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SHORT COMMUNICATIONS

SNOWY OWL NUMBERS ON TWELVE QUEEN ELIZABETH ISLANDS, CANADIAN HIGH ARCTIC

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Predominantly white plumage and relatively large body size, form and characteristic flight pattern, facilitate aerial surveys of the Snowy Owl (*Nyctea scandiaca*) on tundra islands of the Canadian High Arctic. Snowy Owls were recorded on nine central (July 1985) and three western (July 1986) Queen Elizabeth Islands, Northwest Territories, during Canadian Wildlife Service aerial surveys of Peary Caribou (*Rangifer tarandus pearyi*) and Muskoxen (*Ovibos moschatus*).

Bathurst, Alexander, Marc, Massey, Vanier, Cameron, Helena, Lougheed and Edmund Walker islands were surveyed by air between 10 and 25 July 1985 (Fig. 1A). Prince Patrick Island, Eglinton Island and Emerald Isle were surveyed by air between 4 and 13 July 1986 (Fig. 1B). Survey design consisted of systematically spaced, north-south orientated line transects at 6.4-km intervals. A Bell-206B "Jet Ranger" turbo-helicopter was flown approximately 90 m above ground level (agl) and at an airspeed of approximately 160 km/hr. A four-person survey crew was used: pilot, navigator and two rear-seat observers.

All four crew members spotted Snowy Owls. Rear-seat observers recorded the angle of depression from the horizontal plane to the position of each owl observed using a hand-held clinometer to calculate each owl's right angle horizontal distance from the helicopter. All clinometer readings were taken when the observer in the helicopter was at a right angle to the point where an owl first was seen. Snowy Owls already in flight or flushed during observations were classed as "flushed," and owls that remained perched were classed as "perched."

Strip transect boundary width was set at 6°: all readings of ≥6° were designated as "on transect" and all readings of ≤5° were designated as "off transect." Right angle horizontal distance from the helicopter to a Snowy Owl at a reading of 6° was 857 m (90 m agl/0.105, tangent of 6°). On this basis, "on transect" owls were within a strip transect 1.714 km wide, which yields an overall coverage of 27.3% of 20 855 km² in 1985 and 27.9% of 17 930 km² in 1986. Only "on transect" owl numbers were used in population and mean density estimates. Calculation of population estimates and mean densities and their associated statistics were done following procedures for analysis of data arising from systematic transect surveys (Kingsley and Smith 1981).

1985 SURVEY

In July 1985, 314 Snowy Owls were counted on nine islands (Fig. 1A) of which 81.2% were on transect (Table 1). Based on these numbers, I estimated that there were 932 Snowy Owls at a mean density of 45 owls/1000 km² on the entire survey area (Table 2).

Eighty-seven percent of the owls counted on transect were either in flight or took flight during observations. Owls appeared to flush in response to the oncoming survey helicopter. The remainder of owls counted remained perched during observations. No record of "flushed" versus "perched" owls was kept for the 59 Snowy Owls seen off transect.

Relatively low numbers of Snowy Owls counted on all islands except Bathurst prevent "among-island" or "within-island" statistical examination of densities and distributions on the overall survey area. Densities of Snowy Owls were highest on Ile Marc, Massey Island and northwestern Bathurst Island (Tables 1 and 2). On a collective basis, numbers of Snowy Owls counted on Bathurst Island, compared to numbers counted on the other eight islands, was proportional to the two landmasses involved. Bathurst Island comprised 77.2% of the total landmass of the nine-island survey area in July 1985, and 84.7% of Snowy Owls counted on transect and 79.7% of the owls counted off transect were counted on Bathurst.

Snowy Owls were rather evenly distributed over large areas of Bathurst Island. However, the number of Snowy Owls seen "on transect" on northwestern Bathurst Island (Stratum I, Fig. 1A) was significantly greater ($P < 0.05$, $\chi^2 = 6.22$, df = 2) compared on a relative landmass basis to numbers of Snowy Owls seen "on transect" on northeastern Bathurst (Stratum II, Fig. 1A) and southern Bathurst (Stratum III, Fig. 1A) (Table 1).

Collared Lemmings (*Dicrostonyx torquatus*) were abundant over most, if not all, of Bathurst Island in July 1985 Lemmings were constantly underfoot in our field tent camp on central Bathurst and were seen at fuel caches on other parts of the island. Most burrows observed showed fresh signs of excavation. We also saw four Arctic Fox (*Alopex lagopus*) dens with pups on Bathurst Island, a positive sign of high lemming availability.

1986 SURVEY

Only three Snowy Owls were counted during the 1986 survey, although the landmass surveyed was 86% as large as that surveyed in 1985 (Fig. 1A, B). All three owls were on Prince Patrick Island: two were on transect and one

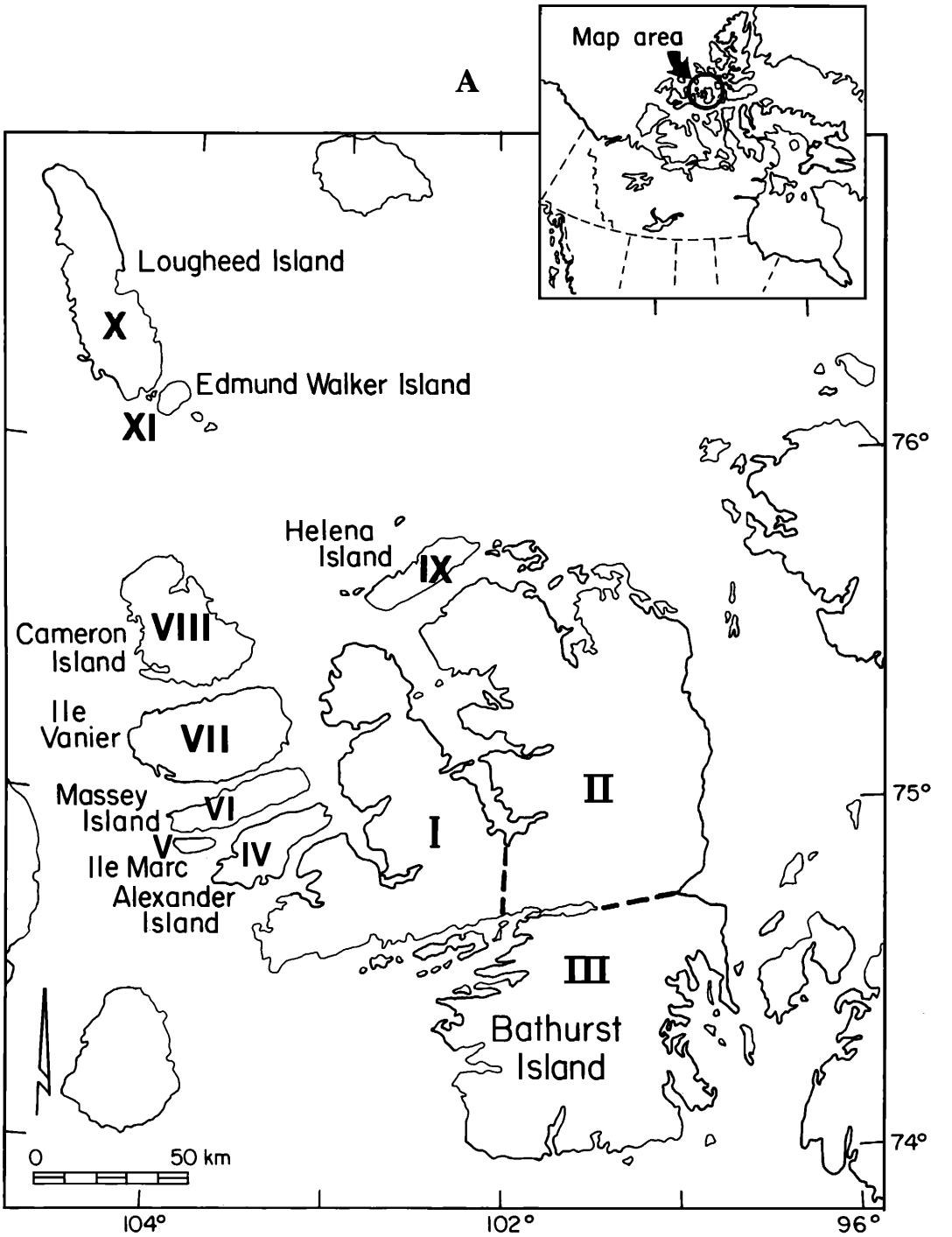

Figure 1. Location of Canadian High Arctic Islands where numbers of Snowy Owls were obtained by aerial survey. (A) nine central Queen Elizabeth Islands (11 survey strata), July 1985; and (B) three western Queen Elizabeth Islands (five survey strata), July 1986.

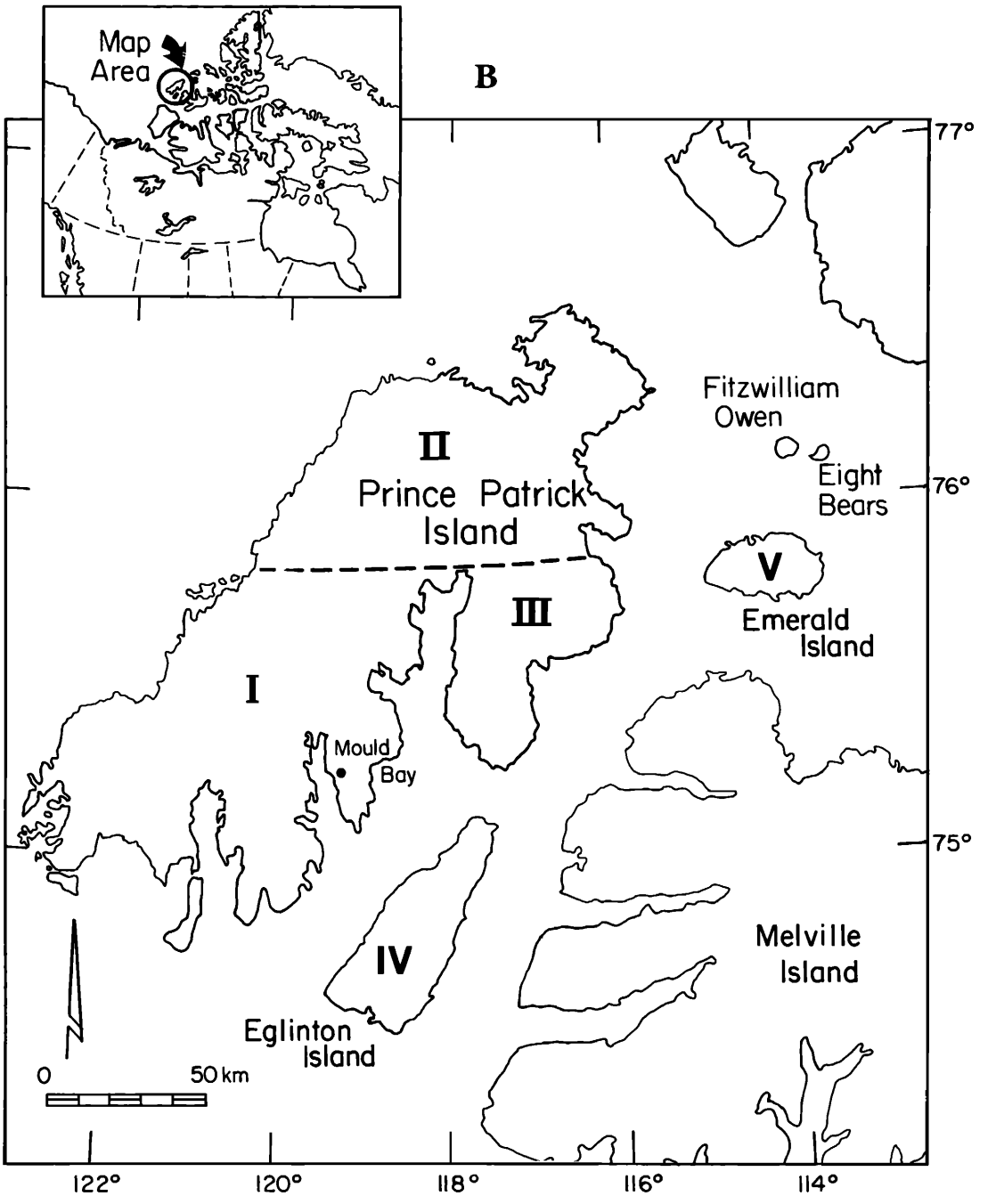
Map Area
B
77°
76°
75°
Fitzwilliam Owen
Eight Bears
II
Prince Patrick Island
V
Emerald Island
III
I
Mould Bay
IV
Eglinton Island
Melville Island
0
50 km
122°
120°
118°
116°
114°

Table 1. Numbers and distributions of Snowy Owls seen during aerial survey of nine central Queen Elizabeth Islands, Canadian High Arctic, Northwest Territories, July 1985.

ISLAND (SURVEY STRATUM)		ON TRANSECT	OFF TRANSECT	TOTAL
Bathurst, NW	(I)	71	23	94
Bathurst, NE	(II)	80	10	90
Bathurst, S	(III)	65	14	79
Alexander	(IV)	7	4	11
Marc	(V)	1		1
Massey	(VI)	8	6	14
Vanier	(VII)	5	1	6
Cameron	(VIII)	13	1	14
Helena	(IX)	2		2
Lougheed	(X)	3		3
Edmund Walker	(XI)			0
Strata I–III		216	47	263
Strata IV–XI		39	12	51
Strata I–XI		255	59	314

was off transect. On this basis, I estimated only seven owls to be on the entire survey area and calculated a density of only 0.4 owls/1000 km^2 in July 1986.

In July 1986 the survey crew searched for lemmings or fresh signs in the base-camp area at Mould Bay, Prince Patrick Island, and in other areas each time the helicopter landed for refueling. No lemmings or fresh burrows were seen anywhere that was searched on the three-island complex (Fig. 1B). In addition five Arctic Fox dens were found, but none were active.

Tener (1963) counted only 13 Snowy Owls during an aerial survey of 7.8% of Bathurst, Alexander, Massey, Vanier and Cameron islands between 19 June and 7 July 1961. Assuming 13 Snowy Owls were counted "on transect," an extrapolated estimate would yield 166 owls total on five islands. On this basis the number of Snowy Owls on the five islands was at least 5.5× greater in 1985 than in 1961. On 23 July 1961 Tener (1963) counted 10 Snowy Owls on Prince Patrick (4.2% coverage), six owls on Eglinton (5.9% coverage), and four owls on Emerald (9.2% coverage) on 24 July 1961. Assuming all 20 owls counted in July 1961 were on transect, the resultant estimate would be 384 owls versus only seven owls estimated in July 1986.

Magnitudes of annual variation in Snowy Owl numbers is best illustrated with data from Eglinton Island. Miller et al. (1975) counted five, 56 and 27 Snowy Owls and estimated 20, 111 and 54 owls on Eglinton in summers of 1972, 1973 and 1974, respectively. Yet not a single owl was counted in summer 1986.

The importance of lemmings to Snowy Owls is well

Table 2. Mean densities and numbers of Snowy Owls on 11 survey strata of nine central Queen Elizabeth Islands, Northwest Territories, July 1985, obtained by aerial survey.

AREA SURVEY STRATUM (ISLAND)		STRATUM SIZE (KM^2)	AREA SURVEYED (KM^2)	OWLS/1000 KM^2		POPULATION ESTIMATES	
				MEAN[a]	95% C.I.[b]	ESTIMATE[a]	95% C.I.[b]
I	(Bathurst, NW)	4080	1113	64	55–73	260	224–297
II	(Bathurst, NE)	6650	1794	45	36–53	297	238–355
III	(Bathurst, S)	5360	1478	44	28–60	236	151–321
IV	(Alexander)	490	129	54	25–84	27	12–41
V	(Marc)	56	15	67	0–719	4	0–40
VI	(Massey)	440	122	66	29–102	29	13–45
VII	(Vanier)	1130	303	16	5–28	19	6–31
VIII	(Cameron)	1060	293	44	20–69	47	21–73
IX	(Helena)	220	90	22	9–54	5	0–12
X	(Lougheed)	1300	352	8	2–19	11	0–24
XI	(Edmund Walker)	69	17				
I–III		16 090	4386	49	43–56	793	689–896
IV–XI		4765	1320	30	23–36	141	109–173
I–XI		20 855	5705	45	40–50	932	827–1038

[a] The discrepancy of three owls (935) obtained by the summation of 11 individual strata (I–XI) versus the single calculation of 932 owls for strata I–XI is a rounding error. Also, use of whole number values for mean densities prevents exact recalculation of estimates from tabular material: e.g., (survey area × mean density = estimate) therefore, (20 855 × 45/1000 = 938) but when actual mean density of (0.0447 owls/km^2) is used (20 855 × 0.0447 = *932*). Note that recalculation of any mean density values requires that the tabular value first be reduced to a unit of one (km^2).

[b] Negative values reported as zero (0).

known. One obvious difference between the survey areas was the high numbers of lemmings present in July 1985 and the extremely low number apparently present (none counted) in July 1986. Likely, high numbers and widespread distribution of lemmings accounted for the commonness of Snowy Owls throughout much of the survey area in 1985 compared to 1961. However, lemming populations can be asynchronous on adjacent islands. For example in summer 1958 lemmings were abundant (approx. $\frac{1}{50}$ m^2), and so were Snowy Owls on Prince of Wales Island, while no lemmings or owls could be found on Somerset Island 40 km away (T. W. Barry, pers. comm.). Absence of lemmings on the July 1986 survey area could account for the difference in Snowy Owl numbers in 1961 vs. 1986.

Unfortunately, I have no knowledge of what proportion of the surveyed area in each year was suitable nesting habitat or what proportion of the owls seen were associated with nests. In general plant cover is relatively sparse on the western half of Prince Patrick Island, the northern tip of Eglinton Island, and the southern end of Lougheed Island compared to the remainder of the areas surveyed in 1985 and 1986.

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A NEW METHOD TO SELECTIVELY CAPTURE ADULT TERRITORIAL SEA-EAGLES

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Adult eagles are difficult to capture in their territory or breeding range. In northern Australia adult territorial White-bellied Sea-eagles (*Haliaeetus leucogaster*) were often attracted to capture sites but usually perched and watched from nearby. However, some came to bait but only after non-target birds had disturbed the trap. Therefore, a new, manually-operated, single-noose system was developed and compared with trapping success of three conventional methods (i.e., cage traps, cannon netting and eagle-triggered multi-noose systems). The new capture system requires a concealed hide (e.g., a camouflaged vehicle) located 200 m from the bait. One operator remains at the hide while another prepares the capture system. A capture site (approx. 2 m^2) clear of debris and vegetation is chosen well within an eagle's territory and in view of the hide. Bait (normal fish prey) is aligned such that the head is facing away from the hide and secured with two 300 × 10 mm steel pegs (Fig. 1). Alignment is important because eagles usually grasp the bait lengthwise with both feet, and the noose when sprung easily snares the eagle's legs from the side; otherwise the noose may slide up the back of the eagle.

Vegetation is cleared next to the hide, and one end of a 5 m length of 10 mm surgical tubing with a loop tied at each end is pegged to the ground next to the hide entrance. The other end is stretched and pegged beyond the hide (Fig. 1). A fishing reel (120 mm dia) bolted to flat steel (300 × 50 × 8 mm thick) is placed on the ground next to the tubing at the farthest point from the bait (Fig. 1a). The reel held 250 m of 18 kg monofilament line and