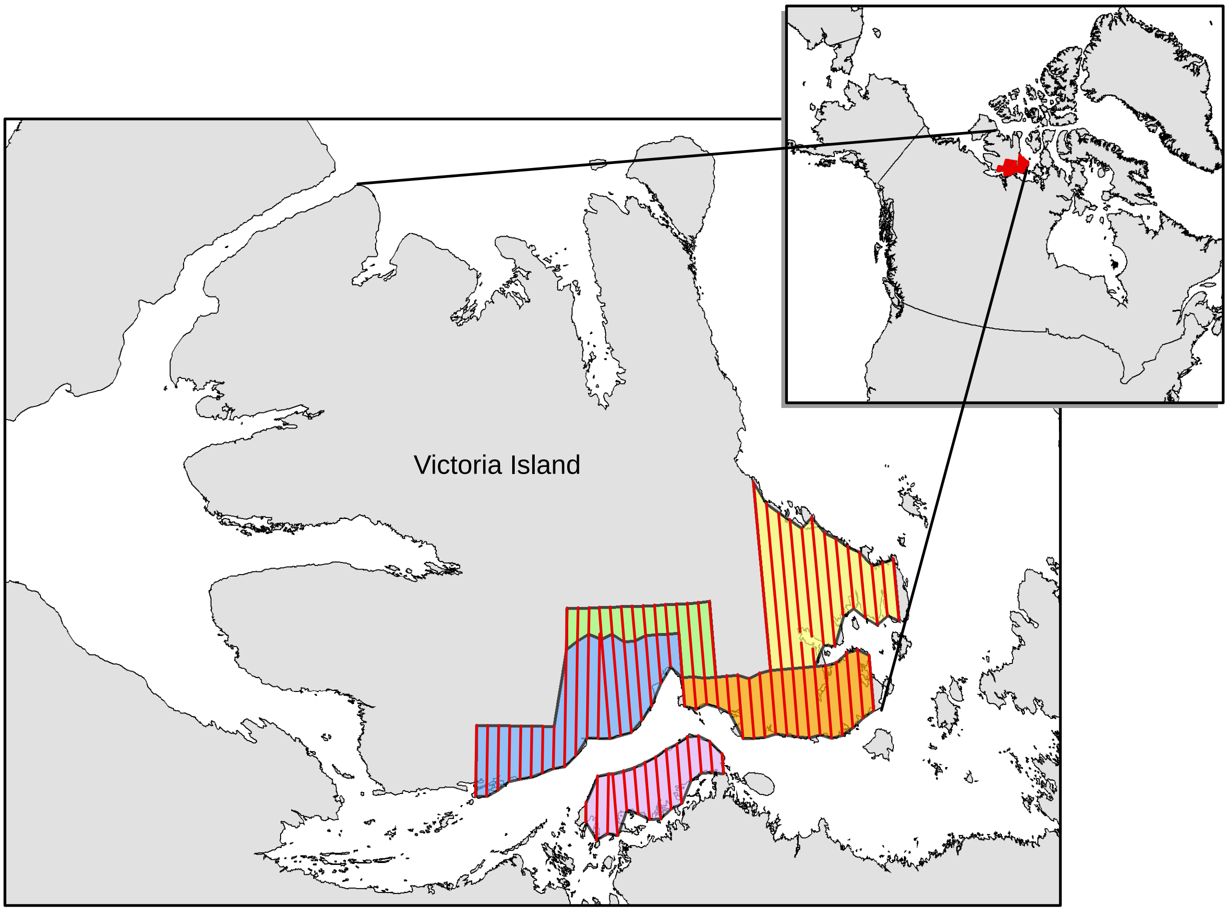
Distribution and Abundance of Wildlife from Fixed-Wing Aircraft Surveys on Victoria Island and Kent Peninsula, Nunavut, Canada June 2005



Bruce Conant
Fred Roetker
Deborah J. Groves

U.S. Fish and Wildlife Service

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Data Presented by: Bruce Conant and Deborah J. Groves

U.S. Fish and Wildlife Service
Waterfowl Management
3000 Vintage Blvd., Suite 260
Juneau, Alaska 99801, USA

Ph (907) 780-1164
Fx (907) 586-7378
Em bruce_conant@fws.gov/debbie_groves@fws.gov

Fred Roetker

U. S. Fish and Wildlife Service/DMBM –WPS
646 Cajundome Blvd., Suite 237
Lafayette, LA 70506, USA

Ph (337) 291-3090
Fx (337) 291-3095
Em fred_roetker@fws.gov

Abstract

In June 2005 we flew a fixed-wing aerial survey for waterfowl on Victoria Island and nearby Kent Peninsula in Nunavut, Canada. This survey followed a previous design, a portion of which was flown with a helicopter the previous year *(Alisauskas 2005)*. The results from our survey are presented by 5 individual subareas (Byron Bay, Kent Peninsula, SE Victoria Island, Central Victoria Island and East Victoria Island). Our results for three subareas combined (Byron Bay, Kent Peninsula and SE Victoria Island) are compared to those obtained the previous year by helicopter *(Alisauskas 2005)*, as revised for Canada and white-fronted geese in December 2005 (*Moser 2005*). From this pilot effort, we believe fixed-wing surveys are a reasonable alternative to those using a helicopter. Some concurrent fixed-wing/helicopter surveys are recommended to better understand the relationship between the two methods.

Introduction

In early 2005, Tim Moser (USFWS – Denver, CO) requested that the Waterfowl Management Branch of the USFWS in Alaska consider conducting an experimental waterfowl survey with a fixed-wing aircraft on Victoria Island in Nunavut, Canada. Ray Alisauskas (Canadian Wildlife Service – Saskatoon, Saskatchewan) had conducted a wildlife survey using a helicopter in June 2004 *(Alisauskas 2005)*. The main purpose of repeating that survey there in 2005 was to test the feasibility of using a fixed-wing aircraft for gathering comparable data. This report summarizes the preliminary results from our fixed-wing survey there in 2005.

Study Area

The 2004 study area was identified and described, including flight lines, by Alisauskas (*2005*). Three subareas were delineated: Byron Bay (12,084 km^2), SE Victoria Island (9,113 km^2), and Kent Peninsula (5,530 km^2), for a total of 26,737 km^2 (Figure 1). The 2004 study area was used again in 2005, along with two new subareas added per recommendations of Alisauskas and Moser: Central Victoria Island (4,792 km^2) and East Victoria Island (11,692 km^2) (Figure 1). The total area surveyed in 2005 was 43,211 km^2 (Table1).

Design

The survey design developed by Alisauskas (*2005*) for the 2004 study area was repeated in 2005, including use of the same transect lines. The transects were spaced systematically across the study area, 10 km apart and oriented in a north-south direction (Figure 1, Table 1). Approximately 4% of the study area was sampled. For the two new subareas, transects were placed by extending the existing 2004 transects from their northern ends to facilitate the logistics of flying the survey. Additional transects in the East Victoria Island subarea were also placed eastward of the extended transects using the same sampling intensity (Figure 1).

Methods

The 2005 survey was initiated on June 20 and completed on June 27. The standard protocol for continental waterfowl surveys was followed (*USFWS and CWS 1987*). The fixed-wing aircraft used was a specially-modified, one-of-a-kind, turbine-powered de Havilland beaver that has been used for waterfowl surveys in Alaska since 1977 (*Conant and Groves 2005*). The aircraft was flown at a speed of 155 km/hr and an altitude of 50 m., using a Global Positioning System (GPS) in the aircraft panel to navigate along transects to preprogrammed endpoint coordinates. Observations were entered directly into panel-mounted computers with GPS coordinates automatically attached to each observation via a custom-designed computer program (*Conant and Groves 2005*). The computer program also aided the pilot in orientation and navigation by providing a detailed, seamless, moving, zoomable 1:1,000,000 scale map. Both pilot and front-right-seat observer recorded observations by species (or group) out to their respective standard 200 m distance from the flight path (*USFWS and CWS 1987*). All geese, ducks, swans, cranes, loons, ptarmigan, raptors, musk ox and caribou within the transect strip were recorded.

Population estimates were derived using the standard protocol for breeding waterfowl surveys (*USFWS and CWS 1987*). Single observations of geese and ducks were doubled to account for incubating mates. Visibility correction factors (VCF's) from tundra habitats in Alaska (*Conant and Groves 2005*) were also applied to northern pintails and long-tailed ducks to account for birds present within the transect strip but not seen. VCF's have not traditionally been applied in Alaska to the other species recorded during this survey, and none were applied here. Finally, the observations were expanded by the ratio of total area to sampled area to arrive at the population estimates.

Our variance estimates were calculated in accordance with the method used by Alisauskas in 2004 (*Alisauskas 2005*) for comparability. That is, our transects were fragmented into 2 km segments, and each segment was treated as a sample unit.

Results

Population estimates are presented by species for each of the five subareas in Table 2. A comparison of results from the 2004 helicopter and 2005 fixed-wing surveys within the area sampled both years is presented in Table 3.

The observers in 2005 differentiated among two different sizes of Canada geese and recorded their observations appropriately. Population estimates are presented for each size separately and combined (Table 2). The combination of the two sizes provided the best comparison with the results of the 2004 helicopter survey (Table 3).

Discussion

The results obtained this year with a fixed-wing aircraft as the survey platform are encouraging. The terrain we encountered on the survey was manageable using the turbine-powered, fixed-wing aircraft. The population estimates derived from our survey were quite comparable to the 2004 estimates for many species. Population estimates did differ substantially for a few species, especially for king eiders, long-tailed ducks, and northern pintails. Survey timing could possibly have been a significant factor, especially for eiders, and it should be kept in mind that our survey was conducted one year later and a little later in June. The large difference between the numbers of long-tailed ducks is puzzling. Additional helicopter/fixed-wing comparison surveys in the future would help determine whether this discrepancy among the survey platforms is consistent over time.

Our variance estimates were computed using 2-km segments as the sample units. Contiguous sample units such as these have the potential of being correlated if the transects were parallel to the density grain of the observed birds rather than perpendicular to it. This would lead to an underestimate of variance. Also, the sample variance reported does not include components for seasonal timing, weather conditions, observer differences or phenology of habitat. For these reasons we urge the reader to view the confidence limits as representing only sampling error. These confidence limits could miss the true population by a large margin.

Recommendations

We recommend that more fixed-wing aerial waterfowl surveys be conducted in this part of the waterfowl breeding grounds in North America. Concurrent fixed-wing/helicopter surveys are recommended to better understand the relationship to each other as a tool for gathering wildlife population information. Because of fuel availability and safety considerations, we recommend that the fixed-wing aircraft be turbine powered.

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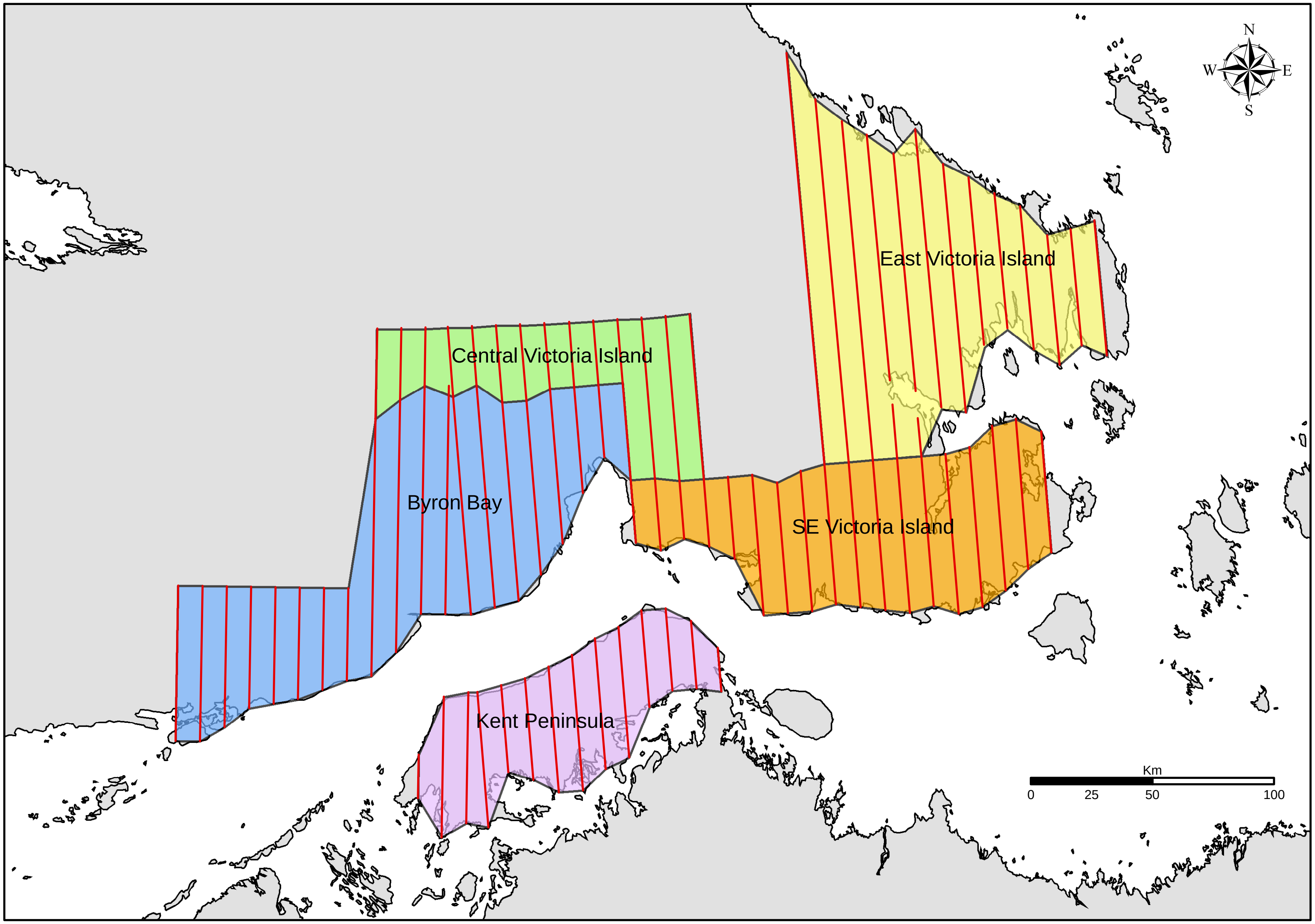

Figure 1. Transect lines within five subareas surveyed for wildlife by fixed-wing aircraft on southern and eastern Victoria Island and Kent Peninsula, Nunavut, Canada, 20-27 June 2005. Transects within the three southernmost subareas were also flown by helicopter in June 2004 (Alisauskas 2005). The Central and East Victoria Island subareas were added in 2005.

Table 1. Survey design used for fixed-wing aerial surveys on Victoria Island and Kent Peninsula, Nunavut, Canada in June 2005.

	Byron Bay	Southeast Victoria Island	Kent Peninsula	Subtotal	Central Victoria Island	East Victoria Island	All Areas
Study Area (km^2)	12,084	9,113	5,530	26,727	4,792	11,692	43,211
No. Transects	20	18	14	52	14	15	81
No. Segments	661	465	300	1,426	258	630	2,314
Total Transect Length (km)	1,322.0	930.0	600.0	2,852.0	513.0	1,256.3	4,621.3
Transect Coverage (km^2)	528.8	372.0	240.0	1,140.8	205.2	502.5	1,848.5
% Coverage of Study Area	4.4	4.1	4.3	4.3	4.3	4.3	4.3

Table 2. Population estimates by species and subarea from the fixed-wing survey in Nunavut, Canada in June 2005. Single birds were doubled for geese and ducks when calculating estimates.

Species	Byron Bay	Kent Peninsula	Southeast Victoria Island	Subtotal	Central Victoria Island	East Victoria Island	Subtotal	Total
Geese:								
Small Canada Goose	983	783	1,445	3,211	348	1,925	2,273	5,484
Medium Canada Goose	18,007	8,203	21,239	47,449	6,222	35,378	41,600	89,049
Total Canada Goose	18,990	8,986	22,685	50,661	6,570	37,303	43,873	94,534
White-fronted Goose	4,525	7,696	6,565	18,786	1,997	7,006	9,003	27,789
Brant	137	0	98	235	511	371	882	1,117
Snow/Ross' Goose	411	277	27,094	27,782	395	10,950	11,345	39,127
Ducks:								
Common Eider	1,303	553	637	2,493	186	1,647	1,833	4,326
King Eider	6,787	783	8,623	16,193	4,434	8,978	13,412	29,605
Long-tailed Duck*	11,837	6,808	17,316	35,961	7,381	14,099	21,480	57,441
Northern Pintail*	7,039	5,905	6,277	19,221	3,895	2,901	6,796	26,017
Other:								
Tundra Swan	3,108	2,995	3,748	9,851	1,718	1,972	3,690	13,541
Swan Nest	434	277	416	1,127	163	302	465	1,592
Sandhill Crane	663	806	49	1,518	116	70	186	1,704
Pacific Loon	1,348	668	2,229	4,245	859	2,088	2,947	7,192
Red-throated Loon	251	323	318	892	139	650	789	1,681
Yellow-billed Loon	503	207	416	1,126	395	510	905	2,031
Ptarmigan	1,348	346	1,102	2,796	557	2,645	3,202	5,998
Rough-legged Hawk	274	69	73	416	116	0	116	532
Short-eared Owl	69	23	24	116	46	0	46	162
Snowy Owl	457	115	98	670	116	116	232	902
Musk Ox	6,536	1,175	2,597	10,308	4,551	3,039	7,590	17,898
Caribou	3,793	253	171	4,217	859	812	1,671	5,888

* Visibility ratio: 1.87 for long-tailed duck and 3.05 for northern pintail.

Table 3. Comparison of population estimates and 95% confidence limits from the 2005 fixed-wing and 2004 helicopter surveys for the combined areas of Byron Bay, Kent Peninsula and SE Victoria Island, Nunavut, Canada.

Species	Fixed Wing[a] June 20-27, 2005			Helicopter[b] June 12-18, 2004		
Geese:						
Canada Goose	50,661	±	4,177	61,479	±	7,454[c]
White-fronted Goose	18,786	±	3,537	21,085	±	5,351[c]
Brant	235	±	206	1,766	±	2,433
Snow/Ross' Goose	27,782	±	12,759	19,995	±	2,514
Ducks:						
Common Eider	2,493	±	784	779	±	59
King Eider	16,193	±	2,394	35,267	±	5,349
Long-tailed Duck	35,961	±	5,814	8,310	±	2,266
Northern Pintail	19,221	±	4,770	297	±	304
Other:						
Tundra Swan	9,851	±	1,784	9,647	±	2,344
Sandhill Crane	1,518	±	439	3,272	±	925
Pacific Loon	4,245	±	807	4,893	±	1,403
Red-throated Loon	892	±	366	220	±	199
Yellow-billed Loon	1,126	±	388	155	±	179
Ptarmigan	2,796	±	553	4,421	±	1,254
Rough-legged Hawk	416	±	191	603	±	258
Short-eared Owl	116	±	102	182	±	142
Snowy Owl	670	±	265	805	±	336
Musk Ox	10,308	±	3,167	29,348	±	4,998

[a] Standard visibility correction factors for tundra habitat in Alaska (*Conant and Groves 2005*) applied to long-tailed duck (1.87) and northern pintail (3.05). Singles doubled for geese and ducks.

[b] Detection probability determined by a double sampling method (front-to-rear-seat positions) in the helicopter (*Alisauskas 2005*).

[c] As revised by Alisauskas and presented by Moser at the Central Flyway meeting in New Mexico in early December 2005.