FIELD INVESTIGATION OF SEABIRDS AT PRINCE LEOPOLD ISLAND, LANCASTER SOUND, NORTHWEST TERRITORIES, 1988

D.N. Nettleship
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ABSTRACT / RÉSUMÉ

Nettleship, D.N., J.W. Chardine, E.P. Huyck & W.W. Lidster. 1990. **Field investigation of seabirds at Prince Leopold Island, Lancaster Sound, Northwest Territories, 1988.** *Canadian Wildlife Service Technical Report Series* No. 97: 1-84.

Observations of the status and numbers of Northern Fulmar *Fulmarus glacialis*, Glaucous Gull *Larus hyperboreus*, Black-legged Kittiwake *Rissa tridactyla*, and Thick-billed Murre *Uria lomvia* were made at Prince Leopold Island, Lancaster Sound, Northwest Territories, Canada by a 5-man team from 18 July to 8 August 1988. Timing of laying and breeding performance of three of the four species seemed normal: Glaucous Gull, Black-legged Kittiwake, and Thick-billed Murre. In contrast, few (<20%) Northern Fulmar pairs appeared to have produced an egg, but those that did hatched their young close to the normal time. Reduced productivity by fulmars is not unusual when conditions such as ice break-up is late. But in the past, when such poor breeding performance occurred in fulmars, there were corresponding failures or delays in timing of breeding by the other species. Data showing these inter-specific differences are presented, as are details related to the study plot monitoring system now in place at Prince Leopold Island and other topics of the 1988 study exercise.

Nettleship, D.N., J.W. Chardine, E.P. Huyck & W.W. Lidster. 1990. **Field investigation of seabirds at Prince Leopold Island, Lancaster Sound, Northwest Territories, 1988.** *Canadian Wildlife Service Technical Report Series* No. 97: 1-84.

Du 18 juillet au 8 août 1988, une équipe de cinq hommes a fait des observations sur la situation et le nombre de Fulmars boréaux *Fulmarus glacialis*, de Goélands bourgmestres *Larus hyperboreus*, de Mouettes tridactyles *Rissa tridactyla*, et de Marmettes de Brünnich *Uria lomvia*, dans l'île du Prince Leopold, détroit Lancaster, dans les Territoires du Nord-Ouest au Canada. Le moment de la ponte et les activités de nidification de trois des quatre espèces semblaient normaux, soit le Goéland bourgmestre, la Mouette tridactyle et la Marmette de Brünnich. En revanche, peu de couples de Fulmars boréaux (<20 %) semblaient avoir pondu un oeuf, mais chez ceux qui avaient pondu, les petits ont éclos à peu près au moment normal. La productivité réduite des fulmars n'est pas inusitée lorsque le dégel, par example, se produit tardivement. Toutefois, dans le passé lorsque les fulmars éprouvaient des problèmes de nidification, les autres espèces accusaient aussi des retards ou encore leur nidification n'était pas fructueuse. Des données reflétant ces différences interspécifiques sont présentées tout comme des détails portant sur le système de surveillance des parcelles d'échantillonnage qui est maintenant en place dans l'île du Prince Leopold; d'autres sujets relatifs à la période d'étude de 1988 sont aussi abordés.

INTRODUCTION

The principal objectives of the ornithological project carried out at Prince Leopold Island, Lancaster Sound, Northwest Territories, in 1988 were:

(1) Assessment of the status and numbers of Northern Fulmar *Fulmarus glacialis*, Black-legged Kittiwake *Rissa tridactyla*, Glaucous Gull *Larus hyperboreus*, and Thick-billed Murre *Uria lomvia* on monitoring plots established in 1975-78;

(2) Execution of a photographic survey by boat of the east cliff Thick-billed Murre colony to obtain materials necessary to identify current pattern and recent changes in distribution and numbers of breeding murres on large sections of sea-cliffs; and

(3) Assessment of the extent to which the study plot monitoring system now in place may be used to indicate changes in the abundance and status of seabird populations at selected colonies.

The approaches taken to attain these objectives, involving research both on land and at sea, have been outlined in Nettleship (1976, 1977), Birkhead and Nettleship (1980), Gaston and Nettleship (1981), and Evans and Nettleship (1985). In the present report, we provide a summary record of the information obtained in 1988, placing emphasis on data important to objectives (1) and (3) above. Complete details of the 1988 work programme are given in Appendix 1.

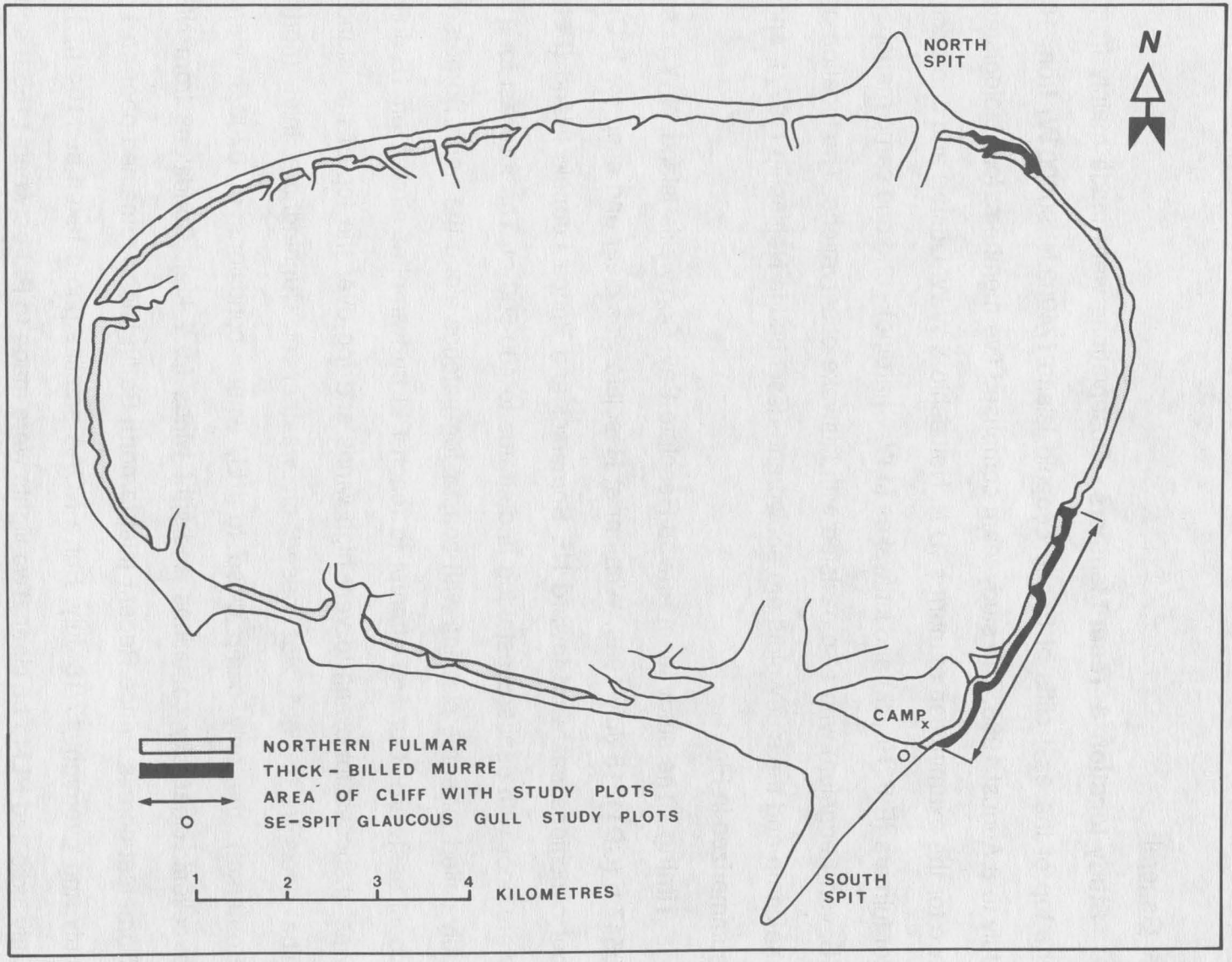
MATERIALS AND METHODS

A. General

Study location & Team Members.- Observations were made mainly from the top of the east cliffs of Prince Leopold Island (74°02'N, 90°00'W) from 18 July to 8 August 1988. The study team comprised five members: four biologists - two for the examination of murres (D.N. Nettleship & W.W. Lidster) and one each for fulmars (E.P. Huyck) and kittiwakes (J.W. Chardine) - and one camp manager (B. van Feggelen) who also assisted with kittiwake observations. The location of the camp and the study plots are shown and described in Nettleship (1977), and summarized in Fig. 1.

Timing.- The study team arrived Resolute Bay, Cornwallis Island, N.W.T. at 0547 h (CDT), 15 July 1988. Weather at Resolute was clear and crisp (c. 1°C), but conditions eastward toward NE Somerset and Prince Leopold Island (PLI) were poor with dense coastal fog and stratus to 400-500 m. The forecast for 16 July called for some clearing with coastal fog patches along the north Somerset coast eastward. Our first attempt to reach PLI by twin-otter aircraft on 16 July was unsuccessful owing to very high winds and fog over the top of the island. The decision to "go" was based on weather at Cunningham Inlet (north Somerset), the only camp close to PLI, where conditions at 0700 h were excellent: clear sky conditions and light winds (c. 7 kts). Conditions from NE Somerset across Prince Regent Inlet to north Baffin Island remained poor on 17 July and overnight 17/18 July. But a NOAA satellite photo taken at 1104 h, 18 July indicated PLI to be clear. Two flights were made to PLI between 1155 h and 1425 h, with the entire camp in place on top of the SE cliffs at 1525 h. A cache comprising the inflatable boat, engines, fuel and associated materials was

FIGURE 1. Sketch map of Prince Leopold Island showing physiographic features, location of study plots, and the general breeding distribution of Northern Fulmars and Thick-billed Murres.



established on the South Spit during the second flight. The scientific programme was initiated at 1715 h, 18 July, and terminated 1805 h, 8 August. The team remained on PLI until 8 August, with the exodus to Resolute requiring two flights between 1950 h and 2240 h. On 9 and 10 August, field equipment was serviced and/or prepared for shipment south or storage at Resolute. All members of the team departed Resolute at 0140 h, 11 August 1988. A record of aircraft usage is given in Appendix 2 and a summary of key events in Table 1.

Weather.- Observations were recorded twice daily, at 0700 h and 1900 h, and reported to PCSP Resolute. The station was located about 200 m inland from the eastern sea-cliffs on top of the SE corner of PLI (see Fig. 1). Elevation at the site was roughly 300 m above sea level. Surface conditions were flat in all directions with no obstructions to vision. Photos of the observation site are in Gaston & Nettleship (1981). Observations were made according to PCSP instructions given in "A manual for field station aviation weather reports" and "Aviation weather reports: an operational guide", and recorded on PCSP Aviation Weather Reports forms. Regular observations comprised: sky conditions and cloud types; visibility and obstructions to vision; dry-bulb, maximum and minimum temperatures; wind direction and speed; and precipitation. Records are deposited with PCSP, EM&R Canada, Ottawa, and presented in Appendix 3.

There were marked differences in weather conditions through the 22-day study period at PLI. Weather was extremely good between 18 July and 1 August, with high visibility, few foggy days (n=3), and unusually high temperatures and low wind speeds. In contrast to this, there was almost perpetual fog from 2 to 8 August, with visibility usually less than 300 m (except for short breaks 4/5 August); temperatures and wind speeds were, on average, lower and higher,

TABLE 1. Diary: key events during 1988 investigation at Prince Leopold Island, Lancaster Sound, N.W.T.

Date	Event
14 July	Departure from Halifax (JWC, BvF, DNN), Boston (EPH),& St. John's (WWL) for Montreal enroute to Resolute.
15 July	Arrive Resolute 0547 h (CDT).
16 July	First twin-otter attempt to reach PLI: failure owing to fog and high winds over PLI.
18 July	Team landed safely on top of PLI (two trips); boat cache placed on South Spit. Scientific programme begins: first TBM counts at all plots, 1715-1930 h.
19 July	Base camp completed. No hatching detected in NF, BLK, or TBM; most GGs with young nestlings.
22 July	First BLK and TBM chicks to hatch.
23 July	First NF chick to appear. Large groups of Beluga (total: 225 i) moving southwestward past east cliffs. Photographic survey by boat of East Cliff and North TBM colonies executed.
24 July	Old GG colony on South Spit examined - no breeding.
25 July	All study plot photos taken except BLK Plots M to T.
29 July	Median & mean hatch date of BLKs at Plot G, and median hatch date at Plot M.
30 July	Study plot photos completed. Icon Media Productions film crew (CBC/BBC co-production: Paul Lang, Producer) arrived for "Polar Passage" documentary. Jeff MacInnis and Michael Beedell landed their boat (catamaran) on the South Spit enroute to Pond Inlet. Median and mean hatch date of TBMs at Plot S1. Mean hatch date of BLKs at Plot M.
1 August	"Polar Passage" boatmen and film crew depart. Median and mean hatch date of TBMs at Plot U. 3 August First sighting of a Polar Bear - off G on pan ice.
4 August	169th Anniversary of the discovery and naming of Prince Leopold Island by W.E. Parry in 1819.
6 August	Preparation of South Spit boat cache for evacuation.
7 August	Polar Bear sighted on South Spit.
8 August	Preparation of base camp for evacuation. CF-NAN takes first load (JWC,BvF,EPH + gear) off at 1951 h. Second and final load (WWL,DNN + gear) by CF-ASG at 2200 h. Camp evacuation complete.
9-10 Aug.	Preparation of equipment for storage at Resolute and shipment south to Dartmouth, N.S.
11 August	Team departs Resolute for home on CP184 at 0140 h. Arrive Montreal at 0735 h (0835 EDT). Group disbands in Montreal, EPH for Boston, WWL for St. John's, JWC and DNN for Halifax. Arrive Halifax 1425 h (ADT).

respectively. Overall, climatic conditions were good for survey and census work (see Appendix 3 for details).

B. Study Methods

General.- Methods used for daily counts, estimates of status and timing of breeding, and reproductive performance of the four study species are outlined in Appendix 1 and summarized below. Most information for fulmars, kittiwakes and murres came from observations on study plots, made for 6 to 12 h each day, employing standardized techniques described in detail in Birkhead & Nettleship (1980). All study plots of fulmars, kittiwakes and murres were located and rephotographed in 135 mm and 6x7 cm formats. Data for Glaucous Gulls came from counts of individuals and inspections of all nests found along the top of the east cliffs and on the South Spit. A survey by Zodiac rubber inflatable boat was performed on 23 July to photograph the East Cliff and North Spit colonies. Incidential observations of other birds and mammals (aquatic and terrestrial) were recorded daily. A collection of murre eggs and young for toxic chemical examination was also made. All errors reported below are ± 1 SD; all statistical tests are two-tailed.

Northern Fulmar.- Plots AA, A, C, D, G, H and J were observed each day (conditions permitting) from 19 July to 8 August. Counts of all individuals (in adult plumage) present within plot boundaries were recorded daily between 1700 and 1900 h, with numbers of single birds and pairs noted. About 6 h per day was spent determining the numbers of eggs/chicks present and sites occupied on study plots AA and C. Status checks were made of sites on all other plots (A, D, G, H and J) on 21, 27, 28, 31 July and 3 August, times of peaks or troughs of the cyclic pattern of attendance at the colony. The best time to determine status of

individual sites was at the low phase of the cycle, a time when only birds with an egg or chick are present (D.N. Nettleship, A. Greene, E. Greene, in prep.). The fate of all eggs found was recorded, and information on timing of breeding, number of pairs, breeding success and productivity was derived for each study plot using methods similar to those outlined for murres in Birkhead and Nettleship (1980).

Glaucous Gull.- All Glaucous Gull breeding sites occurring between Plots AA and Z, and those on the South Spit were surveyed on 29 July and 24 July, respectively. At these times the position and contents of all nests identified were recorded. Additional observations were made at both locations on 25 and 31 July, and daily at nests on S1 and U. The lower cliffs of the southwest coast were examined on 1 August.

Black-legged Kittiwake.- Black-legged Kittiwake study plots (G, M, Qs upper, Qs lower, S south-facing, Q north and T) were visited between 20 July and 8 Aug 1988. Daily observations at Plot G and, when possible, Plot M provided information on nest contents (eggs and/or chicks, clutch or brood size), timing of breeding, and breeding performance. Nests at Plot G were usually observed from mid-morning to mid-afternoon each day for a total of 82 h of direct observation, while those at Plot M were observed less regularly and for briefer periods owing to limits of observer availability. Other plots were visited periodically to determine the status of sites. All plots were visited once a day (weather permitting) between 1700-1900 h, and counts of all birds (in adult plumage) within plot boundries were made.

Thick-billed Murre.- Extent of breeding, timing of hatching, fate of eggs and chicks, and breeding performance were determined from observations made for 6 to 12 h/plot each day on study plots S1 and U, using standardized techniques

described in Birkhead and Nettleship (1980). For each site where an egg was present at the start of observations, the timing of hatching or loss of the egg was recorded, usually within 24 h. Laying dates of eggs that survived to hatch were calculated from hatching dates using a mean incubation period of 32 days. Counts of all individuals (in adult plumage) within boundaries of each study plot (G1, G4, N1, Q1, Q4, S1, & U) were made daily between 1700 h and 1900 h. Status checks of all sites on plots G1, G4, N1, and Q4 were made on 2, 4 and 6 August.

RESULTS

A. Northern Fulmar

Daily counts and status of sites

The daily counts for each of the seven Northern Fulmar study plots observed in 1988 are given in Table 2 and plotted in Fig. 2. There was a clear, cyclical attendance pattern of adults at all plots with concordance between plots. On the first visit (19 July), attendance was increasing to a peak that occurred around 22-23 July. Attendance then dropped dramatically to a trough around 25-26 July. One more cycle occurred before the last visit (8 August) with a peak and trough occurring around 29-30 July and 3 August, respectively. The mean daily count of 400 individuals (i) for all plots combined was similar to that recorded in 1976 (418 i) and 1977 (438 i) for about the same time period. Mean values for Plots A and G were lower, and Plot H slightly higher, than the baseline years, with the other 4 plots remaining the same. Numbers of birds present on Plot A varied from 1 to 21 during the daily counts (n=19), with no active pairs identified, a marked decline from that observed earlier (1975-78).

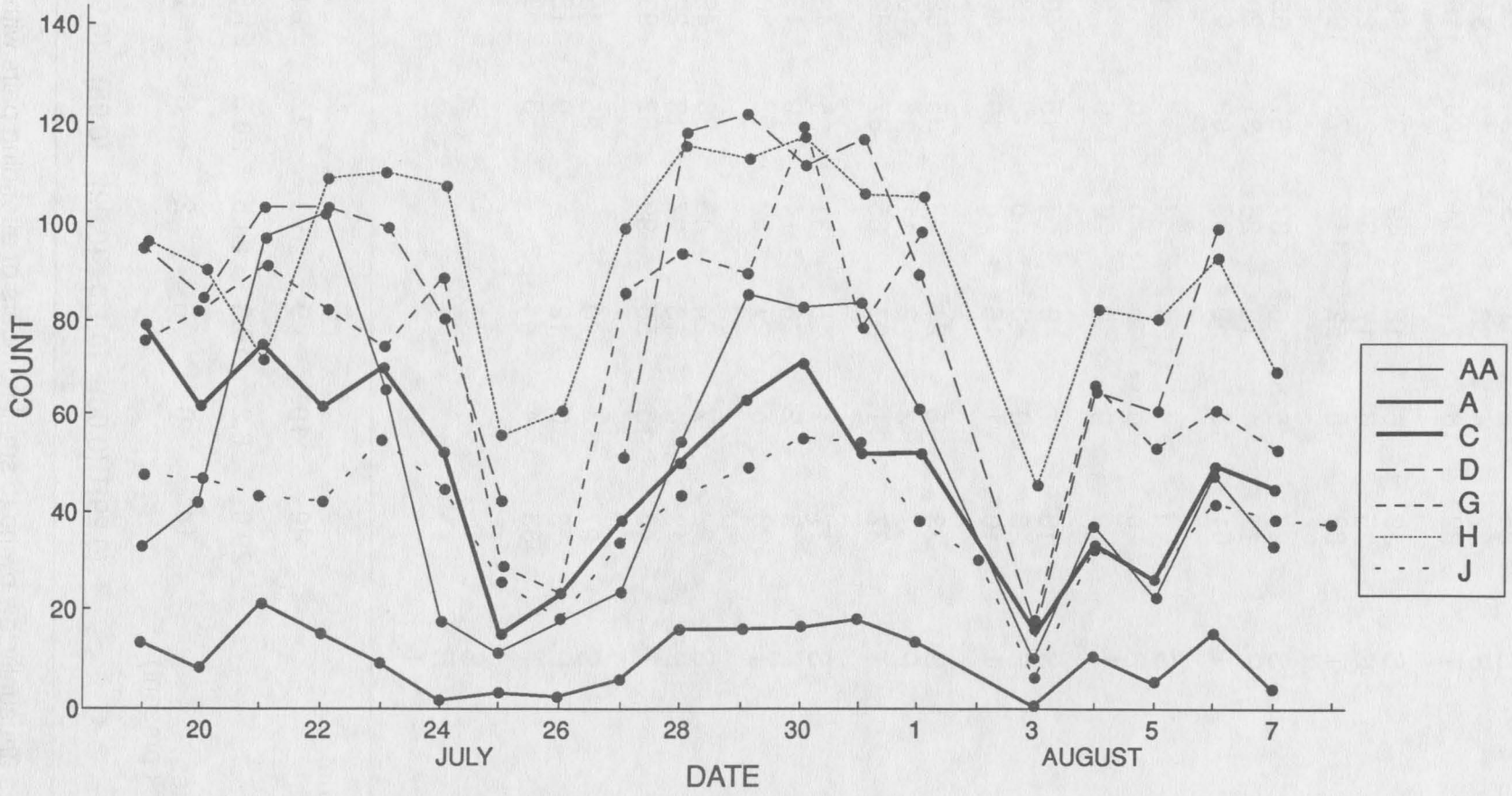
TABLE 2. Daily counts of Northern Fulmars on study plots at Prince Leopold Island, 1988.

Date	Count Unit	Study Plot						
		AA	A	C	D	G	H	J
19 July	Singles(S)	19	7	27	43	26	47	17
	Pairs(P)	7	3	26	26	25	25	15
	Total(T)	33	13	79	95	76	97	47
20	S	26	6	25	42	30	55	19
	P	8	1	18	21	26	18	14
	T	42	8	61	84	82	91	47
21	S	49	9	26	45	19	34	23
	P	24	6	24	29	36	19	10
	T	97	21	74	103	91	72	43
22	S	32	7	23	35	30	49	20
	P	35	4	19	34	26	30	11
	T	102	15	61	103	82	109	42
23	S	35	7	18	43	29	50	25
	P	15	1	26	28	23	30	15
	T	65	9	70	99	75	110	55
24	S	16	2	24	34	33	60	19
	P	1	0	14	23	28	24	13
	T	18	2	52	80	89	108	45
25	S	12	1	11	22	19	38	12
	P	0	1	2	10	5	9	7
	T	12	3	15	42	29	56	26
26	S	13	2	17	-	12	47	6
	P	2	0	3	-	6	7	6
	T	17	2	23	-	24	61	18
27	S	17	2	24	25	30	57	18
	P	3	2	7	13	28	21	8
	T	23	6	38	51	86	99	34
28	S	31	6	23	48	34	64	21
	P	12	5	14	35	30	26	11
	T	55	16	51	118	94	116	43
29	S	33	4	27	48	25	57	23
	P	26	6	18	37	32	28	13
	T	85	16	63	122	89	113	49

TABLE 2 (cont'd)		AA	A	C	D	G	H	J
30 July	S	28	8	11	45	34	50	20
	P	27	4	30	33	43	34	18
	T	82	16	71	111	120	118	56
31	S	33	6	18	49	33	56	32
	P	25	6	17	34	23	25	11
	T	83	18	52	117	79	106	54
1 August	S	27	5	16	37	37	65	26
	P	17	4	18	26	31	20	6
	T	61	13	52	89	99	105	38
2	S	f	f	f	f	f	f	14
	P	o	o	o	o	o	o	8
	T	g	g	g	g	g	g	30
3	S	10	1	9	f	15	40	6
	P	0	0	3	o	2	3	0
	T	10	1	15	g	19	46	6
4	S	23	5	21	43	35	62	25
	P	7	3	8	11	16	10	4
	T	37	11	37	65	67	82	33
5	S	17	1	15	31	35	48	16
	P	3	2	6	14	9	16	5
	T	23	5	27	59	53	80	26
6	S	22	7	24	45	36	49	22
	P	13	4	13	27	13	22	10
	T	48	15	50	99	62	93	42
7	S	27	4	20	-	35	45	24
	P	3	0	12	-	9	12	7
	T	33	4	44	-	53	69	38
8	S	-	-	-	-	-	-	21
	P	-	-	-	-	-	-	8
	T	-	-	-	-	-	-	37
Mean count total birds		49	10	49	90	72	91	39
SD		29.9	6.2	19.3	24.5	26.6	21.8	12.4
Active sites (egg/chick present)		14	0	6	2	6	0	5
k-value[1]		(0.29)[1]	(0.00)	(0.12)	(0.02)	(0.08)	(0.00)	(0.13)

[1] *k*-values unusually low owing to small numbers of attending pairs with egg or chick (see text).

FIGURE 2. Daily counts of Northern Fulmars on study plots at Prince Leopold Island, 1988.



Appendix 4 shows adult attendance and site contents for all Northern Fulmar plots on each day of observation. Only the contents of sites in Plots AA, C and G were recorded systematically. There was a combined total of 33 active sites (those with either an egg or chick) in the seven plots examined, 26 in AA, C and G, and a minimum of seven sites in Plots D and J (Table 2). A total of 150 other sites in these plots were attended by adults but did not contain an egg or chick. An additional 27 sites previously used in these plots were unattended through the observation period.

Timing of breeding

Of the 26 active sites in Plots AA, C and G, timing of hatching could be determined in only six cases and then usually to within a few days only. All chicks hatched between 23-31 July with four hatching between 24-28 July. Back-dating by using a mean incubation period of 48 days (for PLI fulmars 1975-77: D.N. Nettleship, unpubl.) gives approximate dates of laying for these eggs of 5-12 June. These hatching dates and estimated times of laying are similar to those for 1975-77.

Breeding performance

Only 14% (n=33) of the expected number (1976 & 77: x = 245) of active sites were present at the seven plots (AA, A, C, D, G, H, J) in 1988. Of the 26 eggs known to have been laid in Plots AA, C and G, only one disappeared during the observation period. Of the 22 chicks known to have hatched in the three plots, two disappeared soon after hatching. Thus, survival of eggs and chicks that were present during the study period seemed normal.

B. Glaucous Gull

Number of nests and brood size

A minimum of 11 pairs of Glaucous Gulls were found nesting near the top of the east cliffs between plots AA and Z, 10 of which had at least one chick (Fig. 3). Four broods contained three chicks each, three contained two chicks and three contained one chick.

There was no evidence of breeding at the South Spit Glaucous Gull colony. A check on 24 July of 20+ old nest scrapes and the surrounding area revealed little evidence of nesting activity. Two gulls, perhaps a pair, were present on a seaward gravel ridge adjacent to the colony area during the inspection, but no eggs or young were found.

A walk along the gravel beach at the base of the lower cliffs along the south coast (west of the South Spit) was made on 1 August. Three adult Glaucous Gulls were counted, all flying above the skree slopes of the lower cliffs of the Black Guillemot colony. No attempt was made to locate nests.

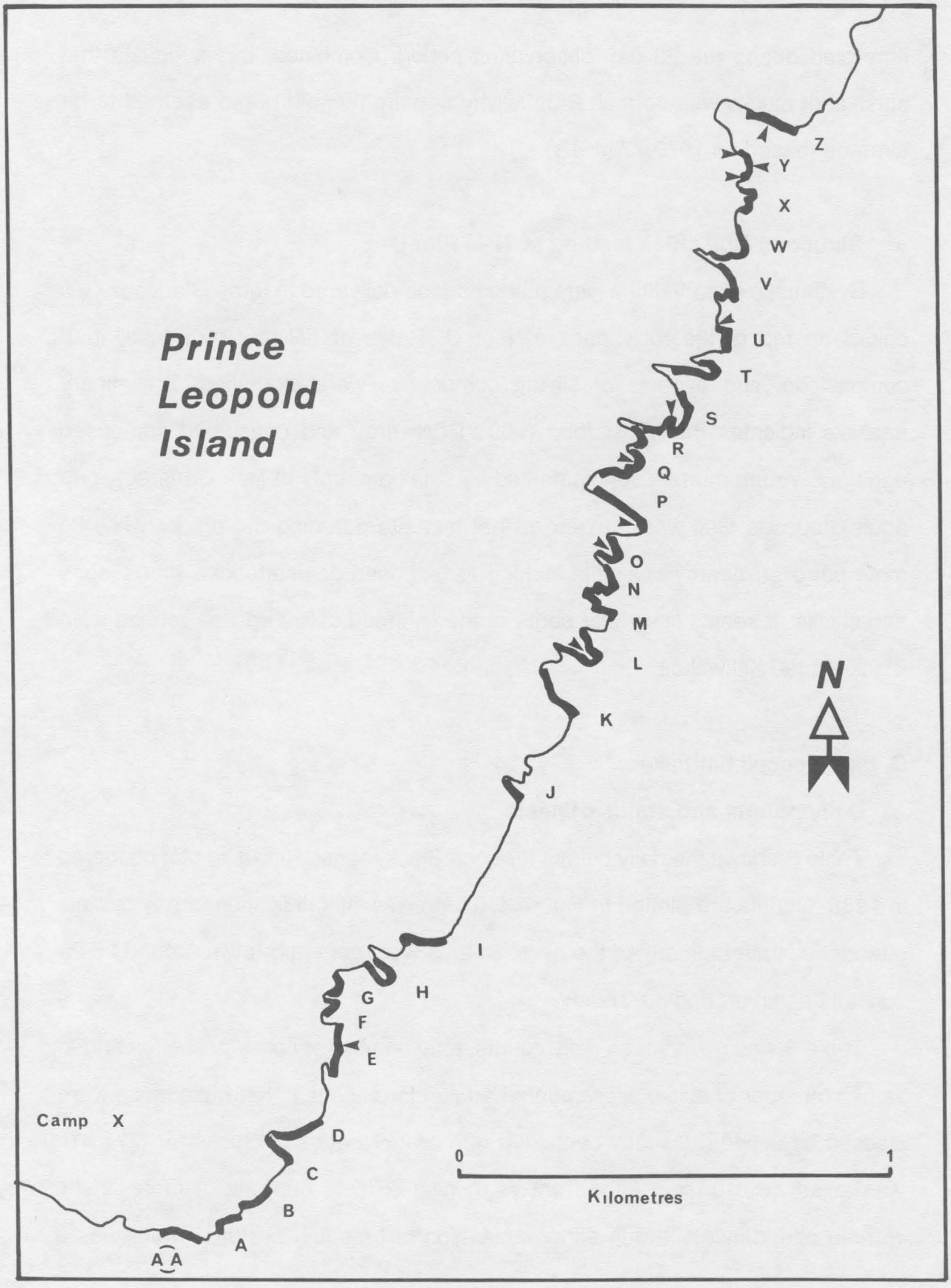
Timing of breeding

Ten of the 11 Glaucous Gull nests examined between AA and Z contained chicks when first examined 18-25 July; one nest at Z was empty. No hatching was thus observed. Rough estimates of chick age suggest that some chicks had hatched in the first or second week of July. Laying would therefore have occurred about four weeks earlier, in the second week of June. It therefore appears that timing of laying fell within the normal range.

Breeding performance

All six chicks present at S1 and U (2 broods, 3 chicks each) on 18 July, survived to 8 August. Only one of 15 other chicks observed for varying lengths of

FIGURE 3. Distribution of study areas along the East Cliff colony, and locations of Glaucous Gull nest sites in 1988 (➢).



time died during the 22 day observation period. Combined, this suggests that survival of chicks was normal. Productivity of pairs that did breed seemed to be average (based on 1975-77 levels).

Glaucous Gull chick feeding at TBM Plot U

Systematic observations were made on food delivered to three Glaucous Gull chicks on top of the rock stack at Plot U. Rates of delivery by adults, food composition, and aspects of sibling competition were examined. Preliminary analysis indicates that most food (>80%) delivered and consumed comprised eggs and young murres, supplemented by small amounts of fish. Generally, one adult Glaucous Gull was present at the nest site guarding the chicks while its mate patrolled nearby sea-cliffs looking for exposed or unattended murre eggs and chicks. It seems likely that some of the fish food delivered was robbed from Black-legged Kittiwakes.

C. Black-legged Kittiwake

Daily counts and status of nests

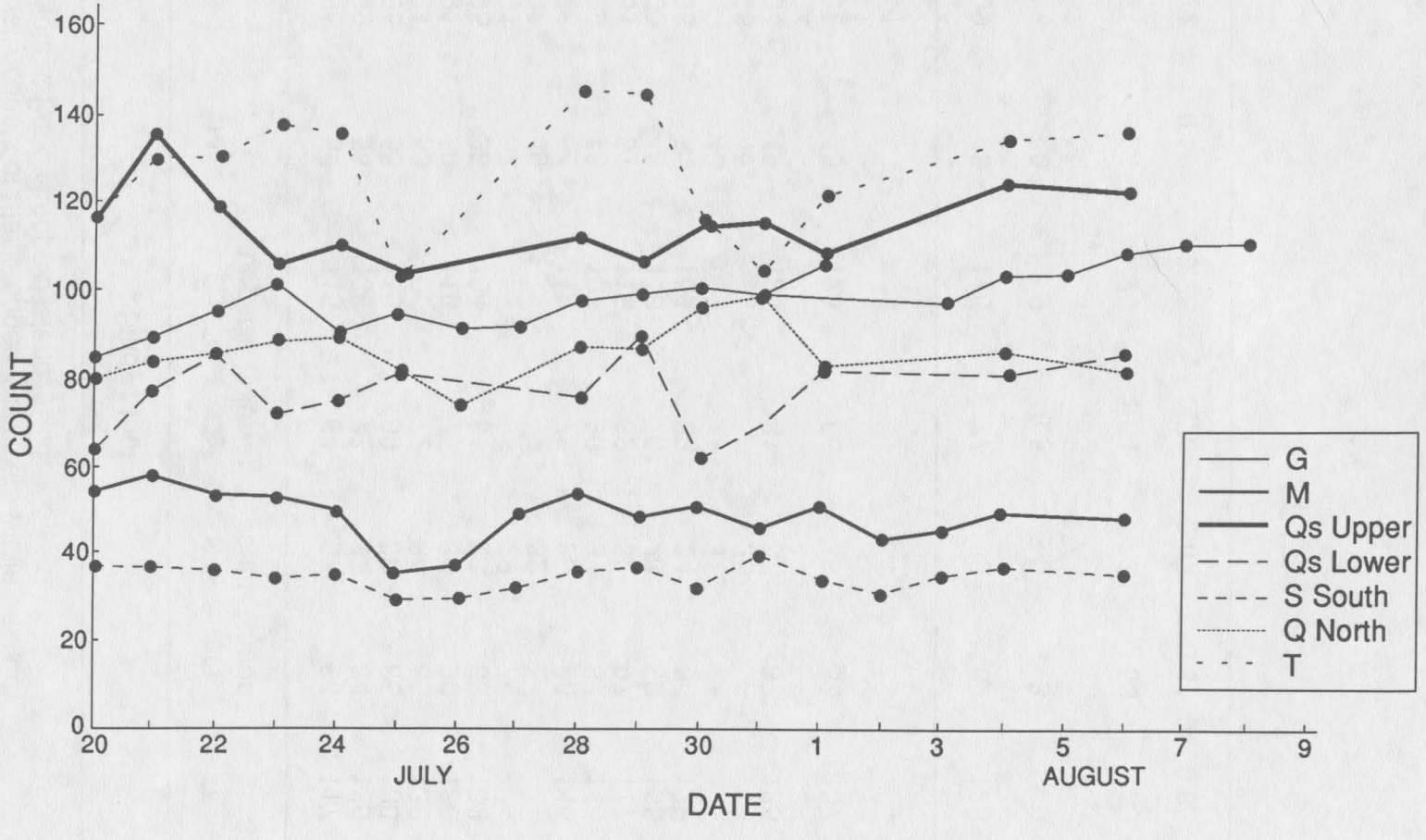
Table 3 shows the daily counts for each Black-legged Kittiwake plot observed in 1988. Counts are plotted in Figure 4. There was little indication of any cyclical attendence pattern in any of the plots. Counts were generally lower around 25-26 July and again around 30-31 July.

Table 3 also gives mean daily counts, total number of active nest-sites and *k*-values (number of active sites/count of adults) for each plot. Kittiwake nests were classed as active if (1) they contained one or more eggs or chicks, or (2) there was evidence of recent (in current year) nest-building and one or more adults were in attendance showing either incubation or brooding posture. There was a

Table 3. Daily counts of Black-legged Kittiwakes within on study plots at Prince Leopold Island, 1988.

Date	Study Plot						
	G	M	Qs upper	Qs lower	S south	Q north	T
20 July	85	54	115	64	37	80	117
21	89	58	136	77	37	84	130
22	95	53	119	86	36	86	130
23	101	53	106	72	34	89	138
24	91	50	110	75	35	90	136
25	95	35	104	81	29	83	103
26	91	37	-	-	29	74	-
27	92	49	-	-	32	-	-
28	98	54	112	76	36	88	146
29	99	48	107	90	37	87	145
30	101	51	115	62	32	97	117
31	100	46	116	70	40	99	105
1 August	106	51	109	82	34	84	122
2	-	43	-	-	31	-	-
3	98	45	-	-	35	-	-
4	104	49	125	81	37	87	135
5	104	-	-	-	-	-	-
6	109	48	123	86	36	83	137
7	111	-	-	-	-	-	-
8	111	-	-	-	-	-	-
Mean	99	48	115	77	35	87	128
SD	7.5	6.0	8.9	8.5	3.0	6.3	14.0
Active nests	71	24	90	54	23	53	83
k-value	0.72	0.50	0.78	0.70	0.67	0.61	0.65

FIGURE 4. Daily counts of Black-legged Kittiwakes on study plots at Prince Leopold Island, 1988.



total of 398 active nests in all plots combined. The number of active nest-sites in each plot represented from 49% to 78% of the mean number of adults counted in each plot (k-values) with an average *k*-value of 0.68.

Appendix 5 shows the nest contents of Black-legged Kittiwakes in Plots G and M for each day of observation. Daily observations of nests in Plots G and M allowed a more detailed account of nest status than at other plots. In Plot G, a total of 67 nests contained one or more eggs or chicks, and was attended regularly by adults. An additional 14 nests were empty (no egg or chick present), but were attended on a regular basis by adults. Fourteen nest-sites that had been used in previous years were abandoned; five of these had Thick-billed Murres in regular attendance. The status of four sites could not be determined because of obstructions to vision (cliff overhangs, etc.), but were regularly attended by adults in incubating or brooding postures. In Plot M, a total of 24 nests contained one or more eggs or chicks, and was attended regularly by adults. Five nests were attended regularly by adults but contained no eggs or chicks. Seventeen previously occupied sites were found without kittiwakes, of which eight were attended by Thick-billed Murres and one by Northern Fulmars.

A summary of status and breeding biology information for Black-legged Kittiwakes nesting in Plots G and M is given in Table 4.

Timing of breeding

Timing of breeding could be determined at plots G and M. The great majority of nests in both plots contained eggs on the first visit (Plot G: 20 July, Plot M: 21 July). No chicks were seen at that time. Subsequently, two clutches were initiated in Plot G, one each on 22 and 23 July; no new clutches were laid on Plot M. The late clutches on G (2-egg and 1-egg, respectively) had not hatched when observations terminated on 7 August.

TABLE 4. Summary of breeding biology of Black-legged Kittiwakes nesting in Plots G and M, Prince Leopold Island, 1988.

Measure	Plot G	Plot M
No. sites with egg(s) or chick(s)	67	24
No. sites with no eggs or chicks but regularly attended by one or more adults	14	5
No. sites used in previous years and abandoned in 1988	14	17
% of hatch completed by end of observations	85	96
Median and mean date of hatching	31 July	29-30 July
SD	3.7 days	3.3 days
Date of first hatch in plot	22 July	25 July
Median date of laying (assume 27 d incubation period)	4 July	2-3 July
Date of first laying (assume 27 d incubation period)	25 June	28 June
Mean clutch size	1.70	-[1]
SD	0.47	-[1]
No. eggs lost of minimum of 105 eggs laid in Plot G and 37 eggs in Plot M	6-7	1
No. chicks missing or dead	0-1	1

[1] Observations inadequate to determine value.

In Plot G, 55 clutches had hatched by the time observations ended, which represented 87% of the potential hatch (eight clutches that could have hatched, remained at this time). The proportion hatching in Plot M was higher at 96% (21 clutches hatched with one remaining). Figure 5 shows the number of clutches in which hatching had started for each day of observation in each plot. Hatching peaked in both plots between 29-31 July with median and mean dates of hatching on 31 July (± 3.7 days) in Plot G, and on 29 and 30 July, respectively, in Plot M. Back-dating by the incubation period of 27 days gives a mean laying date of around 4 July. First hatching in the plots was on 22 July, which gives an approximate date of first eggs of 25 June.

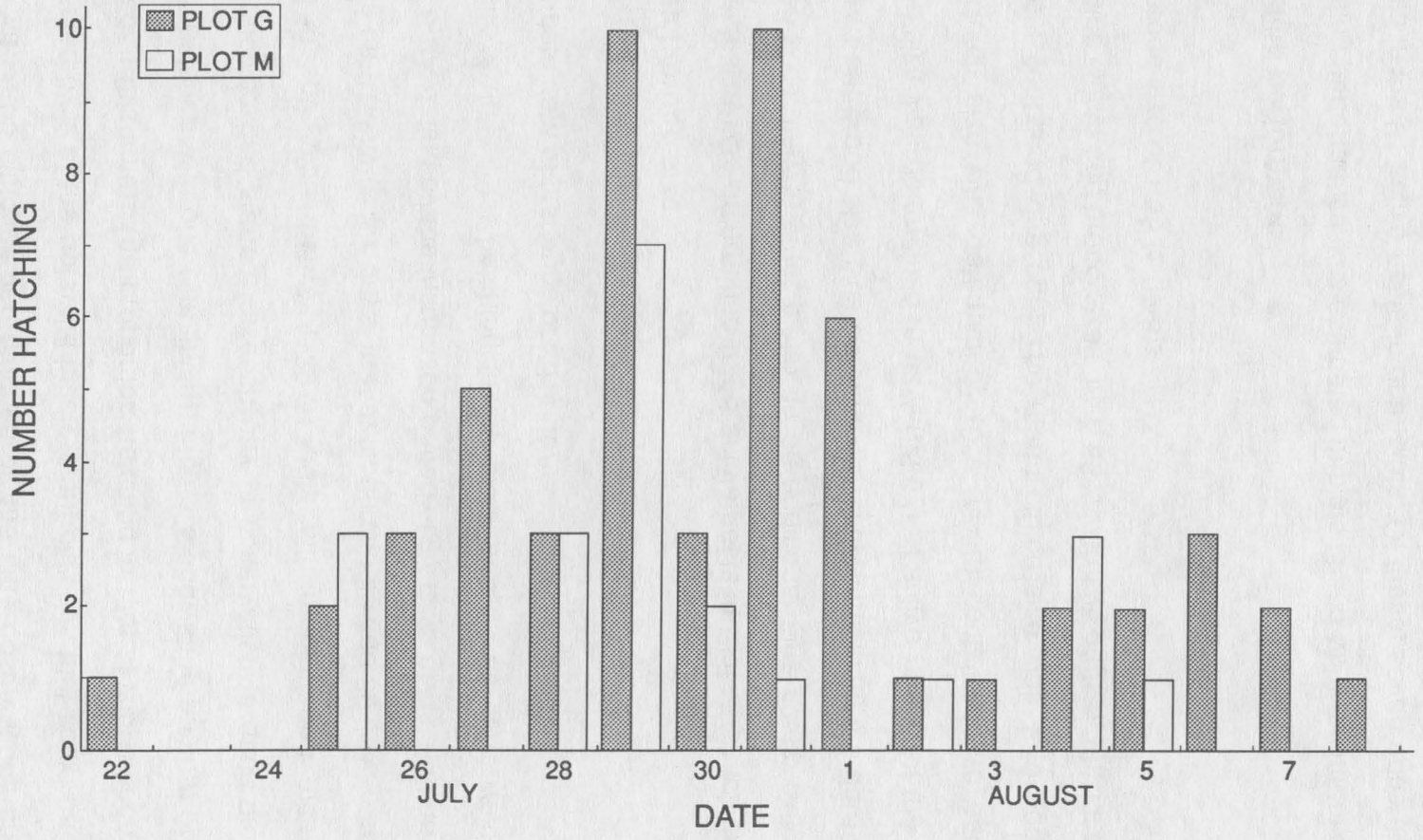
Clutch/brood size

Clutch size was determined in 46 active nests in Plot G (clutch size was not recorded accurately in other plots). In an additional nine nests, clutch size was not known but brood size was determined. Thus combining the data sets, clutch or brood size was determined in 82% (55/67) of active nests. Of the 46 nests in which clutch size was determined, 70% (n=32) contained two eggs and the remainder contained one egg. The mean clutch size was 1.70 eggs (± 0.47). Combining clutch and brood sizes gave 66% with two eggs or chicks and a mean clutch/brood size of 1.65 (± 0.48).

Breeding performance

Breeding performance was estimated in plots G and M. A minimum of 142 eggs were laid in the 91 active nests in both plots. Of these, seven eggs (six in Plot G and one in Plot M) and one egg or chick from Plot G, and one chick from Plot M disappeared between visits. No other chicks disappeared or died during the study

FIGURE 5. Timing of hatching of Black-legged Kittiwakes on study plots G and M at Prince Leopold Island, 1988.



period. Combined, this gives a survival rate of 93.7% for eggs and chicks through the 21 days of observation.

D. Thick-billed Murre

Daily counts and status of breeding sites

The daily counts for each Thick-billed Murre plot monitored in 1988 are given in Table 5 and plotted in Figure 6. There was little indication of any cyclical attendence pattern in any of the plots. Counts were generally lower around 25-26 July and again around 30-31 July and 3 August, dips that corresponded in timing with those observed for both Northern Fulmars (Table 2) and Black-legged Kittiwakes (Table 3).

The 1988 mean count for all murre plots combined was 1228.0 birds (±50.2, n=16), a value that is significantly higher than either the 852.4 (±66.0, n=18) or the 1004.1 (±67.5, n=19) values recorded in 1976 ($P<0.001$, $t=18.5$, $df=32$) and 1977 ($P<0.001$, $t=11.0$, $df=33$), respectively (Table 6). A comparison with 1977 figures (the most representative of the baseline years, 1975-77) indicates that mean numbers in 1988 were much higher in plots G4, N, and Q4, with only small differences at the other four plots (G1, Q4, S1, U) (Table 6). Overall, the trend during the study period (1975 to 1988) is a steady increase in the mean counts for most of the plots under observation.

Table 5 also gives mean daily counts, total number of active sites for Plots S1 and U, and *k*-values (number of active sites/count of adults) for these plots. Murre breeding sites were classed as active if they contained an egg or chick. There was a total of 239 active sites within combined plot boundries. As a proportion, the number of active sites in plots S1 and U represented 0.61 and 0.72 repectively of the mean number of adults counted in each plot (*k*-values).

TABLE 5. Daily counts of Thick-billed Murres on study plots at Prince Leopold Island, 1988.

Date	Study Plot							Totals
	G1	G4	N		Q1	Q4	S1	U	
18 July	81	155	289		256	109	279	77	1246
19	79	162	200		259	104	291	89	1184
20	75	130	216	(31/32)[1]	251	112	-[2]	87	-
21	82	159	266	(36/22)	274	114	325	97	1317
22	82	164	223	(30/22)	257	121	314	78	1239
23	93	156	216	(29/21)	254	114	331	84	1248
24	85	147	208	(30/22)	251	116	322	83	1212
25	76	154	211	(29/16)	237	116	299	73	1166
26	65	111	fog		fog	fog	249	76	-
27	78	143	fog		fog	fog	276	75	-
28	89	158	210	(25/29)	281	128	293	86	1245
29	96	159	217	(29/26)	297	122	318	79	1288
30	87	127	258	(26/34)	214	110	274	78	1148
31	100	164	221	(18/27)	247	111	333	76	1252
1 August	105	173	216	(22/33)	287	115	307	78	1281
2	77	fog	fog		fog	fog	274	77	-
3	77	139	189	(17/30)	fog	fog	271	79	-
4	102	171	221	(23/30)	265	116	309	87	1271
5	100	159	198	(24/27)	fog	fog	278	74	-
6	93	151	212	(16/27)	255	115	310	79	1215
7	93	153	213	(21/29)	241	105	293	78	1176
8	83	154	212	(23/29)	240	104	286	81	1160
Mean	86	152	221		257	114	297	81	1228
SD	10.4	15.0	24.4		20.0	6.4	22.8	5.8	50.2
N	22	21	19		17	17	21	22	16
Active sites	-[2]	-	-		-	-	181	58	-
k-values	-	-	-		-	-	0.61	0.72	-

[1] Count values for two expansion areas in parentheses: (birds below plot/birds off corner of plot).
[2] No data or not determined.

FIGURE 6. Daily counts of Thick-billed Murres on study plots at Prince Leopold Island, 1988.

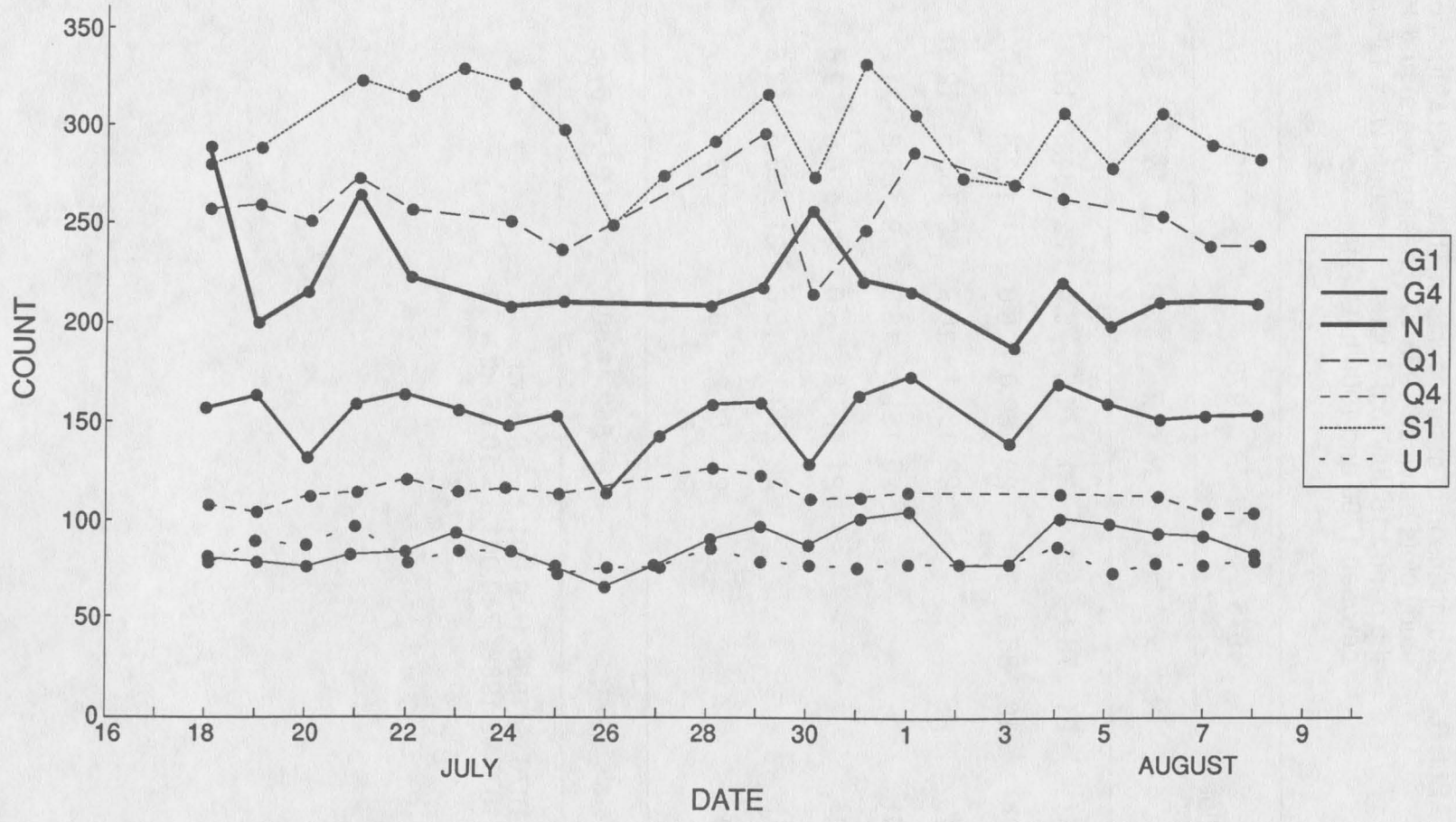


TABLE 6. Comparison of mean counts of Thick-billed Murres on seven study plots between 1975-77 (baseline years) and 1988 for the period 18 July to 8 August. All counts were taken between 1700 and 1900 h (CDT).

Plot	1975			1976			1977			1988		
	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD
G1	21	78.1	6.1	21	74.6	6.4	22	84.6	10.4	22	86	10.4
G4	19	88.6	7.6	20	89.0	8.0	21	102.5	14.0	22	152	15.0
N	-	-	-	22	138.1	16.9	20	165.5	12.3	19	221	24.4
Q1	-	-	-	20	151.6	16.3	19	183.8	21.6	17	257	20.0
Q4	-	-	-	21	104.8	6.0	20	116.6	9.6	17	114	6.4
S1	-	-	-	22	220.1	15.8	21	256.6	18.5	21	297	22.8
U	-	-	-	21	80.2	8.3	22	89.1	6.7	22	81	5.8
Totals	-	-	-	18	852.4[1]	66.0	19	1004.1[2]	67.5	16	1228	50.2

[1] 1976 vs 1988: $P<0.001$, $t = 18.5$, $df = 32$.
[2] 1977 vs 1988: $P<0.001$, $t = 10.95$, $df = 33$.

A comparison of the total number of active sites identified in 1988 against those recorded in 1975-77 indicates small increases in both Plots S1 and U, 8% and 5.4% respectively (Table 7).

The contents of all sites in Plots S1 and U on each day of observation are tabulated in Appendix 6. Some active sites outside the perimeter of each plot are also included, four in S1 (181 active within, 4 outside) and 27 in U (58 within, 27 outside). Appendix 7 shows adult attendance and site contents of four of the five Thick-billed Murre plots (G1, N, Q1, Q4) not studied in detail in 1988. These data are intended to provide only a coarse index of "status" of sites based on limited observation (<1 day per plot). Of 434 sites identified in the four plots, 398 (91.7%) were considered "active" (estimated or known to have an egg or chick) of which 57 (14.3%) were "new" (based on 1975-77 baseline); 36 "old" sites (8.3%) were unoccupied (i.e., vacant). The data are summarized in Table 8.

Timing of breeding

Timing of breeding was determined at Plots S1 and U. The great majority of sites in both plots contained eggs on the first visit (18 July). No chicks were seen at that time. Subsequently, five new eggs were laid, all in Plot S1. Principal features of the 1988 breeding regime for murres are summarized in Table 9.

In Plot S1, 96 clutches had hatched by the time observations had ceased, which represented 55% of the potential hatch (n=174). The proportion hatching in and adjacent to Plot U was higher at 71% (58 of a potential 82 eggs hatched by 8 August). Figure 7 shows the number of clutches in which hatching had started for each day of observation in each plot. Hatching peaked in both plots between 31 July and 1 Aug with median and mean dates of hatching on 31 July (± 4.1 days) in Plot S1 and on 1 Aug (± 3.2 days) in Plot U. Back-dating using an incubation period of 32 days give mean laying dates of around 29 June. The first chick to

TABLE 7. Comparison of numbers of active sites on Thick-billed Murre Study Plots S1 and U between 1975-77 (baseline years) and 1988.

Year	Plot S1	Plot U	Totals
1975	171	63	234
1976	162	52	214
1977	168	50	218
Mean 1975-77	167	55	222
1988	181	58	239
% Difference (1975-77 vs 1988)	8.3	5.4	7.7

TABLE 8. Status check of Thick-billed Murre plots (G1, N, Q1, Q4) not studied in detail at Prince Leopold Island, 1988.[1]

Plot	Date of inspection	Number of sites	"Old" sites vacant[2]		Number of "active" sites	"New" active sites[3]	
			N	%		N	%
G1	6 August	75	11	14.7	64	15	23.4
N	6 August	113	8	7.1	105	7	6.7
Q1	2,4 August	149	8	5.4	141	28	19.9
Q4	2 August	97	9	9.3	88	7	7.9
Totals		434	36	8.3	398	57	14.3

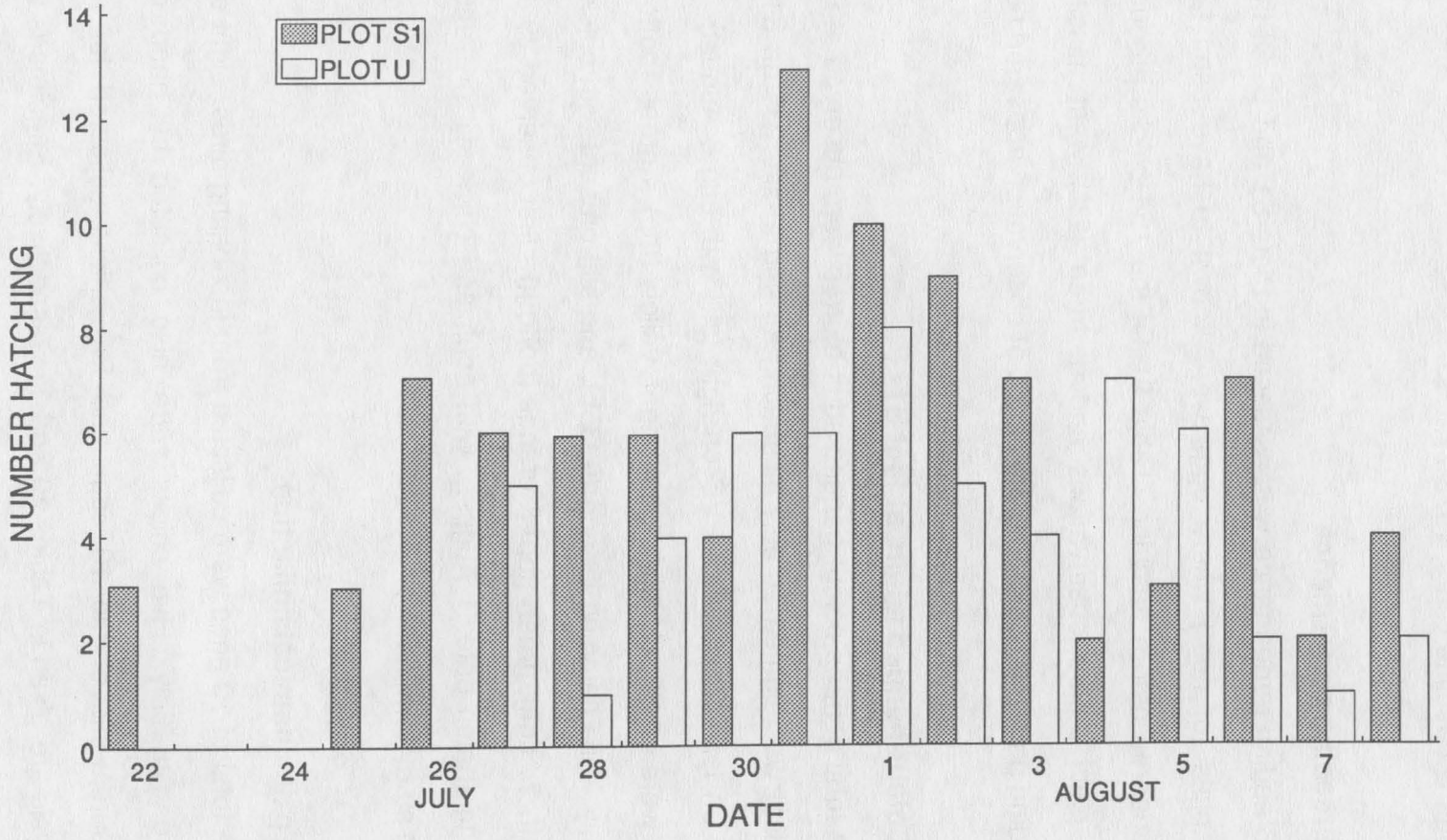
[1] Plot G4 was not examined owing to fog.
[2] "Old" sites not occupied in 1988 (empty: no adult, egg, or chick).
[3] Sites not occupied on 1975-77 baseline plot photos.

TABLE 9. Summary of breeding biology of Thick-billed Murres breeding in Plots S1 and U, Prince Leopold Island, 1988.

Measure	Plot S1	Plot U
No. sites with egg(s) or chick(s)	185[1]	85[1]
% of hatch completed by end of observations	55	71
Median and mean date of hatching	31 July	1 Aug
SD	4.1 days	3.2 days
Date of first hatch in plot	22 July	27 July
Median date of laying (assume 32 day incubation period)	29 June	30 June
Date of first laying (assume 32 day incubation period)	20 June	25 June
No. eggs lost of 185 and 85 laid in or near Plots S1 and U	6 (3%)	3 (4%)
No. chicks missing or dead	2	1

[1] Note: some sites outside plot boundaries are included, 4 under S1 (i.e., 181 within plot S1) and 27 under U (i.e., 58 within plot U).

FIGURE 7. Timing of hatching of Thick-billed Murres on study plots S1 and U at Prince Leopold Island, 1988.



hatch in the plots did so on 22 July giving an approximate date of first eggs of 20 June. Thus, timing of breeding by murres in 1988 was similar to that recorded during the baseline years, 1975-77.

Breeding performance

Breeding performance was assessed in Plots S1 and U. Of the 270 sites in both plots (or near) where eggs were known to have been laid, nine (3%) disappeared before hatching (Table 9). Of the 154 chicks produced in or near both plots before observations ended, three (2%) went missing. Generally, breeding performance during the period of observation appeared normal.

Colour-banded adults at Plot S1

A total of three colour-banded adult murres were observed at Plot S in 1988. The first was sighted 20 July incubating an egg at site 235 on S1: monel metal band on left tarsus, white PVC on right (still with egg 8 August). The other two birds were on S2: (1) left, monel / right, yellow (top) & green (bottom) - first seen 28 July while hatching its egg (0935h), and still present with chick on 8 August; (2) left, ? / right, green (top) & orange (bottom) - first observed 29 July incubating an egg (hatch date: 1 August), with adult and chick still present on 8 August when study terminated.

Toxic chemical collection

A total of 10 eggs were collected from incubating birds, eight on 21 July and two on 28 July. Five chicks were also collected by hand on 6 August. Measurements of the 10 eggs and five chicks collected for toxic chemical analysis are given in Tables 10 and 11, respectively. Specimens were frozen in

TABLE 10. Measurements of eggs of Thick-billed Murres collected for toxic chemical analysis at Prince Leopold Island, 1988.

Egg No.	Date (1988)	Length (mm)	Breadth (mm)	Volume Index ($L \cdot B^2 \cdot 10^{-3}$)	Mass (g)	Density Index (M/VI)
1	21 July	73.6	48.2	171.0	81.0	0.47
2	"	76.8	52.2	209.3	100.0	0.48
3	"	77.1	49.6	189.7	85.0	0.45
4	"	80.8	50.9	209.3	97.0	0.46
5	"	75.7	48.6	178.8	86.0	0.48
6	"	76.5	52.2	208.5	99.0	0.48
7	"	79.1	47.2	176.2	86.0	0.49
8	"	75.3	49.8	186.7	83.0	0.45
9	28 July	82.3	46.1	174.9	84.5	0.48
10	"	76.9	46.5	166.3	81.0	0.49

TABLE 11. Measurements of Thick-billed Murre chicks collected for toxic chemical analysis at Prince Leopold Island, 6 August 1988.

Chick No.	Winglength left (mm)	Winglength right (mm)	Culmen length (mm)	Nostril to tip (mm)	Tarsus left (mm)	Tarsus right (mm)	Mass (g)	Remarks
1	58	59	19.5	14.2	37.8	37.7	222	Egg tooth present
2	65	67	17.9	13.0	36.1	36.7	209	Egg tooth present
3	45	46	15.5	11.0	34.8	34.7	159	Egg tooth present
4	54	54	18.8	12.8	37.1	36.3	195	Egg tooth present
5	52	53	17.8	12.4	33.6	35.2	181	Egg tooth present

Resolute and transported south. They are presently (March 1989) being analysed at the CWS National Wildlife Research Centre (D.B. Peakall, Toxicology Research Section, Hull, P.Q.).

Boat survey of East Cliff and North colonies

A photographic survey of the East Cliff and North Spit Thick-billed Murre colonies was conducted on 23 July 1988. The sea-cliffs were photographed by DNN from a 4-m inflatable boat using a Pentax 6x7 camera with 5-TMY-120 black & white film. Photo mosaics were taken of the East Cliff Colony and North Colony between 1315-1535 h and 1610-1635 h, respectively. Low light levels made photo conditions during the North Colony survey poor. An attempt to rephotograph these cliffs on 1 August was aborted owing to heavy onshore ice. Inclement weather conditions from 1-8 August precluded a third attempt.

The photographic negatives summarized in Table 12 are on file. Budgetary reductions imposed on the project in late 1988 prevented photo analyses from being performed.

E. Black Guillemot

No attempt was made to survey Black Guillemots in 1988. A brief examination of the low-cliff southwest colony (immediately west of the South Spit) on 1 August between 0700 and 0900 h revealed some information. Most breeding sites observed appeared active, based on defecation staining at the entrance of each rock crevice or fissure. Twenty to 24 birds were seen on the water off the colony at different times, most in small groups of 6-10 individuals. Four single birds were noted sitting at entrances to their breeding site, vocalizing softly with a high-pitched, plaintive call. Most breeding site numbers painted on the rocks by DNN

TABLE 12. Photographic survey by boat of the East Cliff and North Spit Thick-billed Murre colonies, Prince Leopold Island, 23 July 1988.[1]

Roll # (PLI 88)	Frames	Details		Time (CDT)	Remarks
		Sp[2]	F[3]		
A. East Cliff Colony:					
BW-1	1-2	1/500	11	1300-	TBMs on water, South Spit.
	3-5			1315	S. Spit to start east cliffs.
	6-10				East cliffs.
BW-2	1-10	1/500	8	1316-	From A - C - I with distant
				1330	shots to Z cliffs.
BW-3	1-10	1/500	8&5.6	1350-	Retake of BW-2 using vertical
				1420	format: start east cliffs to H.
BW-4	1-10	1/500	5.6-8	1425-	Cliffs at H to c. M.
				1450	
BW-5	1-10	1/500	5.6-8	1450-	From c. M to W.
				1510	
BW-6	1-10	1/500	5.6	1515-	From W to just past Z (end
				1535	of TBM colony); f8-10 blank.
B. North Spit Colony:					
BW-7	1-10	1/500	4	1610-	West side of colony, but looking
				1620	into sun (cliffs in shade).
BW-8	1-7	1/500	4	1625-	Remainder of colony to east.
				1635	
	8-10			c. 1730	South Spit area on water.

[1] Executed with Pentax 6x7cm (200mm lens) using TMY-120 (ASA 400).
[2] Shutter speed
[3] F. stop

in 1977 were still present and legible. Small numbers (total: 10-20 i) of guillemots were also seen on the water during the boat survey of the East Cliffs and North Colony on 23 July between 1300 and 1800 h, but no systematic count was performed.

F. General Bird and Mammal Observations

A daily log of observations of other aquatic and terrestrial birds and mammals sighted was maintained throughout the study period at Prince Leopold Island. Highlights are given below.

Birds

Common Eider *Somateria mollissima*.- Three (1 male, 2 females) seen on the water off the beach area of the South Spit c. 2200 h, 25 July (WWL).

Gyrfalcon *Falco rusticolus*.- White-phase bird seen flying near J at 1600 h, 24 July, being chased and mobbed by 3 Glaucous Gulls (BvF). Two sightings of dark-phase birds were recorded, one below G at 1020 h, 29 July (JWC) and another flying inland from J at 1150 h, 31 July (WWL).

Parasitic Jaeger *Stercorarius parasiticus*.- Single adult (dark phase) seen flying over wet "meadow" area inland near M on 4 August (JWC & BvF).

Ivory Gull *Pagophila eburnea*.- Two individuals flying by east cliffs off Plots A and AA at c. 1845 h, 29 July (DNN). Single bird observed flying north near Q at c. 1700 h, 1 August (JWC & WWL).

Common Raven *Corvus corax*.- Common, recorded almost daily, often in family groups. A group of 4 ravens (2 adults, 2 juveniles) was seen 23 July, killing and eating an adult Black-legged Kittiwake near camp (see below for details). Other group sightings, possibly of the same family, were seen 26 July (3 birds near U,

DNN), 29 July (2 near camp, EPH & DNN), 31 July (2 by U, DNN), 1 August (2 adults, 2 fledglings on ridge of South Spit, DNN), and 2 August (2 fledglings near AA, EPH).

A kill of an adult Black-legged Kittiwake flying from a small freshwater pond near camp towards the sea-cliffs by a family of ravens (2 adults, 2 juveniles) was recorded c. 1815 h, 23 July (EPH). Four ravens were observed flying c. 50 m overhead a group of 30-40 kittiwakes flying over camp at an altitude of c. 10 m towards AA. One adult raven dove (wings closed in rapid descent, much like a falcon) down on the kittiwake flock and struck one individual very hard on the back. The impact of the strike caused "feathers to fly" and the kittiwake to plummet to the ground with the raven grasping it by its claws. Once on the ground, the raven pinned the kittiwake with its feet and quickly killed it by a series of rapid jabs to the underbody. The raven was joined immediately by the other 3 ravens. The dead kittiwake was retrieved and examined (by DNN). It appeared to have been a "healthy" bird with medium fat deposition, probably a female. The ravens had torn the right side, eaten one pectoral muscle and most contents of the body cavity including stomach, intestines and gonads.

Snow Bunting *Plectrophenax nivalis*.- Common, seen daily, particularly around G and other valleys from J to Z. Some highlights include: 29 July, 1 male seen singing at 1745 h near N (EPH), and 1 female observed coming out of a rock crevice near P (WWL); 31 July, family group (?) of 2 adults (1 male, 1 female) and two fledglings seen flying together near S1 (WWL); and 4 August, concentration of 10-15 buntings (mixed adults and fledglings, 3-4 families?) observed at rocky headland adjacent to wet "meadow" area inland from M and N (JWC & BvF). Observations indicate a small breeding group of buntings may occur at this inland location.

Mammals

Arctic Fox *Alopex lagopus*.- Single fox in summer ("blue") pelage seen c. 50 m from murre Plot S1 at 2130 h, 24 July (WWL). Fresh fox scats were found beside the rock cairn at G on 3 August (JWC). The scats had been deposited between 1830 h, 2 August, when observations terminated at G and 0940 h, 3 August, when observations resumed. The scats contained egg shell fragments and small feather shafts, probably Snow Bunting remains (DNN). A small cache of dried apricots left at the site had been found and eaten by the fox (JWC).

Polar Bear *Ursus maritimus*.- One individual seen 1157 h, 3 August, walking north across pan ice c. 2 km offshore from E (JWC). Adult male identified lying down on top of gravel ridge on east side of South Spit at 1800 h, 7 August (EPH). It had moved c. 20 m farther inland by 2030 h (EPH, WWL, DNN) where it remained, apparently sleeping, until observations ceased at 2315 h (DNN). This bear probably came in on heavy pancake drift ice pushed up on the east side of the spit owing to strong NE winds (c. 30-40 kts) over 2/3 August. The bear was not sighted on the spit on 8 August.

Bearded Seal *Erignathus barbatus*.- Two individuals were seen at close range in waters at the base of the sea-cliffs off M on 23 July. One large male surfaced c. 5 m from the inflatable boat and followed it for about 5 min diving and surfacing several times close by (DNN & BvF).

Beluga *Delphinapterus leucas*.- Belugas were seen almost every day when the waters at the base of the cliffs were visible from the cliff tops (i.e., fog was absent). Three were seen on 20 July, two east of the South Spit and one off headlands H-G (EPH); another two were sighted on 21 July, one off the South Spit and the other east of Plots C and D (EPH). The largest numbers occurred on 23 July, when a total of 225 animals were counted between G and S1. A long

broken line comprising about 150 animals in groups ranging in size from single individuals to pods of 10 were recorded off S1(WWL). The first aggregation sighted totalled 90 individuals, 79 adults and 11 calves; they arrived from the east between 1119 and 1140 h and departed 10-15 min later moving S to SE. A second influx of roughly 60 animals, including at least 3 calves, arrived from the east around 1220 h. They swam amongst the ice pans for c. 15 min and then moved off southwards. Parts of these concentrations were also seen passing southwest past I and G, a total of 77 animals, including at least 4 calves, made up of two groups, 34 at 1121 h and 43 at 1224 h (JWC).

Peary Caribou *Rangifer tarandus pearyi*.- The remains of an adult male that had succumbed in the winter 1987-88 was found near S at 1900 h, 18 July 1988 (WWL & DNN). It had been evicerated with the entire exposed side eaten; teeth marks on bones and antlers suggested consumption by fox. The caribou was not present on 8 August 1987, the previous year.

DISCUSSION AND CONCLUSIONS

The results presented here indicate the timing and performance of breeding for three (Glaucous Gull, Black-legged Kittiwake, Thick-billed Murre) of the four species examined fell within the "normal" ranges recorded previously (Nettleship et al. 1984; D.N. Nettleship, T.R. Birkhead, & A.J. Gaston, in prep.). In contrast was the Northern Fulmar, where it appears that either only a small proportion of its breeding population produced eggs or egg loss prior to 18 July was unusually high. The absence of evidence in support of high egg loss suggests that few females formed and laid eggs, but those that did laid at the normal time.

A reduced production of eggs in arctic seabirds is often related to factors that control the ability of females to form eggs (Birkhead & Nettleship 1981, Nettleship et al. 1984, etc.). At Prince Leopold Island between 1975 and 1977 the timing of egg laying varied by only a few days for all four species under observation. But in 1978 unusually late ice break-up and associated environmental factors delayed breeding in Thick-billed Murres by 18 days (Nettleship et al. 1984) and caused most (>80%) Northern Fulmars, Black-legged Kittiwakes and Glaucous Gulls not to produce eggs (D.N. Nettleship, T.R. Birkhead & A.J. Gaston, in prep.). It is not yet clear, however, what factors may have been operative at Prince Leopold Island during the 1988 breeding season that affected breeding performance of fulmars, but not the other principal seabird species. The lack of concordance between fulmars and kittiwakes in 1988 is of considerable interest (cf. Nettleship et al., in prep.).

Currently, the effort is directed towards an attempt to review and analyse all databases available for the community of seabirds breeding in Lancaster Sound, with emphasis on Prince Leopold Island where information for the period 1975 to 1988 is greatest. Attention needs to be given to a better understanding of the fluctuations in breeding performance that have been observed, identifying causal relationships, and in assessing their effects on population size and status. In addition, is the immediate need to determine the effects of hunting in West Greenland and Labrador/Newfoundland on the Thick-billed Murre population of Lancaster Sound and vicinity (Nettleship & Evans 1985).

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APPENDICES

APPENDIX 1. Study outline - Prince Leopold Island 1988

Supervisor: Dr. D.N. Nettleship

Field Team: Dr. J.W. Chardine
Mr. E.P. Huyck
Mr. W.W. Lidster
Dr. D.N. Nettleship
Mr. B. van Feggelen

A. **THICK-BILLED MURRE** (W.W. Lidster & D.N. Nettleship)

1. **Daily Count** - at 1700h each day systematically count total number of birds present within boundaries of each study plot: G1, G4, N, Q1, Q4, S1, and U (see plot photos). Record as follows:

Date (1988)	Study Plot G1	G4	N	Q1	Q4	S1	U	Total
16 July								
17								
18								
19								
20								
21								
etc.								

2. **Status & Timing of Breeding** - Spend as much time as possible each day in examining individual sites within study plots G1, G4, N, Q1, Q4, S1, and U. These observations will provide information on number of sites occupied, number of eggs laid, and timing of breeding. Record data in usual manner as outlined in Appendix 2 of Birkhead & Nettleship (1980) as follows:

Plot: G1

Site #	Date (1988) 16J	17J	18J	19J	20J	21J	etc.
1							
2							
3							
4							
etc.							

Timing of breeding can vary. Median hatching dates in 1975, 1976, and 1977 were 30 July, 30 July and 3 August, respectively. But in 1978, an unusual ice year, the median hatching date was 18 August. Since most eggs laid in 1988 will not have hatched by 16 July (target arrival date), timing of breeding can be determined from hatching dates for individual eggs on the study plots (using a mean incubation period of 32d). In addition, estimates of hatching dates can be made from the ratio of egg weight to egg volume index (Wt/lxb^2 : see Gaston et al. 1983 for details) for samples of eggs that are accessible (e.g., G, S and elsewhere); inter-year differences in mean egg volumes will also be derived. Combined, these data will allow a comparison of timing of breeding for 1988 at PLI against earlier years.

[Further background information re timing: **first hatching**, 24 July in 1975, 20 July in 1976, and 23 July in 1977; **spread of hatching**, 78% in first 10 days in 1975, 47% in 1976, and 30% in 1977.]

3. **Study Plot Photographs** - Photograph all study plots in b&w and colour using the Pentax 6x7cm camera (photos to be taken by JWC). Record location, time of day and date of each photo. Take special care to duplicate the "master" plot photo (i.e., take photos from same point and orientation as original baseline photo).

4. **Chick Condition & Growth** - If phenology of breeding permits, it may be useful to individually mark, weigh and measure some chicks to determine age, condition and mean daily weight increments for comparison with other years.

5. **Toxic Chemical Collection** - See below for details.

B. **NORTHERN FULMAR** (E.P. Huyck)

1. **Daily Count** - At 1700 h each day systematically count total number of birds present within boundaries of each study plot: AA, A, C, D, G, H, and J (see plot photos enclosed). It is also important to record the total number of pairs present and record count data as follows: (Note - expect major fluctuations in numbers.)

Plot Date (1988)	AA S P T	A S P T	C S P T	D S P T	G S P T	H S P T	J S P T	Total nos.
16 July								
17								
18								
19								
20								
21								
etc.								

2. **Status and Timing of Breeding** - The work objective is to determine the breeding status of birds (pairs) at all sites within the study plots: AA, A, C, D, G, H, and J. Special emphasis is to be placed on determining the numbers of eggs/chicks present and sites occupied on the study plots. This task is not easy; it will require considerable effort and endurance on part of the observers (EPH). Few, if any, eggs will have hatched by 16 July when you arrive (see below). At sites where hatching has occurred, many will have young chicks that are still being brooded by adults. This makes the nestling difficult to detect and see. Once chicks can thermoregulate they are left unattended by their parents (except when meals are delivered). This means that it will take considerable work to determine which birds have eggs or chicks. Spend as much time daily (between 0900 and 1600h) as possible examining sites on the study plots.

When chicks are pipping their egg, incubating adults often get up and roll (=turn) the egg which allows the observer to determine whether an egg or newly hatched chick is present. This requires great patience and stamina by the observer, but the reward is great! Birds incubating late laid or infertile/addled eggs present a major problem as they sit tight with only very infrequent egg rotation or turning. These birds (and status of their site) can usually be distinguished from non-breeders/failed breeders during a drop (or at a trough) in attendance. At these times (and by following the daily count figures you can identify when this is occurring or about to take place -- occurs about every 4-5 days) most non-breeders and failed breeders leave the colony and their sites are therefore vacant (empty). On the other hand, however, breeders still incubating eggs or brooding young chicks remain at the colony.

Timing of hatching and egg size (egg volume index = lxb^2) can also be determined by visiting accessible sites. The status of individual sites can be noted (egg, chick, empty), and eggs and chicks weighed and measured. Revisiting sites with eggs/chicks will provide information on hatching dates and mean daily weight increments, etc. Sites on plot AA and the growth plot G' (above G) can be used if time permits. (Note: climbing to be supervised by DNN.) Altogether, the data will allow certain inter-year comparisons to be made.

Notes:

(1) **Median hatching dates** at PLI are: 28 July in 1975 and 1976, and 25 July in 1977. In 1976 hatching occurred between 22 July and 6 August, and in 1977 between 20 July and 9 August (D.N. Nettleship, unpubl.).

(2) **Plot observations**: Observations **must** be made from the precise same spot as used in previous years. Observer position at plots C, G, H, and J are marked by rock cairns; exact observer positions for plots AA, A, and D are shown on sketch maps drawn on the backs of the plot photos. Also remember that there are: 2 photos comprising plot C, 2 for plot D, and 3 for plot G (the remainder have only 1 photo).

3. **Study Plot Photographs** - Photograph all study plots in b&w and colour using the Pentax 6x7cm camera (photos to be taken by JWC). Record location, time and day that each photo is taken. Take special care to duplicate the "master" plot photo at each site (i.e., take plot photo from same point and orientation as original baseline photo).

4. **Toxic Chemical Collection** - See below for details.

C. **BLACK-LEGGED KITTIWAKE** (J.W. Chardine, B. van Feggelen)

1. **Status & Timing of Breeding** - The chief objective is to determine the total numbers and contents of nests within study plots: G, M, Q north, Q south upper, Q south lower, S south facing, and T (see plot photos enclosed). In 1975 and 1976 the total number of nests examined was 334 and 333, respectively, of which 100% produced at least one egg each year. Median hatching date was 18 July in 1975 and 21 July in 1976, with chicks first recorded on 14 and 17 July, respectively (D.N. Nettleship, unpubl.). Record data in usual manner by individual site and day for each plot recording nest contents and number of adults in attendance at each site:

Plot: G

Site	Date (1988)						
	16 July		17 July		18 July		etc.
	Nest	Adults	Nest	Adults	Nest	Adults	
1	2C	1					
2	1E/1C	2					
3	0	2					
4	1C	0					
5	2C	1					
etc.							

In addition to the above (based on nests present in 1975 & 76), record total number of nests present within each study plot, and the number of adults present (0a, 1a, 2a) and contents (0, 1e, 2e, 1e/1c, etc.) of each nest (part of this documentation will have already been accomplished in previous check).

2. **Study Plot Photographs** - Photograph all study plots in bxw and colour using the 6x7cm camera (photos to be taken by JWC). Record location, time of day, and date of each photo. Take

special care to duplicate the "master" plot photo (i.e., take photos from same point and orientation as original baseline photo).

3. **Toxic Chemical Collection** - See below for details.

D. **GLAUCOUS GULL** (D.N. Nettleship)

1. **Status and Numbers** - Execute counts of adults and estimates of breeding activity (number of pairs that built a nest and laid at least one egg). It may be difficult to estimate the numbers of breeding pairs owing to the fact that some may have laid but lost their eggs and/or young before observations begin on 16 July. However, failed pairs normally remain in the general area of their nest, and their presence alone will provide some indication of the number of active pairs in 1988, as will the presence of a nest albeit empty. It will be important to survey the number of adults and young present in areas for which there is accurate information from previous years: east cliffs (top, cliff face, and basal scree) and the South Spit colony at the base of the east cliffs (South Spit colony can be observered from the top of the cliffs near Plot AA before a visit is made). Record location, date, and productivity of each pair identified, and make a count of the total numbers of adults and young present in each major area examined. Data can be summarized as follows:

Area	# Adults Present	# Occupied Sites	# Active Nests
East Cliffs:			
top	20	8	5
cliff face			
basal scree			
South Spit Colony	18	15	6
Other areas:			
.			
.			
.			

Counts may be possible in other regions of the island in association with various work tasks and during aerial flights. Take advantage of all opportunities.

E. **TOXIC CHEMICAL COLLECTION** (D.N. Nettleship)

Certain materials are to be collected for toxic chemical analysis and comparison with baseline organochlorine levels recorded in Northern Fulmar (NF), Black-legged Kittiwake (BLK),

and Thick-billed Murre (TBM) from Prince Leopold Island between 1975-77 (see Nettleship & Peakall 1987 for details). Collect at least five samples of each of the following for NF, BLK and TBM:

. Adult, liver
. Adult, pectorals
. Egg, whole specimen
. Chick, whole specimen

Materials are to be wrapped in aluminum foil (shiny side in), labelled, and placed in whirl-pacs. Keep materials from the same adult together: i.e., in separate whirl-pacs, then both placed inside a single large pac. Be sure to record sex and other measurements of adults autopsied. If it is easier to keep whole adult specimens, do so. Since all materials are to be collected from PLI, the best idea would be to make the collection as late as possible, store in a cool place, and place them in the PCSP freezer when the camp is closed.

F. GENERAL BIRD AND MAMMAL OBSERVATIONS

Maintain a daily log of all other observations of birds and mammals (terrestrial and aquatic) sighted. Incidental observations will probably include Parasitic Jaegers, Snow Buntings, Rock Ptarmigan, Ivory Gulls, Beluga, Narwhal, and perhaps if we're lucky, a number of exotics including Polar Bear, various shorebirds and even Peary Caribou!

David N. Nettleship
Research Scientist
Seabird Research Unit

28 April 1988

APPENDIX 2. Twin-otter aircraft usage between Resolute (Res) and Prince Leopold Island (PLI),N.W.T., 1988.

Date (d/m)	Otter (pilot)[2]	Trip	CWS Records[1] dep	arr	time(h)	CWS (h)	PCSP (h)	Diff (h)
A. CAMP ESTABLISHMENT:								
1607	CF-NAN	Res/PLI	0940	-				
	(DG)	PLI/Res	-	1116	1h36m(1.6)	1.6	1.8	0.2
1807	CF-NAN	Res/PLI	1155	1240	0h45m(0.75)			
	(DG)	PLI/Res	1254	1345	0h56m(0.9)	1.7	2.0	0.3
	CF-NAN	Res/PLI[3]	1424	1510	0h46m(0.76)			
	(DG)	PLI[3]/PLI	1520	1525	0h05m(0.1)			
		PLI/Res	1540	1630	0h50m(0.83)	1.7	2.3	0.6
	TOTALS:					5.0	6.1	1.1
B. CAMP CLOSURE:								
0808	CF-NAN	Res/PLI	1850	1933	0h43m(0.9)			
	(KZ)	PLI/PLI[3]	1951	1956	0h05m(0.1)			
		PLI[3]/Res	2006	2047	0h41m(0.68)	1.7	2.3	0.6
	CF-ASG	Res/PLI	2026	2120	0h54m(0.9)			
	(PR)	PLI/Res	2200	2238	0h38m(0.6)	1.5	1.8	0.3
	TOTALS:					3.2	4.1	0.9
C. GRAND TOTALS (Flying Hours):						8.2	10.2[4]	2.0

Notes:

[1] Times underlined are estimates only; all other times are actual times recorded by DNN/JWC at take-off and landing (accurate within 1 min).

[2] Pilots: DG = D. Grant; PR = P. Rask; KZ = K. Zberg.

[3] PLI[3] = PLI south spit (PLI = camp site on top).

[4] Charge time = 10.2h (includes ground prep. time).

APPENDIX 3. Aviation weather reports recorded at camp, SE corner of Prince Leopold Island, 1988.

Date	Time (CDT)	Sky Conditions	Visibility (miles)	Temp (°C)	Wind (kts) Dir. & Speed	Cloud Type/ coverage	Obstr. to vision	Temp. (°C) Max.	Min.	Remarks
15 Jul	0547	Clear,sunny	est.15	est.1	light	-	None	-	-	Res.Bay weather dry & warm
16 Jul	0700	Clear,sunny,bright	est.15	est.8	NW at 20-30	-	None	-	-	Scat. clouds 1/10
17 Jul	0745	Sunny	est.15	est.8	NE at 20 (30-35)	CS3	None	-	-	Fog bank over sea/Res.Bay
18 Jul	1900	10000	25	09	SE(14) at 09	SC2	None	-	-	Low-lying fog
19 Jul	0700	6000,10000	25	12	Calm	SC6,AC2	None	12	16	Fog bank to west
	1020	5000,10000	25		E(09) at 06	SC2,AC1	None	-	-	Low fog bank to west
	1900	3500,10000	25	10	NNE(02) at 10	SC6,LA1	None	16	10	Somest.precipitation to SE
20 Jul	0700	5000,20000	25	07	ENE(07) at 15	SC5,CI4	None	11	06	Wind gusts to 20,rain to S
	1000	4000,10000	25		E(09) at 20	SC6,AC2	None	-	-	Wind gusts to 25, rain to S
	1900	5000,15000	25	07	NE(04) at 15	SC3,AC5	None	10	05	
21 Jul	0700	5000,8000	25	07	NE(04) at 0k	SC7,AC1	None	08	05	
	1900	5000	25	12	NE(04) at 01	AC10	None	-	-	Overcast but calm
22 Jul	0700	800,3000,est.8000	25	04	N(36) at 06	ST2,SC7,AC1	None	18	03	Light rain,shower overnight
	1900	1000,5000	20	08	NNW(34) at 11	ST1,AC6	None	11	04	Heavy fog bank over sea W/W
23 Jul	0700	3000	25	11	N(36) at 03	SC6	None	11	05	
	1900	est.20000	25	09	S(18) at 02	CI7	None	15	09	
24 Jul	0700	est.20000,25000	25	12	NE(04) at 8	CS3,CI2	None	12	06	
	1900	est.20000	25	12	NE(04) at 8	CS1	None	13	12	
25 Jul	0700	est.20,000	25	11	NE(04) at 10	AC2	None	16	09	
	1900	est.15,000	25	08	ENE(07) at 18	CS2	None	12	08	Wind gusting to 35 kts
26 Jul	0700	500	<1/4	02	NNE(02) at 26	Fog 10	Fog	09	02	Wind gust to 35 kts
	1900	100	1/2	04	NE(04) at 31	Fog 10	Fog	-	-	Wind gust to 48 kts/rain
27 Jul	0700	100	<1/4	04	NE(04) at 24	Fog 10	Fog	04	0	
	1900	100	<1/8	02	NE(04) at 20	Fog 10	Fog	04	0	
28 Jul	0700	100	<1/8	03	NE(04) at 20	Fog 10	Fog	03	01	Wind gust 30 kts
	1900	1000, 5000, 10000	25	05	NNE(02) at 13	ST1,AC2,5C6	None	05	04	Wind gust 20 kts
29 Jul	0700	500	<3/4	04	NNE(02) at 16	Fog 10	Fog	05	02	Wind gust 20 kts
	1900	est.800, 5000, 15000	25	05	NNE(02) at 10	ST1,5C3,CI1	None	07	04	Wind gust 15 kts

Date	Time (CDT)	Sky Conditions	Visibility (miles)	Temp (°C)	Wind (kts) Dir. & Speed	Cloud Type/ coverage	Obstr. to vision	Temp. (°C) Max.	Min.	Remarks
30 Jul	0700	est.5000, 20000	25	09	N(36) at 09	SC3,CI1	None	09	04	Rain showers to W
	1900	20000, 30000	25	07	WNW(29) at 19	CU1,CI1	None	15	07	
31 Jul	0700	e30000	25	06	WNW(29) at 09	CI1	None	06	03	
	1900	Clear	25	08	WNW(29) at 09	-	None	10	06	
1 Aug	0700	Clear	25	08	W(27) at 14		None	08	04	
	1900	est.6000, 20000	25	07	SW(22) at 06	SC1,CI8	None	13	06	
2 Aug	0700	est.6000	10	06	SW(22) at 04	Fog5,SC3	Fog int.	08	04	Rain, showers o/n
	1900		<1/4	05	NE(04) at 15	Fog 10	Fog	12	05	Interm. rain
3 Aug	0700		<1/4	04	NNE(02) at 14	Fog 10	Fog	07	04	Rain showers o/n w gust 20 kts
	1900		<1/8	04	ENE(07) at 18	Fog 10,	Fog	06	04	wind gust to 25 kts
4 Aug	0700	est.15000	1	04	N(36) at 11	Fog 4,AC3	Fog	04	02	
	1900	est.1500, 6000	10	04	NE(04) at 05	ST2,AC5	None	08	04	
5 Aug	0700	est.1500, est.3000	15	04	NNE(02) at 15	ST1,SC9	None	04	03	Fog bank to south
	1900	800, est.3000	10	04	NNE(02) at 13	Fog5,ST2,SC3	Fog	05	04	Sun dimly visible
6 Aug	0700	1000,est.4000	25	04	NNE(02) at 25	ST2,SC6,	None	05	03	
	1900	1500, est.3000, est.6000	25	05	NNE(02) at 14	ST5,SCU,AC1	None	06	04	
7 Aug	0700	X	<1/4	04	NNE(02) at 30	Fog 10	Fog	05	04	gust to 35 kts, heavy rain overnight

Notes: est. = estimated; int. = intermittant; o/n = overnight; kts = knots; BLK = Black-legged Kittiwake; NOP = Not on photograph

KEY TO SYMBOLS

IN APPENDICIES 4 - 6

0	=	site/nest empty (no birds or eggs)
a	=	adult
e	=	egg
C	=	chick recorded for first time
c	=	chick, recorded previously
√ok	=	status unchanged, egg(s) &/or chick(s) definitely seen
√	=	status apparently unchanged - for site where egg(s) &/or chick(s) had been recorded previously
+	=	'n' or more eggs/chicks seen
TBM	=	Thick-billed Murre on site
NF	=	Northern Fulmar on site

APPENDIX 4. Adult attendance and site contents of Northern Fulmars on Prince Leopold Island, 1988.

Plot AA (daily check)

	July												Aug		
Site	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3
1	0	0	1a	0 1a	0	0	0	0	0	1a	2a	1a	1a	0	0
2	0	0	2a	2a	1a	?	?	1a	1a	C 2a	1a	√ok2a	√ok2a	√1a	√ok1a
3	1a	1a	1a	1a	e1a	1a	C1a	02a	0	2a	0	2a	2a	0	0
4	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	C1a
5	1a	1a	1a	1a	C1a	1a	√ok1a	1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a
6	0	1a	1a	1a	1a	1a	1a	1a	1a	C1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a
7	e1a	0?2a	0	1a	1a	?	?	?	?	?2a	?2a	?0	?1a	?0	?
8	0	1a	2a	0	1a	0	0	0	1a	1a	2a	2a	1a	0	0
9	0	0	1a	2a	0	0	0	0	0	1a	2a	1a	2a	0	0
10	0														
11	1a	2a	2a	02a	0	0	0	0	0	1a	1a	1a	1a	2a	0
12	0	0													
13	0	1a	01a	0	2a	0	0	0	0	2a	2a	2a	1a	0	0
14	1a	0	0	01a	0	0	0	0	0	0	0	0	0	0	0
15	1a	2a	1a	1a	C1a	1a	1a	2a	1a	√ok1a	√ok2a	√ok1a	√ok1a	√ok1a	√ok1a
16	1a	2a	2a	0 2a	0 2a	0	0	0	0	1a	2a	2a	2a	1a	0
17	0	2a	2a	0 1a	0	0	0	0	0	2a	2a	1a	2a	0	0
18	0														
19	0														
20	2a	2a	2a	0 1a	1a	0	0	0	0	1a	2a	2a	2a	2a	0
21	1a	1a	2a	1a	e 1a	1a	C 1a	1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a
22	0	2a	2a	0	1a	0	0	0	0	0	2a	2a	2a	1a	0
23	1a	1a	1a	0 1a	0	0	0	0	0	1a	2a	2a	2a	1a	0
24	1a	1a	1a	2a	0	0	0	0	0	1a	1a	1a	1a	1a	0
25	1a	2a	1a	0 2a	0	0	0	0	0	2a	2a	2a	2a	1a	0
26	0	2a	2a	1a	0	0	0	0	0	2a	2a	1a	1a	0	0
27	0	1a	2a	0 2a	1a	0	0	0	0	2a	2a	1a	2a	0	0
28	0	0	0	0	0	0	0	0	0	0	0	1a	2a	2a	0
29	0														
30	1a	1a	0 2a	2a	0	0	0	0	0	2a	2a	2a	0	2a	0
31	2a	1a	1a	e 1a	1a	1a	1a	1a	1a	1a	C 2a	√ok1a	√ok1a	√ok1a	√ok1a
32	0	0	0	0	0	0	0	0	0	0	0	0	0	1a	0
33	0	1a	2a	0 2a	0	0	0	0	0	1a	2a	2a	1a	0	0
34	2a	2a	2a	2a	0 2a	0	0	0	1a	1a	1a	1a	1a	0	0
35	1a	1a	2a	e?2a	C 1a	1a	1a	1a	1a	√ok1a	√ok1a	√ok2a	√ok1a	√ok1a	√ok1a
36	0	1a	0 1a	0	0	0	0	1a	0	0	0	0	0	0	0
37	1a	2a	0 2a	2a	0	1a	1a	1a	0	1a	1a	1a	1a	0	0
38	0	1a	1a	1a	0	0	1a	1a	1a	1a	2a	2a	1a	0	0
39	0														
40	0														
41	1a	1a	1a	1a	C 1a	1a	1a	0	0	2a	1a	1a	2a	2a	0
BB	0	1a	0 2a	0 1a	1a	0	0	0	2a	0	2a	0	0	0	0
BD	1a	0	1a	0 2a	0	0	0	0	0	0	1a	2a	1a	0	0
F	1a	1a	2a	1a	1a	1a	1a	1a	1a	1a	C 1a	√ok1a	√ok1a	√ 1a	√ok1a

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
FF	0	2a	0 2a	0	0	0		0	0	2a	1a	2a	0	0	0
G	0	1a	2a	0	2a	0	0	1a	1a	2a	2a	2a	2a	0	0
GG	0	0	2a	1a	0	0	0	0	0	0	0	1a	1a	1a	0
P	1a	1a	2a	1a	1a	1a	0 1a	1a	1a	1a	2a	2a	2a	1a	0
R	0	1a	2a	0 2a	0	0	0	0	0	2a	2a	2a	2a	0	0
S	0	1a	1a	0	2a	0	0	0	0	2a	2a	2a	0	0	0
X	1a	2a	2a	0 1a	0	0	0	1a	0	0	2a	2a	1a	0	0
Y	0	1a	0	0	0	0	0	0	0	0	0	1a	1a	0	0
Z	e1a	2a	√e1a	√ok2a	√ok2a	√ok0a	√ok0a	√ok0a	√ok0a	√ok0a	√ok0a	√ok0a	√ok0a	√ok0a	e√0a
31X	1a	2a	1a	1a	0	0	0	0	0	0	0	2a	2a	1a	0
26a	1a	2a	1a	1a	2a	1a	2a	1a	1a	C 1a	√ok1a	√ok1a	√ok1a	√ok1a	√ok1a

Plot C (daily check)

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
1	1a	2a	0 1a	2a	2a	0	0	1a	1a	0	1a	2a	2a	1a	0
2	1a	1a	2a	1a	0 1a	1a	1a	2a	1a	1a	2a	2a	1a	1a	0
3	2a	1a	2a	2a	0 2a	0	1a	1a	2a	2a	2a	1a	2a	1a	2a
4	2a	2a	0 2a	1a	1a	0	1a	1a	1a	1a	2a	2a	2a	1a	0
5	2a	0 2a	1a	2a	0 1a	1a	1a	1a	2a	2a	2a	1a	2a	0	0
6	2a	1a	1a	1a	2a	1a	2a	C 1a	1a	2a	2a	2a	√ok1a	√ok1a	√ok1a
7	1a	2a	0 2a	0 2a	2a	1a	0	1a	1a	0	1a	2a	2a	0	1a
8	2a	2a	2a	2a	2a	0	1a	2a	1a	0	2a	2a	1a	2a	0
9	2a	2a	2a	0 2a	1a	0	0	2a	2a	1a	2a	2a	1a	2a	0
10	1a	2a	2a	1a	2a	0	0	0	0	1a	1a	1a	2a	2a	0
11	1a	2a	1a	2a	0 2a	0	0	1a	2a	2a	2a	0	2a	2a	1a
12	1a	1a	1a	1a	1a	1a	1a	1a	1a	2a	2a	1a	1a	2a	2a
13	2a	2a	2a	2a	0 2a	0	0	2a	1a	1a	2a	1a	1a	2a	2a
14	2a	1a	0 2a	2a	1a	1a	1a	1a	1a	1a	2a	2a	1a	2a	0
15	0	1a	0	0	2a	0	0	1a	2a	1a	0	1a	1a	1a	1a
16	1a	1a	e 1a	1a	1a	1a	1a	1a	1a	1a	2a	2a	2a	2a	1a
17	1a	1a	1a	1a	e 1a	1a	1a	1a	C 1a	2a	1a	√ok1a	√ 1a	√ 1a	√ok1a
18	1a	2a	0 2a	2a	2a	0	0	2a	2a	2a	2a	2a	1a	1a	0
19	0	0 2a	1a	0	0	0	0	0	0	0	0	0	0	0	0
20	1a	1a	1a	1a	e 1a	1a	1a	1a	1a	1a	2a	C 1a	√ 2a	√ok1a	√ok1a
21	1a	1a	1a	1a	e 1a	1a	1a	C 1a	1a	1a	1a	√ok1a	√ 1a	√ok1a	√ok1a
22	2a	1a	0 2a	1a	1a	2a	0	1a	1a	1a	2a	1a	0	1a	0
23	2a	2a	2a	2a	1a	2a	1a	2a	1a	1a	2a	2a	2a	2a	0
24	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	1a	C 1a	√ 1a	√ok1a
25	2a	2a	2a	0 2a	2a	0	1a	2a	2a	1a	2a	2a	1a	2a	0
26	1a	2a	1a	2a	1a	0	0	0	2a	2a	2a	2a	0	1a	0
27	1a	1a	1a	0 2a	1a	0	0	0	0	1a	2a	2a	2a	2a	0
28	1a	1a	0 2a	2a	2a	0	1a	2a	1a	1a	2a	2a	0	2a	0
29	1a	1a	1a	0 1a	2a	2a	2a	0	0	1a	1a	1a	2a	1a	0
30	1a	2a	0 2a	0 2a	1a	0	0	1a	2a	2a	2a	1a	1a	0	0
31	1a	2a	1a	0	0	0	0	2a	0	1a	2a	2a	0	1a	0

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
32	0	0	0	0	0	0	0	0	2a	0	0	0	0	1a	0
33	1a	2a	2a	2a	1a	0	1a	1a	0	1a	2a	1a	2a	2a	0
34	0	1a	0	1a	0	0	0	0	0	0	0	0	0	0	0
35	0	1a	2a	2a	2a	0	0	1a	2a	2a	2a	0	0	2a	0
36	1a	1a	0 1a	1a	2a	0	0	1a	1a	1a	2a	2a	2a	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	0	2a	2a	01a	1a	0	0	2a	1a	1a	1a	0	0	0	0
39	2a	2a	0	0 2a	1a	0	0	0	1a	2a	2a	2a	0	0	0
40	1a	2a	01a	1a	0	0	1a	0 1a	1a	2a	2a	2a	2a	1a	0
41	0	2a	2a	2a	2a	0	0	1a	2a	2a	2a	2a	1a	1a	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	1a	1a	0	0	0	0	0	0	2a	1a	0	1a	2a	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45A	1a	2a	0 1a	2a	0	0	0	1a	2a	2a	2a	2a	2a	2a	0
45B	0	0	0	0	0	0	0	0	0	0	1a	1a	0	2a	0
46	2a	1a	1a	0	1a	0	0	1a	1a	1a	2a	2a	2a	2a	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	2a	2a	0	1a	0	0	0	0	0	2a	0	1a	0	0	0
49		2a	0 1a	2a	2a	0	0	0	1a	1a	2a	2a	1a	1a	0
A	0	0	1a	1a	0	0	0	0	0	1a	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	1a	1a	0	0	0	0	0	0	0	0	0	0

Plot D (status check only)

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4
1											2a				0	0
2											0					0
3											1a					0
4											2a					1a
5											0					0
6											0					0
7											0					0
8											0					0
9											0					0
10											0					0
11											1a					0
12											0					0
13											2a				1a	0
14											2a				0	0
15											0					0
16											0					0
17											0					0
18											1a					0
19											1a					1a
20											0					1C

July Site	20	21	22	23	24	25	26	27	28	29	30	Aug 31	1	2	3	4
21											0					0
22											1a					1a
23											1a					0
24											1a					1a
25											1a					1a
26											0					0
27											0					0
28											2a					0
29											1a				0	0
30											1a				1a	1a
31											2a				0	1a
32											0					0
33											1a					0
34											2a					0
35											2a					0
36											1a				0	2a
37											1a					0
38											0					0
39											2a					0
40											1a					0
41											1a					0
42											2a					1a
43											1a					0
44											2a					1a
45											1a					0
46											0					0
47											2a					1a
48											0					1a
49											0					0
50											2a					1a
51											1a					1a
52											0					0
53											1a					1a
54											2a					1a
55											2a					1a
56											1a					0
57											2a					0
58											2a					1a
59											2a					1a
60											1a					0
61											1a					0
62											2a					0
63											0					0
64											1a					1a
65											0					0
66											0					0
67											2a					1a
68											1a				0	0
69											0				0	0

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4
70											2a				0	0
71											2a					0
72											2a					0
73											1a					0
74											1a					1a
75											1a					0
76											2a					0
77											1a					0
78											2a					1a
79											2a					1a
80											2a					1a
81											1a					1a
82											0					1a
83											1a					1a
84											0				1a	1a
85											1a					0
86											1a					1a
87											1a					1a
88											1a					0
89											1a					1a
90											0					0
91											0					1C
91																1a
92											0					0
93											2a					1a
94											0					0
95											0					0
96											1a					0
97											2a					1a
98											1a					1a
99											1a				0	0
100											1a					0
101																0
102																0
103																0
104											2a					1a
105											1a					1a
A																
A1											0					1a
A2											0					0
A3											0					0
A4											1a					0
A5											1a					0
A6											1a					1a
A7											0					1a
A8											0					0
A9											0					0
A10											1a					1a
A11											2a					0

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4
A61																0
A14																0
B1																0
B2																0
B3																0
C																2a
D																2a
G																1a
L											1a					0
LL											2a					1a
M																0
MM																0
T1																0
T2																1a
X																1a

Plot G (status check only)

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
1		0						1a	1a			1a			0
2		0						0	0			0			0
3		1a						1a	1a			2a			0
4		2a						2a	2a			2a			C1a
5		1a						1a	2a			1a			0
6		1a						2a	1a			2a			1a
7		2a						2a	2a			1a			0
8		1a						2a	1a			1a			0
9		1a						1a	1a		C1a	√ok1a			√ok1a
10		2a						0	2a			1a			0
11		1a						2a	2a			1a			1a
12		1a	1a					1a	0			2a			0
13		1a	1a					1a	1a			0			0
14		2a	1a					0	1a			1a			0
15		2a	2a					2a	0			2a			0
16		0						0	0			0			0
17		2a	1a					1a	1a			0			1a
18		2a						1a	1a			1a			0
19		0						0	0			0			0
20		1a						0	0			0			0
21		0	1a					0	0			2a			0

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
22		0						0	0			0			0
23		2a	2a					1a	1a			2a			1a
24		2a	2a					1a	1a			1a			1a
25		1a						2a	2a			0			0
26		2a						1a	2a			1a			0
27		1a						1a	1a			1a			C1a
28		1a						0	0			1a			0
29		0						0	0			0			0
30		2a						1a	2a			1a			0
31		1a						0	2a			0			0
32		2a						2a	2a			0			0
33		1a						1a	1a			2a			0
34		0	2a					1a	0			1a			0
35		1a						2a	0			1a			0
36		1a						2a	2a			1a			0
37		1a						2a	1a			2a			0
38		0						0	0			0			0
39		0	1a					1a	1a			1a			0
40		2a						1a	2a			2a			0
41		1a						2a	2a			2a			0
42		2a						2a	2a			0			0
43		1a						2a	2a			2a			0
44		2a						2a	2a			0			0
45		0						0	1a			0			0
46		0						0	0			0			0
47		2a						1a	1a			1a			1a
48		2a	2a					2a	2a			1a			1a
49		0						0	0			0			0
50		2a	2a					1a	0			2a			0
51		0	1a					1a	1a			1a			0
52		1a	1a					2a	2a			1a			0
53		0						0	0			0			0
54		1a	1a					0	0			0			0
55		1a						0	0			1a			0
56		1a						2a	1a			0			0
57		1a						2a	1a			2a			0
58		2a						2a	2a			1a			0
59		2a						1a	0			1a			0
60		1a						1a	1a			1a			2a
61		1a						0	1a			1a			2a
62		1a						1a	1a			1a			0
63		0						0	0			0			0
64		0						0	0			0			0
65		01a	2a					2a	2a			0			0
66	e1a	√ok1a	√1a					1a	0			1a			0
67		0						0	0			2a			0
68		2a						2a	2a			1a			0
69		0						0	0			1a			0
70		0						0	0			1a			0

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
71		0						0	0			0			0
72		1a						1a	1a			1a			0
73		1a						2a	2a			0			1a
74		1a						1a	1a			0			1a
75		1a						1a	0			1a			0
76		1a	1a					0	0			2a			0
77		0						1a	1a			1a			0
78		1a	1a					0	0			0			0
79		2a						2a	2a			0			1a
80		2a	1a					0	0			2a			0
81		1a						0	0			2a			0
82		1a						1a	2a			1a			C1a
83		1a						0	0			0			0
84		1a						1a	0			0			0
85	site not found														
86	site not found														
87								2a	0			2a			0
88	site not found														
A1															0
A		2a						2a	1a			0			0
B1								0	1a			1a			0
C		0						2a	2a			1a			0
D		0	0					0	0			0			0
E		0	0					0	0			0			0
N		0						0	0			1a			0
L		0						2a	2a			2a			0
J		0						0	1a			1a			0
D1		0	0					0	0			0			0
23a	new site	1a	2a					C1a	1a			√ok1a	√ok1a		√ok1a

Plot J (status check only)

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
1												0			0
2												2a			0
3												2a			0
4												2a			0
5												1a			0
6												2a			0
7												2a			0
8												2a			0
9												1a			0
10												0			0
11												1a			0
12												C 1a			1a

Site	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3
13												2a			1a
14												0			0
15												0			0
16												0			0
17												1a			0
18												C 2a			1a
19												2a			0
20												1a			0
21												C 1a			1a
22												1a			0
23												0			0
24												0			0
25												2a			0
26												C 2a			1a
27												2a			0
28												0			0
29												2a			0
30												C 1a			1a
31												2a			0
32												1a			0
33												0			0
34												0			0
35												0			0
36												0			0
37												0			0
38												0			0
39												1a			0
40															
41															
42												1a			0
A												1a			0
B												2a			0
A1												1a			0
B1												0			0
C1												0			0
DD1												2a			0

APPENDIX 5. Nest contents of Black-legged Kittiwakes on Prince Leopold Island, 1988.

Plot G

	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
1	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2e	√ok	√	√ok	√ok	√ok	√e		1+C	√2C	√ok	√ok	√ok	√C	√C	√C	√C	√ok	√C	
3	e	√ok	√			√e	√ok		1+C			√e	√	√ok	√	1e	√ok		C	
4	e	√ok	√	√ok		1+C	1C	√ok	√ok	√ok	√ok	√C	√ok	√C	√C	√ok	√ok	√ok	√ok	√ok
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	e	2e	√e	√e	√1e	√ok				√e	√e	√e	1C	√ok	√ok	√ok	√ok	√ok	√ok	
7			e?	√		√e		1+C	√ok	√ok	√C	√C	√C		√C	√C	√C		1C	
8	1e	√ok	√ok	√ok	√e	√ok	√e		√ok	√ok		√e	√	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10		e	√		√ok	1e	√e					√e	√		√	√		√ok		C
11			2+e	√e		√2e		√e		e+C	√C	2C	√ok	√C	√C	√ok	√C	√C		
12		2e	√		√	√e						√e	√e		√	√				
13	TBM	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
14			1+C		√ok	2C	√C	√C	√C	√C		√ok	√C		√C	√C	√C	√C	√ok	
15		e	√																	
16		2e	√	√ok		√e	1+C	√ok	√ok	√2C	√C	√ok	√C		√C	√ok	√C	√ok		
17			2+e		√e		1+C	√ok	√ok		√C	2C	√C		√C	√ok	√C	√C		
18	0		TBM	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
19	TBM		TBM	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
20							0?		0?	0		?	?			?				
21					2e		C?	e+C	1+C	2C	√ok	√ok	√ok		√C	√ok	√C	√ok	√ok	√ok
22	e		√		2e	√ok	√e	e+C		2C	√ok	√ok	√ok		√C	√ok	√C	√C		√ok
23											e		√		√	√e		√e		
24															C?	√C				√C
25		e	1e		√ok			√e		√ok		√ok			√	√		√ok		
26	2e	√ok	√	1e	√ok	√ok	√e	√e	√ok	√e	√ok		√ok		√e	√ok		√ok	√ok	
27	e		√ok		2e	√e	√e	√e		1+C	√C	√C	√C		√C	√C	√C			
28	e	√ok	√				√ok	√2e	1+C	E+C	√C	√2C	√ok		√C	√ok	√C	√C	√ok	
29	e	√ok	√		√e	√1e	√e	√e					C		√C	√C	√ok		√ok	
30	TBM		TBM	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
31			2+e			√e	√e	√2e				e+C	√C		√C	2C	√C	√C		√ok

	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
32		e	√		2e	√ok	√e	√e		√ok	C	√C	2C	√ok	√ok	√ok	√C	√ok	√ok	
33	2e		√	√e	√e					√e		1+C				√C				
34			0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0
35		2e	√	√e	√e	√e	√2e	√ok	√ok	e+C	√C	2C	√C	√ok	√C	√C	√ok	√C	√ok	
36			e		1e	√e	√	√e	√ok	√ok	√ok		√	√e	√	√e	√e	√C		
37						e	√e			e+?		C	√C	√C		√C	√C			
38							e		√ok			√ok	C		√C		√C	√C		
39	e	√ok	1e		√ok	√ok	√e	√ok	√e	√ok	√C	C	√C	√C	√C	√C				
40	e		√	√ok		√ok	2e		√ok	√ok	√e	C	2C	√ok	√C	√ok	√C	√C	√ok	
41	e	1e	√						√e			√ok			√e	√		C		
42	2e	√ok	√	2+e			√ok	√e		e+C			√ok	√C	√C	√2C	√C			√ok
43	0	0	0	0	0	0	0	0	0			0	0		0		0	0	0	0
44	2e		√e	√2+e	√e	√e	√	√e	e+C	2C	√C	√C	√ok	√ok	√C	√ok	√C	√C	√ok	√ok
45	e	√ok	√ok	√ok							√ok	√ok		√ok	√ok	Cnw	√C			
46			e		e	√e				√ok		1+C	√C		√C				√C	
47	e	1e	√		√e			√e		√e	√e	√e	√ok	√ok	√e	√ok		√ok		√ok
48		e	√ok		2C			√e	√ok	C	√C	√2C	√ok	√C	√C	√ok	√C		√ok	
49	e	√ok	√	√ok		√e	√e		√e	√e	√e	√e			√e	√e	C	√C		
50						e√						C?	C			√C				√C
51	0	√ok	e	√	1e	√ok	√e	√2e	√e	√e	√e	√e	√e		√e	√e	√e	1e		
52			e?	e	√e	√e		√		√e		√e			√e	√e	C	1C	√ok	
53	e	√ok	√ok	√ok	√ok	1e		√e		√e			√e	√	√ok	√e		√e		
54				e				√e	√ok	√ok	√ok	√ok			1e	√ok	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57		e	√		2e	√e	√e	√e	√ok	e+C	√ok	√ok	√ok	√C	√C	√ok	√C	√ok		
58	2e	√ok	√		√ok	√ok	√e	√e	√e	√ok	√ok	1+C	e+C	√C	√C	√C	√C	√C		
59	e	√ok	√		√e	√e	√e	√e	2e	√e		C	√C	√C	2C	√ok	√C	√ok	√ok	
60		0	√ok	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61										C	√C	2C	√C	√ok	√C	√C	√C	√C		
62				1+e	2e	√e	√e	√e	1e	C		√C	√C	√C	√C	√C	√C	√C		
63	e		√		√ok	√ok		1+C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√C	√C	√C	1C	
64	TBM	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
65		2e	√		√ok		√ok	√e		√ok	e+C	√ok	2C		√ok	√ok	√C	√ok		
66		2e	√	√ok	√ok	√ok	√e	√e	√ok		√ok	√ok	2C	√ok	√C	√ok	√ok	√ok	√ok	√ok
67	e		2e			√	√ok	√ok		1+C	√C	√C	√C	2C	√C	√ok	√C	√ok		

	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
68	e		√ok		2e	√e	√ok	√e		e+C	√ok	√ok	√C	√ok	√ok	√ok	√ok	√C		
69		e	√			√	√e	√1e	√ok	√ok	√	√e	C		√ok	√ok	√C	√ok		
70	0		0	0			0			0		0	0		0	0	0	0	0	0
71	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72		e	0	e	√e	√e		√e		√e		√	√		√	√				
73								e		√e	1+C	1C	√C	√ok	√ok	√ok	√ok	√ok		
74	e		√	√ok		√ok	√ok		√ok				C	√C	√	√C	√C	√C		
75	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0
76				e?	2e		√e					√	√		C	√C	√1C	1C		
77			e?	2+e		√e		√2e		√e		C		√C	√C	√C	√C	√C		
78	e	2e	√ok	√ok		√e		1+C	√ok	2C	√C	√ok	√ok	√ok	√C	√ok	√ok	√ok		√ok
79	2e		√					√e				√ok				√		C		
80			e				2e	√e		√ok			2C	√C		√ok	√C	√ok		
81	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
82	0		√			0	√			√						√		√		
83			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	e?		2e?	2+e		√e	√e	1+C	e+C	√ok	√C	√e+C				√ok				
85	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86	e		√		√e	√e	√e		√	e+C	√C	√C	2C			√C		√C		
87	0	0	0	0		0	0	0	0	0	0					0		0	0	0
88		1e	√e			√e		√e	√e	√ok	√ok	√e	√e	√e	√e	√ok	√e	√e		√e
89					0	0	0	0		0	0	0	0	0		0	0	0	0	0
90	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0		0		0
91	0	0	0	0	0		0	0	0	0		0		0		0		0		0
92				e?	e	√	√ok	√ok	√ok	√1e	√e	√e		√e	√e	√		√ok	C	
93		hidden																		
94		hidden																		
95		0	0	0	0		0		0	0		0	0	0	0	0		0	0	0
96		hidden																		
97					0		0	0	0	0			0		0	0		0	0	0
98		hidden																		
99								0	0	0			0	0	0	0		0	0	0
a														C		√C		√C		
b										1e				√okP		C				
c														1+C	√ok	2C		√C		
d																				

	July 20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
e													e		1+C					
f																				
g										1+e			2e			√e				
h										0					0	0		0		
i																			e+C	
j														1+C	√C	√C		2C		
k																				
l																				
m																				
n										0	0				0	0				
o										0					0	0			0	0
p													e+C		√C	√C		√C		
q															0	0				

Plot M

	July 20	21	22	23	2√	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
1		TBM	√		√	√														
2		TBM	√																	
3		2e			√ok	√e			3e?	2+e			√e	1+C		2+C	√ok	2C		
4		1e				√ok				√ok	1C	√ok	√ok	√ok		√ok	√ok	√ok		
5		e	2e		√ok	1C			1+C	2C	√C	√ok	√ok	√ok		√ok	√ok	√ok		
6		e	√ok		√ok	√ok				C	√ok	√ok	√ok	√1ok		0	0	0		
7		no nest	0		0	0														
8					1+e	√e				√1e	√ok		√ok			√ok	√ok			
9		2e	√e							√ok		1+C	√C	2C		√C	√C	√C		
10		1e	√ok		√ok	√e			1+C	√C	√C	√C	√C	1C		√ok	√ok	√ok		
11					2e	√e			√ok	1+C	√C	√C	√C	√C		2C	√C	√C		
12		2e			√ok	1+C			2C	1+C	2C	√ok	√ok	√ok		√ok	√ok	√ok		
13		1e	√ok		√ok	√ok			√ok			√ok	√ok			0	0	0		
14		1e				√e			1+C	√C	√C	√C	√C	√C		1C	√ok	√ok		
15		no nest																		
16					1+e					2C	√ok	√ok	√ok	√ok		√ok	√ok	√ok		

	July												Aug							
	20	21	22	23	2√	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8
17			1e			√ok				1+C	√C	√C	√C	√1C		√ok	√ok	√ok		
18									0	0	0	0	0			0	0	0		
19		0	0		0	0			0	0	0	0	0			0	0	0		
20		no nest					0?													
21		no nest																		
22			TBM																	
23			TBM																	
24			TBM																	
25		no nest																		
26					1+e															
27		1e			√e	2C			√e	√e						1+C	√C	√C		
28		2e				1+C			√C	2C	√ok	√C	√C	√ok		√ok	√ok	√ok		
29		2e	√e		√e	√ok			1+C	√C	√C	2C	√C	√ok		√C	√ok			
30			TBM																	
31					1+C	√e					e?+C	√1C	2C	√ok		√C	√C	√C		
32		no nest																		
33			2e		√e					e+C	2C	√ok	√ok	√ok		√ok	√C	√ok		
34		2e			√ok					1+C	√C	√C	√C	√C		2C	√C	√ok		
35		NF																		
36										1+C		√C	√C			√C	√C	√C		
37						1+e				1e						1e	1C			
38			TBM	√	√	√														
39		2e	√ok		√ok					√ok		√ok	√ok			e+C	2C	√C		
40			TBM																	
41										1e	√ok	√ok				1+C	√C	√C		
42		0	√ok		0	0			0	0	0	0	0			0	0	0		
43		no nest																		
44		hidden																		
45			0							0	0	0	0			0	0	0		
46		no nest																		
47										0		0	0			0	0	0		
48		no nest																		

APPENDIX 6. Site contents of Thick-billed Murres on Prince Leopold Island, 1988.

Plot S1

Site	July													Aug							
	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8
1	0		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√	√ok	√	√ok	√ok	√
2	e	√	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok
3	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	X	0	0	0	0a	0a	0a	0					
4			e	√ok	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√	√ok	√		√
5	0	0	0	?	0	0	0	0	0	0	0	0	0	0a	0	0					
6	e	√	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
7		e?	e	√ok	e?	e?	?		e?	C	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
8	e	√	e?	e	√ok	√ok	e?	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
9	e	√	√ok	e?	e?	e?	?		0?	?	0?	C	√ok	√ok	√ok	√ok			√ok		√ok
10	e	√ok	√ok	√ok	√ok	√ok	X	0	0	0	0	0	0a	0a	0	0					
11	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	0	0a	0a	0a	0a	0a	0					
12			e?	e	√ok	e?	e?		e?	e	C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
13		e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
14		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
15		0	0	0	0a	0a	0a		0	0a	0a	0	0	0a	0	0					
16			e?	e?	e	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√	C	√ok			√ok		√ok
17	0	0	0	0	0	0	0		0	0	0	0	0	0	0a	0					
18	e		√e	e?	e	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	X	CH		
19	e		√ok	√ok	√ok	e?	e		√ok	√ok	C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
20			e?	e	√ok	e?	e	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
21			e	√ok	√ok	C	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
22			?	0	0	0	0	0	0	0	0	0	0a	0a	0	0					
23			e?	e	√ok	√ok	√ok		√ok	C	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
24	e	√ok	√ok	√ok	e?	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C		√ok
25	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√
26			e	√ok	e?	C?	e		e?	e	√ok	√ok	√ok	√	√	C			√ok		√ok
27			0	0	0	0	0		0	0	0	0	0	0	0	0					
28			e	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
29	e	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
30		e	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
31	e	√ok	√ok	√ok	e	√ok	C?	e	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√	√ok	√	√ok	√ok

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
32			?	0a																	
33	e	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
34			0	0a	0a	0a	0		0	0	0	0	0	0	0	0					
35	e		√ok	√ok	e?	e	√ok		√ok	√ok	√ok	C	√ok	√ok	√ok	√ok			√ok		√ok
36			e	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
37			e	√ok	√ok		e?	e	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
38			0	0	0	0	0	0	0	0	0	0	0a	0a	0	0					0
39			e	√ok	√ok		√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
40	e	√ok	√ok	√ok	√ok		√ok	√ok	e?	e	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
41	e	√ok	√ok	√ok	√ok	√ok	e?		e	√ok	√ok	√ok	√ok	√	C	√ok			√ok		√ok
42					e		e	√ok	√ok		C	√ok	√ok	√ok	√ok	√ok			√ok		√ok
43			e?	e?	e?	e	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
45			e	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok			√ok		√ok
46			e	√ok	e?	e	e?		e	√ok	√ok	√ok	√ok	√	√	C			√ok		√ok
47	0	0	0	0	0	0	0	0	0	0a	0	0	0	0	0	0					0
48	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√ok
49	e		e?	e	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
51			e	√ok	e?		e		√ok	√ok	√ok	e?	e	√	C?	e	√	√	√	√ok	√
52			e	e?	e?		e		e?	e	e?	e?	e	C	√ok	√ok			√ok		√ok
53		e	√ok	√ok	√ok	√ok	e?	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
54			e?	e	e?		e	C?	?	e?	?	e?	C	√ok	√ok	√ok			√ok		√ok
55		C?	e?	e	e?		?	C?	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
56	e	√ok	√ok	e?	e?	e	√ok	√ok	e?	e	√ok	e?	e?	?	C	√ok			√ok		√ok
57		0	o√e	e	√ok	√ok	e?		e	√ok	√ok	√ok	√ok	√	√		√ok	√ok	√	√ok	√
58			e?	e	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
59			e	e?	e		e		e?	e	√ok	√ok	e?	e?	e		√ok	√	√ok	√	?
60		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok		√ok	√ok	√	√	C
61			e	√ok	√ok		e		e?	e	e?	e?	e	√	√ok		√ok	√	√ok	√	√
62			?	?	e?																
63			e	√ok	√ok		√ok		C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
64			?	e	√ok		√ok		√ok	C	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
65			e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√ok
66			e?	e?	e	√ok	e?		√ok	√ok	√ok	√ok	√ok	√	√	√ok	√ok	√ok	√ok	√	√
67			?	?	C	√ok	e?		√ok	√ok	√ok	√ok	√ok	√ok	√	√	√ok	√	√ok	√ok	√

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
68			?	?	e?	e	√ok		√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√ok
69	e		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
70			e	√ok	√ok		√ok		√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√	√ok
71			e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
72			?	?	?		?		e?	e?	e	√ok	√	?	e	√ok	√ok	√ok	√	√ok	√
73	0		?	?	e?		?		e	√ok	e?	e?	e?	?	?	?	e	?	e	?	?
74			e	√ok	√ok	√ok	C?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√
75			?	?	e?	e	√ok		√ok	√ok	√ok	e?	e?	e	√		√ok	e?	e	√	√
76			?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok			√ok		√ok
77	e		√ok	e?	e		e?	e	e?	e	e?	e	√ok	√	√	e?	e	√ok	√	√	√
78			?	?	e	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√	√
79			?	?	e	√ok	√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
80		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√ok
81		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	C
82			?	?	?		e?		e	√ok	√ok	√ok	√ok	√		√ok	√ok	√ok	√ok	√ok	√
83	e		√ok	√ok	√ok	√ok	√ok	√ok	e?	e	√ok	e?	e	√ok		√ok	√	√ok	√	√	√
84	0		0	0	0	0	0		0	0	0	0	0	0		0					
85			?	?	?		?		?												
86	e		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok
87		e	√ok	e?	e?		e?	e?	e?	e	e?	e	√ok	√		e?	e	√	√ok	√	√
88	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√	√ok
89	0	0	0	0	0	0	0	0	0	0	0	0	0a	0a	0	0					
90	e	√ok	√ok	√ok	e?	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√	√
91		e	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
92		e	√ok	√ok	C?		e		√ok	√ok	√ok	√ok	√ok	√ok	C	√ok			√ok		√ok
93				e	e?		√ok	√	e?	C	√ok	√ok	√ok	√		√			√ok		√
94		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
95	0	0	0	0	0	0a	0a	0a	0	0	0	0	0	0	0	0					
96	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok	√ok	√ok
97	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok			√ok	√ok	√ok
98		e	√ok	√ok	√ok		e	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok	√ok	√ok
99			?	0	0	0	0	0	0	0	0	0	0	0	0	0					
100		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
101		e?	e√ok	√ok	e?		e?		C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
102		e	e?	e	e?		e		e?	e	√ok	√ok	√	√		e	√ok	√	C		√ok
103		e?	e	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
104		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
105		e	√ok	√ok	√ok		√ok		√ok	e?	e	√ok	√ok	√ok	C	√ok			√ok		√ok
106			e?	e	e?		e		√ok	√ok	e?	e	√ok	√	√	√ok	√	√ok	C		√ok
107	e	√ok	e?	e	√ok		√ok		?	e	√ok	√ok	√ok	√ok	√	C			√ok		√ok
108	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
109	0		0	0	0	0	0		0	0	0	0	0	0	0a	0					
110			0	0	0	0	0	0	0	0	0	0	0	0	0	0					
111		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√		√ok	√ok	√ok	√ok	√ok	√
112			?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok
113	e	√ok	√ok	√ok	√ok		√ok	√ok	e?	e	√ok	√ok	√	e?	e	√ok	√ok	√ok	√ok	√	√
114	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√
115	0	0	?	0	0	0	0	0	0	0	0	0	0	0	0	0					
116			0	0	0	0	e		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√	√
117	0?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√
118		e	√ok	√ok	e?		e	√ok	√ok	√ok	√ok	√ok	√ok	√	√	√	√ok	√	√ok	√	√
119	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√	√ok	√ok	√
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
122	e		√ok	√ok	√ok		√ok	√ok	√ok	e?	e	√ok	√ok	√	√ok	√	√ok	√ok	√ok	√	√
123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
124			?	?			e?		e	√ok	√ok	e?	e	√ok		√	√	√ok	√	√	C
125	e?	e	√ok	√ok	e?		e?		√ok	√ok	√ok	√ok	√ok	√ok		√	√ok	√ok	√	√	√
126	e		√ok	√ok	e?	e	e?	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	C	√ok
127			?	?			e?	e	√ok	e?	e	√ok	√ok	√ok		√	√ok	√ok	√ok	√	√ok
128			?	e?			e?		e?	e?	e	√ok	√ok	√		√	e?	e	√ok	√	√
129			?	e?			e?			e?	e?	?	e	e?		e?	?	e	√	√	√
130			?	e?			e?	e	√ok	√ok	√ok	√ok	C	√ok		√ok		√ok	√ok		√ok
131	0	0	?	0			0	0	0	0	0	0	0	0		0					√ok
132		0	e	?	e	√ok	√ok		e?	e	√ok	√ok	√ok	√		√ok	√ok	√ok	√	√	√ok
133			e	0	0	0	0		0	0	0	0	0	0	0	0					
134	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√ok
135	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
136	e	√ok	√ok	√ok	√ok	√ok	√ok		e?	e	√ok	√ok	√ok	e?	e	√ok	√ok	√ok	√ok	√	√
137	e?	e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√
138	e		√ok	√ok	e?		e		√ok	e?	e?	e	√ok	e?	e	e	√ok	√	√	√	√
139		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok

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140				e	e	√ok	√ok	√ok	broken	0	0	0	0	0	0	0					
141		0	Gone																		
142	0	0	Gone																		
143			e?	e	e?		e?		e	√ok	√ok		√ok	√				√ok	√	√	√ok
144	e		√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√	√		√ok	√	√ok	√	√ok	√
145	0		?	e?			e?		e?	e?	e?										
146			e			e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C			√ok		√ok
147	e	√ok	√ok	√ok	√ok	√ok	e?	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√ok
148		e	√ok	e?	e	√ok	√ok		√ok	√ok	√ok	e?	e?	e	√	e?	e	√ok	C		√ok
149			e?	e?			e?		e	e?	√ok	e?	e?	e	√	√	√	e?	C	√	√ok
150			e?	e?			e?		e	e?	e	√ok	√ok	√	√	√	√	√ok	C		√ok
151	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
152	0	0	e	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√		C			√ok		√ok
153	e	√ok	e?	e			√ok		√ok	√ok	√ok	e?	e	√ok		√ok	√ok	√ok	√ok	C	√ok
154	e	√ok	e?	e	e?	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	C	√ok			√ok		√ok
155	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	e?	e	√ok	√	√ok	√ok	√ok	√ok	√ok
156	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
157		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√	√ok	√ok	√ok	C
158			e	e?	e	√ok	√ok		√ok	√ok	e?	e	√ok	C?		e	√ok	C	√ok		√ok
159			?	?			?														
160			?	?			?														
161	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√	√ok	√ok	√ok	√	√
162		e	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok
163		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok
164		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	e?	e	√		√		√ok	√	√	√ok
165	e	√ok	e?	√ok	√ok		e?		√ok	e?	e	√ok	√ok	√	C	√ok			√ok		√ok
166		e	e?	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√ok	√ok	√
167	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√	√	√ok	√ok	√	√ok	√ok	√ok	√
168		eok	√ok	√ok	C?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√		√ok	√ok	√ok	√ok	√ok	√
169				e	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			
170			e	√ok	√ok		√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
171	0	e	e?	e	e?		e		√ok	√ok	√ok	√ok	√	√ok	C	√ok			√ok		√ok
172	e	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
173	e	√ok	e?	√eok	e?	e	√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
174	e	√ok	e?	e?	e?		e		C	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
175	e	√ok	√ok	√ok	√ok		√ok	√ok	√ok	C	√ok	√ok	√ok	X	0	0			√ok		

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
176		e?	e	e?			?		e?	e?				e		?	C		√ok		√ok
177			?	?			?														
178		e	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok			√ok		√ok
179			√ok	√ok	C?	e	√ok		e	√ok	√ok	√ok	√ok	√ok		√ok	C		√ok		√ok
180	e		√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok		√ok			√ok		√ok
181																					
182																					
183																					
184																					
185																					
186	e						e	√ok	√ok	e?	e?	e	√ok	√ok		√ok	√ok	√ok	C		√ok
187																					
188																					
189																					
190																					
191	0		e	√ok	√ok	√ok	√ok	√ok	e?	e	√ok	√ok	√ok	√		√ok	√	√ok	√ok	√ok	√
192																					
193																					
194																					
195																					
196																					
197		e	√ok	√ok	e?	e	e		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
198				e	e?		e		√ok	√ok	√ok	√ok	√ok	√ok		√	√ok	√ok	√	√ok	√
199																					
200	0	0		0																	
201		e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok		√ok	√	√	√	√ok	√ok	√ok	√ok	√ok
202																					
203																					
204	0	0	0																		
205	0	0	0																		
206	0	0	0																		
207	0	0	0																		
208																					
209																					
210																					
211									e	√ok	√ok	√ok	√ok	√		√	√ok	√ok	√ok	√ok	√

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
212		e?		e			C?		e	√ok	e?	e	C	√ok		√ok			√ok		√ok
213		e?		?			e		√ok	√ok	√ok	√ok	√ok	C	√ok	√ok			√ok		√
214		e?		e			e?				C	√ok	√ok	√ok		√ok			√ok		√
215	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok
216		0	0																		
217										e	√ok	√ok	√ok	√		√ok	√	√ok	√	√	√
218	c?	e	e?	e?			e?		e?	e?	e?	e	√	C	√ok	√ok			√ok		√ok
219																					
220																					
221																					
222																					
223																					
224																					
225																					
226																					
227																					
228																					
229																					
230																					
231																					
232																					
233		0	0																		
234			0																		
235		e	√ok	√ok	e?	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√ok		√ok
236																					
237																					
238																					
239																					
240		e	e?						√ok	√ok	√ok	√ok	C	√	√ok			√			√
241		e?	e					√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok			√
242		e	e?																		
243																					
244																					
245																					
174A	e	X	0			0	0	0	0	0	0	0	0	0		0					
148A	e	√ok	e?	e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	e?	e?		e	√ok	√ok	√ok	√ok	√

Site	July 19	20	21	22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
186A	e	√ok	√ok	e?	√ok	√ok	√ok	√ok	√ok		√ok	√ok	e?	e	√ok	C			√ok		√ok
56A			e	√ok	√ok		√ok	√ok	√ok	√ok	e?	e	C	√ok	√ok	√ok			√ok		√ok
148B			e	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	C	√ok	√ok	√ok			√ok		√ok
136A				e	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok		√ok	C	√ok	√ok		√ok
153A				e	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√	√ok			√ok	√	√ok	√ok	√ok
214A					e	√ok	√ok			C	√ok	√ok	√ok	√ok		√ok			√ok		√ok
215A					e	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok		√ok	√ok		√	√	√
97A							e	√ok	√ok	√ok	√ok	√ok	√	e?	?	e	√ok	C		√ok	
146A							e	√ok	√ok	√ok	√ok		√ok	√ok	√ok	√ok	√ok	√ok	√ok	√	√
147A							e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√
166A							e		√ok	√ok		√ok	√ok	√		√ok	√ok	√ok	√	√ok	√
144A										e	√ok	√ok	√	√		C			√ok		√ok
148C										e	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√	√
111A											e	e?	e	√		√ok	√ok	√	√ok	√	√
117A											e	√ok	e?	√	√	√ok	√	√ok	√ok	√	√
128A									e	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok		√ok
112A													e	√ok	√ok	e	√ok	√	√ok	√	√

Plot U

Site	July 19	20	21	2	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
1	Site gone - ledge missing																				
2	Site gone - ledge missing																				
3	0	0	0			0	0	0	0	0	0	0	0a	0a	0	0					
4	e?	0	0	e		√ok				0	0	0	0	0	0	0					
5	0	0a	e	e		√ok		√	√	√	√ok	ok	√	√	√ok	√	√	√ok	√	C	
6	e?			e		√			√	√	√	√	√	√C	C?	√	eok	√	√ok	√ok	
7	0		e			√ok				√	√	√ok	√ok	√ok	√	√ok	C	√ok	√ok	√ok	
8	e?			e?						e	√	√ok	√ok	√	√	√ok	√ok	√	√ok	√	
9	0	0a								0	0	0	0	0	0	0					
10	e	√ok		√ok		√ok		√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√ok	√ok	√ok	√ok	√	C
11	0	0								0a	0a	0	0a	0	0	0					
12	e	√ok		√ok		√ok			√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok	√ok	

Site	July 19	20	21	2	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
13	e?			e?				e	√ok	√ok	√	√ok	√ok	√	√ok	√ok	√ok	√ok	√ok	√	
14	0	0		e		01a				01a	01a	0	02a	02a	0	0					
15	e?	e	√ok	√ok		√ok			√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok		√	√ok	√ok	
16	Site gone - ledge missing																				
17	e	√ok		e?		e			√ok	√ok	√	√	√	√	√	√	√ok	√ok	√ok	√	
18	e?	0		?		e		√ok	√	√	√ok	√	√ok	√ok	√ok	√	√	√	C	√	
19	0	0		?		0			01a	01a	0	0	01a	0	0	0					
20	e?		e	√ok		√ok			√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√	
21	e?	e	√ok	e?				01a	0	0	0	01a	01a	02a	02a	0					
22	0*	0								0	0	0	0	0	0	0					
23	e?			e?						√	√	√	√	e	√ok	√	√	√	√	√	
24	e?	e	√ok	√ok		√				√	√	√	C	√ok	√ok	√	√ok	√ok	√ok	√ok	
25	e?			√ok					√ok	√ok	√	√ok	√ok	√	√	√	√ok	√ok	√ok	√ok	√ok
26	e?	0		e?		e			√ok	√ok	√	C	√ok	√ok	√ok	√ok	√ok				
27	e?	e		e?		√ok			√ok	√	√	√	√ok	C	√	√					
28	e?	e		e?						C	√ok	√ok	√ok	√ok	√ok	√ok	√ok				
29	e?	0	e	e?						√	√	√	e	√ok	√	√ok	√	C	√ok	√ok	
30	e?		e	e?						√	C?	e?	e?	√	√	√	√ok	√ok	√	√	
31	e?	e		√ok						√	√	e?	C	√ok	√	√					
32	0	0								?	?	?	e?	0	0	0					
33	e?		e	e?					e	√	√	e?	e	√	C	√					
34	e?		e	e		√ok		√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok		√ok		
35	0	0								0	0	0	01a	0	0	0					
36	e?	e		√ok		√			e?	√	?	?	?	?	?	?					
37	e?	e		√ok						√ok	√	√	√	√	√	√	C?	C		√ok	
38	0	0								0	0	0	0	0	0	0					
39	0	0								0	e	√ok	√	√ok	√ok	√	C	√ok	√ok	√ok	
40	e?			e?					e	√	√	√	√ok	√	√	√ok	√ok	√	√	√	
41	e?	e	√ok	e?		√			√	√ok	√	√ok	√ok	C	√ok	√				√ok	
42	0	0								0	0	0	0	0	0	0					
43	e?	0								0	0	0	0	0	0	0					
44	e?		e	e?		e			√ok	√ok	√ok	√ok	√ok	√ok	√ok	C	√ok	√ok		√ok	
45	e?	0								0	0	0	01a	0	0	0					
46	0	0								0	0	0	0	0	0	0					
47	e?		e	√ok		√ok			√ok	√ok	√ok	C	√ok	√ok	√ok	√					
48	e?	e	√ok	√ok		√ok		√ok	C	√ok	√	√	?								

Site	July 19	20	21	2	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
49	e	√ok	√ok	√ok		√ok		√ok	√ok	√?	√ok	C	√ok	√ok	√ok	√	√ok	√ok		√ok	
50	e?			e					√	√ok	C	√ok	√ok	√ok	√	√					
51	e?	e		e?					C	√ok	√ok	√	√	√ok	√	√					
52	e?			e?						e?	e?	C	√	√	√	√					
53	e?			e?						e?	e?	e	√	√	√	√ok	C	√ok		√	
54	e?			e?						e?	e?	C	√	√ok	√ok	√	√ok				
55	e?	e		e?						0?	0?	0	0	0	0	0					
56	e?			e?						C	√	√	√	√	√	√					
57	e?			e?						C	√	√	√ok	√ok	√	√		√ok		√	
58	e	√ok		√ok		√ok		√ok	√ok	√ok	√ok	√	√ok	C	√ok	√		√ok			
59	e?			e?						e	√	√	√	C	√ok	√	√ok			√ok	
60	e?		e	e?						e	C	√ok	√ok	√ok	√ok	√	√ok	√ok		√ok	
61	e			e?		√ok				e?	e?	C	√ok	√ok	√	√	√ok				
62	e	√ok	√ok	√ok		√ok		√	√ok	√ok	√ok	√ok	√ok	C	√ok	√	√ok	√ok		√ok	
63				e?		e				e?	e?	e	√	C	√	√ok		√ok			
64																					
65																					
66	0	0		0							0	0	0	0	0	0					
67		0		0a						02a	01a	0	02a	02a	0	0					
68		0		0						0	0	0	0	01a	0	0					
69																					
70																					
71										e?	e?	√	√	e	√	√ok	√	√	C	√ok	√
72		0									0?	0?	0?	0	0	0	0				
73																					
74		e?									e?	√	C	√ok	√	√					
75																					
76																					
77			e?	0?		e			√ok	√	√	√ok	√ok	√ok	√ok	√	√	√ok	√	√ok	√ok
78																					
79			e						√ok	√ok	e?	e?	e	√	√	√					
80																					
49a													e	√ok	C	√					
60a									e	01a	0	0	02a	01a	0	0					
60b									01a	0	0	0	01a	01a	0	0					

Site	July 19	20	21	2	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4	5	6	7	8
71a									e?	e?	√	√	e	√	√	√	√	C		√	
71b									e?	e	√	C	√	√	C	cde					
60c														e	√ok	√	√	√	√	√	C
49a													e	√	√	√	√	√ok	√ok	√	
29a																		e	C		
16a											e	√ok	√ok	√ok	√ok	√	C	√ok	√ok	√ok	
4a				e		√ok		√ok	√ok	√ok	√	√ok	√ok	√ok	√	√	√ok	√ok	√ok	√ok	√ok
10a				e?		√		√ok	√			√	√ok	C	√ok	√	√ok				
40a				e		√ok		√ok	√	√ok	√	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	√ok	
40B				e		√ok			√ok	√ok	√ok	C	√ok	√ok	√ok	√			√ok	√ok	
41A		e?		e?		e		√ok	√	√ok	√ok	√ok	√ok	√ok	√ok	√	√ok	√	C	√	
45A						e				01a	0	0	01a	0	0	0					
a						e			√ok	√	√eok	√ok	C	√ok	√ok	√ok	√ok	√ok	√ok	√ok	
b									e	√	√	√ok	√	√	√ok	C	√ok				
c				e		√ok			√ok	√	√	√	C?	√	C	√	√ok			√ok	
d										√	√	C	√ok	√ok	√ok	√	√ok			√ok	
e										√	e	√	√	√	C?	√	C			√	
f										√	√	C	√ok	√	√	√					
g										e	√	C	√	√	√	√					
h									e	√ok	√	√	√ok	C	√	√	√ok	√ok			
i						e			e?	√	C	√ok	√ok	√ok	√	√	√ok	√ok	√ok	√	
46A						e					√	e	C	√	√						
47A						e		e			√	√	√	√	√	√	√?	√?	?	?	
47B						e		e			√	√	√	√	√	√	C		√ok	√ok	
47C									e		√	√	√	C	√ok	√	√ok				
J						e?				√	√	√	√ok	√	√ok	C	√ok	√ok	√ok	√	
K						e?				e?	√	√	√	√	√	C	√ok	√ok		√ok	
L											C	√ok	√ok	√	√	√					
M											02a	0	0	0	0	0					
N											e	√	√	√	√	√	e?	√	√	√ok	
Z													e	√	√	√	√	√	√	√	

APPENDIX 7. The status of Thick-billed Murre sites in Plots G, N, Q1, Q4, S1 on Prince Leopold Island, 1988.

Plot G

Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status
1	1a+C	2	1a+C	3	2a	4	1a	5	1a
6	1a	7	1a	8	1a	9	1a+C	10	1a
11	0 abs	12	1a	13	1a	14	1a	15	BLK nest
16	1a	17	1a	18	1a+C	19	1a	20	1a
21	1a+C	22	1a	23	1a	24	NOP	25	2a+C
26	2a	27	1a	28	1a+C	29	1a+C	30	0 abs
31	1a	32	1a	33	1a	34	BLK nest	35	BLK nest
36	2a	37	0 abs	38	1a	39	1a	40	ledge gone
41	now BLK	42	now BLK	43	0 abs	44	1a	45	1a
46	1a	47	1a+C	48	2a+C	49	1a+C	50	0 abs
51	1a+C	52	1a+C	53	NOP	54	2a+C	55	2a+C
56	NOP	57	NOP	58	NOP	59	NOP	60	NOP
61	NOP	62	1a	63	NOP	64	1a	65	1a50
66	NOP	67	NOP	68	NOP	69	NOP	70	NOP
71	1a+0	72	NOP	73	NOP	74	1a	75	1a

Plot N

Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status
1	1a	2	1a	3	1a	4	0 abs	5	1a
6	0 abs	7	1a	8	2a	9	2a	10	1a
11	0 abs	12	1a	13	1a	14	1a	15	1a
16	1a	17	1a	18	1a	19	2a	20	1a
21	2a	22	2a	23	1a+C	24	1a	25	1a
26	1a	27	1a	28	1a	29	1a	30	1a
31	1a	32	1a	33	1a	34	1a	35	1a
36	1a	37	1a	38	1a	39	1a	40	2a
41	1a	42	1a	43	0 abs	44	1a	45	1a
46	1a	47	1a	48	1a	49	1a	50	1a
51	1a	52	1a	53	1a	54	2a	55	1a
56	1a	57	1a	58	1a	59	1a	60	1a
61	1a	62	1a	63	2a	64	1a	65	2a
66	1a	67	1a	68	1a	69	1a	70	2a
71	NOP	72	1a	73	1a	74	1a	75	
76	1a	77	1a	78	1a	79	1a	80	1a
81	1a	82	1a	83	1a	84	2a	85	1a
86	1a	87	1a	88	1a	89	0 BLK site	90	1a
91	1a	92	0 abs	93	1a	94	NOP	95	1a
96	1a	97	1a+C	98	NOP	99	0 abs	100	NOP

Site		Site		Site		Site		Site	
No.	Status	No.	Status	No.	Status	No.	Status	No.	Status
101	NOP	102	NOP	103	1a	104	1a	105	1a
106	1a	107	1a	108	1a	109	1a	110	1a
111	1a	112	NOP	113	1a				

Plot Q1

Site		Site		Site		Site		Site	
No.	Status	No.	Status	No.	Status	No.	Status	No.	Status
1	1a	2	1a	3	1a	4	1a	5	1a
6	2a+e	7	0 abs	8	1a	9	1a	10	1a
11	1a	12	1a+e	13	1a	14	1a+e	15	2a
16	BLK Nest	17	2a	18	1a	19	1a	20	2a
21	2a	22	1a+e	23	1a	24	1a	25	1a+C
26	1a	27	1a	28	1a	29	1a	30	2a
31	1a	32	1a	33	1a+e	34	1a	35	1a
36	2a	37	1a	38	1a	39	2a	40	2a
41	1a+C	42	0 abs	43	1a	44	1a	45	1a
46	1a	47	1a	48	0 abs	49	0 abs	50	1a
51	1a	52	1a	53	1a+C	54	1a+e	55	1a+C
56	1a	57	1a	58	1a	59	1a	60	1a
61	1a	62	1a	63	1a	64	1a	65	1a
66	1a	67	1a	68	NOP	69	ledge gone	70	1a
71	1a	72	1a	73	2a	74	1a	75	1a
76	1a	77	1a+C	78	1a+C	79	2a+e	80	1a+C
81	1a	82	1a	83	1a	84	1a	85	NOP
86	1a	87	1a	88	1a	89	1a	90	NOP
91	1a	92	1a+e	93	1a	94	1a	95	1a
96	1a+C	97	1a	98	2a+e	99	1a+e	100	1a
101	1a	102	1a	103	1a	104	0 abs	105	1a
106	1a	107	NOP	108	NOP	109	2a	110	1a+C
111	1a	112	NOP	113	2a	114	NOP	115	1a
116	1a	117	1a	118	1a	119	1a	120	NOP
121	NOP	122	1a	123	1a	124	1a	125	NOP
126	NOP	127	1a+e	128	NOP	129	NOP	130	0 abs
131	NOP	132	NOP	133	NOP	134	NOP	135	1Ad
136	NOP	137	NOP	138	NOP	139	NOP	140	NOP
141	NOP	142	NOP	143	1a	144	NOP	145	2a
146	NOP	147	NOP	148	NOP	149	1a		

Plot Q4

Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status
1	1a	2	1a	3	0 abs	4	1a	5	1a
6	1a+C	7	1a	8	1a	9	1a	10	1a
11	1a	12	1a	13	1a+C	14	2a+C	15	1a
16	1a+C	17	0 abs	18	1a	19	1a	20	0 abs
21	2a	22	1a	23	1a	24	2a	25	1a+C
26	1a+C	27	2a	28	1a	29	1a	30	1a
31	1a+C	32	1a	33	1a	34	1a	35	1a
36	1a	37	1a	38	1a+C	39	1a	40	1a
41	2a	42	1a	43	1a	44	1a	45	2a
46	1a	47	1a	48	1a	49	0 abs	50	1a
51	1a	52	1a	53	1a+e	54	1a+e	55	1a
56	1a	57	1a	58	1a+C	59	1a	60	0 abs
61	1a	62	1a	63	1a	64	1a	65	0 abs
66	1a	67	1a	68	2a	69	1a	70	1a
71	1a	72	NOP	73	1a	74	1a	75	1a
76	1a	77	1a	78	1a	79	NOP	80	0 abs
81	0 abs	82	1a	83	1a+C	84	1a	85	NOP
86	NOP	87	1a	88	1a	89	2a	90	1a
91	NOP	92	1a	93	1a+C	94	1a	95	NOP
96	0 abs	97	NOP						

Plot S1

Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status	Site No.	Status
1	1a	2	1a	3	2a	4	1a	5	0 abs
6	1a+C	7	1a+C	8	1a	9	1a	10	1a
11	2a	12	1a	13	1a	14	1a	15	0 abs
16	1a	17	0 abs	18	2a	19	1a	20	1a
21	1a	22	1a	23	1a	24	1a	25	1a
26	2a	27	0 abs	28	1a	29	1a	30	1a
31	2a	32	NOP	33	1a	34	0 abs	35	1a
36	1a+C	37	1a	38	1a+C	39	1a	40	1a
41	2a	42	1a	43	2a+C	44	1a	45	1a
46	1a	47	2a	48	1a	49	1a	50	0 abs
51	1a	52	1a	53	1a	54	1a	55	1a
56	1a	57	1a	58	1a	59	2a	60	1a
61	2a	62	NOP	63	1a	64	1a	65	1a
66	2a	67	1a	68	1a	69	1a	70	1a
71	1a	72	1a	73	2a	74	1a	75	1a
76	1a	77	1a	78	1a	79	1a+C	80	1a+C
81	1a	82	1a	83	1a	84	1a+0	85	NOP
86	1a	87	1a	88	1a	89	0 abs	90	1a

Site		Site		Site		Site		Site	
No.	Status	No.	Status	No.	Status	No.	Status	No.	Status
91	1a	92	1a	93	1a	94	1a	95	0 abs
96	1a	97	1a	98	1a	99	0abs	100	1a+0
101	1a	102	2a	103	1a	104	1a	105	1a
106	1a	107	1a	108	1a	109	0 abs	110	1a
111	2a	112	1a	113	1a	114	2a	115	0 abs
116	1a	117	2a	118	1a	119	1a	120	1a+0
121	1a	122	1a	123	2a	124	2a	125	2a
126	1a	127	1a	128	1a	129	2a	130	2a
131	1a+C	132	1a+C	133	1a+C	134	1a	135	1a
136	1a	137	2a	138	1a	139	1a	140	1a
141	0 abs	142	abs	143	2a	144	1a	145	1a
146	1a	147	2a	148	1a	149	1a	150	1a
151	1a	152	1a	153	2a	154	1a	155	1a+e
156	1a	157	1a	158	1a	159	NOP	160	NOP
161	1a	162	1a	163	1a	164	1a	165	1a
166	1a	167	1a	168	1a	169	1a	170	1a
171	1a	172	1a	173	1a	174	2a -	175	1a
176	1a	177	NOP	178	1a	179	1a	180	1a
181	NOP	182	0 abs	183	1a	184	NOP	185	0 abs
186	2a	187	NOP	188	NOP	189	NOP	190	NOP
191	1a	192	NOP	193	NOP	194	NOP	195	0 abs
196	0 abs	197	1a	198	1a	199	NOP	200	0 abs
201	1a	202	NOP	203	NOP	204	0 abs	205	1a+0
206	1a+0	207	NOP	208	NOP	209	NOP	210	NOP
211	1a	212	2a	213	2a	214	2a	215	1a
216	NOP	217	1a	218	1a	219	NOP	220	NOP
221	NOP	222	NOP	223	NOP	224	NOP	225	NOP
226	NOP	227	NOP	228	NOP	229	NOP	230	NOP
231	NOP	232	NOP	233	0 abs	234	0 abs	235	1a

Codes:

a	= adult
e	= egg
C	= chick
abs	= absent
BLK	= Black-legged Kittiwake
NOP	= Not on photograph