DISTRIBUTION AND ABUNDANCE OF BIRDS ON WESTERN VICTORIA ISLAND, 2005

Progress Report
January 2006

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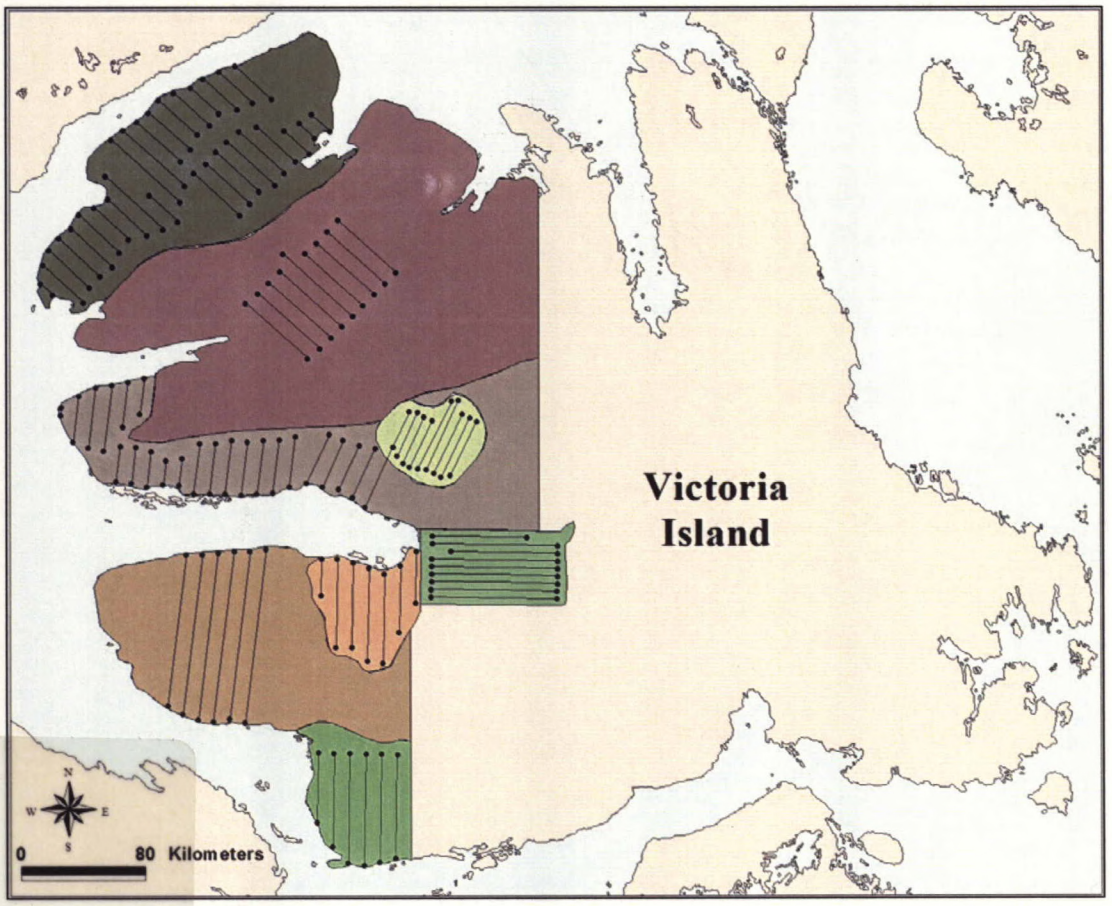

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INTRODUCTION

Current North American Waterfowl Breeding Population Surveys do not adequately cover breeding grounds for King Eiders (*Somateria spectabilis*), small Canada Geese (*Branta hutchinsii*, also known as Cackling Goose), and Long-tailed Ducks (*Clangula hyemalis*) within Canada. Additionally, information on the abundance and distribution of birds in general has been very limited on western Victoria Island. Several studies provided bird species accounts in certain areas of western Victoria Island but no quantitative data for the region (Porsild 1951, Barry 1960, Smith 1973).

The settlement of the Inuvialuit land claim in the Canadian western Arctic brought the need to improve our understanding of harvested bird species within the Inuvialuit Settlement Region. Specified in the Inuvialuit Final Agreement were the preferential hunting rights of the Inuvialuit within their settlement region. Waterfowl surveys were required in order to set harvest limits that would ensure populations remained stable. In recognition of the lack of bird knowledge for western Victoria Island and in the interest of getting data needed to better manage harvested species, the Canadian Wildlife Service, in cooperation with the Inuvialuit, conducted breeding waterfowl surveys from 1992 to 1994 (Cornish and Dickson 1996). Primary objectives were to determine the abundance and distribution of King Eiders, and to establish a baseline for monitoring breeding population trends in future years. Western Victoria Island was selected for monitoring based on reconnaissance surveys by Barry (1960) that indicated it was a core breeding area for King Eiders in western arctic Canada.

The western Victoria Island aerial surveys were repeated in 2004 and 2005 to allow comparisons among years and provide population trends for King Eiders, Canada Geese, Long-tailed Ducks, and other bird species nesting on western Victoria Island. This report summarizes the historical survey data as well as the more recently collected data with emphasis on 2005 data.

METHODS

The aerial surveys in 2005 were designed and conducted in the same way as the surveys in 1992-1994 and 2004 to allow direct comparison of the results (Cornish and Dickson 1996, Dickson et al. 1997, Raven and Dickson 2005). As in the previous surveys, the western half of Victoria Island (a total area of approximately 105 000 km^2) was divided into 8 different strata (Table 1; Fig. 1) based on physiographic and habitat similarities. Landsat Thematic Mapper satellite imagery was used to determine the boundaries of strata based on vegetation cover and moisture (Cornish and Dickson, 1996). Plots were surveyed within each stratum to represent each of the dominant habitat types.

Due to the immense size of several strata, plots were used to sample areas within each stratum. Straight line transects were flown within plots for each of the strata at a spacing of 10 km (4% plot coverage), except in the Kagloryuak River valley (stratum 2) and near Tahiryuak Lake (stratum 3) where the spacing was 5 km (8% plot coverage). Transect spacing near Tassijuak Lake at the extreme southwest of Victoria Island (stratum 8) was 5 km in 1993 and 10

km in 2004 and 2005. Transect length varied between 6 and 116 km while between 6 and 29 transects were flown per stratum (Fig. 2).

The surveys were conducted from a Bell 206B helicopter flown at a height of 30 m above ground and at a speed of 145 kph. In addition to the pilot there were two observers, one in the left front seat and one in the rear right seat. Each observer recorded all birds within 200 m of their side of the helicopter. Species, number, and when possible, sex of birds were recorded as well as the time of the observation. By recording observations on a cassette tape recorder observers never had to look away from transects. FUGAWI GIS mapping software (Northport Systems Inc., Toronto, Ontario, Canada) logged all aircraft movements and provided real time locations at 2 second intervals, which could later be merged with observations. At the beginning of each day and at intervals throughout the day survey conditions (snow cover, percentage of open water) and weather (temperature, wind speed and direction, cloud cover, precipitation) were recorded. Dates of surveys in 2005 were 18 to 26 June.

Population indices for King Eider, Long-tailed Duck and Canada Geese were based on total indicated birds, whereas all other population indices were based on the observed number of birds. The standard operating procedure for waterfowl breeding population surveys, developed by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service (Anonymous 1987), was used to calculate the indicated breeding population of King Eiders and Canada Geese. King Eider observations were divided into the following categories: lone males, flocks of two to four males, pairs, and groups of five or more birds. Observations of one hen and two drakes were treated as a pair and a lone drake. Likewise, a hen and three drakes were treated as a pair and two drakes. The number of indicated breeding pairs was calculated by adding together the number of lone males, males in flocks of two to four, and pairs. Total indicated birds was calculated by multiplying the number of indicated breeding pairs by two and adding the number of grouped birds. Observations of one to four females were not included in the calculations. Due to the inability to reliably differentiate between male and female Long-tailed Ducks we used the same technique used for Canada Geese for calculating the Indicated Breeding Population. To calculate Long-tailed Duck and Canada Goose Indicated Breeding Population, observations of single birds or pairs were multiplied by two, whereas groups of more than two birds were multiplied by one. Tundra Swans were highly visible and not likely missed during surveys. Consequently, the breeding population estimate was calculated using the number of swans actually observed during the surveys.

For all species, the population index, density, and standard error for each stratum were calculated using the ratio method (Jolly 1969:48; Cochran 1977:155):

$$\hat{R} = \sum y_i / \sum x_i$$

where:

$\hat{R}$ = population density (number of birds/km^2);

x_i = area of transect i; and

y_i = total indicated birds on transect i

and

$$s^2 = 1 - n/N\left[\sum_{i=1}^{n}(y_i - \hat{R}x_i)^2\right]/(n-1)n\bar{x}^2$$

where:

s^2 = variance of $\hat{R}$;
n = number of transects in stratum that were sampled;

N = number of possible transects; and

$1 - n/N$ = finite population correction factor.

Where only a portion of a stratum was surveyed, we assumed that the density and variance within the survey plot was representative of the entire stratum. The total population of a species within a stratum was calculated by multiplying the density by the stratum area. The population variance was calculated by multiplying the density variance by the square of the area (Beyer 1968:15). The total population for numerous strata was calculated by taking the sum of the population estimates for each stratum. Likewise, the variance for more than one stratum was calculated by summing the variances of each included stratum (Caughley 1977:614), and the standard error was calculated by taking the square root of the sum of the variances.

Density and distribution of certain species observed during surveys were mapped using ArcView 3.1 (Environmental Systems Research Institute, Inc., Redlands, California, U.S.A.). Observed numbers (indicated numbers for King Eiders, Long-tailed Ducks and Canada Geese), at specific locations, were divided by the proportion of the plot that was surveyed to represent assumed observations given entire survey coverage. For example, survey values were divided by 0.04 for plots where transects were flown every 10 km and values were divided by 0.08 for plots where transects were flown every 5 km (strata 2 and 3).

Density was calculated and mapped using the location values and a 10 km search radius. Strata were defined for each mapped species according to density of birds within the search radius.

RESULTS

King Eider

Western Victoria Island density indices for King Eider in 2005 were lower in nearly all strata than were observed in 1992 – 1994, but comparable to 2004 results (Table 2). Population indices for both northwestern and southwestern portions of the island were approximately half of those indicated in the earlier surveys (Table 3). Highest densities in 2005 occurred in the Kagloryuak River valley (stratum 2), southwest of Quunnguq Lake (stratum 1), and in northeastern portions of Prince Albert Peninsula (stratum 6: Fig. 3).

Canada Goose

Density (Table 2) and population indices (Table 3) for Canada Geese in 2005 were higher than those observed in previous surveys. Highest densities (1.2-3.6/km^2) were found near Tassijuak Lake (stratum 8) in southwestern Victoria Island. The southern portion of Wollaston Peninsula (stratum 7) and the majority of the Kagloryuak River valley (stratum 2) also had densities > 1.2/km^2. Pockets of high densities were also observed in western portions of Diamond Jenness Peninsula (stratum 4), near Quunnguq Lake (stratum 1), and on Prince Albert Peninsula (stratum 6: Fig. 4).

Long-tailed Duck

Densities of Long-tailed Ducks in 2005 were similar to previous surveys in most strata (Table 2). Population indices for 2005 were slightly above those observed in 2004 but very similar to historical estimates (Table 3). Distribution of Long-tailed Ducks in 2005 was widespread with pockets of higher densities (0.3-0.8/km^2) scattered throughout the study area (Fig. 5).

Tundra Swan

Tundra Swan densities in 2005 were similar to those observed in 1992 – 1994 but higher than those observed in 2004 (Table 2). Densities in one stratum (stratum 7) were actually above those observed during the 1993 surveys. Population indices in 2005 were approximately twice those observed during 2004 surveys in both northwestern and southwestern Victoria Island (Table 3). Tundra swans were widely distributed at moderate densities over the southern half of Victoria Island but less common in the northern half (Fig. 6). Highest densities in 2005 (> 0.8/km^2) were found west of Tassijuak Lake (stratum 8) (Fig. 6).

Sandhill Crane

2005 Sandhill Crane population indices for northwestern Victoria Island were similar to those observed in 1993 and 1994 but higher than those observed in 2004 (Table 3). Indices for southwestern Victoria Island in 2005 were above those observed in both 1993 and 2004.

Common Eider

Common Eiders were seldom observed inland, where our surveys took place. Rare observations were made near the coast in half of the strata (Table 2).

Other Geese

Black Brant were observed only in one locationin 2005: a pair on an inland lake in north central Victoria Island (Table 2). Though rare, Brant were more plentiful during the early surveys (Table 2; Table 3).

Greater White-fronted Geese were found primarily in the southernmost stratum though a few were also observed in the Kagloryuak River valley and on Wollaston Peninsula (Table 2). Numbers were comparable to past surveys (Table 3; Fig. 7).

Snow Geese occurred in low densities throughout the southern half of Victoria Island in numbers similar to those observed in the previous surveys (Table 2; Table 3). An incidental

observation of an apparent nesting pair was observed on a coastal cliff near the north end of Prince Albert Peninsula.

Ptarmigan

Rock and Willow Ptarmigan could not reliably be distinguished from the aircraft so the two species were combined. They were observed throughout western Victoria Island but in low densities (Table 2). Highest densities were observed in the Kagloryuak River valley (stratum 2) and in the southernmost stratum (stratum 8). Population indices were very similar to those observed in previous surveys (Table 3).

Loons

Three species of loons were observed on western Victoria Island in 2005. Yellow-billed Loons were slightly more numerous than Pacific Loons on northwestern Victoria Island in 2005, but more Pacific Loons were observed in southwestern Victoria Island (Table 3). Fewer Red-throated Loons were observed than the other two species. Population indices for loons as a group were slightly below those observed in previous surveys for northwestern Victoria Island but slightly above for southwestern Victoria Island (Table 3). Highest densities of loons in general were found around Tassijuak Lake in stratum 8 (0.3-0.8/km^2) but moderate densities were found throughout western Victoria Island (Table 2; Fig. 8).

Jaegers

Three species of jaegers were observed on western Victoria Island in 2005. Population indices were above those observed in 2004 but similar to those observed in the earlier surveys (Table 2; Table 3). In general, jaegers were distributed throughout the study area with highest densities (0.8-1.2/km^2) observed in the Kagloryuak River Valley (stratum 2; Fig 9).

Gulls

Population indices for Glaucous Gulls in 2005 were well above estimates from 2004 but similar to those observed during the earlier surveys (Table 2; Table 3). Highest densities (0.3 – 0.9/km^2) of Glaucous Gulls were observed primarily on Diamond Jenness Peninsula (stratum 4) and the southwest portion of Prince Albert Peninsula (stratum 6; Fig 10). Thayer's Gull observations were rare and limited to the Kagloryuak River valley (stratum 2) and near Quunnguq Lake (stratum 1; Table 2) in 2005. Sabine's Gull population indices for 2005 were similar to those observed in 2004 and remain 50 – 70% lower than in earlier surveys (Table 3).

Arctic Tern

2005 population indices for Arctic Tern were above those observed in 2004 but still considerably lower than those observed in the earlier surveys (Table 2; Table 3).

Raptors

Snowy Owl observations in 2005 were greater than 2004 but population indices remain below those observed in the earlier surveys. Two short-eared owls were observed in 2005, one in the Kagloryuak River valley (stratum 2) and the other one south of Tassijuak Lake (stratum 8; Table 2). Rough-legged Hawks were observed scattered throughout western Victoria Island in

2005 but more frequently in the south than in previous surveys (Table 2; Table 3). Single observations of Peregrine Falcons were recorded northeast of Minto Inlet (stratum 5) and south of Tassijuak Lake (stratum 8; Table 2) in 2005.

DISCUSSION

Preliminary results from the 2005 aerial surveys on western Victoria Island show some species may have rebounded from the low numbers observed in 2004 while others remain well below numbers observed when the surveys were last performed in 1992, 1993, and 1994. King Eider population indices were similar to those observed in 2004 and remain at approximately half that observed during the 90's. In contrast Tundra Swan population indices rebounded and were similar to those observed during the surveys in the 90's. Canada Goose population indices for 2005 surpassed those observed in all previous surveys and their distribution appears to be expanding northward. It was a more typical spring on western Victoria Island in 2005, in contrast to the late spring of 2004. This may have affected the results observed for earlier nesting species like Tundra Swans and Canada Geese, who may have been unable to nest due to late snow cover in 2004.

ACKNOWLEDGEMENTS

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Table 1. Extent of aerial surveys for breeding populations of birds on western Victoria Island, 1992 – 1994, 2004 and 2005.

Stratum			Transects surveyed									
			1992		1993		1994		2004		2005	
No.	Location	Area (km^2)	No.	Length (km)	No.	Length (km)	No.	Length (km)	No.	Length (km)	No.	Length (km)
1	Quunnguq Lake	3971	7	172	7	324	7	324	7	324	7	324
2	Kagloryuak River Valley	4573	8	608	9	688	9	688	9	688	9	688
3	Tahiryuak Lake	2298	8	282	9	322	9	322	9	322	9	322
4	Diamond Jenness Peninsula	15866	26	817	18	527	23	709	18	527	23	709
5	Minto Inlet to Wynniatt Bay	39676	16	690	6	338	9	476	9	476	9	476
6	Prince Albert Peninsula	16365	29	964	26	914	29	983	29	983	29	983
7*	Wollaston Peninsula	16596	-	-	6	662	-	-	6	662	6	662
8*	Tassijuak Lake	5508	-	-	12	799	-	-	6	392	6	392

* surveyed only in 1993, 2004 and 2005

Table 2. Density (number per 100 sq km) of birds observed in each stratum during aerial surveys on Victoria Island, 1992 – 1994, 2004, and 2005. Numbers in brackets represent standard errors.

		Stratum							
SPECIES	Year	1	2	3	4	5	6	7	8
Pacific Loon	1992	2.9 (1.7)	9.0 (2.7)	8.0 (4.5)	1.8 (1.0)	1.2 (1.6)	5.9 (4.7)	ns -	ns -
	1993	11.6 (3.3)	9.8 (2.1)	8.5 (5.1)	5.2 (1.5)	3.0 (2.8)	6.9 (6.1)	4.5 (1.7)	8.4 (1.9)
	1994	2.3 (1.5)	17.4 (2.3)	10.9 (5.1)	12.3 (3.0)	3.2 (1.6)	5.8 (2.5)	ns -	ns -
	2004	3.1 (2.0)	3.3 (1.4)	3.9 (2.1)	1.4 (1.0)	0.5 (0.5)	2.5 (1.0)	0.0 (0.0)	1.9 (1.4)
	2005	4.6 (1.9)	2.9 (1.1)	1.6 (1.5)	1.4 (0.8)	0.0 (0.0)	0.5 (0.3)	3.8 (0.4)	4.5 (1.9)
Red-throated Loon	1992	0.0 (0.0)	3.3 (1.9)	1.8 (1.2)	0.9 (0.5)	0.0 (0.0)	0.9 (1.3)	ns -	ns -
	1993	0.0 (0.0)	0.7 (0.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.9 (1.0)	0.0 (0.0)	0.9 (0.6)
	1994	1.5 (1.5)	2.5 (1.6)	0.0 (0.0)	1.4 (1.4)	0.0 (0.0)	1.1 (1.2)	ns -	ns -
	2004	3.1 (2.1)	4.4 (1.9)	0.8 (0.7)	0.0 (0.0)	0.5 (0.5)	2.0 (0.9)	0.8 (0.5)	0.0 (0.0)
	2005	0.8 (0.7)	1.8 (1.0)	3.1 (1.6)	0.0 (0.0)	0.0 (0.0)	1.0 (0.7)	0.0 (0.0)	0.0 (0.0)
Yellow-billed Loon	1992	0.0 (0.0)	0.0 (0.0)	0.9 (0.9)	0.6 (0.6)	0.8 (1.6)	3.1 (2.7)	ns -	ns -
	1993	0.0 (0.0)	2.2 (1.7)	0.8 (0.8)	1.4 (0.7)	0.7 (0.7)	3.7 (1.6)	0.8 (0.5)	1.3 (0.7)
	1994	1.5 (0.9)	0.4 (0.3)	0.0 (0.0)	0.7 (0.7)	0.5 (0.5)	1.6 (1.7)	ns -	ns -
	2004	8.5 (2.0)	0.4 (0.3)	3.1 (3.0)	0.9 (0.6)	2.1 (1.1)	2.3 (1.1)	1.1 (0.8)	1.3 (1.2)
	2005	3.1 (1.8)	1.8 (1.4)	0.0 (0.0)	2.1 (1.2)	0.5 (0.5)	0.8 (0.4)	0.4 (0.4)	0.6 (0.6)
All Loons[a]	1992	2.9 (1.7)	16.9 (3.0)	13.3 (5.1)	4.0 (1.2)	2.5 (2.8)	10.5 (6.6)	ns -	ns -
	1993	13.1 (4.2)	14.2 (2.1)	9.3 (5.3)	8.5 (1.6)	5.2 (3.1)	15.2 (6.5)	5.3 (1.5)	11.9 (2.0)
	1994	8.5 (3.3)	24.3 (4.6)	11.6 (5.2)	17.3 (3.5)	6.3 (2.3)	11.8 (2.4)	ns -	ns -
	2004	17.0 (4.3)	9.8 (2.6)	8.5 (3.1)	2.8 (1.1)	3.7 (1.3)	7.4 (1.6)	6.4 (1.8)	3.2 (1.6)
	2005	13.1 (3.1)	8.4 (2.7)	8.5 (2.9)	6.7 (1.4)	0.5 (0.5)	4.8 (1.3)	7.9 (1.6)	9.6 (4.3)
Tundra Swan	1992	5.8 (5.7)	34.5 (6.5)	5.3 (4.3)	5.5 (1.2)	1.1 (1.8)	2.0 (1.9)	ns -	ns -
	1993	10.8 (6.1)	28.3 (3.1)	7.0 (1.7)	6.6 (2.4)	0.0 (0.0)	1.3 (1.2)	13.2 (4.1)	37.5 (5.7)
	1994	13.9 (3.0)	41.4 (4.2)	4.7 (2.5)	5.3 (2.0)	1.1 (1.0)	0.2 (0.4)	ns -	ns -
	2004	8.5 (1.1)	16.0 (5.4)	3.1 (1.8)	1.4 (1.0)	0.0 (0.0)	0.5 (0.3)	9.4 (3.7)	8.3 (3.8)
	2005	8.5 (3.5)	30.9 (4.3)	3.9 (1.5)	3.2 (1.0)	0.5 (0.5)	1.8 (0.8)	20.0 (5.6)	31.3 (6.5)

Table 2. (continued)

SPECIES	Year	Stratum 1	2	3	4	5	6	7	8
Canada Goose[b]	1992	23.3 (9.8)	153.4 (24.6)	38.1 (11.6)	58.1 (7.7)	10.9 (7.9)	10.9 (5.1)	ns -	ns -
	1993	94.9 (18.1)	151.2 (28.6)	29.5 (5.6)	19.4 (6.3)	1.5 (1.5)	6.5 (3.4)	65.7 (3.9)	148.3 (14.0)
	1994	66.4 (6.2)	187.1 (12.9)	48.1 (8.8)	45.5 (8.8)	7.4 (3.1)	16.0 (6.4)	ns -	ns -
	2004	55.6 (11.2)	86.8 (14.5)	29.5 (7.7)	36.5 (7.0)	4.2 (1.7)	24.9 (3.9)	74.4 (7.3)	121.2 (24.4)
	2005	84.9 (12.5)	160.6 (23.5)	45.0 (7.8)	55.7 (13.0)	5.3 (2.3)	50.1 (7.3)	105.0 (19.1)	242.3 (30.4)
Brant	1992	0.0 (0.0)	4.5 (4.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	6.1 (7.1)	ns -	ns -
	1993	0.0 (0.0)	1.5 (0.9)	0.0 (0.0)	1.9 (1.9)	0.0 (0.0)	3.3 (3.1)	1.1 (1.1)	0.3 (0.3)
	1994	0.8 (0.8)	11.3 (8.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	2.6 (5.0)	ns -	ns -
	2004	0.0 (0.0)	1.1 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	2005	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.1 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Greater White -fronted Goose	1992	1.5 (1.3)	0.0 (0.0)	0.0 (0.0)	1.2 (1.2)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	1993	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.9 (1.4)	12.8 (6.4)
	1994	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	0.0 (0.0)	0.0 (0.0)	1.5 (0.5)	8.3 (3.7)
	2005	0.0 (0.0)	2.5 (1.8)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.4 (0.4)	12.1 (4.6)
Lesser Snow Goose	1992	1.5 (1.3)	1.6 (0.8)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	3.4 (6.3)	ns -	ns -
	1993	3.1 (3.2)	1.1 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.8 (6.1)	0.0 (0.0)	5.0 (3.3)
	1994	9.3 (8.6)	20.0 (11.2)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.8 (6.7)	ns -	ns -
	2004	1.5 (1.5)	8.4 (4.2)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0 (1.0)	1.9 (1.2)	3.8 (4.0)
	2005	3.1 (1.7)	26.5 (16.5)	0.8 (0.7)	1.1 (0.8)	0.0 (0.0)	4.1 (1.5)	3.0 (2.9)	20.4 (8.0)
Northern Pintail	1992	0.0 (0.0)	1.6 (1.2)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	1993	0.0 (0.0)	0.7 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.5 (1.5)	1.6 (1.2)
	1994	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.1 (0.8)	12.1 (7.2)
	2005	0.0 (0.0)	0.7 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.2 (2.0)

Table 2. (continued)

SPECIES	Year	Stratum 1	2	3	4	5	6	7	8
Common Eider	1992	39.2 (26.4)	0.0 (0.0)	0.0 (0.0)	33.0 (19.5)	7.8 (14.0)	5.4 (5.9)	ns -	ns -
	1993	6.2 (6.1)	1.5 (1.4)	0.0 (0.0)	0.9 (0.6)	0.0 (0.0)	0.7 (0.8)	0.0 (0.0)	0.6 (0.4)
	1994	1.5 (1.5)	0.7 (0.7)	0.0 (0.0)	10.2 (3.7)	0.0 (0.0)	3.6 (3.9)	ns -	ns -
	2004	0.8 (0.7)	0.0 (0.0)	0.0 (0.0)	0.9 (1.0)	0.0 (0.0)	3.3 (1.2)	1.5 (1.0)	6.4 (6.6)
	2005	3.9 (2.2)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.3 (1.2)	0.8 (0.7)	1.9 (1.3)
King Eider[b]	1992	81.4 (18.2)	135.7 (19.6)	140.1 (25.7)	41.0 (6.8)	9.7 (7.1)	60.4 (11.1)	ns -	ns -
	1993	84.1 (19.4)	130.1 (12.4)	132.8 (21.1)	38.9 (9.3)	17.8 (4.9)	47.5 (18.1)	38.5 (9.8)	86.4 (10.2)
	1994	79.5 (15.4)	186.0 (23.1)	166.1 (22.6)	49.4 (10.2)	37.8 (9.2)	74.8 (20.4)	ns -	ns -
	2004	20.1 (7.3)	66.9 (11.5)	92.4 (22.6)	1.9 (1.3)	13.7 (6.9)	38.7 (7.4)	21.5 (6.3)	31.9 (9.6)
	2005	53.2 (14.1)	82.1 (14.0)	63.7 (15.1)	6.3 (2.2)	9.5 (3.4)	27.7 (6.7)	22.7 (5.7)	45.9 (6.2)
Long-tailed Duck[b]	1992	11.6 (3.6)	18.1 (4.6)	61.2 (22.8)	14.4 (3.8)	10.1 (6.7)	4.0 (2.4)	ns -	ns -
	1993	7.7 (3.6)	25.1 (3.7)	6.2 (2.5)	13.3 (4.1)	14.8 (7.7)	7.3 (7.8)	11.3 (1.4)	11.3 (3.0)
	1994	6.9 (5.1)	11.6 (3.9)	12.4 (4.0)	16.2 (4.4)	1.6 (1.5)	4.3 (2.3)	ns -	ns -
	2004	7.7 (2.8)	14.9 (2.8)	14.0 (5.9)	4.7 (2.0)	4.2 (2.7)	8.1 (2.0)	5.3 (1.3)	17.9 (6.7)
	2005	9.3 (2.2)	21.1 (6.7)	20.2 (6.0)	9.9 (2.6)	7.4 (4.0)	5.8 (1.9)	4.5 (2.8)	23.6 (10.4)
Peregrine Falcon	1992	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.1 (0.3)	0.2 (0.4)	ns -	ns -
	1993	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.9 (0.6)	0.0 (0.0)	0.0 (0.0)	0.4 (0.4)	0.3 (0.3)
	1994	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.4 (0.4)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.4 (0.4)	0.0 (0.0)
	2005	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	0.0 (0.0)	0.0 (0.0)	0.6 (0.6)
Rough-legged Hawk	1992	1.5 (1.5)	1.2 (0.8)	0.0 (0.0)	0.9 (0.5)	3.3 (3.7)	2.4 (1.3)	ns -	ns -
	1993	0.8 (0.8)	0.4 (0.4)	0.8 (0.8)	2.4 (1.2)	0.0 (0.0)	2.2 (1.2)	0.4 (0.4)	0.6 (0.4)
	1994	1.5 (1.0)	0.4 (0.4)	1.6 (1.0)	0.0 (0.0)	1.1 (0.7)	3.2 (1.2)	ns -	ns -
	2004	2.3 (1.2)	1.1 (0.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.2)	0.8 (0.5)	1.3 (1.2)
	2005	0.8 (0.7)	1.8 (0.8)	0.0 (0.0)	1.4 (0.6)	0.0 (0.0)	0.8 (0.4)	1.9 (0.4)	2.6 (2.5)

Table 2. (continued)

SPECIES	Year	Stratum 1	2	3	4	5	6	7	8
Ptarmigan	1992	0.0 (0.0)	2.5 (1.0)	4.4 (1.8)	0.3 (0.3)	1.3 (0.6)	2.7 (2.1)	ns -	ns -
	1993	0.0 (0.0)	4.0 (1.3)	0.8 (0.7)	0.5 (0.4)	0.0 (0.0)	2.1 (1.8)	1.1 (0.8)	4.7 (1.2)
	1994	0.8 (0.8)	2.5 (0.8)	3.1 (1.9)	0.7 (0.5)	1.6 (1.1)	5.7 (2.5)	ns -	ns -
	2004	0.8 (0.8)	2.9 (0.6)	1.6 (1.6)	0.5 (0.5)	0.5 (0.5)	0.8 (0.4)	0.4 (0.4)	0.0 (0.0)
	2005	1.5 (1.0)	4.7 (1.6)	3.1 (2.2)	0.4 (0.8)	1.6 (1.1)	2.0 (0.6)	0.8 (0.5)	3.8 (2.5)
Sandhill Crane	1992	0.0 (0.0)	4.9 (1.4)	0.0 (0.0)	0.6 (0.4)	4.8 (2.6)	2.2 (1.8)	ns -	ns -
	1993	0.0 (0.0)	1.8 (1.0)	0.8 (0.8)	0.5 (0.5)	0.7 (0.7)	2.0 (1.7)	0.0 (0.0)	5.6 (1.4)
	1994	3.9 (3.6)	1.5 (0.9)	1.6 (1.4)	3.2 (1.1)	0.0 (0.0)	2.3 (1.8)	ns -	ns -
	2004	0.0 (0.0)	0.4 (0.3)	0.0 (0.0)	1.9 (1.2)	0.0 (0.0)	1.0 (0.4)	1.1 (1.1)	1.9 (1.3)
	2005	1.5 (1.5)	2.2 (0.8)	0.0 (0.0)	1.4 (1.1)	0.0 (0.0)	3.3 (1.0)	1.1 (0.8)	8.9 (1.1)
Shorebird	1992	61.0 (10.4)	90.9 (16.7)	88.7 (14.0)	25.4 (4.1)	22.0 (6.1)	74.4 (17.8)	ns -	ns -
	1993	10.8 (2.3)	28.7 (3.6)	33.4 (6.6)	7.6 (2.5)	12.6 (3.4)	22.4 (9.2)	10.6 (2.9)	41.9 (5.4)
	1994	17.7 (5.2)	32.3 (7.4)	40.4 (10.4)	14.5 (3.6)	7.4 (2.2)	18.8 (6.6)	ns -	ns -
	2004	30.9 (6.5)	74.1 (13.4)	51.2 (8.2)	5.2 (2.0)	2.1 (1.1)	16.5 (3.1)	32.5 (3.7)	44.6 (5.8)
	2005	20.1 (7.3)	30.2 (7.1)	19.4 (6.3)	2.5 (1.8)	1.6 (0.8)	10.9 (2.5)	12.8 (4.6)	14.7 (1.3)
Pomarine	1992	4.4 (3.0)	16.9 (1.2)	10.6 (3.9)	2.1 (1.1)	1.0 (1.8)	11.8 (3.5)	ns -	ns -
Jaeger	1993	3.9 (2.1)	14.5 (2.7)	42.7 (6.3)	1.4 (0.8)	5.2 (2.5)	19.9 (9.1)	5.7 (1.5)	4.1 (0.6)
	1994	0.0 (0.0)	4.0 (1.5)	4.7 (2.4)	1.8 (1.1)	0.0 (0.0)	4.1 (1.5)	ns -	ns -
	2004	0.8 (0.7)	1.5 (0.8)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.3 (0.8)	1.1 (0.7)	2.6 (1.2)
	2005	5.4 (1.5)	12.7 (1.8)	3.1 (2.0)	0.7 (0.5)	0.0 (0.0)	4.3 (0.9)	1.5 (0.7)	1.3 (0.8)
Parasitic	1992	7.3 (3.8)	25.1 (3.6)	3.5 (1.5)	4.6 (1.7)	1.1 (1.5)	11.9 (4.1)	ns -	ns -
Jaeger	1993	2.3 (1.3)	5.8 (1.2)	3.9 (1.9)	1.4 (0.7)	2.2 (1.5)	8.5 (2.9)	3.4 (1.2)	1.6 (0.7)
	1994	1.5 (1.6)	2.2 (1.2)	2.3 (1.2)	0.0 (0.0)	0.0 (0.0)	3.7 (2.4)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	1.1 (0.7)	1.3 (0.6)	0.0 (0.0)	0.0 (0.0)
	2005	2.3 (1.1)	8.4 (1.7)	0.8 (0.8)	0.4 (0.8)	0.0 (0.0)	1.3 (0.5)	0.4 (0.4)	1.9 (0.8)

Table 2. (continued)

SPECIES	Year	Stratum 1	2	3	4	5	6	7	8
Long-tailed	1992	2.9 (2.9)	6.2 (1.2)	0.9 (0.9)	0.9 (0.5)	2.5 (2.1)	6.4 (2.3)	ns -	ns -
Jaeger	1993	1.5 (1.0)	2.2 (0.9)	2.3 (2.2)	0.9 (0.6)	0.0 (0.0)	3.5 (1.4)	1.1 (0.5)	1.6 (0.5)
	1994	3.1 (2.4)	2.5 (0.9)	3.1 (1.6)	0.4 (0.3)	1.1 (1.0)	4.8 (2.7)	ns -	ns -
	2004	1.5 (0.9)	1.8 (0.9)	0.8 (0.8)	0.0 (0.0)	0.5 (0.5)	1.5 (0.7)	0.4 (0.4)	0.6 (0.7)
	2005	6.2 (1.7)	4.4 (0.8)	3.9 (2.9)	2.5 (0.8)	0.0 (0.0)	4.8 (1.1)	0.8 (0.5)	2.6 (1.3)
All Jaegers[c]	1992	16.0 (6.0)	53.9 (5.3)	16.8 (5.3)	8.0 (2.8)	5.2 (2.7)	34.0 (6.7)	ns -	ns -
	1993	7.7 (2.4)	23.6 (3.0)	49.7 (7.4)	3.8 (1.1)	8.9 (4.1)	19.6 (9.7)	11.3 (1.7)	9.1 (1.7)
	1994	4.6 (2.8)	9.4 (1.6)	10.1 (3.6)	2.5 (1.1)	1.1 (1.0)	14.0 (3.2)	ns -	ns -
	2004	3.1 (1.5)	6.5 (1.7)	2.3 (1.2)	1.9 (1.1)	1.6 (0.7)	8.6 (2.0)	3.4 (0.9)	5.7 (1.5)
	2005	20.1 (4.6)	55.2 (6.8)	14.8 (3.3)	6.0 (1.7)	0.0 (0.0)	20.3 (3.1)	6.4 (2.1)	11.5 (1.1)
Glaucous Gull	1992	16.0 (6.3)	4.1 (1.3)	14.2 (5.8)	18.7 (6.6)	16.2 (1.5)	6.1 (2.4)	ns -	ns -
	1993	6.9 (2.1)	10.2 (3.2)	3.9 (2.1)	11.4 (3.7)	8.1 (3.2)	10.9 (3.9)	7.2 (2.8)	17.5 (3.8)
	1994	10.0 (1.6)	14.5 (2.7)	8.5 (4.7)	12.3 (2.7)	3.7 (1.3)	6.8 (2.5)	ns -	ns -
	2004	6.9 (3.7)	5.5 (2.1)	0.8 (0.8)	5.7 (1.8)	1.6 (1.1)	3.3 (1.4)	0.8 (0.7)	1.9 (1.2)
	2005	10.8 (2.7)	10.5 (2.8)	18.6 (7.7)	14.5 (5.2)	1.6 (0.8)	10.9 (4.3)	10.6 (2.6)	14.7 (3.0)
Thayer's Gull	1992	0.0 (0.0)	0.0 (0.0)	0.9 (1.0)	7.6 (5.9)	0.0 (0.0)	0.4 (0.5)	ns -	ns -
	1993	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	5.2 (3.4)	0.0 (0.0)	0.2 (0.4)	0.0 (0.0)	0.0 (0.0)
	1994	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	5.3 (4.6)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	2004	0.0 (0.0)	1.1 (1.0)	0.0 (0.0)	0.9 (0.9)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	2005	0.8 (0.7)	2.9 (2.8)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Sabine's Gull	1992	7.3 (7.5)	12.7 (7.8)	4.4 (2.5)	0.6 (0.6)	0.6 (1.4)	1.1 (1.8)	ns -	ns -
	1993	0.0 (0.0)	17.4 (7.2)	20.2 (11.8)	0.0 (0.0)	0.0 (0.0)	0.8 (1.1)	0.8 (0.7)	0.6 (0.6)
	1994	0.0 (0.0)	18.5 (8.9)	24.1 (19.1)	0.0 (0.0)	0.0 (0.0)	1.6 (1.7)	ns -	ns -
	2004	0.8 (0.7)	10.9 (7.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.2)	0.0 (0.0)	1.3 (0.8)
	2005	0.0 (0.0)	4.4 (1.7)	9.3 (4.4)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.6 (0.6)

Table 2. (continued)

SPECIES	Year	Stratum 1	2	3	4	5	6	7	8
Arctic Tern	1992	5.8 (3.4)	6.2 (2.7)	5.3 (2.5)	4.0 (1.9)	0.2 (0.6)	6.4 (2.5)	ns -	ns -
	1993	9.3 (3.8)	7.6 (3.0)	14.8 (5.4)	0.0 (0.0)	0.7 (0.7)	6.1 (3.4)	1.5 (1.5)	13.1 (3.0)
	1994	17.0 (7.7)	8.0 (3.6)	11.6 (4.7)	1.4 (1.0)	2.6 (1.8)	7.1 (8.3)	ns -	ns -
	2004	0.8 (0.8)	2.9 (1.2)	2.3 (1.5)	0.0 (0.0)	0.0 (0.0)	1.0 (0.6)	0.0 (0.0)	3.8 (2.7)
	2005	8.5 (2.9)	7.3 (2.9)	7.8 (2.9)	0.7 (0.5)	0.0 (0.0)	2.0 (0.8)	0.4 (0.4)	7.7 (2.6)
Snowy Owl	1992	1.5 (1.4)	10.3 (2.6)	0.0 (0.0)	2.1 (0.9)	1.1 (2.0)	9.1 (2.5)	-	-
	1993	0.0 (0.0)	2.5 (0.8)	3.1 (1.3)	0.9 (0.6)	8.1 (3.8)	8.2 (3.9)	1.5 (0.8)	1.9 (1.1)
	1994	0.8 (0.8)	0.7 (0.5)	1.6 (1.1)	1.8 (0.7)	0.0 (0.0)	3.5 (2.4)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	2005	2.3 (0.9)	2.9 (1.3)	2.3 (1.2)	1.8 (0.8)	1.1 (0.7)	5.3 (1.5)	0.0 (0.0)	0.6 (0.6)
Short-eared Owl	1992	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	1993	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	1994	0.0 (0.0)	0.4 (0.3)	0.8 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.2)	0.0 (0.0)	0.0 (0.0)
	2005	0.0 (0.0)	0.4 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.6 (0.6)
Common Raven	1992	0.0 (0.0)	0.4 (0.4)	0.0 (0.0)	0.3 (0.3)	0.2 (0.6)	0.5 (0.9)	ns -	ns -
	1993	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.4 (0.4)	0.3 (0.3)
	1994	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	0.2 (0.4)	ns -	ns -
	2004	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
	2005	0.0 (0.0)	0.7 (0.7)	0.8 (0.7)	2.5 (1.2)	0.0 (0.0)	0.0 (0.0)	0.4 (0.4)	0.0 (0.0)
Passerine sp.	1992	20.3 (4.0)	9.0 (2.6)	8.0 (3.5)	10.7 (3.1)	10.4 (5.3)	14.0 (3.6)	ns -	ns -
	1993	3.1 (2.9)	0.0 (0.0)	0.8 (0.7)	2.8 (1.2)	3.0 (1.5)	4.5 (1.6)	1.5 (0.5)	6.3 (2.5)
	1994	3.1 (1.4)	2.9 (0.8)	3.9 (2.1)	11.6 (2.6)	6.3 (2.0)	10.6 (4.8)	ns -	ns -
	2004	7.7 (4.8)	5.1 (1.7)	45.0 (7.8)	12.3 (4.8)	17.9 (5.4)	22.9 (4.4)	12.1 (2.9)	1.3 (1.2)
	2005	6.9 (3.8)	8.7 (2.1)	3.1 (1.2)	6.3 (2.4)	6.3 (1.9)	8.9 (1.7)	7.9 (2.6)	14.0 (3.6)

[a] including loons that were not identified to species
[b] based on indicated number
[c] including jaegers that were not identified to species
ns – not surveyed

Table 3. Population estimates for birds observed during aerial surveys on western Victoria Island, 1992 – 1994, 2004 and 2005. Numbers in brackets represent standard errors.

	NW Victoria Island[a]					SW Victoria Island[b]		
SPECIES	1992	1993	1994	2004	2005	1993	2004	2005
Pacific Loon	2453 (1041)	4235 (1520)	5292 (898)	1212 (323)	659 (173)	1217 (296)	105 (75)	873 (128)
Red-throated Loon	483 (236)	179 (169)	575 (310)	881 (277)	352 (132)	52 (35)	125 (77)	0 (0)
Yellow-billed Loon	941 (797)	1237 (415)	659 (359)	1784 (502)	875 (300)	194 (86)	258 (146)	98 (70)
All loons[d]	4553 (1173)	7284 (1653)	9509 (1258)	4436 (642)	3161 (418)	1532 (1676)	1241 (314)	1843 (362)
Tundra Swan	3575 (885)	3144 (511)	3838 (570)	1449 (307)	2842 (385)	4262 (745)	2024 (648)	5043 (999)
Canada Goose[c]	24146 (2602)	16100 (1972)	25055 (2232)	18397 (1647)	30872 (2540)	19074 (1011)	19021 (1812)	30772 (3590)
Brant	1205 (1176)	904 (600)	978 (915)	50 (48)	417 (407)	205 (188)	0 (0)	0 (0)
Greater White-fronted Goose	252 (193)	0 (0)	0 (0)	75 (74)	116 (81)	1020 (427)	707 (219)	730 (263)
Snow Goose	737 (1042)	786 (1003)	1909 (629)	610 (259)	2187 (803)	276 (182)	524 (298)	1625 (656)
Northern Pintail	75 (54)	33 (31)	0 (0)	0 (0)	33 (32)	337 (259)	855 (415)	176 (109)
Common Eider	10789 (6515)	579 (298)	2301 (578)	722 (244)	361 (222)	34 (22)	602 (397)	231 (141)

Table 3. (continued)

	NW Victoria Island[a]					SW Victoria Island[b]		
SPECIES	1992	1993	1994	2004	2005	1993	2004	2005
King Eider[c]	32875 (3266)	33321 (3996)	50561 (5369)	18023 (3112)	16627 (2001)	11149 (1728)	5329 (1170)	6290 (1010)
Long-tailed Duck[c]	9653 (2769)	10762 (3383)	4991 (1035)	5060 (1189)	7236 (1714)	2501 (284)	1861 (429)	2052 (737)
Peregrine Falcon	215 (106)	151 (96)	56 (56)	42 (41)	208 (204)	230 (115)	63 (61)	35 (34)
Falcon sp.	459 (140)	151 (96)	56 (56)	42 (41)	208 (204)	230 (115)	63 (61)	35 (34)
Rough-legged Hawk	1963 (1472)	800 (282)	1226 (461)	183 (65)	462 (128)	97 (65)	196 (103)	454 (149)
Ptarmigan sp.	1215 (425)	627 (313)	1896 (599)	608 (236)	1363 (470)	447 (143)	133 (92)	336 (158)
Sandhill Crane	2588 (1078)	791 (402)	1139 (233)	484 (208)	926 (247)	310 (78)	293 (196)	680 (139)
Passerine sp.	33544 (3950)	12364 (2058)	11396 (1578)	10160 (1020)	5428 (749)	4064 (563)	7849 (692)	2939 (260)
Pomarine Jaeger	3857 (937)	7340 (1816)	1236 (308)	305 (136)	1687 (205)	1164 (253)	329 (141)	321 (129)
Parasitic Jaeger	4639 (965)	2948 (787)	813 (164)	700 (297)	756 (173)	650 (204)	0 (0)	168 (76)
Long-tailed Jaeger	2624 (861)	936 (260)	1564 (611)	620 (235)	1716 (246)	274 (87)	98 (71)	266 (107)

Table 3. (continued)

	NW Victoria Island[a]					SW Victoria Island[b]		
SPECIES	1992	1993	1994	2004	2005	1993	2004	2005
All jaegers[e]	12385 (1644)	12370 (2276)	3949 (703)	2816 (485)	7942 (676)	2380 (304)	880 (173)	1698 (352)
Glaucous Gull	11525 (5228)	7644 (1540)	5794 (802)	2612 (590)	6048 (1149)	2156 (506)	231 (140)	2563 (468)
Thayer's Gull	1293 (945)	857 (536)	839 (733)	200 (157)	164 (130)	0 (0)	0 (0)	0 (0)
Sabine's Gull	1469 (779)	1386 (464)	1662 (646)	571 (336)	414 (128)	160 (128)	70 (46)	35 (34)
Arctic Tern	2400 (597)	2340 (674)	3732 (1580)	384 (118)	1293 (238)	975 (295)	211 (151)	484 (155)
Snowy Owl	2802 (927)	5577 (1412)	944 (405)	208 (206)	1849 (391)	354 (140)	0 (0)	35 (34)
Short-eared Owl	0 (0)	0 (0)	34 (23)	42 (41)	17 (16)	0 (0)	0 (0)	52 (38)
Common Raven	230 (288)	0 (0)	238 (204)	0 (0)	443 (201)	80 (63)	0 (0)	505 (210)
Passerine sp.	9507 (2263)	2499 (688)	6429 (1194)	14362 (2392)	5710 (911)	595 (158)	2076 (484)	2089 (479)

[a] Strata 1 to 6
[b] Strata 7 and 8
[c] based on indicated number
[d] including loons that were not identified to species
[e] including jaegers that were not identified to species

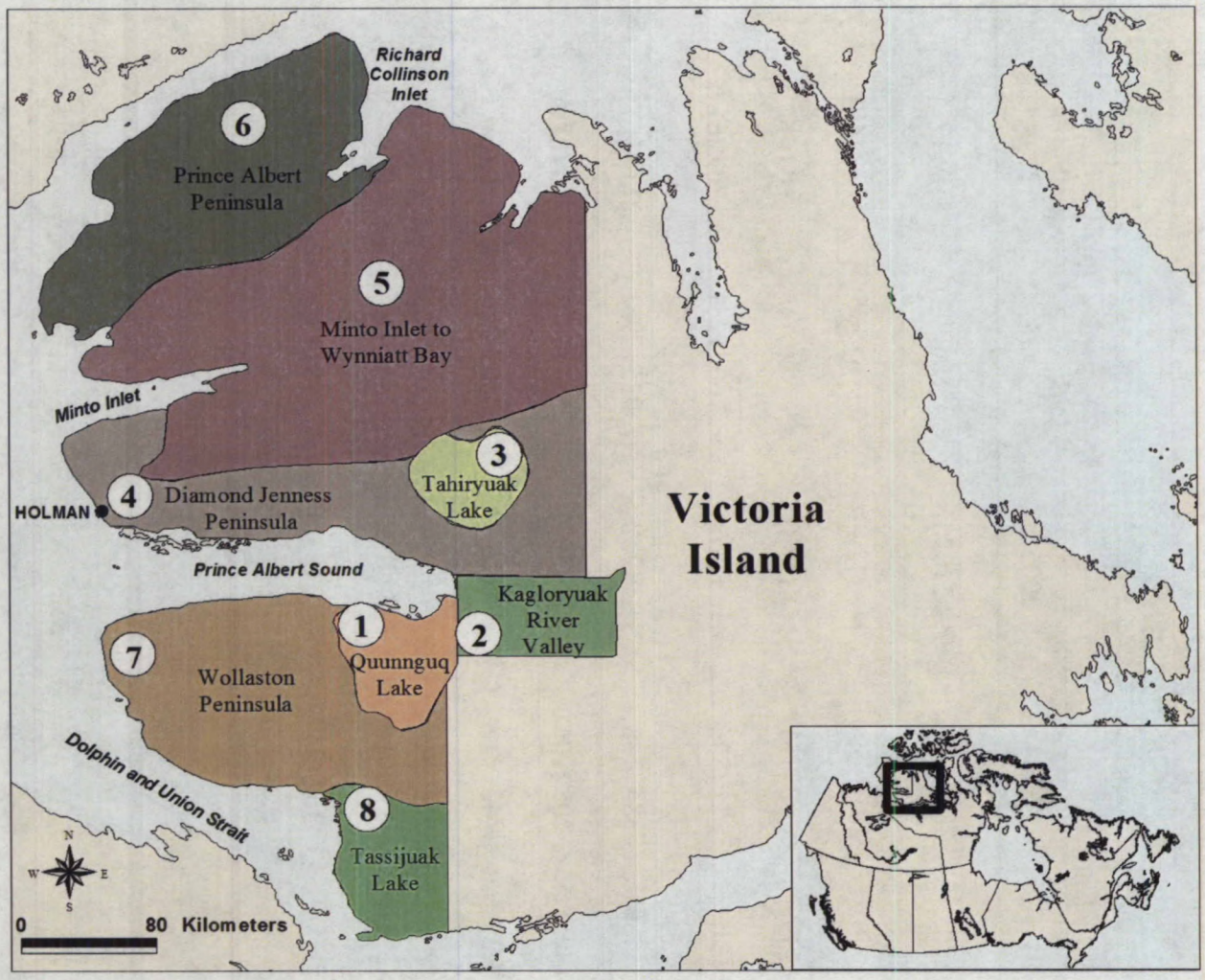

Figure 1. Location of the study area and boundaries of the strata used to estimate bird populations on western Victoria Island, 1992 to 1994, 2004 and 2005.

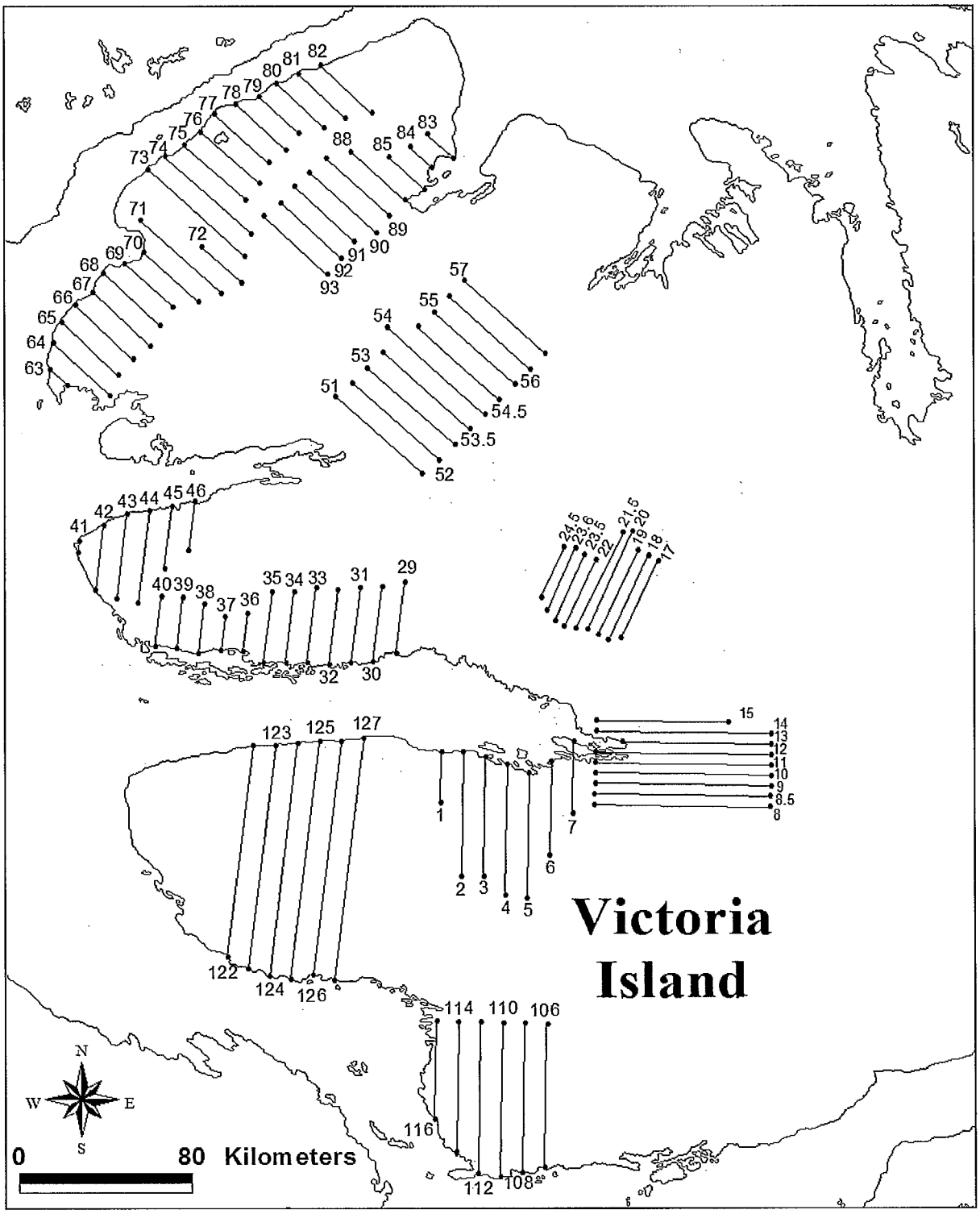

Figure 2. Locations of transects surveyed by helicopter on western Victoria Island in June 2004.

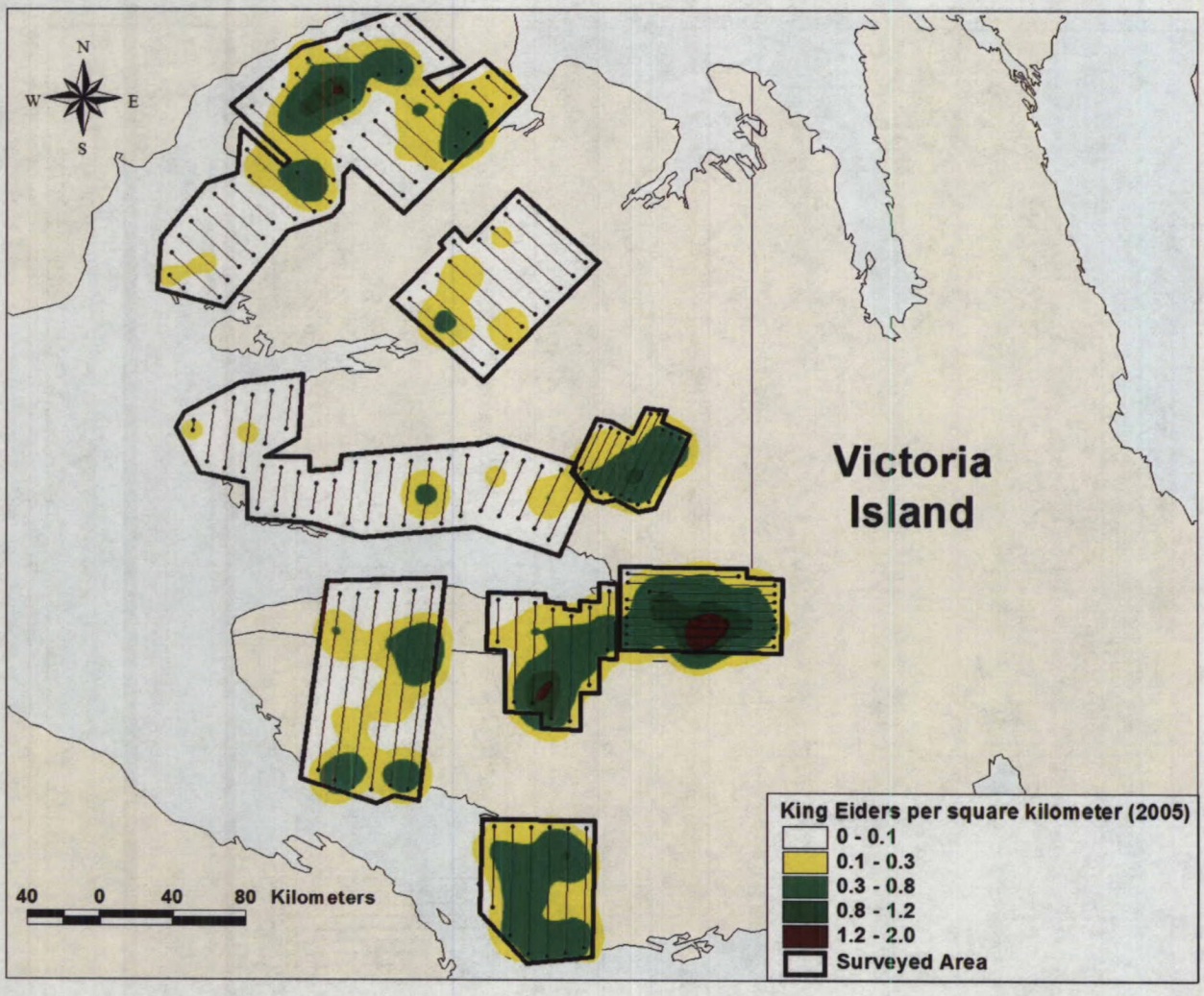

Figure 3. Distribution of indicated King Eiders recorded during aerial surveys on western Victoria Island in 2005.

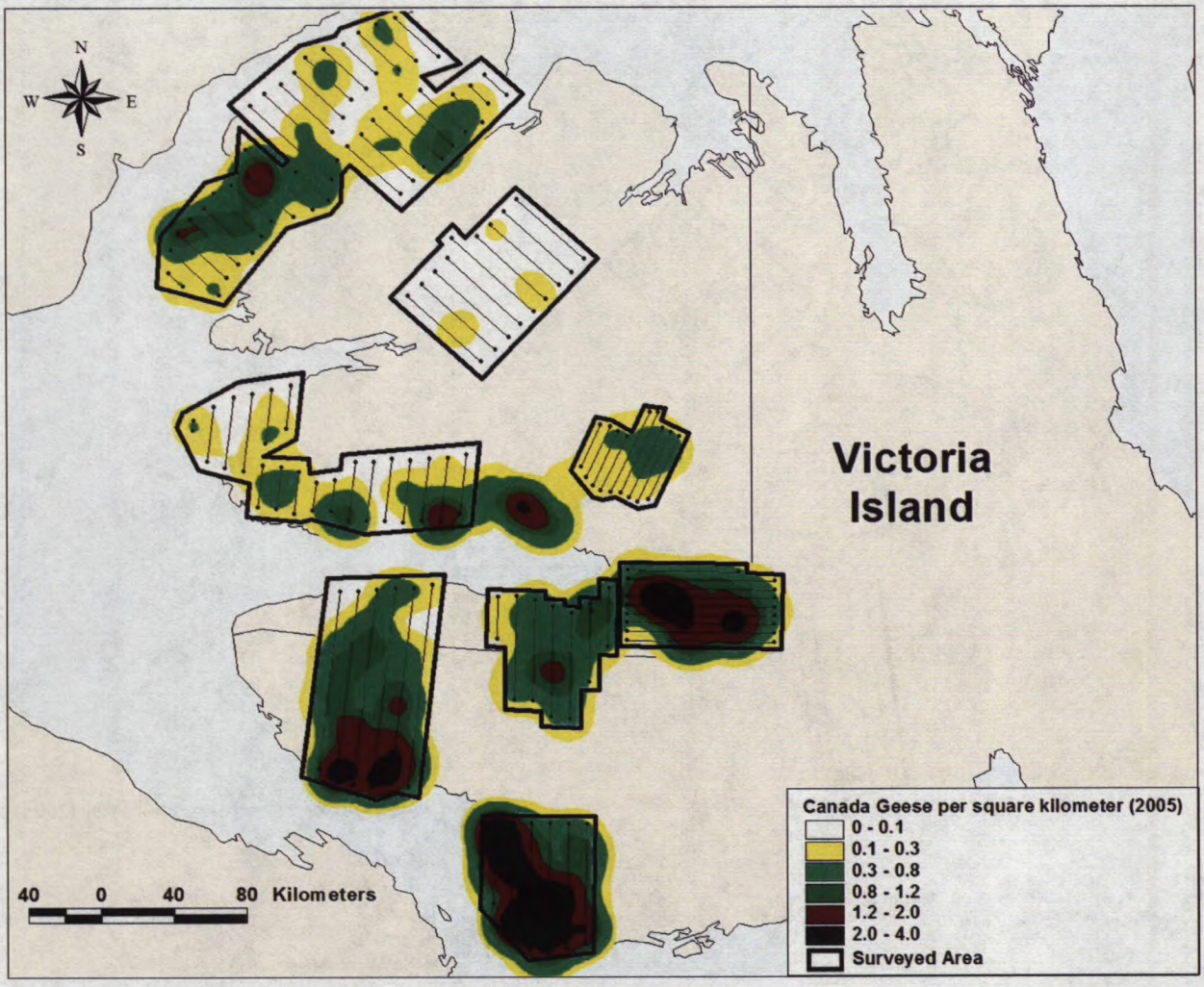

Figure 4. Distribution of indicated Canada Geese recorded during aerial surveys on western Victoria Island in 2005.

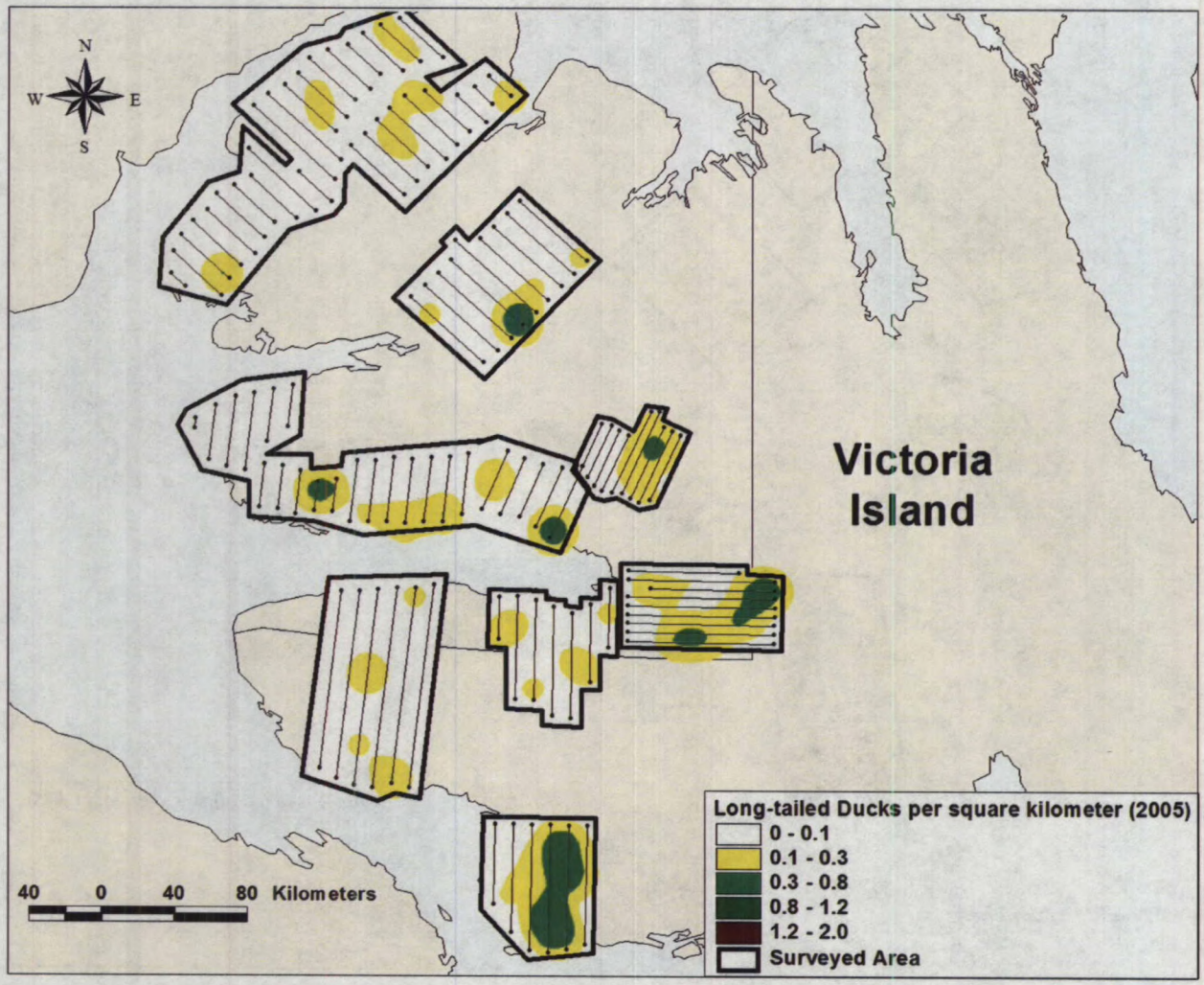

Figure 5. Distribution of indicated Long-tailed Ducks recorded during aerial surveys on western Victoria Island in 2005.

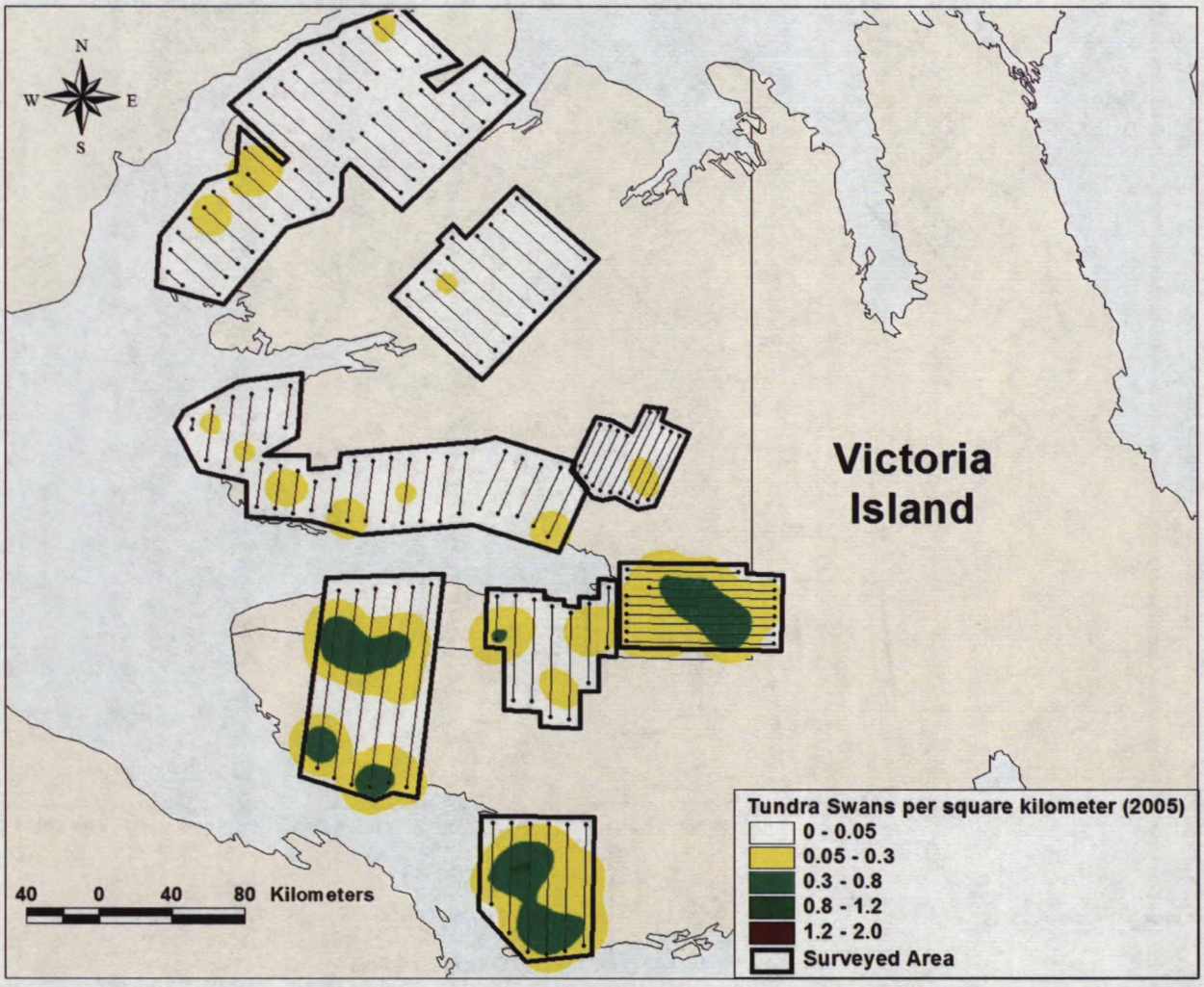

Figure 6. Distribution of observed Tundra Swans recorded during aerial surveys on western Victoria Island in 2005.

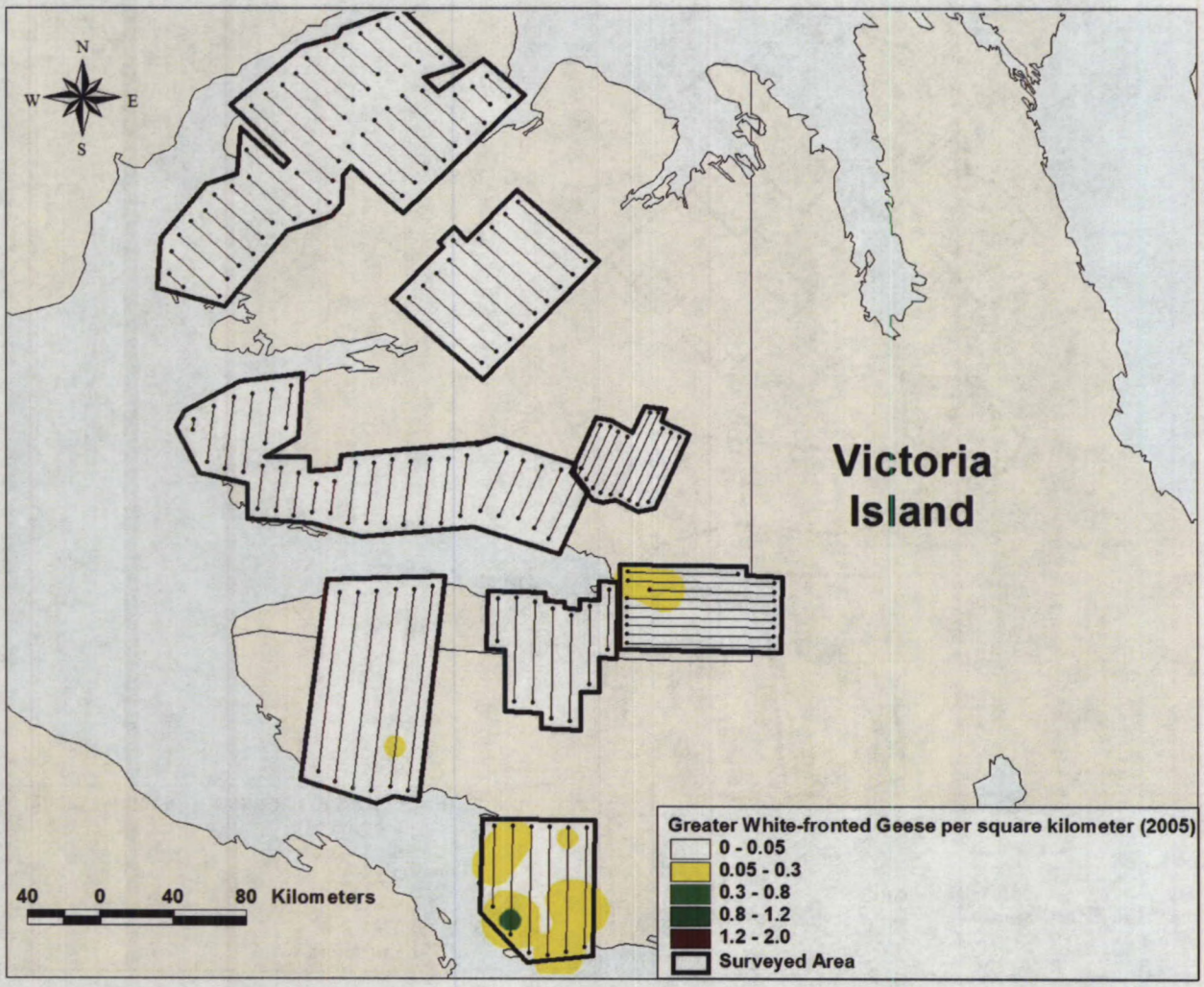

Figure 7. Distribution of observed White-fronted Geese recorded during aerial surveys on western Victoria Island in 2005.

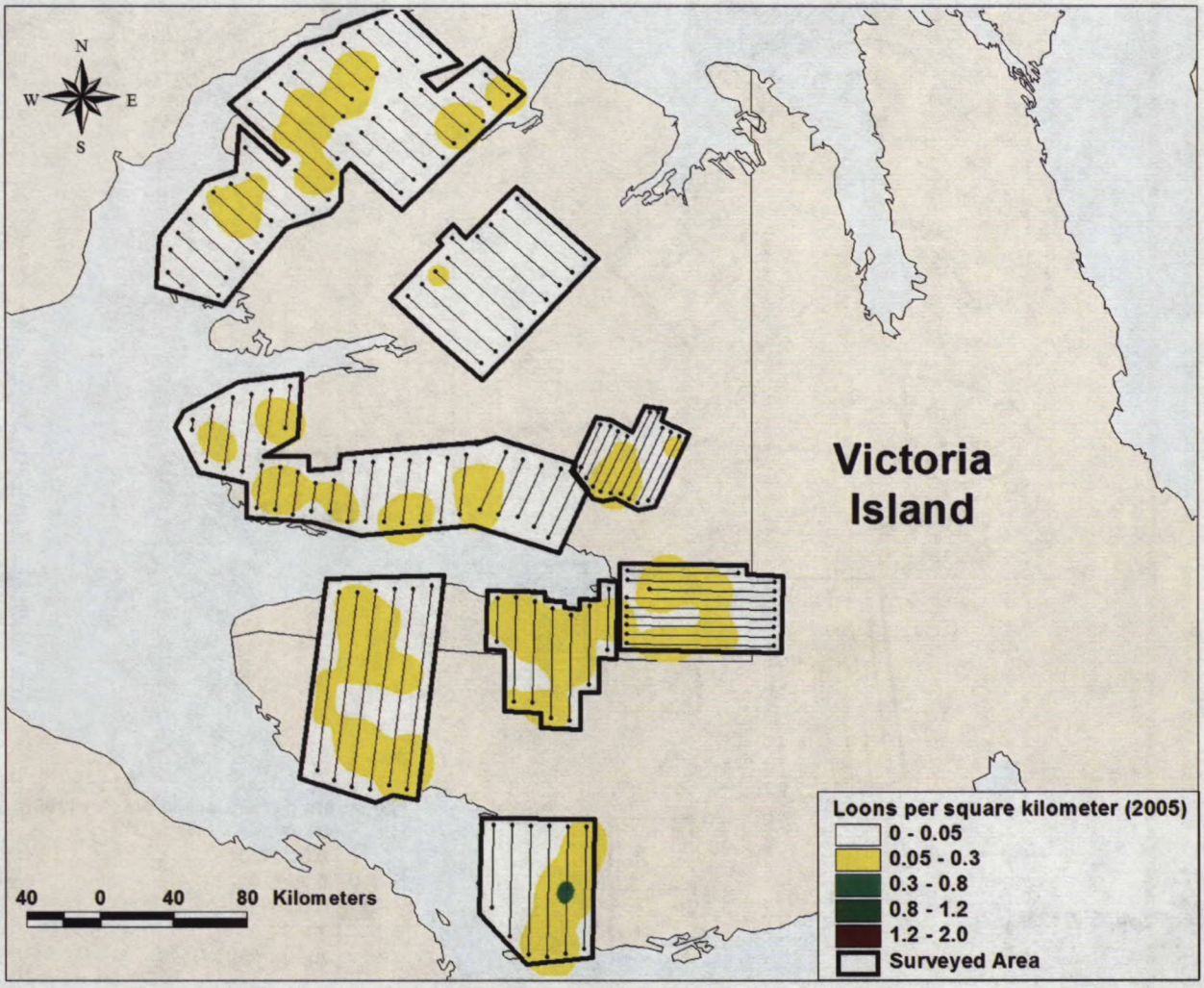

Figure 8. Distribution of observed Loons recorded during aerial surveys on western Victoria Island in 2005.

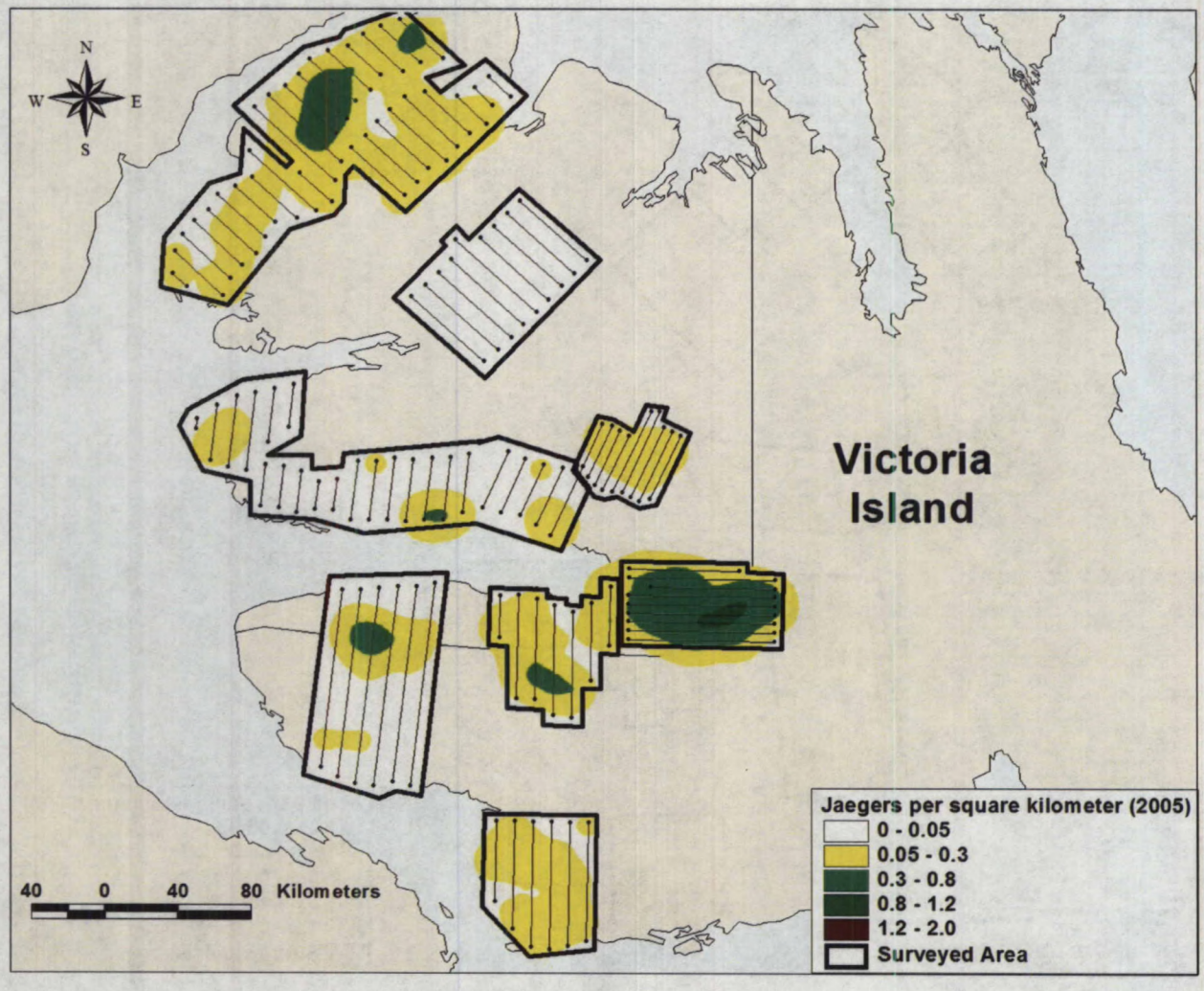

Figure 9. Distribution of observed Jaegers recorded during aerial surveys on western Victoria Island in 2005.

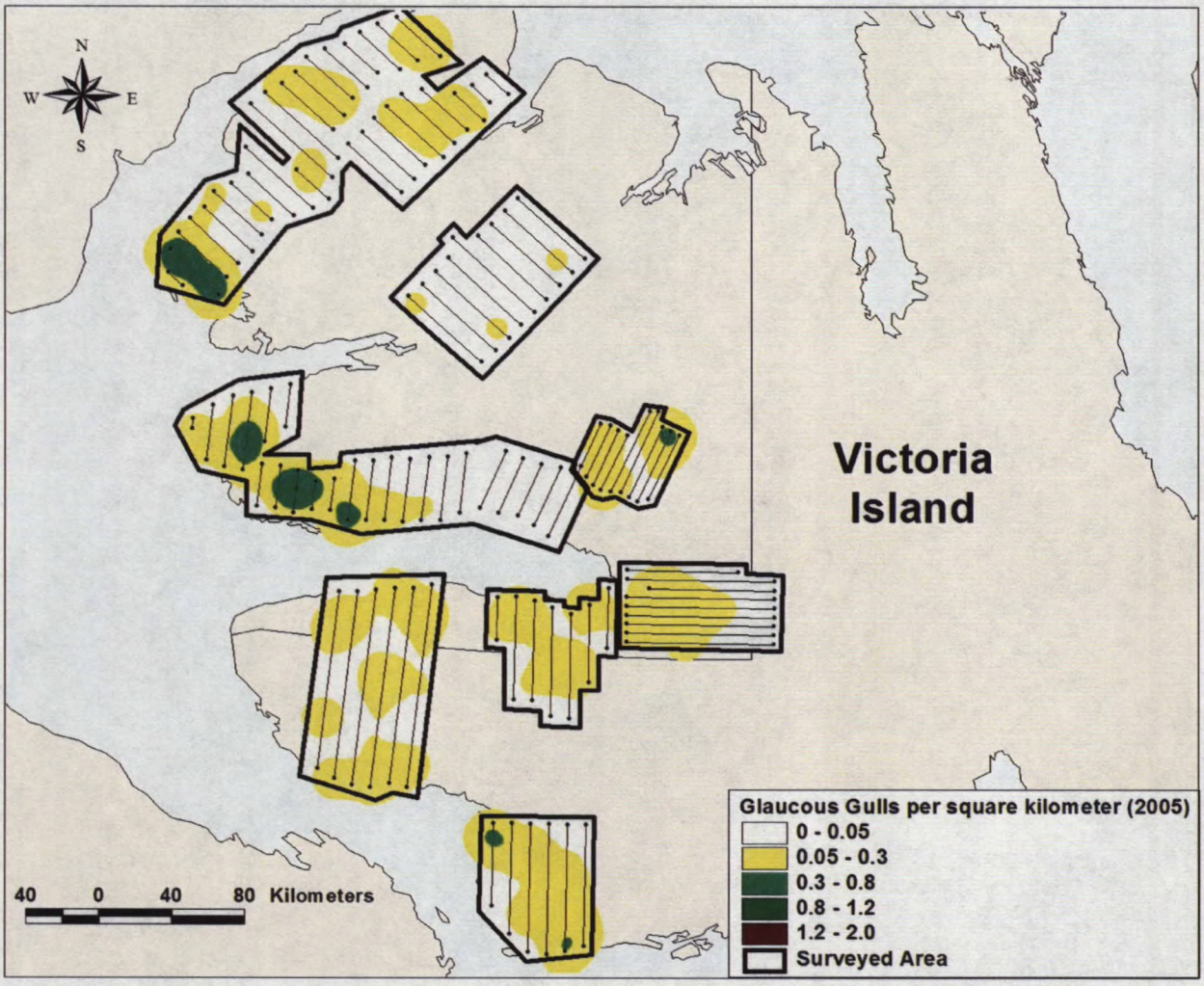

Figure 10. Distribution of observed Glaucous Gulls recorded during aerial surveys on western Victoria Island in 2005.

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