
AMWI*	AVG	47	103.5	0.454	0.699
BUFF	I	24	41	0.585	0.277
BWTE*	AVG	2.5	6	0.417	0.041
CANV	I	10	19	0.526	0.128
COGO	I	18	25	0.720	0.169
COME*	AVG	1	1.5	0.667	0.010
MALL	I	116	217	0.535	1.466
NOPI	I	31	103	0.301	0.696
NSHO*	AVG	13.5	27	0.500	0.182
RNDU*	II	25	63	0.397	0.426
SCAU*	II	128	241	0.531	1.628
SCOT	I	1	2	0.500	0.014
SUSC	I	84	510	0.165	3.446
WWSC	I	1	24	0.042	0.162

SPECIES ¹	IBP Interval	IBP	Total Ducks	IBP / Total ducks	Total Ducks / Basin
Total		517.5	1431	0.362	9.669

¹ see Appendix XXVII for species name

* incomplete data (back seat observer only for IBP II)

Brood Surveys

Helicopter brood surveys were successfully completed July 9-13 and August 5-8. Individual basins surveyed were identical, where possible, to those completed during breeding surveys (Figure 1). The total brood count for 2001 was almost twice the amount of broods that were observed in 2000 (Table 5). Total unique brood numbers for Brood I and II surveys were 45 and 111 respectively on 148 basins. Divers boast 59% of total observed broods (divers; n = 92 and dabblers; n = 55) (detailed observations of broods per basin per survey can be found in Appendix XIII & XIV). Broods from nine species of ducks were observed during the two surveys. Scaup spp. (45) and Ring-necked duck (20) broods were the most abundant diving duck broods observed, Mallard (18) and American Wigeon (16) were the dominant dabbling duck broods (Table 5). These four species represented 63% of all observed broods. There was a significant increase in brood numbers between the 2000 and 2001 surveys, especially for scaup, Ring-necked duck, Mallard and Northern Shoveler (Table 5).

Table 5: Comparison of unique brood numbers for 2000 & 2001 surveys.

Species ¹	2000	2001
AGWT	5	6
AMWI	18	16
BU/GO	1	1
BUFF	5	6
BWTE	1	0
CANV	0	0
COGO	0	0
COME	0	0
MALL	9	18
NOPI	0	4
NSHO	1	6
RN/SC	2	5
RNDU	3	20
SCAU	17	45
SCOT	0	0
SUSC	7	7
UNDA	5	5
UNDI	5	8
UNDU	4	9

Species ¹	2000	2001
UNTE	1	0
WWSC	0	0
Total	84	156

¹see Appendix XXVII for species names

With the exception of Surf Scoter, all species were more successful at hatching a brood in 2001. This can be interpreted by low a Pair:Brood Ratio (Table 6).

Although our efforts were concentrated on counting waterfowl broods, total abundance was also recorded (Appendix XV-XVI and XXI-XXII). During Brood survey I and II, 81% and 69% respectively of total waterfowl abundance were diving ducks, mostly scaup spp. or Ring-necked duck. Pacific Loon abundance peaked during Brood I survey with 112 individuals counted, followed by 70 individuals during Brood II survey.

Table 6: Waterfowl Pair:Brood Ratios for 2000 and 2001.

Species ¹	Pair : Brood Ratio 2000	Pair : Brood Ratio 2001
SCAU*	3.5:1	2.8:1
MALL	36.6:1	6.4:1
SUSC	6.1:1	12:1
AMWI*	5.2:1	2.9:1
NOPI	N/A	7.8:1
RNDU*	9.7:1	1.3:1
BUFF	7.2:1	4:1
AGWT*	12.1:1	2.6:1
NSHO*	39:1	2.3:1
BWTE*	7:1	N/A

¹ see Appendix XXVII for species names

* incomplete data set for IBP II

Staging Surveys

Two staging surveys were successfully flown during late August (25-27) and late September (24-26) (Appendix I) with basins surveyed illustrated in Figure 2 and Appendix III. A total of 17593 ducks were recorded during both staging surveys. Species identification was less reliable than during previous brood and IBP surveys of the same area. This had to do with

the aircraft type used for staging versus the other two surveys (i.e. fixed wing versus rotary wing) and the presence of young of the year birds as well as non-distinguishing plumage colors during this time of year (Baldassarre and Bolen 1994). Of the identified waterfowl during Staging I Ring-necked duck/scaup spp. (n = 2873), American Wigeon (n = 227), Scoter spp. (n = 207) and Northern Pintail (n = 134) were the most abundant. However, with unknown divers, dabblers and duck numbers being so high it was difficult to determine the true breakdown of abundance from this survey (Table 7). Of the identified birds during Staging II Ring-necked duck/scaup spp. (n = 938) and Bufflehead (n = 24) were the most abundant. Again, trends in abundance for species was problematic to determine due to the inability to classify most observations at the species level (Table 7). Once more this year, 3000 swans were recorded during the late September survey of which 83% of them were observed on Brackett Lake (Appendix XXIV). Detailed observations of staging counts by basin are presented in Appendices XVII-XVIII and XXIII-XXIV.

Table 7: Species and Number of Waterfowl Observed During the Norman Wells 2001 Staging 1 and Staging 2 Surveys.

Species	Staging I	Staging II
AGWT	25	0
AMWI	227	1
BUFF	12	24
BU/GO	0	1
CANV	25	10
COGO	53	3
LTDU	0	4
MALL	3	4
NOPI	134	0
RN/SC	2873	938
RNDU	8	1
SCAU	30	5
SCOT	207	12
SUSC	0	1
UNDA	587	1219
UNDI	2660	1427
UNDU	2485	4599
UNTE	11	0
WWSC	1	3
Total	9341	8252

Total duck abundance this year was higher during the first staging survey than the second. Total duck abundance in Norman Wells during the staging surveys was significantly higher than in 2000 (Table 8). In both years, Staging I was flown approximately on the same

dates (Aug 27-30 in 2000 and Aug 25-27 in 2001). The interval between staging surveys was longer in 2001 due to the September 11th events. In 2000, the total duck abundance was higher during the second staging survey (Table 8).

Table 8: Comparison between the 2000 and 2001 staging surveys.

Survey	2000	2001
Staging I	3189	9341
Staging II	4505	8252
Total	7694	17593

Brackett Lake Transects

Brackett Lake was surveyed three times this year; during the Brood II survey (Aug 10), during the Staging I survey (Aug 27) and during the Staging II survey (September 24). In the first two surveys, transect and shoreline surveys were conducted. In the last survey, only a shoreline survey was conducted.

Duck density for Brackett Lake during the Brood II and Staging I transect surveys was estimated to be 67.08 ducks/km² and 169.44 ducks/km². Total duck Abundance estimates for Brackett Lake are 3701.30 and 9348.78 ducks during each transect survey. Trends in abundance of waterbirds can be seen in the shoreline surveys on Brackett Lake (Table 9). Total duck abundance peaked during the Staging I survey, whereas total swan and goose abundance peaked during the Staging II survey.

Table 9: Comparison of Total counts of Shoreline survey over Brackett Lake in 2001.

	BRD II	STG I	STG II
DUCK	886	3049	2246
SWAN	0	8	2500
GOOSE	0	180	250

DISCUSSION

This report represents the second year of a three-year survey schedule and hence it was possible to compare our results to last year's for each species.

The first breeding pair survey resulted in a very low total breeding pair estimate this year. Early breeding diver species numbers were significantly higher this year with the exception of Bufflehead. This low total breeding pair estimate is attributed to low dabbling breeding pairs. Mallard breeding pair estimates, for example, were twice as high last year. Two other studies in the boreal forest observed similar results. Dabbling breeding pair estimates were low on the Yellowknife Study Area (Hines, pers. com.) and only half of the breeding pairs for dabbling species were recorded on the Peace Athabasca Delta compared to 2000 (Leach *et al.* 2002). It is possible that this is due to the timing of our survey, or the result of one of the wettest springs in the Mackenzie District over the last 54 years (Environment Canada-MS, Climate Research Branch).

Alas, the data for the second breeding survey is incomplete, as most of the observations for that survey were inadvertently taped over for one observer. Both the 2000 and the 2001 second breeding pair survey data are summarized excluding the front seat observer (referred to as modified data), in order to draw better comparisons between the years. Other alternatives are being investigated at the moment to solve this gap in the dataset. Therefore, breeding pair II and AVG estimates (and all subsequent values resulting from the use of these estimates) are most probably underestimates for all affected species.

Unlike the results from the first breeding pair survey, the modified total breeding pair estimates for the second survey were very similar to 2000. In fact, scaup breeding pair estimates are twice as high as last year, but it is again the dabbling species that lower the total estimate, notably American Wigeon, American Green-winged Teal and Northern Shoveler.

Surf Scoters were very abundant during the breeding surveys this year. However, only a small percentage of them initiated breeding during our surveys (16%). This is a disturbing result, given that this is a species currently considered of continental conservation concern (CWS *et al.* 1997). Again, this might be the product of poor timing of our surveys, as most Surf Scoters

observed during the breeding surveys were migrants (on way to their breeding grounds). Each species has a different onset of breeding and dispersal which makes it difficult to adequately sample for all species. Timing of surveys should be revised to optimize for this and other species of concern.

For all species, 36% of all ducks initiated breeding during the breeding pair surveys. This low percentage is comparable to 43 % found at Utikuma Lake, AB (Leach *et al.*, 2002). Boreal wetlands are known to be less productive but the reasons for this are still unclear (Wiebe *et al.* 1997).

It was a good year for brood abundance in the Norman Wells study area, although this region has recorded one of its wettest summers ((Environment Canada-MS, Climate Research Branch). Total unique brood numbers were almost twice of that observed in 2000. Significant increases were noticed for scaup spp., Ring-necked duck and Mallards. An increase in brood numbers was also recorded over the Peace Athabasca Delta region (Leach *et al.* 2002), but species composition of the top producers was different.

Kay and Steinhouse (1993) reported species-specific productivity for the Brackett Lake Wetland Complex. Mallard productivity was observed at 0.20 broods/IBP versus our 0.16 broods/IBP, Bufflehead at 0.07 broods/IBP versus our 0.25 broods/IBP and Surf Scoter 0.06 broods/IBP versus our 0.08 broods/IBP. Only early nesters were compared due to the incomplete data for the second breeding survey. Mallard and Surf Scoters have comparable productivity indices, but this does not indicate the quality of production. Compared to last year's results (MacDonald *et al.* 2001), Mallard production is high (2000: 0.03 broods/IBP) whereas Surf Scoter production is low (2000: 0.16 broods/IBP). The trends in production will begin to be more apparent after our third year of surveys, however more years would be even better. Bufflehead had a higher productivity index compared to Kay and Steinhouse (1993), as well as last year's data (0.14 broods/IBP). While this increase may be partially explained by a difference in methodologies and size of area covered, Gauthier (1993) considers Bufflehead population numbers to be stable or increasing. From the modified data an improvement in productivity over 2000 can be noticed for all late nesting species, but the true extent of it is impossible to determine.

During both staging surveys large numbers of birds were recorded, particularly on several large basins. A significant increase in abundance was observed this year, which may be explained by natural fluctuations over time. Although large amounts of ducks were observed, the peak of the migration was clearly missed due to the presence of staging Tundra Swans on Brackett Lake. It is local knowledge that Swans are usually the last waterbirds to migrate. The chronology of the second staging survey was delayed due to the international events of September 11. In addition to that, some of the large basins during the Staging II survey could not be appropriately surveyed for safety reasons; a plane on floats was not available. These basins, such as Brackett Lake were limited to a shoreline survey to remain within gliding distance of the shore. It is therefore sensible to assume that the staging estimates for the Norman Wells study area are in reality an underestimate of the duck population during that period. The factors affecting our staging surveys were unavoidable, and it is hoped that in 2002 we will be able to adequately survey the duck migration through the Sahtu region.

There is a long tradition of hunting waterfowl in the Brackett Lake area (locally called Willow Lake) due to high numbers of staging waterfowl during both spring and late summer migration periods. Other studies have also documented the value of the Brackett lake area including: 21 IBP/km² (Kay and Barrett 1997), 34 birds/km² (mostly scaup) (Davis 1974) and 12,000 ducks during an early September survey (Barry 1958). Unfortunately, no surveys were performed during the breeding season, and hence it is impossible to compare our results to those of Kay and Barrett (1997). However, our density estimates for Brackett Lake (Brood II: 67.08 birds/km² and Staging I: 169.44 birds/km²) are higher than those estimated by Davis (1974). Although peak numbers on Brackett Lake were missed between our two staging surveys, it could be assumed that our numbers would have been comparable to Barry's (1958), since our estimate for first staging survey was 9348.78 ducks in late August.

Other waterbirds of particular interest were Pacific loons. Kay and Barrett (1997) recorded breeding pairs of Pacific loons at 0.52/km² for the Brackett lake area. These numbers represent 1.5% of the estimated continental breeding populations for Pacific loons. Our 2001 numbers showed Pacific loons as a prominent waterbird present on our surveyed basins. However, the size of the study area differed greatly for both studies. Kay and Barrett's study area was concentrated within a 700 km² area of known high waterfowl concentrations, whereas our

study consisted randomly selected basins over a 32 000 km² area. During IBP I, 25 observations of PALO pairs were recorded (28% in the Brackett Lake Complex). During the Brood surveys, 15 unique PALO broods were observed, 40% of these occurred in the Brackett Lake Complex. Total abundance of Pacific Loons peaked during the Brood I survey with 112 individuals counted throughout the study area. MacDonald *et al.* (2001) counted 64 individuals at the Pacific Loon's peak abundance during the first brood survey. Next year's results should give us a better understanding of the annual trends in Pacific Loon numbers. Upon receipt of the water chemistry sampling results for the Sahtu Region, comparisons might be made with the study performed by Heglund *et al.* (1994) on Pacific Loon wetland selection in east central Alaska based on limnological characteristics.

In brief, surveys performed in 2001 were successful and provided valuable data. However, improvements will be made in our protocol for data collection and storage in order to avoid the loss of data, as it happened in the 2001 Indicated Breeding Pair II survey. Immediately after a survey, the data will be stored as a .wav file on a laptop and then burnt to a CD or other backup device.

LITERATURE CITED

- Barry, T.W. 1958. Waterfowl investigations and wildlife surveys of the western Arctic and some of the central Arctic Islands. Unpubl. Rep., Can. Wildl. Serv. Edmonton. 13pp.
- Black Duck Joint Venture. 1996. Revised standard operating procedure for helicopter based surveys of breeding populations of waterfowl in eastern Canada and northeastern United States. Ottawa, ON. 3 pp.
- Canadian Wildlife Service, U.S. Fish and Wildlife Service and U.S. Geological Survey (Biological Resources Division). 1997. Conservation Issues for North American Sea Ducks – A concept paper for a Sea Duck Joint Venture under the North American Waterfowl Management Plan. 28pp.
- Davis, R.A. 1974. Aerial survey of bird populations along the route of the proposed gas pipeline in the Mackenzie District, NWT, summer 1971. *Arct. Gas Biol. Rep.* Ser. 11(1):1-156.
- Dzubin, A. 1969. Assessing breeding populations of ducks by ground counts. Saskatoon Wetlands Seminar, Canadian Wildlife Service Rep. Series No 6:178-230.
- Environment Canada, Meteorological Service of Canada, Climate Research Branch. Climate Trends and Variations Bulletin for Canada. <http://www.msc-smc.ec.gc.ca/ccrm/bulletin/archive.htm>. Last Updated: March 4, 2002.
- Gauthier, G. 1993. Bufflehead (*Bucephala albeola*). In *The Birds of North America*, No. 67 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences: Washington, D.C.: The American Ornithologists' Union.
- Gollop, J.B. and W.H. Marshall. 1954. A Guide For Aging Duck Broods in The Field. Mississippi Flyway Council Technical Section. 14pp.
- Heglund, P.J., Jones, J.R., Frederickson, L.H. and M.S. Kaiser. 1994. Use of Boreal forested wetlands by Pacific loons (*Gavia pacifica* Lawrence) and horned grebes (*Podiceps auritus* L.): relations with limnological characteristics.
- Kay, D.G. and G. Barrett. 1997. Distribution, abundance and reproductive success of waterfowl on the Brackett Lake Study Area, Northwest Territories. Interim Report, Ducks Unlimited Canada. 20 pp.
- Kay, D.G. and G. B. Steinhouse. 1993. Status of Waterfowl in the Brackett Lake Wetland Complex, Northwest Territories-1993 Progress Report. 23pp.
- Klett, A.T., H.F. Duebbert, C.A. Faanes and K.F. Higgins. 1986. Techniques for studying nest success of ducks in upland habitats in the Prairie pot hole region. *U.S. Fish Wildl. Serv., Resour. Publ.* 158. 24 pp.

- Leach A.J., Butterworth E., and G.R. Stewart. 2002a. Peace-Athabasca Delta waterbird inventory program- 1998-2001: final report. Unpublished. Western Boreal Region, Ducks Unlimited Canada.
- Leach A.J., Butterworth E., and G.R. Stewart. 2002b. Utikuma Lake waterbird inventory program: 2001 interim report. Unpublished. Western Boreal Region, Ducks Unlimited Canada.
- MacDonald, B, Gendron, M., Pollard, J.B. and G.R. Stewart. 2001. Norman Wells, NT Waterbird Inventory – 2000 surveys : Progress Report. Western Boreal Region, Ducks Unlimited Canada.
- U.S. Fish and Wildlife Service / Canadian Wildlife Service. 1987. Standard operating procedures for aerial breeding ground population and habitat surveys in North America. U.S. Dept. of the Interior & Environment Canada.
- U.S. Fish and Wildlife Service. 1998. Waterfowl Population Status, 1998. U.S. Dep. Interior, U.S. Fish Wildl. Serv. 46 pp.
- Wiebe, M. O and J. E. Hines. 1997. Survival and recovery rates of Mallards and Northern Pintails from the Northwest Territories, 1966-95. Progress Notes. No. 212, November 1997. Canadian Wildlife Service. 21 pp.
- Wishart, R.A. 1983. Aging and back-dating duck broods. *In*: Biological Techniques Manual. Unpubl. Ducks Unlimited Canada Rep.

PERSONNAL COMMUNICATION

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APPENDIX I: Survey Dates and Aircrew.

Rotary-Wing Indicated Breeding Pair Surveys			
DATE	Pilot	Navigator	Observer
May 22-25, 2001	Dwayne Hanson	Bruce MacDonald	JF Dufour
June 12-14, 2001	Steve Thorn	Bruce MacDonald	Michel Gendron

Rotary-Wing Brood Surveys			
DATE	Pilot	Navigator	Observer
July 9-13, 2001	Murray Douglas	JF Dufour	Darryl Kroeker
August 5-8, 2001	Tim Simmons/Guy Thibault/Dale Simpson	Bruce MacDonald	JF Dufour

Fixed-Wing Brood Transect Survey for Brackett Lake			
DATE	Pilot	Navigator	Observer
August 10, 2001	Perry Linton	Stuart Slattery	Bairn Mooney

Fixed-Wing Staging Surveys			
DATE	Pilot	Navigator	Observer
August 25-27, 2001	Jeremy	Bruce MacDonald	JF Dufour
September 24-26, 2001	Steve Kaiser	JF Dufour	Melanie Cyr/Arianna Zimmer

Fixed-Wing Staging Transect Survey for Brackett Lake			
DATE	Pilot	Navigator	Observer
August 27, 2001	Jeremy	Bruce MacDonald	JF Dufour

APPENDIX II: Norman Wells 2001 Breeding and Brood surveyed basins with corresponding latitude/longitude and surface area in hectares.

BASIN ID	LONGITUDE	LATITUDE	AREA HA
349	-126.82266	65.7468	10.91
350	-126.78695	65.74809	6.87
352	-126.80821	65.74611	6.63
739	-126.81467	65.68663	1.62
920	-126.2751	65.6931	4.28
1249	-126.78621	65.61208	2.16
1582	-125.75706	65.65258	1.25
1941	-125.82942	65.62829	3.34
2349	-127.14526	65.50942	3.74
2368	-127.19394	65.50494	3.03
2427	-125.35728	65.63724	3.46
2593	-125.90085	65.59514	18.76
2736	-125.19459	65.63555	4.78
2801	-125.83871	65.59008	28.98
2962	-125.83945	65.5797	7.58
3935	-127.34695	65.42857	19.61
4129	-125.13837	65.58214	1.77
4441	-126.98866	65.43545	3.28
4515	-125.01089	65.57483	2.46
4817	-127.33268	65.39217	1.51
5456	-127.25154	65.37438	1.07
5645	-125.80551	65.47504	15.37
5647	-127.21207	65.3677	2.56
5672	-125.08318	65.5203	2.19
6154	-125.0664	65.50124	202.98
6681	-124.44835	65.49523	2.21
7575	-124.20681	65.47493	15.36
7776	-124.32391	65.45658	1.02
7836	-124.31219	65.45584	2.37
7953	-124.44782	65.44493	16.97
8997	-125.62469	65.33493	1.97
9079	-125.5182	65.34064	3.65
9120	-127.53397	65.18812	11.08
9544	-124.9636	65.3688	1.57
9602	-125.44486	65.33757	25.54
9962	-124.03027	65.41949	6.94
9994	-126.97029	65.21478	2.12
10215	-123.89565	65.42086	1.13
10277	-124.21578	65.40259	11.92
10540	-125.51418	65.31117	1.16
10840	-124.94074	65.34253	2.31
10895	-126.56085	65.22938	26.83
11191	-127.54895	65.14135	11.77
11282	-126.71464	65.20887	83.72
11597	-125.48149	65.28779	2.1
12846	-124.71018	65.31011	1.49

BASIN ID	LONGITUDE	LATITUDE	AREA HA
13144	-124.75553	65.29874	2.55
13146	-123.81635	65.35799	7.85
13356	-125.43085	65.24957	4.89
13655	-124.40196	65.30957	3.89
13755	-124.44049	65.304	1
14341	-126.45258	65.15177	2.38
14591	-124.66948	65.26979	1.08
14738	-123.48514	65.33683	1.03
14796	-126.41667	65.14411	5.21
15058	-126.73036	65.11389	4
15143	-124.37042	65.27502	1.41
15684	-123.79223	65.29737	1.11
15887	-124.09861	65.27651	24.1
16286	-124.69052	65.22952	3.1
16298	-127.14675	65.0529	15.71
16434	-126.5953	65.10484	573.6
17568	-126.53008	65.07645	12.62
17901	-125.28369	65.15958	3.66
17961	-125.24183	65.16149	4.42
18001	-123.85995	65.24759	3.11
18157	-126.09235	65.09869	6.39
18220	-126.49263	65.06682	1.55
18377	-125.23571	65.1549	1.39
18901	-125.26356	65.14365	1.06
19182	-125.1527	65.14442	1.43
19616	-125.40378	65.11915	1.09
19786	-125.33663	65.12048	1.4
19838	-123.34507	65.24187	2.34
19909	-125.35987	65.11597	1.23
20059	-125.40832	65.10947	9.7
20236	-125.22298	65.1204	44.39
20318	-125.20211	65.11647	4.43
20616	-126.37522	65.02963	32.57
20893	-125.24264	65.10218	1.16
21364	-126.26668	65.01911	1.05
21745	-125.20866	65.08746	9.32
21875	-125.10893	65.08989	4.35
21876	-124.81036	65.10932	1.39
22178	-125.22283	65.07529	1.9
22678	-125.42673	65.0589	57.18
22683	-125.17544	65.07045	1.02
22818	-125.44525	65.04994	3.44
22878	-125.13544	65.06957	1.12
23384	-126.05091	64.99816	4.04
23397	-126.91206	64.93268	8.78
25048	-126.51637	64.93567	8.23
25599	-125.94242	64.96882	8.12
25774	-125.37828	65.00379	1.78
25873	-125.86629	64.96823	2.25

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
26366	-123.76211	65.09641	1.57
26427	-125.66482	64.97276	2.6
26482	-124.87761	65.02604	9.01
26499	-124.81829	65.02823	1.09
26735	-126.46534	64.90974	31.56
26880	-125.2062	64.99739	14.34
27091	-125.83149	64.94759	1.35
28342	-124.14621	65.04379	74.55
28601	-125.29252	64.96053	2.94
28735	-125.11922	64.96941	2.77
29032	-126.06688	64.89689	1.92
29698	-125.35627	64.93869	3.84
30155	-125.77612	64.90004	2.14
30703	-125.23213	64.92877	12.24
31073	-125.03869	64.93553	5.62
31106	-125.89269	64.87545	5.08
31467	-124.86095	64.94048	1.73
31596	-124.92307	64.93402	1.73
31654	-124.94587	64.93164	1.35
32041	-124.84338	64.93332	1.85
32811	-123.8065	64.9869	1.65
32913	-125.55335	64.87295	1.88
33089	-123.94745	64.97497	1.37
33413	-125.41001	64.87698	2.32
33763	-123.75897	64.97924	13.86
34318	-123.85835	64.96594	26.95
34618	-124.64071	64.91002	2.38
35762	-125.625	64.82899	1.91
36013	-124.60521	64.89626	20.9
36224	-125.40059	64.84085	21.77
36815	-125.3958	64.83289	2.11
38393	-125.79075	64.78305	1.02
38656	-126.66289	64.71492	9.44
38900	-126.32487	64.7373	3.67
39731	-125.80914	64.76392	13.51
39754	-124.86992	64.82808	3.15
40719	-124.85438	64.81091	1.43
41661	-124.07096	64.84011	4.26
42967	-124.84167	64.75738	1.23
43198	-125.36595	64.71566	1.61
43609	-124.92907	64.73605	1.32
43713	-124.94269	64.73171	1.11
43787	-124.96334	64.7282	1.36
44018	-125.33626	64.69781	4.18
44068	-125.15367	64.70946	3.91
44117	-125.37791	64.69232	1.16
44200	-124.94565	64.72171	8.39
44360	-125.39448	64.68775	4.01
44505	-124.79272	64.72567	12.72

BASIN_ID	LONGITUDE	LATITUDE	AREA HA
47145	-124.79347	64.6693	1.94
47789	-126.39398	64.54133	3.19
62824	-124.70769	64.23602	10.18
64018	-124.97861	64.12219	1.14

APPENDIX III: Norman Wells 2001 Staging surveyed basins with corresponding Latitude/Longitude and Surface area in hectares.

BASIN ID	LONGITUDE	LATITUDE	AREA HA
349	-126.82266	65.7468	10.91
350	-126.78695	65.74809	6.87
352	-126.80821	65.74611	6.63
357	-126.95892	65.81477	4762.37
421	-126.4048	65.76503	5.71
773	-126.82543	65.6825	9.76
907	-126.75463	65.66468	143.34
1015	-127.13271	65.6183	94.32
1151	-127.0779	65.61257	412.75
1190	-126.22277	65.66309	1.94
1394	-126.24454	65.65699	503.31
1941	-125.82942	65.62829	3.34
2294	-125.81421	65.61403	51.09
2368	-127.19394	65.50494	3.03
2593	-125.90085	65.59514	18.76
2736	-125.19459	65.63555	4.78
2801	-125.83871	65.59008	28.98
2962	-125.83945	65.5797	7.58
3231	-126.54447	65.56088	3081.88
3614	-127.08512	65.47955	948.12
3935	-127.34695	65.42857	19.61
4129	-125.13837	65.58214	1.77
4515	-125.01089	65.57483	2.46
5645	-125.80551	65.47504	15.37
5670	-125.67708	65.49398	399.48
6090	-127.18341	65.34134	5.95
6154	-125.0664	65.50124	202.98
6497	-124.89795	65.48114	26.15
7485	-126.84	65.296	11.99
7575	-124.20681	65.47493	15.36
8709	-125.35735	65.49998	18441.42
9079	-125.5182	65.34064	3.65
9112	-125.53198	65.35018	309.99
9544	-124.9636	65.3688	1.57
9602	-125.44486	65.33757	25.54
9611	-126.49355	65.26731	120.86
9962	-124.03027	65.41949	6.94
10277	-124.21578	65.40259	11.92
10430	-125.24759	65.33218	7.81
10895	-126.56085	65.22938	26.83
11191	-127.54895	65.14135	11.77
11282	-126.71464	65.20887	83.72
11394	-123.88699	65.40495	50.21
11597	-125.48149	65.28779	2.1

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
12314	-124.29624	65.35414	80.55
12431	-125.35995	65.31096	1363.94
12846	-124.71018	65.31011	1.49
12865	-123.78762	65.39124	416.63
13144	-124.75553	65.29874	2.55
13146	-123.81635	65.35799	7.85
13655	-124.40196	65.30957	3.89
13747	-124.31077	65.31394	7.35
14591	-124.66948	65.26979	1.08
14738	-123.48514	65.33683	1.03
14757	-126.76182	65.14098	2208.58
14796	-126.41667	65.14411	5.21
15058	-126.73036	65.11389	4
15143	-124.37042	65.27502	1.41
15418	-123.79937	65.30518	9.18
15598	-123.29997	65.3279	5.63
15742	-123.32661	65.32334	10.5
16434	-126.5953	65.10484	573.6
17066	-126.54193	65.09401	349.27
17568	-126.53008	65.07645	12.62
17961	-125.24183	65.16149	4.42
18157	-126.09235	65.09869	6.39
18220	-126.49263	65.06682	1.55
18377	-125.23571	65.1549	1.39
18898	-125.35268	65.14009	22.58
19182	-125.1527	65.14442	1.43
19204	-123.61467	65.25053	151.62
19786	-125.33663	65.12048	1.4
19818	-127.00781	65.00872	375.47
19909	-125.35987	65.11597	1.23
19948	-125.40675	65.12576	361.91
20059	-125.40832	65.10947	9.7
20236	-125.22298	65.1204	44.39
20273	-127.11415	64.98865	124.83
20318	-125.20211	65.11647	4.43
20616	-126.37522	65.02963	32.57
20833	-125.34785	65.10208	342.06
21285	-125.12783	65.11217	381.26
21364	-126.26668	65.01911	1.05
21530	-126.76211	64.98777	327.35
21745	-125.20866	65.08746	9.32
21812	-123.78217	65.17852	77.04
22087	-125.3203	65.07932	590.42
22678	-125.42673	65.0589	57.18
22818	-125.44525	65.04994	3.44
23384	-126.05091	64.99816	4.04
23397	-126.91206	64.93268	8.78
23437	-126.54294	64.96391	99.77

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
24572	-124.38028	65.09683	54.3
25048	-126.51637	64.93567	8.23
25594	-124.90755	65.04737	558.56
25599	-125.94242	64.96882	8.12
25774	-125.37828	65.00379	1.78
26272	-124.86003	65.0378	148.19
26366	-123.76211	65.09641	1.57
26482	-124.87761	65.02604	9.01
26499	-124.81829	65.02823	1.09
26539	-126.55875	64.9139	145.38
26880	-125.2062	64.99739	14.34
27091	-125.83149	64.94759	1.35
27158	-126.62089	64.90249	456.18
28342	-124.14621	65.04379	74.55
28601	-125.29252	64.96053	2.94
28735	-125.11922	64.96941	2.77
29032	-126.06688	64.89689	1.92
29190	-126.57514	64.87603	686.16
29350	-124.65383	65.00151	305.35
30001	-125.23689	64.94382	67.17
30058	-125.13167	64.95566	133.82
30155	-125.77612	64.9004	2.14
30390	-125.03716	64.95543	391.16
30703	-125.23213	64.92877	12.24
30897	-125.80045	64.88943	51.94
31073	-125.03869	64.93553	5.62
31106	-125.89269	64.87545	5.08
31596	-124.92307	64.93402	1.73
33089	-123.94745	64.97497	1.37
33413	-125.41001	64.87698	2.32
34318	-123.85835	64.96594	26.95
34618	-124.64071	64.91002	2.38
35762	-125.625	64.82899	1.91
36013	-124.60521	64.89626	20.9
36224	-125.40059	64.84085	21.77
36708	-126.70188	64.73723	1.8
38111	-124.80298	64.85865	58.34
38251	-124.97979	64.85043	301.1
38364	-125.92663	64.78128	266.05
38900	-126.32487	64.7373	3.67
39053	-125.01957	64.82905	3.99
39731	-125.80914	64.76392	13.51
39754	-124.86992	64.82808	3.15
40113	-124.37963	64.87152	1177.16
40719	-124.85438	64.81091	1.43
41661	-124.07096	64.84011	4.26
42687	-125.00777	64.75378	5.57
43713	-124.94269	64.73171	1.11

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
43787	-124.96334	64.7282	1.36
44018	-125.33626	64.69781	4.18
44068	-125.15367	64.70946	3.91
44200	-124.94565	64.72171	8.39
44360	-125.39448	64.68775	4.01
44505	-124.79272	64.72567	12.72
46413	-124.27613	64.72008	62.03
47323	-124.16373	64.71224	140.43
48715	-124.22137	64.68174	93.65
53818	-124.99469	64.50107	7.83
54044	-125.36315	64.50586	3084.52
54479	-124.82433	64.52462	753.12
57800	-125.26337	64.3905	2055.22
62824	-124.70769	64.23602	10.18

APPENDIX IV: Norman Wells 2001 Water Quality sampled basins with corresponding latitude/longitude and surface area in hectares.

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
748	-126.24755	65.72917	17.37
1071	-126.46023	65.65736	4.99
1249	-126.78621	65.61208	2.16
1276	-126.18530	65.65503	6.16
2319	-125.56763	65.62774	2.57
2332	-125.94167	65.60083	4.13
2368	-127.19394	65.50494	3.03
2593	-125.90085	65.59514	18.76
2801	-125.83871	65.59008	28.98
2962	-125.83945	65.57970	7.58
3391	-125.68457	65.57435	3.99
3523	-127.09359	65.46396	2.31
4105	-125.69076	65.54541	6.85
4343	-126.92205	65.44476	4.49
4820	-126.75955	65.43729	15.37
5456	-127.25154	65.37438	1.07
5667	-126.64328	65.41024	1.79
5744	-125.55682	65.48477	4.30
5931	-127.20481	65.35031	13.16
6424	-125.50145	65.44185	1.05
7563	-124.37603	65.46241	2.12
7776	-124.32391	65.45658	1.02
7953	-124.44782	65.44493	16.97
8528	-125.41085	65.36289	1.67
8997	-125.62469	65.33493	1.97
9460	-124.18797	65.41880	2.40
9487	-124.33485	65.40947	1.18
9602	-125.44486	65.33757	25.54
9962	-124.03027	65.41949	6.94
10540	-125.51418	65.31117	1.16
11454	-124.00321	65.38558	1.01
11755	-125.51485	65.28280	5.16
11978	-124.09849	65.36830	3.55
12566	-124.14020	65.35175	1.07
12846	-124.71018	65.31011	1.49
13517	-125.22275	65.26350	37.15
13591	-126.21080	65.18750	1.23
13655	-124.40196	65.30957	3.89
14796	-126.41667	65.14411	5.21
15046	-126.18343	65.15668	15.47
15058	-126.73036	65.11389	4.00
15386	-127.00536	65.08708	29.09
15464	-124.74714	65.24458	1.09
15684	-123.79223	65.29737	1.11
16286	-124.69052	65.22952	3.10

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
16298	-127.14675	65.05290	15.71
16434	-126.59530	65.10484	573.60
17961	-125.24183	65.16149	4.42
18001	-123.85995	65.24759	3.11
18100	-124.63244	65.19879	1.51
18551	-125.47029	65.13581	1.26
18901	-125.26356	65.14365	1.06
19164	-125.37830	65.12944	1.06
19786	-125.33663	65.12048	1.40
20318	-125.20211	65.11647	4.43
20616	-126.37522	65.02963	32.57
20893	-125.24264	65.10218	1.16
20998	-125.32902	65.09386	1.78
21072	-127.15797	64.95579	1.24
21285	-125.12783	65.11217	381.26
21875	-125.10893	65.08989	4.35
22087	-125.32030	65.07932	590.42
22678	-125.42673	65.05890	57.18
22683	-125.17544	65.07045	1.02
23293	-125.32414	65.05472	56.01
23397	-126.91206	64.93268	8.78
25183	-123.78910	65.11581	1.53
25250	-125.30889	65.01925	5.30
25599	-125.94242	64.96882	8.12
26880	-125.20620	64.99739	14.34
27091	-125.83149	64.94759	1.35
27504	-123.78624	65.07404	1.06
28735	-125.11922	64.96941	2.77
29032	-126.06688	64.89689	1.92
29090	-123.66583	65.05291	0.21
30145	-124.95932	64.95709	17.12
30703	-125.23213	64.92877	12.24
31467	-124.86095	64.94048	1.73
33545	-125.59580	64.86183	2.35
33763	-123.75897	64.97924	13.86
34133	-124.99184	64.89420	2.44
34318	-123.85835	64.96594	26.95
35275	-125.53333	64.84154	2.92
35762	-125.62500	64.82899	1.91
36660	-125.36151	64.83799	9.06
37409	-125.42740	64.82335	1.45
37755	-125.49061	64.81364	1.89
39648	-125.28583	64.80314	15.52
40426	-124.94749	64.81063	5.46
41112	-124.81921	64.80367	1.56
42021	-123.83881	64.84402	2.72
43198	-125.36595	64.71566	1.61
43609	-124.92907	64.73605	1.32
43863	-125.18657	64.71193	5.32

BASIN_ID	LONGITUDE	LATITUDE	AREA_HA
44200	-124.94565	64.72171	8.39
44248	-125.24685	64.69951	3.46
44360	-125.39448	64.68775	4.01
44505	-124.79272	64.72567	12.72
46504	-124.77964	64.68156	1.27
48987	-125.23990	64.60679	51.48

APPENDIX V: Estimated number of breeding duck pairs (IBP) on basins in the Sahtu Region, calculated from Breeding Pair Survey 1 (22-25 May 2001).

BASIN	BUFF	CANV	COGO	MALL	NOPI	SCOT	SUSC	WWSC	Grand Total
350				2			6		8
352	1			1			2		4
920				4	2		5		11
1582							1		1
1941							1		1
2368				1					1
2427							4		4
2593				1	1			1	3
2801				1					1
3935			1	5			2		8
4129					1				1
4515				1					1
5645							4		4
6681				2					2
7575		1		1					2
8997				1			1		2
9602	1	1		3					5
9994							1		1
10277						1	1		2
10540				1	1				2
10895				4			9		13
11191		1							1
11282			5	2			6		13
11597				3					3
13144				1					1
13146	1				2		1		4
13356				4					4
13655				1					1
14591				1					1
15058	1								1
16286							4		4
17568				2			1		3
17901			1	7					8
17961	1			2	5				8
18157				4			2		6
18377				3	1				4
19182				1			1		2
19616	1								1
20236					1				1
20616				4	1		5		10
21364				4	1				5
21876	2								2
22678							4		4

BASIN	BUFF	CANV	COGO	MALL	NOPI	SCOT	SUSC	WWSC	Grand Total
22683				1	1				2
22818							1		1
25048				2					2
25774	1								1
25873							3		3
26366				1	1				2
26427					1				1
26482				2					2
26499				1					1
26735							4		4
26880				1			2		3
28342				1					1
29032	1			1					2
31106	2	1		3			2		8
32811	1			1					2
32913			1	2					3
33763	1								1
34618				1	8				9
35762		2			1		3		6
36013	1		5						6
36224	1			4			3		8
38393	1			2					3
38656		2	1	6					9
38900	1								1
41661				3					3
43198				1			3		4
43609			1						1
44018				2					2
44068	3			4	1		1		9
44117				1					1
44200	2	2		3			1		8
44360				1					1
44505	1		2	1					4
47789			1	4	2				7
Grand Total	24	10	18	116	31	1	84	1	285

APPENDIX VI: Estimated number of breeding duck pairs (IBPc) on basins in the Sahtu Region, calculated from Breeding Pair Survey 1 (22-25 May 2001).

BASIN	BUFF	CANV	COGO	MALL	NOPI	SCOT	SUSC	WWSC	Grand Total
350				2			2		4
352	1			1			2		4
920				2	2		2		6
1582							1		1
1941							1		1
2368				1					1
2427							2		2
2593				1	1			1	3
2801				1					1
3935			1	1			2		4
4129					1				1
4515				1					1
5645							2		2
7575		1		1					2
8997				1			1		2
9602	1	1		1					3
9994							1		1
10277						1	1		2
10540				1	1				2
10895				4			7		11
11191		1							1
11282			1						1
11597				1					1
13144				1					1
13146	1				2		1		4
13655				1					1
14591				1					1
15058	1								1
16286							2		2
17568							1		1
17901			1	5					6
17961	1			2	2				5
18157				2			2		4
18377				3	1				4
19182				1			1		2
19616	1								1
20236					1				1
20616				1	1		2		4
21364					1				1
21876	2								2
22678							4		4
22683				1	1				2
22818							1		1

BASIN	BUFF	CANV	COGO	MALL	NOPI	SCOT	SUSC	WWSC	Grand Total
25048				2					2
25774	1								1
25873							1		1
26366				1	1				2
26427					1				1
26499				1					1
26735							2		2
26880				1			2		3
28342				1					1
29032	1			1					2
31106	2	1		1			2		6
32811	1			1					2
32913			1						1
33763	1								1
34618				1	4				5
35762		2			1		1		4
36013	1		1						2
36224	1			2			3		6
38393	1								1
38656		2	1	3					6
38900	1								1
41661				3					3
43198				1			1		2
43609			1						1
44018				2					2
44068	1			2	1		1		5
44117				1					1
44200	2	2		3			1		8
44360				1					1
44505	1		2	1					4
47789			1	2	2				5
Grand Total	22	10	10	68	24	1	52	1	188

APPENDIX VII: Estimated number of breeding duck pairs (IBP) on basins in the Sahtu Region, calculated from Breeding Pair Survey II (12-14 June 2001), back seat observer only.

BASIN	RNDU	SCAU	Grand Total
349		3	3
350	2	1	3
352		1	1
739		1	1
1941	1		1
2349		1	1
2593		6	6
2801		1	1
2962	1		1
3935	1		1
6154		10	10
7953		3	3
8997		5	5
9120		1	1
9544		1	1
9602	1	1	2
10277		2	2
12846		2	2
13356	1	4	5
14591		1	1
14738		1	1
15887		3	3
17901		3	3
17961		1	1
18220		2	2
18377	1		1
18901	2	3	5
19182	1	1	2
19616		1	1
20059		1	1
20236		2	2
20318	3		3
20616	1	7	8
20893		2	2
21364		1	1
21745		3	3
22178	2	6	8
22678		11	11
22818		4	4
26427	1		1
26482		3	3
26735		4	4

BASIN	RNDU	SCAU	Grand Total
26880		1	1
27091		1	1
28342		8	8
29032	1		1
31106	1	2	3
36224	2	5	7
36815		1	1
42967		3	3
43787	1		1
44068	2		2
44200		3	3
47789		1	1
Grand Total	25	128	153

APPENDIX VIII: Estimated number of breeding duck pairs (IBPc) on basins in the Sahtu Region, calculated from Breeding Pair Survey II (12-14 June 2001), back seat observer only.

BASIN	RNDU	SCAU	Grand Total
349		3	3
350		1	1
352		1	1
739		1	1
1941	1		1
2349		1	1
2593		4	4
2801		1	1
2962	1		1
3935	1		1
6154		8	8
7953		1	1
8997		3	3
9120		1	1
9544		1	1
9602	1	1	2
12846		2	2
13356	1	4	5
14591		1	1
14738		1	1
15887		1	1
17901		3	3
17961		1	1
18220		2	2
18377	1		1
18901	2	1	3
19182	1	1	2
19616		1	1
20059		1	1
20236		2	2
20318	3		3
20616	1	3	4
20893		2	2
21364		1	1
21745		3	3
22178	2	4	6
22678		7	7
26427	1		1
26735		2	2
26880		1	1
27091		1	1
28342		5	5

BASIN	RNDU	SCAU	Grand Total
29032	1		1
31106	1	2	3
36224	2	3	5
36815		1	1
42967		3	3
43787	1		1
44068	2		2
44200		3	3
47789		1	1
Grand Total	23	90	113

APPENDIX IX: Estimated number of breeding duck pairs (IBP) on basins in the Sahtu Region, calculated from the average of Breeding Pair Survey I and II (22-25 May & 12-14 June 2001), back seat observer only for IBP II.

BASIN	AGWT	AMWI	BWTE	NSHO	Grand Total
352				0.5	0.5
739	0.5				0.5
920				0.5	0.5
1941		1			1
2368	1				1
2427		1.5			1.5
2593	1	0.5		0.5	2
2801	1	3.5			4.5
3935	0.5	0.5			1
4129	0.5				0.5
4515		0.5			0.5
5672	0.5	0.5			1
6154		0.5			0.5
7575		0.5			0.5
7953		0.5			0.5
8997		0.5		1.5	2
9079		0.5			0.5
9544	0.5				0.5
9602		1.5	0.5	1	3
10540		1.5			1.5
10840	1	0.5			1.5
10895				1	1
11191		0.5			0.5
11282		0.5		0.5	1
11597		1.5			1.5
13146		0.5			0.5
13356	0.5	1			1.5
14591	0.5				0.5
14796	0.5				0.5
15684	0.5				0.5
15887	0.5	0.5			1
16286		1			1
17901				1	1
17961		0.5		1.5	2
18157		0.5			0.5
18377		0.5		0.5	1
19182		1.5		0.5	2
19616		1			1
20318	0.5				0.5
20616		1.5			1.5
20893		0.5			0.5
21364		1	1	1	3

BASIN	AGWT	AMWI	BWTE	NSHO	Grand Total
21875		0.5			0.5
22178	0.5				0.5
22678	0.5	0.5		0.5	1.5
25048		1		0.5	1.5
26482	1	0.5			1.5
26735		1			1
28601		0.5			0.5
31106		1		0.5	1.5
32811	0.5				0.5
32913		1	0.5		1.5
33413	0.5				0.5
34618	1	4.5			5.5
36013		1			1
36224	0.5			0.5	1
38656		4			4
39754		0.5			0.5
41661				0.5	0.5
43198	0.5	0.5			1
44018	0.5	1.5			2
44068		0.5			0.5
44200	0.5	1	0.5		2
44360		1			1
44505					0
47789				1	1
Total	15.5	47	2.5	13.5	78.5

APPENDIX X: Estimated number of breeding duck pairs (IBPc) on basins in the Sahtu Region, calculated from the average of Breeding Pair Survey I and II (22-25 May & 12-14 June 2001), back seat observer only for IBP II.

BASIN	AGWT	AMWI	BWTE	COME	NSHO	Grand Total
352					0.5	0.5
739	0.5					0.5
920					0.5	0.5
1941		1				1
2368	1					1
2427		1.5				1.5
2593	1	0.5			0.5	2
2801	1	3.5				4.5
3935	0.5	0.5				1
4129	0.5					0.5
4515		0.5				0.5
5672	0.5	0.5				1
6154		0.5				0.5
7575		0.5				0.5
7953		0.5				0.5
8997		0.5			1.5	2
9079		0.5				0.5
9544	0.5					0.5
9602		1.5	0.5		1	3
10540		1.5				1.5
10840	1	0.5				1.5
10895					1	1
11191		0.5				0.5
11282		0.5		0.5	0.5	1.5
11597		1.5				1.5
13146		0.5				0.5
13356	0.5	1				1.5
14591	0.5					0.5
14796	0.5					0.5
15684	0.5					0.5
15887	0.5	0.5				1
17961		0.5			1.5	2
18157		0.5				0.5
18377		0.5			0.5	1
19182		0.5			0.5	1
19616		1				1
20318	0.5					0.5
20616		0.5				0.5
20893		0.5				0.5
21364		1				1
21875		0.5				0.5
22178	0.5					0.5

BASIN	AGWT	AMWI	BWTE	COME	NSHO	Grand Total
22678	0.5	0.5			0.5	1.5
25048		1			0.5	1.5
26482	1	0.5				1.5
26735		1				1
28601		0.5				0.5
31106		1			0.5	1.5
32811	0.5					0.5
32913		1	0.5			1.5
33413	0.5					0.5
34618	1	2.5				3.5
36013		1				1
36224	0.5				0.5	1
38656		2.5				2.5
39754		0.5				0.5
41661					0.5	0.5
43198	0.5	0.5				1
44018	0.5	1.5				2
44068		0.5				0.5
44200	0.5	1	0.5			2
44360		1				1
44505				0.5		0.5
47789					1	1
Total	15.5	40.5	1.5	1	11.5	70

APPENDIX XI: Total Duck Abundance for IBP I survey, May 22-25 2001.

BASIN	AGWT	AMWI	BUFF	CANV	COGO	COME	LTDU	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
349													11							11
350								3					14		31				21	69
352			2					1		2			52		4			1		62
920								11	3	2		2			8					26
1582													13		1	15				29
1941		2											1		9					12
2349												2								2
2368	2							1												3
2427		9											11		7		1			28
2593		4						1	26	6			10		2				2	51
2736													23		11			1		35
2801		7					4	2					2					7		22
2962													6							6
3935					1		4	14					26		8					53
4129									1											1
4515								2					2							4
4817													2							2
5645													7		11					18
6154								20	10				7							37
6681								2												2
7575		2		1				1					9		8					21
8997		2						1		1	10		6		8					28
9602	6	10	5	2				3	4	4			105		55		11	76		281
9994													6		2					8
10215													1							1
10277									20				79	2	14			2		117

BASIN	AGWT	AMWI	BUFF	CANV	COGO	COME	LTDU	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
10540		5						1	1				14				10	40		71
10895								7		3			12		13			3		38
11191		2		2									6			4				14
11282		2			5	1		3		2			72		25	50				160
11597		3						15												18
13144								1												1
13146		6	1						3				42		5	1	2			60
13356	2	2						4					5				1			14
13655								1												1
14591	2							1												3
14738													14							14
15058			1										2							3
15684	2																			2
16286		2											15		6					23
16298																		1		1
17568								2					11		2			2		17
17901					2			8		6			13				1			30
17961			2					13	7	5			20					3		50
18157		2						4					22		9					37
18377								4	2	1			4							11
18901																	2			2
19182								2		2		3	9		2					18
19616		4	2									7	16							29
20059													8							8
20236									1									1		2
20318	2																			2
20616		12						4	1			5	76		68					166
21364		2						4	1	2			12							21

BASIN	AGWT	AMWI	BUFF	CANV	COGO	COME	LTDU	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
21875		2										2					1			5
21876	1		3																	4
22678	2	2								1					8					13
22683								1	2				7		6					16
22818													12		32		1			45
22878													23				1			24
23397													1							1
25048		4						4		2			30		4					44
25599													3		14					17
25774			1															2		3
25873													12		4					16
26366								2	1											3
26427									2											2
26482	3							2					8				3			16
26499								2												2
26735		2											15		5		1			23
26880								2					9		4		2			17
28342								2					33		39		3			77
28601		2													5				1	8
29032			2					2												4
31073													2							2
31106	4	4	4	2				13		2			30		13		15			87
31467													9							9
32811	6		1					1				3	8		5					24
32913		4			2			3										1		10
33413	2																			2
33763			1																	1
34618	3	20						5	11				2							41

BASIN	AGWT	AMWI	BUFF	CANV	COGO	COME	LTDU	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
35762				4					2				17		5					28
36013	2	4	2		6															14
36185																	1			1
36224	17		2					6		2			26		6		2			61
36815													5		4					9
38393			2					2												4
38656		7		4	1			8					50		22					92
38900			2		1										1					4
39754		2																		2
40719																	2			2
41661								4		2										6
42967													6		5		3	4		18
43198	2	2						1				8	19		5					37
43609					1								2							3
44018	2	3						3					18				1			27
44068	1	2	5					5	2				6		2			1		24
44117								2					4							6
44200			2	4				5					33		12					56
44360		3						1					2							6
44505			1		4	2		1					15							23
47789	10				2			4	3	1			7							27
Grand Total	71	141	41	19	25	3	8	217	103	46	10	32	1180	2	510	70	66	143	24	2711

BASIN	AGWT	AMWI	BUFF	BWTE	MALL	NOPI	NSHO	RNDU	SCAU	SUSC	UNDI	UNDU	UNTE	WWSC	Grand Total
22178	2				21			3	11	2		1			40
22678					4				25	3		3			35
22818									5						5
23397											1				1
25048		3													3
25599					2										2
26427			2		1			1							4
26482		2						5	3						10
26735		3							6	6	2				17
26880									2						2
27091									2						2
28342			3		5				20	12					40
29032			1					1							2
31106	4	3	9	2	4			1	13						36
32913				1	4										5
33089					2										2
34318										8					8
34618		2													2
36224			1		7			3	10						21
36815					1				2						3
38656		15			7			5	8						35
42967									5						5
43787					2			3							5
44018		2			2										4
44068					1	1		4							6
44200	2	3	2	2					5						14
44505					1										1
47789			7				1		2						10
Grand Total	29	79	29	14	168	4	8	65	293	63	33	42	1	14	842

APPENDIX XIII: Total Brood count for Brood I survey, 9-13 July 2001.

BASIN	AMWI	BU/GO	BUFF	MALL	NSHO	RNDU	SCAU	SUSC	UNDA	UNDI	UNDU	Grand Total
349								2				2
350				1								1
739	1											1
1249				1								1
2593	1											1
5645											1	1
7953				1							1	2
8997					1							1
10540				1								1
10895			1			1						2
11282				1					1			2
12846										1		1
13356			1									1
15684								1				1
15887										1		1
17901					1							1
17961	2											2
21364				1								1
21745				1								1
22178						1	2					3
22678							1					1
25873						1						1
26735							1					1
29032	1											1
36224	1	1	1	1							1	5
44018				2					1		1	4
44068							1					1
44117				1		1						2

47789							1		1			2
Total	6	1	3	11	2	4	6	3	3	2	4	45

25048	1													1	2		
26482	1													4	5		
26735														3	3		
29032														1	1		
31106	3			1				1		1				6			
31467	1													1			
32041														1	1		
33413	1													1	2		
36224	3	1	1	1	1	1	1	2	1	1	1	2	1	11			
38656	1													1			
43787														1	1		
44018														2	2	1	5
44068														1	1	2	
44117														1	1	2	
47145														1	1		
47789	1													1	2		
Total	6	10	4	7	4	4	5	16	39	4	3	6	5	113			

APPENDIX XV: Total Duck Abundance for Brood I survey, 9-13 July 2001.

BASIN	AGWT	AMWI	BUFF	CANV	COGO	MALL	NSHO	REDH	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDI	UNDU	WWSC	Grand Total
349			2								3		2	4	1		12
350										7	8						15
352			8											1		1	10
2593		1				2					16						19
2736		1															1
2801	8	3								5	5			3	3	1	28
2962		8								3	30			4			45
3935		1								11	4						16
4129	3																3
4515														1			1
6154	1	8				5				8	86	10	1	1	75	5	200
7836														2			2
7953											9			1			10
8997			3											1			4
9120											2			1			3
9544											1						1
9602	1															20	21
9994														1			1
10540														1			1
10895											3						3
11191		1												1			2
11282		1				2				21	6						30
13146														1			1
13356						3				2	8						13
14591	1																1
14738													1				1
15684														1			1
15887										1							1

BASIN	AGWT	AMWI	BUFF	CANV	COGO	MALL	NSHO	REDH	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDI	UNDU	WWSC	Grand Total
30703														1			1
31106	3		4		1					5	25						38
31467										1							1
34618			1														1
36224		3	2							4	2			2			13
36815										8							8
38393			3														3
38656		1								16	3						20
38900										2				3			5
42967										8							8
43609						1					1			1			3
43713			4								6						10
43787											1						1
44018		1									2						3
44068										1							1
44360										2							2
44505															2		2
47145		1															1
47789			1			4											5
Grand Total	23	116	33	2	12	56	1	1	250	164	624	10	10	42	85	46	1477

BASIN	AGWT	AMWI	BUFF	CANV	COME	LESC	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	UNDA	UNDI	UNDU	Total
17901												1				1
17961											6					6
18157														1		1
19182							1		1							2
19616														1		1
19786	1															1
19909							1									1
20236							5									5
20318							1									1
20616											1					1
20893						1	3									4
21364														1		1
21745							3									3
21875							2									2
22178									1					1		2
22678							2			1				1		4
22878							3				5					8
23384														1		1
23397							3									3
26482												3				3
26735									1		1	3	1			6
27091												7				7
28342							1			15					1	17
29032							1									1
30155							1									1
30703											1					1
31106		1							8		8			2		19
32913														1		1
33763												1				1
36224	1	1					1						2	1		6
36815											15					15

BASIN	AGWT	AMWI	BUFF	CANV	COME	LESC	MALL	NOPI	NSHO	RN/SC	RNDU	SCAU	UNDA	UNDI	UNDU	Total
38656			2				1					4				7
38900												3				3
42967											4					4
43198								2			1					3
44018	4							1			17					22
44068											3					3
44200										15	7					22
44360		4												1		5
Total	6	15	8	1	3	1	69	9	14	121	94	37	9	13	2	402

APPENDIX XVII: Total Duck Abundance for Staging I survey, 25-27 August 2001.

Basin	AGWT	AMWI	BUFF	CANV	COGO	MALL	NOPI	RN/SC	RNDU	SCAU	SCOT	UNDA	UNDI	UNDU	UNTE	WWSC	Grand Total
350								2									2
352													10				10
773												1					1
1015										6							6
1394										150		51					201
2294												25	5				30
2368								10					4				14
2801												5					5
3614				20	20		2	66				6	110	65			289
5670													55				55
6154												40	58				98
9112		3				1						13	18	5			40
9544								3									3
10895							2					6	6				14
11191		26															26
11282								6						33			39
11394								18			1	10		7			36
12314													15				15
12431		8						500		6		30	143				687
12865		2										8	24	5			39
14738														1			1
15143												6					6
15742													3				3
16434					9			338			5		66	795	11		1224
17066			3		15			226			18	151		167			580
17961								1					1				2
18898														2			2
19204								40				3	5	10			58
19818								10	1	3			13	11			38
19948	25				2			63				52	125	177			444
20236													8				8
20273		50										1	2				53
20616													80				80
20833												7	83	7			97
21285		5		5	2			102				57	177	52			400
21364												8					8
21812													10				10
21882												1	10				11
22087		5	4				25	278				1	126	325			764
22678												15	21				36

Basin	AGWT	AMWI	BUFF	CANV	COGO	MALL	NOPI	RN/SC	RNDU	SCAU	SCOT	UNDA	UNDI	UNDU	UNTE	WWSC	Grand Total
22818											1						1
23384														1			1
23437		25			1			15		20		3	28	16			108
25594								324			19	7	194	72			616
25599						1							5				6
26272							90	19			5	46					160
26482								15									15
26539													9	8			17
27158												6	8				14
28342												7	30				37
28601												1					1
29190													4				4
30058													15				15
30390								317			2		51	48		1	419
30897												2	1				3
31106		3												33			36
33413														4			4
34318						1											1
35762			3														3
36224								20					4	2			26
36708														12			12
38251			1		4		15	15				40	43	99			217
38364		99	1					25	7			9	16	100			257
40113								191				5	563	130			889
42687												1	5				6
43713														3			3
44018								10					5	3			18
44068		1										1		1			3
44360								6		1			2				9
46413												15	89				104
47323								63				3	1	116			183
48715												20					20
54044													5	57			62
54479								186					334	98			618
57800								4					3	11			18
Grand Total	25	227	12	25	53	3	134	2873	8	30	207	587	2660	2485	11	1	9341

APPENDIX XVIII: Total Duck Abundance for Staging II survey, 24-26 September 2001.

Basin	AMWI	BU/GO	BUFF	CANV	COGO	LTDU	MALL	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
349															1		1
350															1		1
352															1		1
773		1															1
907															39		39
1190														1			1
1394															46		46
2294													50		38		88
2368															1		1
2736														9			9
2801				1										2	27		30
2962															2		2
3614														22	108		130
5645														25	2		27
5670	1														10		11
6154				2									2	54	71		129
6497														1			1
7485															1		1
7575														1	6		7
9112					3			780						10	46		839
9602							2						60		6		68
9611															2		2
9962														7	19		26
10277															2		2
10430															7		7
10895														3	11		14

Basin	AMWI	BU/GO	BUFF	CANV	COGO	LTDU	MALL	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
11282															16		16
11394							1						5	11	42	3	62
11597														35			35
12314															38		38
12865														19	263		282
13146													15	47			62
13747															4		4
15418														54			54
15598														1			1
15742														7	5		12
16434														495	253		748
17066				10									25	265	113		413
17568													1		1		2
17961															3		3
18157															2		2
18898							1								10		11
19204			1						1	5				7	64		78
19818														5	79		84
19909															3		3
19948															20		20
20059														1	8		9
20236													33	7	28		68
20273													8	19	12		39
20318															1		1
20616													6	10	12		28
20833														12	95		107
21285			4										27	1	19		51
21530														14	38		52

Basin	AMWI	BU/GO	BUFF	CANV	COGO	LTDU	MALL	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
21745															5		5
21812													1	6	44		51
22087													25	8	233		266
22678													9		29		38
22818														3			3
23384															2		2
23397													3				3
23437													3	18	16		37
24572															2		2
25048													4				4
25594			14							12			5	66	353		450
25774													7				7
26272													105		38		143
26539						4								2	4		10
26880															8		8
27158													6		18		24
28342															39		39
28601															2		2
29190													4	26	29		59
30058															16		16
30390													50		40		90
30897												1		8			9
33413													3				3
36224													1				1
38251													1	3			4
38364													25	2	35		62
39731															5		5
43787															1		1

Basin	AMWI	BU/GO	BUFF	CANV	COGO	LTDU	MALL	RN/SC	RNDU	SCAU	SCOT	SUSC	UNDA	UNDI	UNDU	WWSC	Grand Total
44068			2											1			3
44200													12				12
44505														8	1		9
46413															7		7
47323								8					12	14	53		87
48715													10	1	32		43
54479								150					6	65	211		432
Brackett													695	51	1800		2546
Grand Total	1	1	24	10	3	4	4	938	1	5	12	1	1219	1427	4599	3	8252

BASIN	BAEA	CAGO	COLO	GHOW	gull	GWFG	HOGR	LSGO	MEGU	NOHA	PA/RT LO	PALO	PEFA	RNGR	SACR	sandpiper	ShMe	ShSm	ShUn	tern	UNLO	WSHW	Yellowlegs	Total
43198					2							1												3
44018		1			2																			3
44068																					2		4	6
44117									3															3
44360									2			1											2	5
44505																			7					7
47145															1									1
47789		1																	3					4
Grand Total	1	42	2	1	25	2	13	1	15	5	5	63	2	13	24	6	50	3	181	2	7	4	39	506

APPENDIX XX: Other Waterbird observations recorded during IBP II survey, 12-14 June 2001.

BASIN	BAEA	CAGO	COLO	COSN	gull	MEGU	PALO	RNGR	SACR	ShSm	tern	UNLO	Yellowlegs	Total
352				1										1
2801								1					2	3
3935			1											1
4129													2	2
5456					2		2							4
5645							1							1
5647							2							2
5672		4												4
6154	1											2		3
6681							1					1		2
7836							1							1
8997								2						2
9602								1					1	2
9994		3								1				4
10215													1	1
11191							2							2
11282			1		1	2					2			6
14341									1					1
14796		1												1
16298							1							1
17568							1							1
18220							1							1
20059					2									2
20236							2							2
20616												2		2
21364								1						1
21875						1								1
22178							1							1
23384							2							2
26499		1												1
28735		4												4
29698					1		1							2
30703		2					1							3
31073							2							2
31106					4									4
32041		2					1							3
32811		1												1
33413							1							1
34318													1	1
38393							1							1
39731			1				1							2
40719		4												4
44018													4	4
44360													1	1
Grand Total	1	22	3	1	10	3	25	5	1	1	2	5	12	91

APPENDIX XXI: Other Waterbird observations recorded during Brood I survey, 9-13 July 2001.

BASIN	BAEA	COLO	HOGR	MEGU	PA/RTLO	PALO	RNGR	RTLO	SACR	ShUn	UNLO	WSHW	Yellowlegs	Total
920						1								1
1249						1								1
1941						1								1
2349						2								2
2427						3						2		5
2593		1				2						4		7
2736						1								1
2801						2	3							5
3935						3	4							7
4441						1							1	2
5645				2		2								4
5647								2						2
6681						2								2
7575						2								2
7953			2											2
9120				2									2	4
9602							2							2
10215						2								2
10277						2								2
11191						1								1
11282			2	6		2			2					12
13146						1								1
13356						1	1							2
13655						1								1
14796						5								5
15684									2					2
15887						2								2
17568						2								2
17901											2			2

BASIN	BAEA	COLO	HOGR	MEGU	PA/RTLO	PALO	RNGR	RTLO	SACR	ShUn	UNLO	WSHW	Yellowlegs	Total
38656												2		2
39731						2								2
39754					1									1
43198						1								1
44018													1	1
44360						2								2
44505						1								1
47789	1												1	2
Grand Total	1	4	4	14	1	112	10	2	9	1	2	8	6	174

BASIN	AMCO	BAEA	BEKI	COLO	COSN	PALO	RNGR	SACR	ShMe	ShSm	ShUn	UNLO	WSHW	Yellowlegs	Total
20318						2									2
21745						2									2
21875						2									2
22178						3									3
22678						5	1								6
22818								2							2
23397												2			2
25599						2									2
25774						1									1
25873										1					1
26366								2							2
26880						5									5
29698						3									3
30155												1		2	3
31073								2							2
31106			2	3											5
32913						2									2
33089										1					1
34318										1					1
36224			1			1									2
38656	2												2		4
42967				1											1
44018						2									2
44068						2									2
44360						1									1
47789										13					13
Grand Total	2	1	3	7	2	70	8	15	5	25	5	3	5	8	159

APPENDIX XXIII: Other Waterbird observations recorded during Staging I survey, 25-27 August 2001.

Basin	BAEA	CAGO	COLO	gull	NOHA	PA/RTLO	PALO	RNGR	SACR	ShSm	UNLO	WSHW	Total
1015											2		2
1394					1								1
3614							2						2
3935			3										3
6090							1						1
9112	1										2	2	5
12431			5	1			1				7		14
16434												2	2
19818		10											10
19948							8						8
20059							6						6
20236							5						5
20318											2		2
20833							1				1		2
21285										15			15
22087									4				4
22678							4						4
23384		75											75
23437							1						1
25599											2		2
29190											1		1
30058			1										1
30390							2						2
30897			2										2
36013											1		1
36224						1							1
39731							1						1
40113											1		1
40719							2						2
44200							1						1
44505											1		1
57800							1	1			5		7
Grand Total	1	85	11	1	1	1	36	1	4	15	25	4	185

APPENDIX XXIV: Other Waterbird observations recorded during Staging II survey, 24-26 September 2001.

Basin	BAEA	CAGO	COLO	hawk	LSGO	PALO	RNGR	UNLO	WSHW	Total
421								1		1
1151	1									1
1394								1		1
2294									108	108
3614	1									1
3935		1								1
5670									4	4
9112				1						1
11394									80	80
11597									300	300
12865							3			3
13144					20					20
17066									4	4
20059						1				1
20236							3			3
20833								1		1
24572	1									1
25594								2		2
26272								1		1
28601	1									1
30001			2							2
30058								1		1
30390					9					9
38364						1				1
39754				1						1
54479		35							3	38
Brackett		120			130				2500	2750
Grand Total	4	156	2	2	159	2	6	7	2999	3337

APPENDIX XXV: Mammal observations recorded during all 2001 surveys.

Date	Observer	Basin	Latitude	Longitude	Species	Count
07/12/2001	JF Dufour	9544	65.3688	-124.9636	Beaver	1
08/05/2001	Bruce MacDonald	2349	65.50942	-127.14526	Beaver	1
08/06/2001	Bruce MacDonald	14796	65.14411	-126.41667	Beaver	1
08/06/2001	JF Dufour	14796	65.14411	-126.41667	Beaver	1
08/25/2001	JF Dufour	44018	64.69781	-125.33626	Beaver	1
09/24/2001	JF Dufour	21285	65.11217	-125.12783	Beaver	1
09/25/2001	JF Dufour	11394	65.40495	-123.88699	Beaver	1
09/25/2001	Arianna Zimmer	44018	64.69781	-125.33626	Beaver	1
09/25/2001	Arianna Zimmer	54479	64.50586	-125.36315	Beaver	1
Total						9

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
05/23/2001	JF Dufour	9962	65.6931	-126.2751	Caribou	1	1312XX	woodland caribou, no antlers
06/12/2001	Bruce MacDonald	38656	64.71492	-126.66289	Caribou	2	104541	woodland caribou w/ calf
08/08/2001	Bruce MacDonald	28342	65.04379	-124.14621	Caribou	1		cow, on the basin
08/25/2001	JF Dufour	38364	64.78128	-125.92663	Caribou	2	172533	males, woodland
09/24/2001	JF Dufour	9611	65.26731	-126.49355	Caribou	2	183535	females
Total						8		

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
07/13/2001	JF Dufour	4441	65.43545	-126.98866	Muskox	20	1043XX	6 young in gp, top of range

Date	Observer	Basin	Latitude of Basin	Longitude of Basin	Species	Count	Time
05/22/2001	Bruce MacDonald	14796	65.14411	-126.41667	Muskrat	1	
09/25/2001	Arianna Zimmer	10277	65.40259	-124.21578	Muskrat	1	195728
Total						2	

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time
09/26/2001	Melany Cyr	4515	65.57483	-125.01089	Red Fox	1	93802

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
05/23/2001	JF Dufour	8997	65.33493	-125.62469	Snowshoe hare	1		near wetland

Date	Observer	Basin	Latitude of Basin	Longitude of Basin	Species	Count	Time	Comments
08/08/2001	Bruce MacDonald	28342	65.04379	-124.14621	Wolf	1		swiming 2-300m offshore

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
05/22/2001	JF Dufour	32041	64.93332	-124.84338	Black Bear	1	152039	on way back to NW, no sex foraging in clear cut pipeline/seismic
05/25/2001	JF Dufour	18157	65.09869	-126.09235	Black Bear	1	93320	
05/22/2001	Bruce MacDonald	17568	65.07645	-126.53008	Black Bear	1		
06/12/2001	Gendron	19182	65.14442	-125.1527	Black Bear	1		
07/13/2001	JF Dufour	2368	65.50494	-127.19394	Black Bear	1		2nd year cub, running
08/07/2001	Bruce MacDonald	38656	64.71492	-126.66289	Black Bear	1	80144	
08/07/2001	JF Dufour	26735	64.90974	-126.46534	Black Bear	1	80420	
08/08/2001	JF Dufour	23384	64.96882	-125.94242	Black Bear	2	92950	female and 1yr cub
08/07/2001	Bruce MacDonald	22818	65.04994	-125.44525	Black Bear	1	132357	
08/07/2001	Bruce MacDonald	22818	65.04994	-125.44525	Black Bear	1	132550	
08/05/2001	JF Dufour	9994	65.21478	-126.97029	Black Bear	1	2110XX	3day lake shore
08/26/2001	JF Dufour	26272	65.0378	-124.86003	Black Bear	1	165114	
08/26/2001	JF Dufour	19948	65.12576	-125.40675	Black Bear	1	183131	on seismic line // to Mack R.
09/26/2001	JF Dufour	25594	65.04737	-124.90755	Black Bear	1	103128	male?
Total						15		

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
05/22/2001	JF Dufour	18220	65.06682	-126.49263	Moose	2	113533	no sex noted
05/22/2001	JF Dufour	38393	65.42857	-127.34695	Moose	1	123005	a bull
05/22/2001	Bruce MacDonald	18220	65.06682	-126.49263	Moose	2		cow + yearling
05/22/2001	Bruce MacDonald	38656	64.71492	-126.66289	Moose	1		no sex
05/23/2001	Bruce MacDonald	13356	65.24957	-125.43085	Moose	2		cow + yearling
05/23/2001	Bruce MacDonald	13356	65.24957	-125.43085	Moose	1		no sex
05/23/2001	Bruce MacDonald	7953	65.44493	-124.44782	Moose	3		1 male, cow + yearling near 7953
05/23/2001	JF Dufour	19182	65.14442	-125.1527	Moose	1		no sex
05/23/2001	JF Dufour	28342	65.04379	-124.14621	Moose	1	1424XX	no sex
05/25/2001	JF Dufour	4441	65.43545	-126.98866	Moose	2	74155	no antlers
05/25/2001	JF Dufour	5645	65.6931	-126.2751	Moose	1	0822XX	

Date	Observer	Nearest Basin	Latitude of N. Basin	Longitude of N. Basin	Species	Count	Time	Comments
06/12/2001	Bruce MacDonald	15058	65.11389	-126.73036	Moose	1	100134	a cow moose
06/12/2001	Bruce MacDonald	16434	65.10484	-126.5953	Moose	2	100528	cow + calf moose
06/12/2001	Bruce MacDonald	25048	64.93567	-126.51637	Moose	1		a bull
06/12/2001	Bruce MacDonald	47789	64.54133	-126.39398	Moose	1	111010	a bull
06/12/2001	Gendron	15058	65.11389	-126.73036	Moose	1		sw of basin
07/09/2001	JF Dufour	3935	65.42857	-127.34695	Moose	1		female
07/09/2001	JF Dufour	9120	65.18812	-127.53397	Moose	1	1911XX	male with big rack
07/09/2001	JF Dufour	15058	65.11389	-126.73036	Moose	1		a male was lying down
07/11/2001	JF Dufour	26735	64.90974	-126.46534	Moose	1		a female on wetland edge
07/12/2001	JF Dufour	6154	65.50124	-125.0664	Moose	2		cow with calf
07/13/2001	JF Dufour	2349	65.50942	-127.14526	Moose	1	103316	male
07/13/2001	JF Dufour	349	65.7468	-126.82266	Moose	1		male
07/13/2001	JF Dufour	352	65.74611	-126.80821	Moose	2		edge of wetland
07/12/2001	Darryl Kroeker	6154	65.50124	-125.0664	Moose	2		cow with calf
08/07/2001	JF Dufour	21745	65.08746	-125.20866	Moose	1	143332	female
08/08/2001	JF Dufour	1582	65.65258	-125.75706	Moose	2	144120	2 males
08/08/2001	Bruce MacDonald	9079	65.34064	-125.5182	Moose	1	95508	bull
08/08/2001	Bruce MacDonald	1941	65.62829	-125.82942	Moose	2	143910	bulls
08/25/2001	JF Dufour	20273	64.98865	-127.11415	Moose	2	151136	cow with young
08/25/2001	JF Dufour	39731	64.76392	-125.80914	Moose	2		cow with calf on peninsula of island
08/26/2001	JF Dufour	30058	64.9004	-125.77612	Moose	1	172559	bull, small rack
08/25/2001	Bruce MacDonald	29190	64.87603	-126.57514	Moose	2	162650	cow & calf
09/26/2001	JF Dufour	22087	65.07932	-125.3203	Moose	1	101635	male
09/26/2001	JF Dufour	36708	64.73723	-126.70188	Moose	5	112725	2 males, 3 females
09/26/2001	JF Dufour	23437	64.96391	-126.54294	Moose	1	115148	male
09/25/2001	Arianna Zimmer	21364	65.01911	-126.26668	Moose	1	154329	male
09/26/2001	Melany Cyr	6154	65.50124	-125.0664	Moose	2	94341	
09/26/2001	Melany Cyr	38900	64.7373	-126.32487	Moose	2	112402	
09/26/2001	Melany Cyr	36708	64.73723	-126.70188	Moose	1	112939	male

Total	61
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APPENDIX XXVI: Basins surveyed containing some indication of beaver presence.

Date	Observer	Basin	Latitude	Longitude	Count	Comment
08/08/2001	Bruce MacDonald	352	65.74611	-126.80821	1	beaver dam
08/26/2001	Bruce MacDonald	907	65.66468	-126.75463	1	beaver lodge
07/13/2001	JF Dufour	920	65.6931	-126.2751	1	beaver lodge
08/08/2001	JF Dufour	1941	65.62829	-125.82942	2	beaver lodgex2
08/05/2001	Bruce MacDonald	2349	65.50942	-127.14526	1	beaver lodge
08/05/2001	Bruce MacDonald	2368	65.50494	-127.19394	1	beaver lodge
08/08/2001	Bruce MacDonald	2962	65.5797	-125.83945	1	beaver lodge & dam
06/12/2001	Bruce MacDonald	4817	65.39217	-127.33268	1	beaver lodge
06/12/2001	Bruce MacDonald	5647	65.3677	-127.21207	1	beaver lodge
09/26/2001	JF Dufour	6497	65.48114	-124.89795	1	beaver lodge
08/27/2001	JF Dufour	9112	65.35018	-125.53198	1	beaver lodge
08/08/2001	JF Dufour	9544	65.3688	-124.9636	1	beaver lodge
08/05/2001	Bruce MacDonald	11191	65.18812	-127.53397	1	beaver lodge
06/12/2001	Bruce MacDonald	11282	65.20887	-126.71464	1	beaver lodge
09/25/2001	JF Dufour	11394	65.40495	-123.88699	1	beaver lodge
09/25/2001	JF Dufour	12865	65.39124	-123.78762	1	beaver lodge
08/08/2001	Bruce MacDonald	13146	65.35799	-123.81635	0	beaver dam
06/12/2001	Bruce MacDonald	14796	65.14411	-126.41667	1	beaver lodge
06/12/2001	Bruce MacDonald	17568	65.07645	-126.53008	1	beaver lodge
05/23/2001	Bruce MacDonald	17961	65.16149	-125.24183	1	beaver lodge
05/25/2001	Bruce MacDonald	18157	65.09869	-126.09235	1	beaver lodge
08/07/2001	JF Dufour	18377	65.1549	-125.23571	1	beaver lodge
09/24/2001	JF Dufour	18898	65.14009	-125.35268	1	beaver lodge
08/07/2001	Bruce MacDonald	20059	65.10947	-125.40832	1	beaver lodge
09/26/2001	JF Dufour	20833	65.10208	-125.34785	5	beaver lodge x 5
08/27/2001	JF Dufour	21285	65.11217	-125.12783	1	beaver lodge
09/24/2001	JF Dufour	21285	65.11217	-125.12783	1	beaver lodge
06/12/2001	Bruce MacDonald	21364	65.01911	-126.26668	1	beaver lodge
08/07/2001	Bruce MacDonald	21745	65.08746	-125.20866	1	beaver lodge
08/07/2001	Bruce MacDonald	21875	65.06957	-125.13544	1	beaver lodge
08/26/2001	JF Dufour	22087	65.07932	-125.3203	1	beaver lodge

Date	Observer	Basin	Latitude	Longitude	Count	Comment
08/07/2001	Bruce MacDonald	22178	65.08746	-125.20866	1	beaver lodge
08/07/2001	Bruce MacDonald	22818	65.00379	-125.37828	1	beaver lodge
08/26/2001	Bruce MacDonald	24572	65.09683	-124.38028	1	beaver lodge
08/25/2001	JF Dufour	25599	64.96882	-125.94242	1	beaver lodge
08/25/2001	Bruce MacDonald	26539	64.9139	-126.55875	0	beaver dam
06/12/2001	Bruce MacDonald	26735	64.90974	-126.46534	2	beaver lodge x 2
08/07/2001	Bruce MacDonald	26880	64.99739	-125.2062	3	beaver lodge x 3
05/23/2001	Bruce MacDonald	27091	64.94759	-125.83149	1	beaver lodge
05/23/2001	Bruce MacDonald	28342	65.04379	-124.14621	1	beaver lodge
08/07/2001	Bruce MacDonald	28601	64.96053	-125.29252	1	beaver lodge
08/07/2001	Bruce MacDonald	29698	64.93869	-125.35627	2	beaver lodge x 2
08/07/2001	Bruce MacDonald	32041	64.93332	-124.84338	1	beaver lodge
05/22/2001	Bruce MacDonald	32913	64.87295	-125.55335	1	beaver lodge
08/07/2001	Bruce MacDonald	36013	64.89626	-124.60521	1	beaver lodge
05/22/2001	Bruce MacDonald	36224	64.84085	-125.40059	1	beaver lodge
08/07/2001	JF Dufour	42967	64.75738	-124.84167	1	beaver lodge
05/22/2001	Bruce MacDonald	43609	64.73605	-124.92907	1	beaver lodge and beaver dam
08/07/2001	Bruce MacDonald	44068	64.70946	-125.15367	0	beaver dam
08/07/2001	Bruce MacDonald	44200	64.72171	-124.94565	1	beaver lodge
08/07/2001	Bruce MacDonald	44360	64.68775	-125.39448	0	beaver dam
08/07/2001	Bruce MacDonald	44505	64.72567	-124.79272	3	beaver lodge x 3
TOTAL COUNT					59	

APPENDIX XXVII: American Ornithological Union Species Alpha-codes.

COMMON NAME	Scientific Name	ALPHA CODE
American Bittern	<i>Botaurus lentiginosus</i>	AMBI
American Coot	<i>Fulica americana</i>	AMCO
American Kestrel	<i>Falco sparverius</i>	AMKE
American White Pelican	<i>Pelicanus erythrorhynchos</i>	AWPE
American Wigeon	<i>Anas americana</i>	AMWI
Arctic Tern	<i>Sterna paradisaea</i>	ARTE
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BAEA
Barrow's Goldeneye	<i>Bucephala islandica</i>	BAGO
Belted Kingfisher	<i>Ceryle alcyon</i>	BEKI
Black Scoter	<i>Melanitta nigra</i>	BLSC
Black Tern	<i>Chlidonias niger</i>	BLTE
Blue-winged Teal	<i>Anas discors</i>	BWTE
Bonaparte's Gull	<i>Larus philadelphia</i>	BOGU
Boreal Owl	<i>Aegolius funereus</i>	BOOW
Bufflehead	<i>Bucephala albeola</i>	BUFF
Bufflehead or Goldeneye	n/a	BU/GO
Canada Goose	<i>Branta canadensis</i>	CAGO
Canvasback	<i>Aythya valisineria</i>	CANV
Common Goldeneye	<i>Bucephala clangula</i>	COGO
Common Loon	<i>Gavia immer</i>	COLO
Common Merganser	<i>Mergus merganser</i>	COME
Common Snipe	<i>Gallinago gallinago</i>	COSN
Common Tern	<i>Sterna hirundo</i>	COTE
Gadwall	<i>Anas strepera</i>	GADW
Golden Eagle	<i>Aquila chrysaetos</i>	GOEA
Great Gray Owl	<i>Strix nebulosa</i>	GGOW
Great Horned Owl	<i>Bubo virginianus</i>	GHOW
Greater Scaup	<i>Aythya marila</i>	GRSC
Greater White-fronted Goose	<i>Anser albifrons</i>	GWFG
Green-winged Teal	<i>Anas crecca</i>	AGWT
Gyrfalcon	<i>Falco rusticolus</i>	GYRF
Herring Gull	<i>Larus argentatus</i>	HERG
Horned Grebe	<i>Podiceps auritus</i>	HOGR
Killdeer	<i>Charadrius vociferus</i>	KILL
Lesser Scaup	<i>Aythya affinis</i>	LESC
Lesser Snow Goose	<i>Chen caerulescens</i>	LSGO
Lesser Yellowlegs	<i>Tringa flavipes</i>	LEYE
Long-tailed Duck	<i>Clangula hyemalis</i>	LTDU
Mallard	<i>Anas platyrhynchos</i>	MALL
Merlin	<i>Falco columbarius</i>	MERL
Mew Gull	<i>Larus canus</i>	MEGU
Northern Goshawk	<i>Accipiter gentilis</i>	NOGO
Northern Harrier	<i>Circus cyaneus</i>	NOHA
Northern Pintail	<i>Anas acuta</i>	NOPI

COMMON NAME	Scientific Name	ALPHA CODE
Northern Shoveler	<i>Anas clypeata</i>	NSHO
Osprey	<i>Pandion haliaetus</i>	OSPR
Pacific Loon	<i>Gavia pacifica</i>	PALO
Peregrine Falcon	<i>Falco peregrinus</i>	PEFA
Red-breasted Merganser	<i>Mergus serrator</i>	RBME
Redhead	<i>Aythya americana</i>	REDH
Red-necked Grebe	<i>Podiceps grisegena</i>	RNGR
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RTHA
Red-throated Loon	<i>Gavia stellata</i>	RTLO
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	RWBL
Ring-neck or Scaup	<i>n/a</i>	RN/SC
Ring-necked Duck	<i>Aythya collaris</i>	RNDU
Rough-legged Hawk	<i>Buteo lagopus</i>	RLHA
Ruddy Duck	<i>Oxyura jamaicensis</i>	RUDU
Sandhill Crane	<i>Grus canadensis</i>	SACR
Scaup spp.	<i>n/a</i>	SCAU
Scoter spp.	<i>n/a</i>	SCOT
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SSHA
Short-eared Owl	<i>Asio flammeus</i>	SEOW
Sora	<i>Porzana carolina</i>	SORA
Snowy Owl	<i>Nyctea scandiaca</i>	SNOW
Surf Scoter	<i>Melanitta perspicillata</i>	SUSC
Swainson's Hawk	<i>Buteo swainsoni</i>	SWHA
Tundra Swan	<i>Cygnus columbianus</i>	WHSW
Unidentified Dabbler	<i>n/a</i>	UNDA
Unidentified Diver	<i>n/a</i>	UNDI
Unidentified Duck	<i>n/a</i>	UNDU
Unidentified Gull	<i>n/a</i>	Gull
Unidentified large shorebird	<i>n/a</i>	ShLg
Unidentified medium shorebird	<i>n/a</i>	ShMe
Unidentified shorebird	<i>n/a</i>	ShUn
Unidentified small shorebird	<i>n/a</i>	ShSm
Unidentified Teal	<i>n/a</i>	UNTE
Unidentified tern	<i>n/a</i>	Tern
Unidentified Yellowlegs	<i>n/a</i>	Yellowlegs
White-winged Scoter	<i>Melanitta fusca</i>	WWSC
Whooping Crane	<i>Gurs americana</i>	WHCR
Yellow-billed Loon	<i>Gavia adamsii</i>	YBLO