THE DISTRIBUTION OF PENGUINS ON THE ANTARCTIC PENINSULA AND ISLANDS OF THE SCOTIA SEA

By
J. P. CROXALL *and* E. D. KIRKWOOD
Life Sciences Division, British Antarctic Survey

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INTRODUCTION

THE recent great increase of interest in the marine living resources of the Southern Ocean has focussed attention on euphausiid crustaceans, particularly *Euphausia superba* (krill), the staple diet of so many vertebrates of these regions. For understanding the operation of this ecosystem and especially for ensuring that any exploitation of it is managed on a rational basis, a knowledge of the stocks of krill, and of the role that predators play in their consumption, is fundamental.

The need for such information has highlighted how few relevant and accurate data we possess on the size and food requirements of the stocks of the main Antarctic and sub-Antarctic krill-eating vertebrates. The best data that exist are for whales; some rough estimates have been made for seals but for seabirds (and fish) there is essentially no reasonable basis on which to make such estimates.

Recognizing this situation, the Sub-committee on Bird Biology of the Working Group on Biology of the Scientific Committee for Antarctic Research (SCAR) made a number of recommendations which were accepted at the Fifteenth Meeting of SCAR at Chamonix, France, in May 1978 (SCAR, 1979). Amongst the recommendations are those for:

a. Monitoring changes in breeding numbers and reproductive performance of selected populations of certain seabird species at specified intervals. This recognizes that such studies are likely to offer the best prospect for identifying changes in the abundance and distribution of prey species and especially those changes which may arise following the advent of commercial exploitation of krill.
b. Conducting an international survey of Antarctic seabirds, aimed principally at Adelie Penguin *Pygoscelis adeliae* and the crested penguins *Eudyptes* spp. This accepts that Adelie Penguin comprises the vast majority of the bird biomass in Antarctic regions and that crested penguins are the major bird biomass component of sub-Antarctic areas.

A further recommendation contained the request for data on distribution and numbers of penguins and on the species and sites selected for monitoring. Details of British Antarctic Survey (BAS) monitoring programmes are being presented elsewhere (Croxall and Prince, in press *a*). This publication is a preliminary attempt to collate and make available BAS data on the location and size of colonies of all penguin species within the context of already published data on the subject.

1. *Scope and sources*

The geographical area covered is the whole of the Antarctic Peninsula (i.e. north of about lat. 75°S) and all associated islands, the South Shetland Islands (including the Elephant and Clarence Islands group), the South Orkney Islands and the South Sandwich Islands. The penguin populations of the latter are poorly known and virtually all information presented here has been taken from the recent general review of the islands by Holdgate and Baker (1979). South Georgia is not included (although the distribution of penguins there is shown on the general map for each species) as it is currently the centre for BAS ornithological research and detailed bird-distribution mapping (initiated by P. A. Prince and based on the 5 km square grid), and colony census schemes are in operation. The results of these will be published independently and accounts for King Penguin (Smith and Tallowin, in press) and Wandering Albatross (Croxall, in press) will shortly be available.

Although the area thus covered is visited by scientists of many nations, it is not inappropriate that BAS should prepare the preliminary review as the Survey has worked extensively over much of the area during the last 30 years in the course of which much anecdotal and unpublished information on penguin colonies has accumulated. Equally, it is realized that many other scientists will have relevant unpublished information and it is hoped that a revised edition incorporating this can be prepared in time for the commencement of the international survey in 1981-82.

In preparing this account, we were fortunate to be able to commence on the basis of the *Antarctic Map Folio* produced by Watson and others (1971). All references pertaining to penguins cited in this have been examined (principally to determine the precise location of colonies and to extract any numerical information), except for a small number of unpublished manuscripts which have not yet been made available. Their coverage of the published literature was very comprehensive up to 1968.

We have attempted to locate all subsequent relevant publications up to and including 1978 and, as far as possible, in 1979.

There are two major sources of unpublished records. First, in BAS archives there are many reports and record cards which contain references to penguin colonies. These have been thoroughly checked and in some cases supplemented by personal communications from the authors. Some data, chiefly relating to colonies that were fairly frequently visited and for which numerical information was available, were presented by Conroy (1975) but the great majority appears for the first time here. Secondly, we were fortunate to have a complete copy of the ornithological report of the Joint Services Expedition to Elephant Island, 1970-71 (Furse and Bruce, 1971). In addition to work on a number of the resident species as time and weather permitted, the expedition members conducted an exemplary census of the island's breeding species. The results of this were presented in great detail on many maps and with extensive covering notes. It has not been possible to reproduce all this information here; the omissions are chiefly of indications of the very few areas where absence of penguins was not conclusively proved and of descriptions of colony topography. We are most grateful for permission to draw so extensively on this material. The second Joint Services Expedition to the group (Furse, 1978) worked chiefly on the other islands and J. R. Furse kindly provided sketch maps of colony distribution and estimates of colony size in advance of the production of the ornithological report itself.

2. *Presentation of data*

2.1 *Maps*

The maps are a most important part of this publication. For any survey it is clearly of prime importance to know the location of those colonies whose existence is already recognized.

In nearly all cases the maps used are the most detailed that could be drawn on the basis of existing information. In some cases they were copied from rough field sketches and may, therefore, not match too closely the real topography. Maps are numbered serially throughout the accounts of the four main species. For each species there is an introductory map showing overall distribution in the area (although one dot may represent several colonies). This and general maps are assigned whole number references. All more detailed maps are related to the general map on which they appear and of which they can be regarded as "insets" by prefixing their number with that of the appropriate general map (e.g. 2.1., 3.1., 3.1.1., 4.4., etc.).

Each colony is identified by a number, corresponding to that used in the text, serial within each species. In general terms, the sequence of colonies is from south to north along the length of the Antarctic Peninsula and then from south to north along the island groups.

If the colony number is placed in a "box" then another, and more detailed, map of that colony is provided. Sub-divisions of a colony (where this degree of information exists) are coded by letter. It should be emphasized that the concept of "colony" and "sub-colony" is not consistent throughout. In particular, in areas of detailed information (e.g. Elephant Island, Signy Island) sub-colony letters are used extensively, purely for the convenience of grouping a number of sites together without going to the lengths of according each an independent number. It would have been ideal to have reflected a consistent distinction between rookery and colony, along the lines of the definitions proposed by Penney (1968) but ground information is totally inadequate to do this for the majority of sites and the two terms are used interchangeably here.

In showing the location of a colony three symbols are used:

● breeding colony,
⊘ breeding colony, but exact location uncertain,
○ possible or probable breeding colony.

All maps without latitude and longitude details have an arrow marking the direction of north. All maps have a metric scale but in a few cases the original form lines in feet have been retained. The use of many unofficial place-names was unavoidable. These have been placed in quotation marks.

2.2 *Counts: nature, interpretation and accuracy*

In the text tables all counts are expressed as breeding pairs. In broad terms the numerical estimates and counts are of three kinds. The most accurate counts are those of breeding pairs, normally derived from a count of nests, usually during incubation, occasionally while the chicks are in the nest before crèches are formed. Such counts (designated as N in the text tables) are under-

estimates only by the number of breeding failures sustained between egg-laying and the date of the count.

Late in the breeding season the only counts possible are those of the chicks (designated as C in text tables). As, in round figures, most pygoscelid penguins raise about one chick per pair per season, this may be a reasonable approximation to the original number of breeding pairs. Unfortunately season-to-season variation in breeding success can often be considerable especially in Gentoo Penguin (70% and <1% in successive seasons at South Georgia (Croxall and Prince, in press *a*) and substantial in Adelie Penguin (26%, 47% and 68% in three seasons at Cape Royds (Yeates, 1968)); there are insufficient data to evaluate Chinstrap Penguin. At South Georgia, Macaroni Penguins only raise *c.* 0.5 chicks per pair per season so chick counts of this species may be considerable underestimates.

Many colony estimates and some counts, particularly early in the season, are expressed as total number of birds or adults (designated as A in text tables). These figures are difficult to interpret. Probably for all species for some days before laying commences and until it is finished both birds of the pair will be present at the nest site. Thus the number of breeding pairs is half the count of adults and as many BAS counts were done early in the season the actual figure shown is the number of pairs, derived on this basis from the adult count. During incubation it is more likely that only one bird will be present at the site and an adult count at this time would give a reasonable estimate of the number of pairs. Most observers, however, correctly counted nests at this time. A further problem with the counts of "birds" is that they may include individuals that are not breeding or will not do so. As very immature birds tend to arrive in the breeding colonies much later than the breeding birds this will reduce errors in early season counts but these may still include a proportion of non-breeders and hence be an overestimate of the true breeding total. As the exact stage of the breeding cycle at which many counts were made is unknown and to avoid interpreting all these counts individually, *all* adult counts have been halved to give the figure that is recorded in the count column of the table. Thus in these cases the original author's statement can be obtained by multiplying the tabulated count figure by two.

The degree of accuracy of these counts is, inevitably, highly variable and it is often difficult to ascertain on what basis a figure was arrived at. For the present purposes counts have been allocated to one of five categories:

1. Pairs/nests essentially individually counted, count probably accurate to better than ±5%.
2. Number of pairs in a known area counted individually and, knowing the total colony area, the overall total calculated. This technique has not been greatly used so far but it is particularly appropriate for very large colonies.
3. Accurate estimate; hopefully to ±10-15%.
4. Rough estimate; possibly accurate to 25-50%.
5. Guesstimate; to nearest order of magnitude (e.g. a few, hundreds, thousands, etc.).

Some counts from Elephant Island are clearly worse than accurate estimates but, recognizing the extensive amount of relevant experience the counters were accumulating, better than rough estimates. These are scored as 3/4.

2.3. *References*

Many of the entries in the reference column of the text tables are self-explanatory. A large number refer to unpublished BAS reports and the year of the reference is that which appears on the report and is often the year of the beginning of the field season (i.e. 1957-58 season appears on the report as 1957).

References in the form of BAS (Burn) refer to standardized cards for recording details of seabird colonies completed by the author whose name is in parenthesis. BAS records refers to a similar card or filed note without an indication of authorship. B. B. Roberts—and "Roberts (unpublished data)" in the text—refers to his diaries from the British Graham Land Expedition, 1934-37, which he looked out just before his recent death and to which his trustees kindly gave access. The Joint Services Expeditions are abbreviated to J.S.E.

2.4. *Comments*

Text comment following the tables has been kept to a minimum and is used chiefly to note apparent anomalies or in a few cases, involving colonies for which reliable data are available, to give

an approximate figure for the mean annual change between successive counts. Laying and hatching dates are given where these are reliably recorded.

In the species accounts which follow, for each of the four penguins treated in detail there is a brief prefatory review of sources of further relevant information. The breeding occurrence in the area of three additional species is also discussed.

SPECIES ACCOUNTS

1. Emperor Penguin *Aptenodytes forsteri*

There is only one colony in the area—on Emperor Island, Dion Islands (see Map 3.4)—and this is the most northerly breeding site of the species. It is also the smallest colony known and Conroy (1975) summarized counts made between its discovery by Stonehouse (1953) in 1948 and 1968, which showed a fairly stable population of *c.* 150 pairs. Recent aerial photographs (from *c.* 500 m altitude) gave a count of *c.* 1 000 presumably moulting adults on 14.12.1977. Although the number of birds actually breeding is unknown, even at *c.* 500 pairs it would be by far the largest total of birds hitherto recorded and must surely reflect an increase in breeding numbers.

2. King Penguin *Aptenodytes patagonica*

This species breeds on all the main sub-Antarctic islands but there is no certain record of a breeding colony south of lat. 55°S, although it has been suggested to breed at the South Shetland Islands (Eights, 1833) and South Sandwich Islands (Wilkins, 1923; Kemp and Nelson, 1931). It certainly does not breed in the South Shetland Islands nowadays and it must be most improbable that it ever did so; occasional birds straggle as far south as Adelaide Island. It seems very doubtful that it breeds at the South Sandwich Islands as the March date of recent visits would be quite suitable to record breeding birds and none was reported (Holdgate and Baker, 1979). Nevertheless many birds, especially juveniles, must visit the group from the South Georgia colonies and a thorough search of the northern islands is especially recommended. Conroy and White (1973) reviewed the status of the species and Smith and Tallowin (in press) have documented its status at South Georgia, confirming substantial increases in numbers over the past 40 years. They also show that, contrary to Conroy (1975), it is unlikely that any colonies have disappeared in this time and about ten small new colonies have been discovered in the last 5 years.

3. Adelie Penguin *Pygoscelis adeliae*

This has a circumpolar distribution and the southernmost breeding range of any pygoscelid penguin, reaching its northern limit at Bouvetøya (lat. 54° 23′S, long. 3° 24′E). It has been extensively studied in many parts of its range, e.g. at Pointe Géologie, Terre Adélie (Sapin-Jaloustre, 1960), near Syowa base (Matsuda, 1964; Aoyanagi, 1979), at Hope Bay and Signy Island (Sladen, 1958), and especially at Cape Hallett (Reid, 1964), Cape Royds (Taylor, 1962; Yeates, 1968) and Cape Crozier (Sladen and others, 1968; Penney, 1968; Tenaza, 1971; Ainley and Schlatter, 1972; Ainley, 1975; Oelke, 1975). At the latter three sites, and in particular Cape Crozier, there have been extensive investigations of population structure and dynamics, breeding performance and overall numerical fluctuations. Quantitative analyses of diet have been made by Emison (1968) at Cape Crozier, who found *Euphausia crystallorophias* to be the main prey, and Volkman and others (Ms.) at Point Thomas, King George Island, South Shetland Islands, where mainly *E. superba* was taken.

The use of aerial photography for colony census purposes was discusssed by Stonehouse (1969), Sladen and Leresche (1970) and Butler and Muller-Schwarze (1977).

Population increases between 1912 and 1962 were reported for Haswell Island (lat. 66° 30′S, long. 92° 40′E; Pryor, 1968). Decreases, attributed to human interference, have been reported in colonies near permanent bases (Reid, 1962; Yeates, 1968; Johnston, 1971). Natural changes in colony location have also been reported (Caughley, 1960; Spellerberg, 1970) and the effect of weather conditions on breeding has been investigated (Ainley and Leresche, 1973).

1 CHARCOT ISLAND — MAP 2.1

Count	*Nature*	*Date*	*Reference*
50	C3	Feb. 1977	B.A.S. (Burn)

On promontory opposite small islands to the west of Mount Monique, north-west Charcot Island.

2 RHYOLITE ISLANDS — MAP 2

Count	*Nature*	*Date*	*Reference*
12	N1	1948	R. J. Adie, pers. comm.
7	N1	20.12.48	Stonehouse, 1950

Stonehouse (1950) believed this site to have been colonized within the last year or two.

3 FLYSPOT ROCKS — MAP 2

The Antarctic Pilot (1974 edition) noted that penguins (which this far south must be Adelie) breed at this locality.

4 RED ROCK RIDGE — MAPS 3.1; 3.1.1

Count	*Nature*	*Date*	*Reference*
540	N3	24.11.36	B. B. Roberts
600	A3	1940-41	Eklund, 1945
800+	C3	1.1.48	Stonehouse, 1950
1 000	A3	29.11.48	Stonehouse, 1950
900	N3	25.11.60	Lefeuvre, 1960
800	N3	18.11.68	B.A.S. (Norman)

In January 1948, Stonehouse flipper-banded 400 adults at nests; 348 were re-trapped on 29.11.1948 but Lefeuvre found no sign of banded birds in 1960. In 1948 the rookery was divided into five areas, each with 100-200 chicks, arranged in a line along the north side of a landspit extending westward from Red Rock Ridge. By 1965 the spit had apparently become an island and the configuration of colonies is that illustrated in Map 3.1.1, although overall rookery size was not greatly different.

Several visitors have noted the extensive predation of eggs and chicks by *Catharacta maccormicki* at this rookery.

5 LAGOTELLERIE ISLAND — MAP 3.2

Count	*Nature*	*Date*	*Reference*
350-400	N3	13.12.36	B. B. Roberts
750	A3	1940-41	Eklund, 1945
1 750	A3	8.11.48	Stonehouse, 1950
2 402	N1	28.11.55	Scotland, 1956
1 100	A3	15.11.59	Franks, 1959
1 000	N3	28.12.60	Lefeuvre, 1960

The earliest counts for this rookery are probably sufficiently accurate to be confident that a real increase in numbers had taken place by the late 1940's–early 1950's. Equally, it is clear from Franks' (1959) account that there were never more than 2 200 birds present from 15 to 28 November 1959 and he recorded that this figure is in agreement with counts made in the previous season. Lefeuvre's (1960) count is also in good agreement and 50% of his birds had hatched eggs so the original total was probably slightly greater. Scotland's (1956) nest count was an extremely accurate one (to ±5%), with two sub-colonies being checked independently by other observers although some old nests may have been included in this total. The subsequent decline in breeding numbers is possibly attributable to the removal of eggs (for base use) from the colony. In 1955, 800 eggs were taken (Scotland, 1956) and it is not unlikely that similar collections were made in some other seasons. Even the effect of the 1955 removal would probably already have been reflected in 1959 totals.

Conroy (1975) cited, without reference, a count of 1 000 birds in October 1968 but we are unable to trace the source of this. In any case many breeding birds would not have arrived in the colony by then.

6 CONE ISLAND — MAP 3

Willey (1968) stated that the Adelie Penguin was a resident of Cone Island, but the date of his visit (11.9.68) was too early for any count.

7 AVIAN ISLAND — MAP 3.3

Count	*Nature*	*Date*	*Reference*
25 000	A4	11.1.68	B.A.S. (Barlow)
32 500	A3	15.11.68	Willey, 1968

Willey's (1968) count of 65 000 birds included some non-breeding individuals and it is probable that the actual breeding population was not greatly in excess of 25 000 pairs. 30% of the population had eggs on 15 November; the first chicks appeared on 24 December.

Barlow (1967) noted that a colony existed on a small outcrop to the east of Avian Island. It is possible, however, that he was referring to the Ginger Islands colony.

8 HENKES ISLANDS — MAP 3

Count	*Nature*	*Date*	*Reference*
10 000+	N4	9.10.48	Stonehouse, 1950

On the easternmost island of the group occupying the northern half of the island.

9 EMPEROR ISLAND, DION ISLANDS — MAP 3.4

Count	*Nature*	*Date*	*Reference*
500	N4	11.10.48	Stonehouse, 1950
175	A1	24.2.69	B.A.S. (Brown)

In the same general area as the Emperor Penguin colony.

10 GINGER ISLANDS — MAP 3

Count	*Nature*	*Date*	*Reference*
200	N3	8.10.48	Stonehouse, 1950
600	C3	17.2.69	B.A.S. (Brown)

One colony extended over the majority of the central island and there were approximately 20 sites on the southern island (Brown).

11 JENNY ISLAND — MAP 3

B. B. Roberts (unpubl. data) noted that Adelies bred on this island in 1936.

12 ANCHORAGE ISLAND — MAP 3

Count	*Nature*	*Date*	*Reference*
c. 250	A3	Mar. 1977	L. Sturgeon, pers. comm.

13 DETAILLE ISLAND — MAP 3

Count	*Nature*	*Date*	*Reference*
10 000	A5	1.2.09	Gain, 1914
350	N3	18.12.57	Smith, 1957
400	A4	Nov. 1958	White, 1958

Although Gain (1914) probably overestimated the size of many of the colonies he saw, it is hard to reconcile his figures with subsequent counts and it is even possible that different colonies are referred to. White's (1958) count of 800 adults, 75% of them paired on 16 November, does not match his estimate of 1 500–2 000 eggs laid in the colony. At 1.8 eggs/pair, even the lower figure would represent *c.* 750 pairs and this is probably a more realistic total. In 1958-59 bad ice conditions (*c.* 50 km to open water) were apparently responsible for the failure of all breeding adults to raise chicks to fledging. 8% of pairs had eggs on 16 November, the first chicks hatched on 19 December and 95% were hatched by the end of that month.

14 "DEPOT ISLET" — MAP 3.5

Count	*Nature*	*Date*	*Reference*
a few	A5	Dec. 1958	White, 1958

A colony here was also recorded by Roberts (unpubl. data) in 1936.

15 "OUTER ISLET" — MAP 3.5

Count	*Nature*	*Date*	*Reference*
300	A3	Dec. 1958	White, 1958

16 YALOUR ISLANDS — MAPS 4.1; 4.1.1

Count	*Nature*	*Date*	*Reference*
Many thousands	A5	7.1.09	Gain, 1914
c. 25 000	A4	24.11.54	Lenton, 1954
10 400+	N1, N3	5.12.58	Smith, 1958

Smith counted the populations of each island (see Map 4.1.1) separately; those for (c), (d) and (f) being nests counts, the remainder accurate estimates:

(a) *c.* 4 000, (b) *c.* 2 000, (c) 500, (d) 3 000, (e) *c.* 100, (f) 350, (g) *c.* 200, (h) *c.* 200, (i) *c.* 100.

He regarded the total of 10 400 nests as providing a minimum overall estimate.

17 PETERMANN ISLAND — MAP 4.2

Count	*Nature*	*Date*	*Reference*
925	A3	6.11.09	Gain, 1914
100	N3	1954-55	Lenton, 1954
few hundred	N5	Jan. 1960	Smith, 1959
1 540	N3	9.12.71	Muller-Schwarze, 1975
708	C1, C3	10-13.2.75	B.A.S. (Rodger)

Rodger made counts of the chicks in each of the colonies shown on Map 4.2 with results (accurate at least to ±5%) as follows; (a) 133, (b) 180, (c) 320, (d) 50, (e) 10, (f) 15. This total of 708 is, allowing for loss of eggs and chicks, probably not inconsistent with Muller-Schwarze's (1975) count. Gain's (1914) count of 1 850 birds will have contained a proportion of non-breeders but the two subsequent figures are surprisingly low, unless there had been interference (e.g. egging) in some previous seasons.

18 HOVGAARD ISLAND — MAP 4

Turquet (1906) noted that there were Adelie colonies on Hovgaard Island and on islets farther south in 1903-05.

19 PORT CHARCOT — MAP 4.3

Count	*Nature*	*Date*	*Reference*
200-250	A4	21.2.04	Ménégaux, 1907
c. 500	A5	1-3.1.09	Gain, 1914

20 PORT LOCKROY — MAP 4.4

Gain (1914) recorded a breeding colony with *c.* 1 000 birds at Alice Creek 27-28.1.1908. On 24.1.1931, however, Roberts (unpubl. data) saw no trace of Adelies and noted that Gentoo Penguins were occupying the Alice Creek area.

21 BISCOE POINT — MAP 4

Count	*Nature*	*Date*	*Reference*
3 020	N3	10.12.71	Muller-Schwarze, 1975

22 CORMORANT ISLAND — MAP 5

Count	*Nature*	*Date*	*Reference*
<1 000	N4	28.12.74	Parmelee and others, 1977

23 HERMIT ISLAND — MAP 5

Recorded as breeding here by Watson and Angle (1966) in Watson and others (1971) but their report was unavailable for consultation.

24 "CHRISTINE ISLAND" — MAP 5

Count	*Nature*	*Date*	*Reference*
2 170	N3	3.12.71	Muller-Schwarze, 1975

25 TORGERSEN ISLAND — MAP 5

Count	*Nature*	*Date*	Reference
8-10 000	N4	23.12.55	Wylie, 1958
8 650	N3	2.12.71	Muller-Schwarze, 1975

26 LITCHFIELD ISLAND — MAP 5

Count	*Nature*	*Date*	*Reference*
c. 1 000	N4	23.12.55	Wylie, 1958
890	N3	2.12.71	Muller-Schwarze, 1975

27 HUMBLE ISLAND — MAP 5

Count	*Nature*	*Date*	*Reference*
3 000+	N4	23.12.55	Wylie, 1958
3 215	N3	2.12.71	Muller-Schwarze, 1975

28 HALFWAY ISLAND — MAP 4

Reported as breeding by Watson and Angle (1966) in Watson and others (1971) but report unavailable for consultation.

29 DREAM ISLAND — MAP 4

Wylie (1958) reported a huge rookery here on 5.1.1957.

30 CAPE MONACO — MAP 4

Reported as breeding here by Schmitt (1962-63) in Watson and others (1971) but report unavailable for consultation.

31 JOUBIN ISLANDS — MAP 4

Count	*Nature*	*Date*	*Reference*
90+	N3	16.1.75	Parmelee and others, 1977

32 SEYMOUR ISLAND — MAP 6

Andersson (1905) reported a fairly big colony here in 1901-03.

33 COCKBURN ISLAND — MAP 6

Andersson (1905) reported a fairly big colony here in 1901-03.

34 DEVIL ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
Fairly big colony	—	1901-03	Andersson, 1905
Several hundred	A5	Dec. 1945	Marshall, 1945

35 VORTEX ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
Several hundred	A5	Dec. 1945	Marshall, 1945
250-300	A4	1947	Roberts, 1948

Located on screes on the north-east side of the island (Marshall, 1945).

36 JONASSEN ISLAND — MAP 6

Andersson (1905) reported a fairly big colony here in 1901-03.

37 HOPE BAY — MAP 6.1

Count	*Nature*	*Date*	*Reference*
50 366	?	1945	cited in Conroy, 1975
60 000	N4	1955	Novatti, 1959
74 264	N1, N3, N4	1963-64	Lefeuvre, 1963

Although Andersson (1905) referred to this as "next largest to Paulet [Island]", which he estimated at several hundred thousand, Sladen (1958) showed from charts that there has been a marked increase in area of the Hope Bay rookery between the time of the Swedish South Polar Expedition of 1902 and Sladen's work there in 1948-49.

Lefeuvre (1963) made a detailed map of the rookery and plotted the position of all colonies on this. During 6-24 November (first egg laid 3 November) he made head counts of all nests in small groups, accurate estimates of many colonies and a rough count of a few larger concentrations. His figures were as follows:

Accurate 24 142
Estimate 38 122
Rough 12 000

The detailed distribution of the sub-colonies is shown in Map 6.1 and the respective counts were as follows:
(a) 533, (b) 90, (c) 1916, (d) 442, (e) 723, (f) 160, (g) 1 108, (h) 338, (i) 302, (j) 980, (k) 14 083, (l) 6 146, (m) 10 634, (n) 40, (o) 7 151, (p) 11 385, (q) 13 216, (r) 3 531, (s) 503, (t) 403, (u) 52, (v) 347.

38 GOURDIN ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
c. 300	N4	6.12.69	B.A.S. (Curphey)

On the northern end of the island there are one or two small colonies; near the north-eastern end of the island they are a little more common but not plentiful. The largest rookery is in the same bay as the Gentoo colonies.

39 NOBLE HEAD — MAP 6

Count	*Nature*	*Date*	*Reference*
100	N3	1960	Orr, 1960

40 "NORTH CAPE", D'URVILLE ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
75	N3	1960	Orr, 1960

The precise location of this colony is uncertain.

41 WIDEOPEN ISLANDS — MAP 6

Count	*Nature*	*Date*	*Reference*
100	N3	1960	Orr, 1960
Common	—	Feb. 1978	Elliot and others, 1978

42 MADDER CLIFFS, JOINVILLE ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
A few	A5	1947	Roberts, 1948

43 GIBSON BAY, JOINVILLE ISLAND — MAP 6

Donald (1895) recorded that there were Adelie colonies in three places on Joinville Island, one being on the northern shores of the Firth of Tay. From the description of the location and map references the colony is likely to be in what is now known as Gibson Bay.

44 PATELLA ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
1 000	N5	1960	Orr, 1960
Numerous	—	Feb. 1978	Elliot and others, 1978

Orr (1960) reported that his figure of 1 000 pairs is probably an underestimate as only part of the island was covered.

45 AMBUSH BAY — MAP 6

In Feb. 1978, Elliot and others (1978) described the east side of the bay as having nests everywhere possible. They found a single nest at nearby King Point.

46 ETNA ISLAND — MAP 6

Count	*Nature*	*Date*	*Reference*
25	N3	1960	Orr, 1960
Small number	—	Feb. 1978	Elliot and others, 1978

47 PAULET ISLAND — MAP 6

Andersson (1905) described this as the largest rookery he saw with several hundred thousand birds.

48 DANGER ISLANDS — MAP 6

Count	*Nature*	*Date*	*Reference*
15 000	N4	1960	Orr, 1960

On all available rock (Orr, 1960).

Elliot and others (1978) found the species numerous on all islands of the group visited except for Darwin Island which had steep sides.

SOUTH SHETLAND ISLANDS

49 HARMONY POINT, NELSON ISLAND — MAP 7

Although Stephens (1958) recorded 10 000 birds here in 1957-58, neither Araya and Aravena (1965) in Dec.-Jan. 1965 nor J. L. Smellie (pers. comm.) in 1976 saw any breeding Adelie Penguins, although up to 50 non-breeding birds were present. It is probable that Stephens' record refers to the large Chinstrap colony.

50 ARDLEY ISLAND

MAP 7

Count	*Nature*	*Date*	*Reference*
c. 1 000	N4	20.12.71	Muller-Schwarze, 1975

51 STRANGER POINT

MAP 7

Count	*Nature*	*Date*	*Reference*
6 440	N3	29.1.66	B.A.S. (M. G. White)
c. 18 000	N4	21.12.71	Muller-Schwarze, 1975

White noted that there were two colonies at Stranger Point, one of 490 nests covering approximately 460 sq. yd (385 m²) and the other of 5 950 nests covering 6 000 sq. yd (5 023 m²).

52 SPHINX HILL

MAP 7

Count	*Nature*	*Date*	*Reference*
c. 500	N4	4.1.57	Stephens, 1957
1 600	N3	29.1.66	B.A.S. (M. G. White)
7 000	N1, N3	1977-78	Trivelpiece and Volkman, in press
			Volkman and others, Ms.

53 POINT THOMAS

MAP 7

Count	*Nature*	*Date*	*Reference*
8-10 000	A4	26.12.09	Gain, 1914
1 000	N4	4.1.57	Stephens, 1957
8 800	N3	29.1.66	B.A.S. (M. G. White)
11 000	N1, N3	1977-78	Trivelpiece and Volkman, in press
			Volkman and others, Ms.

The comparability of the above data depends on the assumption that the rookery shown by Stephens (1957) and White (B.A.S. records) by Sphinx Hill is the same as that referred to by Trivelpiece and Volkman (in press) as Point Thomas East and, similarly, that the counts for Point Thomas are equivalent to those recently made at Point Thomas West.

Although Stephens recorded 5 000 adults associated with the 1 000 nests, he must have overlooked a large portion of the Point Thomas colony as Gain's (1914) figures are unlikely to have been a gross overestimate.

Trivelpiece and Volkman (in press) note that, while Adelies in the Point Thomas area have increased from *c.* 10 400 in 1965-66 to 18 000 in 1977-78 (at a mean annual rate of 4.7%), in some areas they are becoming displaced by the more rapidly increasing Chinstraps. In 1977-78 the peak laying date was 3 November and 97% of clutches were complete by 15 November.

54 CHABRIER ROCK

MAP 7

Gain (1914) referred to a small colony here in 1909.

55 LIONS RUMP

MAP 7

Count	*Nature*	*Date*	*Reference*
5 000	A4	1957-58	Stephens, 1958
10 000	A4	Oct. 1960	Downham, 1960
8 400	A3	26.1.66	B.A.S. (M. G. White)

In 1960 the rookery was divided into one large and one much smaller colony. Stephens (1958) noted that 1 000 eggs were collected there on 1 November 1957, but does not indicate if this practice had occurred in other seasons.

56 TURRET POINT

MAP 7

Count	*Nature*	*Date*	*Reference*
223	N3	27.1.66	B.A.S. (M. G. White)

57 PENGUIN ISLAND

MAP 7

Count	*Nature*	*Date*	*Reference*
400	N3	27.1.66	B.A.S. (M. G. White)

ELEPHANT AND CLARENCE ISLANDS GROUP

58 GIBBS ISLAND

MAP 8

Count	*Nature*	*Date*	*Reference*
2	N1	8.1-14.2.77	J.S.E.

Two Adelie nests were found on the western side of "The Spit" (see Map 35.2) towards the eastern end of the island.

59 "PINK POOL POINT", CLARENCE ISLAND

MAP 8.1

	Count	*Nature*	*Date*	*Reference*
a	57	N1	16-19.12.76	J.S.E.
b	2	N1	16-19.12.76	J.S.E.

60 CAPE BOWLES, CLARENCE ISLAND

MAP 8.1

Count	*Nature*	*Date*	*Reference*
60	N4	16-19.12.76	J.S.E.

61 GOSLING ISLANDS — MAP 9

Count	*Nature*	*Date*	*Reference*
c. 500	N4	9.1.56-29.3.56	B.A.S. (Cordall)

This colony is sited on the largest island of the group.

62 CAPE HANSEN — MAP 9

Count	*Nature*	*Date*	*Reference*
c. 10 000	N4	28.12.78	B.A.S. (Rootes)

A series of Adelie colonies stretches the length of the north-eastern side of the cove to the north ("Half Moon Cove") and a further small group was seen on an off-lying islet south-east of Cape Hansen.

63 SHINGLE COVE — MAP 9

Count	*Nature*	*Date*	*Reference*
3 000	N4	28.12.78	B.A.S. (Rootes)

The five colonies that comprise this rookery are situated at the south-west corner of the cove.

64 AMPHIBOLITE POINT — MAP 9

A mixed colony of Adelie and Chinstrap Penguins totalling *c.* 4 000 nests was recorded here in Jan. 1965 (B.A.S. records).

65 NORTH POINT, SIGNY ISLAND — MAP 9.1

Count	*Nature*	*Date*	*Reference*
c. 3 000	A4	21.10.47	Robin, 1948
4 535	C1	6.1.58	Scotland, 1958
8 824	N1	Dec. 1978	Rootes, 1978

The 1958 and 1978 counts were accurate to ±5% and represent a mean annual increase of 3.2% over the 21 years. Some mortality would have occurred by the time of the 1958 count and the true rate is probably about 3% per annum.

66 SPINDRIFT ROCKS, SIGNY ISLAND — MAP 9.2

Count	*Nature*	*Date*	*Reference*
c. 2 500	A4	21.10.47	Robin, 1948
c. 3 816	C3	6.1.58	Scotland, 1958
5 898	N1	Dec. 1978	Rootes, 1978

This represents a mean increase of 2.1% per annum since 1958 and 2.8% per annum since 1947.

67 GOURLAY PENINSULA, SIGNY ISLAND — MAP 9.3

a. *Gourlay Point*

Count	*Nature*	*Date*	*Reference*
1 230	N3	19.1.64	B.A.S. (Burton)
6 174	N1	Nov. 1978	Rootes, 1978

b. *Pageant Point*

Count	*Nature*	*Date*	*Reference*
379	N1	Nov. 1978	Rootes, 1978

c. *Pantomime Point*

Count	*Nature*	*Date*	*Reference*
10 250	N1	Nov. 1978	Rootes, 1978

This gives a present-day total for the peninsula of 16 803. In late October 1947 Robin (B.A.S. records) estimated that *c.* 10 000 birds were present and in 1950-51 Sladen (1958) estimated that 10 000 pairs bred there. This would give a mean annual increase since 1950 of 1.9%. In view of Burton's count for Gourlay Point, which would indicate a mean annual increase of 11.1% over 15 years, it is possible that Sladen's figure may have been an overestimate.

68 MICHELSEN ISLAND — MAP 9.4

Count	*Nature*	*Date*	*Reference*
14 650	N3	5-17.12.57	B.A.S. (Scotland)
c. 6 000-7 500	A5	27.1-7.2.65	B.A.S. (R. I. L. Smith)

Colonies now cover most of Michelsen Island, Falkland Harbour promontory and the southernmost part of the island (Smith).

69 CHRISTOFFERSEN ISLAND — MAP 9.4

Count	*Nature*	*Date*	*Reference*
Small colony	—	Dec. 1957	Scotland, 1957
Small colony	—	27.1-9.2.65	B.A.S. (R. I. L. Smith)

The colony is situated on the north side of the island (Smith).

70 WEDDELL ISLANDS — MAP 10

Breeding Adelie Penguins were reported from here in Jan. 1965 (B.A.S. records).

71 POINT MARTIN — MAP 10

Count	*Nature*	*Date*	*Reference*
Extensive rookery	—	1903-04	Clarke, 1915

72 **"THEODOLITE POINT"** MAP 10

Wilton and others (1908) reported a small rookery here on 20.10.1903 and, although the precise location of the colony is uncertain, from the description it must lie towards the head of Scotia Bay.

73 **POINT RAE** MAP 10

Clarke (1915) reported an extensive rookery here in 1903-04.

74 **ACUNA ISLAND** MAP 10

Clarke (1915) reported an extensive rookery at this site which was formerly known as "Delta Island".

75 **GRAPTOLITE ISLAND** MAP 10

Clarke (1915) reported a vast colony here in 1903-04.

76 **FERRIER PENINSULA** MAP 10

Count	*Nature*	*Date*	*Reference*
1 000 000	A5	1903-04	Clarke, 1915
4	C1	23.2.48	Robin, 1948

Robin recorded four Adelie chicks but noted a vast colony of Chinstrap Penguins. It is possible that Clarke made an error in species identification.

77 **WATSON PENINSULA** MAP 10

Clarke (1915) reported an extensive rookery in 1903-04.

78 **PIRIE PENINSULA** MAP 10

The precise extent and location of the extensive rookery noted by Clarke (1915) is uncertain.

SOUTH SANDWICH ISLANDS

79 **THULE ISLAND** MAP 11

Holdgate and Baker (1979) reported that this species may breed.

80 **BELLINGSHAUSEN ISLAND** MAP 11

Holdgate and Baker (1979) reported this species as probably breeding in March 1964.

81 **MONTAGU ISLAND** MAP 11

Reported as being a probable breeder by Ivanov (1959 *a*, *b*) in Holdgate and Baker (1979) but the original report was unavailable for consultation.

82 **SAUNDERS ISLAND** MAP 11

Holdgate and Baker (1979) recorded this species as probably breeding in March 1964.

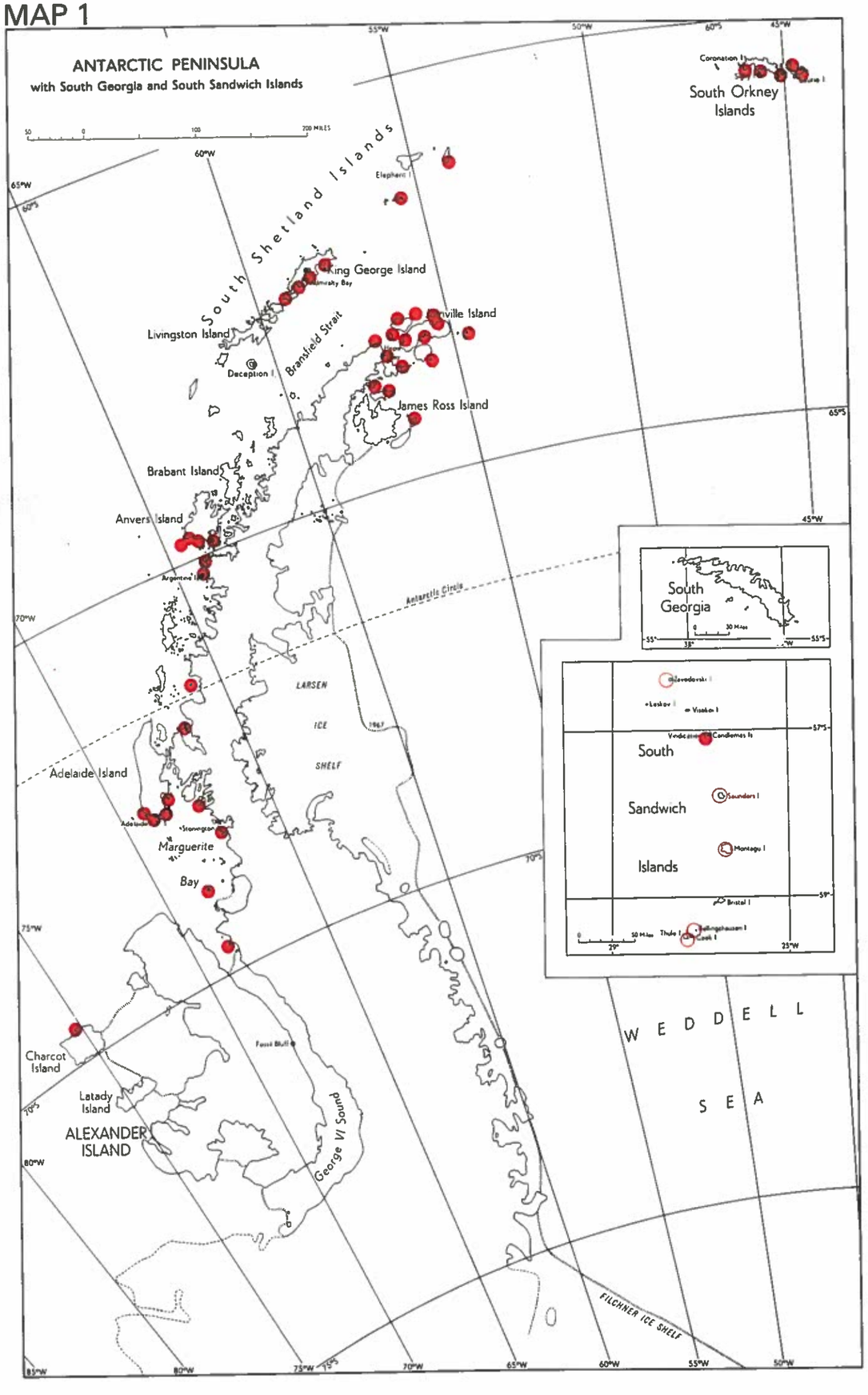
83 **CANDLEMAS ISLAND** MAP 11

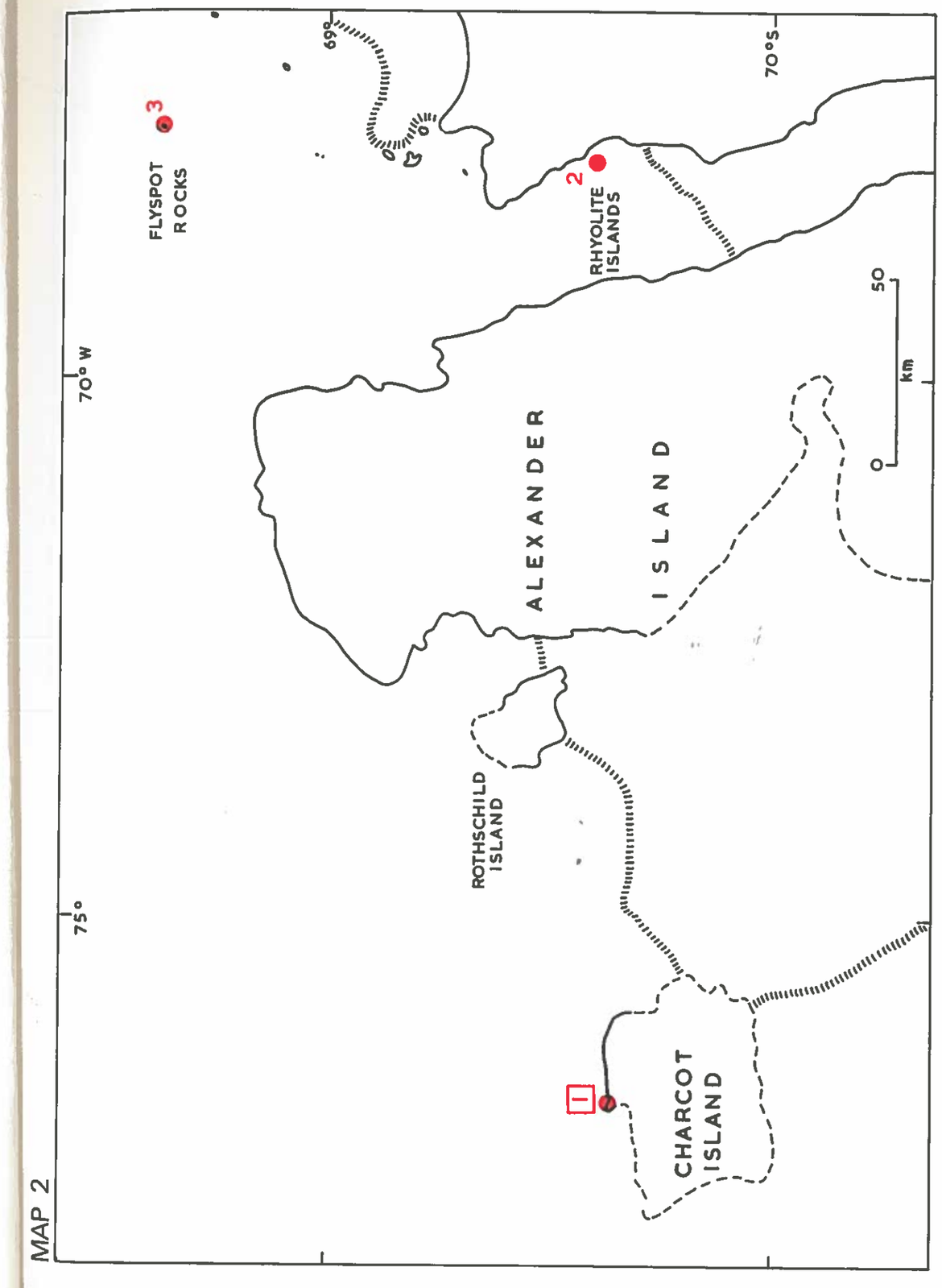
Larsen (1908) described enormous rookeries of Adelie and Chinstrap Penguins. There is no recent information.

84 **ZAVODOVSKI ISLAND** MAP 11

Kemp and Nelson (1931) stated that in March 1930 "Adelie Penguin probably occurs but was not recognized with certainty".

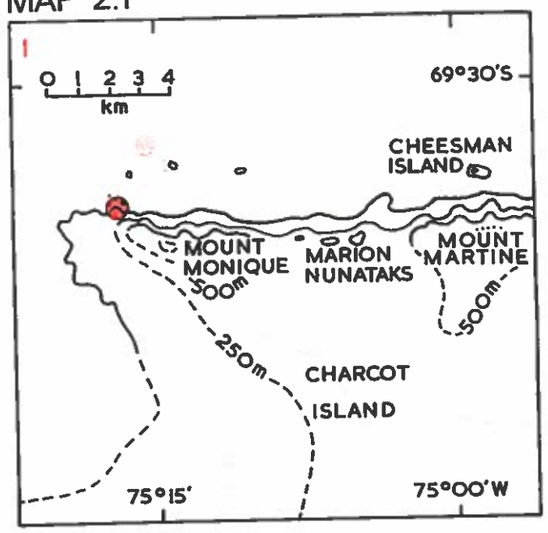
MAP 1


ANTARCTIC PENINSULA
with South Georgia and South Sandwich Islands
South Orkney Islands
South Shetland Islands
King George Island
Livingston Island
Deception I
Bransfield Strait
James Ross Island
Brabant Island
Anvers Island
Antarctic Circle
LARSEN
ICE
SHELF
Adelaide Island
Marguerite
Bay
Charcot Island
Latady Island
ALEXANDER ISLAND
George VI Sound
Fossil Bluff
WEDDELL
SEA
FILCHNER ICE SHELF
South Georgia
South Sandwich Islands
Saunders I
Montagu I
Bristol I
Thule I
Cook I

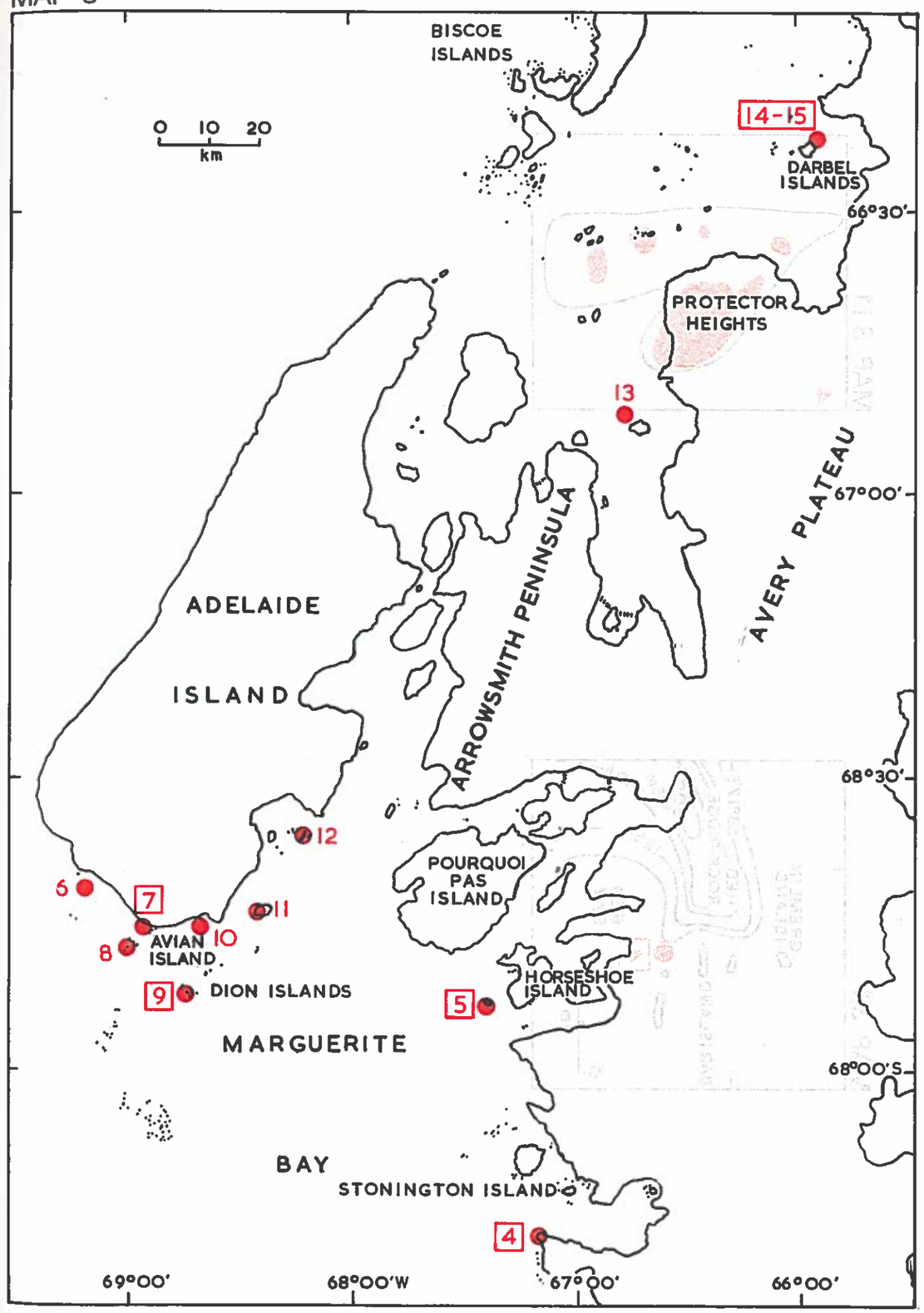

FLYSPOT ROCKS
3
RHYOLITE ISLANDS
2
ALEXANDER ISLAND
ROTHSCHILD ISLAND
CHARCOT ISLAND
1
70° W
75°
69°
70°S
50
0
km

MAP 2

MAP 2.1


1
0 1 2 3 4
km
69°30'S
CHEESMAN ISLAND
MOUNT MONIQUE
MARION NUNATAKS
MOUNT MARTINE
500m
500m
250m
CHARCOT ISLAND
75°15'
75°00'W

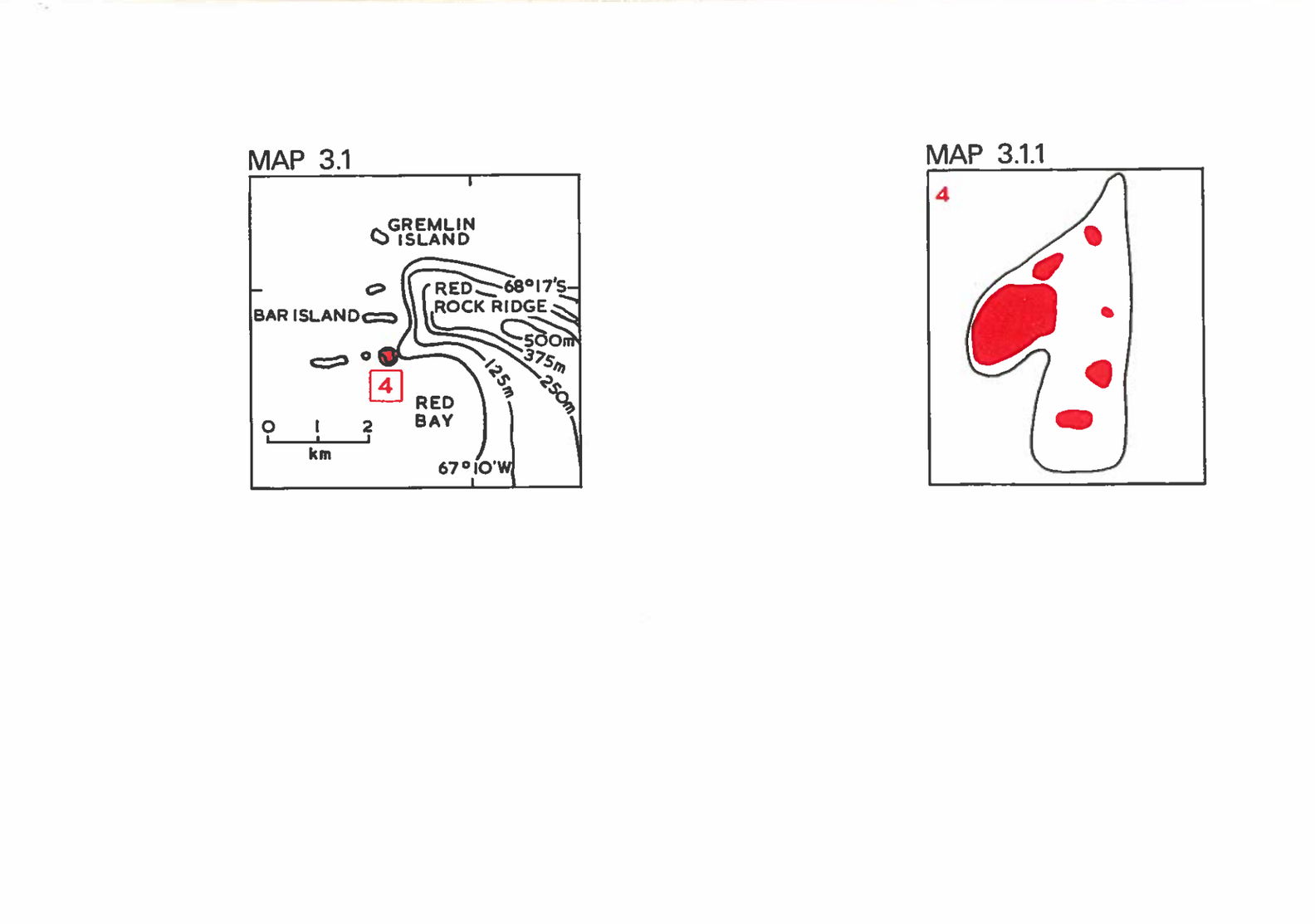
MAP 3


BISCOE ISLANDS
0 10 20
km
14-15
DARBEL ISLANDS
66°30'
PROTECTOR HEIGHTS
13
AVERY PLATEAU
67°00'
ADELAIDE ISLAND
ARROWSMITH PENINSULA
68°30'
12
6
7
11
8
AVIAN ISLAND
10
9
DION ISLANDS
POURQUOI PAS ISLAND
HORSESHOE ISLAND
5
MARGUERITE BAY
68°00'S
STONINGTON ISLAND
4
69°00'
68°00'W
67°00'
66°00'

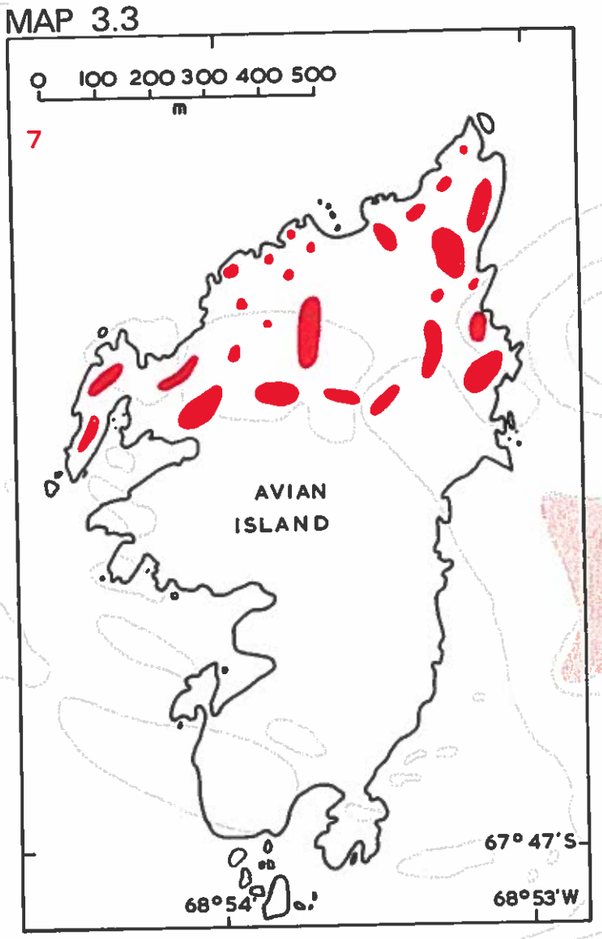
MAP 3.1

MAP 3.1.1

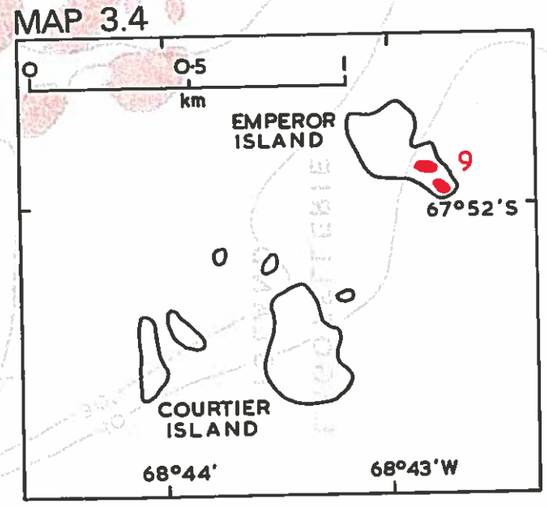
MAP 3.2



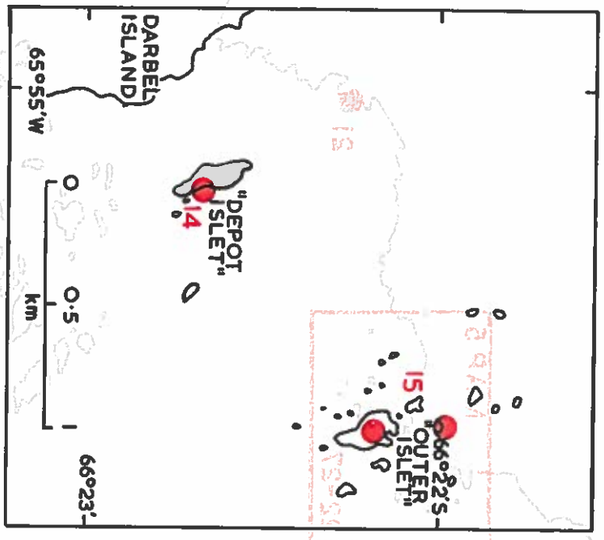
MAP 3.3



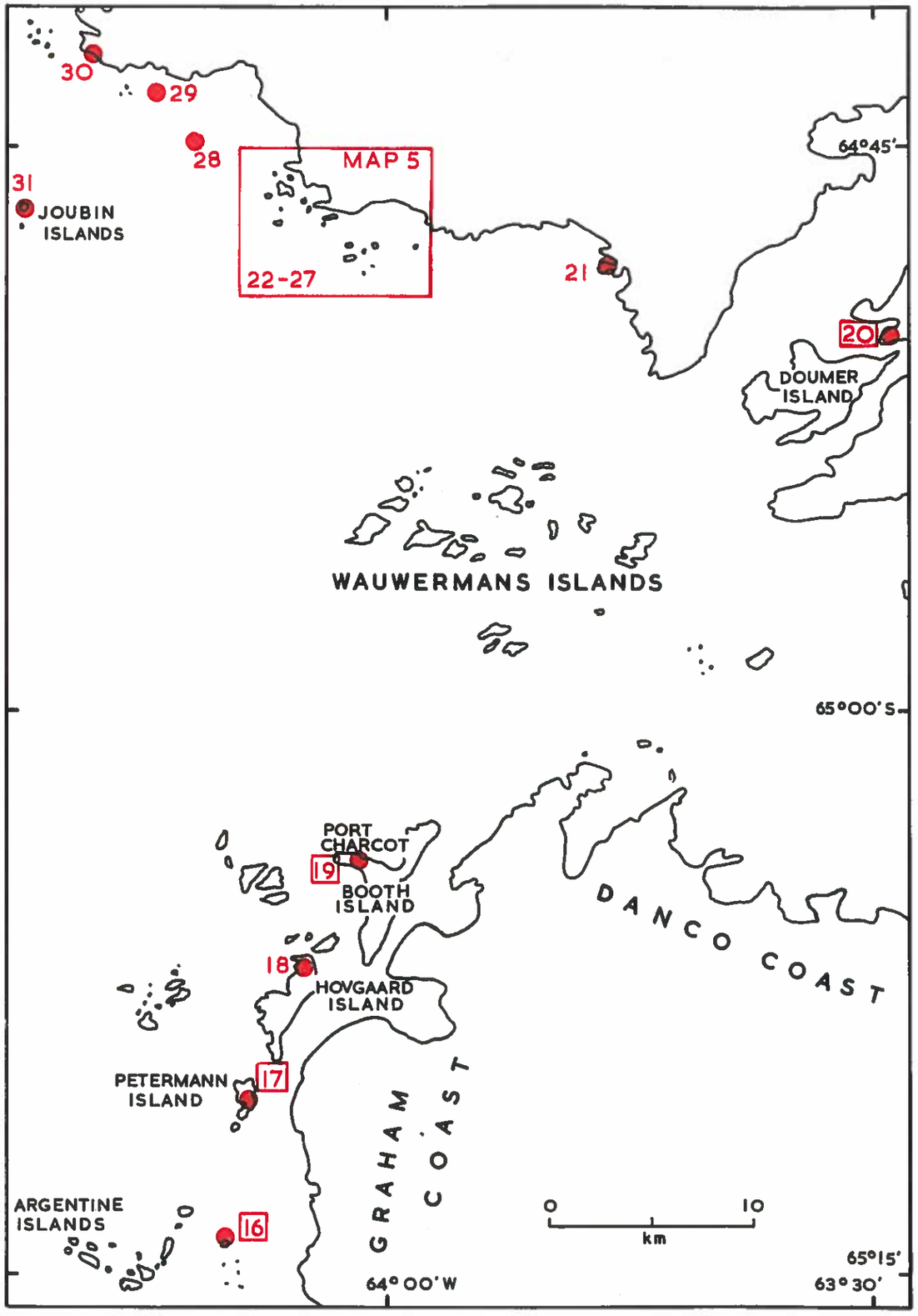
MAP 3.4



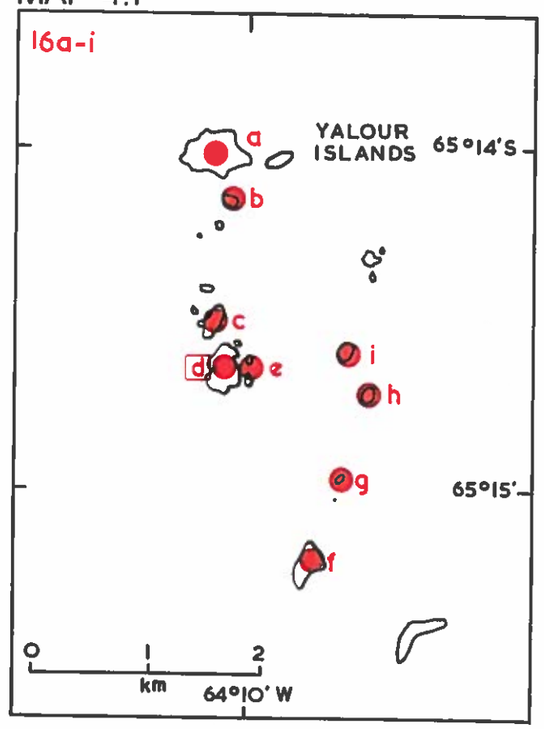
MAP 3.5



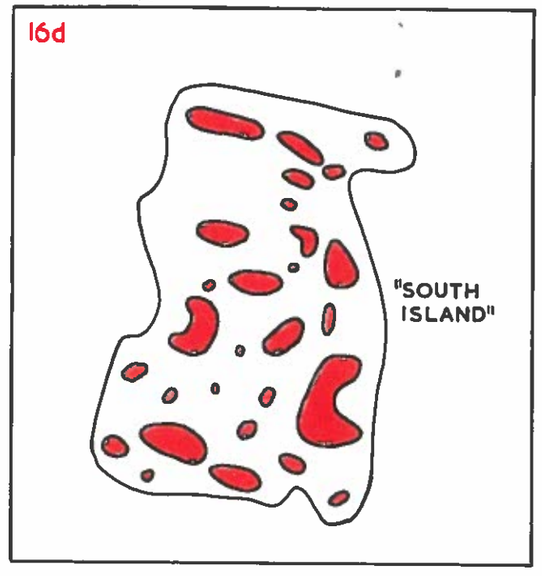
MAP 4



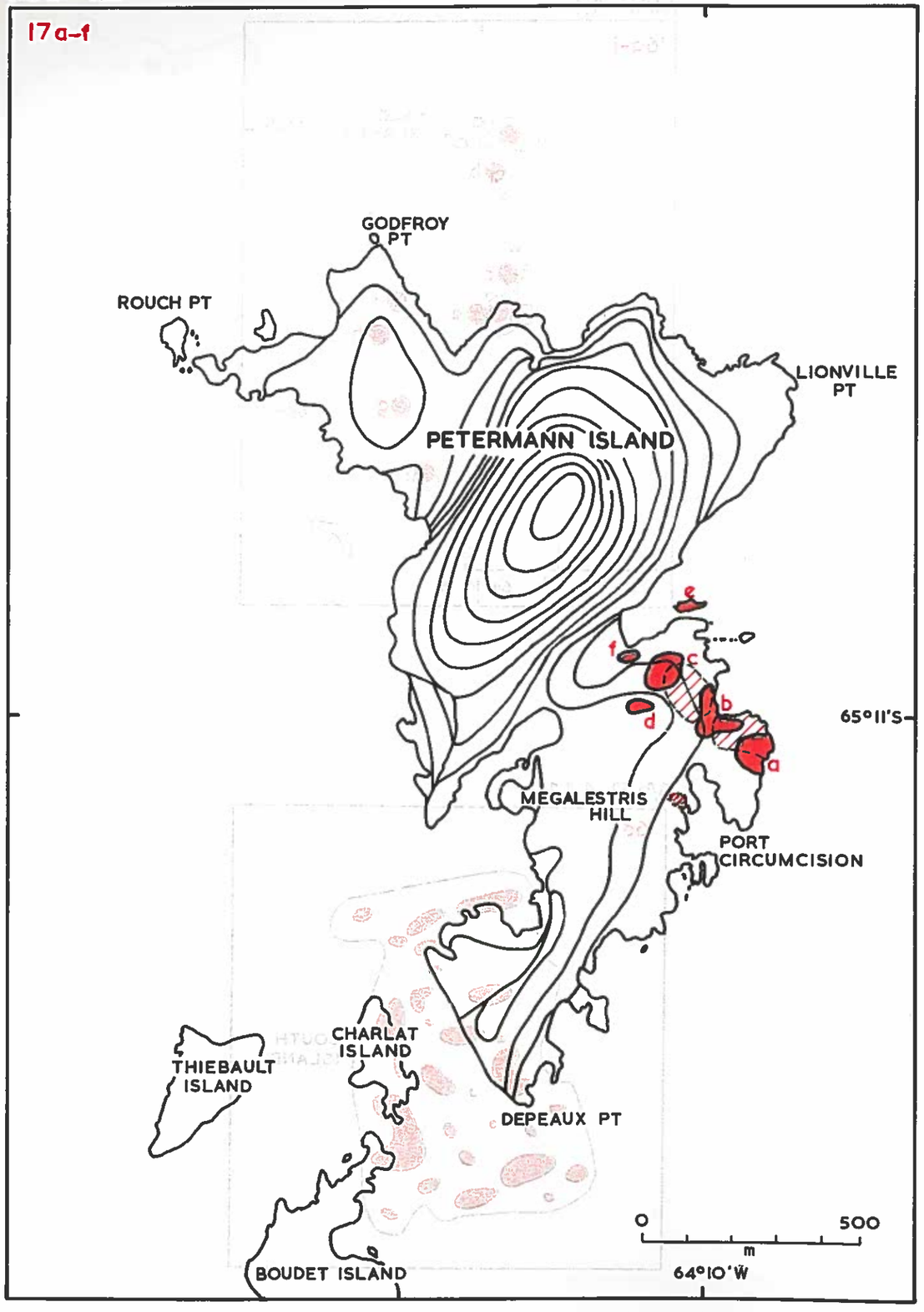
MAP 4.1



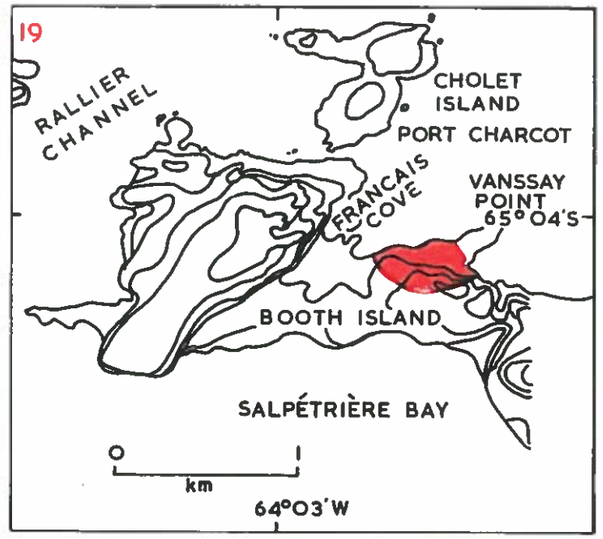
MAP 4.1.1



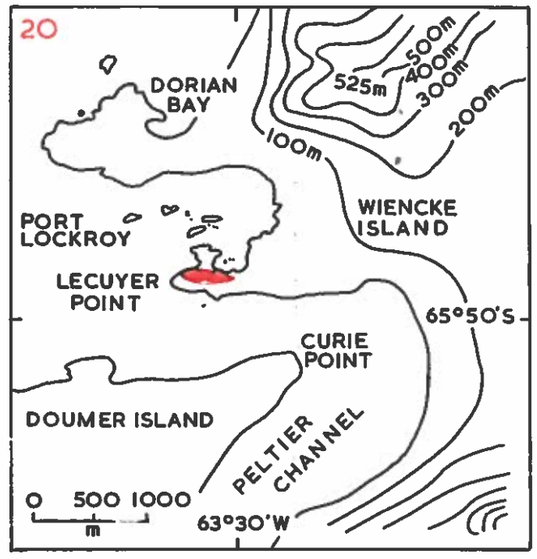
MAP 4.2



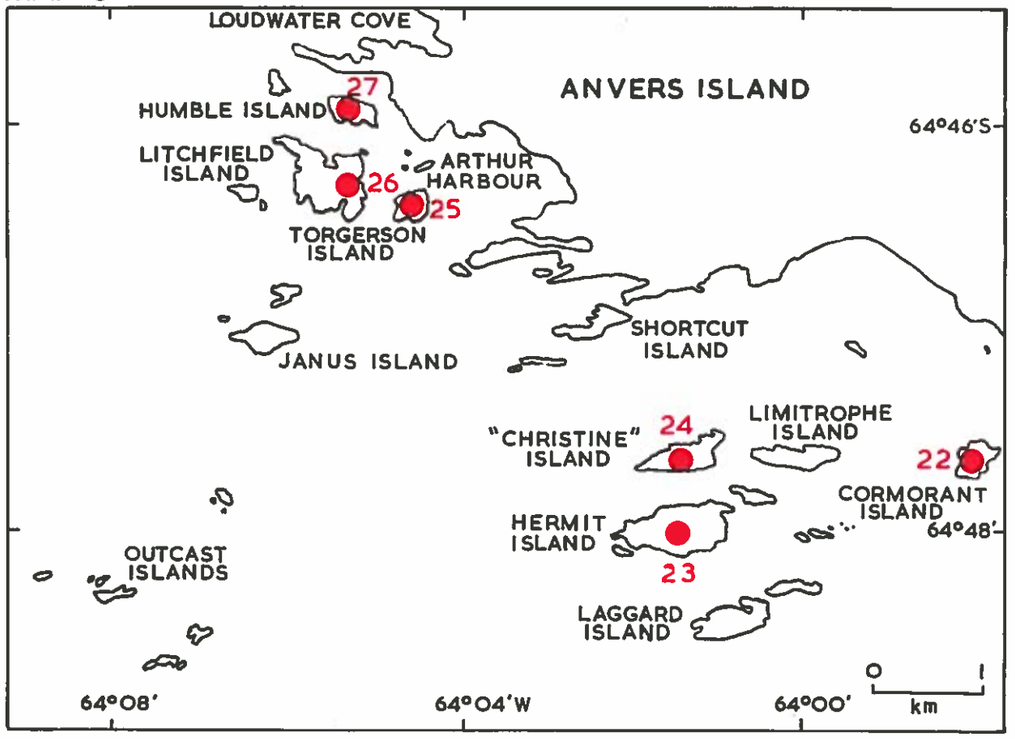
MAP 4.3



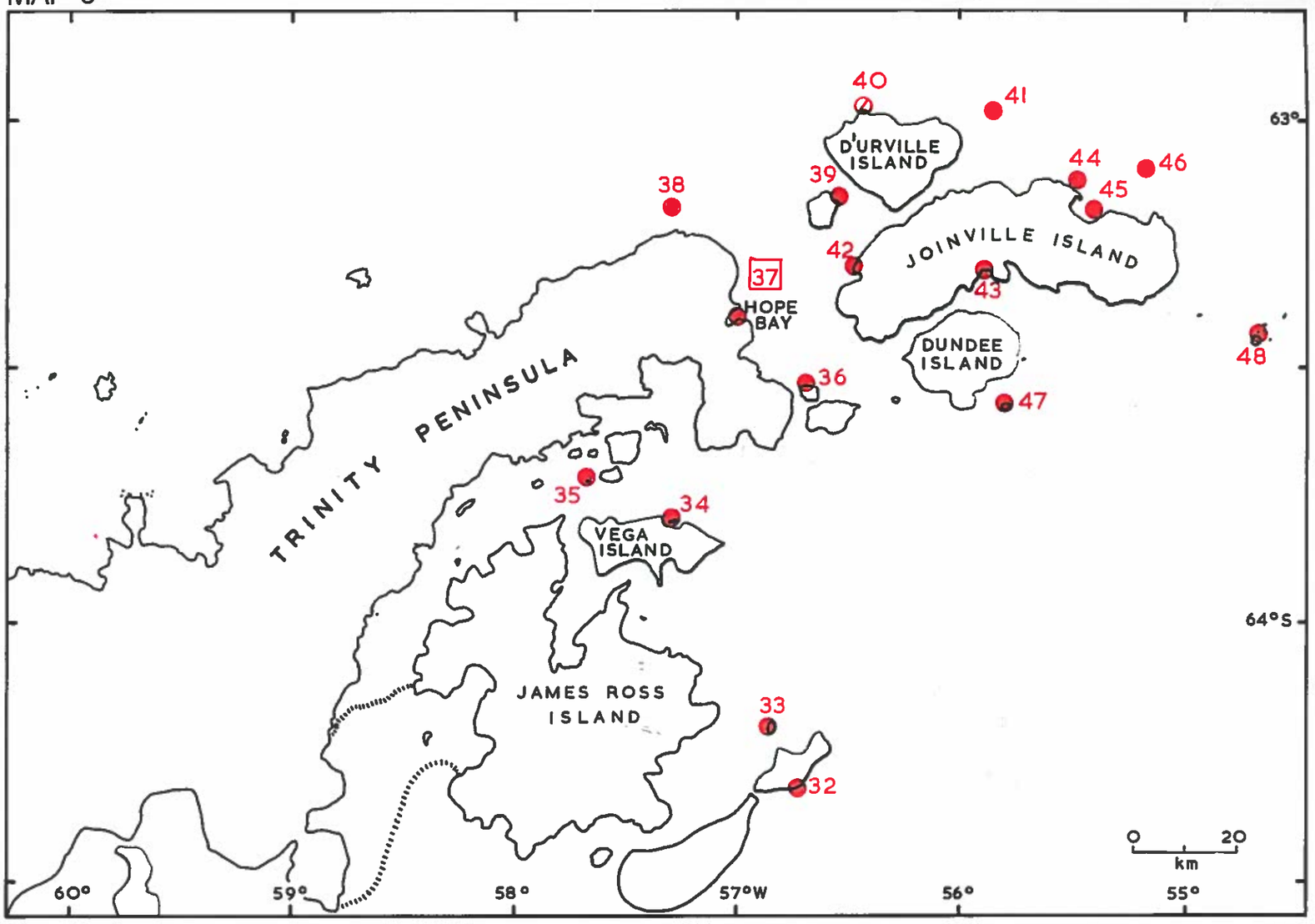
MAP 4.4



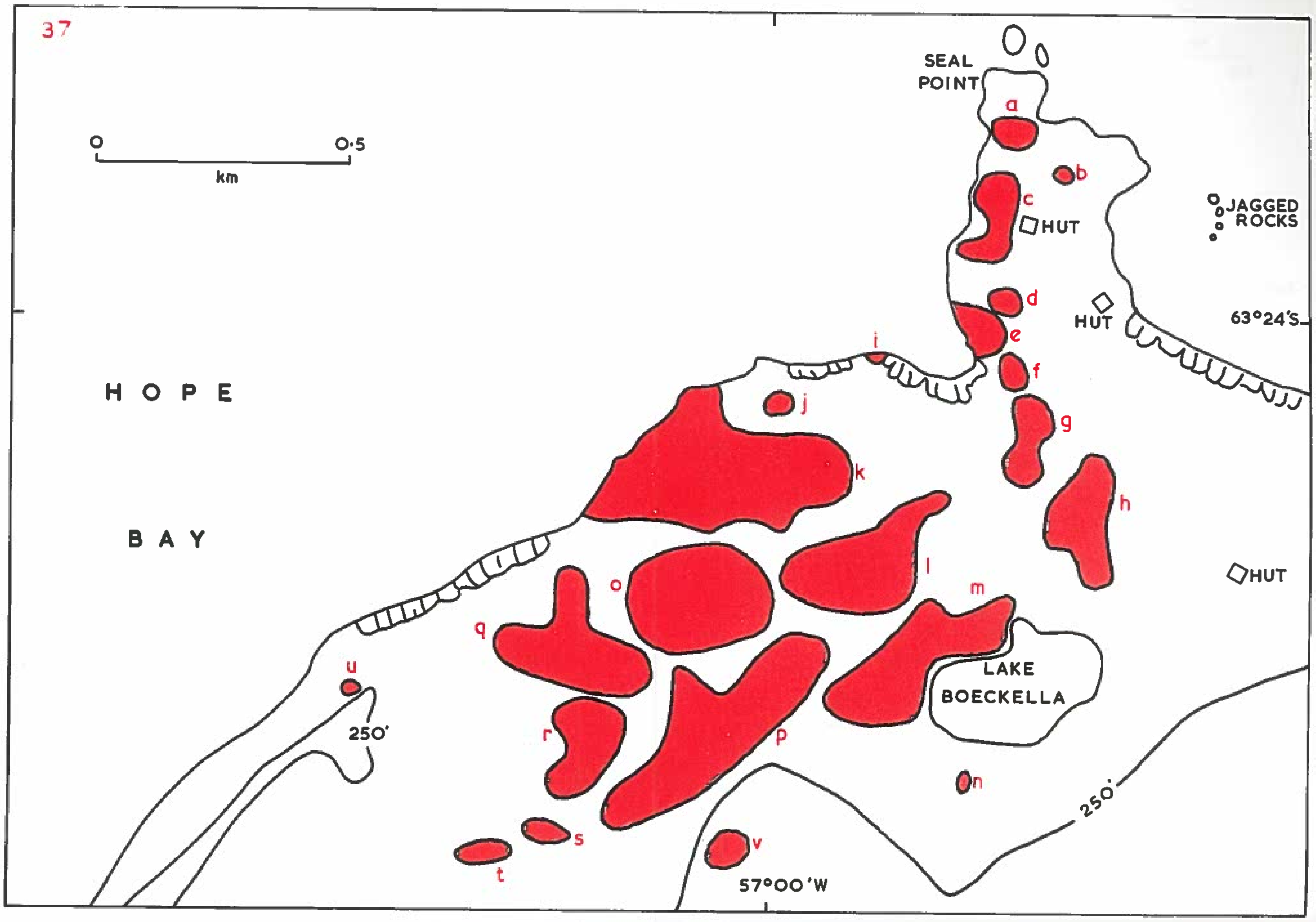
MAP 5


LOUDWATER COVE
ANVERS ISLAND
27
HUMBLE ISLAND
64°46'S
LITCHFIELD ISLAND
ARTHUR HARBOUR
26
25
TORGERSON ISLAND
SHORTCUT ISLAND
JANUS ISLAND
"CHRISTINE" ISLAND
24
LIMITROPHE ISLAND
22
CORMORANT ISLAND
64°48'
HERMIT ISLAND
23
OUTCAST ISLANDS
LAGGARD ISLAND
0
km
64°08'
64°04'W
64°00'

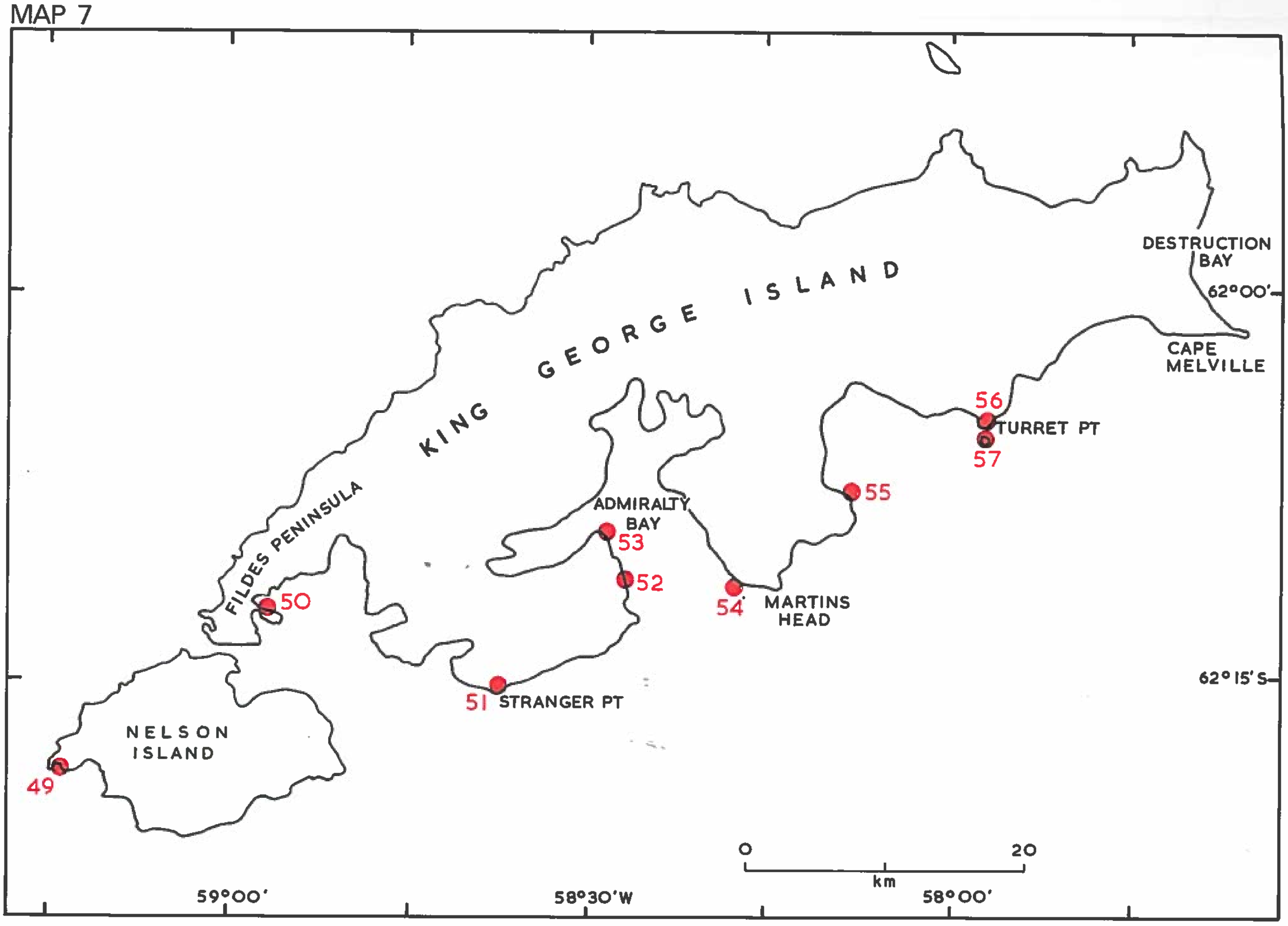
MAP 6


40
41
63°
D'URVILLE ISLAND
44
46
39
45
38
42
JOINVILLE ISLAND
37
43
HOPE BAY
DUNDEE ISLAND
48
36
47
TRINITY PENINSULA
35
34
VEGA ISLAND
64°S
JAMES ROSS ISLAND
33
32
0
20
km
60°
59°
58°
57°W
56°
55°

MAP 6.1


37
0
0·5
km
HOPE
BAY
SEAL
POINT
JAGGED
ROCKS
HUT
HUT
HUT
63°24'S
LAKE
BOECKELLA
250'
250'
57°00'W
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
t
u
v

MAP 7


KING GEORGE ISLAND
DESTRUCTION
BAY
62°00'
CAPE
MELVILLE
56
TURRET PT
57
55
ADMIRALTY
BAY
53
52
54
MARTINS
HEAD
FILDES PENINSULA
50
51
STRANGER PT
62°15'S
NELSON
ISLAND
49
0
20
km
59°00'
58°30'W
58°00'

MAP 8

61°15'S

CLARENCE ISLAND

59-60

CORNWALLIS ISLAND

0 5 10 km

ELEPHANT ISLAND

SEAL ISLANDS

GIBBS ISLAND

58

ASPLAND ISLAND

EADIE ISLAND

O'BRIEN ISLAND

55°30'W

MAP 8.1

0 1 2 km

CAPE LLOYD

"JUBILEE PEAK"

300

"CHEQUERS GLACIER"

600

900

CLARENCE ISLAND

"SERAC POINT"

HUMBLE POINT

61°10'S

"TRIDENT GLACIER"

RAVELIN RIDGE

"FUR SEAL POINT"

SUGARLOAF ISLAND

1200

"STAMINA GLACIER"

"CENTRE POINT"

CHINSTRAP COVE

"MITRE RIDGE"

"LUNAR GLACIER"

MOUNT IRVING

"PILLAR RIDGE"

"FALSE RIDGE"

1800

1500

1200

900

600

300

CRAGGY POINT

"BOLD RIDGE"

59

"PINK POOL POINT"

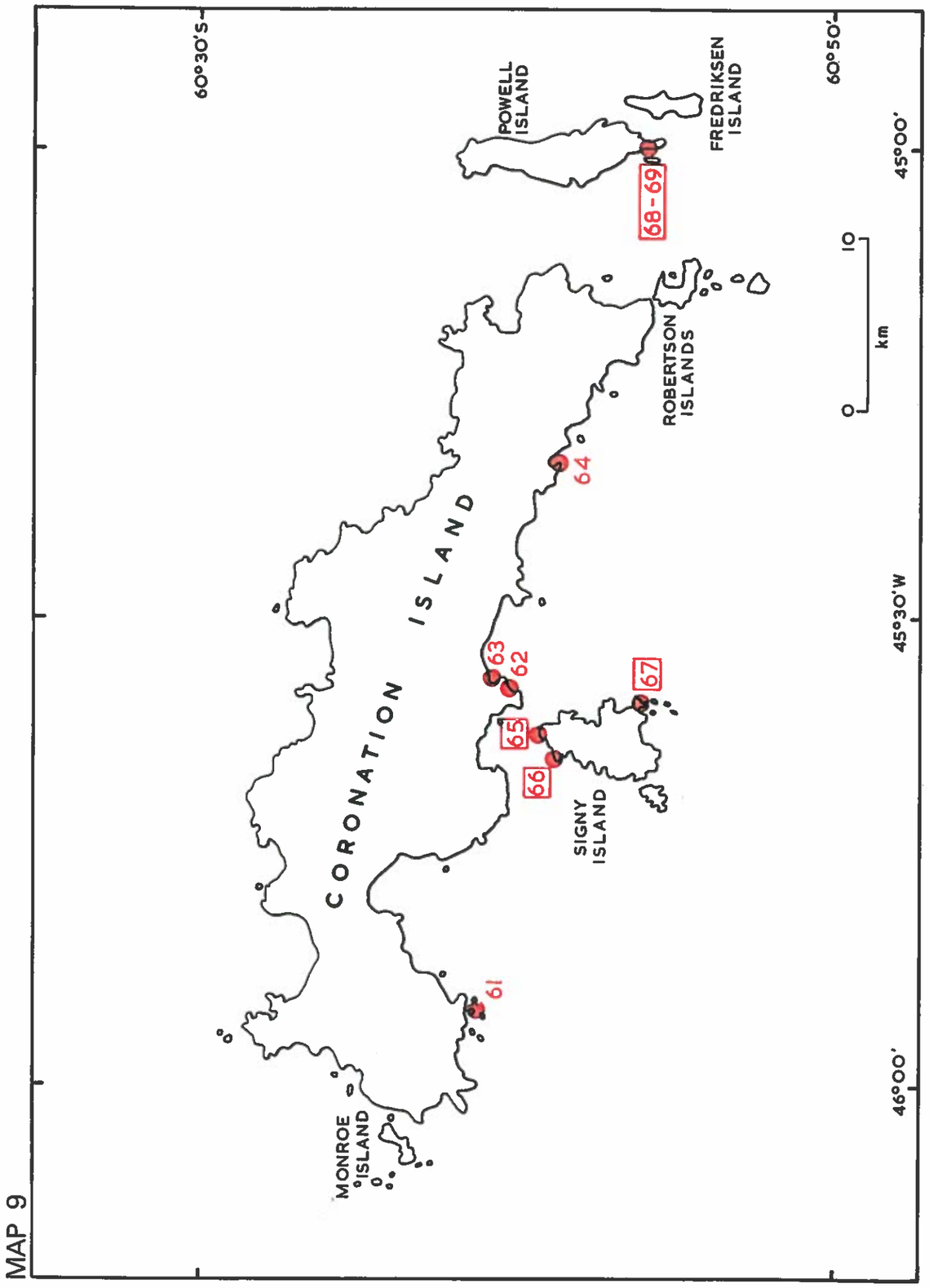
"THUNDER BAY"

"TASMAN COVE"

CAPE BOWLES

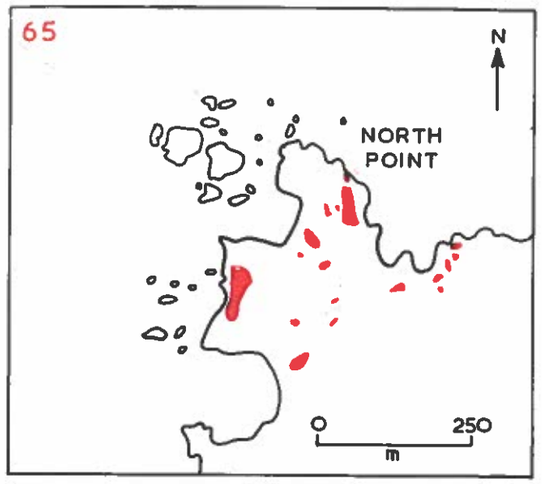
60

54°00'W

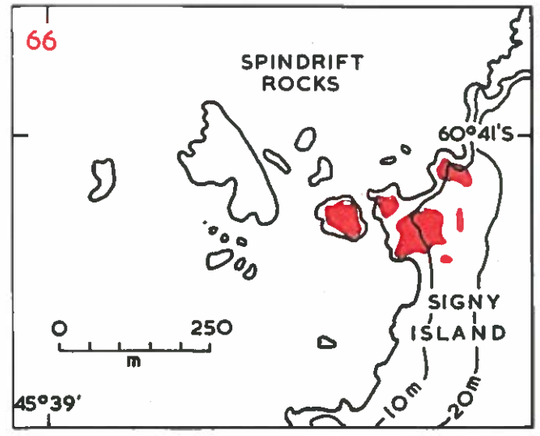


MAP 9

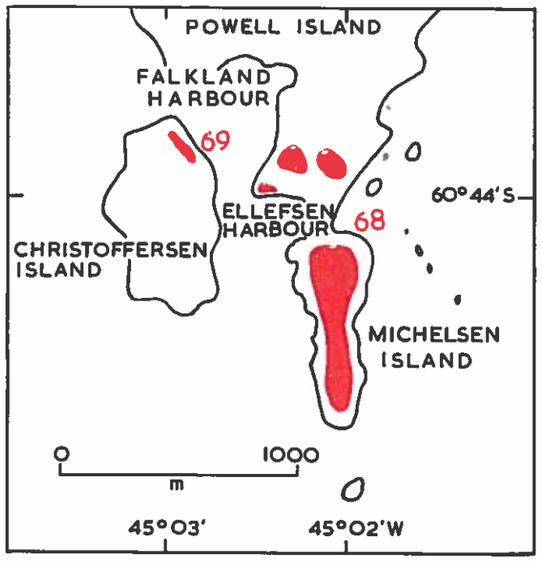
MAP 9.1



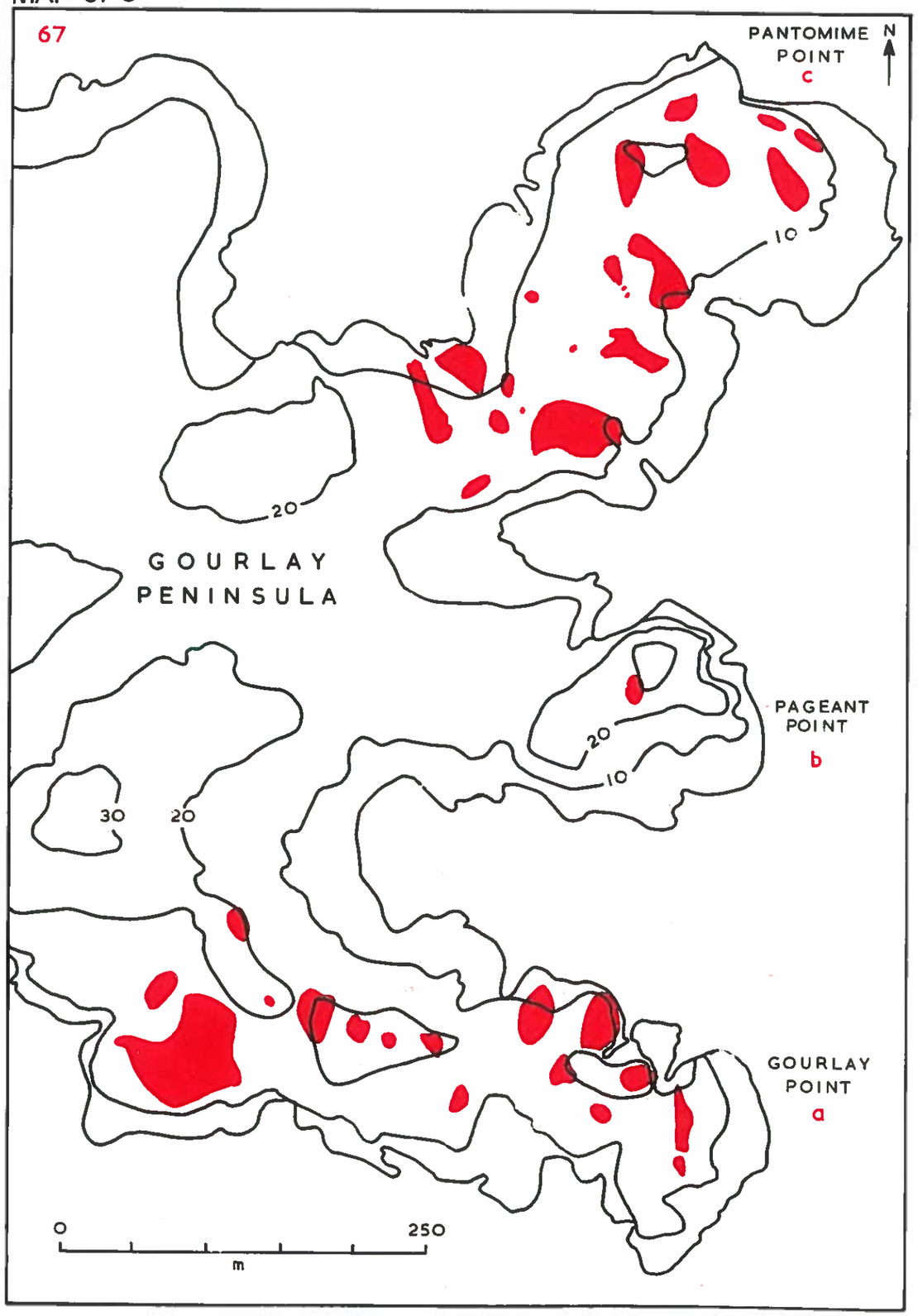
MAP 9. 2



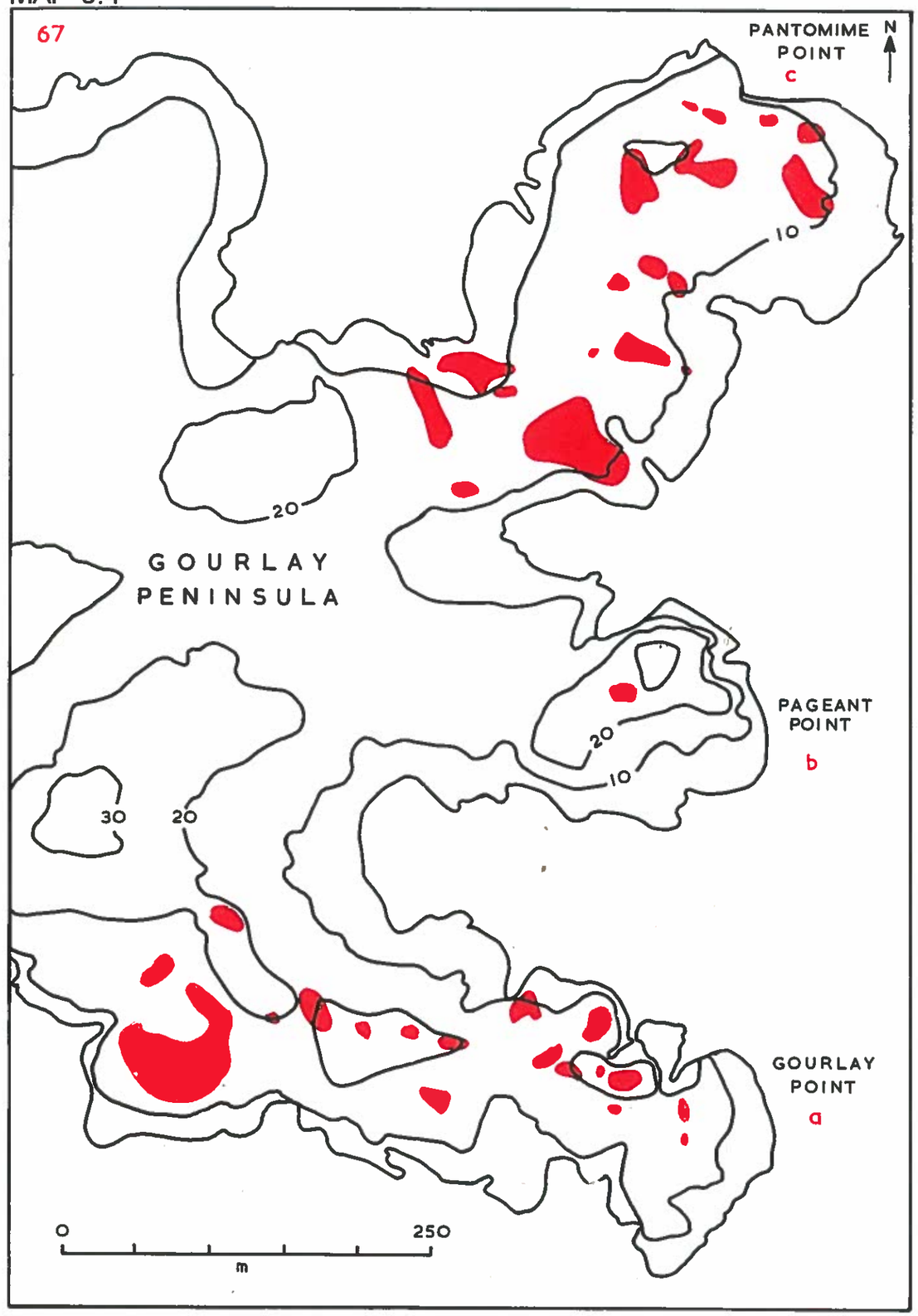
MAP 9. 5

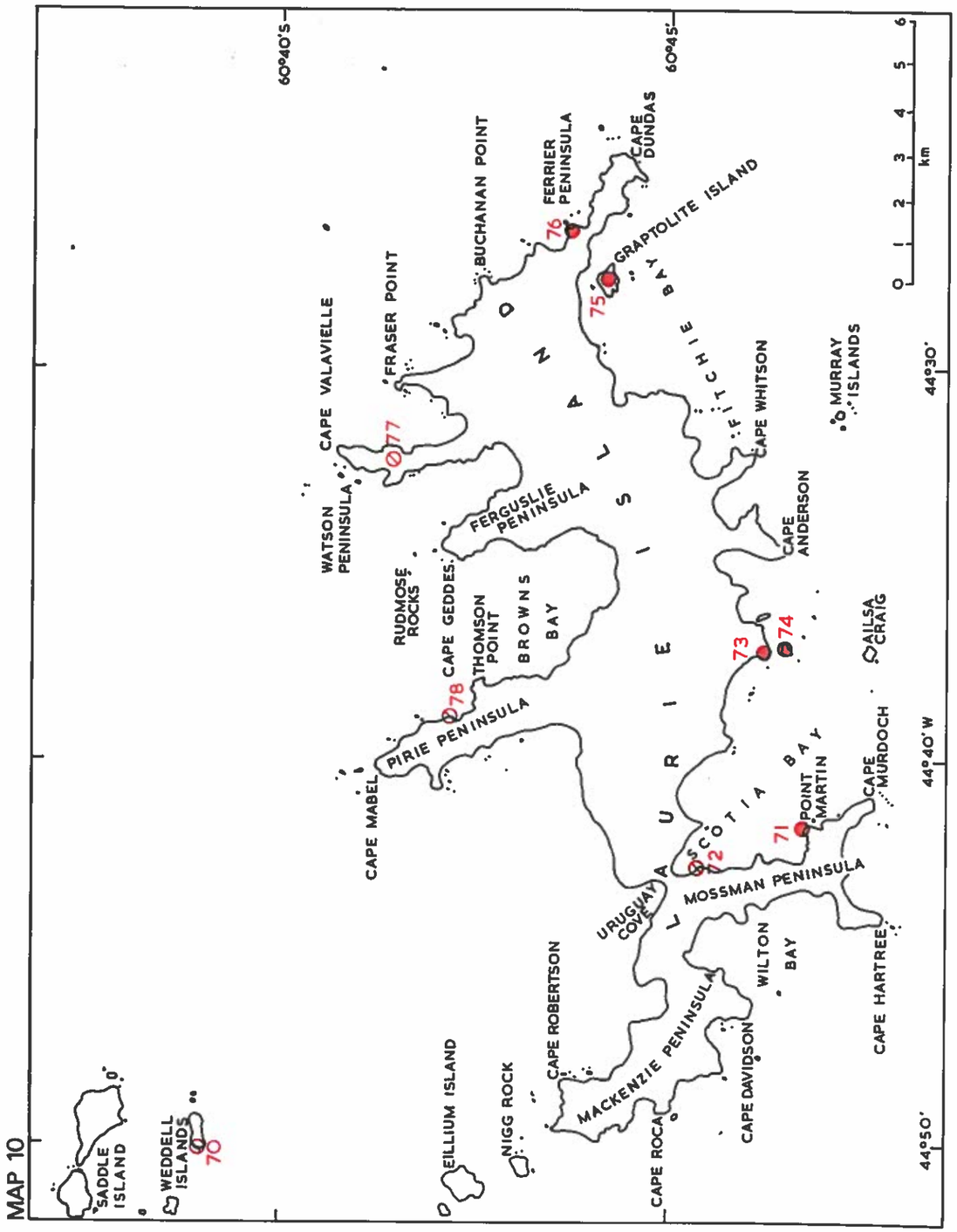


MAP 9. 3


67
PANTOMIME POINT
c
N
10
20
GOURLAY PENINSULA
PAGEANT POINT
b
30
20
10
GOURLAY POINT
a
0
250
m

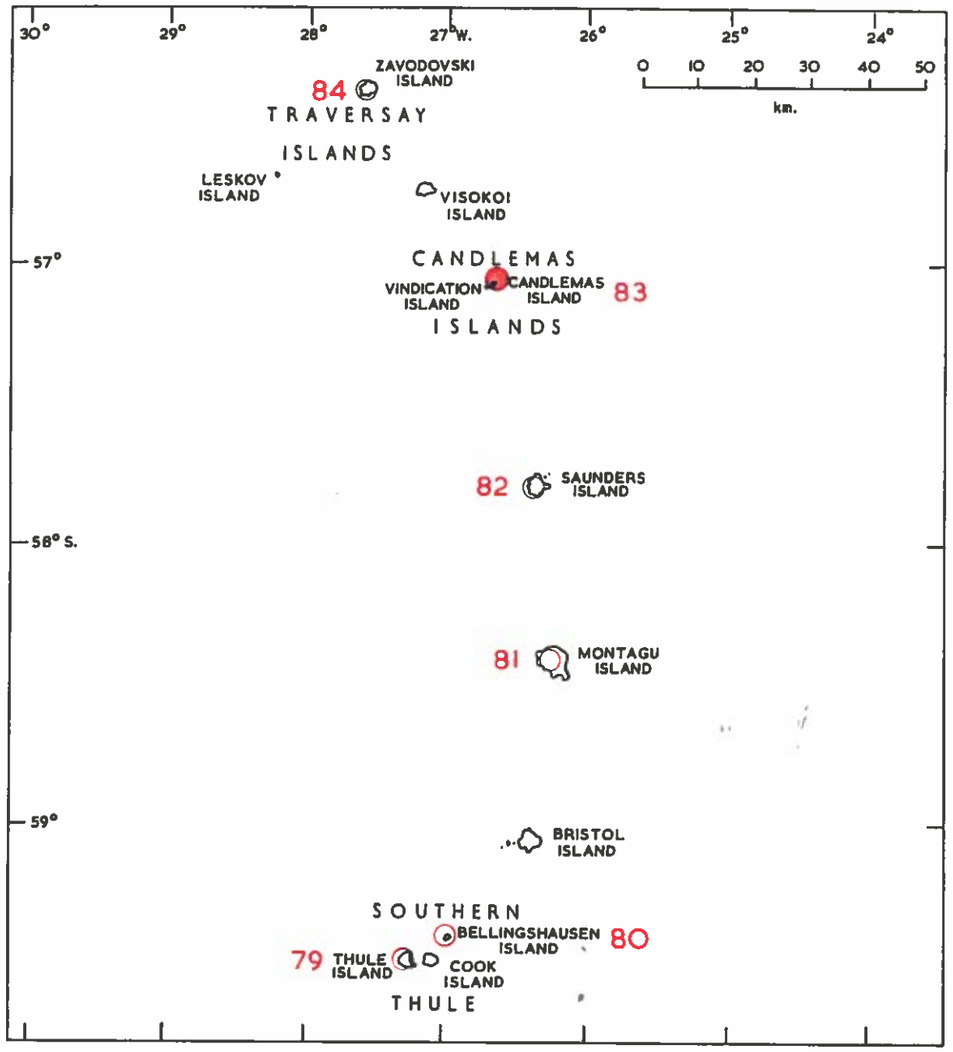
MAP 9.4


67
PANTOMIME POINT
c
N
10
20
GOURLAY PENINSULA
PAGEANT POINT
b
30
20
10
GOURLAY POINT
a
0
250
m



MAP 10

MAP 11 SOUTH SANDWICH ISLANDS



4. Chinstrap Penguin *Pygoscelis antarctica*

The area of the northern half of the Antarctic Peninsula, the South Shetland and South Orkney Islands is the stronghold of Chinstrap Penguin, although breeding colonies extend from Peter I øy (lat. 68° 55'S, long. 90° 26'W) to South Georgia and essentially only three sites (Bouvetøya, Heard Island and the Balleny Islands) lie outside the Antarctic Peninsula quadrant of the Antarctic.

Although the expansion of range (Sladen, 1964) and increase in numbers (Conroy, 1975) of this species have received considerable attention, its breeding biology and ecology have been little studied. Bagshawe (1938), Sladen (1955), and Conroy and others (1975) all contributed information and recently more detailed studies have been undertaken at King George Island, South Shetland Islands (Muller-Schwarze and others, 1977; Trivelpiece and Volkman, in press). Quantitative studies of diet have been undertaken at the Elephant and Clarence Islands group (Croxall and Furse, in press) and at Point Thomas, King George Island (Volkman and others, Ms.); both found krill *E. superba* to be the principal prey.

1 JOUBIN ISLANDS — MAP 13

Count	*Nature*	*Date*	*Reference*
35	N1	16.1.75	Parmelee and others, 1977

2 DREAM ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
2	N1	5.1.57	Wylie, 1958
Breeds sparingly	—	1.2.75	Parmelee and others, 1977

3 TORGERSEN ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
1	N1	2.12.71	Muller-Schwarze, 1975

4 PERRIER BAY — MAP 13

Wylie (1958) noted 30 birds of possible breeding status on 4.11.57 on a small nunatak at the northern end of Perrier Bay. Holdgate (1963) suggested that small colonies of this species occur in several places along this coast (where they are the only breeding penguins) but he noted that supporting evidence was lacking.

5 WATERBOAT POINT — MAP 13.1

Bagshawe (1938) recorded the existence of two colonies at this site:
(a) 350 (700 birds) on 1.1.1922 at Coal Point.
(b) 225 (450 birds) on 1.1.1922 on South Island.

The map in Araya (1965) (from which the colony details in Map 13.1 are taken) shows that both these colonies still existed in 1964 and he noted that *c.* 250 birds are present on Munita Peninsula ("South Island" of Bagshawe). He referred also to 56 birds to the south of the base "Gabriel Gonzalez Videla" but there is no indication of the size of the Coal Point colony. It is hardly surprising that human activity in the vicinity of the base buildings and field huts at this site should have caused a decline in penguin numbers.

6 DUTHIERS POINT — MAP 13

Both Bagshawe (1938) on 7.2.1921 and Araya (1965) in Jan. 1964 noted the existence of a colony here.

7 CUVERVILLE ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
37	N3	14.12.71	Muller-Schwarze, 1975

8 ARCTOWSKI PENINSULA — MAP 13

Count	*Nature*	*Date*	*Reference*
358	N3	15.12.71	Muller-Schwarze, 1975

This may be the colony referred to by Watson and others (1971) as Spigot Peak.

9 NANSEN ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
Small rookery	—	21.1.22	Bagshawe, 1938

The colony is on a little island off the south end of Nansen Island.

10 "SLIPPERY ROCK ISLAND" — MAP 13

Count	*Nature*	*Date*	*Reference*
417	N3	16.12.71	Muller-Schwarze, 1975

This locality could not be exactly identified but from the coordinates given (lat. 64° 28'S, long. 61° 50'W) it may be one of the Gaston Islands (lat. 64° 29'S, long. 61° 50'W). Bagshawe (1938) found a small rookery at "Cape Reclus" on 30.1.22 and this could also refer to the same site.

11 CAPE MURRAY — MAP 13

Bagshawe (1938) noted on 9.3.1922 that there appeared to be a small rookery on the larger of the two rocks to the north of Cape Murray.

12 MELCHIOR ISLANDS — MAP 13

Eklund (1945) reported the presence of a colony here in Feb.-Mar. 1941.

13 CAPE KAISER — MAP 13

Count	*Nature*	*Date*	*Reference*
Enormous	—	27.11.09	Gain, 1914
Moderate	—	9.3.22	Bagshawe, 1938

"An enormous rookery situated more than 100 m high on the island found to the south of Cape Kaiser" (Gain, 1914).

"On the southern or largest of the two small islands off Cape Kaiser there is a moderate sized rookery probably Ringed as many of this kind were seen in the vicinity" (Bagshawe, 1938).

14 TWO HUMMOCK ISLAND — MAP 13

Bagshawe (1938) reported that a large colony was situated on the south-west shore of the island on 9.3.1922.

15 COBALESCOU ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
736	N3	16.12.71	Muller-Schwarze, 1975

Gain (1914) on 27.11.1909 recorded two rookeries on the islets to the south of Two Hummock Island, which are probably the same as that detailed above.

16 AUGUSTE ISLAND — MAP 13

Gain (1914) recorded a colony here on 27.11.1909. Bagshawe (1938) noted a moderate-sized rookery on 5.3.1922 on a small island north-east by north of Two Hummock Island which may be Auguste Island.

17 ALCOCK ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
7 710	N3	16.12.71	Muller-Schwarze, 1975

18 MIDAS ISLAND — MAP 13

Count	*Nature*	*Date*	*Reference*
2 060	N3	16.12.71	Muller-Schwarze, 1975

Although Andersson (1905) did not refer to Midas Island, it is likely that the location shown on his map coincides with it.

19 CAPE HERSCHEL — MAP 13

Andersson (1905) referred to the colony he located here as Cape Wennersgaard.

20 CAPE HERSCHEL (NORTH-EAST) — MAP 13

Andersson (1905) reported a rookery to the north-east of Cape Herschel.

21 SKOTTSBERG POINT — MAP 13

Andersson (1905) recorded a colony at this site.

22 LOW ISLAND — MAP 13

Gain (1914) reported two rookeries on the south-east coast. On 18.1.1975, J. L. Smellie and M. R. A. Thomson (pers. comm.) estimated about *c.* 20-30 000 birds at Cape Hooker (east Low Island), saw a few birds on the headland to the north, and recorded *c.* 10 000 birds at Cape Wallace (north-west Low Island).

23 WENNERSGAARD POINT — MAP 14

Watson and others (1971) recorded this as a breeding site, citing Lonnberg (1905). There is no such reference in this account and it may be a misprint for Andersson (1905). As Andersson's Cape Wennersgaard is in fact Cape Herschel, this colony may be identical with colony 19.

24 TOWER ISLAND (NORTH-WEST) — MAP 14.1

Count	*Nature*	*Date*	*Reference*
250	N3	9.1.69	B.A.S. (Rumble)

25 ZIGZAG ISLAND — MAP 14.1

Count	*Nature*	*Date*	*Reference*
700	N3	9.1.69	B.A.S. (Bell)

Sited on the two scree slopes.

26 TOWER ISLAND (EAST) — MAP 14.1

Count	*Nature*	*Date*	*Reference*
80	N3	9.1.69	B.A.S. (Bell)

27 CAPE ROCQUEMAUREL — MAP 14

Andersson (1905) recorded a colony here in 1901-03.

28 HOMBRON ROCKS — MAP 14.2

Count	*Nature*	*Date*	*Reference*
45+	N3	8.1.69	B.A.S. (D. N. Smith)

29 ASTROLABE ISLAND — MAP 14.3

Pashley (B.A.S. records) noted several colonies of *c.* 300 nests each on 7.1.69.

30 TUPINIER ISLANDS — MAP 14

Count	*Nature*	*Date*	*Reference*
5 000	A4	7.12.69	B.A.S. (Curphey)

Most accessible parts of the islands had rookeries.

31 DUROCH ISLANDS — MAP 14

Araya (1965) noted that Chinstraps were evident on small islands opposite Bernardo O'Higgins base in Feb. 1964.

32 LAFARGE ROCKS — MAP 14.4

Count	*Nature*	*Date*	*Reference*
800-900	N4	6.1.69	B.A.S. (Bell)

33 CASY ISLAND — MAP 14

Count	*Nature*	*Date*	*Reference*
30	N3	6.1.69	B.A.S. (Bell)

34 GOURDIN ISLAND — MAP 14.5

Count	*Nature*	*Date*	*Reference*
Several thousand	—	6.12.69	B.A.S. (Curphey)

35 WIDEOPEN ISLANDS — MAP 14

Elliot and others (1978) recorded that Chinstraps were breeding but were less common than Adelies, in Feb. 1978.

SOUTH SHETLAND ISLANDS

36-46 DECEPTION ISLAND — MAP 15

Gain (1914) recorded four colonies which he estimated to contain more than 100 000 birds.

White (1957) recorded eight colonies with an estimated total of 90 350 birds and in Jan. 1967 Barlow (1966) recorded ten colonies and a total of over 150 000 birds.

The fate and size of colonies at Deception Island may be greatly influenced by volcanic activity there and this may be responsible for some recorded decreases, particularly that at the Vapour Colony.

36 ENTRANCE POINT — MAP 15.1

Count	*Nature*	*Date*	*Reference*
150	A3	Dec. 1957	White, 1957
348	N1	9.1.65	Bird, 1965
450	N3	9.1.67	B.A.S. (Norman)

In 1965 and 1967 there were four colonies (see Map. 13.1.1). On 9.1.66, Bird (B.A.S. records) counted 77 nests in colonies (a) and (b). Norman estimated their sizes as follows: (a) 2 500 sq. yd [2 050 m²], (b) 400 sq. yd [328 m²], (c) 10 000 sq. yd [8 200 m²], (d) 3 750 sq. yd [3 075 m²].

37 ROOKERY TWO — MAP 15.1

Count	*Nature*	*Date*	*Reference*
1 450	N3	19.1.67	B.A.S. (Norman)

In 1967 there were four colonies, containing the following total of nests: (a) 800, (b) 500, (c) 100, (d) 50.

38 ROOKERY THREE — MAP 15.1

Count	*Nature*	*Date*	*Reference*
150	N3	19.1.67	B.A.S. (Norman)

39 ROOKERY FOUR — MAP 15

Count	*Nature*	*Date*	*Reference*
100	A3	Dec. 57	White, 1957
300-400	A3	Jan. 67	Barlow, 1966

Situated on moraine and surrounded by an ice-field (Barlow, 1966).

40 ROOKERY FIVE — MAP 15

Count	*Nature*	*Date*	*Reference*
50	A3	Dec. 57	White, 1957
400-500	A3	Jan. 67	Barlow, 1966

Similarly situated to Rookery Four (Barlow, 1966).

41 VAPOUR COL — MAP 15

Count	*Nature*	*Date*	*Reference*
50 000	A4	21.12.09	Gain, 1914
5 000	A4	Dec. 57	White, 1957
10 000	A4	3.2.67	B.A.S. (Norman)

Gain (1914) stated that this rookery covered an area 2 km by 1 km and up to a height of 100 m. In 1967 it was approx 880 yd square and up to a height of about 400 ft (B.A.S. Norman) so the size of rookery appears to have shrunk by over one-third.

42 ROOKERY SEVEN — MAP 15

Count	*Nature*	*Date*	*Reference*
250	A3	Dec. 57	White, 1957
450-600	A3	Jan. 67	Barlow, 1966

43 ROOKERY EIGHT — MAP 15.2

Count	*Nature*	*Date*	*Reference*
200	N3	17.2.67	B.A.S. (Norman)

44 MACARONI POINT — MAP 15.2

Count	*Nature*	*Date*	*Reference*
1 375	A3	Dec. 57	White, 1957
2 500	N3	17.2.67	B.A.S. (Norman)
5 000	N4	29.1.72	Muller-Schwarze, 1975

Gain (1914) did not record Chinstrap here. In 1967 there were four colonies with the following totals of nests: (a) 200, (b) 300, (c) 400, (d) 1 600.

45 BAILY HEAD — MAP 15

Count	*Nature*	*Date*	*Reference*
50 000	A4	7.12.09	Gain, 1914
40 000	N4	1926-27	Bennet in Roberts
72 660	N2	Jan. 37	B. B. Roberts
37 500	A4	Dec. 57	White, 1957
50 000-75 000	A4	Jan. 67	Barlow, 1966

In 1966 the rookery was estimated to cover an area of 900 yd by 500 yd [0.37 km²].

46 CAPE SHIRREFF — MAP 15

Count	*Nature*	*Date*	*Reference*
2 000	N3	9.1.58	Tufft, 1957

47 LAIR POINT — MAP 15

Count	*Nature*	*Date*	*Reference*
156	N3	1965-66	B.A.S. (M. G. White)

48 ROBBERY BEACHES — MAP 15

Count	*Nature*	*Date*	*Reference*
50	N3	14.1.58	Tufft, 1957

The colony was at the midpoint of the western shore of Barclay Bay (Tufft, 1957).
On 14.12.65 this site was visited and no occupied nests were found. A single nest was found about 1 000 m to the south-east (B.A.S. records; M.G. White).

49 DEVILS POINT — MAP 15.3

Count	*Nature*	*Date*	*Reference*
2 000-3 000	N4	7.1.58	Tufft, 1957
5 300	N3	13.12.65	B.A.S. (M. G. White)

In 1965 there were four discrete colonies: (a) 30 nests, (b) 170 nests, (c) 100 nests, (d) 5 000 nests.

50 ELEPHANT POINT — MAP 15

Count	*Nature*	*Date*	*Reference*
200-300	N3	5.1.58	Tufft, 1957

51 HANNAH POINT — MAP 15.4

Count	*Nature*	*Date*	*Reference*
1 000	N4	Jan. 1958	B.A.S. (Tufft)

52 BARNARD POINT — MAP 15.5

Count	*Nature*	*Date*	*Reference*
1 500	N4	Feb. 1958	Tufft, 1957
8 260	N3	25.11.65	B.A.S. (M. G. White)

In 1965 there were four discrete colonies: (a) 5 000 nests, (b) 1 800 nests, (c) 60 nests, (d) 1 400 nests.

53 RENIER POINT — MAP 15

Andersson (1905) recorded a colony at this site.

54 HALF MOON ISLAND — MAP 15.6

Count	*Nature*	*Date*	*Reference*
1 197	N3	4.1.66	B.A.S. (M. G. White)

White noted the existence of two distinct colonies: (a) 1 145 nests, (b) 52 nests.
On 7.3.76, J. L. Smellie (pers. comm.) noted breeding birds by the disused Argentine base.

55 DEE ISLAND — MAP 15

Count	*Nature*	*Date*	*Reference*
1 500	N4	8.1.66	B.A.S. (M. G. White)

56 AITCHO ISLANDS — MAP 15.7

Count	*Nature*	*Date*	*Reference*
3 500	N4	8.1.66	B.A.S. (M. G. White)

In 1966 there were two distinct colonies: (a) 1 500 nests, (b) 2 500 nests.

57 JORGE ISLAND — MAP 15.8

Schlatter and Orrego (1975) recorded the presence of an established rookery on Jorge Island and noted that a single pair had raised a chick on the coast just north of Carlota Cove (see map).

58 HEYWOOD ISLAND — MAP 15

Count	*Nature*	*Date*	*Reference*
23 000	N4	6.1.66	B.A.S. (M. G. White)

The colony was recorded as being 1 mile [1 610 m] long and 200 yd [183 m] wide.

59 EDWARDS POINT — MAP 15

Count	*Nature*	*Date*	*Reference*
47	N1	15.1.66	B.A.S. (M. G. White)

60 HARMONY POINT — MAP 16.1

Count	*Nature*	*Date*	*Reference*
31 300	A4	24.12.64-25.2.65	Araya and Aravena, 1965
47 600	N3	13.1.66	B.A.S. (M. G. White)
c. 50 000	N4	19.12.71, Jan. 1972	Muller-Schwarze, 1975

In 1966 there were five distinct colonies: (a) 5 400 nests, (b) 700 nests, (c) 40 000 nests, (d) 700 nests, (e) 800 nests.

It is possible that penguins may also breed at Duthoit Point, east Nelson Island (Jan 1976, J. L. Smellie pers. comm.).

61 THE TOE — MAP 16

Count	*Nature*	*Date*	*Reference*
6 000	N3	13.1.66	B.A.S. (M. G. White)
c. 15 000	N4	26.12.71	Muller-Schwarze, 1975

62 RIP POINT — MAP 16

On 26.1.66, M. G. White (B.A.S. records) estimated that the colony here contained *c.* 10 000 nests and was composed mainly of Chinstraps with some Gentoos. The colony was situated about 4 km west of Rip Point and extended on to offshore islets.

63 ARDLEY ISLAND — MAP 16

Count	*Nature*	*Date*	*Reference*
c. 50	N4	20.12.71	Muller-Schwarze, 1975

64 BARTON PENINSULA — MAP 16

Count	*Nature*	*Date*	*Reference*
2 100	N4	18.1.66	B.A.S. (M. G. White)

65 STRANGER POINT — MAP 16

Count	*Nature*	*Date*	*Reference*
950	N3	29.1.66	B.A.S. (M. G. White)
c. 200	N4	21.12.71	Muller-Schwarze, 1975

This is one of the few colonies for which there is an indication of a fairly recent decline in numbers. However Muller-Schwarze's (1975) count was made from the sea through binoculars and may be less accurate.

66 DEMAY POINT — MAP 16

Trivelpiece (in litt.) stated that in 1977-78 there were two colonies of *c.* 1 000 pairs at Demay Point and a third colony, also of *c.* 1 000 pairs, at "Telephon Point".

67 SPHINX HILL — MAP 16

Count	*Nature*	*Date*	*Reference*
250	N3	4.1.57	Stephens, 1957
40	N3	29.1.66	B.A.S. (M. G. White)
290	N1	1977-78	Trivelpiece and Volkman (in press)
			Volkman and others, Ms.

2 000 birds were associated with Stephens' count of 250 occupied nests.

68 POINT THOMAS — MAP 16

Count	*Nature*	*Date*	*Reference*
500	N3	4.1.57	Stephens, 1957
200	N3	29.1.66	B.A.S. (M. G. White)
750	N1	1977-78	Trivelpiece and Volkman (in press)
			Volkman and others, Ms.

As previously, we equate Sphinx Hill with Point Thomas East and Point Thomas with Point Thomas West. Gain (1914) did not record Chinstraps at either site so these colonies (and those at Demay Point) have certainly arisen since then. The drop in population between 1957 and 1966 may conceivably have been influenced by egg collecting, although the only reference to this (Stephens, 1957) relates to the much more abundant Adelie Penguin.

The mean annual increase since 1965-66 is 13.0% but since 1956-57 it would only be 1.6%. Neither Stephens nor White mentioned the Demay Point colonies but there is no evidence that Stephens visited this area and White (pers. comm.) did not do so. Trivelpiece and Volkman (in press) have noted the displacement of Adelie Penguins by Chinstraps at Point Thomas.

69 POINT HENNEQUIN — MAP 16

Tufft (1956) reported a Chinstrap colony at this site.

70 LIONS RUMP — MAP 16

Roberts (unpubl. data) noted breeding Chinstraps on 19.1.1937 but Stephens (1957) recorded only three birds and saw no sign of a breeding colony.

71 TURRET POINT — MAP 16.2

Count	*Nature*	*Date*	*Reference*
400	N3	27.1.66	B.A.S. (M. G. White)

B. B. Roberts (unpubl. data) noted the existence of this colony in January 1937.

72 PENGUIN ISLAND — MAP 16.2

Count	*Nature*	*Date*	*Reference*
5 155	N3	27.1.66	B.A.S. (M. G. White)

In 1966 there were three distinct colonies: (a) 1 800 nests, (b) 1 155 nests, (c) 2 200 nests.
B. B. Roberts (unpubl. data) referred to a "large colony" here in January 1937.

73 CAPE MELVILLE — MAP 16.3

Count	*Nature*	*Date*	*Reference*
3 250	N3	27.1.66	B.A.S. (M. G. White)

B. B. Roberts (unpubl. data) noted the existence of this colony in January 1937. In 1966 it covered 3 000 sq. yd [2 512 m²].

74 ØRNEN ROCKS — MAP 16.3

Count	*Nature*	*Date*	*Reference*
1 100	N3	27.1.66	B.A.S. (M. G. White)

75 NORTH FORELAND — MAP 16.4

Count	*Nature*	*Date*	*Reference*
3 000	A4	1958-59	Stephens, 1958
13 800	N3	7.1.66	B.A.S. (M. G. White)

In 1966 two discrete colonies existed: (a) 11 300 nests, (b) 2 500 nests. It would appear that this colony increased substantially between 1958-59 and 1966.

76 FALSE ROUND POINT — MAP 16

Count	*Nature*	*Date*	*Reference*
13 000	N4	7.1.66	B.A.S. (M. G. White)

77 ROUND POINT — MAP 16.5

Count	*Nature*	*Date*	*Reference*
29 800	N3	7.1.66	B.A.S. (M. G. White)

There were five colonies in 1966: (a) 15 000 nests, (b) 300 nests, (c) 3 500 nests, (d) 1 000 nests, (e) 10 000 nests.

On 21.1.75, P. D. Clarkson (pers. comm.) reported a massive colony, estimated at *c.* 100 000 birds, on nearby Pottinger Point. This may be identical with the colony referred here to as Round Point, or the latter may have expanded, or two colonies may be involved.

78 O'BRIEN ISLAND — MAP 17.1

	Count	*Nature*	*Date*	*Reference*
a	4 000	N4	19.12.76-8.1.77	J.S.E.
b	3 000	N4	,,	,,
c	5 800	N3/4	,,	,,
d	40	N3	,,	,,
e	2 040	N4	,,	,,
f	1 000	N5	,,	,,
g	3 500	N4	,,	,,
h	2 000	N4	,,	,,
i	20	N4	,,	,,

For colony (f) the species identification was not absolutely certain.

79 EADIE ISLAND — MAP 17.1

	Count	*Nature*	*Date*	*Reference*
a	200	N4	19.12.76-8.1.77	J.S.E.
b	600	N3/4	,,	,,
c	500	N3/4	,,	,,
d	50	N5	,,	,,
e	1 500	N5	,,	,,
f	800	N4	,,	,,
g	1 000	N3/4	,,	,,
h	500	N3/4	,,	,,

For colonies (d) and (e) the species identification was not absolutely certain.

80 ASPLAND ISLAND — MAP 17.1

	Count	*Nature*	*Date*	*Reference*
a	1 500	N4	19.12.76-8.1.77	J.S.E.
b	300	N3/4	,,	,,
c	150	N3/4	,,	,,
d	2 000	N3/4	,,	,,
e	700	N3	,,	,,
f	2 000	N3/4	,,	,,
g	2 000	N5	,,	,,

For colony (g) the species identification was not absolutely certain.

81-83 GIBBS ISLAND — MAP 17.2

Location		*Count*	*Nature*	*Date*	*Reference*
81 West	a	200	N5	8.1.-14.2.77	J.S.E.
	b	4 000	N5	,,	,,
82 Central	a	30	N3/4	,,	,,
	b	200	N3/4	,,	,,
	c	50	N3/4	,,	,,
	d	50	N3/4	,,	,,

	e	6 000	N3/4	,,	,,
	f	200	N4	,,	,,
	g	3 000	N3/4	,,	,,
	h	8 000	N3/4	,,	,,
83 East	a	150	N3	,,	,,
	b	10	N3/4	,,	,,
	c	6 000	N3/4	,,	,,
	d	3 000	N3/4	,,	,,
	e	4 000	N3/4	,,	,,
	f	6 000	N3/4	,,	,,

For colonies 81 (a) and (b) the species identification was not absolutely certain.

84-94 CLARENCE ISLAND — MAP 17.3

Location		*Count*	*Nature*	*Date*	*Reference*
84 Cape Lloyd		100	N3/4	28.1-10.2.77	J.S.E.
85 "Serac Point"		7 500	N3/4	,,	,,
86 "Fur Seal Point"	a	30	N3/4	,,	,,
	b	12 920	N3	,,	,,
	c	57 500	N3/4	,,	,,
87 "False Ridge"		5 000	N3/4	16.12.76-3.1.77	,,
88 "Pink Pool Point"		58 500	N3	,,	,,
89 Cape Bowles		33 000	N3/4	,,	,,
90 "Thunder Bay"		20 000	N3/4	,,	,,
91		1 200	N5	3-20.1.77	,,
92 "Pillar Ridge"	a	3 000	N5	,,	,,
	b	200	N3/4	,,	,,
	c	6 670	N3/4	,,	,,
	d	500	N3/4	,,	,,
93 Chinstrap Cove	a	1	N1	,,	,,
	b	19 500	N3/4	,,	,,
	c	1 200	N3/4	,,	,,
94 Humble Point		—	—	1970-71	,,

95 CORNWALLIS ISLAND — MAP 17.4

Count	*Nature*	*Date*	*Reference*
a 1 350	N3	10-14.2.77	J.S.E.
b 750	N3/4	,,	,,
c 100	N3/4	,,	,,

96 SEAL ISLANDS — MAP 18

Count	*Nature*	*Date*	*Reference*
1 000+	N4	Dec. 1970	J.S.E.

As the Joint Services Expedition in 1970-71 made such a thorough survey of the penguin population of this island it is useful to quote at length from the supplementary comments (Furse and Bruce, 1971).

1. *Nest sites*

From 2 to 270 m above sea-level, but mostly below 100 m and only one colony above 180 m. The longest overland journey between breeding areas and the sea was approximately 0.75 km, but in no area did this factor alone appear to limit potential expansion of a colony.

Horizontal areas were used, or sloping areas at average slopes of up to about 50°. Bedrock or consolidated moraine scree were used impartially, including glacier-borne moraines. Gravel or sandy sites were less frequently used even when available.

Early season snow-cover probably plays an important part in nest site selection, and was thought to be the reason for some apparently random gaps found late in the season in the following otherwise crowded areas: Muckle Bluff (Map 18.5), "Chinstrap Camp" (Map 18.4), "Saddleback Point" (Map 18.2) and Penguin Island (Map 18.2).

In several areas where Chinstraps and Gentoos nested together there were signs that the earlier nesting Gentoos had colonized and held small areas exposed by the spring thaw before the main Chinstrap breeding areas.

Macaronis and Gentoos were found nesting in minority groups closely mingled in Chinstrap colonies. The reverse was not noted.

Apart from the gaps in some colonies noted above in connection with snow-cover, nests covered all or almost all suitable parts of colonial areas. There was no grouping within areas except that dependent on suitable and unsuitable terrain.

2. *Distribution*

The estimated total breeding population was 123 070 pairs.

In most parts of the island availability of nest sites appeared to be the dominant factor in limitation of numbers. Lack of nest sites largely explains the comparatively low numbers on the west and north-west coasts, but in the following areas there were vacant, apparently suitable sites:

a. "Golfcourse Point" (Map 18.10) but possibly due to Fur Seals (*Arctocephalus gazella*) on the beach.
b. Behind "Stinker Point" (Map 18.9).
c. "The Green Glen" (Map 18.8) but possibly due to length of overland journey to unoccupied areas.

3. *Population changes*

There were evident signs both of a few recent increases and of a few recent decreases as follows:

a. An abandoned colony with about 50 old nests was found just north of "Stinker Point" (Map 18.9). This site was more likely to have been occupied by Gentoos, but both Chinstraps and Gentoo non-breeders loafed nearby.
b. "The Green Glen" (Map 18.8). The colony at the end of the glen plateau seemed to be advancing into and eroding the moss beds, though this could have occurred some time ago.
c. "Hut Bluff" (Map 18.7). Some abandoned nests up the crest of the east ridge, above a small existing Chinstrap colony on the foot of the ridge, were probably Chinstrap nests, although they were scattered and might conceivably have been Giant Petrels (*Macronectes giganteus*).
d. "Sailors Cache" (Map 18.6). A few old nests on this tiny moraine strip were probably Dominican Gulls, but might conceivably have been penguins. Both Gentoo and Chinstrap Penguins regularly came ashore here to roost and rest, though not to moult.
e. "Chinstrap Camp" (Map 18.10). The fairly thick moss beds at the top of the colonial area were evidently in process of being eroded, indicating that the colony is, or has recently been, expanding.

Since 1917 the snout of Furness Glacier (Map 18.2) has receded by 100-200 m, which indicates a considerable reduction of glaciation at least locally. If general for the island, this reduction must have exposed a larger area of rock and moraine for breeding. Since most moraines were fully occupied, it would follow that there had been some increase in the last 54 years.

Apart from the above signs, it was not possible to be sure whether existing colonies were stable or not, nor how long they have been established.

Apart from colonization of currently unoccupied areas, significant increases by growth of existing colonies into vacant spaces can only occur in the following areas:

a. "Stinker Point" area (Map 18.9); on Bondi Beach and all the plateau areas.
b. "The Green Glen" (Map 18.8); in the glen itself above the existing colony there.
c. "Hut Bluff" (Map 18.7); recolonization of the abandoned part of the east ridge.
d. "Chinstrap Camp" (Map 18.10); extension across the moss beds at the top.
e. Biscoe Ridge (Map 18.4); extension laterally along the ridge.
f. Walker Point (Map 18.4); spread on to the bowl from the cliff access.

However, expansion could occur at the expense of Gentoo Penguins at any of the sites where the latter bred in 1970-71. In particular, the upper Gentoo colony on the "Hut Bluff" moraine appears to be a well-established colony which could well now be in the process of being swamped by Chinstraps.

At "Bondi Beach" (Map 18.9) and "Britannia's Fig Leaf" (Map 18.8) the Gentoo and Chinstrap colonial areas are somewhat interleaved in jigsaw shapes on very similar terrain. Regrettably, the expedition did not make accurate colony maps of either of these areas. It is worth considering aerial photography at these two sites at a convenient opportunity to establish a base for comparison.

4. *Factors affecting census*

Chinstraps were by far the easiest species to census. Apart from the conspicuous colonies with the regular spacing common to all the penguin species, their continued presence at the nest sites until early March enabled a reasonably accurate census of the eastern sites in February.

As even chicks did not leave the nest site until close to fledging (i.e. there was no true créche formation), it was possible to make accurate counts of nests at this time.

The details that follow are tabulated to bring together data for all colonies shown on each inset map.

Locality		*Count*	*Nature*	*Date*	*Reference*
97 Buskin Rocks	a	200	N5	20-31.1.71	J.S.E.
	b	200	N5	,,	,,
98 "Zero Point"	a	50	N4	,,	,,
	b	200	N4	,,	,,
99 "Point One-Five"	a	1 500	N3	,,	,,
	b	1 000	N3	,,	,,
	c	450	N3	,,	,,
	d	50	N4	,,	,,
	e	20	N4	,,	,,

See Map 18.1. The small inhospitable snow-free areas along this bleak coast were crowded to capacity.

Locality		*Count*	*Nature*	*Date*	*Reference*
100 Penguin Island		1 000	N3	4.2-1.3.71	J.S.E.
101 "Saddleback Point"	a	100	N4	4-8.3.71	,,
	b	150	N3	,,	,,
	c	3 000	N4	,,	,,
	d	2 000	N3	,,	,,
	e	5 000	N3	,,	,,
102 Cape Belsham	a	1 500	N4	,,	,,
	b	5 000	N4	,,	,,
	c	500	N3	,,	,,
103 Point Wild	a	750	N4	,,	,,
	b	200	N4	,,	,,

Location		*Count*	*Nature*	*Date*	*Reference*
	c	3 000	N3	4-8.3.71	J.S.E.
	d	100	N3	,,	,,

See Map 18.2.

Locality		*Count*	*Nature*	*Date*	*Reference*
104 "Shilling Shelf"		4 000	N4	4.2-1.3.71	J.S.E.
105 "Decimal Point"	a	150	N4	,,	,,
	b	50	N4	,,	,,
106 Cape Valentine	a	350	N3	,,	,,
	b	750	N3	,,	,,
107 "Pickup Point"	a	200	N3	,,	,,
	b	100	N3	,,	,,

See Map 18.3. The colony off Cape Valentine was noted by Shackleton in 1917.

Locality		*Count*	*Nature*	*Date*	*Reference*
108 Walker Point	a	100	N3	4.2-1.3.71	J.S.E.
	b	70	N4	,,	,,
	c	150	N3	,,	,,
	d	200	N3	,,	,,
109 "Penguin Ladder"	a	1 750	N3	,,	,,
	b	2 000	N3	,,	,,
	c	1 500	N3	,,	,,
110 "Jacob's Ladder"		6 000	N3	,,	,,
111 "Chinstrap Camp"	a	500	N3	,,	,,
	b	300	N3	,,	,,
	c	30	N3	,,	,,
	d	14 000	N3	,,	,,
	e	8 750	N3	,,	,,
	f	500	N3	,,	,,
	g	400	N3	,,	,,
112 "Nelly Point"		150	N3	,,	,,

See Map 18.4. "Chinstrap Camp" holds the largest aggregation of breeding Chinstraps on the island.

Locality	*Count*	*Nature*	*Date*	*Reference*
113 Muckle Bluff	3 000	N3	4.2-1.3.71	J.S.E.
114 "Split Beach"	30	N5	,,	,,

See Map 18.5.

Locality	*Count*	*Nature*	*Date*	*Reference*
115 "George's Rib"	30	N3	4.2-1.3.71	J.S.E.
,, ,,	280	N3	Feb. 1977	,,

See Map 18.6. This colony has thus increased over nine-fold (45% per annum) in the last 6 years.

Locality		*Count*	*Nature*	*Date*	*Reference*
116 "Hut Bluff"	a	5 000	N3	6.12.70-3.1.71	J.S.E.
	b	100	N3	,,	,,
	c	400	N3	,,	,,
	d	10	N1	,,	,,
	e	370	N3	,,	,,
	f	30	N3	,,	,,
	g	2 250	N3	,,	,,
	h	850	N3	,,	,,
	i	1 800	N3	,,	,,
117 "Crab Beach"	a	1 500	N3	,,	,,
	b	150	N3	,,	,,
	c	1 000	N3	,,	,,
	d	1 500	N3	,,	,,

See Map 18.7. Both "Crab Beach" and "Hut Bluff" snow-free areas appeared crowded to capacity.

Locality		*Count*	*Nature*	*Date*	*Reference*
118 Cape Lookout	a	700	N3	6.12.70-3.1.71	J.S.E.
	b	800	N3	,,	,,
	c	3 000	N4	,,	,,
	d	800	N3	,,	,,
119 "Britannia's Figleaf"	a	400	N3	,,	,,
	b	1 000	N3	,,	,,
	c	1 000	N4	,,	,,
	d	3 000	N3	,,	,,
120	a	5	N3	,,	,,
	b	1 000	N3	,,	,,
	c	500	N3	,,	,,
	d	10 000	N3	,,	,,
	e	50	N3	,,	,,

See Map 18.8.

Locality		*Count*	*Nature*	*Date*	*Reference*
121 Point Wordie	a	1 100	N3	3-19.1.71	J.S.E.
	b	200	N3	,,	,,
	c	2 200	N3	,,	,,
	d	4 000	N3	,,	,,
	e	40	N3	,,	,,
	f	1 400	N3	,,	,,
	g	2 700	N3	,,	,,
122 "Cresta Run Bay"	a	150	N3	,,	,,
	b	20	N3	,,	,,
	c	50	N3	,,	,,
	d	500	N3	,,	,,
	e	70	N3	,,	,,
	f	25	N3	,,	,,
123 "Twintits Stack"		100	N4	,,	,,

See Map 18.9.

Locality		*Count*	*Nature*	*Date*	*Reference*
124 "Welcome Point"	a	150	N3	20-31.1.71	J.S.E.
	b	10	N3	,,	,,
	c	70	N3	,,	,,
	d	50	N3	,,	,,
	e	60	N3	,,	,,
125 "Golfcourse Point"	a	60	N3	,,	,,
	b	30	N3	,,	,,
	c	150	N4	,,	,,
	d	100	N3	,,	,,
	e	50	N3	,,	,,
	f	30	N3	,,	,,
126 Cape Lindsey	a	70	N3	,,	,,
	b	70	N3	,,	,,
	c	50	N3	,,	,,
	d	120	N3	,,	,,
	e	150	N4	,,	,,
	f	150	N4	,,	,,
	g	100	N3	,,	,,

See Map 18.10.

SOUTH ORKNEY ISLANDS

127 PENGUIN POINT MAP 19

Both P. A. Cordall (B.A.S. records) in 1956, and R. I. L. Smith (pers. comm.) in 1977 noted that Chinstraps breed on the point and on an island off this.

128 CONCEPTION POINT MAP 19

R. I. L. Smith (pers. comm.) thought that Chinstrap Penguins breed at this site.

129 FOUL POINT MAP 19

R. I. L. Smith (pers. comm.) believed that Chinstrap Penguins breed at this site.

130 CAPE BENNETT (WEST) MAP 19.1

Hall (1956) recorded that Chinstraps were breeding at this site.

131 CAPE BENNETT MAP 19.1

Hall (1956) recorded that Chinstraps were breeding at this site.

132 EAST CAPE MAP 19.1

Hall (1956) recorded Chinstraps breeding.

133 RAYNER POINT MAP 19.1

Hall (1956) recorded thousands of pairs of Chinstraps breeding.

134 GIBBON BAY MAP 19.1

Hall (1956) recorded breeding Chinstrap Penguins.

135 THE TURRET MAP 19.1

Hall (1956) recorded thousands of pairs of breeding Chinstrap Penguins.

136 SPENCE HARBOUR MAP 19.1

Hall (1956) noted that a Chinstrap rookery existed on the point just to the south of Spence Harbour.

137 MATTHEWS ISLAND MAP 19.2

Count	*Nature*	*Date*	*Reference*
7 500+	A5	19-25.1.65	R. I. L. Smith, 1964-65

There are two large colonies on the island, the first on "The Divide" consisting of about 10 000 birds and the second on the south side of Coffer Island of more than 5 000 birds.
There are four other small colonies.

138 MATTHEWS ISLAND (SOUTH) MAP 19.2

Count	*Nature*	*Date*	*Reference*
10 000	A5	25.1.65	B.A.S. (R. I. L. Smith)

This count refers to the colonies which cover the two unnamed islands and the two smaller islets south of Matthews Island.

139 SKILLING ISLAND MAP 19.2

Both Hall (1956) and R. I. L. Smith (B.A.S. records, 1965) noted the existence of a rookery here.

140 ATRICEPS ISLAND MAP 19.2

There is a small colony on the north coast (B.A.S. records) and Hall (1956) recorded another colony to the south-east.

141 AMPHIBOLITE POINT MAP 19

Count	*Nature*	*Date*	*Reference*
c. 4 000	N4	Jan. 1965	B.A.S. records

142 CAPE HANSEN MAP 19

R. I. L. Smith (B.A.S. records) noted a possible Chinstrap colony here on 10.2.65.

143 CAPE VIK MAP 19

Count	*Nature*	*Date*	*Reference*
c. 8 000	N4	Jan. 1965	B.A.S. (Sutherland)

144 STENE POINT MAP 19

R. I. L. Smith (B.A.S. records) noted a possible Chinstrap colony here on 10.2.65.

145 MEIER POINT MAP 19

P. A. Cordall (B.A.S. records) in 1956 recorded a Chinstrap breeding colony here.

146 GOSLING ISLANDS MAP 19

R. I.L. Smith (pers. comm.) recorded the presence of a Chinstrap colony in 1965.

147 CHEAL POINT MAP 19

Count	*Nature*	*Date*	*Reference*
5-7 000	N4	Jan. 1965	B.A.S. records

148 MONROE ISLAND MAP 19

R. I. L. Smith (pers. comm.) recorded the presence of a Chinstrap colony here in 1965.

149-161 SIGNY ISLAND MAP 20

A full account of the 1978-79 penguin survey is given in Croxall and Rootes (Ms.) together with an analysis of previous counts. For the convenience of the present treatment, some of the colonies are grouped together and the counts given are the uncorrected ones obtained by Rootes (1978). At Signy Island, mean laying and hatching dates are 25 November and 30 December, respectively.

149 NORTH POINT MAP 20.1

Count	*Nature*	*Date*	*Reference*
A few	A5	1947-48	B.A.S. (Robin)
1 300	N3	5.1.58	Scotland, 1958
1 289	N1, N3	1958-59	B.A.S. (Richards)
700	N3?	20.1.64	B.A.S. (Burton)
7 126	N1	5-7.12.78	Rootes, 1978

In the 20 years 1958-78 the colony increased over five-fold and has shown a mean annual increase of 8.9%.

150 SPINDRIFT ROCKS MAP 20.2

Count	*Nature*	*Date*	*Reference*
128	N1	7.12.78	Rootes, 1978

Chinstraps were first noted here (where there is a large Adelie colony) by R. I. L. Smith (pers. comm.) in the early 1970's.

151 PORTEOUS POINT MAP 20

Count	*Nature*	*Date*	*Reference*
5	C1	12.2.79	Rootes, 1978

152 FYR CHANNEL MAP 20

Count	*Nature*	*Date*	*Reference*
500	N3	Dec. 1958	B.A.S. (Richards)
300	N3?	Jan. 1965	B.A.S. (Burton)
1 170	C1	12.2.79	Rootes, 1978

There are currently four separate colonies; overall there has been a mean annual increase of about 4.3% in the last 20 years.

153 MOYES — MAP 20

Count	*Nature*	*Date*	*Reference*
4 241	C1	12.2.79	Rootes, 1978

It is possible that the colonies counted along the Fyr Channel by Burton and Richards included the Moyes colony. If this is so, then there has been an increase from 500 pairs in 1958 to 5 411 pairs in 1978 (12.6% per annum).

154 PANDEMONIUM POINT — MAP 20

Count	*Nature*	*Date*	*Reference*
2 200	N3	Dec. 1958	B.A.S. (Richards)
1 200	N3?	Jan. 1965	B.A.S. (Burton)
14 543	C1	22.2.79	Rootes, 1978

This rookery has evidently increased nearly seven-fold (9.9% per annum) over the last 20 years.

155 CONFUSION ISLAND — MAP 20

Count	*Nature*	*Date*	*Reference*
2 000	N3	Dec. 1958	B.A.S. (Richards)
2 000	N3?	28.1.64	B.A.S. (Burton)
7 736	1	13.2.79	Rootes, 1978

Increase at this rookery (7.0% per annum over 20 years) may be limited by the availability of space on the island.

156 McLEOD MORAINES (WEST) — MAP 20

Count	*Nature*	*Date*	*Reference*
1 651	C1	1.2.79	Rootes, 1978

There are four small colonies along this stretch of coast.

157 SHAGNASTY ISLAND — MAP 20

Count	*Nature*	*Date*	*Reference*
1 500	N3	1958-59	B.A.S. (Richards)
700	N3?	28.1.64	B.A.S. (Burton)
2 837	C1	1.2.79	Rootes, 1978

Increase at this rookery (3.2% per annum over 20 years) is probably limited by the availability of space, especially in view of the extensive Blue-eyed Shag *Phalacrocorax atriceps* colony.

158 McLEOD MORAINES (EAST) — MAP 20

Count	*Nature*	*Date*	*Reference*
c. 130	N4	19.12.76	R. I. L. Smith, pers. comm.
585	N1	15.12.78	Rootes, 1978

The massive increase over 2 years is clear evidence of immigration, presumably by progeny of nearby colonies.

159 OLIPHANT CHANNEL — MAP 20

Count	*Nature*	*Date*	*Reference*
143	N1	15.12.78	Rootes, 1978

160 OLIPHANT ISLANDS — MAP 20

Count	*Nature*	*Date*	*Reference*
240	A4	1947-48	B.A.S. (Robin)
4 502	C1	Feb. 1979	Rootes, 1978

There are several colonies here so the mean annual increase of 9.9% over 31 years can only be a very approximate figure.

161a GOURLAY POINT — MAP 20.3

Count	*Nature*	*Date*	*Reference*
2 680	N3?	19.1.64	B.A.S. (Burton)
10 128	N1, N3	17.12.68	B.A.S. (Conroy and Brown)
13 063	N1	29-30.11.78	Rootes, 1978

It is difficult to reconcile Burton's count with the others. There has been a mean annual increase of 2.6% between 1968 and 1978. This is a low value compared with most other Signy Island colonies but Gourlay Point is now rather densely populated.

161b PAGEANT POINT — MAP 20.3

Count	*Nature*	*Date*	*Reference*
250	N3?	19.1.64	B.A.S. (Burton)
921	N1	17.12.68	B.A.S. (Conroy and Brown)
1 219	N1	29.11.78	Rootes, 1978

The apparent increase from 1964 to 1968 was 38.5% per annum but it has only been 2.8% from 1968 to 1978.

161c PANTOMIME POINT — MAP 20.3

Count	*Nature*	*Date*	*Reference*
908	N1	23.12.55	Scotland, 1958
3 429	N1	19.12.68	B.A.S. (Conroy and Brown)
5 246	N1	13-30.11.78	Rootes, 1978

The mean annual increase 1955-68 was 10.8% and from 1968 to 1978 it has been 4.3%.

161 GOURLAY PENINSULA — MAPS 20.3, 20.4

Count	*Nature*	*Date*	*Reference*
c. 5 000	A4	1947-48	B.A.S. (Laws)
c. 10 000	?	1950-51	Sladen, 1958
<5 000	A4	17.11.57	Scotland, 1958
14 478	N1, N3	17.12.68	B.A.S. (Conroy and Brown)
19 528	N1	Nov. 1978	Rootes, 1978

The counts between 1947 and 1957 are not sufficiently consistent to permit direct evaluation of change in colony size before 1968. Between 1968 and 1978 the mean annual increase has been 3.0%.

162-166 MOE ISLAND — MAP 20

Count	*Nature*	*Date*	*Reference*
1 000	N3	1958-59	B.A.S. (Richards)
300	N3?	Jan. 1965	B.A.S. (Burton)
15 771	C1, C3	14.2.79	Rootes, 1978

Burton's count was presumably incomplete. If Richards' was correct, there has been a mean annual increase of 14.8% over 20 years.

167 MARIHOLM — MAP 20

Count	*Nature*	*Date*	*Reference*
100	?	Jan. 1965	B.A.S. records
4 148	C1	14.2.79	Rootes, 1978

If the 1965 count is correct, this would represent a mean annual increase of 30.5% over 14 years.

168 POWELL ISLAND (NORTH) — MAP 19.3

R. I. L. Smith (pers. comm.) (1964-65) noted a large colony on a rocky promontory to the north-east. Hall (1956) gave the locations of a further two colonies on islets off the north coast.

169 POWELL ISLAND (WEST) — MAP 19.3

R. I. L. Smith (pers. comm.) noted a colony here.

170 POWELL ISLAND (EAST) — MAP 19.3

Hall (1956) and R. I. L. Smith (1964-65) gave the locations of Chinstrap colonies but without indication of size except a record by Smith that the two small rocky islands off the east coast had large colonies.

171 CHRISTOFFERSEN ISLAND — MAP 19.3

Scotland (1958) recorded breeding Chinstrap Penguins in December 1957.

172 MICHELSEN ISLAND — MAP 19.3

Count	*Nature*	*Date*	*Reference*
49	N1	Dec. 1957	B.A.S. (Scotland)
300-500	A4	Jan-Feb. 1965	B.A.S. (R. I. L. Smith)

R. I. L. Smith noted that there were two small colonies with several smaller groups attached.

173 FREDRIKSEN ISLAND — MAP 19.3

Count	*Nature*	*Date*	*Reference*
Many thousands	A5	27.1.65	B.A.S. (R. I. L. Smith)

Smith noted that extensive Chinstrap colonies cover a large part of the north-west and centre of the island. A smaller colony occurs towards the south-east on a scree slope.

174 SADDLE ISLAND — MAP 21

Count	*Nature*	*Date*	*Reference*
25 000+	A4	4.2.03	Clarke, 1915

Several subsequent visitors have reported a very large colony.

175 WEDDELL ISLANDS — MAP 21

Hall (1956) reported a large number of breeding Chinstraps.

176 BRUCE ISLANDS — MAP 21

Hall (1956) reported a large number of breeding Chinstraps.

177 EILLIUM ISLAND — MAP 21

Both Clarke (1915) and Hall (1956) reported a large rookery here.

178 NIGG ROCK — MAP 21

A large rookery was reported by Wilton and others (1908).

179 CAPE ROBERTSON — MAP 21

The rookery occupies a strip of coast about half a mile [800 m] long with not less than a quarter of a million birds (Clarke, 1915).

180 POINT MARTIN — MAP 21

Clarke (1915) reported a small rookery amidst the Adelies.

181 AILSA CRAIG — MAP 21

Clarke (1915) reported many thousands of nests.

182 CAPE WHITSUN — MAP 21

Count	*Nature*	*Date*	*Reference*
4 000	A4	8.2.47	Robin, 1948

183 MURRAY ISLANDS — MAP 21

Clarke (1915) noted the occurrence of a rookery here.

184 **FITCHIE BAY** MAP 21

Count	*Nature*	*Date*	*Reference*
7 500	A4	26.2.47	Robin, 1948

Several rookeries in Fitchie Bay and on the north side of Graptolite Island.

185 **FERRIER PENINSULA (SOUTH)** MAP 21

Count	*Nature*	*Date*	*Reference*
1 000	A4	23.2.47	Robin, 1948

186 **FERRIER PENINSULA (NORTH)** MAP 21

Count	*Nature*	*Date*	*Reference*
4-5 000	A4	23.2.47	Robin, 1948

187 **BUCHANAN POINT** MAP 21

Count	*Nature*	*Date*	*Reference*
3 000	A4	24.2.47	Robin, 1948

188 **MACKINTOSH COVE** MAP 21

Count	*Nature*	*Date*	*Reference*
500	A4	24.2.47	Robin, 1948

189 **FRASER POINT** MAP 21

Count	*Nature*	*Date*	*Reference*
c. 5 000	A5	24.2.47	Robin, 1948

Robin (1948) recorded one colony of about 3 000 penguins on the south-west end of the Fraser Point headland and at least four other rookeries in Marrs Bay with approximately 7 000 penguins in total.

190-192 **WATSON PENINSULA** MAP 21

Count	*Nature*	*Date*	*Reference*
3 500-4 000	A5	25.2.47	Robin, 1948

Robin (1948) recorded large continuous colonies on the east side and four more rookeries on the west side. One of these was situated on a promontory to the north (191) and three near the base of the peninsula (192).

193 **FERGUSLIE PENINSULA** MAP 21

Count	*Nature*	*Date*	*Reference*
1 000	A4	29.1.47	Robin, 1948

194 **"PENGUIN POINT"** MAP 21

Count	*Nature*	*Date*	*Reference*
3 500-5 000	A4	Jan. 1946	B.A.S. records
7 500	A4	Nov. 1946	B.A.S. records

195 **CAPE GEDDES** MAP 21

Count	*Nature*	*Date*	*Reference*
25	N1	Jan. 1946	B.A.S. records
40	A3	18.1.47	Robin, 1948

196 **RUDMOSE ROCKS** MAP 21

Count	*Nature*	*Date*	*Reference*
—	—	1903-04	Clarke, 1915
2 000-2 500	A4	Jan. 1946	B.A.S. records
5 000	A4	2.2.47	Robin, 1948

197 **THOMPSON POINT** MAP 21

Count	*Nature*	*Date*	*Reference*
—	—	1903-04	Clarke, 1915
75	A3	9.3.47	Robin, 1948

SOUTH SANDWICH ISLANDS MAP 22

198 **THULE ISLAND** MAP 22.1

Holdgate and Baker (1979) reported colonies at (a) Beach Point (small), (b) Hewison Point (large) and (c) Herd Point (probable). Wilkinson (1956) estimated the second of these to contain 500+ pairs in mid-March 1956.

199 **BELLINGSHAUSEN ISLAND** MAP 22.2

Holdgate and Baker (1979) recorded colonies at (a) "South Plain" (5-6 000 pairs, March 1964) and (b) Hardy Point.

200 **BRISTOL ISLAND** MAP 22.3

Holdgate and Baker (1979) reported colonies at (a) Harker Point, (b) Grindle Rock (probable), (c) Wilson Rock (probable), and (d) Freezland Rock (abundant).

201 **MONTAGU ISLAND** MAP 22.4

Holdgate and Baker (1979) recorded colonies at (a) Mathias Point, (b) Allen Point (large numbers), (c) Scarlett Point (a few hundred pairs) and (d) Horsburgh Point (a few hundred pairs).

202 SAUNDERS ISLAND

MAP 22.5

Holdgate and Baker (1979) reported colonies at (a) Blackstone Plain (many thousand birds), (b) Yellowstone Crags (many thousand birds), (c) Ashen Hills—eastern flanks (many thousands), (d) Natriss Point (many thousands), (e) Ashen Hills (possible colony on the central south coast below the col linking Ashen Hills to Mount Michael) and (f) Ollivant Point (small groups—hundreds).

203 VINDICATION ISLAND

MAP 22.6

Count	*Nature*	*Date*	*Reference*
30-50 000+	A4	Mar. 1964	Holdgate and Baker, 1979

204 CANDLEMAS ISLAND

MAP 22.7

Holdgate and Baker (1979) recorded colonies at several points including Clapmatch Point, Carbon Point, Shrove Point, Demon Point, Sarcophagus Point and Medusa Pool.

205 VISOKOI ISLAND

MAP 22.8

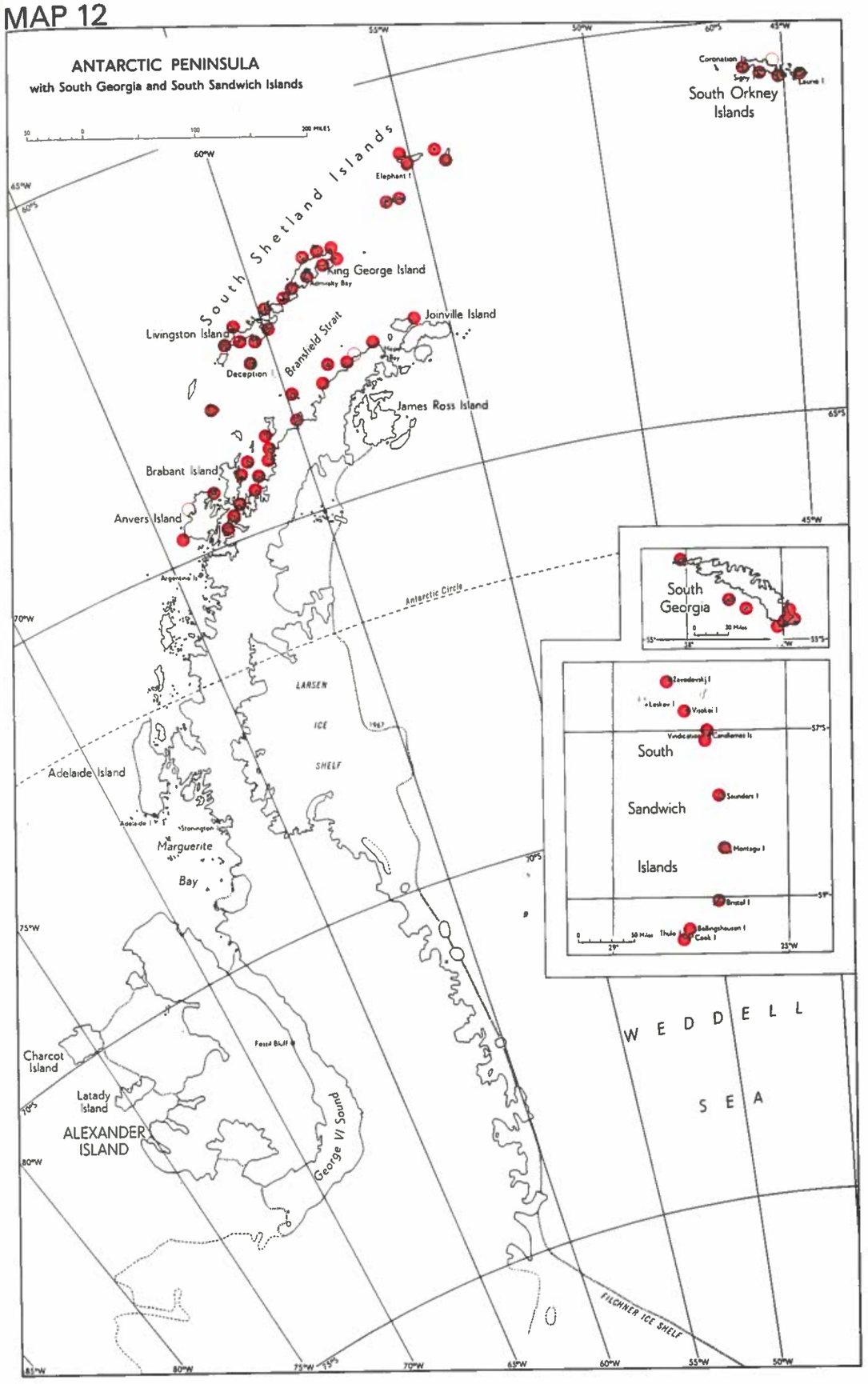
Holdgate and Baker (1979) noted colonies at (a) Finger Point (*c.* 5 000 pairs in March 1964), (b) Irving Point, (c) Mikhaylov Point (2 000 adults).

206 ZAVODOVSKI ISLAND

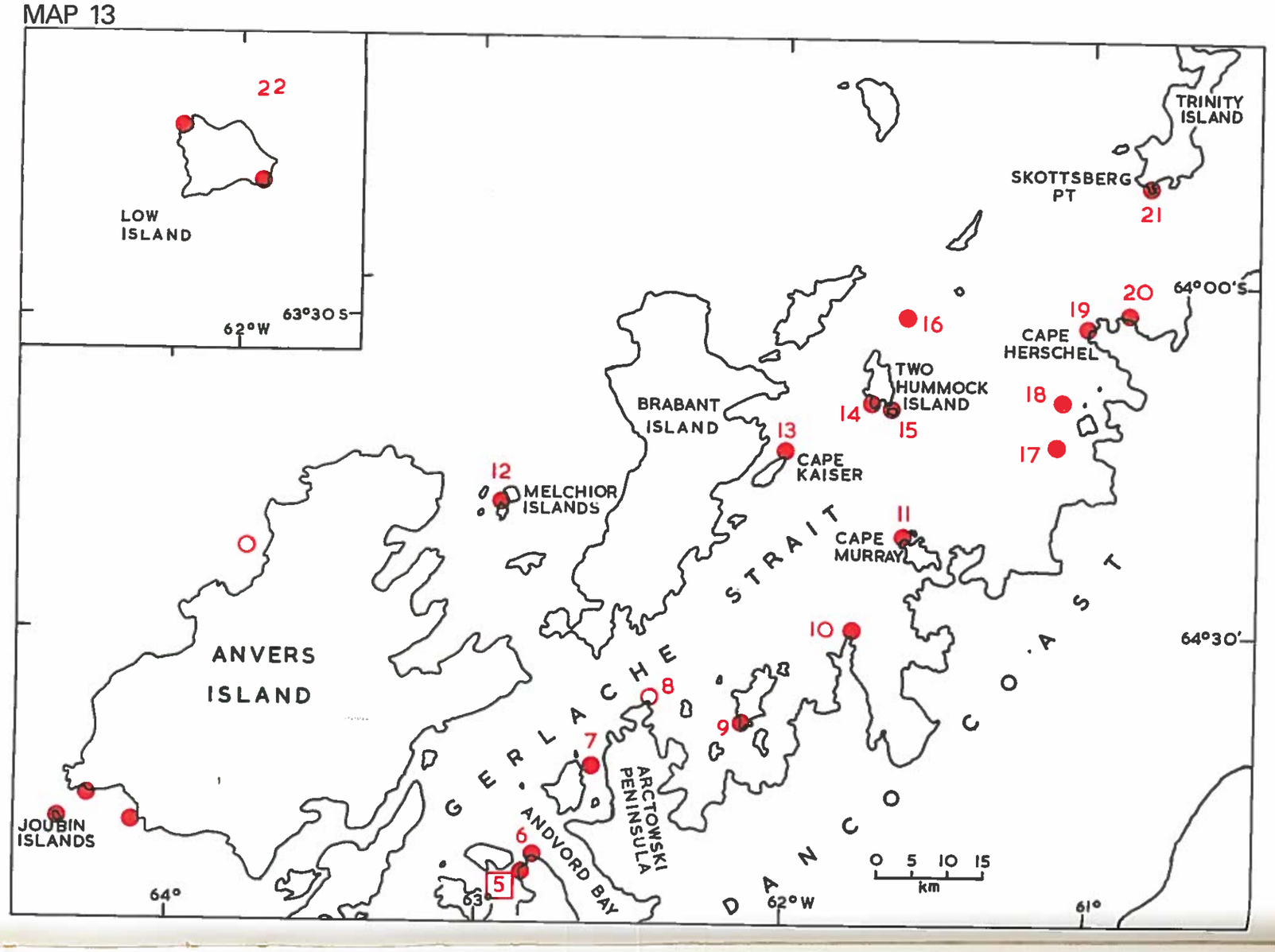
MAP 22.9

Holdgate and Baker (1979) recorded large colonies on the north slopes and near the south platform and also on flanks of the cove above Noxious Bluff.

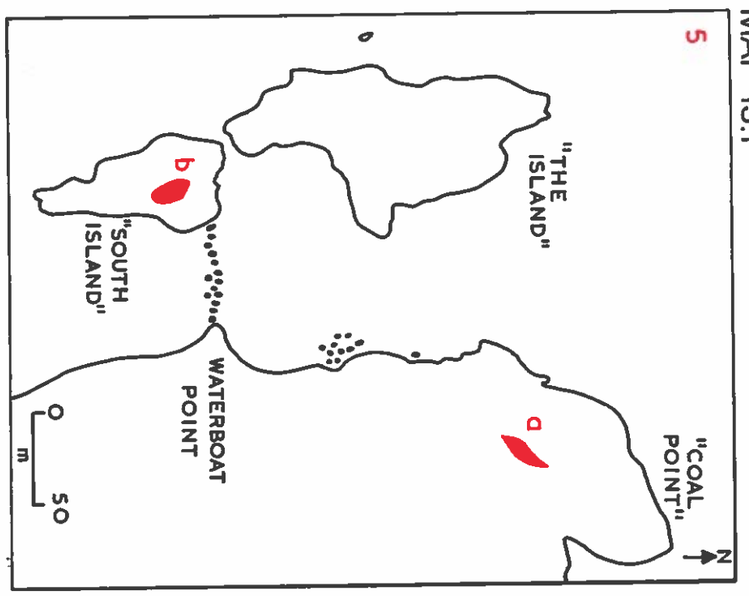
MAP 12

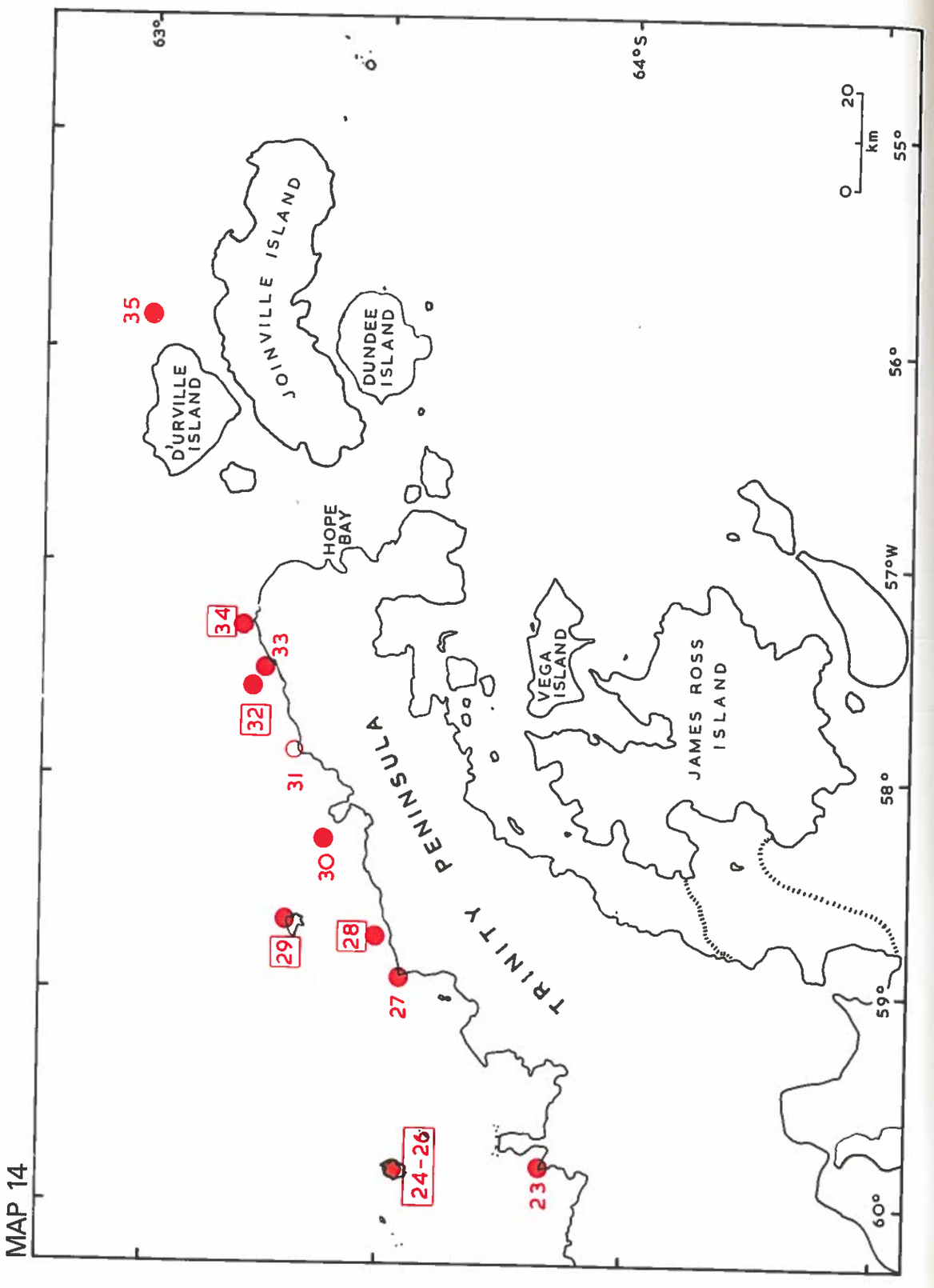


MAP 13



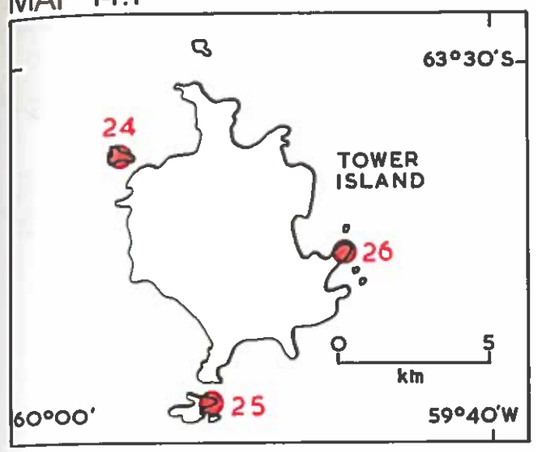
MAP 13.1



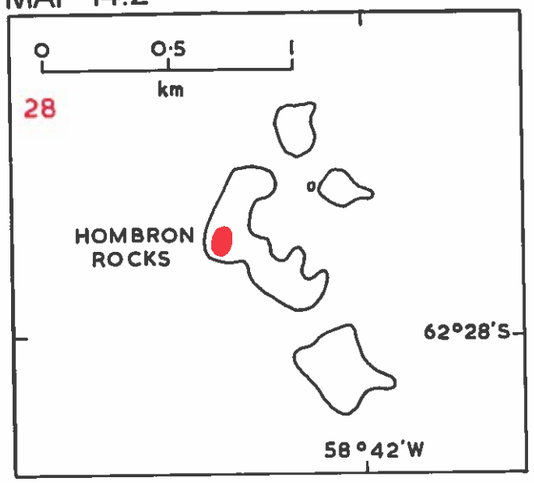


MAP 14

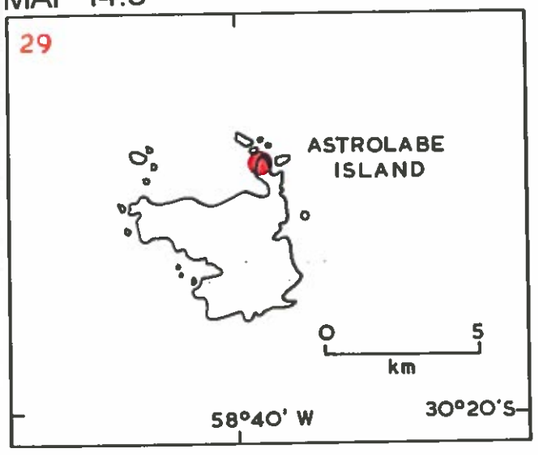
MAP 14.1



MAP 14.2



MAP 14.3



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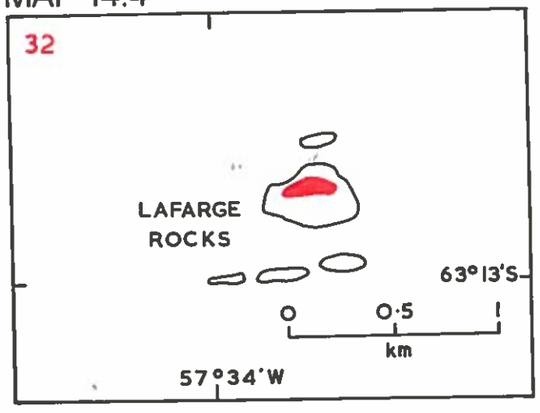
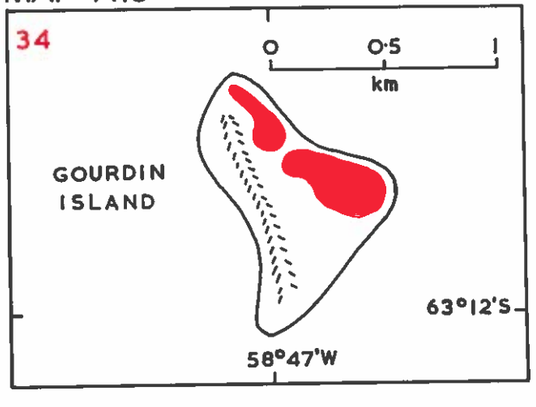
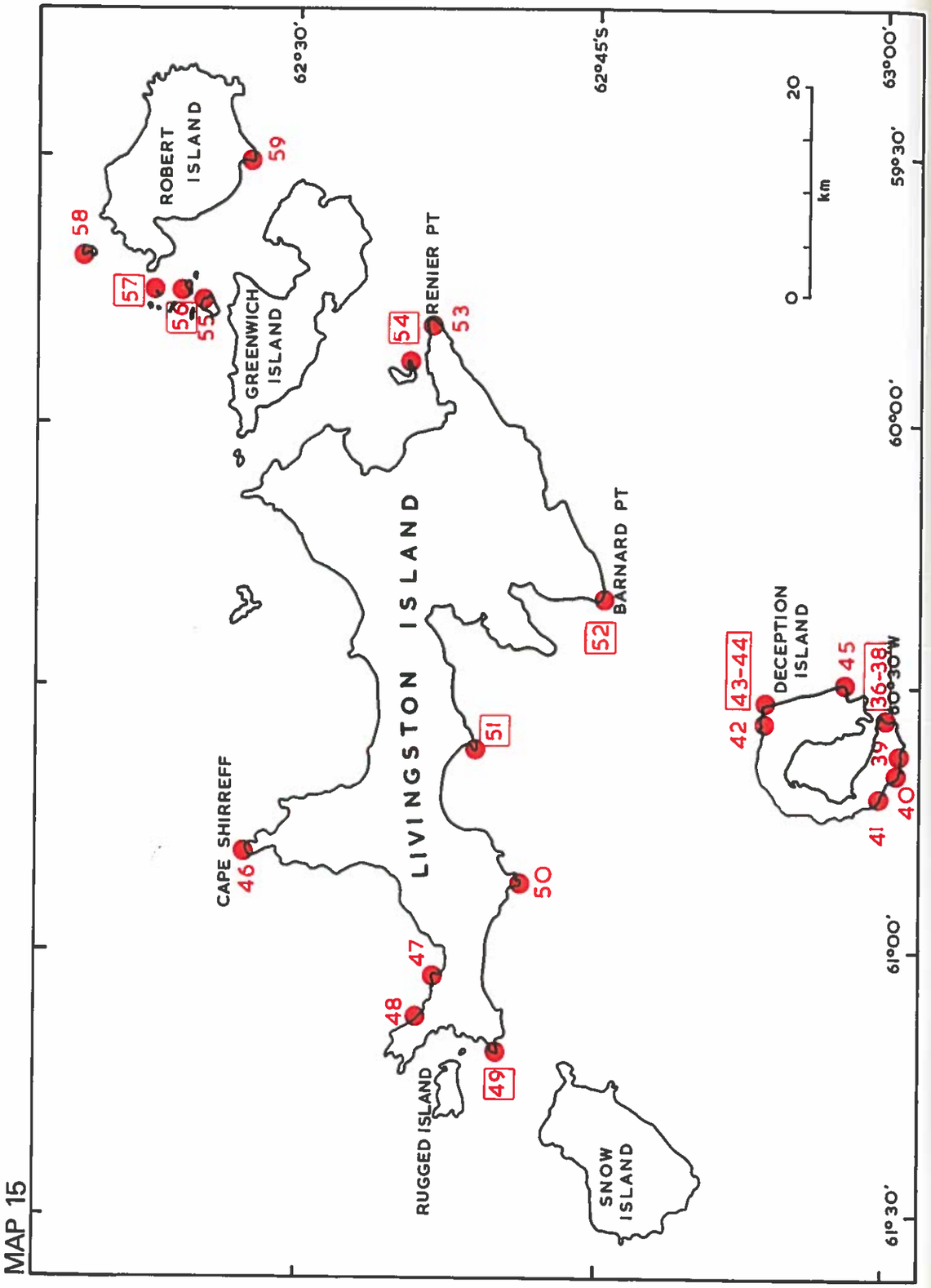


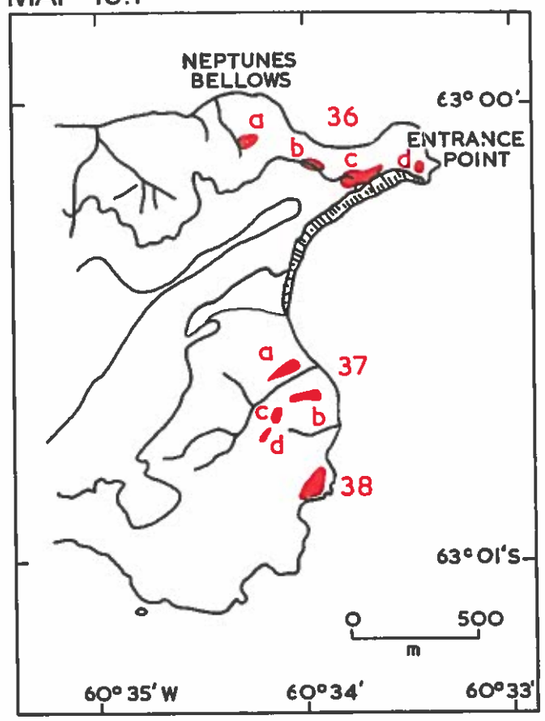
MAP 14.5



MAP 15



MAP 15.1



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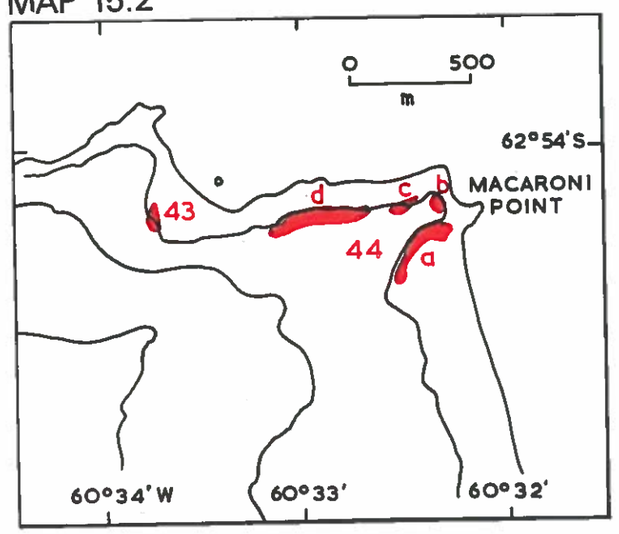

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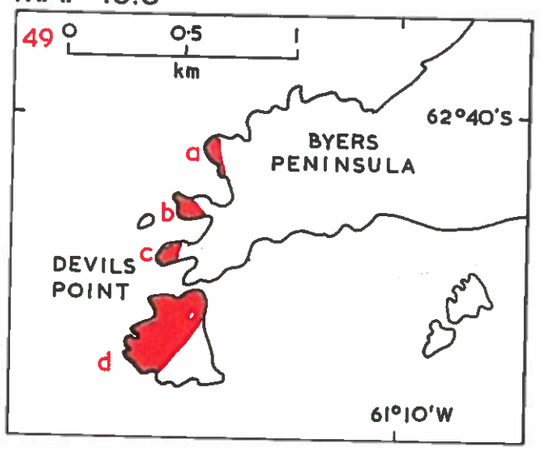

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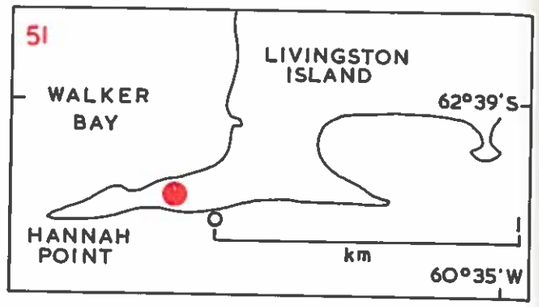
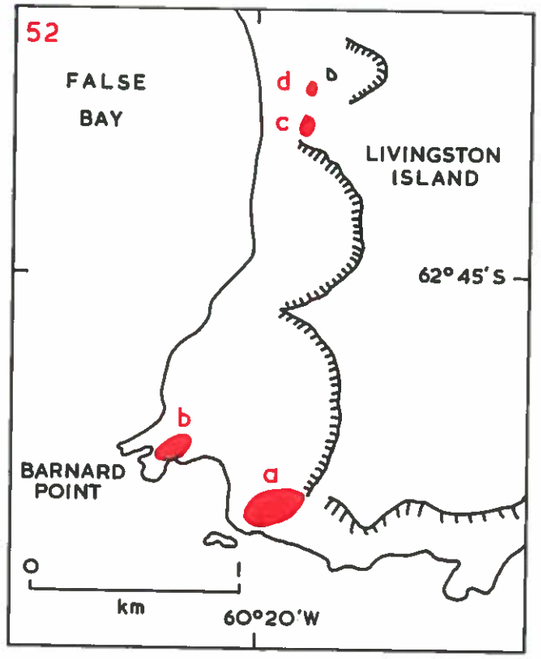
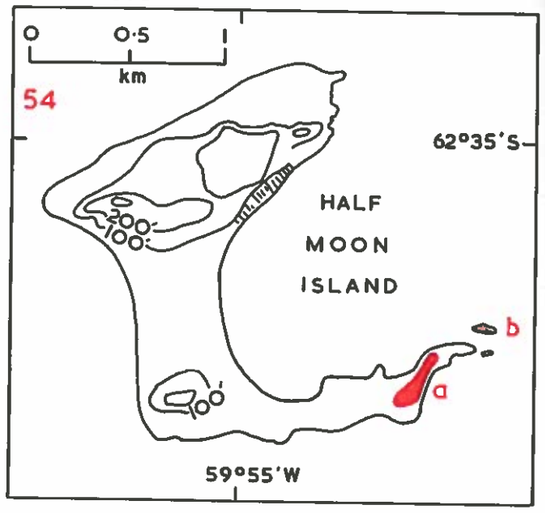


MAP 15.5



MAP 15.6



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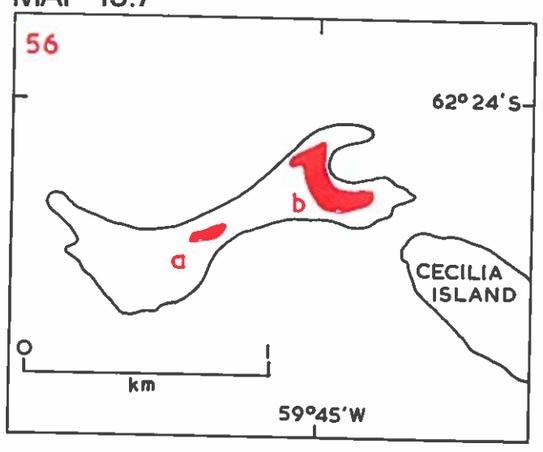

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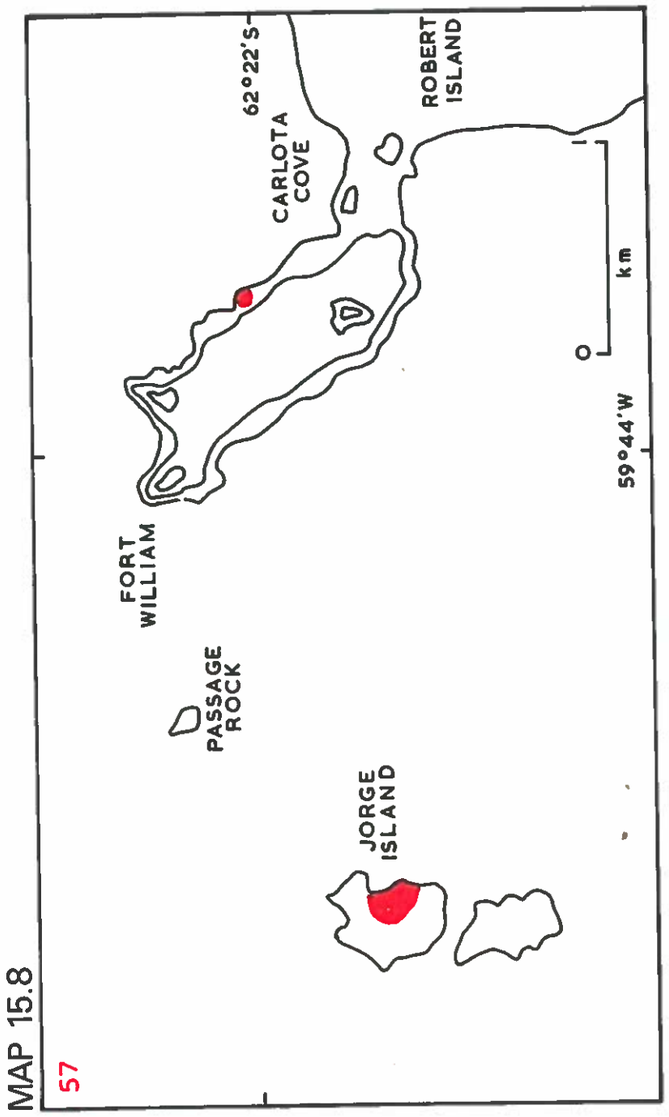
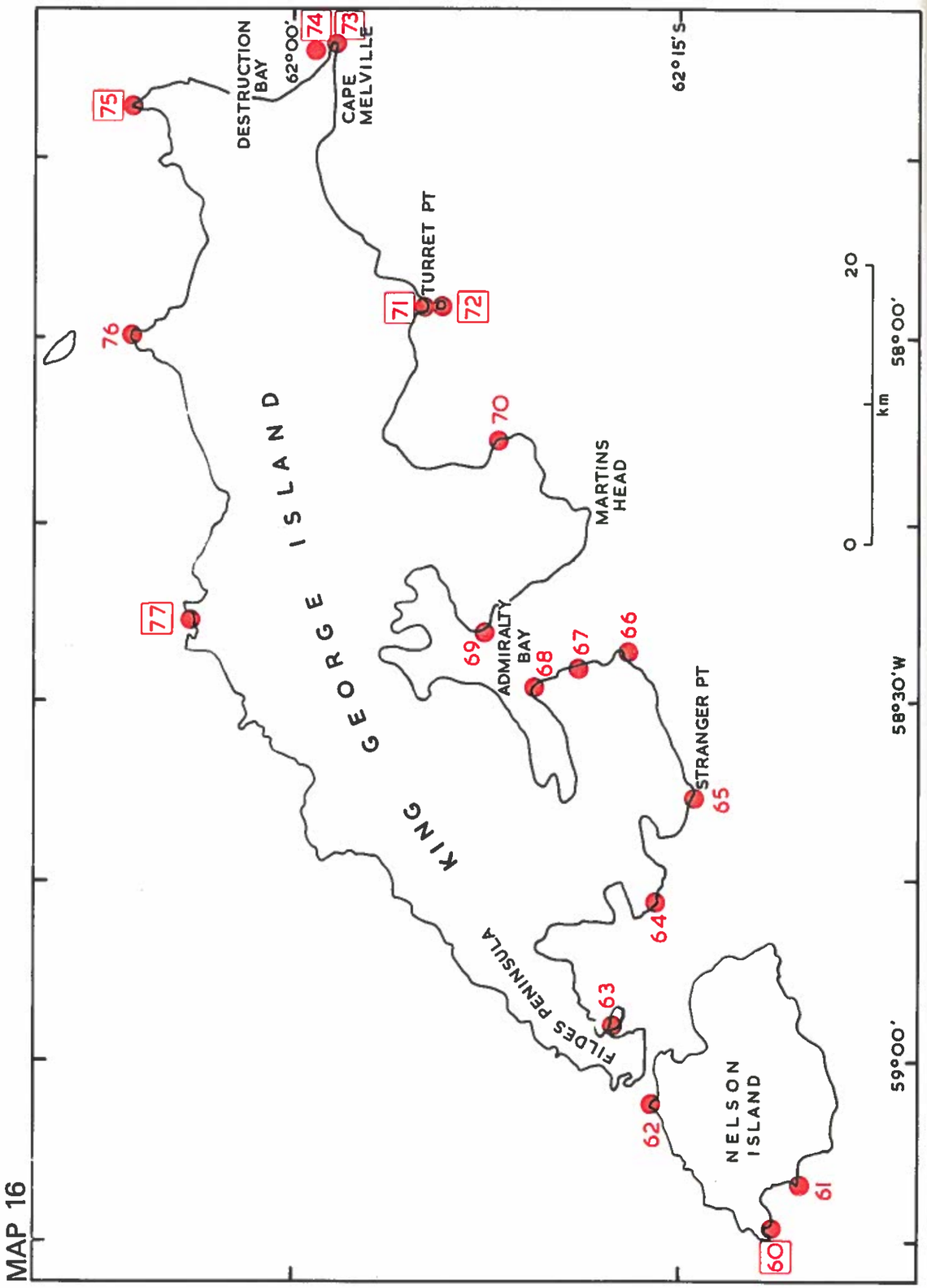
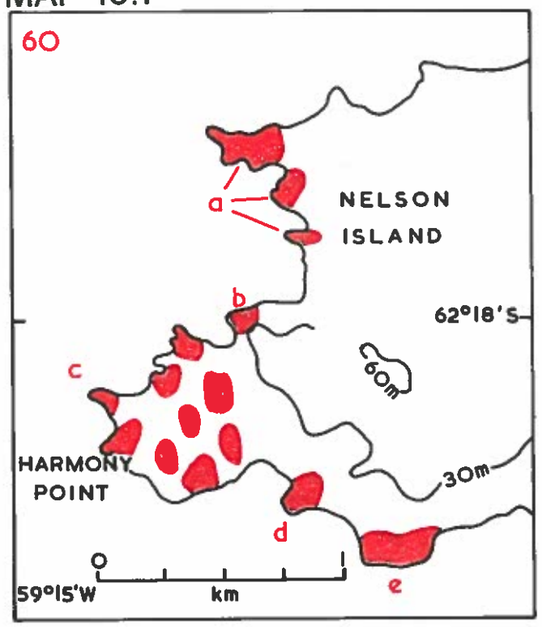




MAP 16

MAP 16.1



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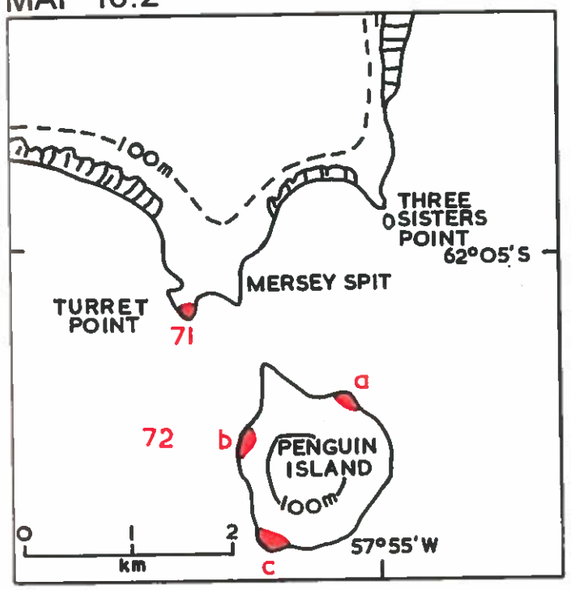

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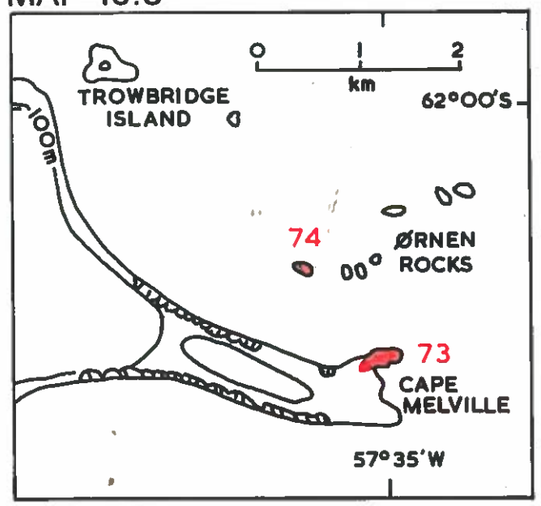

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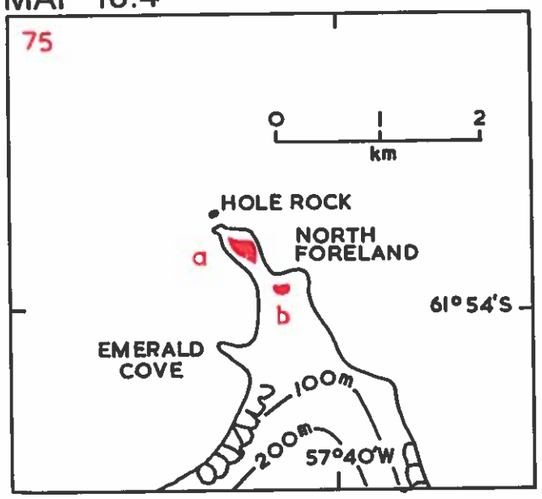

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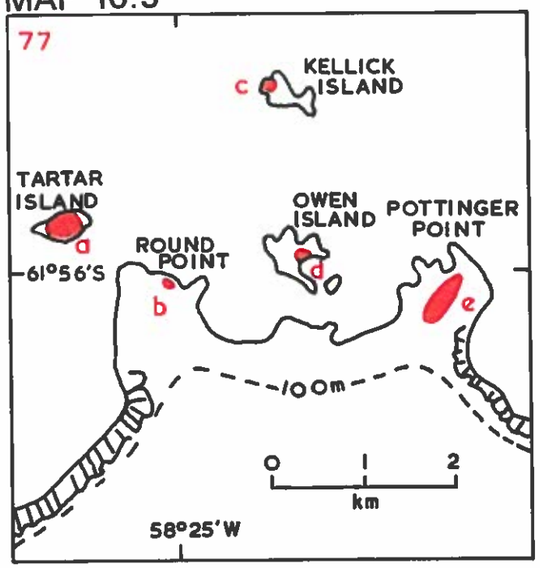
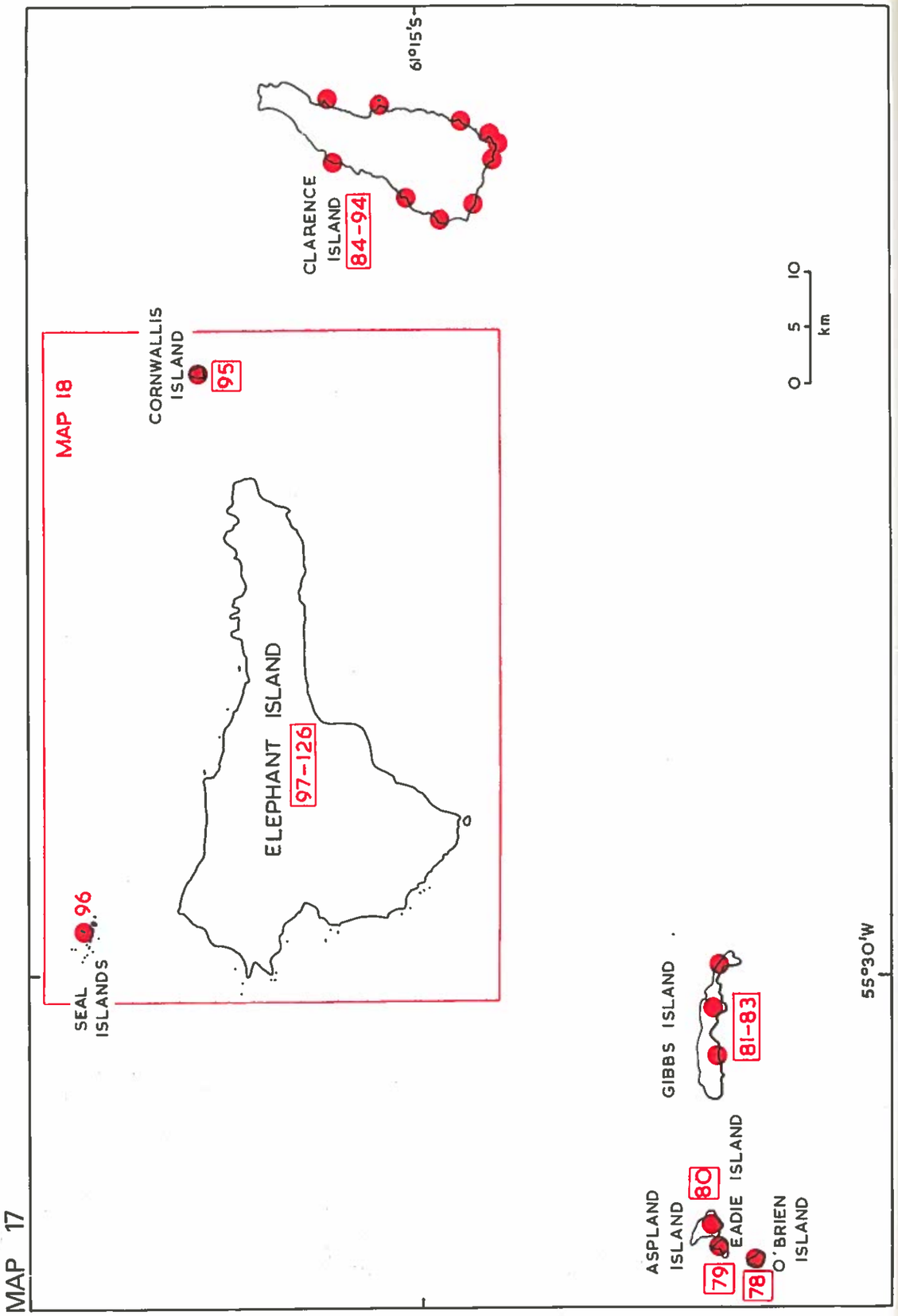
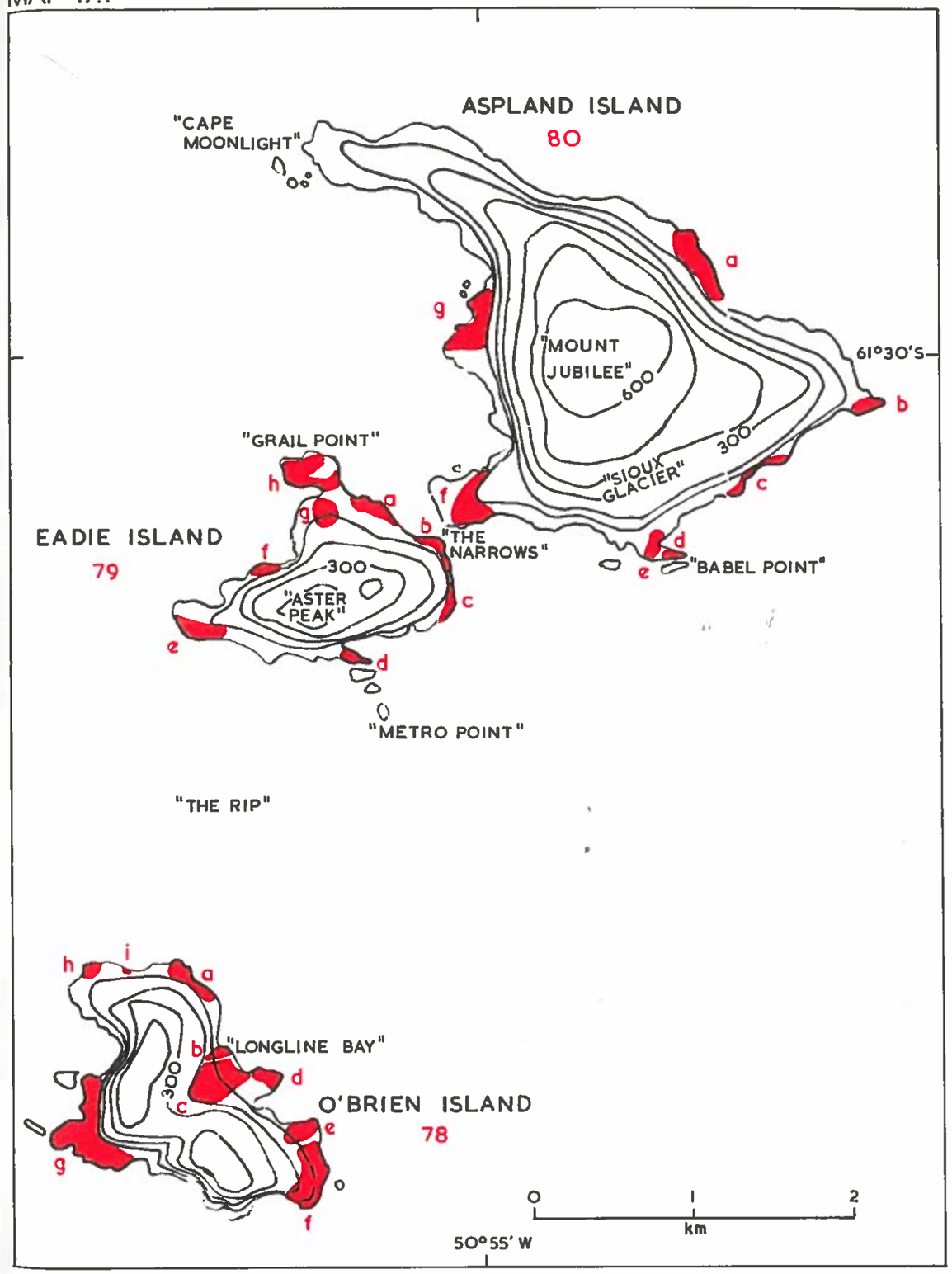
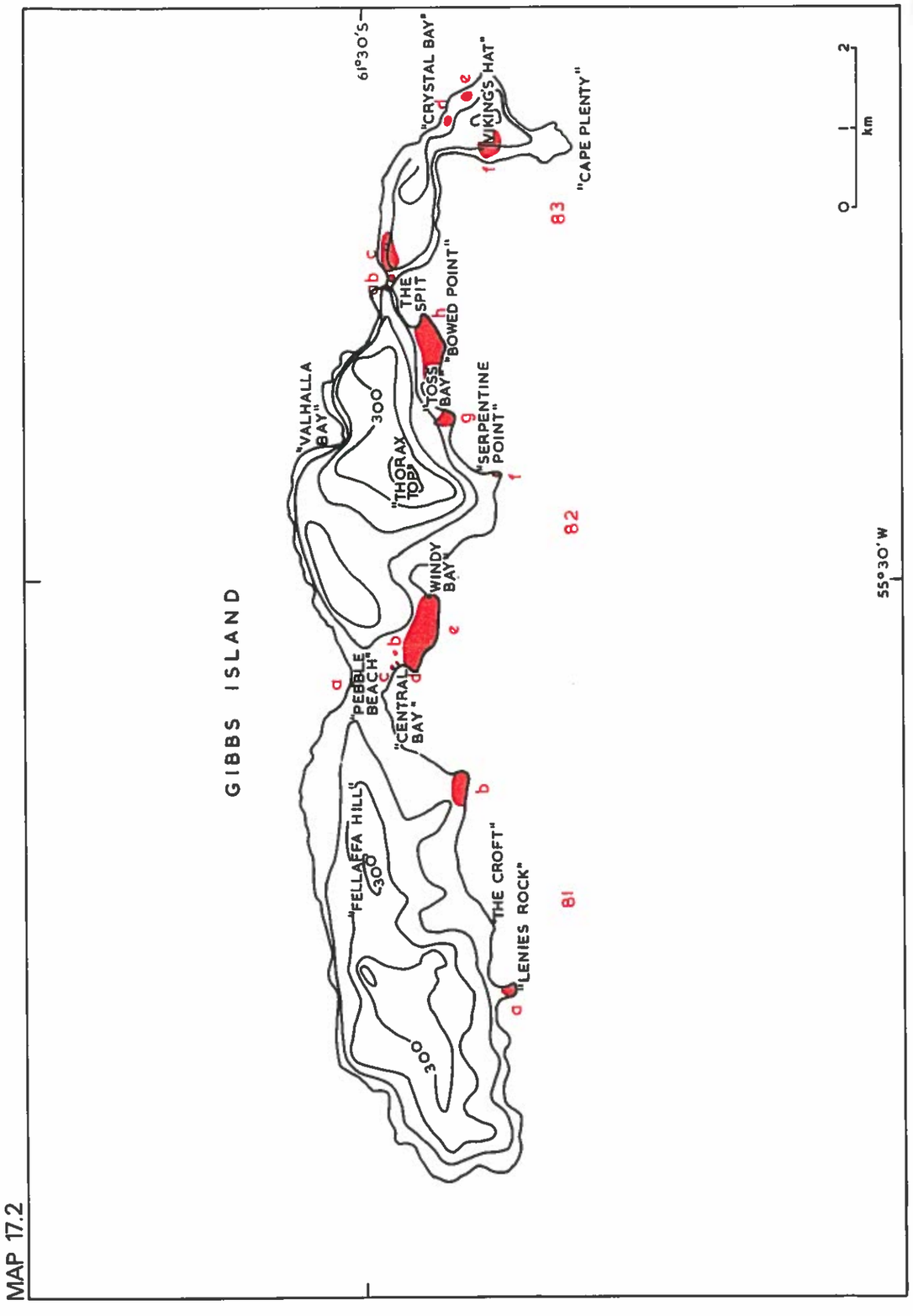



MAP 17
MAP 18
61°15'S
CLARENCE ISLAND
84-94
CORNWALLIS ISLAND
95
ELEPHANT ISLAND
97-126
SEAL ISLANDS
96
GIBBS ISLAND
81-83
ASPLAND ISLAND
80
EADIE ISLAND
79
O'BRIEN ISLAND
78
55°30'W
0
5
10
km

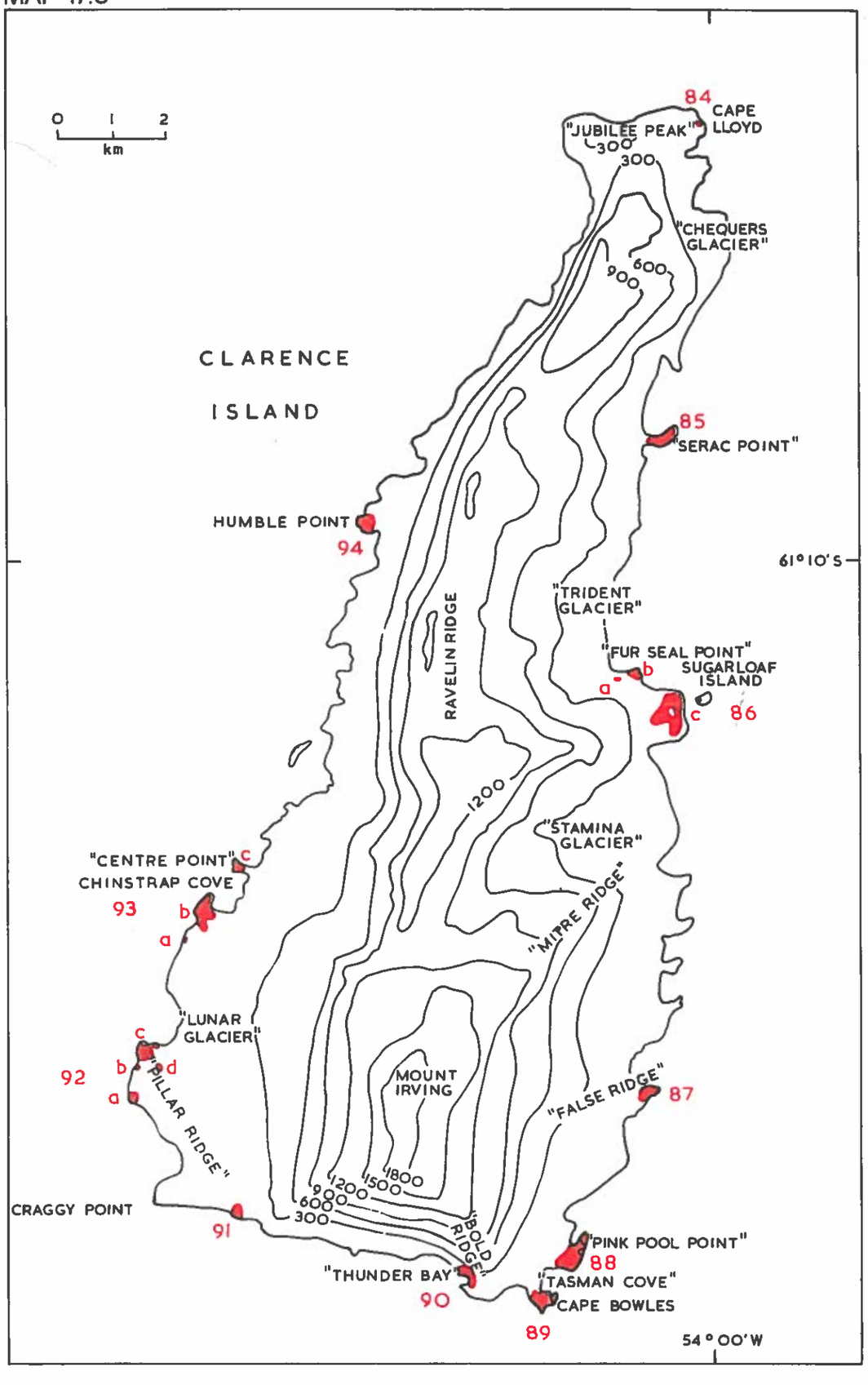
MAP 17.1


ASPLAND ISLAND
80
"CAPE MOONLIGHT"
"MOUNT JUBILEE"
600
300
61°30'S
"SIOUX GLACIER"
"GRAIL POINT"
"THE NARROWS"
"BABEL POINT"
EADIE ISLAND
79
"ASTER PEAK"
"METRO POINT"
"THE RIP"
"LONGLINE BAY"
O'BRIEN ISLAND
78
50°55'W
0
km
2



MAP 17.2

MAP 17.3



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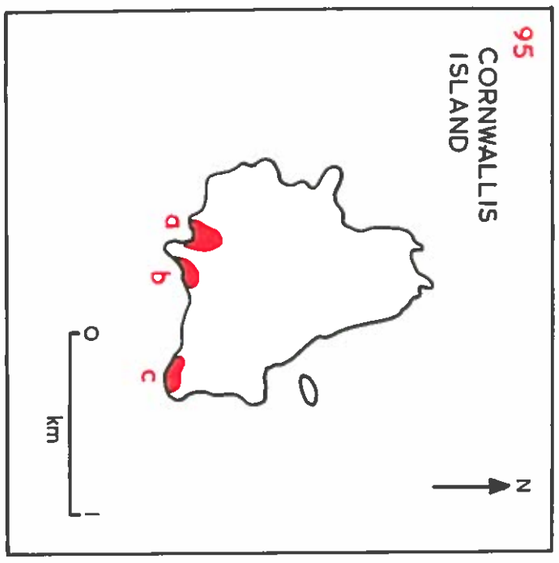
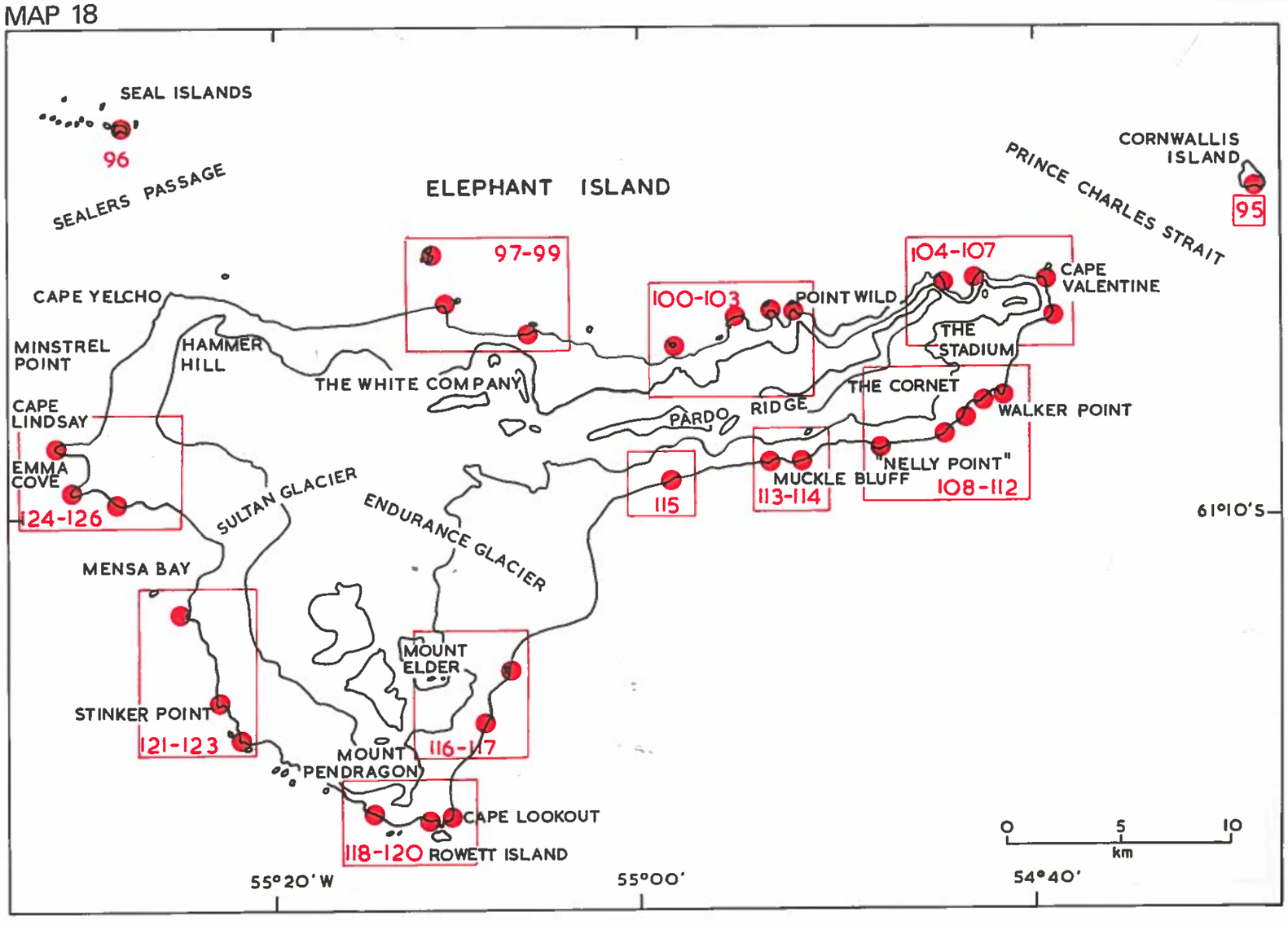
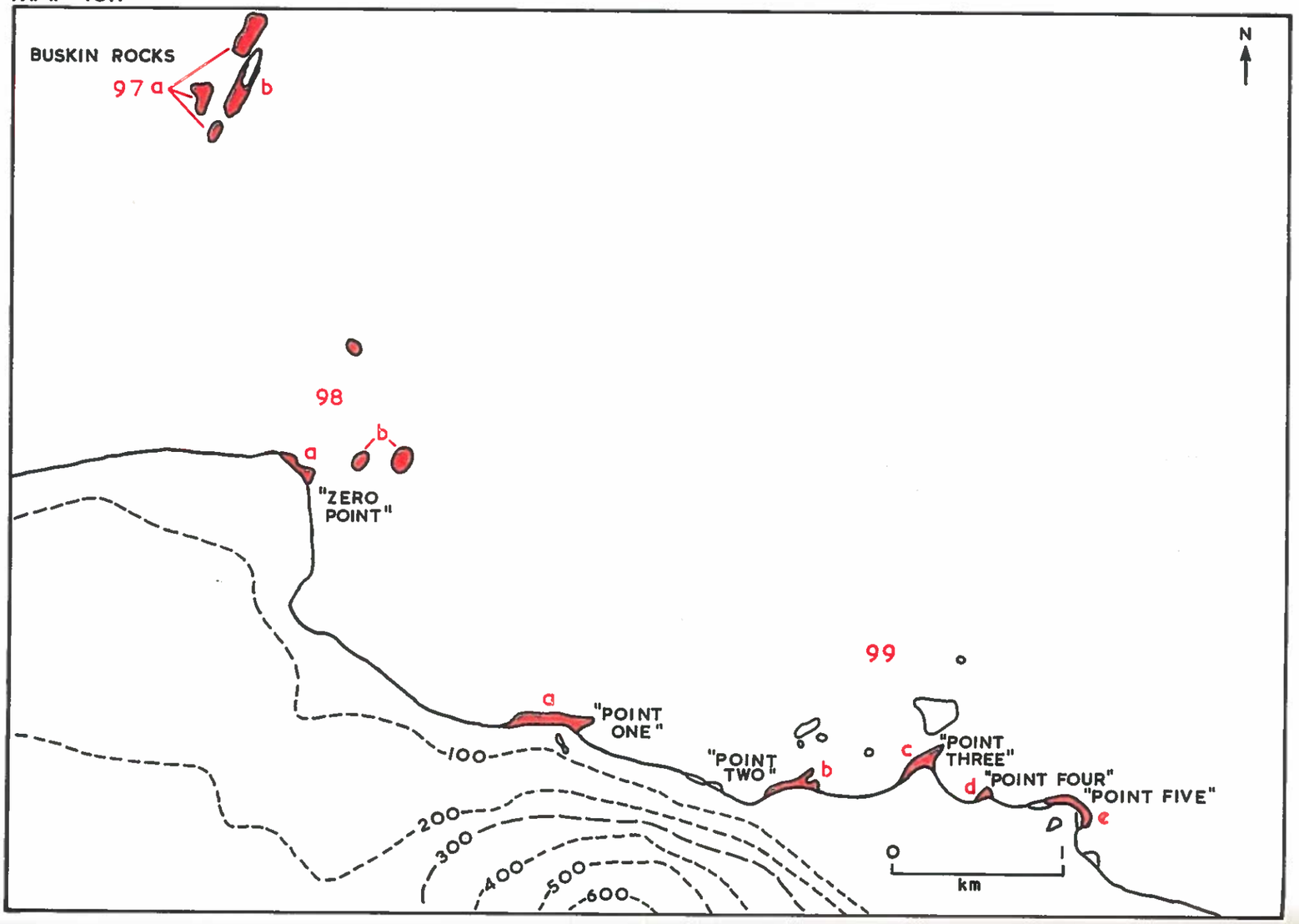


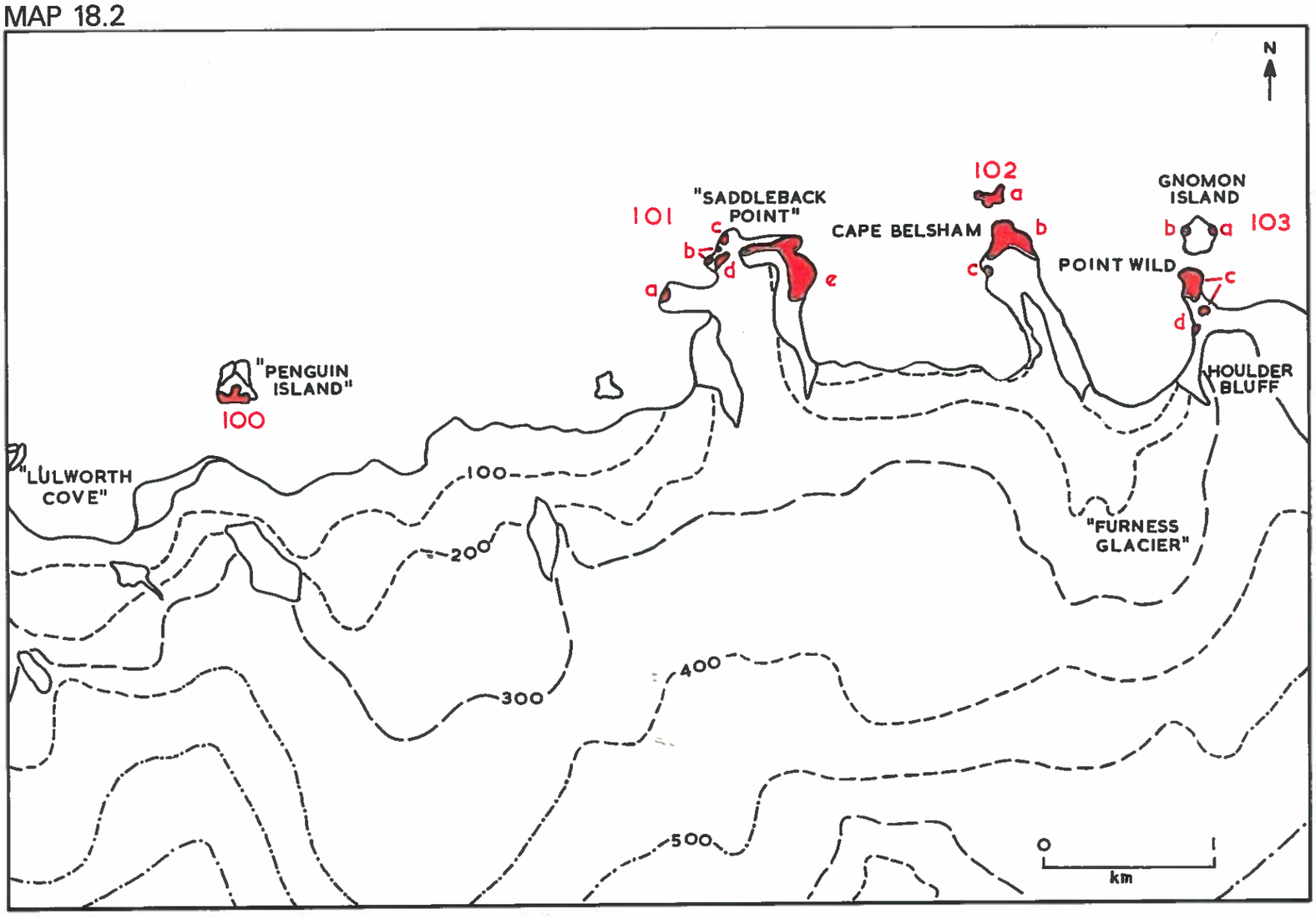
MAP 18



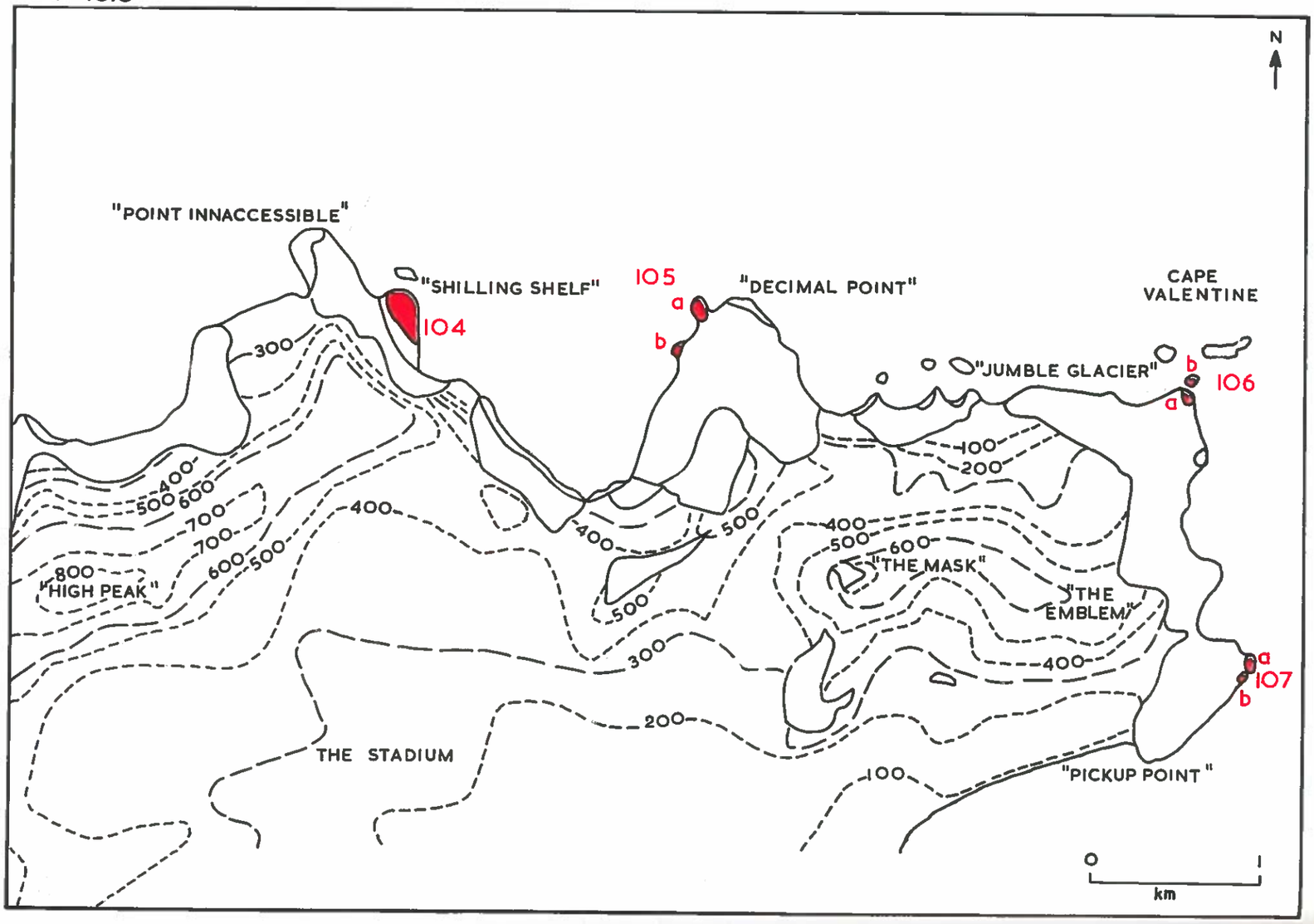
MAP 18.1



MAP 18.2



MAP 18.3



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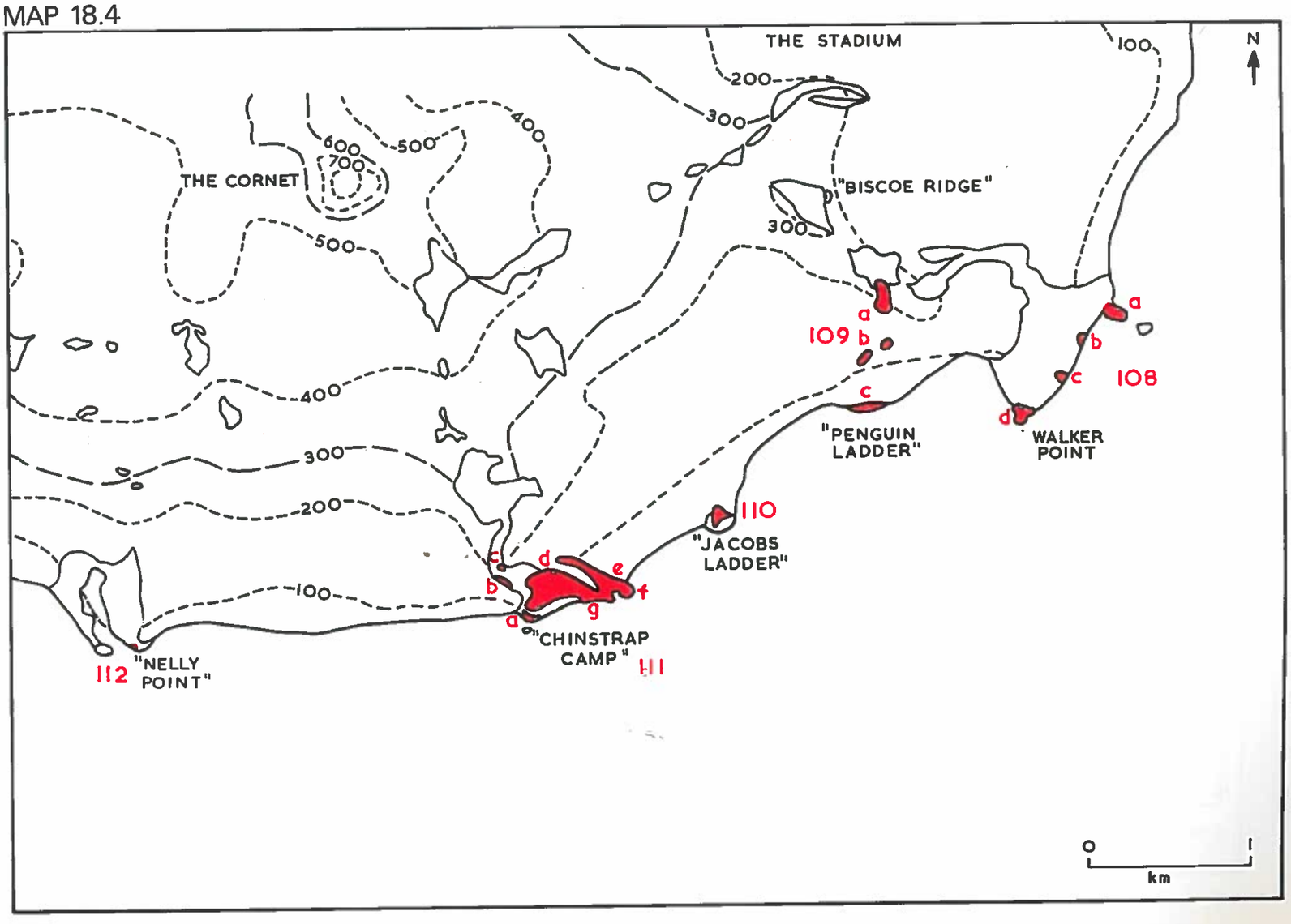
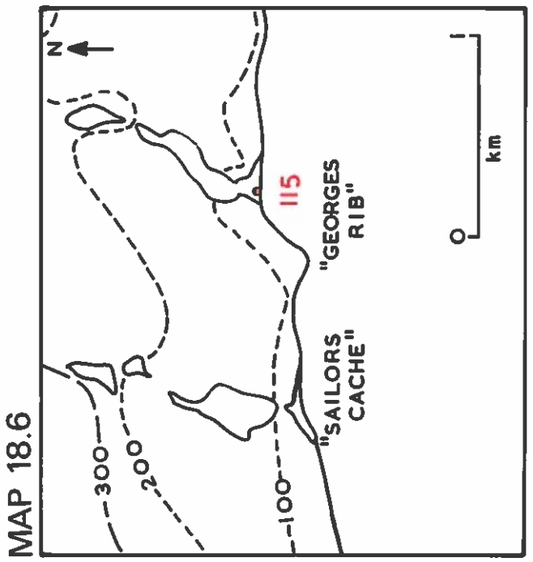
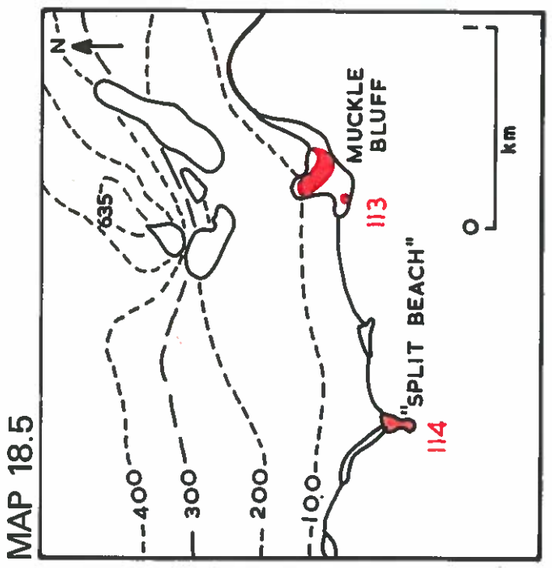


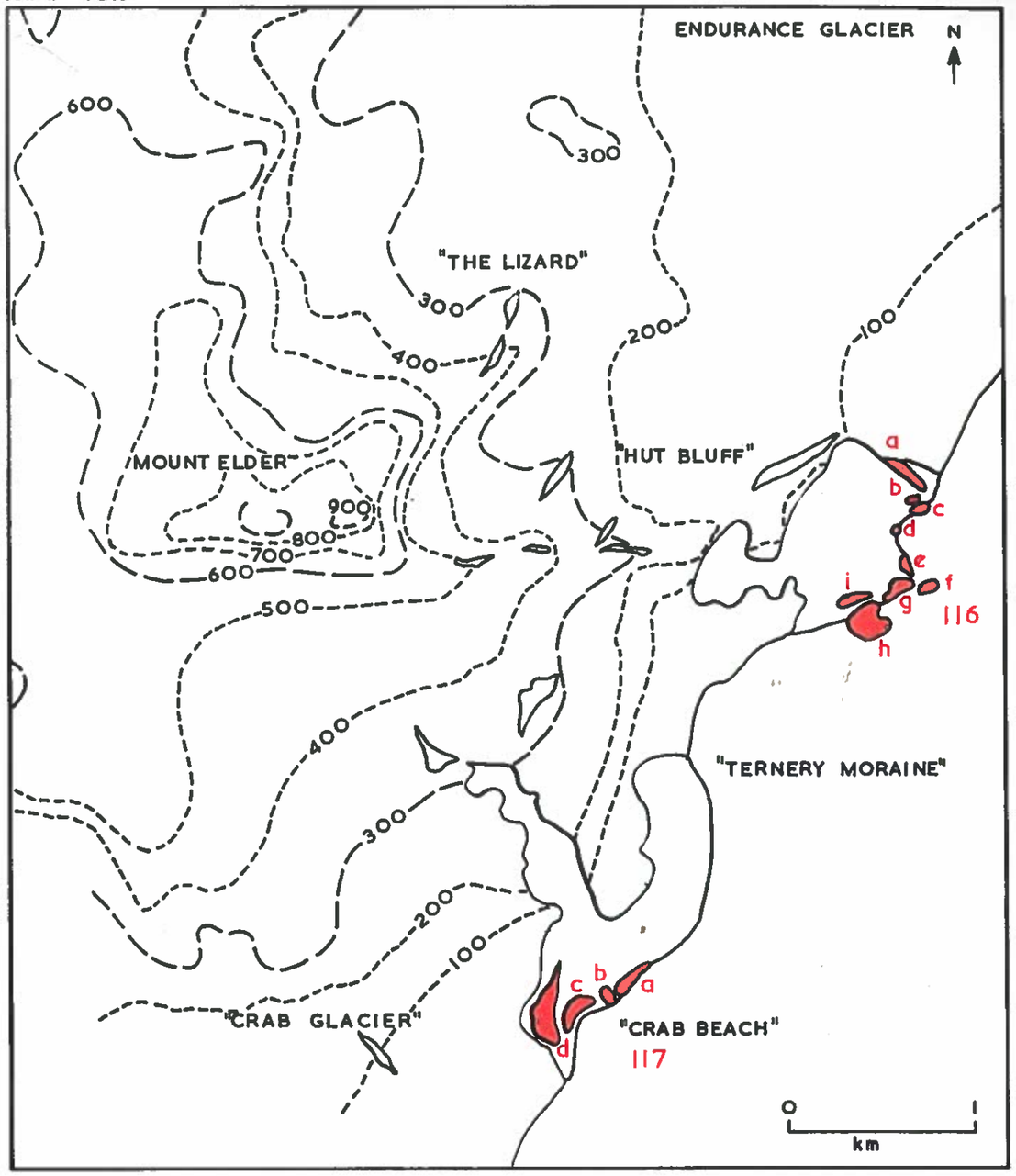
MAP 18.6

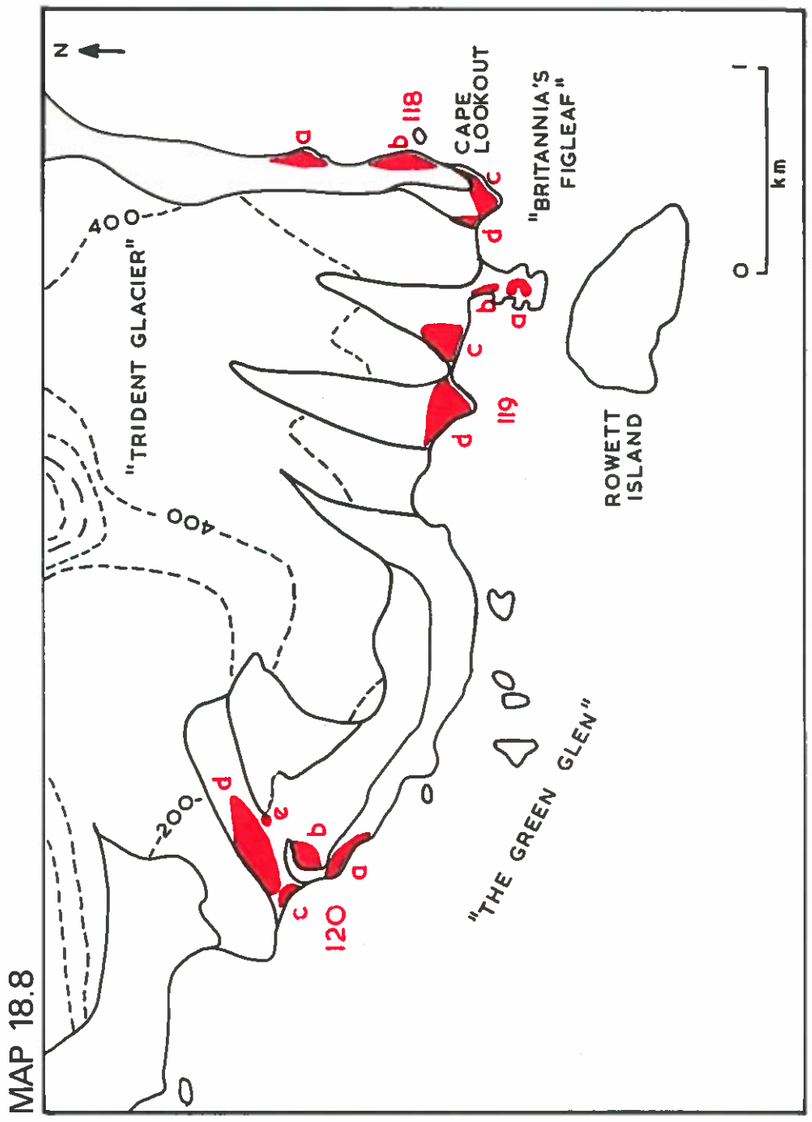


MAP 18.5



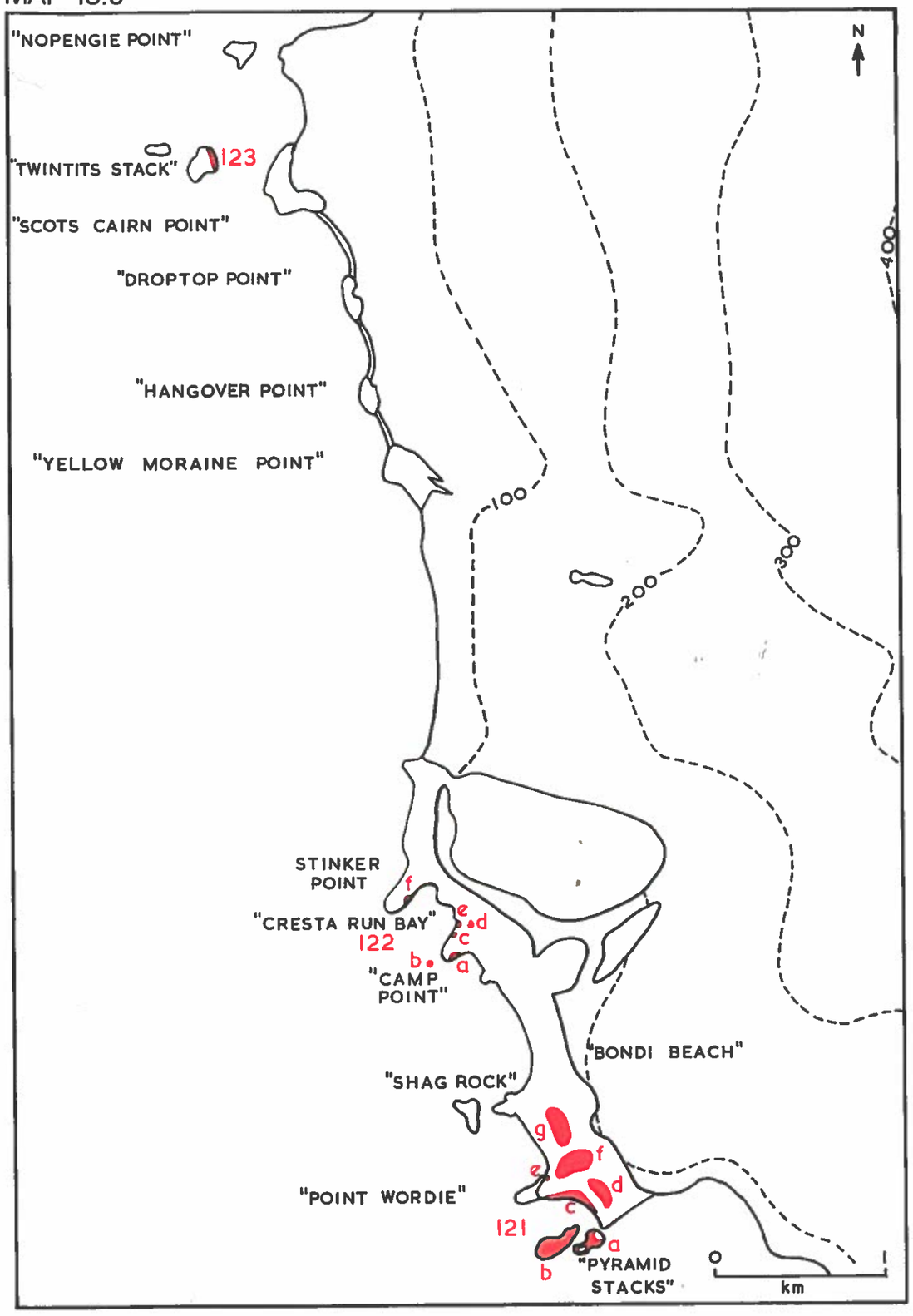
MAP 18.7



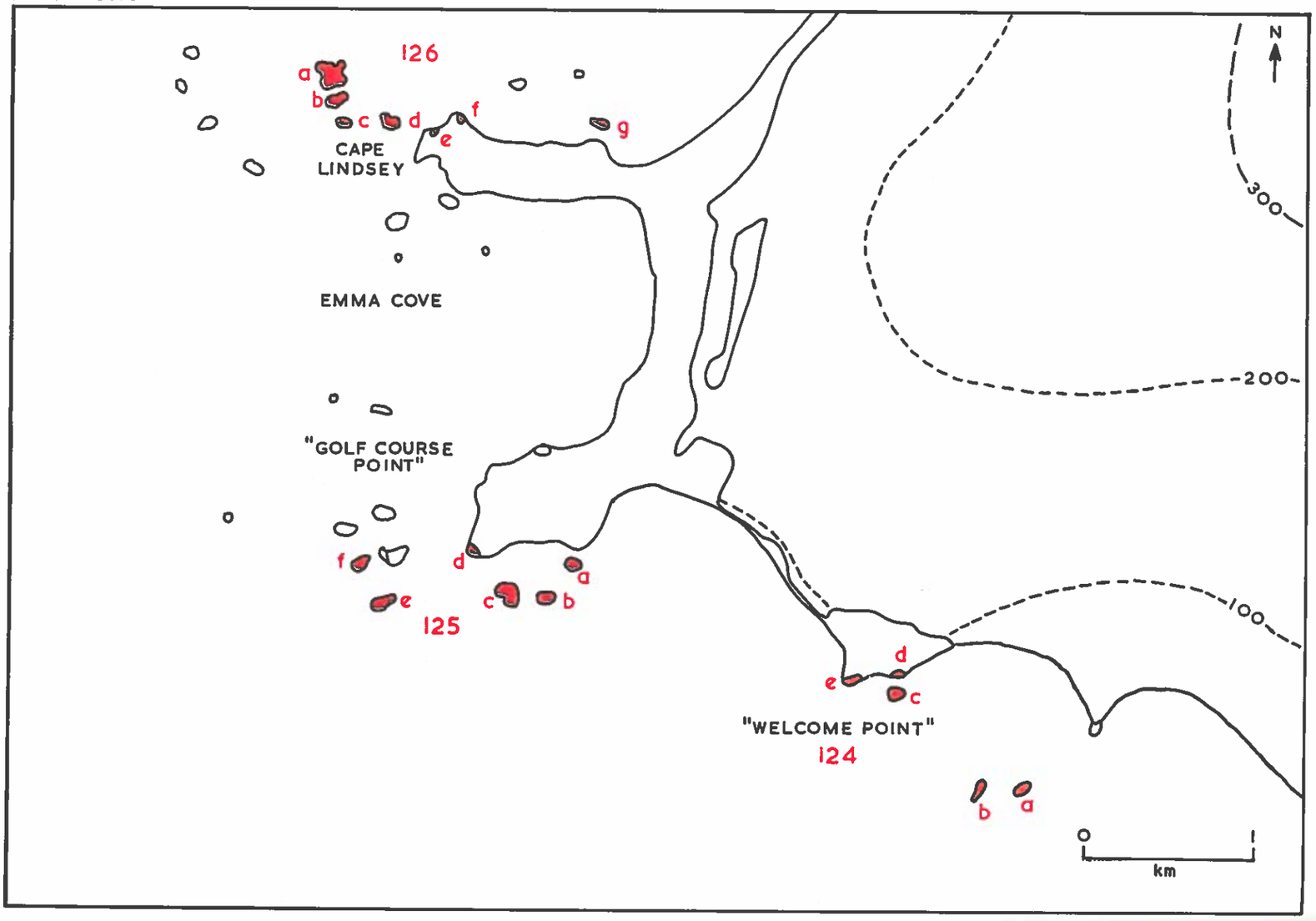


MAP 18.8

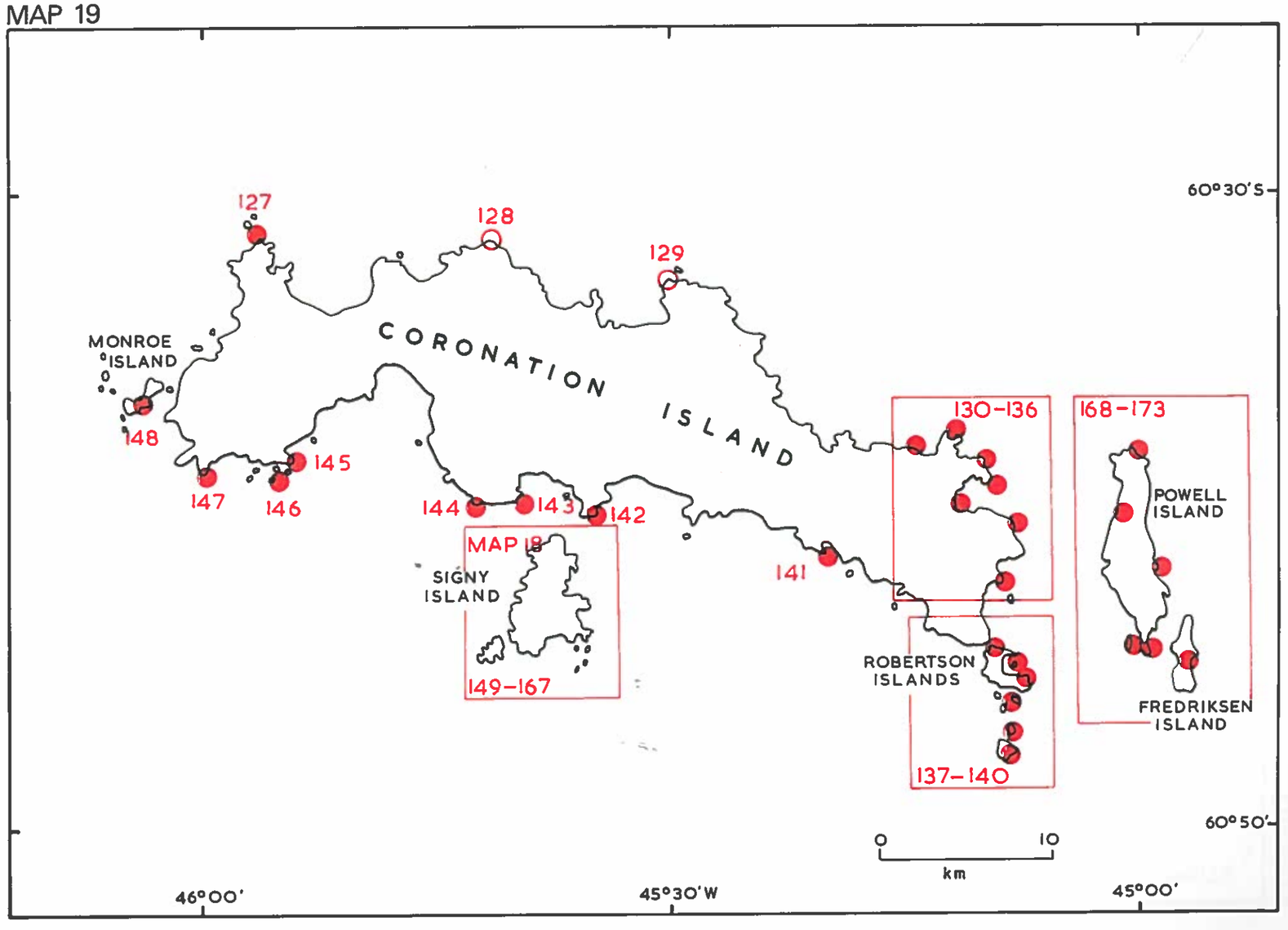
MAP 18.9



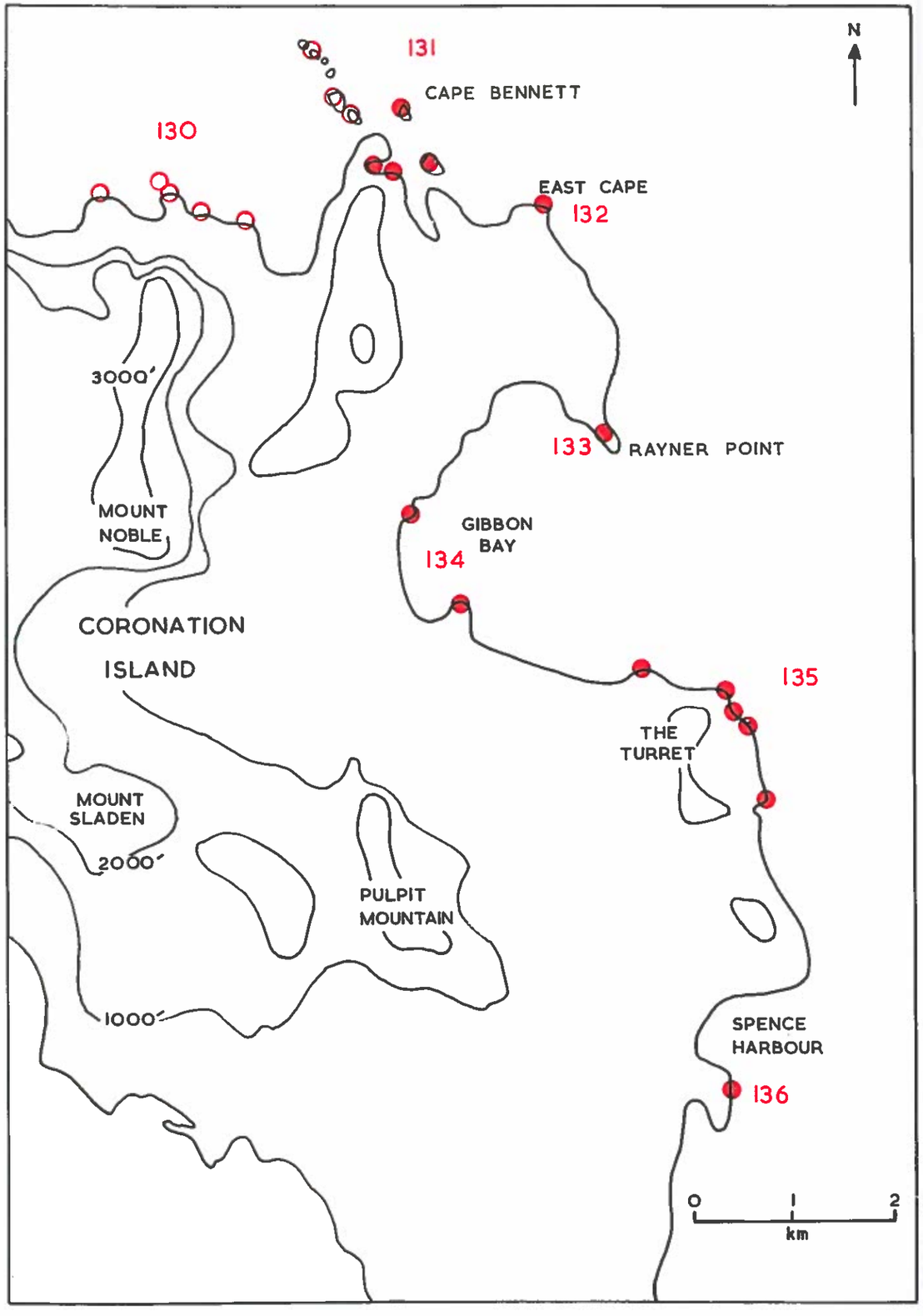
MAP 18.10



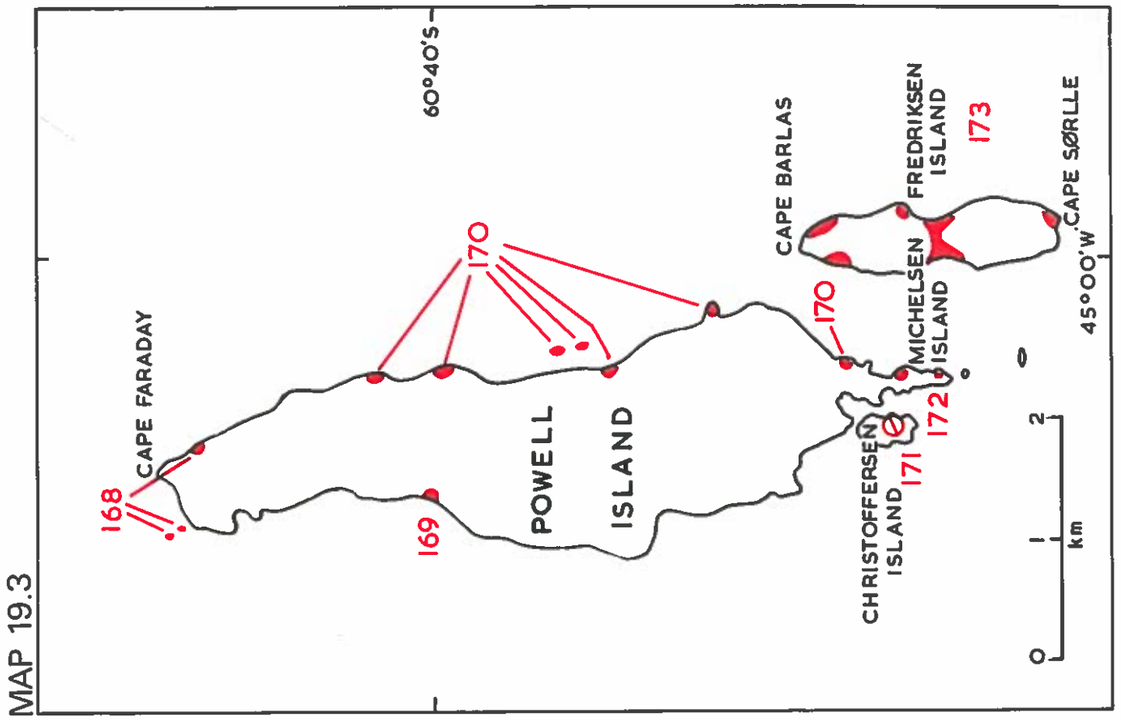
MAP 19



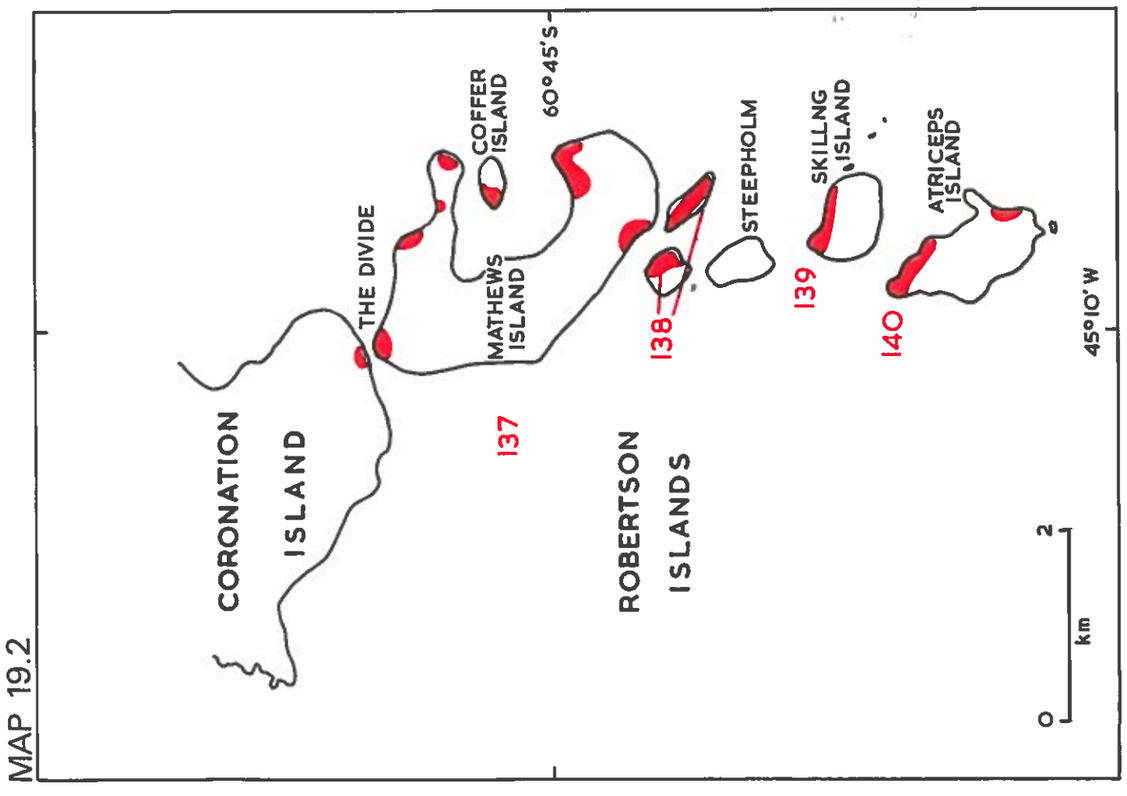
MAP 19.1



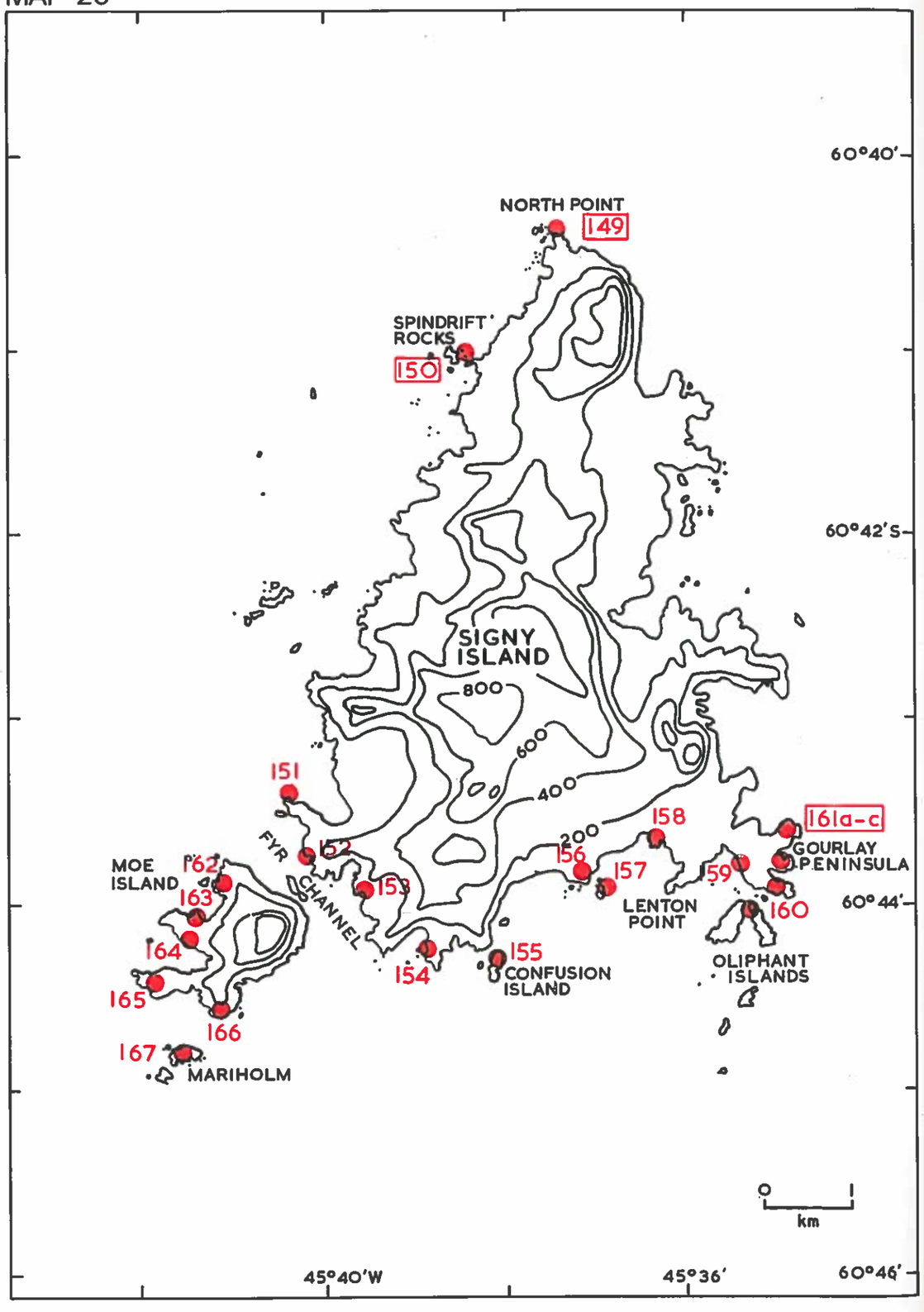
MAP 19.3



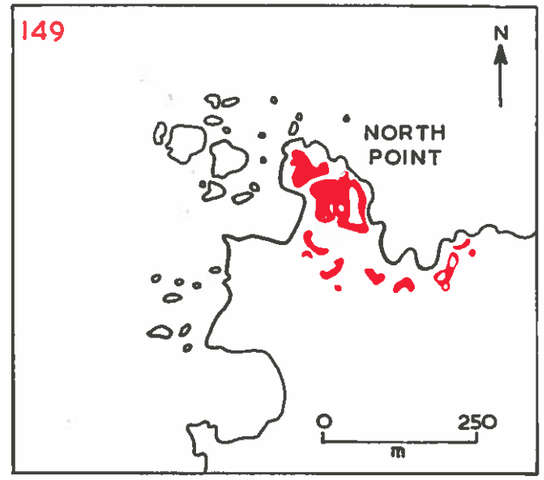
MAP 19.2



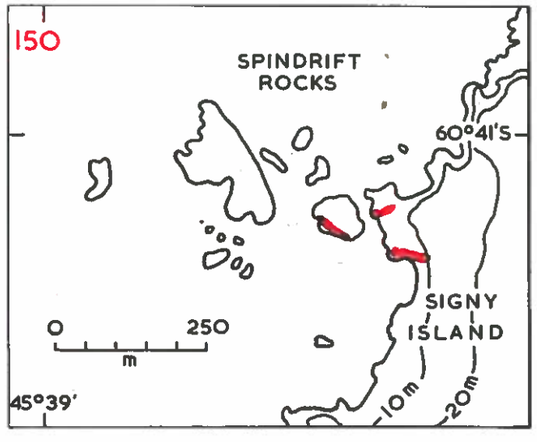
MAP 20



MAP 20.1



MAP 20.2



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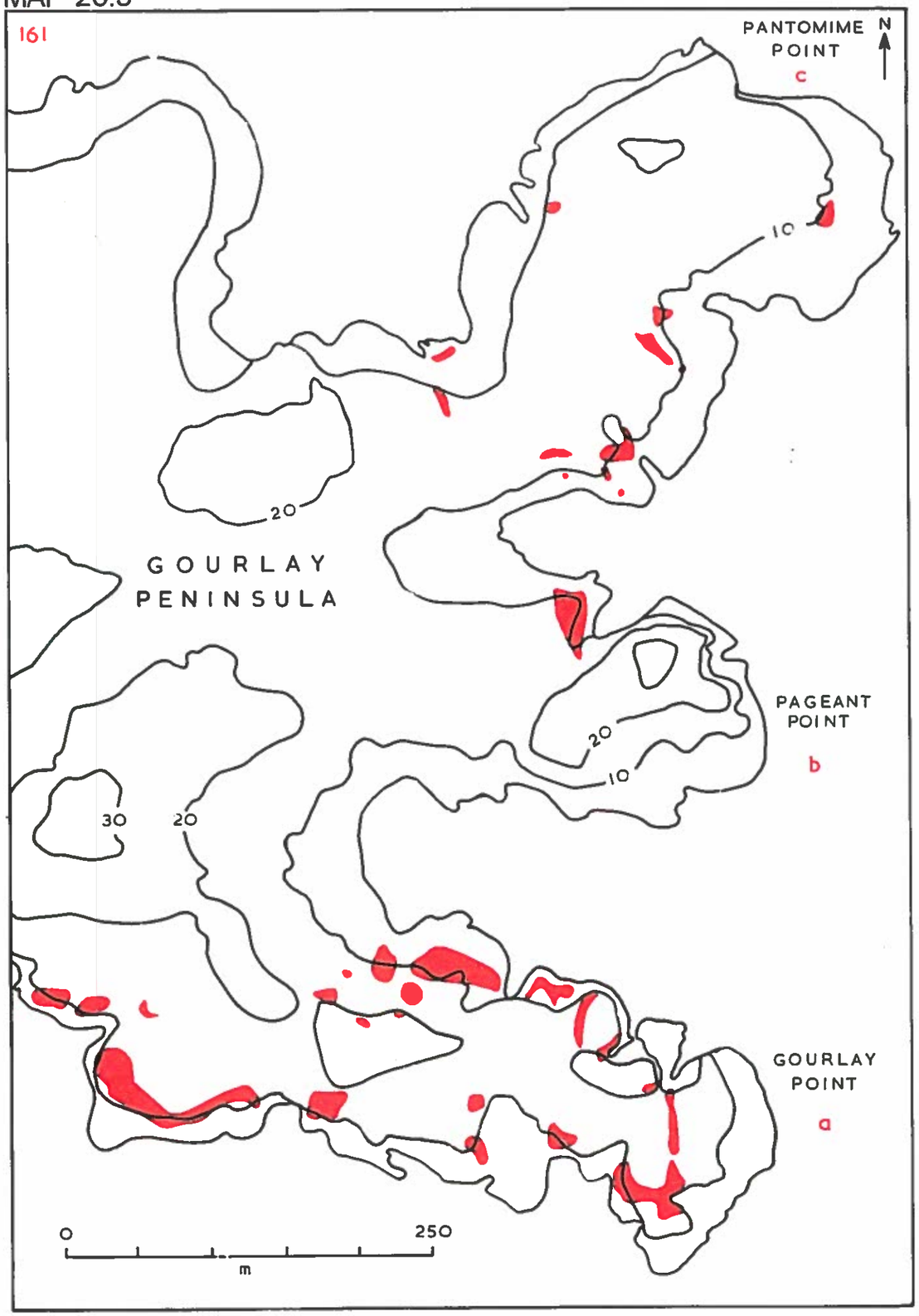
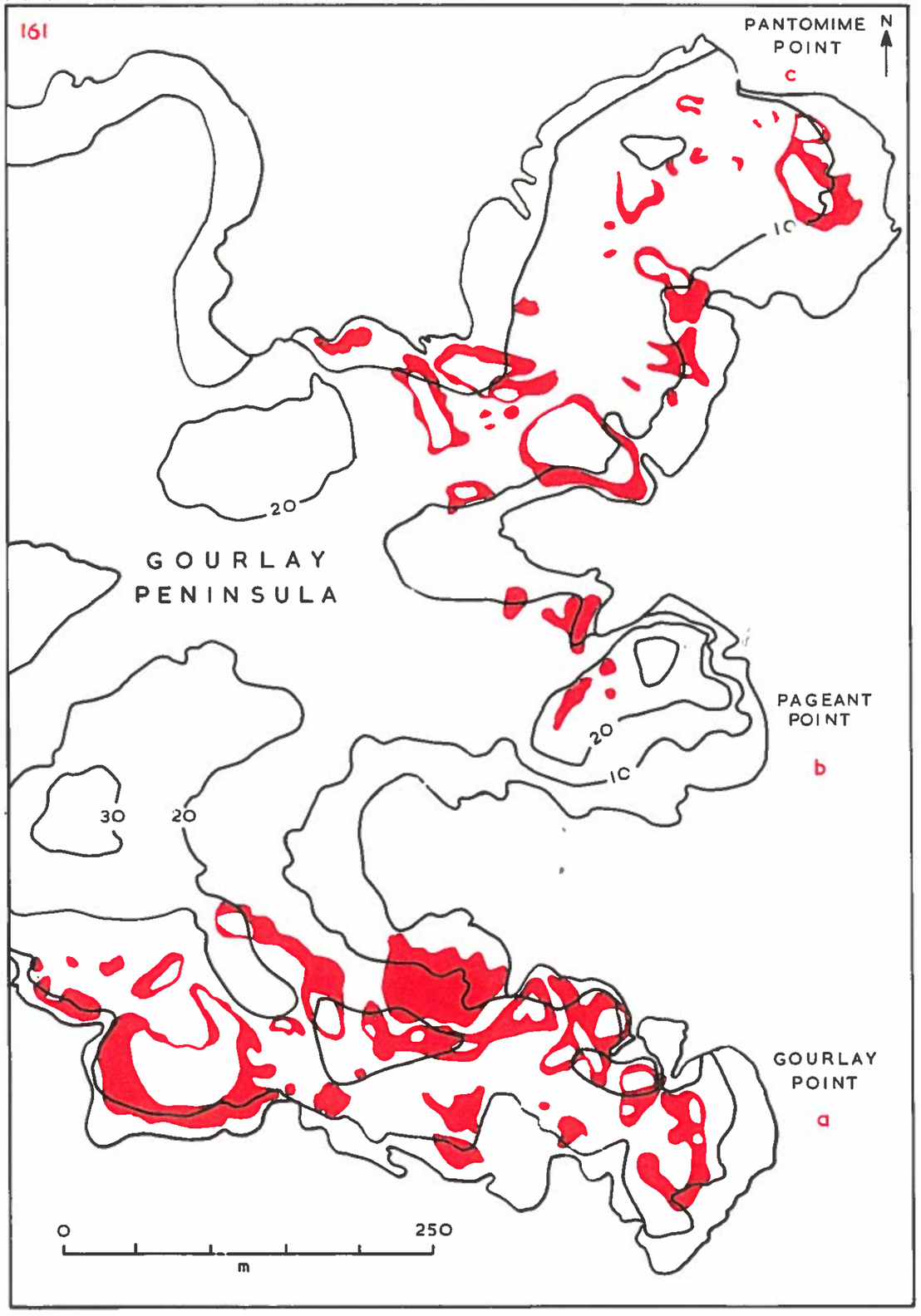
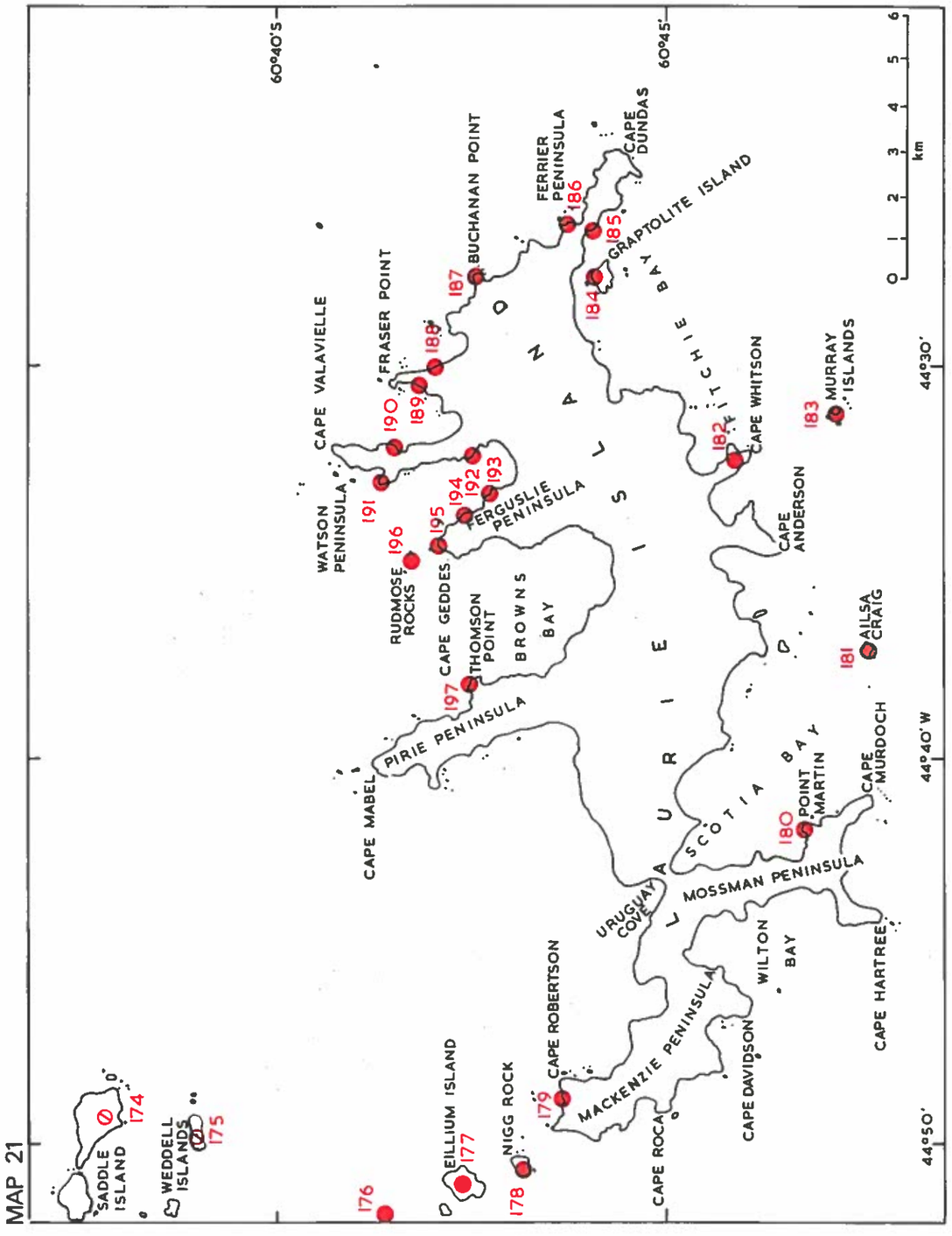


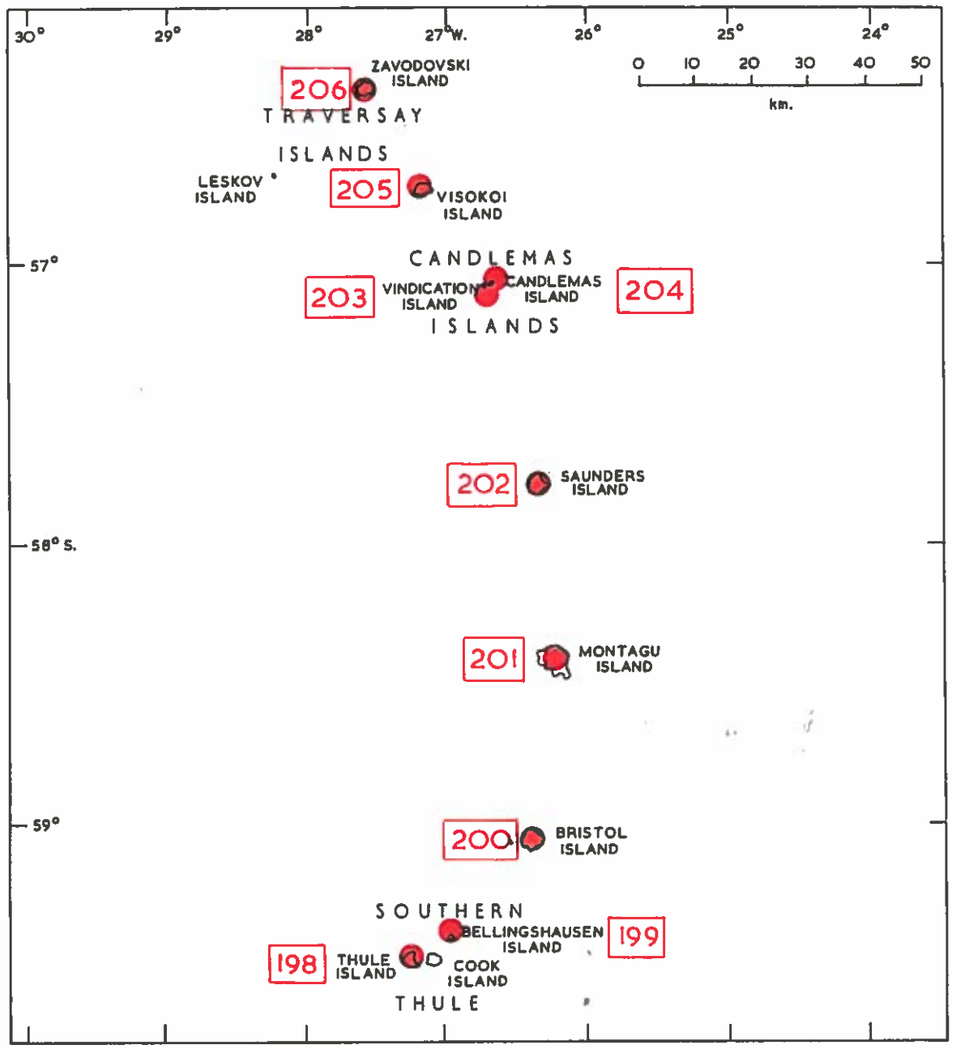
MAP 20.4



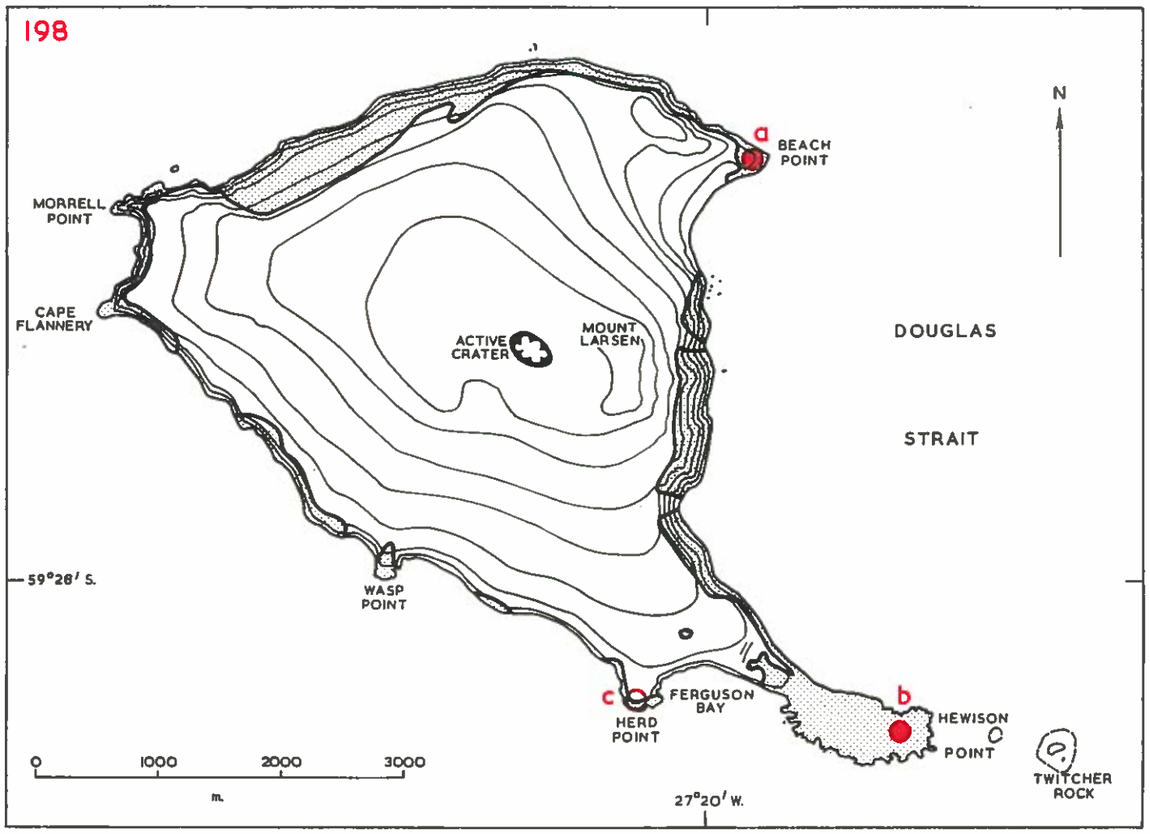


MAP 21

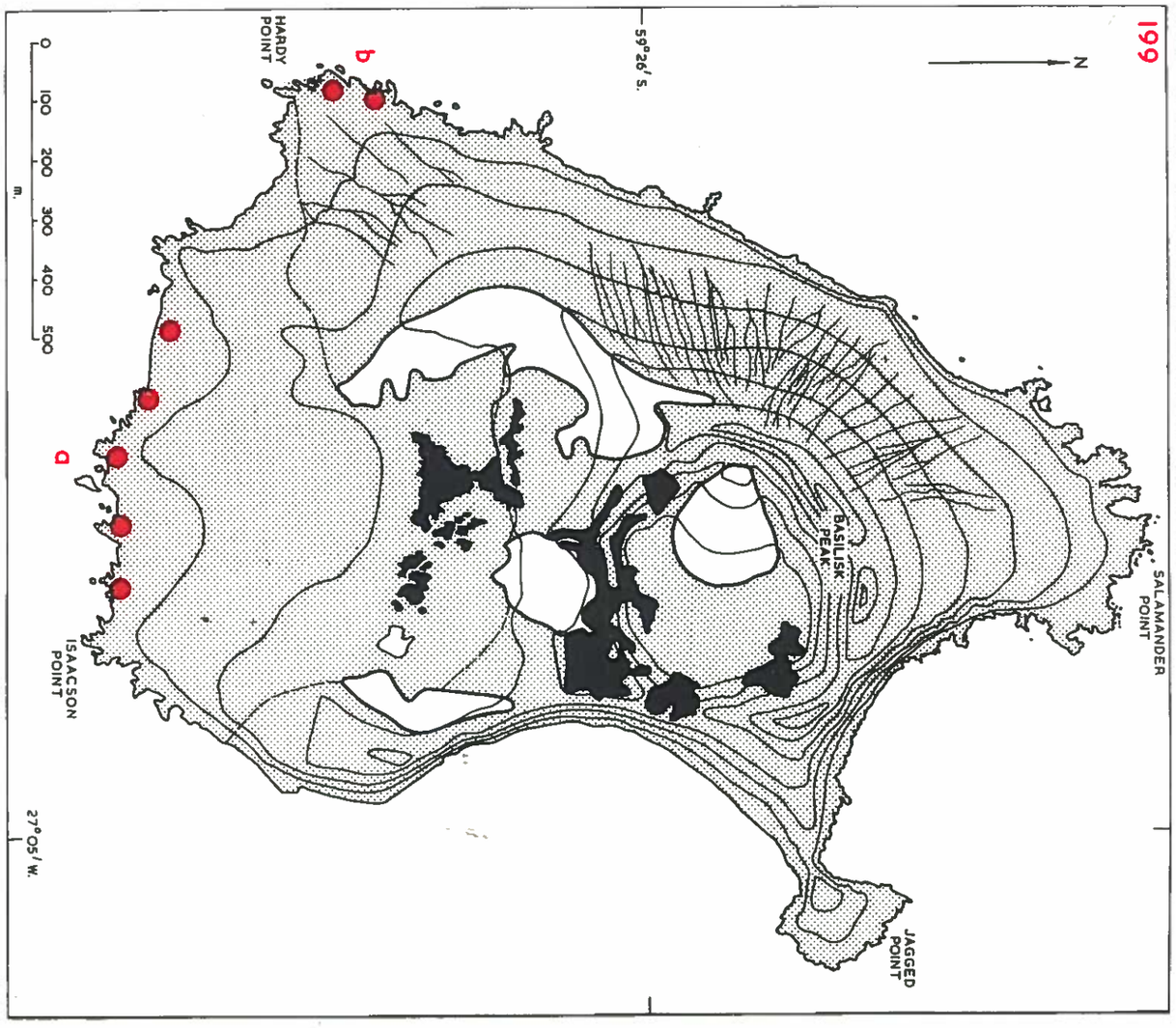
MAP 22 SOUTH SANDWICH ISLANDS



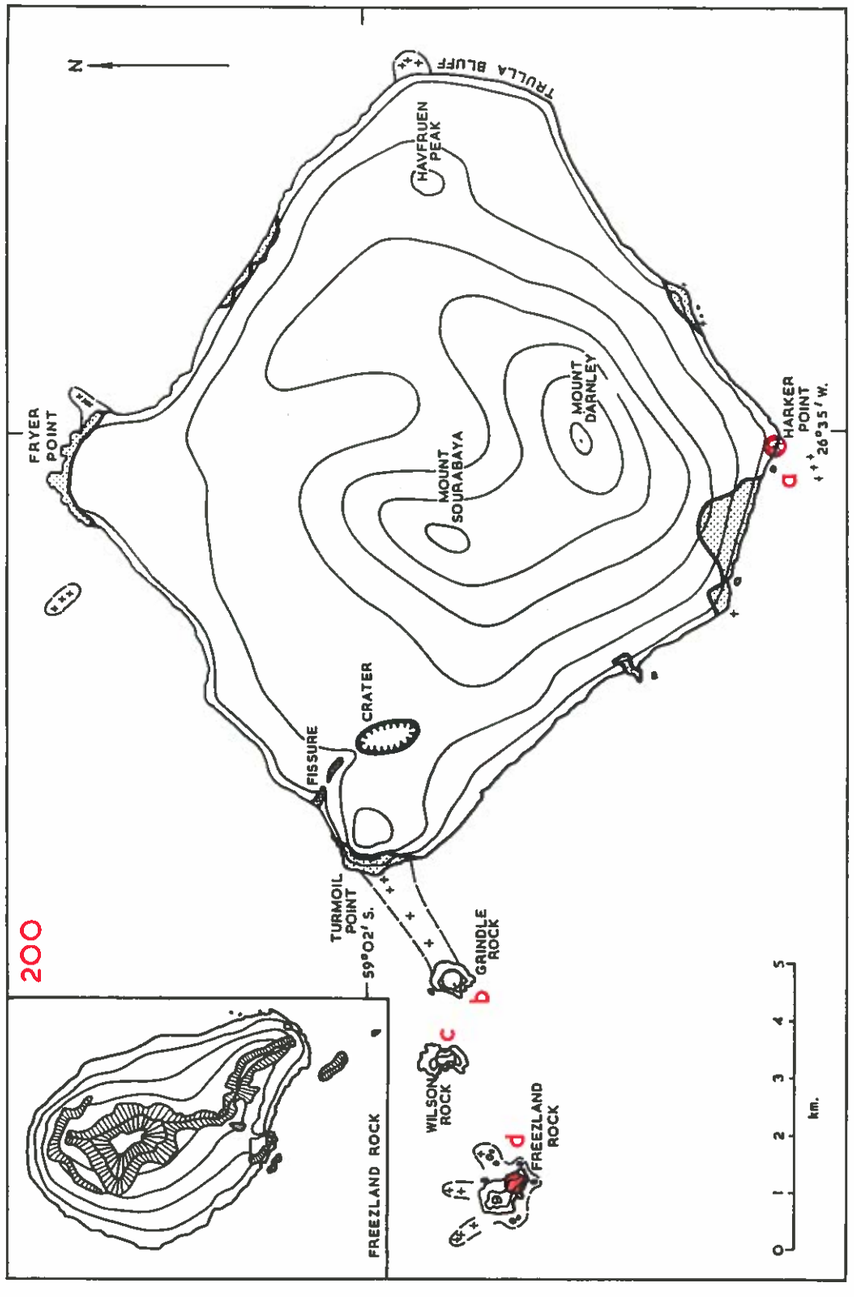
MAP 22.1 THULE ISLAND



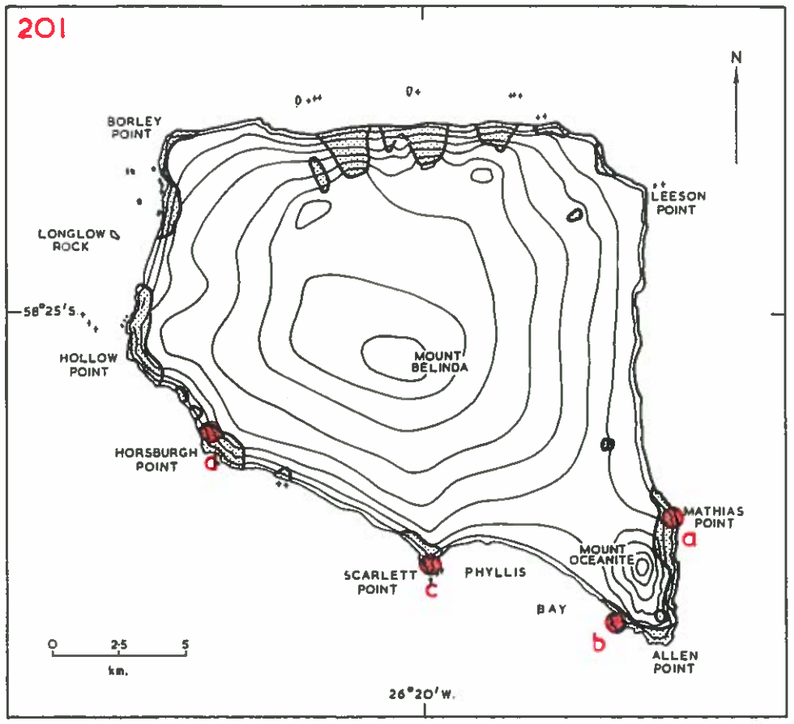
MAP 22.2 BELLINGSHAUSEN ISLAND



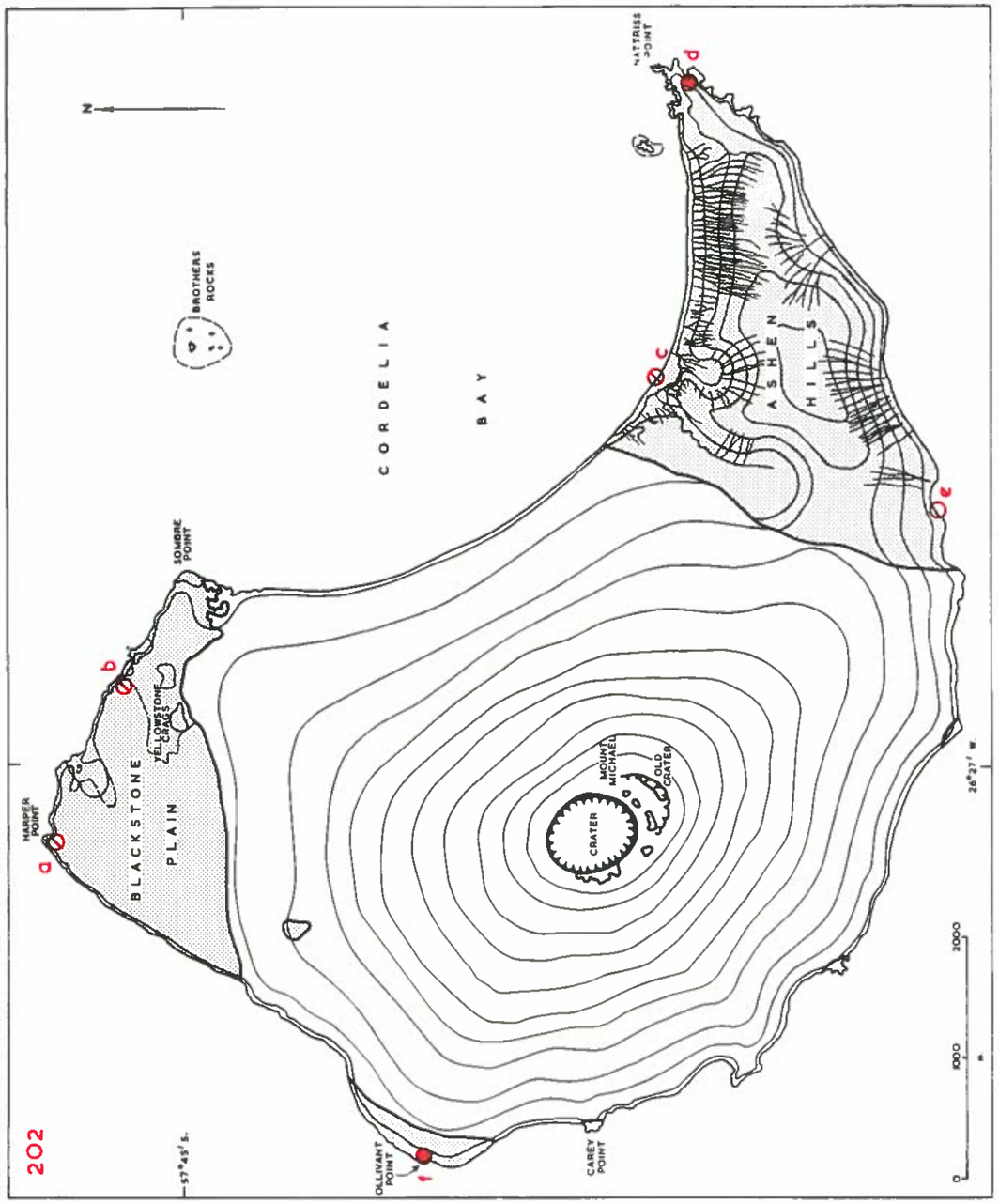
MAP 22.3 BRISTOL ISLAND



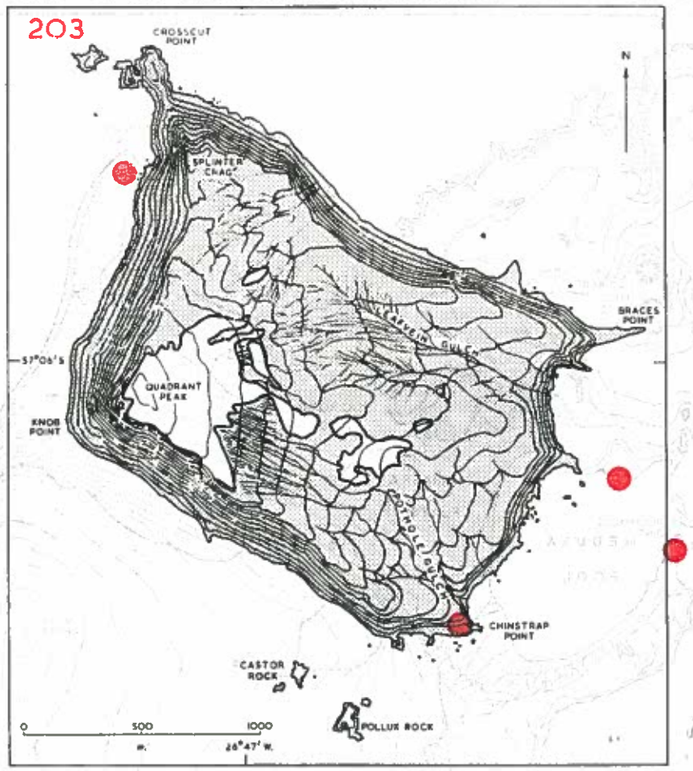
MAP 22.4 MONTAGU ISLAND



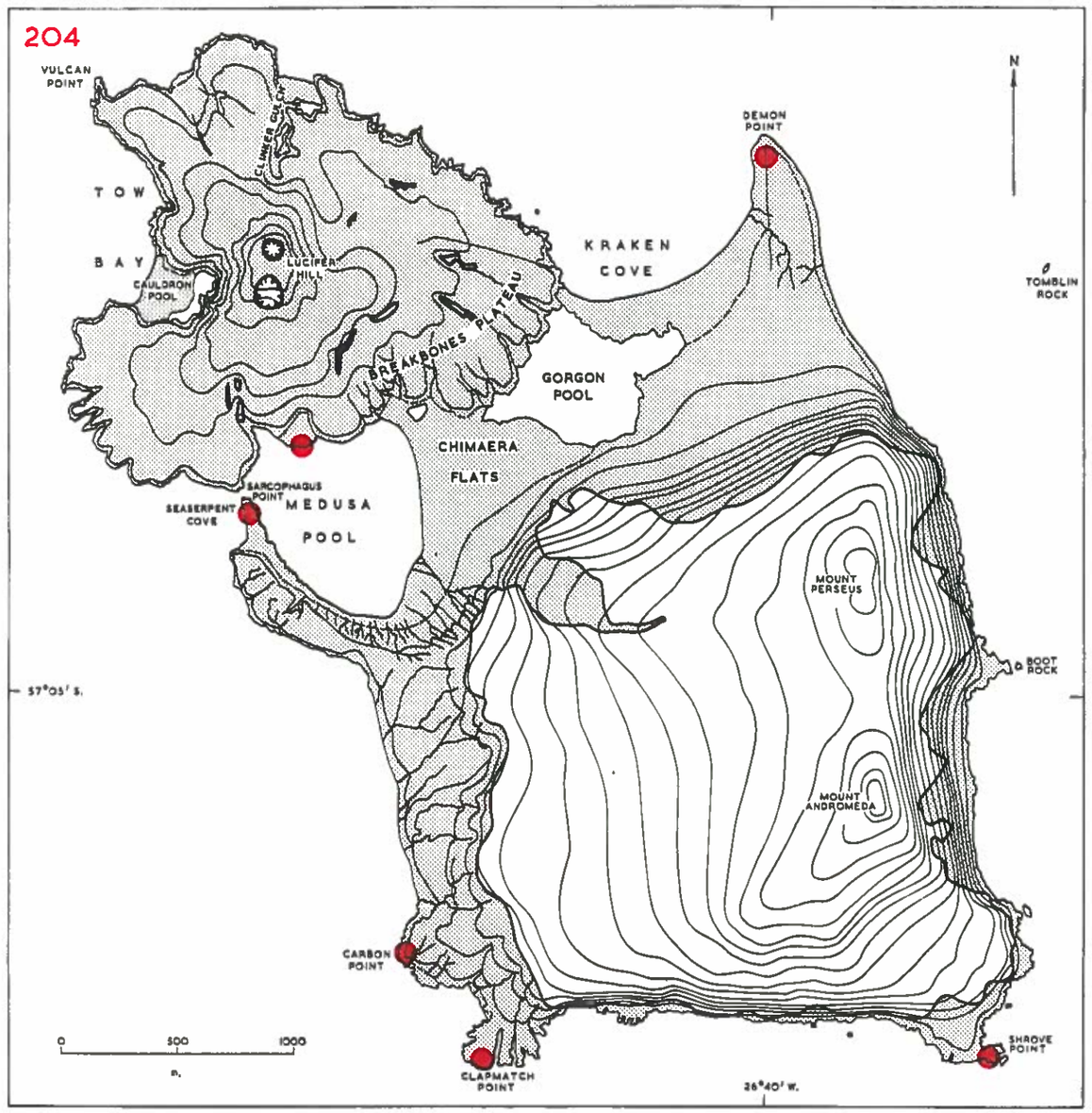
MAP 22.5 SAUNDERS ISLAND



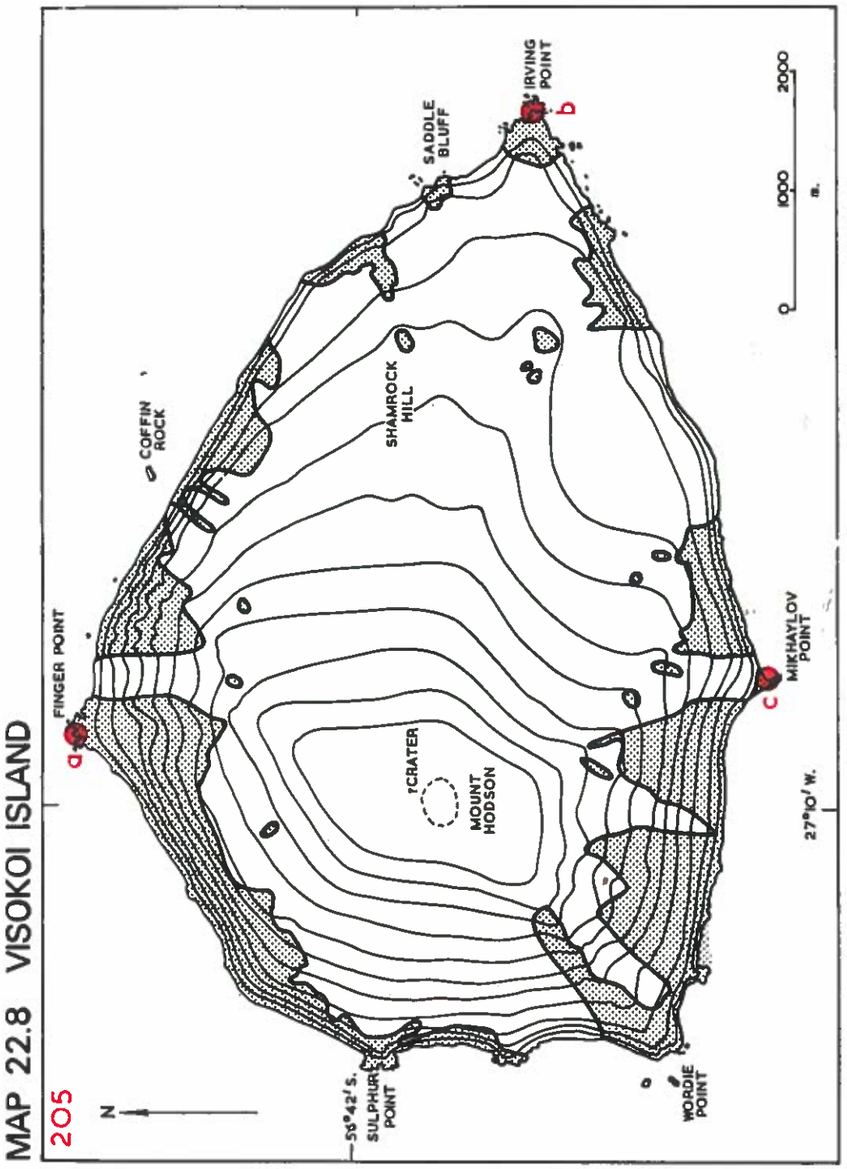
MAP 22.6 VINDICATION ISLAND



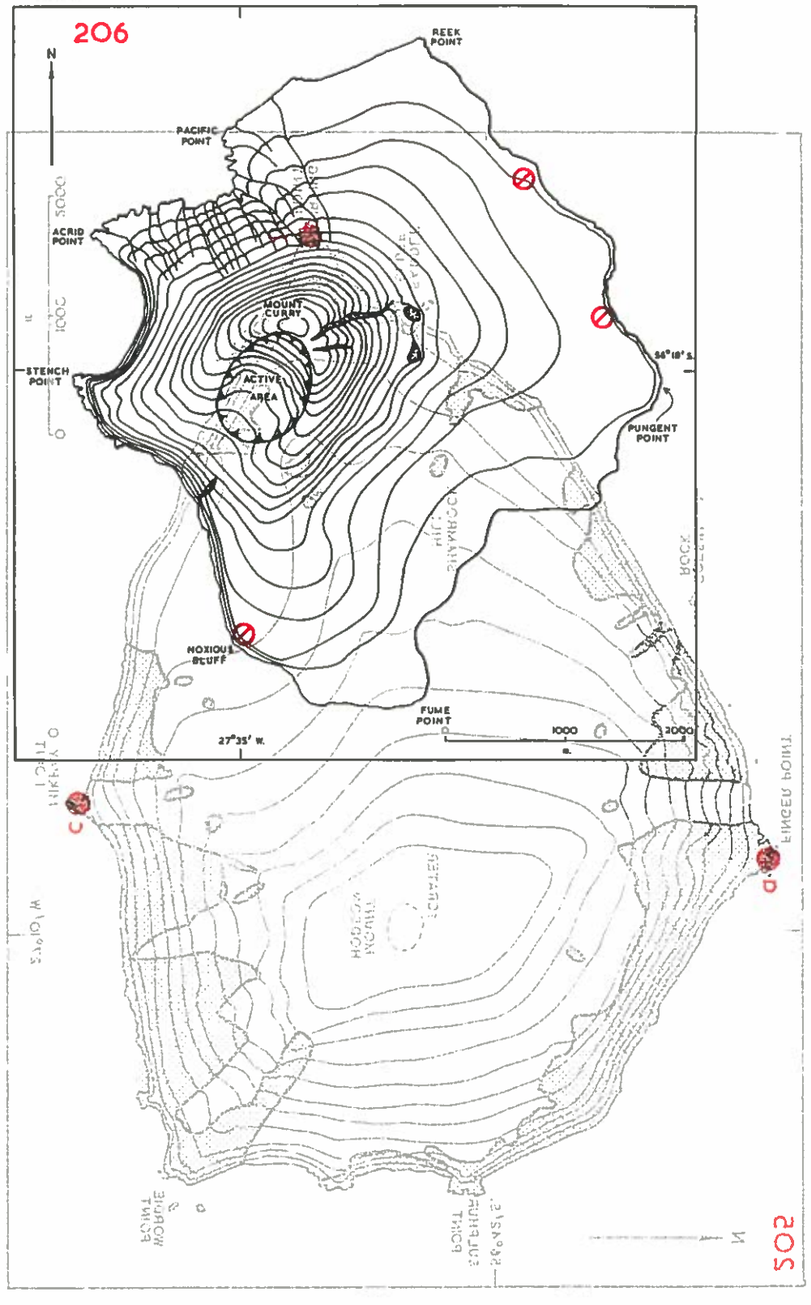
MAP 22.7 CANDLEMAS ISLAND



MAP 22.8 VISOKOI ISLAND



MAP 22.9 ZAVODOVSKI ISLAND



5. **Gentoo Penguin** *Pygoscelis papua*

The distribution of this speces is essentially circumpolar on sub-Antarctic islands with a southerly extension down the Antarctic Peninsula, reaching its southern breeding limit at Petermann Island (lat. 65° 10′S, long. 64° 10′W).

Short-term studies of aspects of the breeding biology have been made at the South Shetland Islands (Bagshawe, 1938), South Georgia (Roberts, 1940; Croxall, in prep.), Marion Island (van Zinderen Bakker, 1971) and Iles Crozet (Despin, 1972), and early season studies at Heard Island (Gwynn, 1953).

Quantitative analyses of diet have been performed at South Georgia (Croxall and Prince, in press *b*), where krill *E. superba* made up two-thirds, and fish one-third, of the diet and at Point Thomas, King George Island (Volkman and others, Ms.), where the proportions were 85% krill, 15% fish.

The species is known for the facility with which some colonies may move their breeding site from year to year and it is becoming clear that, at some colonies at least, there can be large fluctuations in the number of pairs breeding (as well as in breeding success) in successive seasons (Croxall and Prince, in press *a*).

1 PETERMANN ISLAND — MAP 24.1

Count	*Nature*	*Date*	*Reference*
56	A3	9.11.09	Gain, 1914
100-150	N4	1959-60	Smith, 1959
480	N3	9.12.71	Muller-Schwarze, 1975
c. 200	C3	10-13.2.75	B.A.S. (Rodger)

In 1975 there were three distinct colonies whose totals were as follows: (a) *c.* 100 chicks, (b) *c.* 50 chicks, (c) *c.* 50 chicks.

The map also shows the location of the colonies (hatched areas) when they were visited by Gain (1914).

2 HOVGAARD ISLAND — MAP 24

Ménégaux (1907) recorded a breeding colony here and Gain (1914) noted the presence of 25 birds on 10.8.1909.

3 PORT CHARCOT — MAP 24.2

Count	*Nature*	*Date*	*Reference*
2 000+	A4	21.2.04	Ménégaux, 1907
1 500-2 000	A4	1-3.1.09	Gain, 1914

4 GLANDAZ POINT — MAP 24

Count	*Nature*	*Date*	*Reference*
60	N3	Dec. 1971	Muller-Schwarze, 1975

Roberts (unpubl. data) recorded the existence of a small colony in 1935.

5 LOUBAT POINT — MAP 24

Count	*Nature*	*Date*	*Reference*
70	N3	Dec. 1971	Muller-Schwarze, 1975

Roberts (unpubl. data) recorded a large colony here in 1935. Muller-Schwarze (1975) noted that two rookeries were located approximately opposite Clery Peak, the north peak of Booth [Wandel] Island. In addition to that tabulated, distributed over about ten ice-free rocky outcrops 50-100 m a.s.l., he recorded a rookery of 120 nests a few metres above sea-level just to the north. The species could not be determined.

6 SOUTH BAY — MAP 24

Both Roberts (unpubl. data, 1935) and Carroll (1954) recorded Gentoo rookeries to the east of South Bay.

7 PY POINT (EAST) — MAP 24

Roberts (unpubl. data, 1935) and Carroll (1954) both recorded the existence of a rookery north-east of Py Point.

8 ALICE CREEK — MAP 24.3

Count	*Nature*	*Date*	*Reference*
1 000	A4	27-28.12.08	Gain, 1914
700	A4	Feb-Nov. 1945	Lockley, 1945
289	C3	16.2.55	Carroll, 1954
594	N1	12-13.12.57	Tinbergen, 1957
690	N1	3.12.58	Tinbergen, 1958
447	N1	23.12.59	Price, 1959

In 1955 when the count was in chicks there were 18 distinct colonies whose totals were as follows: (a) 19; (b) 15; (c) 10; (d) 29; (e) 2; (f) 0; (g) 19; (h) 13; (i) 40; (j) 31; (k) 12; (l) 15; (m) 14; (n) 10; (o) 3; (p) 8; (q) 28; (r) 21.

9 DORIAN BAY — MAP 24.4

Count	*Nature*	*Date*	*Reference*
885	C3	16.2.55	Carroll, 1954
865	N1	17.12.57	Tinbergen, 1957
560	N1	17.1.59	Tinbergen, 1958
685	N1	7.12.59	Price, 1959
885	N1	26.12.78	B.A.S. (Fletcher)

Both Gain (1914) and Roberts (unpubl. data, 1935) recorded the existence of this colony.

It is not clear whether Muller-Schwarze's (1975) count of 740 nests at Port Lockroy on 7.12.71 refer to either or both of the Alice Creek and Dorian Bay rookeries.

In 1955 there were 13 distinct colonies whose totals (counts in chicks) were as follows: (a) 0; (b) 101; (c) 53; (d) 51; (e) 66; (f) 184; (g) 37; (h) 32; (i) 42; (j) 46; (k) 12; (l) 160; (m) 101.

10 JOUBIN ISLANDS — MAP 24

Count	*Nature*	*Date*	*Reference*
54	N1	16.1.75	Parmelee and others, 1977

These pairs, amongst Adelie and Chinstrap Penguins, constituted the first breeding record for the Palmer station area. The species is present year round in the area.

11 BRYDE ISLAND — MAP 25

Bagshawe (1938) reported a rookery occupied by Gentoos only on the east coast of Bryde Island on 9.2.1921. Araya (1965) noted possibly the same colony on a small island to the east of Bryde Island in March 1962.

12 WATERBOAT POINT — MAP 25.1

Bagshawe (1938) estimated that there were upwards of 12 000 Gentoos at three rookeries (Coal Point, "The Island" and "South Island") at Waterboat Point. The map in Araya (1965) gave the distribution of colonies in 1962-64 (as shown on Map 25.1), indicating that there was no longer a site on "South Island". The colonies on the northern island totalled 650 birds and Araya (1965) estimated the total population as 900 birds. The establishment of a permanent station in the area may well have contributed to this substantial decrease.

13 DUTHIERS POINT — MAP 25

Both Bagshawe (1938) and Araya (1965) reported a rookery at this site, although Bagshawe referred to it as being on the south point entrance to Andvord Bay called "Shag Point".

14 NEKO HARBOUR — MAP 25

Count	*Nature*	*Date*	*Reference*
125	A3	1962	Araya, 1965
214	N3	14.12.71	Muller-Schwarze, 1975

The rookery of Gentoos only, found near the bottom of Andvord Bay on 7.2.1921 (Bagshawe, 1938), presumably refers to the above site.

15 BENEDEN HEAD (I) — MAP 25

Count	*Nature*	*Date*	*Reference*
36	N3	15.12.71	Muller-Schwarze, 1975

16 BENEDEN HEAD (II) — MAP 25

Count	*Nature*	*Date*	*Reference*
124	N3	15.12.71	Muller-Schwarze, 1975

North-east of the previous colony.

17 BENEDEN HEAD (III) — MAP 25

Count	Nature	Date	Reference
127	N3	15.12.71	Muller-Schwarze, 1975

The colony lies 300 m east of the previous site.

18 DANCO ISLAND — MAP 25

Count	Nature	Date	Reference
350	A4	4.4.62; 12.2.64	Araya, 1965
229	N3	15.12.71	Muller-Schwarze, 1975

19 RONGE ISLAND — MAP 25

Count	Nature	Date	Reference
205	N3	15.12.71	Muller-Schwarze, 1975

Araya (1965) noted that the colony was on the north-east side of the island.

20 CUVERVILLE ISLAND — MAP 25

Count	Nature	Date	Reference
1 490	N3	14.12.71	Muller-Schwarze, 1975

21 "CAPE OSTERRIETH" — MAP 25

Gain (1914) recorded finding near "Cape Osterrieth" a rookery which seemed to be inhabited by Gentoos. The exact location of this colony could not be determined.

22 MELCHIOR ISLANDS — MAP 25

On the basis of isolated individuals observed in the Melchior archipelago on 6.2.1953 (Olrog, 1958), Watson and others (1971) inferred the existence of a possible breeding site on the Melchior Islands.

23 CAPE KAISER — MAP 25

On the bais of Bagshawe's (1938) record of several Gentoos seen swimming together towards Brabant Island on 25.3.1922, Watson and others (1971) inferred the existence of a possible breeding site at Cape Kaiser.

24 DUROCH ISLANDS — MAP 26

Araya (1965) recorded breeding birds "on small islets opposite Base 'Bernado O'Higgins'" which may refer to the Duroch Islands.

25 MOUNT JACQUINOT — MAP 26

Roberts (1948) recorded a breeding colony on the coast near Mount Jacquinot.

26 GOURDIN ISLAND — MAP 26

Count	Nature	Date	Reference
50	N3	6.1.69	B.A.S. (Curphey)

In a bay on the north-east end of the island there were small colonies amongst the Adelies and Chinstraps which predominated.

27 HOPE BAY — MAP 26

Count	Nature	Date	Reference
10-40	N4	1901-03	Andersson, 1905
150	A4	1947-48	Roberts (unpubl. data, 1935)
86	N1	Nov. 1963	Lefeuvre, 1963

28 JONASSEN ISLAND — MAP 26

Count	Nature	Date	Reference
c. 20	N4	1901-03	Andersson, 1905

29 NOBLE HEAD, BRANSFIELD ISLAND — MAP 26

Count	Nature	Date	Reference
800	N4	1960	Orr, 1960

30 PATELLA ISLAND — MAP 26

Count	Nature	Date	Reference
200	N4	1960	Orr, 1960

Elliot and others (1978) recorded that the species was few in number in February 1978.

31 FITZROY POINT — MAP 26

Elliot and others (1978) recorded a small number of birds in February 1978 and two birds were observed on the west side of Fleiss Bay but no nests were positively identified.

32 DUNDEE ISLAND — MAP 26

Donald (1895) recorded 40 nests on Dundee Island which may be the same colony as that recorded by Roberts (1948) on the west coast of Dundee Island opposite Diana Reef.

33 PAULET ISLAND — MAP 26

Watson and others (1971) recorded Paulet Island as a possible breeding site based on the statements of Andersson (1905) and Lonnberg (1905).

34 SEYMOUR ISLAND — MAP 26

Watson and others (1971) recorded Seymour Island as a possible breeding site, quoting Andersson (1905) and Lonnberg (1905) as references but there appears to be no mention of Gentoos on Seymour Island in either of these papers.

35 ENTRANCE POINT, DECEPTION ISLAND — MAP 27

The only record of breeding here is apparently that of Olrog (1958), who recorded a large colony in 1952-53. Gain (1914), White (1957) and Araya (1965) all recorded sightings but make no mention of breeding birds.

36 CAPE SHIRREFF — MAP 27

Count	*Nature*	*Date*	*Reference*
200-500	N4	14.1.58	Tufft, 1957

37 LAIR POINT — MAP 27

Count	*Nature*	*Date*	*Reference*
252	N3	1965-66	B.A.S. (M. G. White)

38 ROBBERY BEACHES — MAP 27

Count	*Nature*	*Date*	*Reference*
150	N3	9.1.58	Tufft, 1957

The colony is situated at the mid-point of the west shore of Barclay Bay.

39 DEVILS POINT — MAP 27.1

Count	*Nature*	*Date*	*Reference*
750	N3	13.12.65	B.A.S. (M. G. White)

There were two distinct colonies (see map):
(a) 700 nests and (b) 50 nests.

40 STACKPOLE ROCKS — MAP 27

Count	*Nature*	*Date*	*Reference*
4	N1	4.12.65	B.A.S. (M. G. White)

41 ELEPHANT POINT — MAP 27

Count	*Nature*	*Date*	*Reference*
400	N4	4.1.58	Tufft, 1957

There were 200 nests on the shore and about an equal number on a small adjacent islet.

42 HANNAH POINT — MAP 27.2

Count	*Nature*	*Date*	*Reference*
570	N3	Dec. 1957-Mar. 1958	B.A.S. (Tufft)

There were two distinct colonies (see map):
(a) 70 nests and (b) 500 nests.
Tufft (1957) related that there were indications that colony (a) was once far more extensive.

43 JOHNSON'S DOCK — MAP 27

Tufft (1957) discovered a small colony on the point 1 mile [1 610 m] south of Johnson's Dock, which on 1.3.1958 had mature young.

44 BARNARD POINT — MAP 27.3

Count	*Nature*	*Date*	*Reference*
50	N3	Feb. 1958	Tufft, 1957
264	N3	25.11.65	B.A.S. (M. G. White)

45 HALF MOON ISLAND — MAP 27

Olrog (1958) recorded a few colonies of *c.* 50 pairs in Dec. 1952–Apr. 1953.

46 TRIANGLE POINT — MAP 27

Count	*Nature*	*Date*	*Reference*
45	N3	3.2.66	B.A.S. (M. G. White)

47 SPIT POINT — MAP 27

Count	*Nature*	*Date*	*Reference*
c. 500	N4	Jan-Mar. 1958	Stephens, 1958
2 084	N3	3.2.66	B.A.S. (M. G. White)

48 DEE ISLAND — MAP 27

M. G. White (B.A.S. records) recorded a colony at this site on 16.1.1966.

49 AITCHO ISLANDS — MAP 27.4

Count	*Nature*	*Date*	*Reference*
314	N3	8.1.66	B.A.S. (M. G. White)

In 1966 there were two discrete colonies (see map):
(a) 102 nests and (b) 212 nests.

50 ROBERT POINT — MAP 27

Count	Nature	Date	Reference
2 500	N4	6.1.66	B.A.S. (M. G. White)

51 HARMONY POINT — MAP 28.1

Count	Nature	Date	Reference
c. 50	N4	1901-03	Andersson, 1905
500	A3	1958-59	Stephens, 1958
730	N3	1964-65	Araya and Aravena, 1965
1 642	N1	13.1.66	B.A.S. (M. G. White)
800	N3	19.12.71-Jan. 1972	Muller-Schwarze, 1975

In 1966 there were four distinct colonies (see map): (a) 1 012; (b) 60; (c) 100; (d) 470.

52 RIP POINT — MAP 28

On 21.1.1966 M. G. White (B.A.S. records) reported a colony of 10 000 penguins, mainly Chinstrap with some Gentoo, at this site.

53 ARDLEY ISLAND — MAP 28

Count	Nature	Date	Reference
750-1 000	A4	1-19.1.66	B.A.S. (Sugden and John)
c. 2 000	N4	20.12.71	Muller-Schwarze, 1975

54 BARTON PENINSULA — MAP 28

Count	Nature	Date	Reference
43	N1	18.1.66	B.A.S. (M. G. White)

Olrog's (1958) record of numerous Gentoo at Potter Cove on King George Island, probably refers to this, or the following, colony.

55 STRANGER POINT — MAP 28

Count	Nature	Date	Reference
2 920	N3	29.1.66	B.A.S. (M. G. White)
c. 1 000	N4	21.12.71	Muller-Schwarze, 1975

56 SPHINX HILL — MAP 28

Count	Nature	Date	Reference
100	N3	4.1.57	Stephens, 1957
732	N3	29.1.66	B.A.S. (M. G. White)
1 900	N1	1977-78	Trivelpiece and Volkman (in press)
			Volkman and others, MS.

57 POINT THOMAS — MAP 28

Count	Nature	Date	Reference
100	A3	26.12.09	Gain, 1914
c. 200	N3	4.1.57	Stephens, 1957
1 420	N3	29.1.66	B.A.S. (M. G. White)
700	N1	1977-78	Trivelpiece and Volkman (in press)
			Volkman and others, MS.

The estimate of 1 000 adults (Stephens, 1958), quoted by Conroy (1975), is acknowledged by the author not to be a figure for breeding birds. As with Adelie Penguin, the above comparisons rely on equating Sphinx Hill with Point Thomas East and Point Thomas with Point Thomas West. Comparing the 1966 and 1977 totals, this might seem unreasonable but the species is well known for frequent changes of colony location and interchange between adjacent sites. Overall, the Point Thomas population has increased from 2 152 pairs in 1965-66 to 2 613 pairs in 1977-78 (Trivelpiece and Volkman, in press)—a mean annual increase of 1.6%.

58 LIONS RUMP — MAP 28

Count	Nature	Date	Reference
500	A3	1957-58	Stephens, 1958
1500	N3	26.1.66	B.A.S. (M. G. White)

59 FALSE ROUND POINT — MAP 28

Count	Nature	Date	Reference
40	N1	7.1.66	B.A.S. (M. G. White)

ELEPHANT AND CLARENCE ISLANDS GROUP

60-67 ELEPHANT ISLAND — MAPS 29; 29.1-29.6

The Joint Services Expedition survey provided extensive notes from which the following is an extract of the main points relevant to the census of Gentoo Penguin.

1. *Nest sites*

These ranged from 2-100 m above sea-level, though most nested below 50 m. The longest overland journey from the sea was about 0.5 km though most nested within 100 m of the sea.

The species used many of the flatter sites that were apparently well suited to Chinstrap Penguins but was never found in sites corresponding to the steeper rockier slopes that Chinstraps frequently used.

The principal requirement for the existence of a Gentoo colony appeared to be an area of beach, usually sandy beach, below the colonial area, on which the chicks could stand, wander about and gather in groups after they had left the nest. All the Gentoo colonies were near such beaches, and normally very close to them. The chicks from the small upper colony on the "Hut Bluff" lateral moraine (Map 29.4) moved down about 0.5 km from the nests to the small beach below. In fact, only a few sandy beaches did not support Gentoo colonies.

All the Gentoo colonies were associated with Chinstrap colonies, although largely retaining their own corporate identity. At most sites there was no obvious reason for the particular divisions of the available terrain between the two species. Earlier exposure by the spring thaw was thought to be one possible factor favouring Gentoos; but the only real evidence for this was on the "Hut Bluff" moraine (Map 29.4) where the colonial groups of Gentoos were concentrated on higher parts of the moraine ridges.

2. *Population changes*

The breeding population was estimated to be 2 600 pairs and no signs of recent decrease or increase were noted.

The present census provides a very good basis for comparison with future populations at "Hut Bluff". A reasonable basis for such comparisons has been provided at "The Green Glen"(Map 29.5), where the nest count was fairly accurate, and at "Georges Rib" (Map 29.3), where the change in the minority Chinstrap colony within the confined area can be gauged accurately. However, for various reasons, a less satisfactory basis has been provided at "Bondi Beach" (Map 29.6), "Britannia's Fig-leaf" (Map 29.5) and Muckle Bluff (Map 29.2). This is particularly unfortunate because at each of these three sites Gentoos and Chinstraps were both present in quite large numbers occupying contiguous and partly interwoven areas in generally similar terrain. Changes in these three areas will thus have a double interest.

There is scope for future expansion of this species in several areas, though this would involve ousting Chinstraps from their established colonies, or competing for beach space with seals.

3. *Factors affecting census*

From mid-December counts were difficult because most Gentoo chicks were mobile. By the end of December most were scattered or grouped away from the colonial areas; except in small areas of simple shape and definite boundaries, counts were difficult at this stage.

Locality		*Count*	*Nature*	*Date*	*Reference*	*Map*
60 Point Wild		20	N5	4-8.3.71	J.S.E.	29.1
61 Muckle Bluff		500	N4	4.2-1.3.71	,,	29.2
62 "Georges Rib"		500	N3	,,	,,	29.3
63 "Hut Bluff"	a	58	N1	6.12.70-3.1.71	,,	29.4
	b	9	N1	,,	,,	,,
64		53	N1	,,	,,	,,
65 "Britannia's Figleaf"		400	N4	,,	,,	29.5
66		60	N3	,,	,,	,,
67 Point Wordie	a	150	N4	3-19.1.71	,,	29.6
	b	850	N4	,,	,,	,,

At the colonies on "Bondi Beach" (Map 29.6), in four more or less discrete areas, the count was not very accurate as when visited in January most of the chicks had gathered into creches. Totals of 1 215 and 220 chicks were estimated in the two main areas and the estimate of 850 and 150 nests, respectively, is probably not far out.

The two Gentoo groups in the lateral moraine Chinstrap colony at "Hut Bluff" were on the crest of the moraine ridge among the Chinstraps. The nine nests in the upper group were in a line down the ridge crest and it seemed likely to be due to the earlier arrival of Gentoos at the first areas exposed by the spring thaw. The upper group here was the highest Gentoo site found on the island and also the furthest from the sea. The upper group of nests had been almost vacated by early February and the surviving chicks were presumed to have joined those of the lower group in a loose créche on the little rock shelf and minute beach below.

The status of Gentoos at Point Wild was not firmly established. Neither ornithologist reached the spit itself. The group who did occupy the spit for two nights in mid-February found no Gentoo nests but three adults and one chick were seen. In 1917, Shackleton stated that Chinstraps occupied the spit, but some of Hurley's photographs show Gentoos. If Gentoos do breed here, it is almost certainly the only site on the north coast occupied by them.

68 GOSLING ISLANDS — MAP 30

Count	*Nature*	*Date*	*Reference*
320	N3	27.1.56	B.A.S. (Cordall)

In 1956 the birds were in two colonies of 120 and 200 nests.

69 NORTH POINT — MAP 30.1

Count	*Nature*	*Date*	*Reference*
300	A3	20.20.48	Laws, 1949
314	N1	6.1.58	Scotland, 1958
200	N3	20.1.64	B.A.S. (Burton)
255	N1	14 and 20.12.76	Despin (in litt.)
370	N1	13.11.78	Rootes, 1978

Mean laying and hatching dates are approximately 21 October and 23 November, respectively, but there have been several seasons of rather later breeding.

70 CHRISTOFFERSON ISLAND — MAP 30.2

Scotland (1957) recorded a small colony here in December 1957.

71 MICHELSEN ISLAND — MAP 30.2

Count	*Nature*	*Date*	*Reference*
287	N1	5-17.12.57	B.A.S. (Scotland)
600-750	A3	27.1-7.2.1965	B.A.S. (R. I. L. Smith)

72 SADDLE ISLAND — MAP 31

Clarke (1915) believed that Chinstrap Penguins might breed at this site.

73 POINT MARTIN — MAP 31

Wilton and others (1908) reported a big Gentoo rookery at this site on 9.4.1903.

74 "THEODOLITE POINT" — MAP 31

Wilton and others (1908) reported a Gentoo rookery smaller than that at Point Martin.

75 FERRIER PENINSULA — MAP 31

Count	*Nature*	*Date*	*Reference*
400	A3	23.2.47	Robin, 1948

Clarke (1915) had earlier recorded the existence of a colony in this area.

76 WATSON PENINSULA — MAP 31

Count	*Nature*	*Date*	*Reference*
30	A3	25.2.47	Robin, 1948

77 FERGUSLIE PENINSULA — MAP 31

Clarke (1915) remarked on the occurrence of breeding Chinstrap Penguins on this peninsula.

SOUTH SANDWICH ISLANDS — MAP 32

78 THULE ISLAND — MAP 32.1

Count	*Nature*	*Date*	*Reference*
15-20	A4		Wilkinson, 1956
c. 50	A4	Mar. 1964	Holdgate and Baker, 1979

The rookery occupies the north side of Hewison Point near the Argentine refuge "Teniente Esquivel".

79 BRISTOL ISLAND — MAP 32

Wilkinson (1956) noted that there was probably a Gentoo rookery of *c.* 100 birds on this island.

80 SAUNDERS ISLAND — MAP 32.2

Several hundred birds were seen in March 1964 on the lower slopes of Ashen Hills (Holdgate and Baker, 1979).

Kemp and Nelson (1931) had also noted the occurrence of Chinstraps at this site.

81 CANDLEMAS ISLAND — MAP 32

Count	*Nature*	*Date*	*Reference*
275	A3	Mar. 1964	Holdgate and Baker, 1979

These penguins were found in sheltered spots in the northern lava fields.

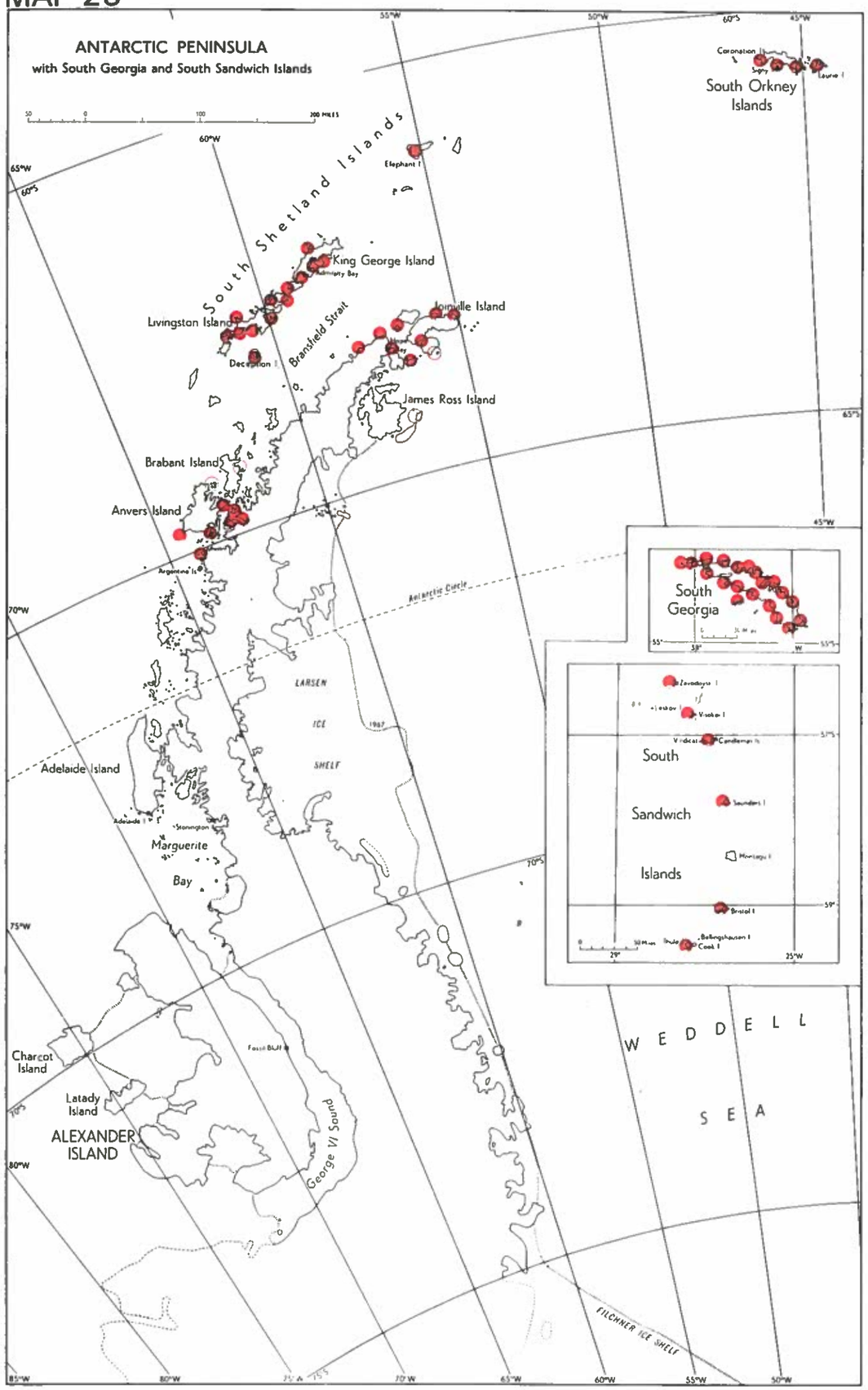
82 VISOKOI ISLAND — MAP 32.3

Separate from the main colony at Irving Point, which consists of Chinstraps and Macaronis, is a small group of about 200 Gentoo Penguins (Holdgate and Baker, 1979).

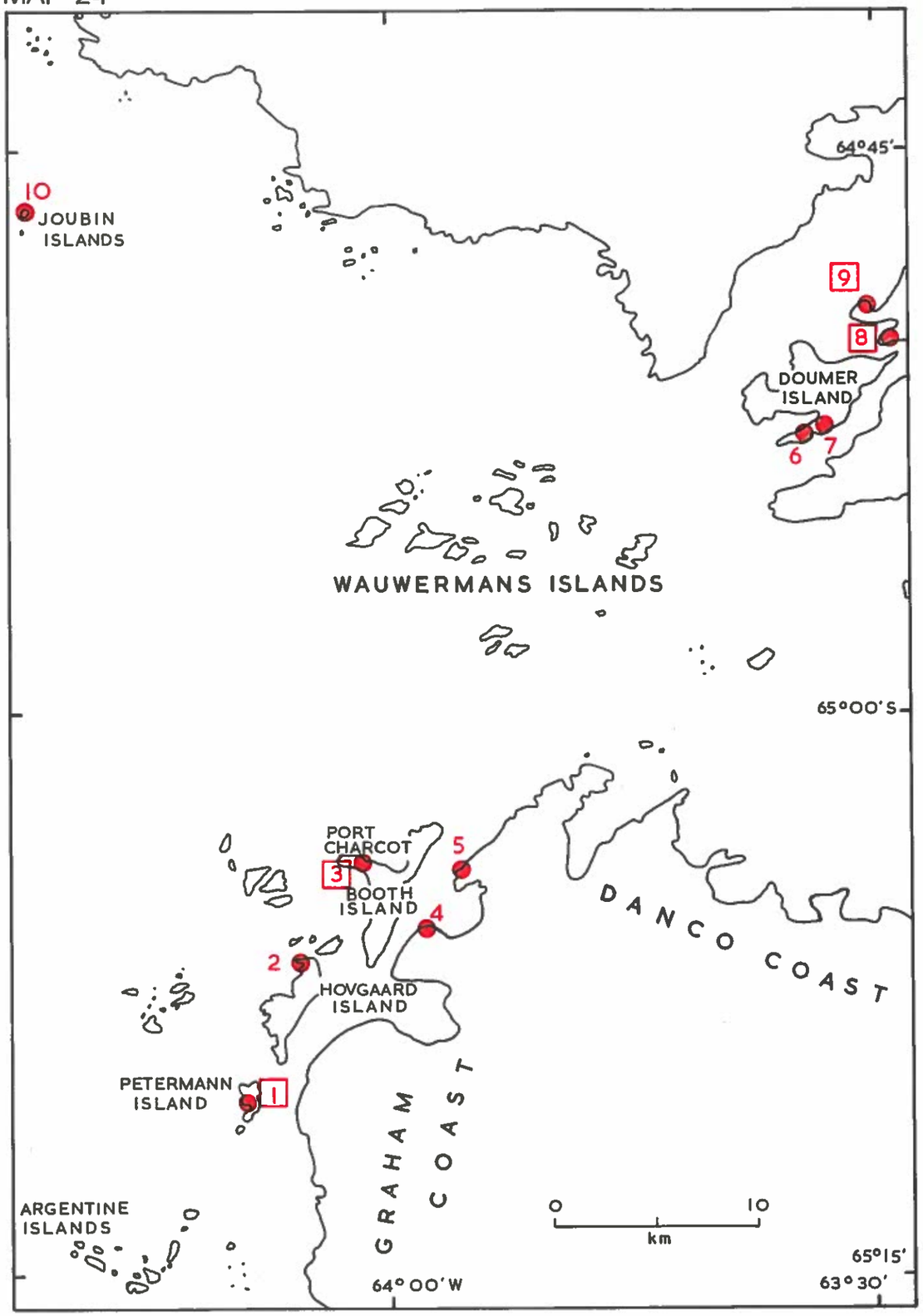
83 ZAVODOVSKI ISLAND — MAP 32

Kemp and Nelson (1931) reported that Gentoo Penguin probably bred on this island.

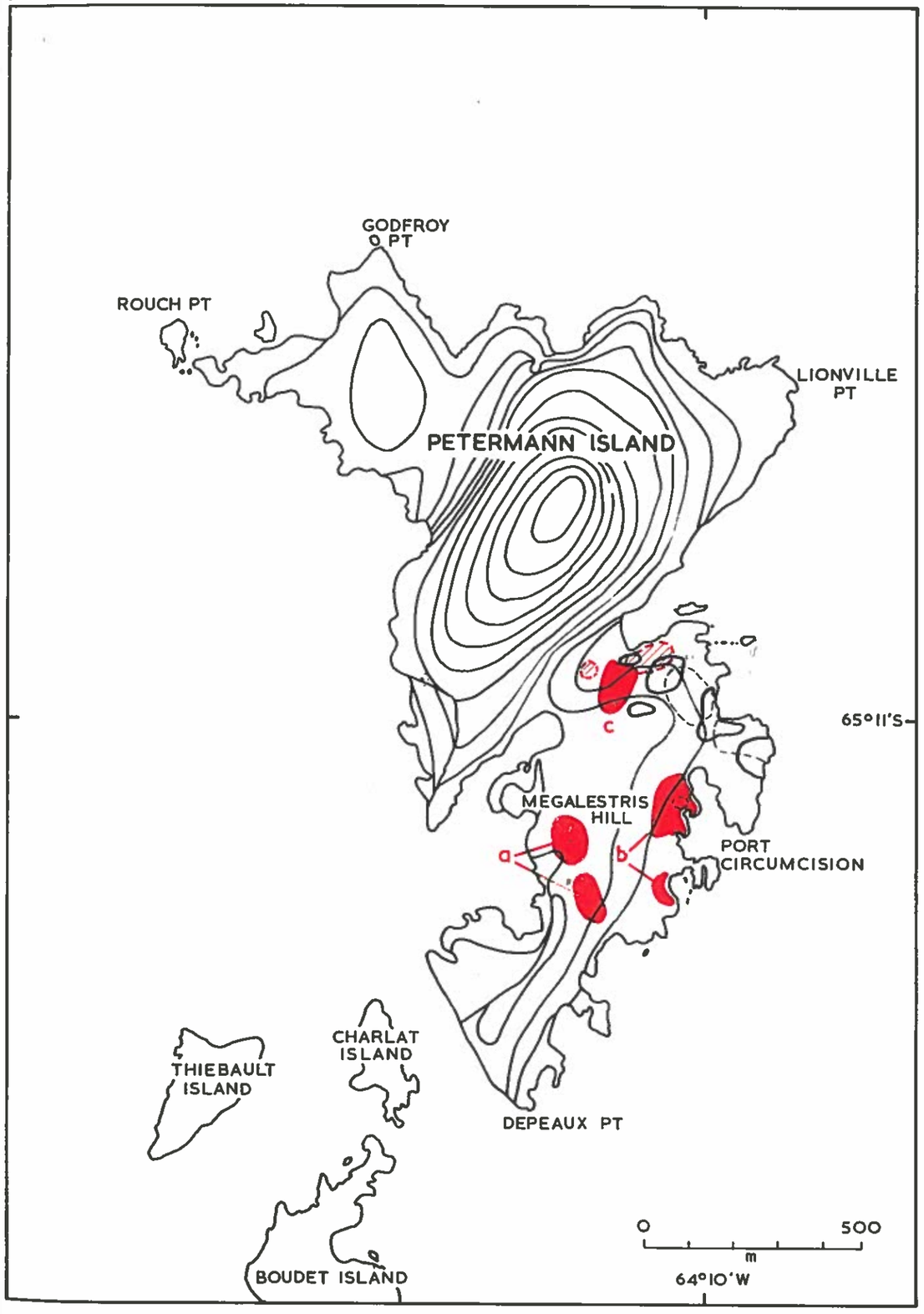
MAP 23



MAP 24



MAP 24.1



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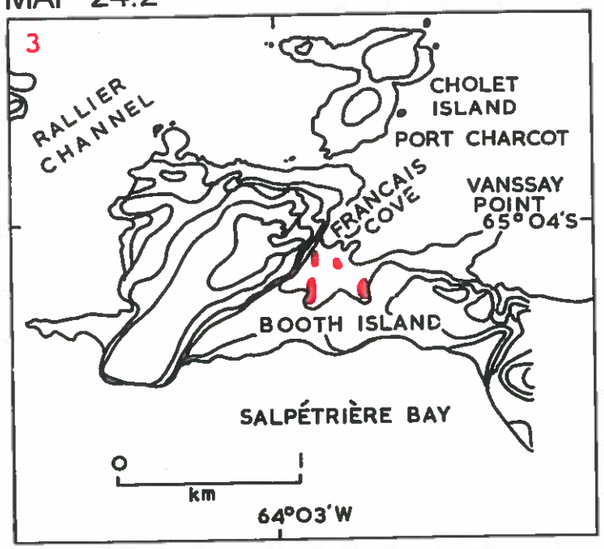
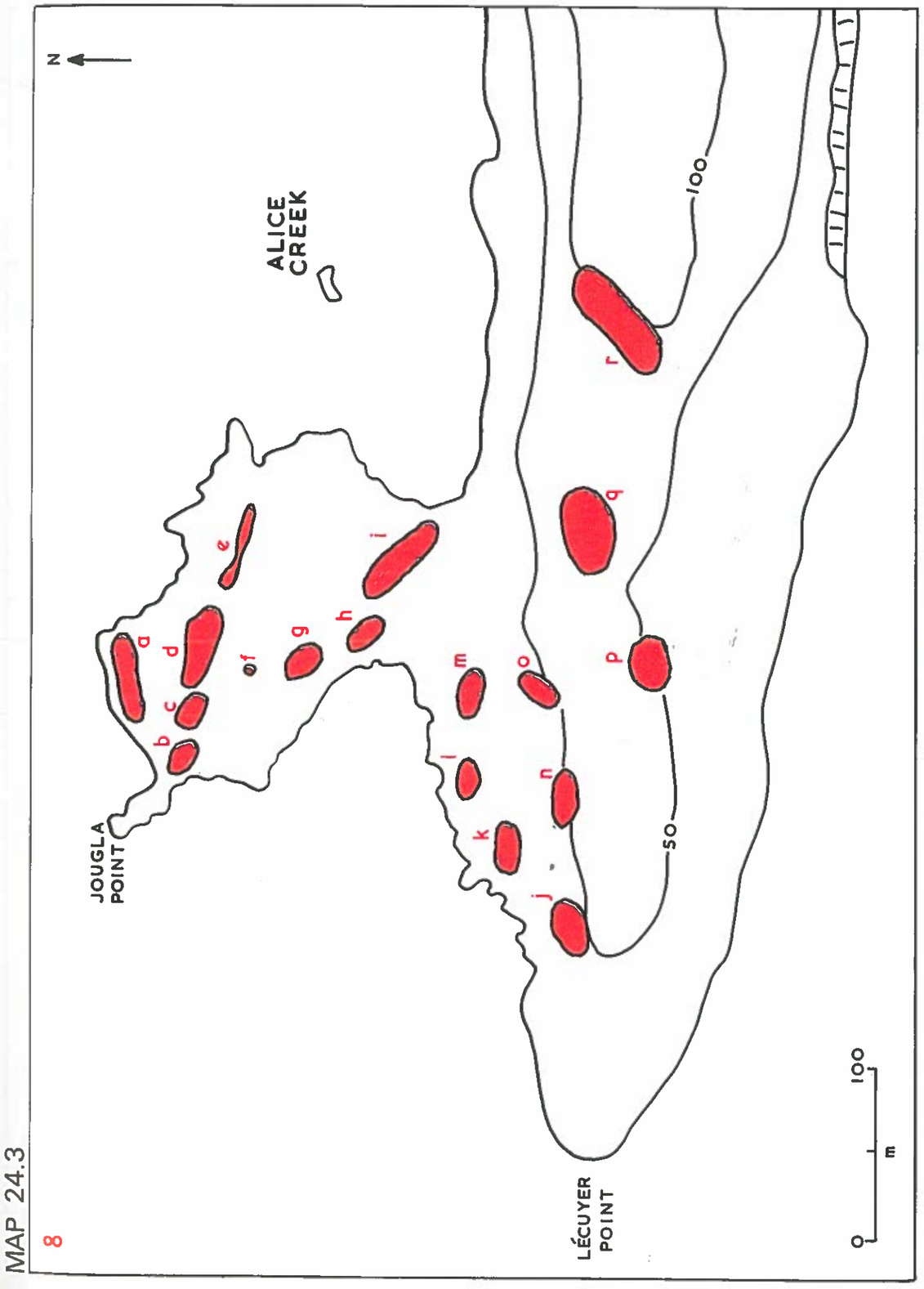
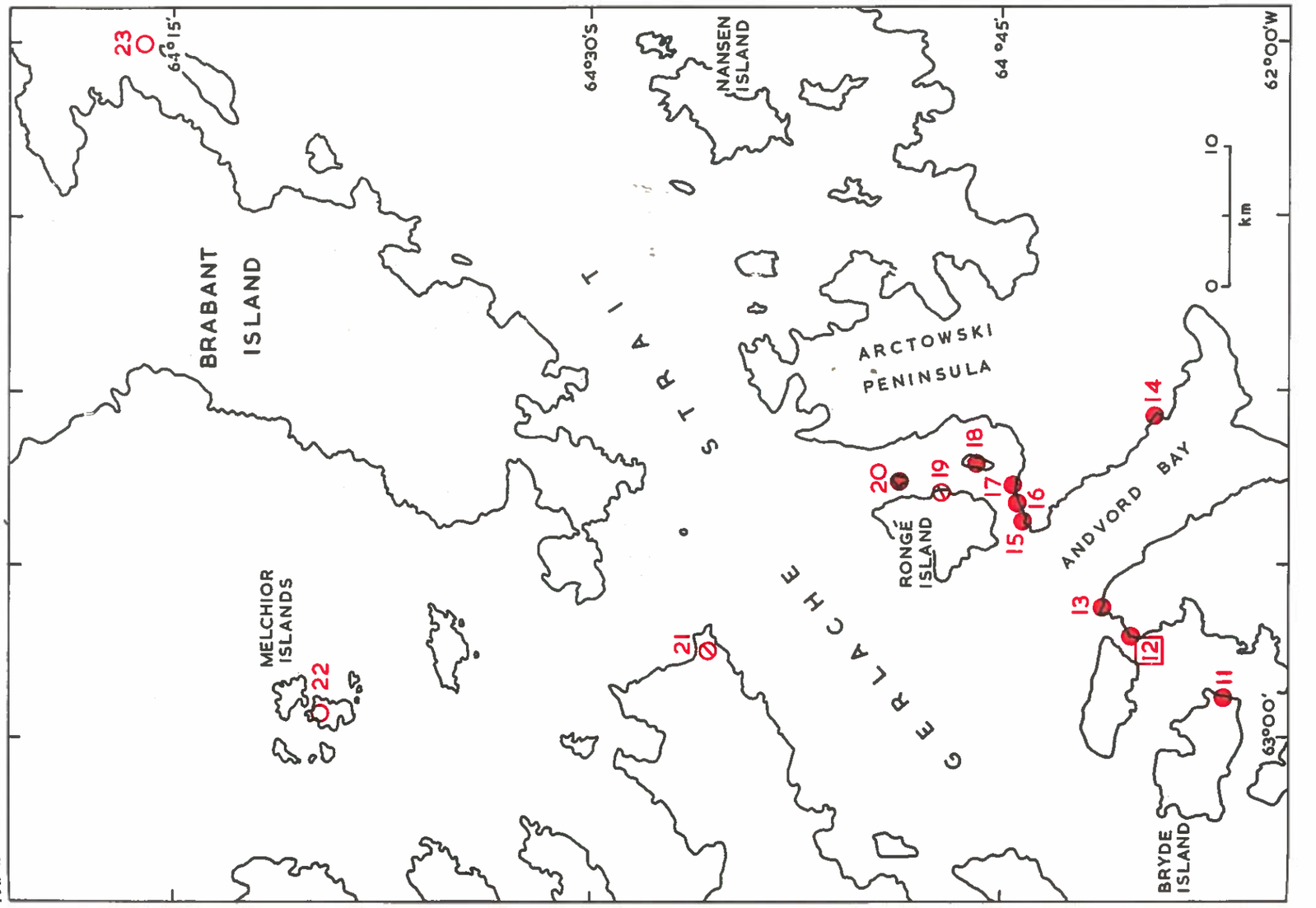




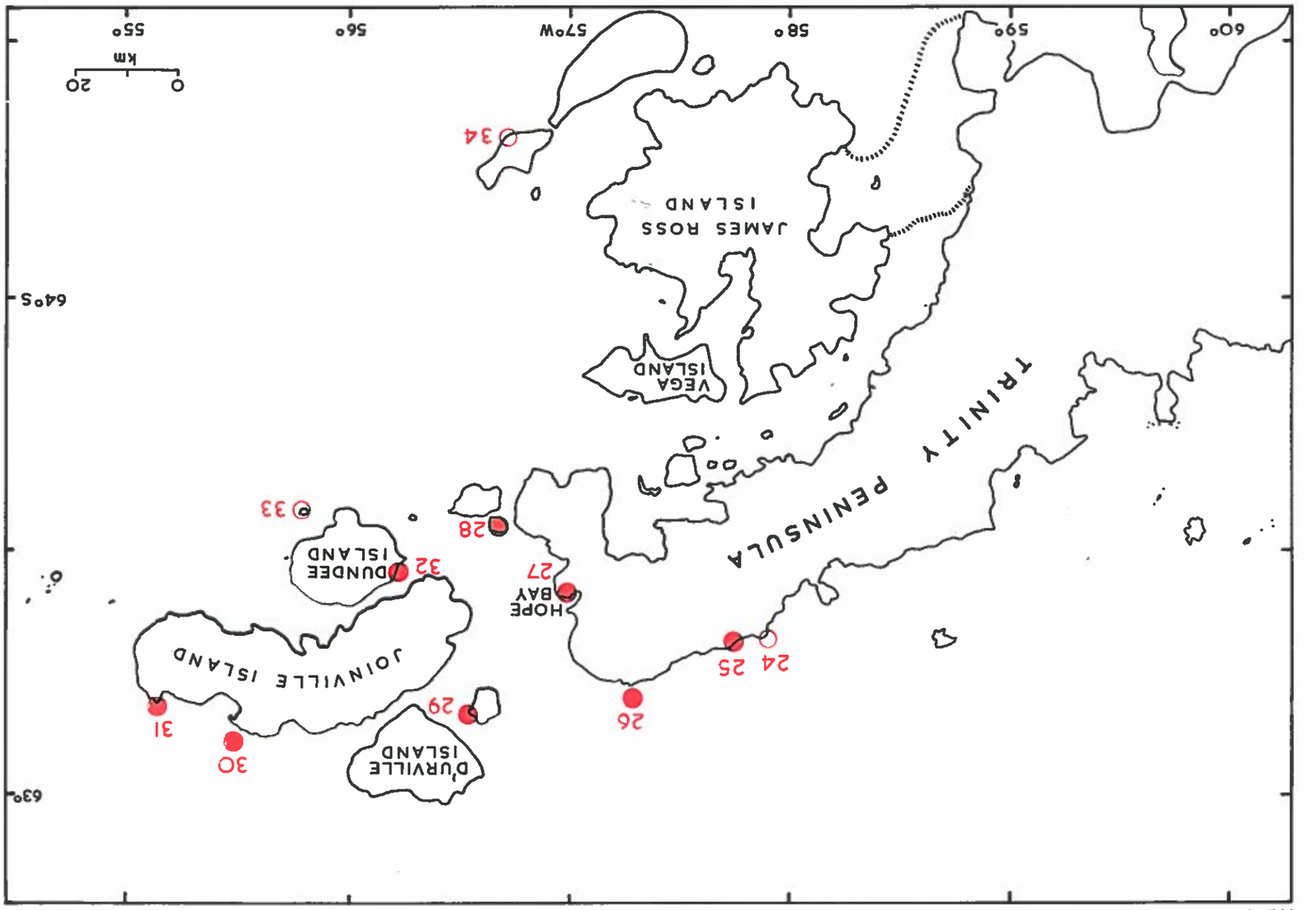
MAP 24.3

MAP 25

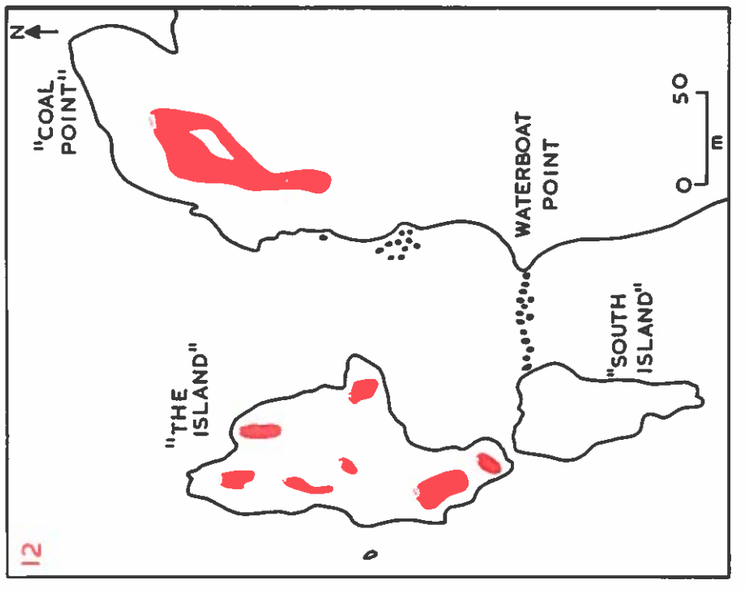


MAP 24.4

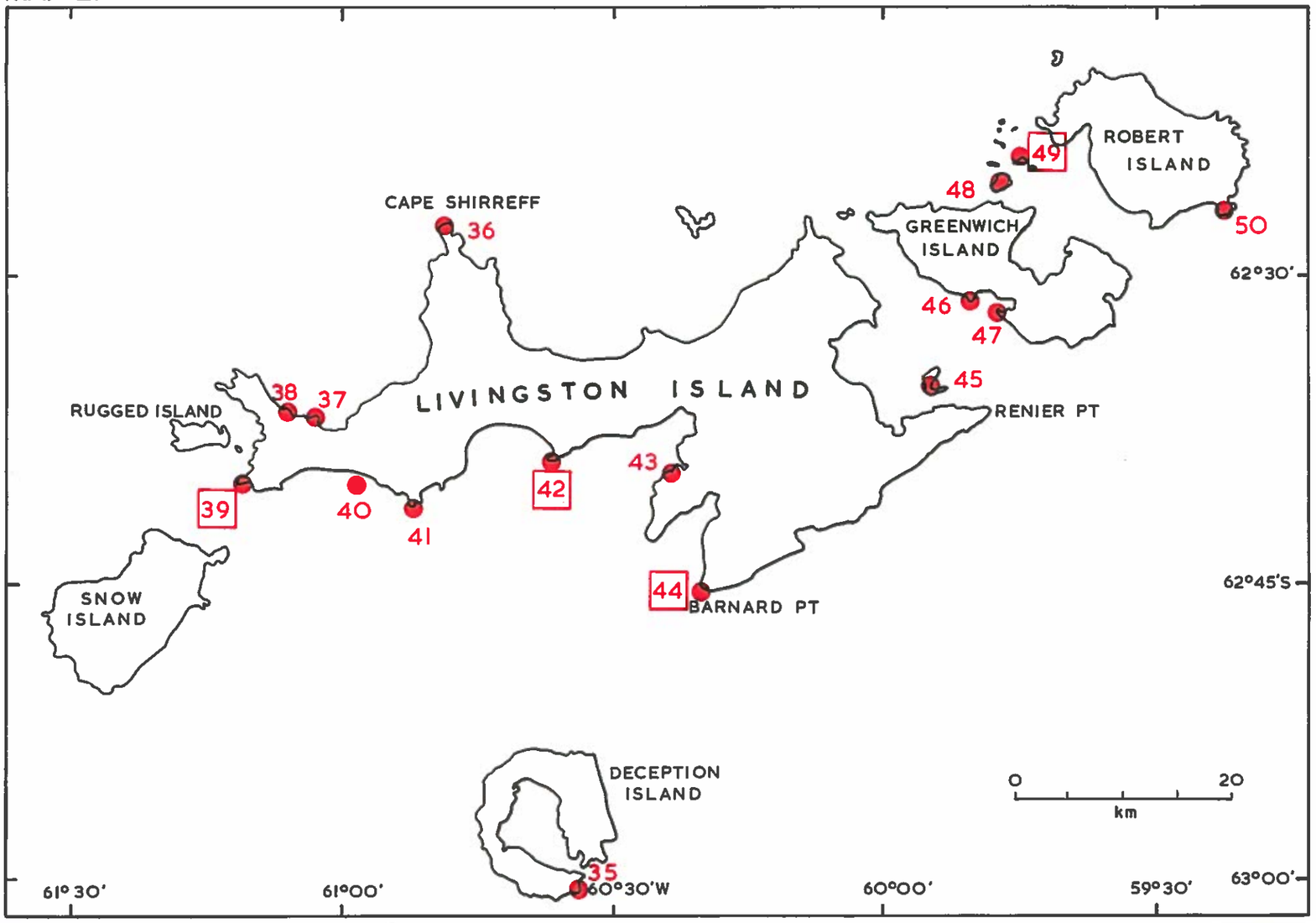
MAP 26



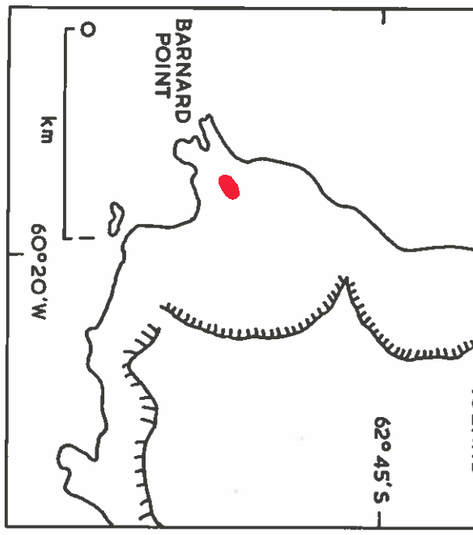
MAP 25.1



MAP 27



MAP 27.1



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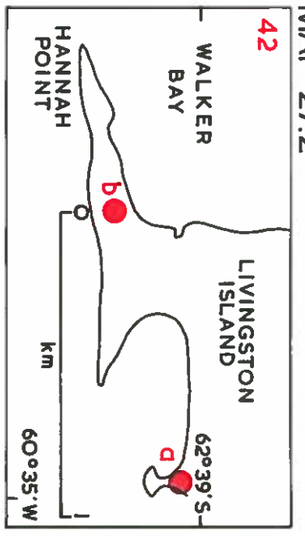
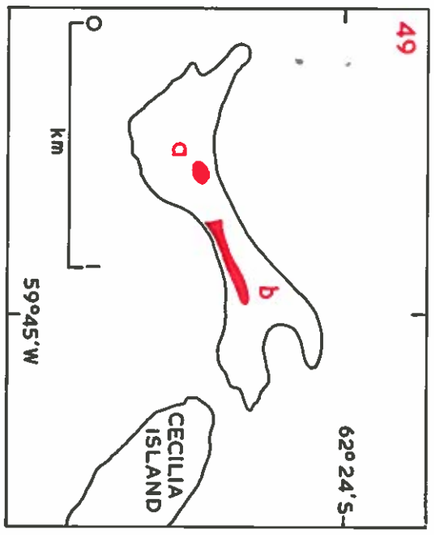
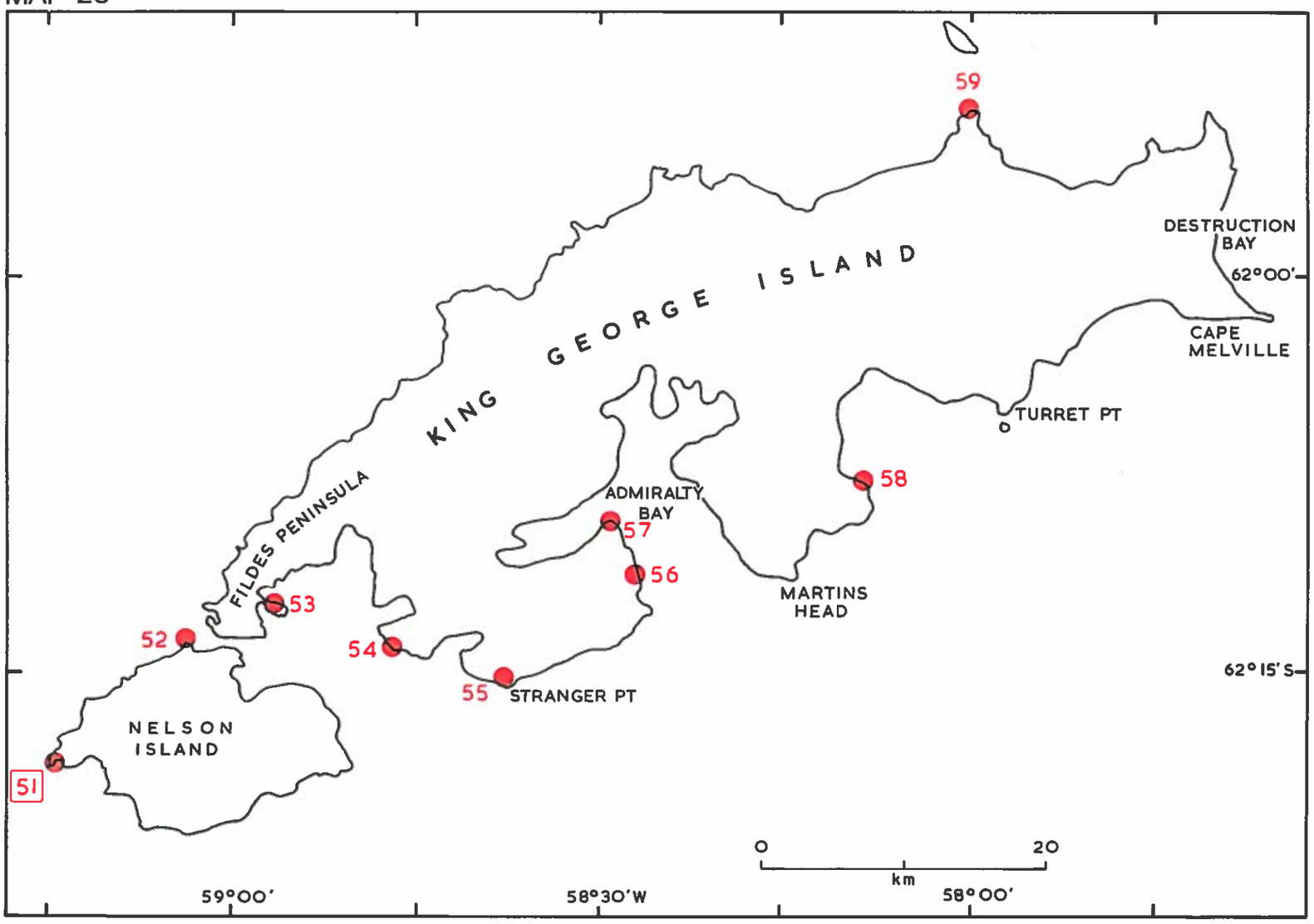


MAP 27.3

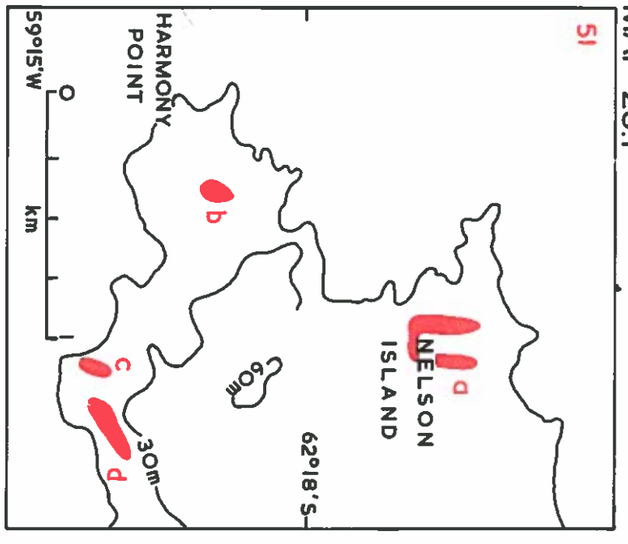
MAP 27.4

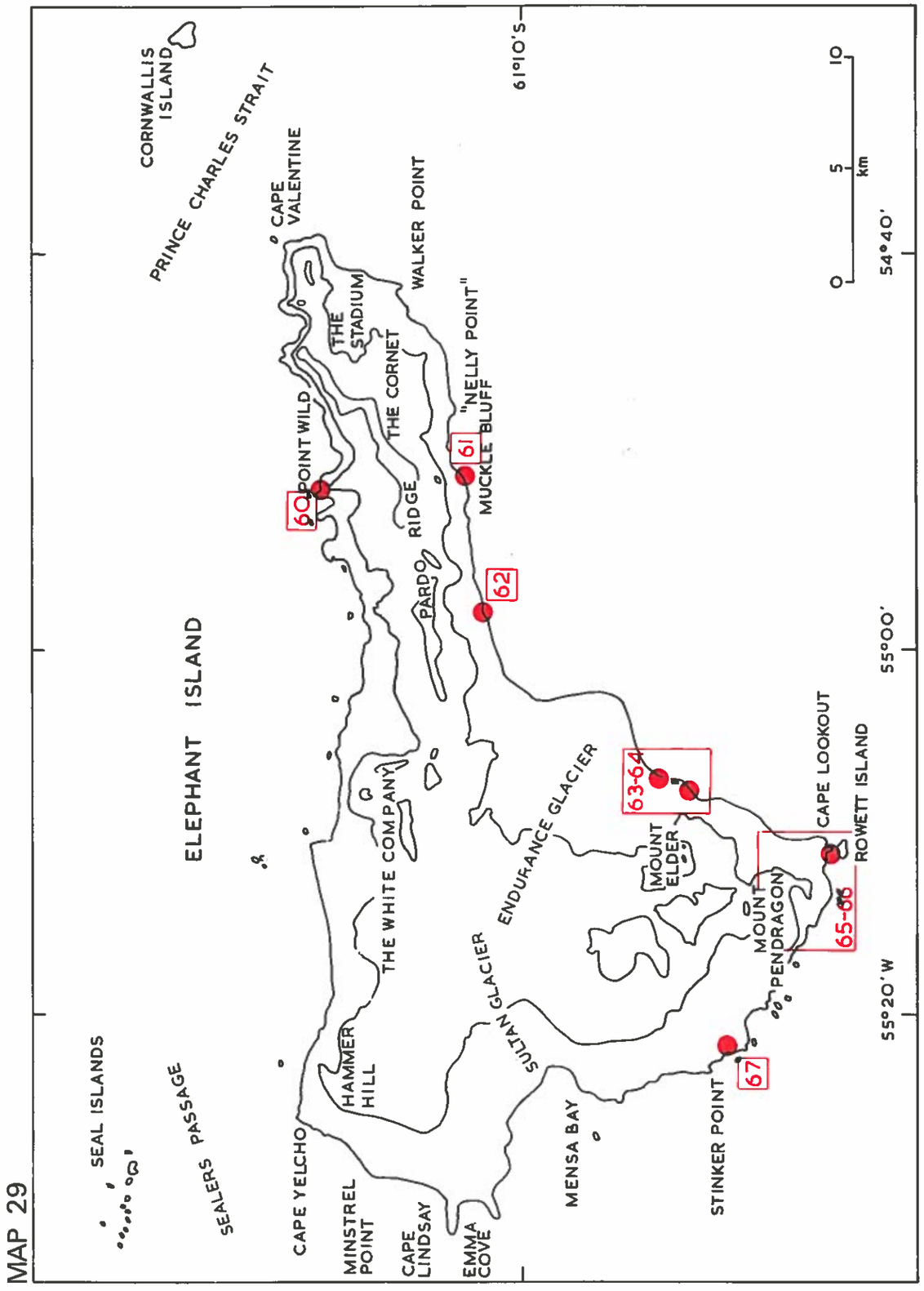


MAP 28

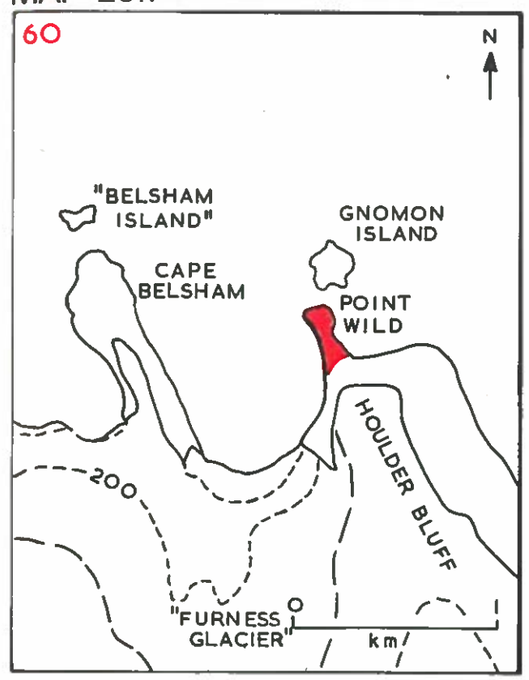


MAP 28.1





MAP 29.1



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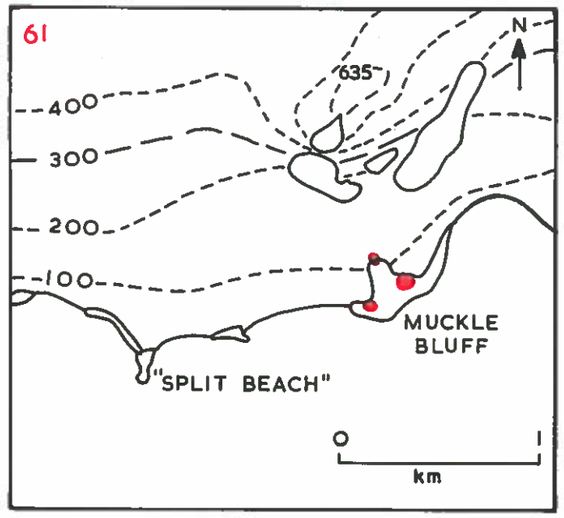

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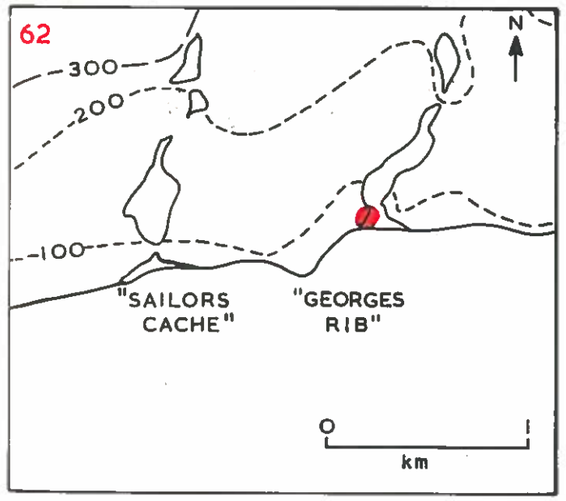

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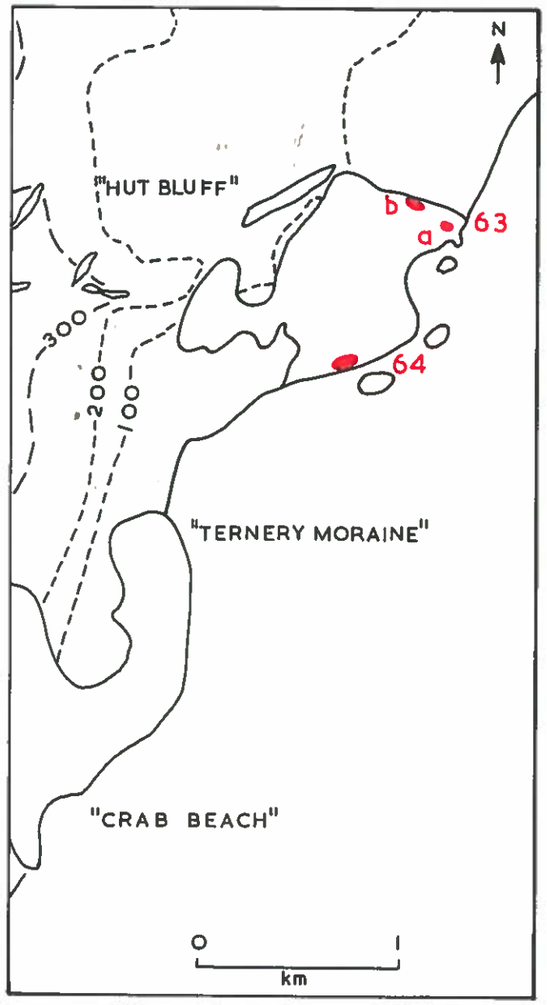
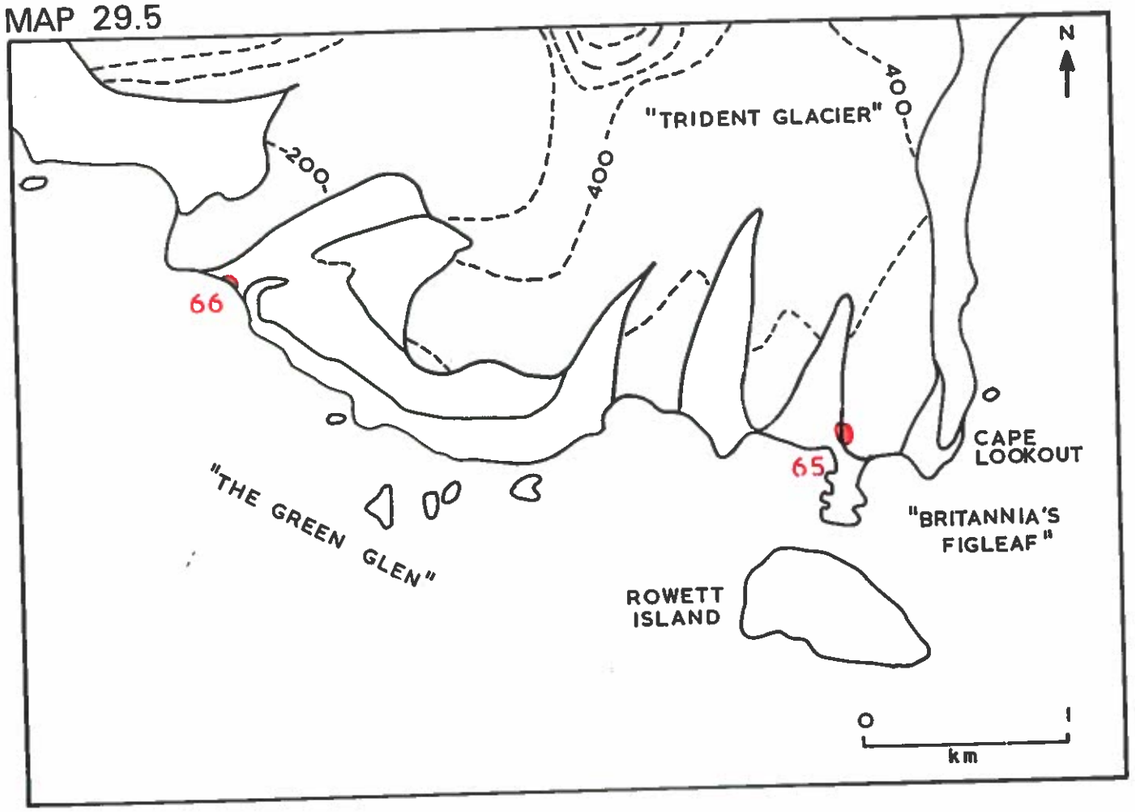


MAP 29.5



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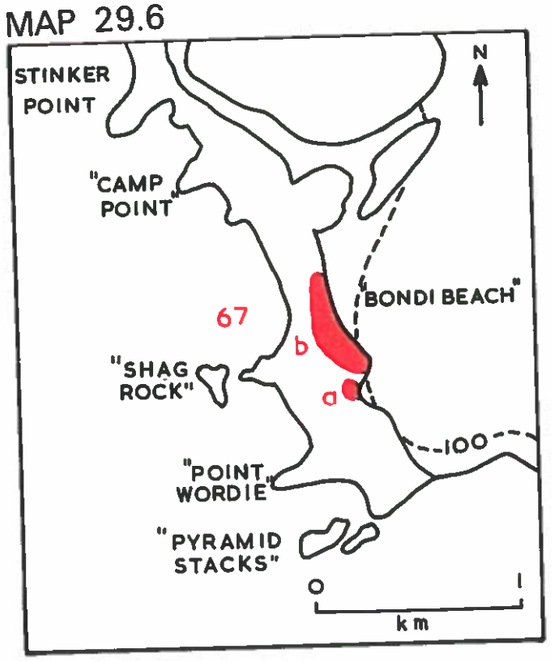
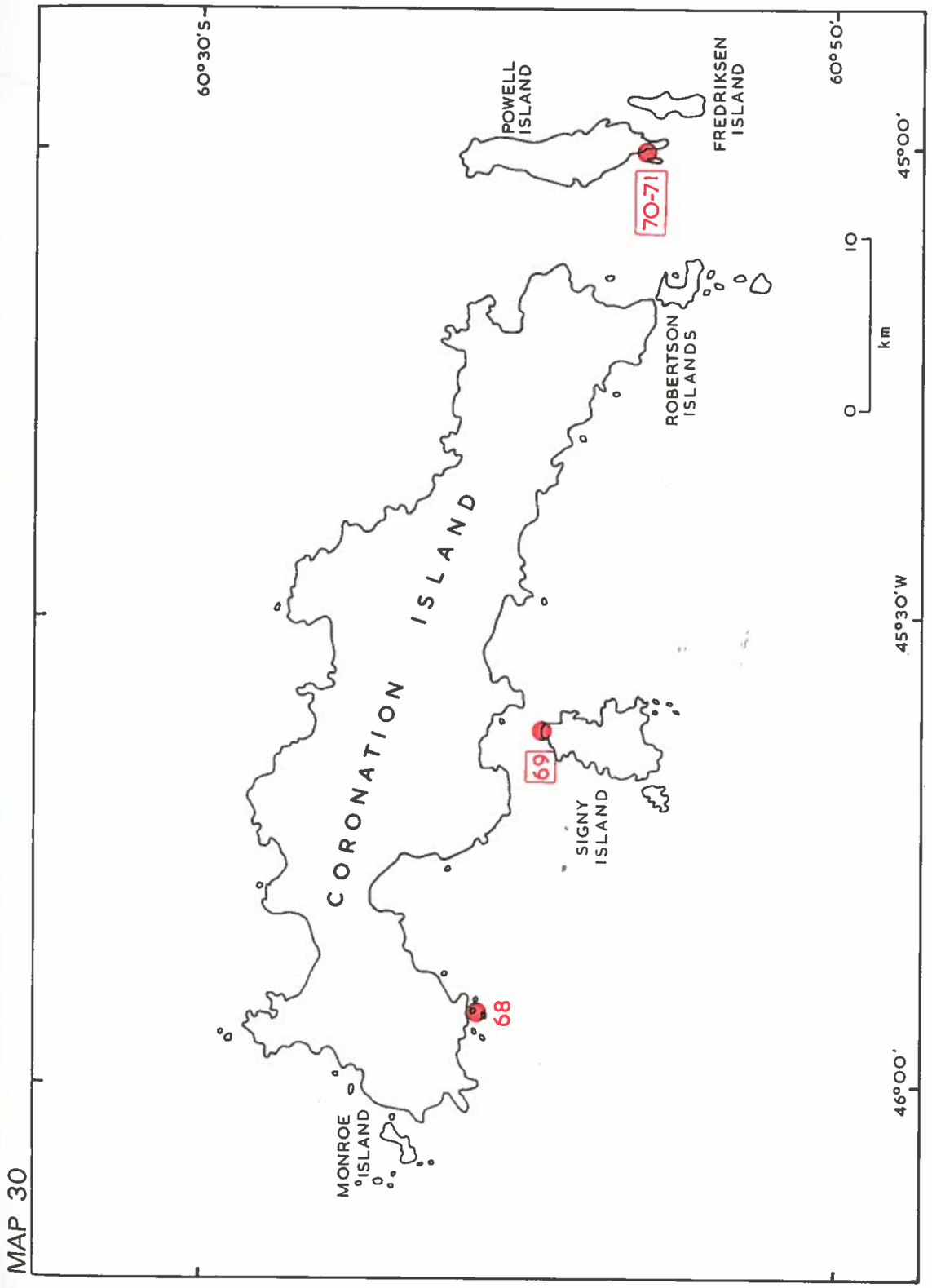
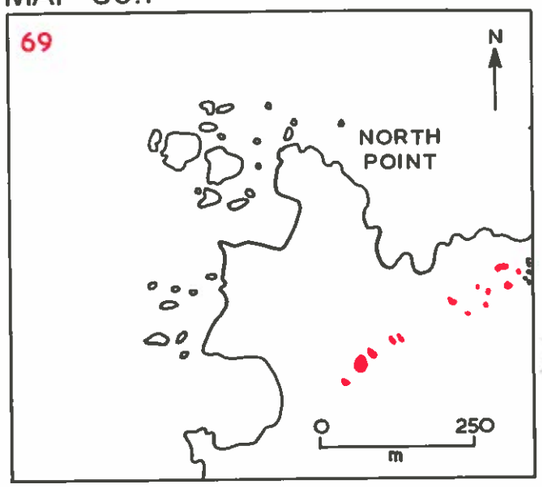


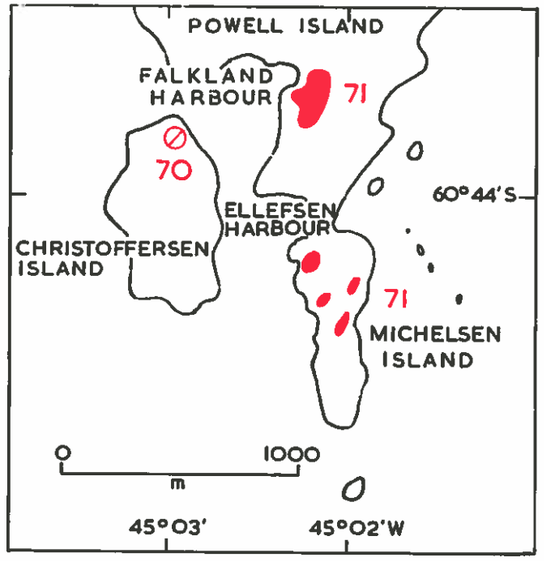


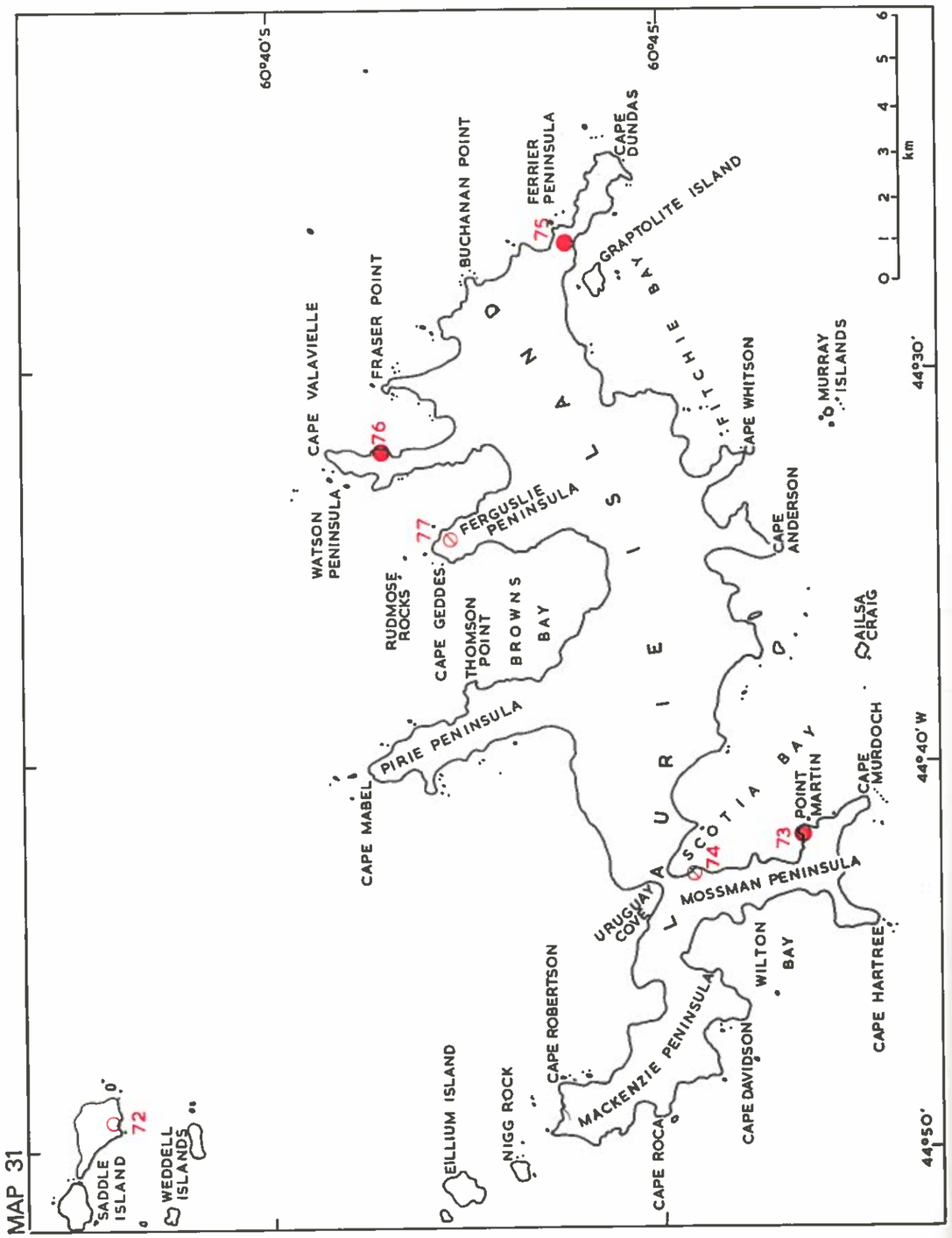
MAP 30

MAP 30.1



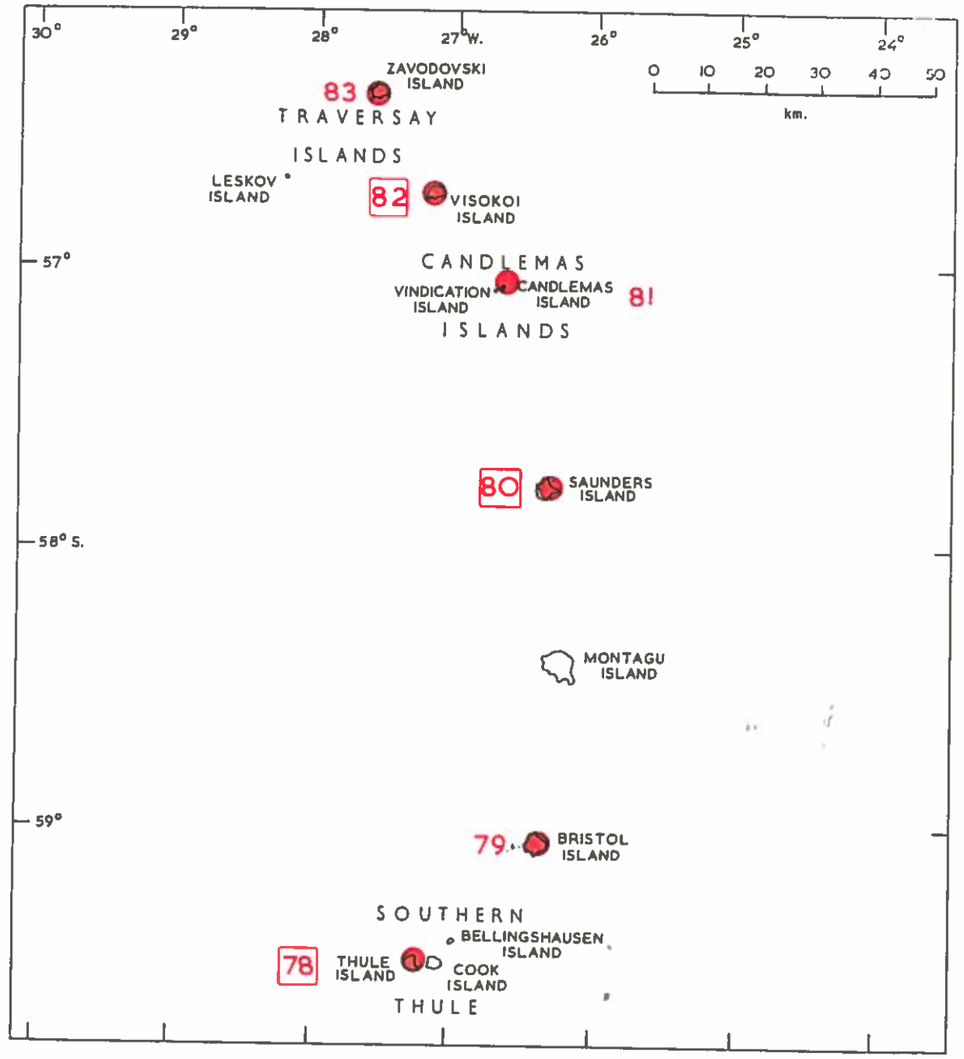
MAP 30.2



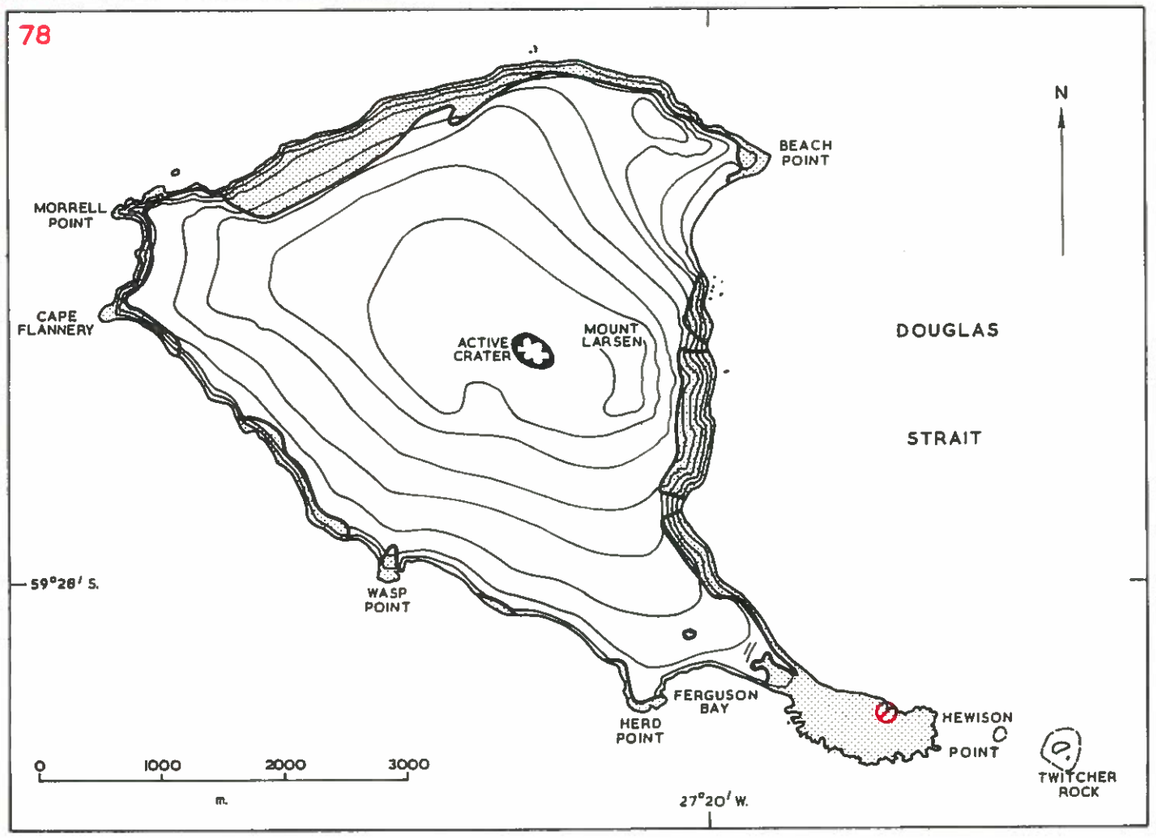


MAP 31

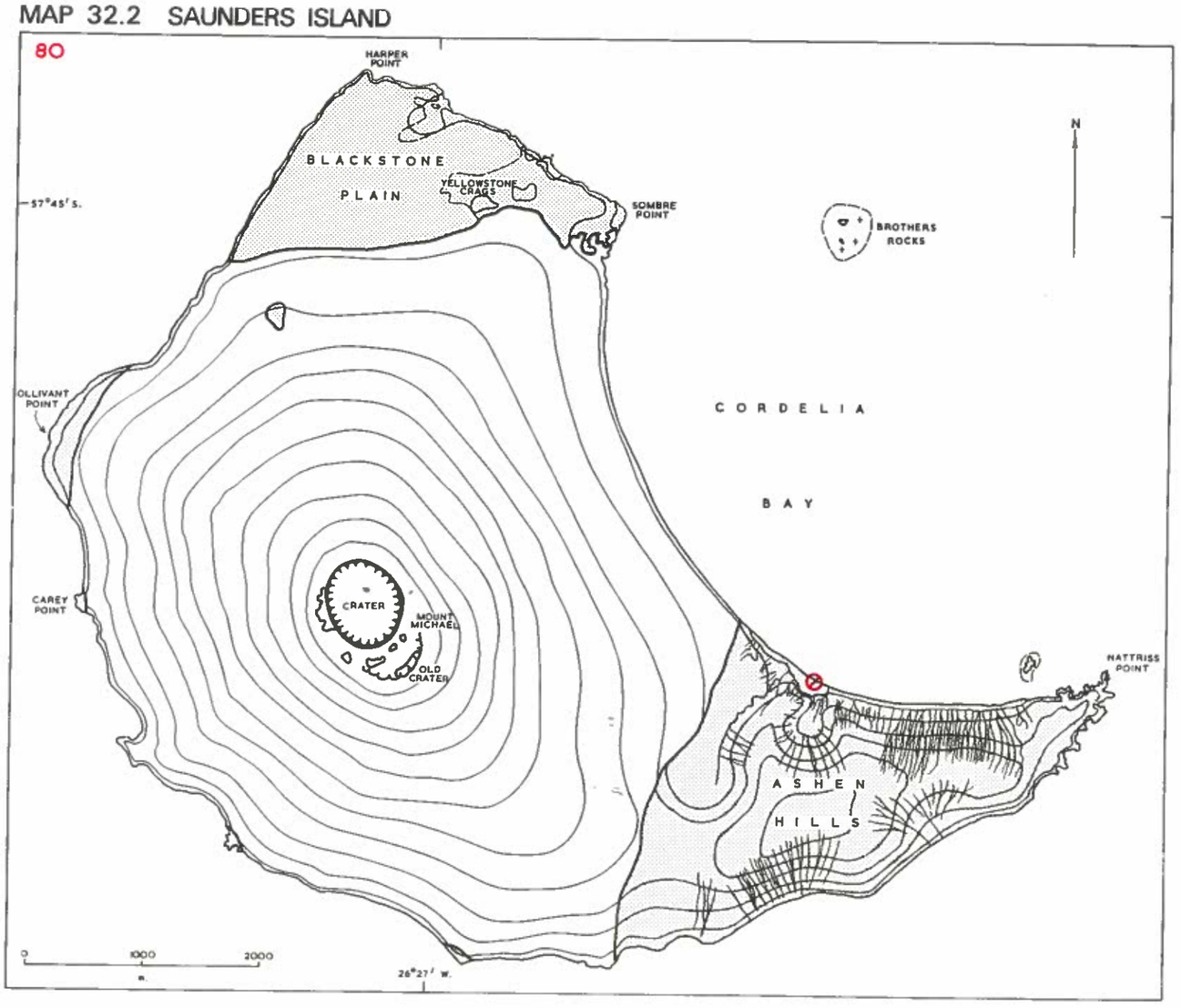
MAP 32 SOUTH SANDWICH ISLANDS

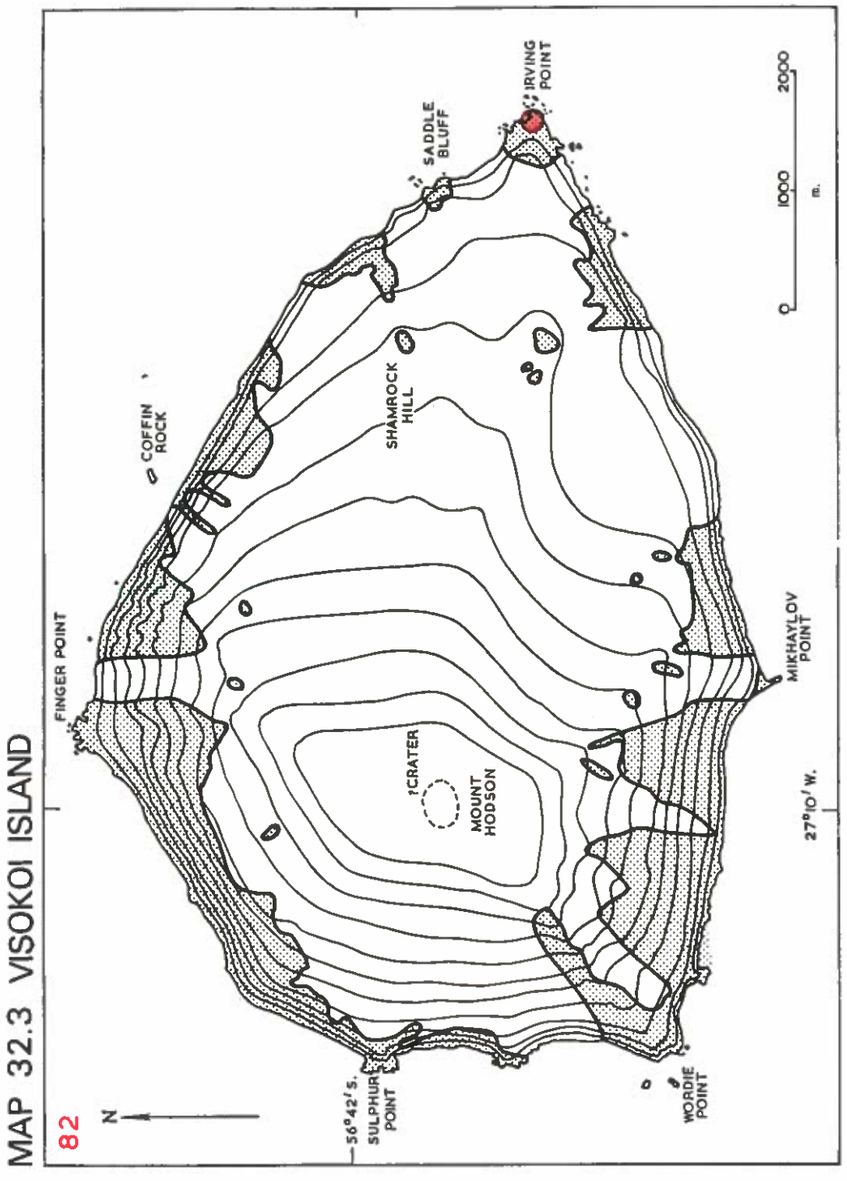


MAP 32.1 THULE ISLAND



MAP 32.2 SAUNDERS ISLAND





6. **Macaroni Penguin** *Eudyptes chrysolophus*

As a breeding species, this is virtually confined to the sub-Antarctic islands of the South Atlantic and South Indian Oceans. It is extremely abundant at South Georgia but much less so further south reaching its present southern limit of breeding at Deception Island, South Shetland Islands. It has the most northerly distribution of the penguins under detailed consideration here. On Macquarie Island, it is replaced by the closely similar (conspecific even) Royal Penguin *E. schlegeli*. This latter has been the subject of an extensive long-term population study (some details in Carrick and Ingham, 1970; Carrick, 1972) but aspects of the breeding biology of Macaroni Penguin have only been studied recently, at Marion Island (Williams and others, 1977) and South Georgia (Croxall, in prep.).

Quantitative studies of diet have been carried out at South Georgia (Croxall and Prince, in press *b*), where it takes both small and large krill *E. superba* and at the Elephant and Clarence Islands group (Croxall and Furse, in press), where medium-sized krill is the principal prey, although some fish is taken.

Like all eudyptid penguins, the first egg is significantly smaller than the second and there are no records of more than one egg surviving to hatching. At South Georgia, with vast colonies on steep slopes, egg mortality is high.

Although the present most southerly Macaroni Penguin colony is at Deception Island, in addition to the record for Hope Bay (see below) a number of Macaronis were seen around Snow Island on 25.1.1975 but breeding could not be confirmed (J. L. Smellie, pers. comm.).

1 HOPE BAY — MAP 33

Macaroni Penguins have been recorded breeding at Hope Bay by Olrog (1963) but there is no evidence of breeding in 1953 (Olrog, 1958) or in 1963 (Lefeuvre, 1963).

SOUTH SHETLAND ISLANDS

2 ENTRANCE POINT, DECEPTION ISLAND — MAP 34

Gain (1914) recorded a colony of 50 birds on 4.12.1909. Roberts (unpubl. data) saw no Macaronis there on 10.1.1936 or 16.1.1936.

3 MACARONI POINT, DECEPTION ISLAND — MAP 34

Count	*Nature*	*Date*	*Reference*
37	A3	1953-54	B.A.S. (P. O. White)
125	A3	1957	B.A.S. (P. O. White)

4 BAILY HEAD, DECEPTION ISLAND — MAP 34

Count	*Nature*	*Date*	*Reference*
750-1 000	N3	7-15.12.09	Gain, 1914
Several hundred	N5	1926-27	A. G. Bennett in B. B. Roberts, (unpubl. data)
100	N3	21.1.36	B. B. Roberts, (unpubl. data)
5	N1	1956-57	B.A.S. (P. O. White)
8	N1	1957-58	B.A.S. (P. O. White)

There would appear to have been quite a substantial decline at this site over the 50 years from 1909 and this may well have been due to volcanic activity.

5 HANNAH POINT — MAP 34

Count	*Nature*	*Date*	*Reference*
40	N3	Jan. 1958	B.A.S. (Tuffi)

6 HARMONY POINT — MAP 34

Andersson (1905) recorded Rockhopper Penguin *E. chrysocome* breeding here and Gain (1914) assumed that this was an error for Macaroni Penguin.

Araya and Aravena (1965) did not mention the species as occurring there in 1962 and 1964 and J. L. Smellie (pers. comm.) did not see any on 30.1.1976.

POINT THOMAS — MAP 34

Since the maps went to press a record of an observation of a single Macaroni Penguin chick at Point Thomas in Feb. 1976 by J. L. Smellie (pers. comm.) has been provided. He was also informed of the presence of another chick on the east coast of Dufayel Island, in Admiralty Bay.

ELEPHANT AND CLARENCE ISLANDS GROUP

7 ASPLAND ISLAND — MAP 35.1

Count	*Nature*	*Date*	*Reference*
21	N1	3-8.1.77	J.S.E.

8-9 GIBBS ISLAND — MAP 35.2

Locality		*Count*	*Nature*	*Date*	*Reference*
8 Central	a	10	N3/4	8.1-14.2.77	J.S.E.
	b	10	N3	,,	,,
9 East	a	1	N1	,,	,,
	b	1	N1	,,	,,
	c	500	N3/4	,,	,,
	d	200	N3	,,	,,
	e	200	N3/4	,,	,,
	f	750	N3/4	,,	,,

10-14 CLARENCE ISLAND — MAP 35.3

Locality		*Count*	*Nature*	*Date*	*Reference*
10 "Fur Seal Point"	a	7	N1	28.1-10.2.77	J.S.E.
	b	2	N1	,,	,,
11 "Pink Pool Point"	a	2	N1	16.12.76-3.1.77	,,
	b	1	N1	,,	,,
12 "Thunder Bay"		10	N3	,,	,,
13 "Pillar Ridge"	a	200	N3/4	3-20.1.77	,,
	b	1 000	N3/4	,,	,,
	c	650	N3/4	,,	,,
	d	1 500	N3/4	,,	,,
14 Chinstrap Cove		770	N3/4	,,	,,

15 SEAL ISLANDS — MAP 35

Count	*Nature*	*Date*	*Reference*
50+	N4	Dec. 1970	J.S.E.

16-23 ELEPHANT ISLAND — MAP 36

1. *Nest sites*

In general, Macaronis seemed to nest in very similar sites to Chinstraps, but preferring the rather steeper type of sites. Only one isolated nest was found on a sand beach (at "The Green Glen"; Map 36.4).

2. *Population and distribution*

The estimated total breeding population was 1 159 pairs. The ten proven colonies were all on the south coast, from "Stinker Point" to Walker Point. However, the north coast was not satisfactorily covered and there may have been colonies on Cape Lindsey, Penguin Island, "Saddleback Point," Cape Belsham, Point Wild, near "Point Inaccessible," and possibly even on "Decimal Point". See Chinstrap maps for location of these sites.

Locality	*Count*	*Nature*	*Date*	*Reference*
16 Cape Belsham	100	N5	4-8.3.71	J.S.E.

Macaronis were believed to breed here.
See Map 36.1.

Locality		*Count*	*Nature*	*Date*	*Reference*
17 Walker Point		45	N3	4.2-1.3.71	J.S.E.
18	a	50	N4	,,	,,
	b	80	N3	,,	,,

See Map 36.2.

Locality	*Count*	*Nature*	*Date*	*Reference*
19 "Crab Beach"	100	N3	6.12.70-3.1.71	J.S.E.

See Map 36.3.

Locality		*Count*	*Nature*	*Date*	*Reference*
20 Cape Lookout	a	150	N3	6.12.70-3.1.71	J.S.E.
	b	101	N1	,,	,,
	c	2	N1	,,	,,
	d	20	N3	,,	,,
21 "Britannia's Figleaf"		60	N3	,,	,,
22 "The Green Glen"	a	1	N1	,,	,,
	b	250	N3	,,	,,

See Map 36.4.

Locality	*Count*	*Nature*	*Date*	*Reference*
23 "Pyramid Stacks"	200	N3	3-19.1.71	J.S.E.

See Map 36.5.

24 THE DIVIDE, MATTHEWS ISLAND — MAP 37

R. I. L. Smith (pers. comm.) noted one pair at The Divide (see Map 19.2) in the early 1970's.

25 NORTH POINT — MAP 37

Count	*Nature*	*Date*	*Reference*
2	N1	5.1.64	B.A.S. (Burton)
5	N1	1967-68	Conroy, 1969
4	N1	1968-69	Conroy, 1969
5	N1	Dec. 1978	Rootes, 1978

A very few pairs have bred at this site in most years since the early 1960's.

26 SPINDRIFT ROCKS — MAP 37

Count	*Nature*	*Date*	*Reference*
1	N1	Nov. 1978	Rootes, 1978

27 MOYES POINT — MAP 37

Count	*Nature*	*Date*	*Reference*
1	N1	12.2.79	Rootes, 1978

28 GOURLAY PENINSULA — MAP 37

a. *Gourlay Point*

Count	*Nature*	*Date*	*Reference*
2	N1	Dec. 1978	Rootes, 1978

b. *Pantomime Point*

Count	*Nature*	*Date*	*Reference*
1	N1	Dec. 1978	Rootes, 1978

29 MICHELSEN ISLAND — MAP 37

Count	*Nature*	*Date*	*Reference*
3	N1	5-17.12.57	B.A.S. (Scotland)
3	N1	27.1-7.2.65	B.A.S. (R. I. L. Smith)

30 POINT MARTIN — MAP 37

Smith reported two adults and two immatures at this site but breeding was not conclusively proven.

31 THULE ISLAND — MAP 38.1

Holdgate and Baker (1979) reported the species to occur at Hewison Point in lesser numbers than Chinstraps in March 1964.

32 BELLINGSHAUSEN ISLAND — MAP 38.2

Holdgate and Baker (1979) recorded small scattered groups of Macaronis amongst the Chinstrap along the lava plain in the south and along the slopes above Hardy Point, there being about 100 pairs on the island.

33 BRISTOL ISLAND — MAP 38.3

A few Macaronis were conspicuous on Freezland Rock (Holdgate and Baker, 1979).

34 MONTAGU ISLAND — MAP 38.4

Holdgate and Baker (1979) found two pairs of Macaroni Penguins with chicks at Horsburgh Point in March 1964.

35 SAUNDERS ISLAND — MAP 38.5

a. *Blackstone Plain*

Count	*Nature*	*Date*	*Reference*
25-50	A4	Mar. 1962	Holdgate and Baker, 1979

b. *Yellowstone Crags*

Count	*Nature*	*Date*	*Reference*
25-50	A4	Mar. 1964	Holdgate and Baker, 1979

c. *Nattriss Point*

Count	*Nature*	*Date*	*Reference*
25-50	A4	Mar. 1964	Holdgate and Baker, 1979

36 VINDICATION ISLAND — MAP 38.6

Count	*Nature*	*Date*	*Reference*
50-100	A4	Mar. 1964	Holdgate and Baker, 1979

Small groups of Macaronis amongst the Chinstrap Penguins on Chinstrap Point.

37 CANDLEMAS ISLAND — MAP 38.7

Count	*Nature*	*Date*	*Reference*
c. 30	A4	Mar. 1964	Holdgate and Baker, 1979

The Macaronis were present among the Chinstrap on Clapmatch Point.

38 VISOKOI ISLAND MAP 38.8

a. *Finger Point*

Holdgate and Baker (1979) reported a few seen amongst the Chinstrap Penguins in March 1964.

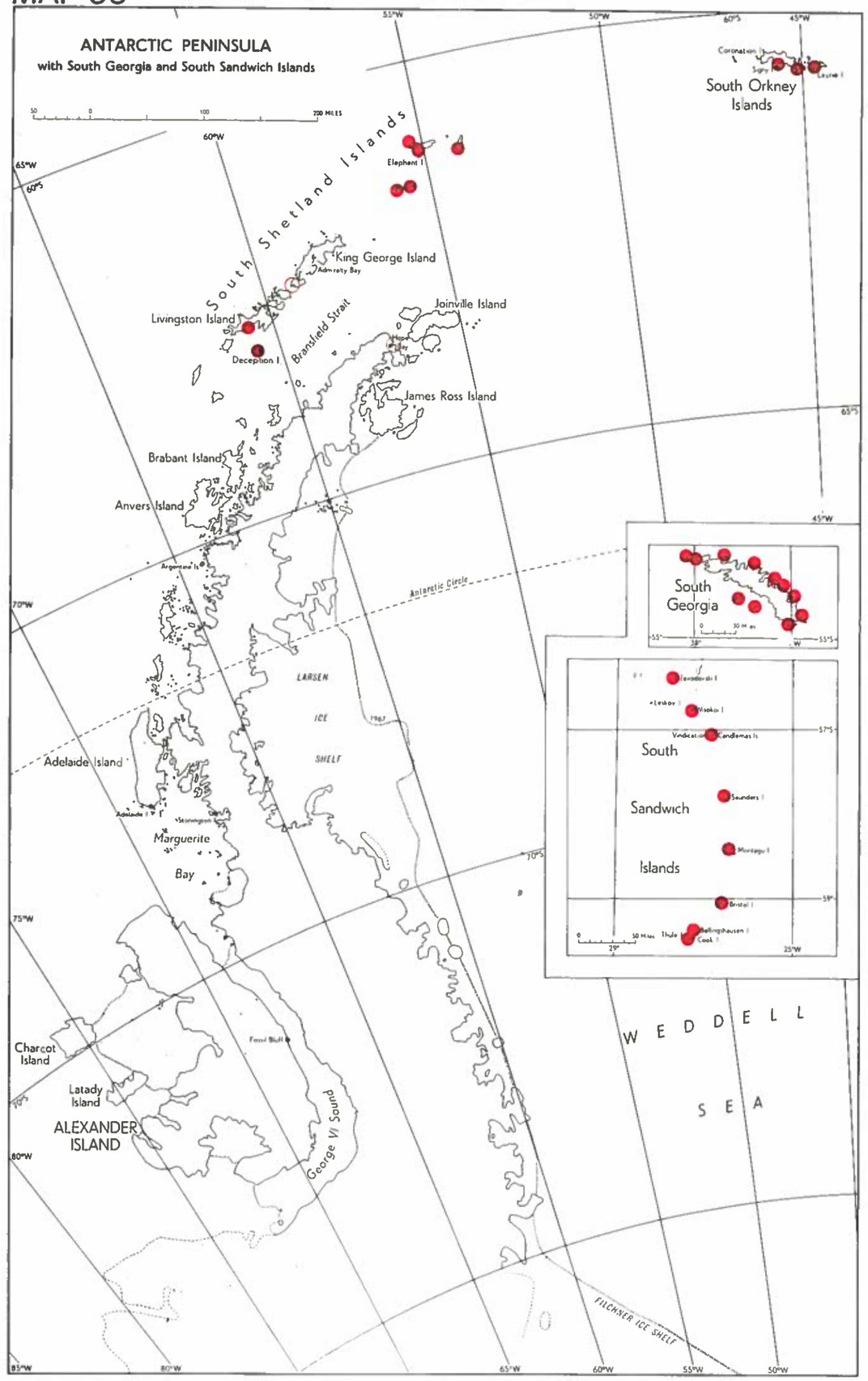
b. *Irving Point*

In March 1964 Holdgate and Baker (1979) reported that some were present among the Chinstrap colony.

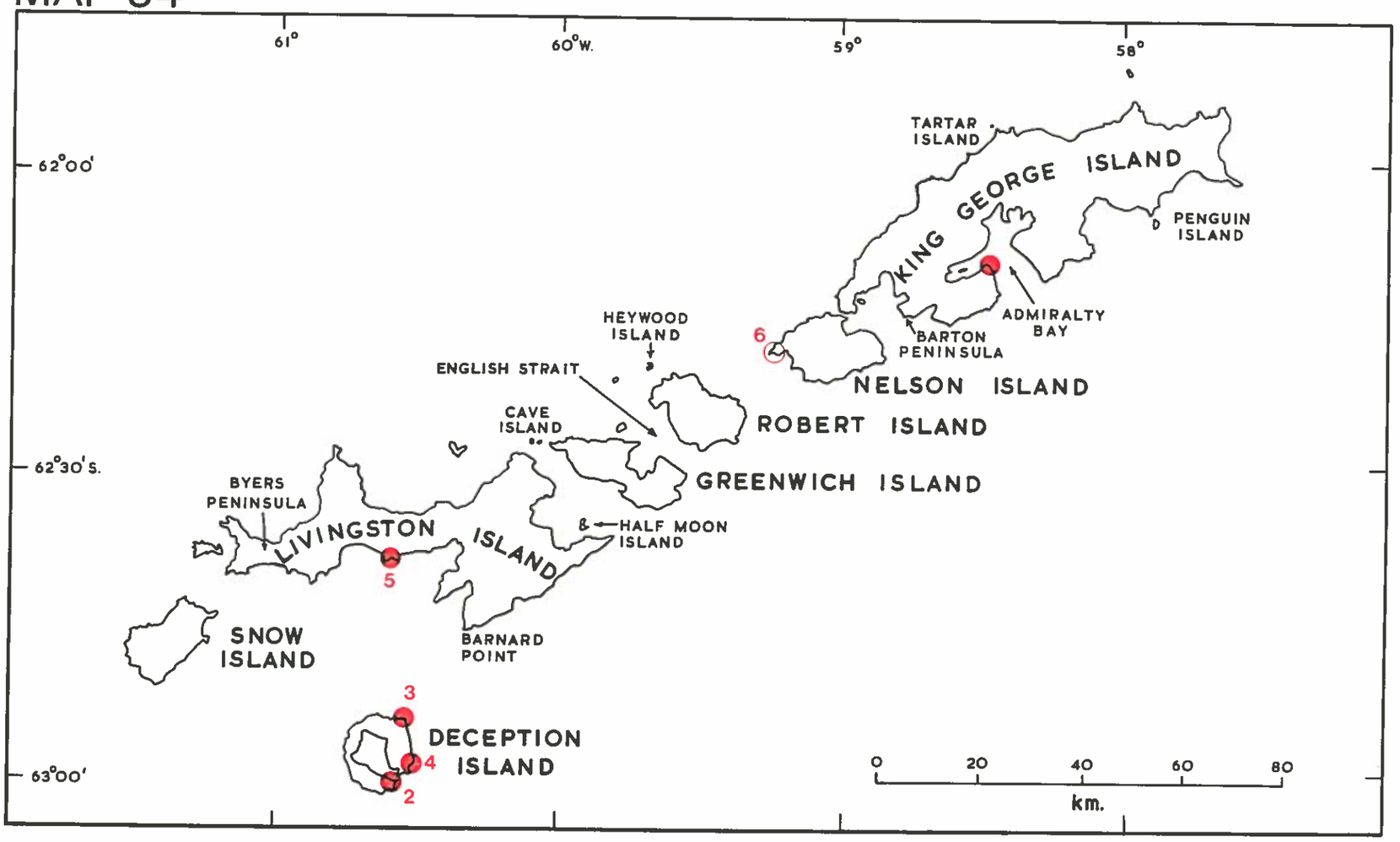
39 ZAVODOVSKI ISLAND MAP 38

Larsen (1908) reported thousands of penguins on this island, with Macaroni the most numerous.

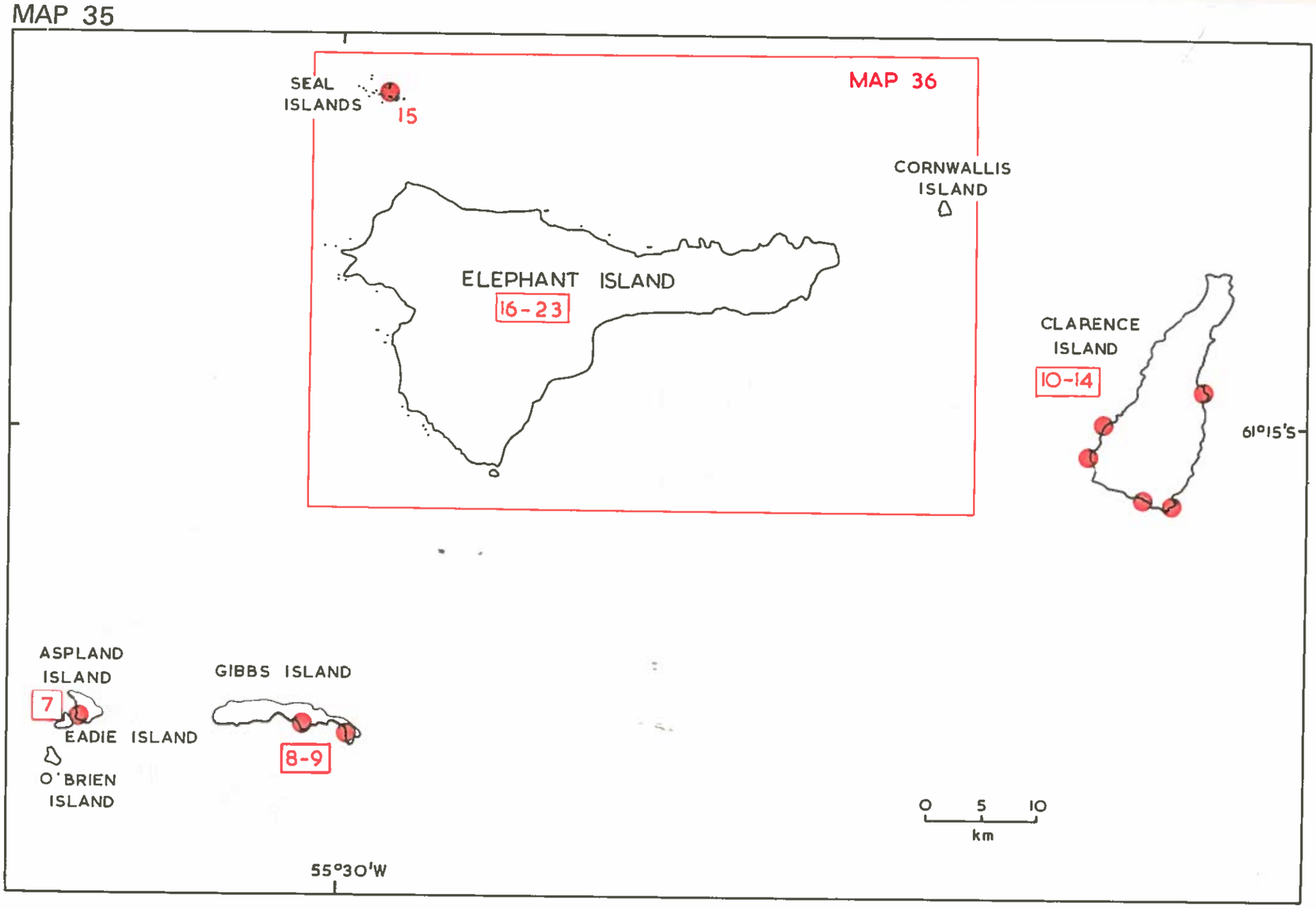
MAP 33



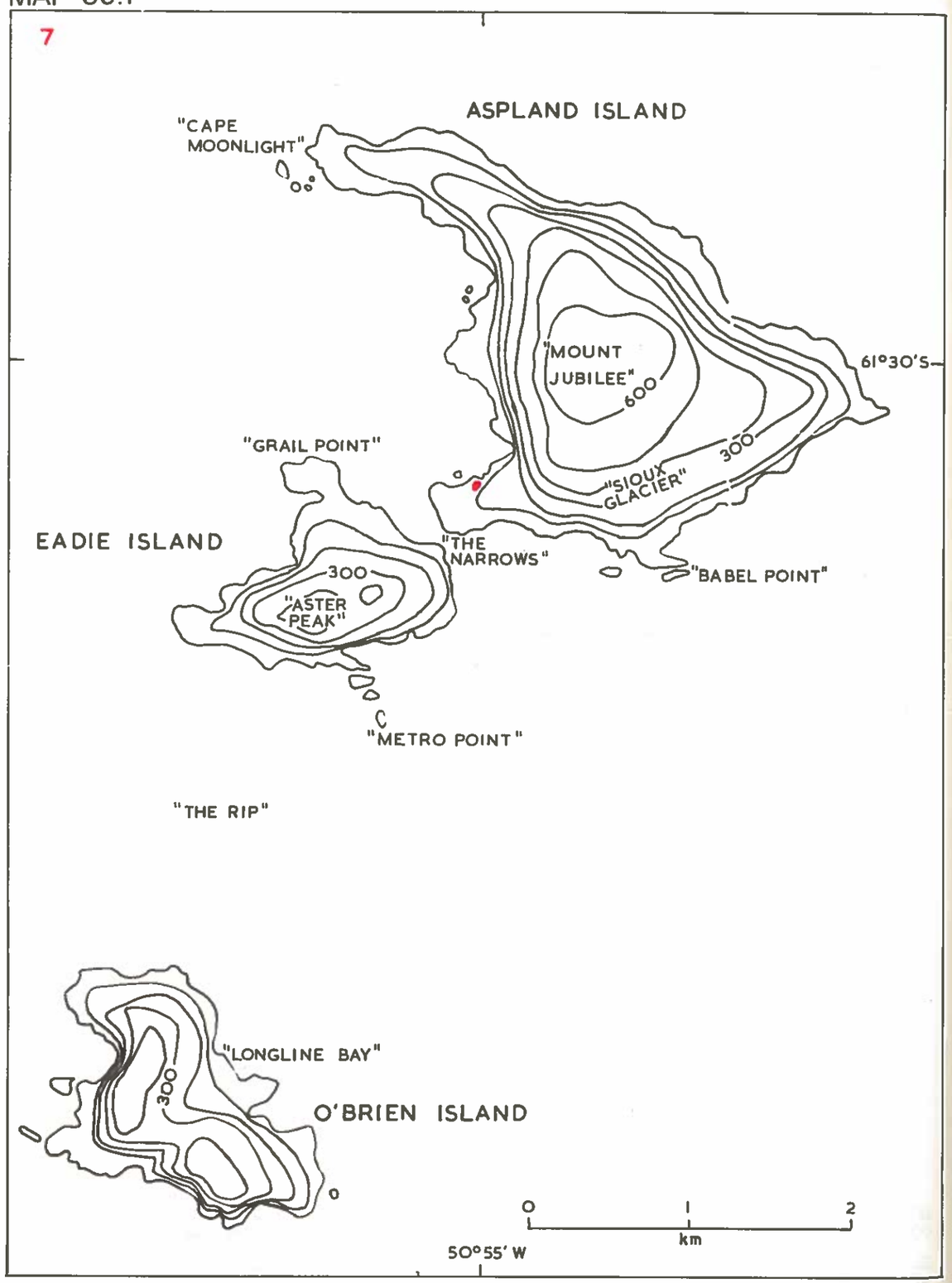
MAP 34


61°
60°W.
59°
58°
62°00'
62°30'S.
63°00'
TARTAR ISLAND
KING GEORGE ISLAND
PENGUIN ISLAND
ADMIRALTY BAY
BARTON PENINSULA
6
NELSON ISLAND
HEYWOOD ISLAND
ENGLISH STRAIT
CAVE ISLAND
ROBERT ISLAND
GREENWICH ISLAND
BYERS PENINSULA
LIVINGSTON ISLAND
HALF MOON ISLAND
5
SNOW ISLAND
BARNARD POINT
3
DECEPTION ISLAND
4
2
0 20 40 60 80
km

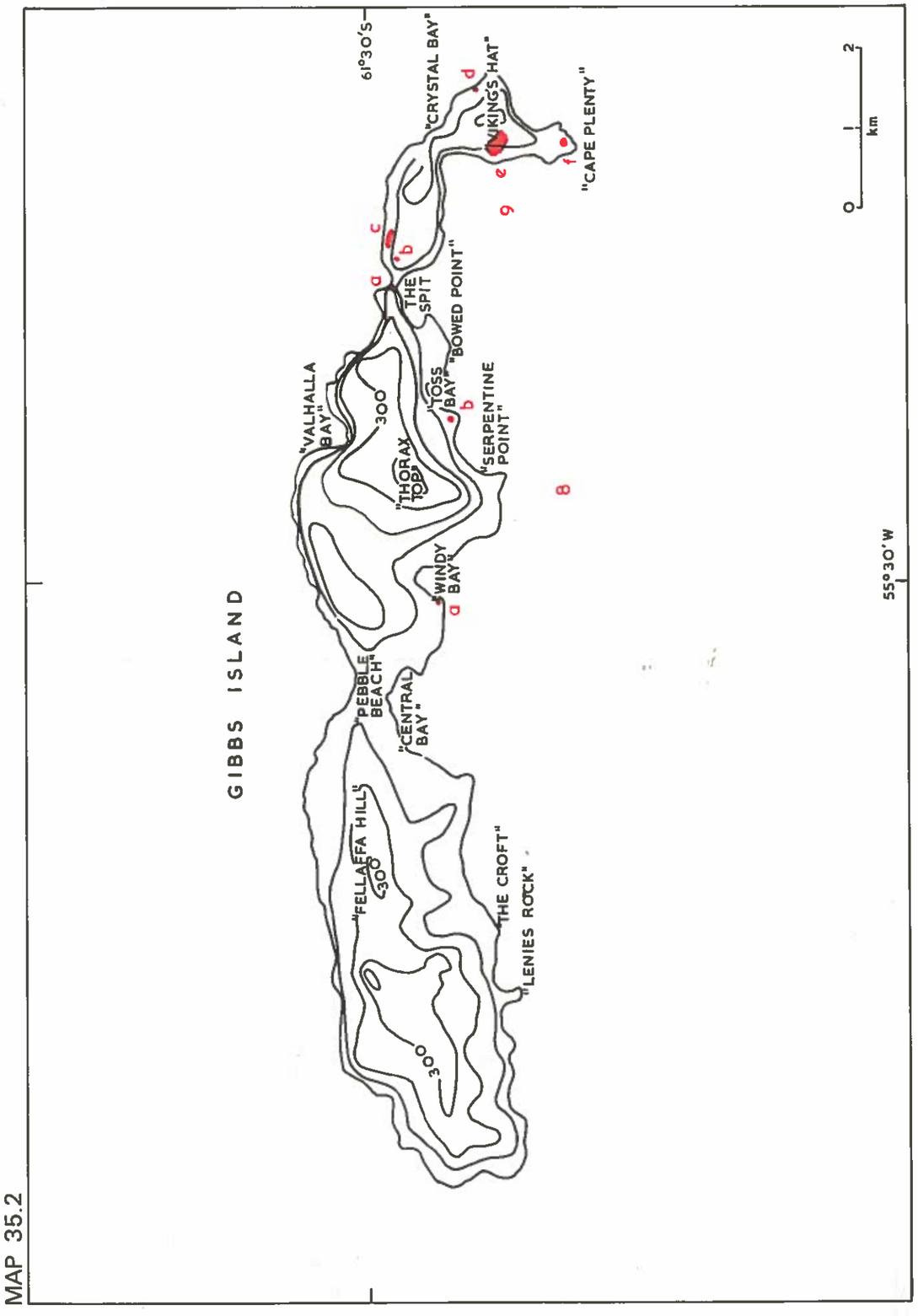
MAP 35


MAP 36
SEAL ISLANDS
15
CORNWALLIS ISLAND
ELEPHANT ISLAND
16-23
CLARENCE ISLAND
10-14
61°15'S
ASPLAND ISLAND
7
EADIE ISLAND
O'BRIEN ISLAND
GIBBS ISLAND
8-9
0 5 10
km
55°30'W

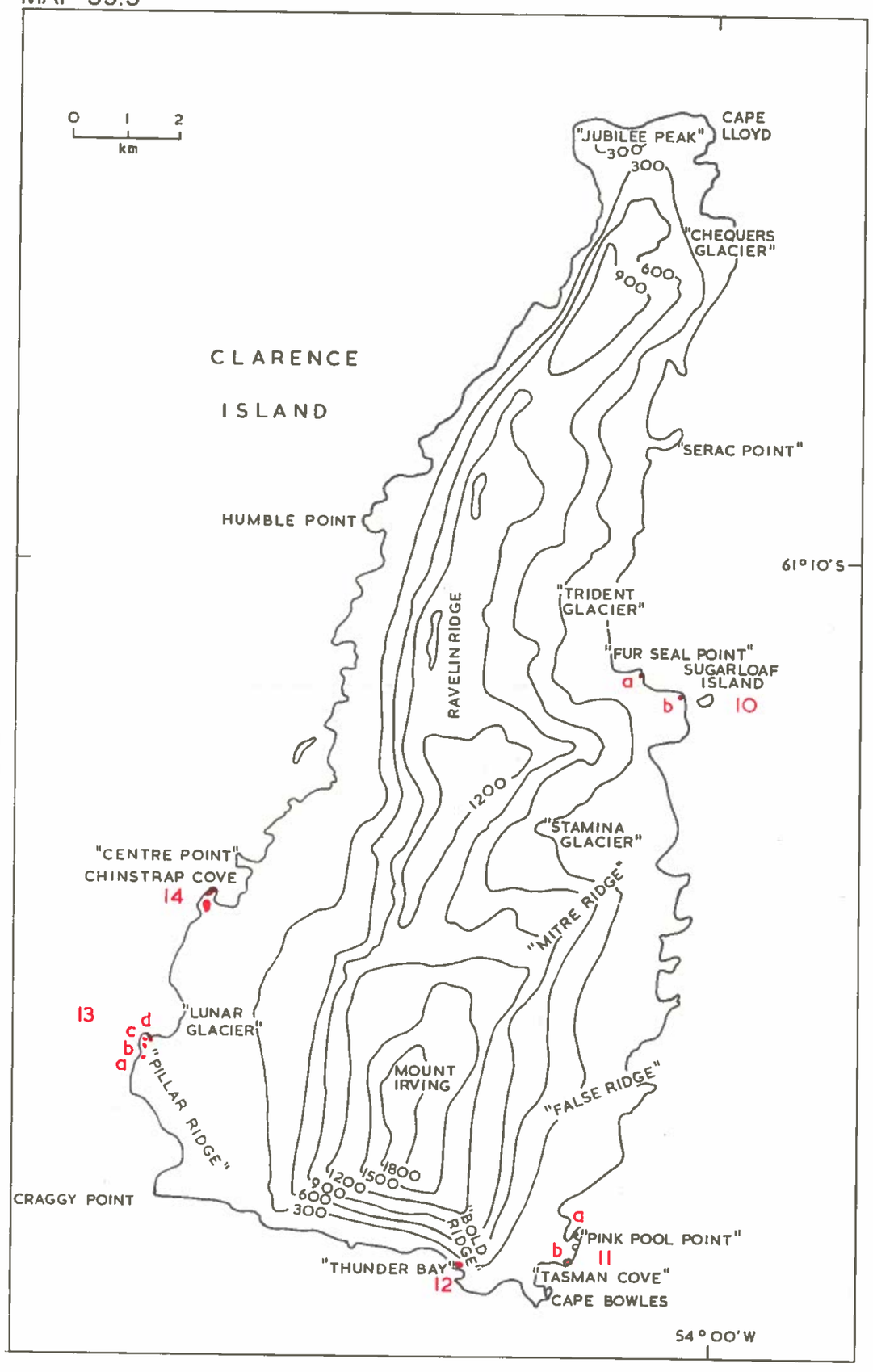
MAP 35.1

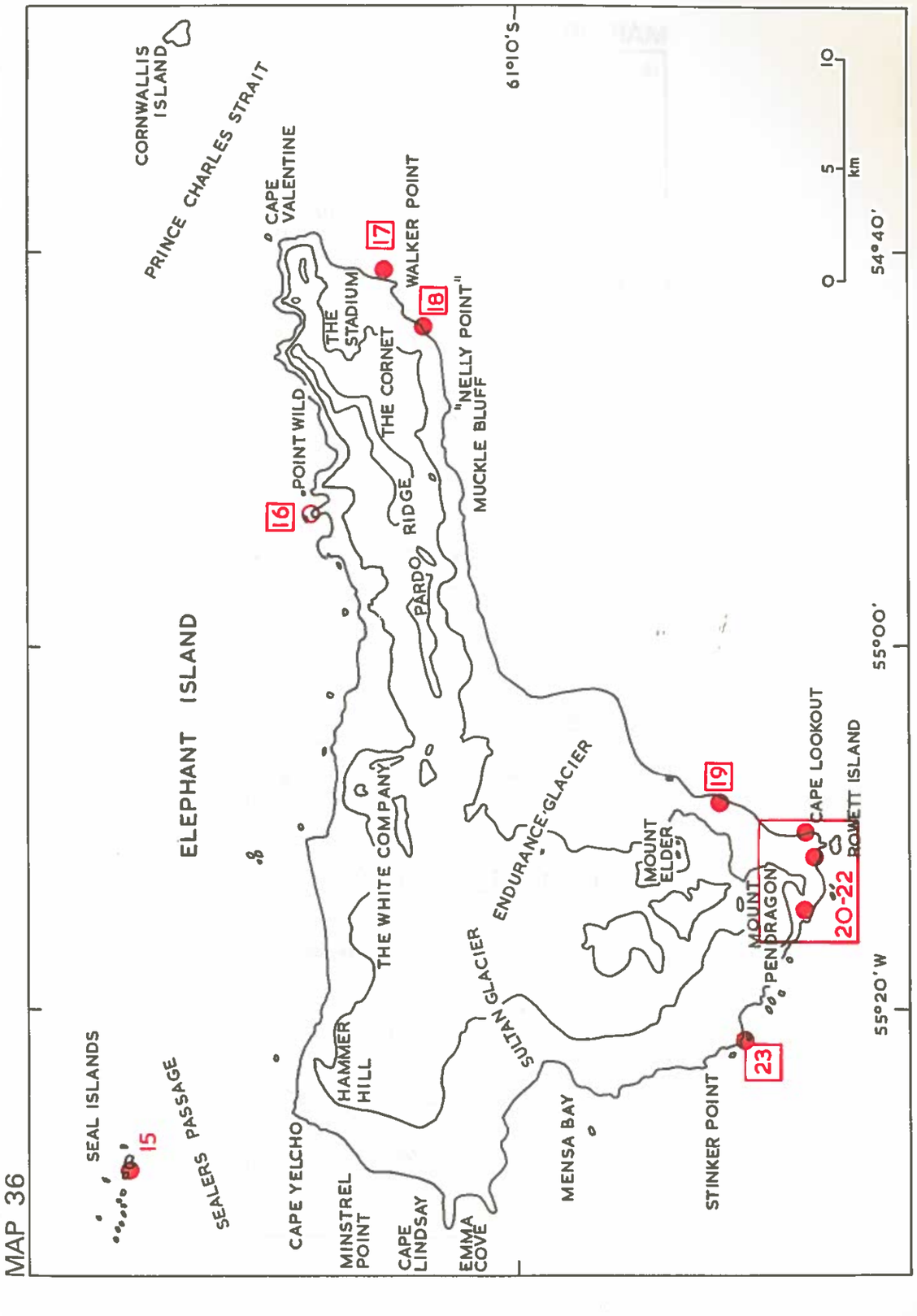


MAP 35.2

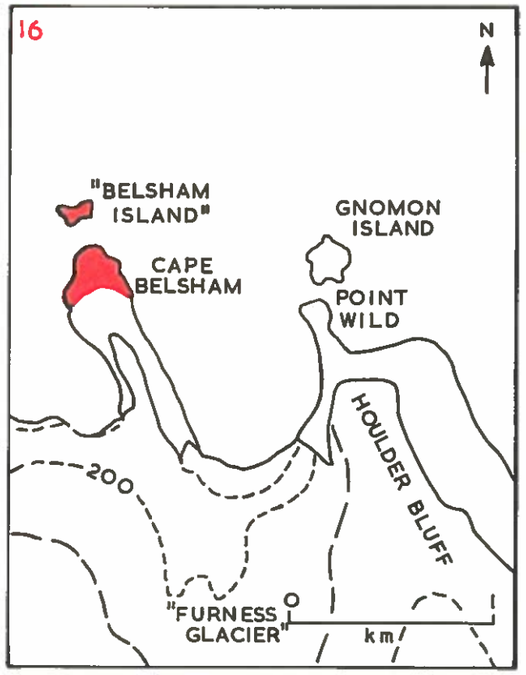


MAP 35.3

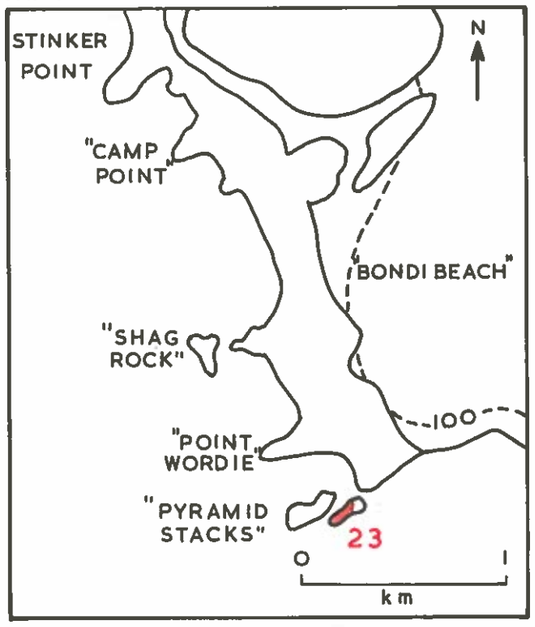

0 1 2
km
"JUBILEE PEAK"
CAPE LLOYD
300
300
"CHEQUERS GLACIER"
600
900
CLARENCE ISLAND
"SERAC POINT"
HUMBLE POINT
61°10'S
"TRIDENT GLACIER"
RAVELIN RIDGE
"FUR SEAL POINT"
SUGARLOAF ISLAND
a
b
10
1200
"STAMINA GLACIER"
"CENTRE POINT"
CHINSTRAP COVE
14
"MITRE RIDGE"
13
"LUNAR GLACIER"
a b c d
"PILLAR RIDGE"
MOUNT IRVING
"FALSE RIDGE"
1800
1500
1200
900
600
300
CRAGGY POINT
"BOLD RIDGE"
a
"PINK POOL POINT"
b
11
"THUNDER BAY"
12
"TASMAN COVE"
CAPE BOWLES
54°00'W

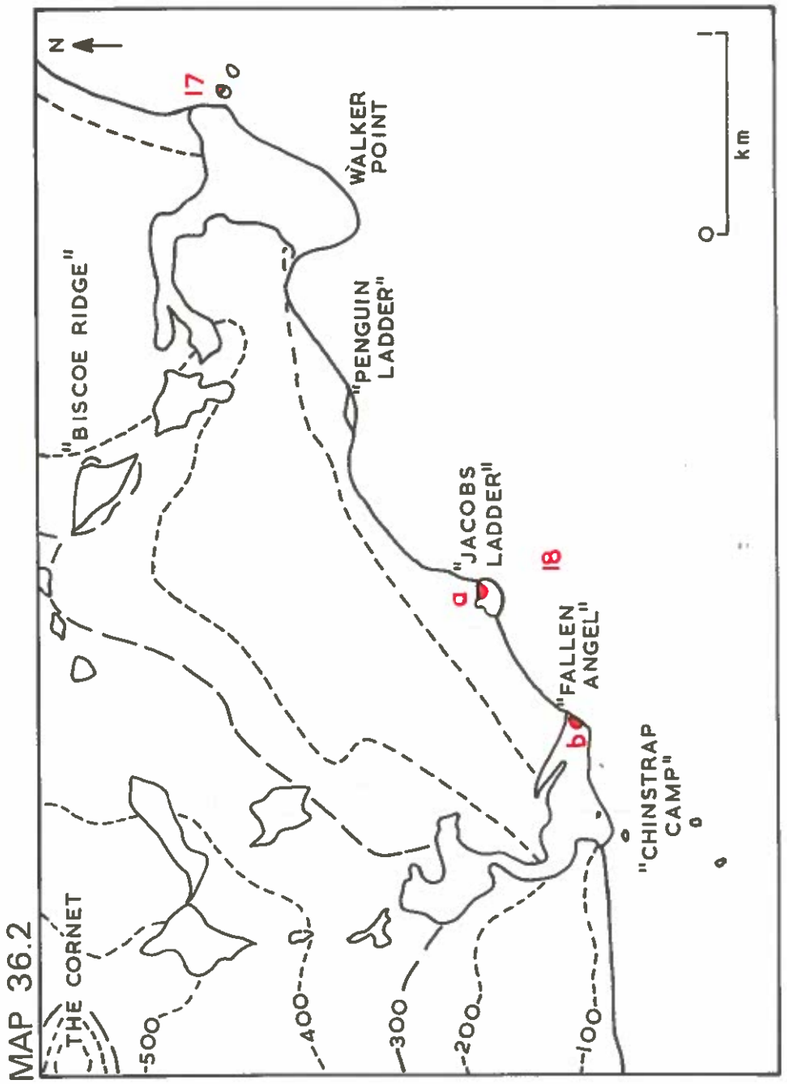

CORNWALLIS ISLAND
PRINCE CHARLES STRAIT
CAPE VALENTINE
61°10'S
0 5 10
km
54°40'
17
WALKER POINT
18
THE STADIUM
"NELLY POINT"
THE CORNET
MUCKLE BLUFF
16
POINT WILD
RIDGE
PARDO
55°00'
ELEPHANT ISLAND
19
CAPE LOOKOUT
MOUNT ELDER
ENDURANCE GLACIER
THE WHITE COMPANY
ROWETT ISLAND
MOUNT PENDRAGON
20-22
SULTAN GLACIER
55°20'W
SEAL ISLANDS
15
SEALERS PASSAGE
HAMMER HILL
23
CAPE YELCHO
MINSTREL POINT
CAPE LINDSAY
EMMA COVE
MENSA BAY
STINKER POINT
MAP 36

MAP 36.1



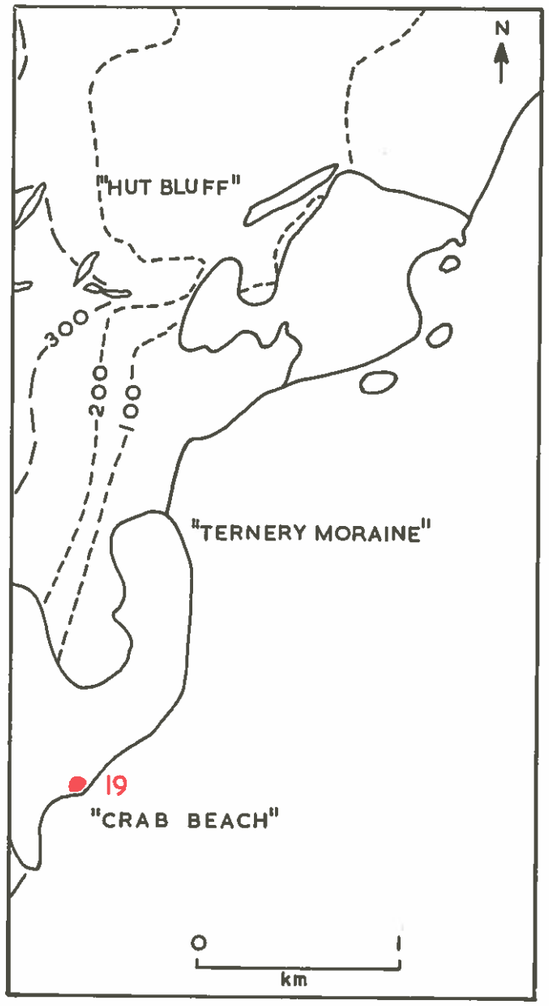
MAP 36.5

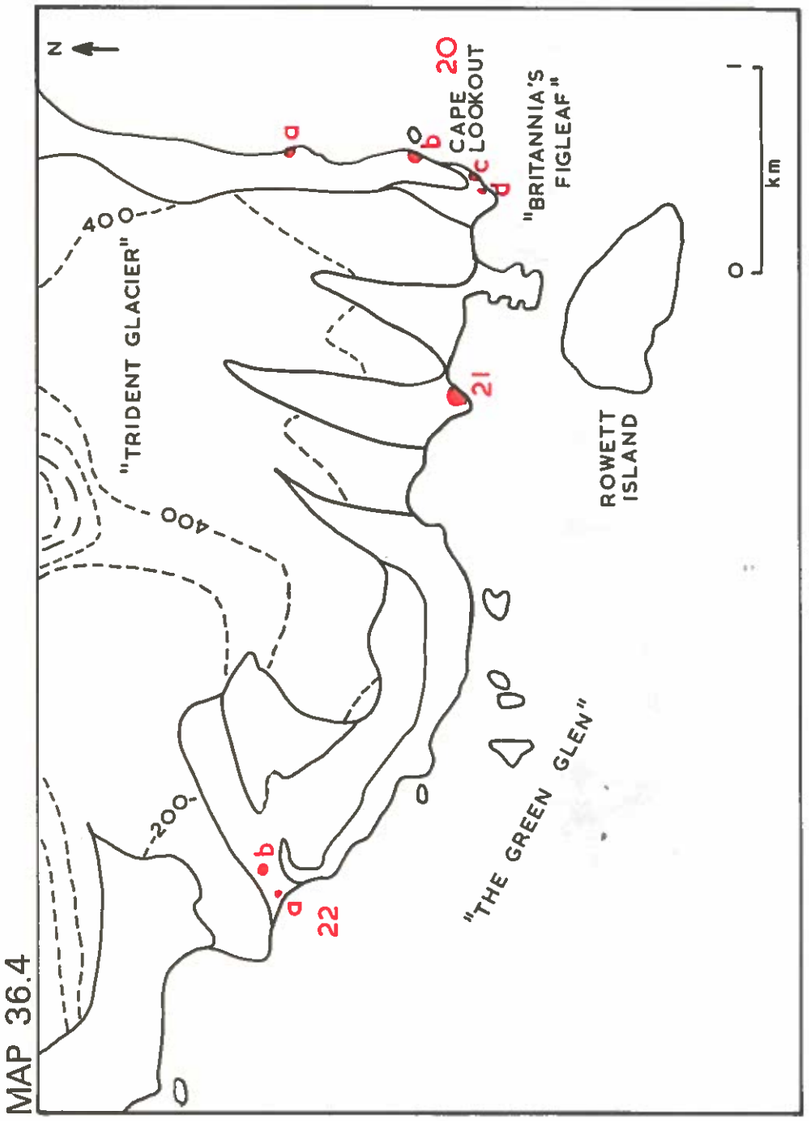




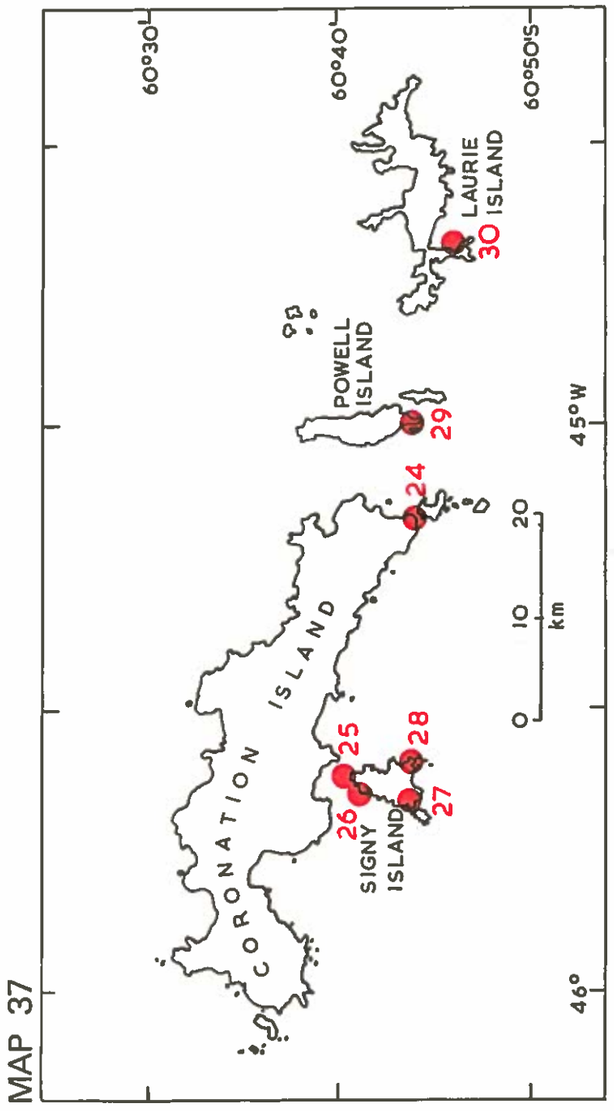
MAP 36.2

MAP 36.3



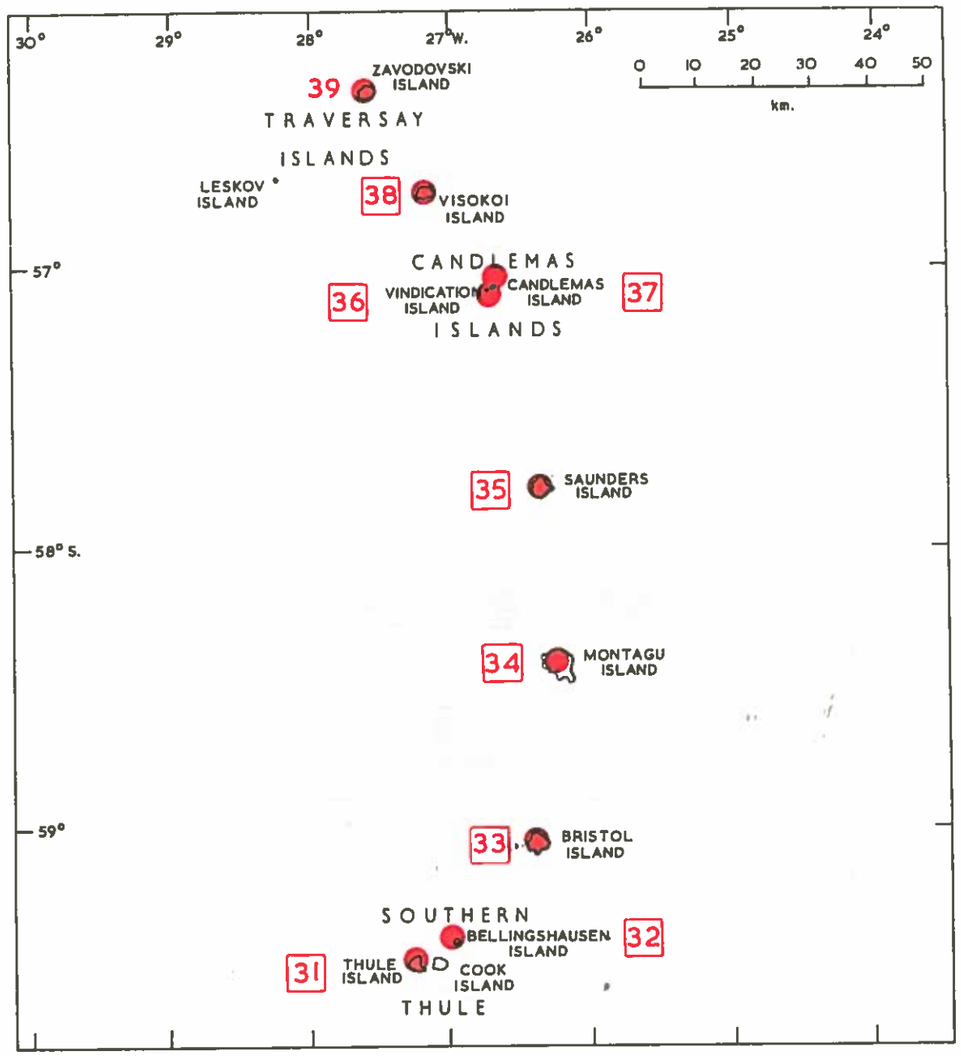


MAP 36.4

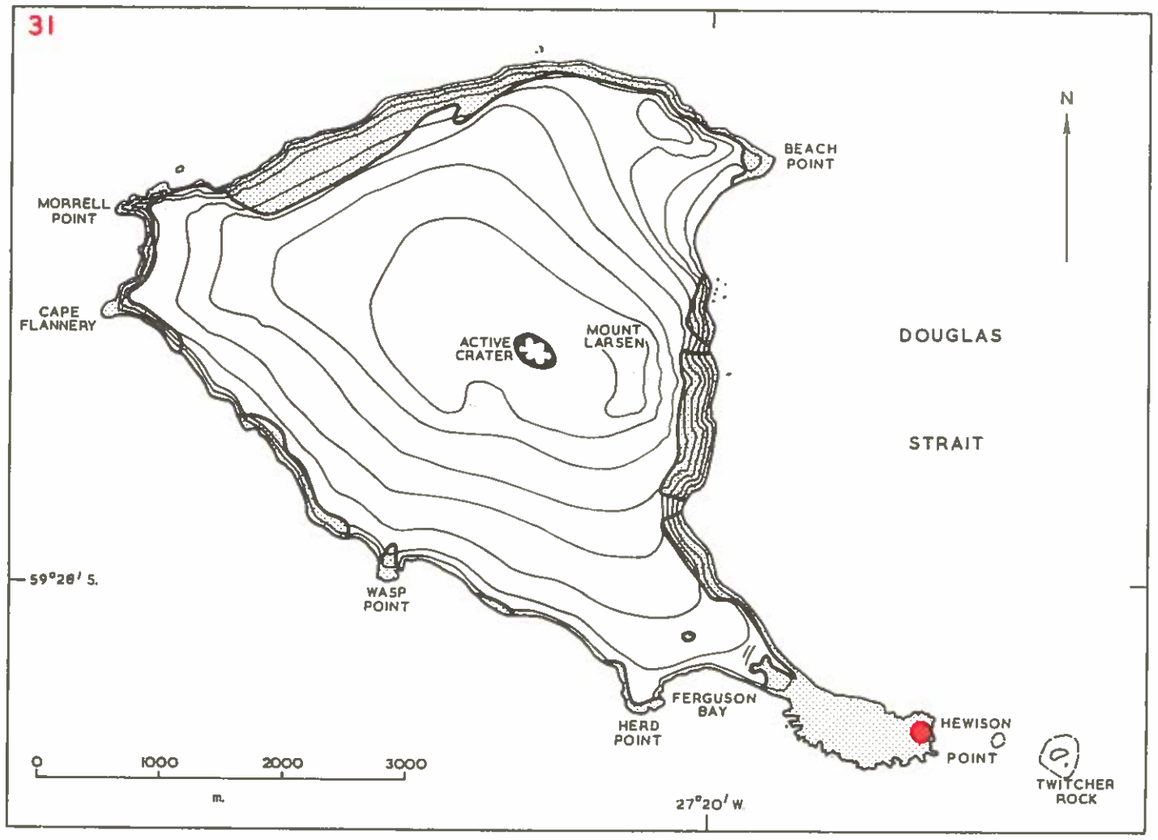


MAP 37

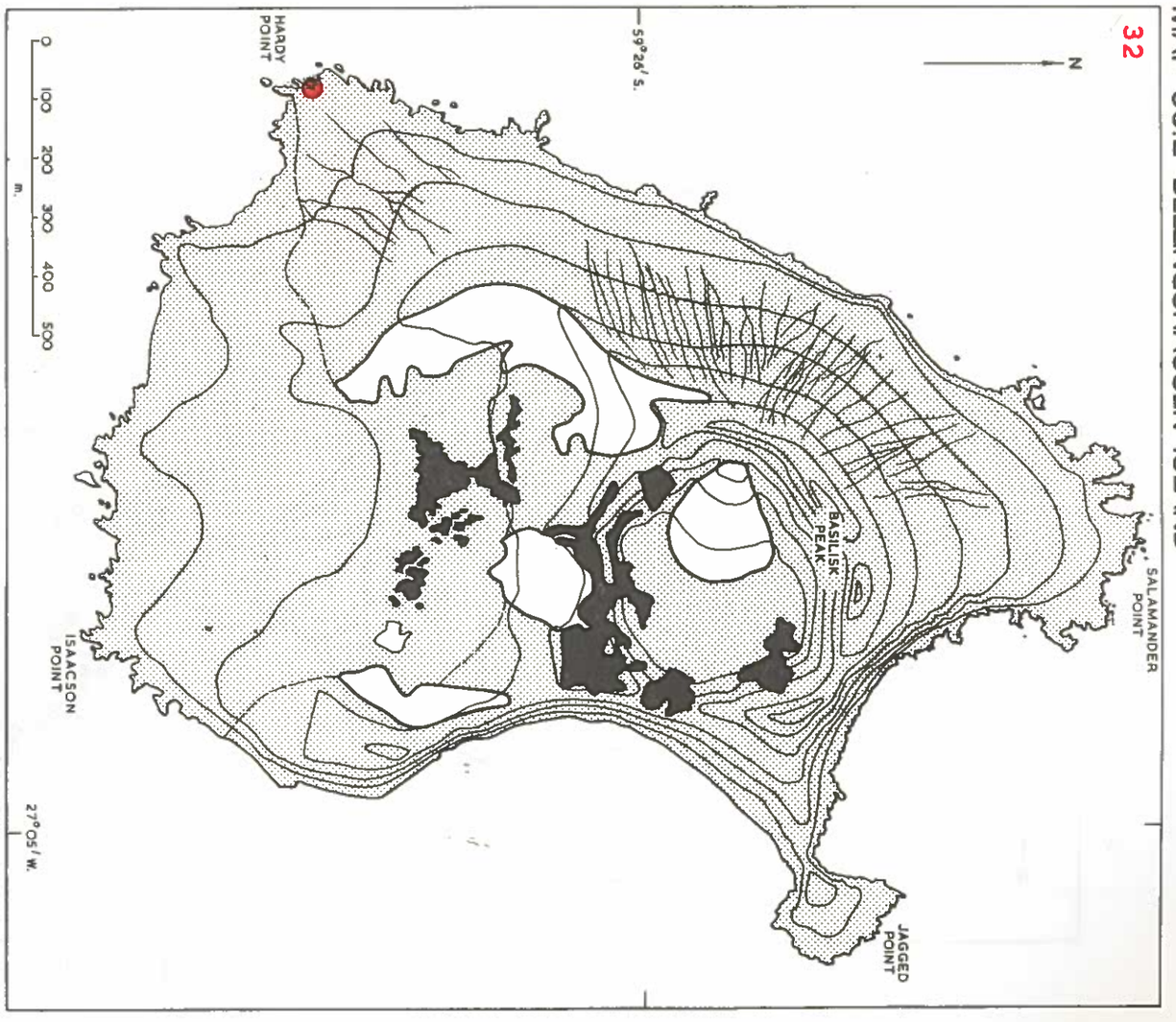
MAP 38 SOUTH SANDWICH ISLANDS



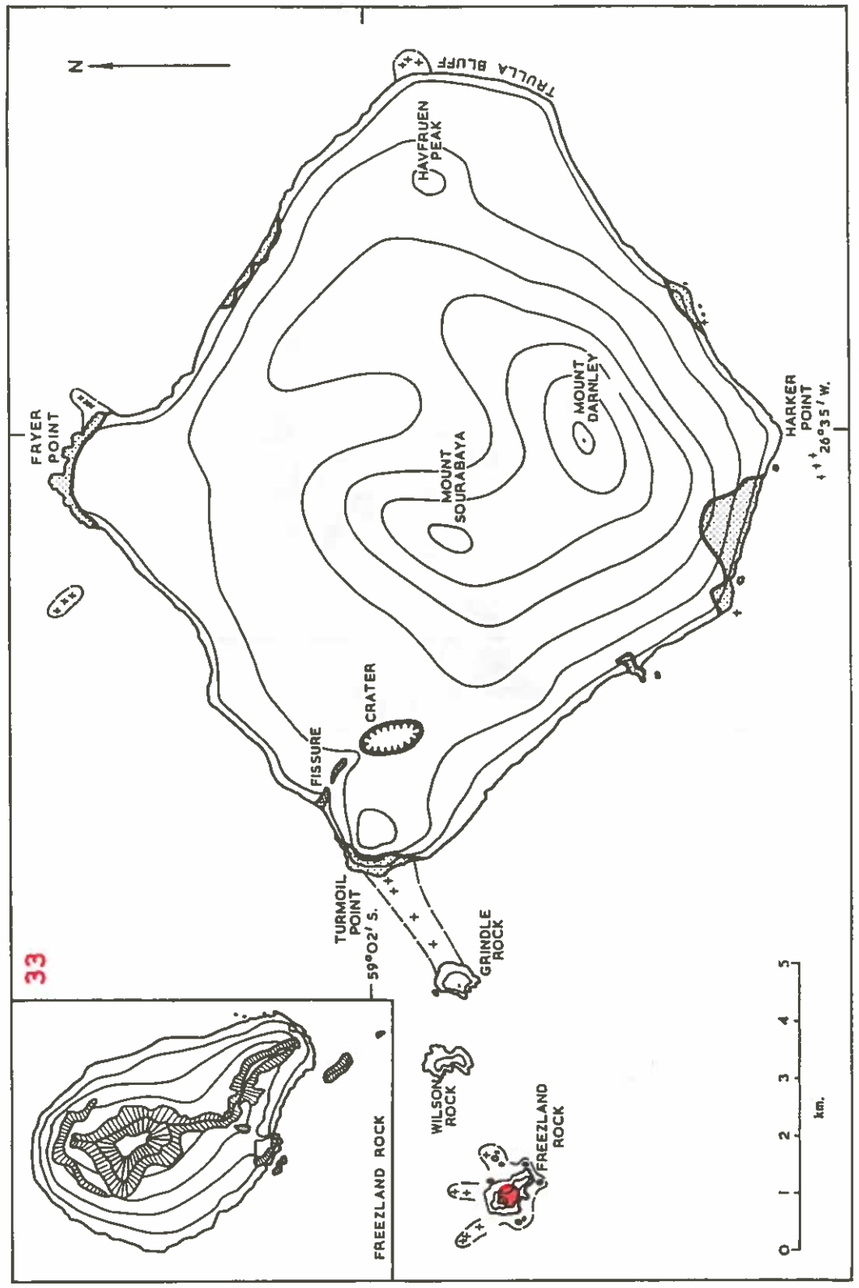
MAP 38.1 THULE ISLAND



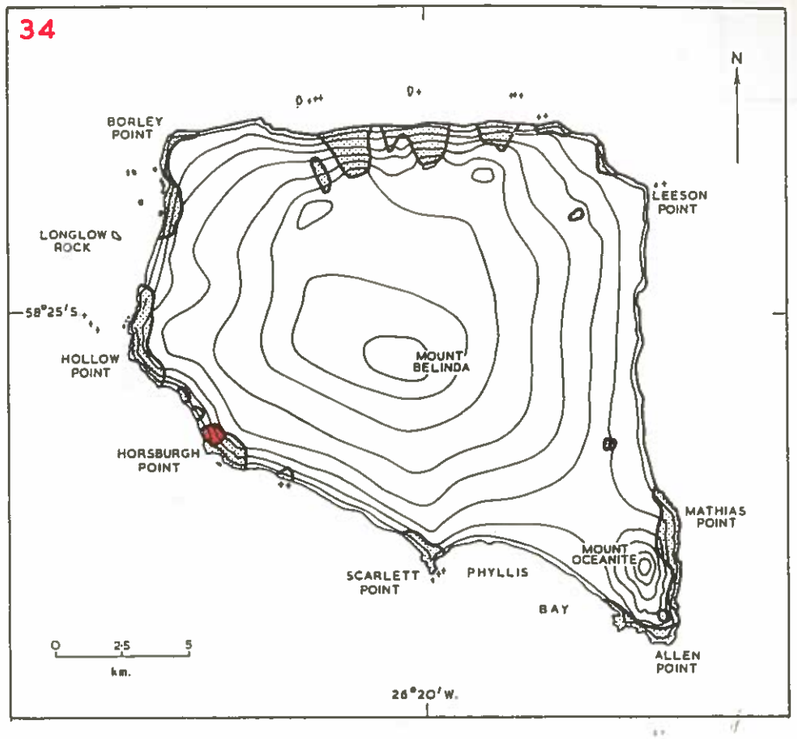
MAP 38.2 BELLINGSHAUSEN ISLAND



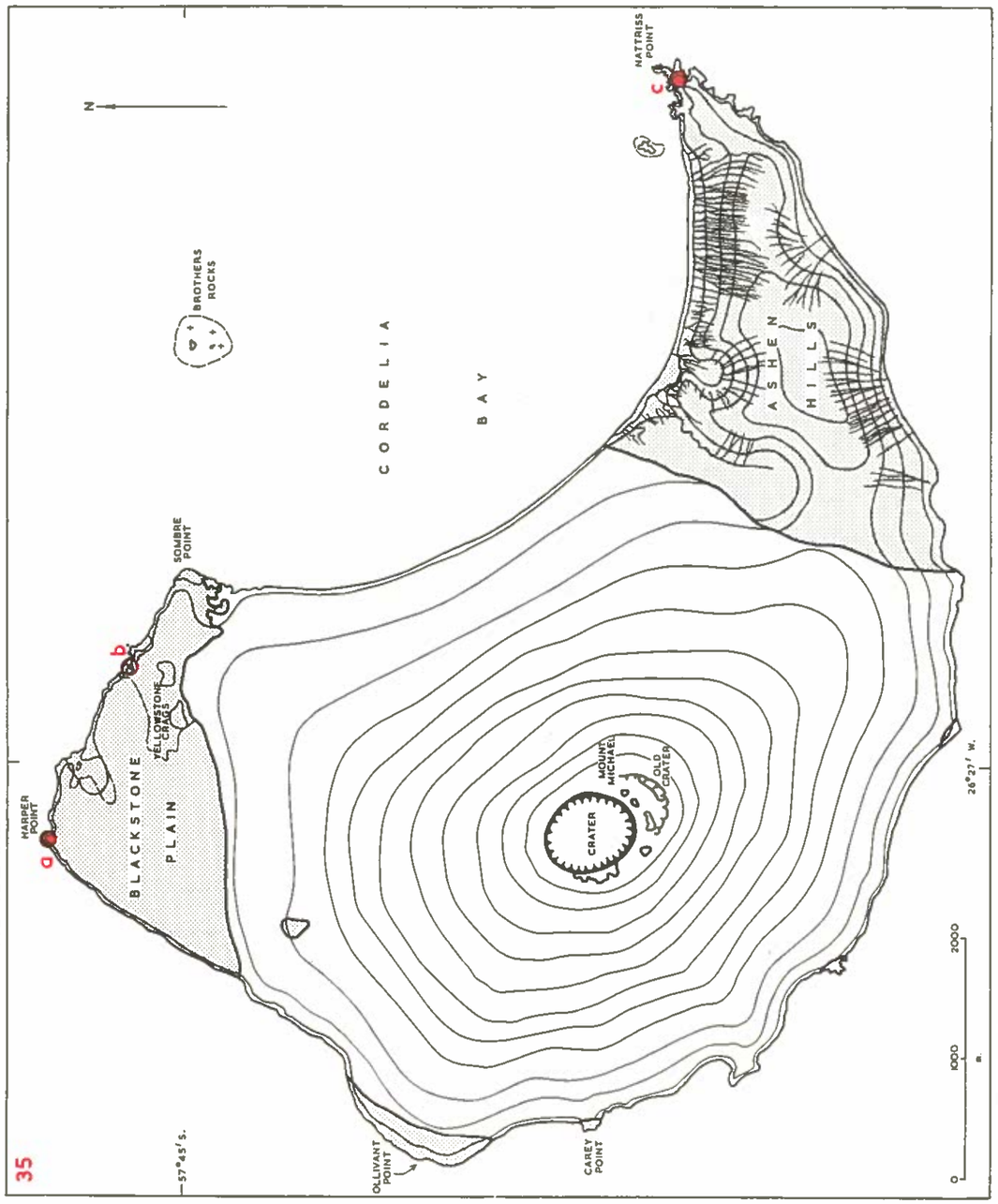
MAP 38.3 BRISTOL ISLAND



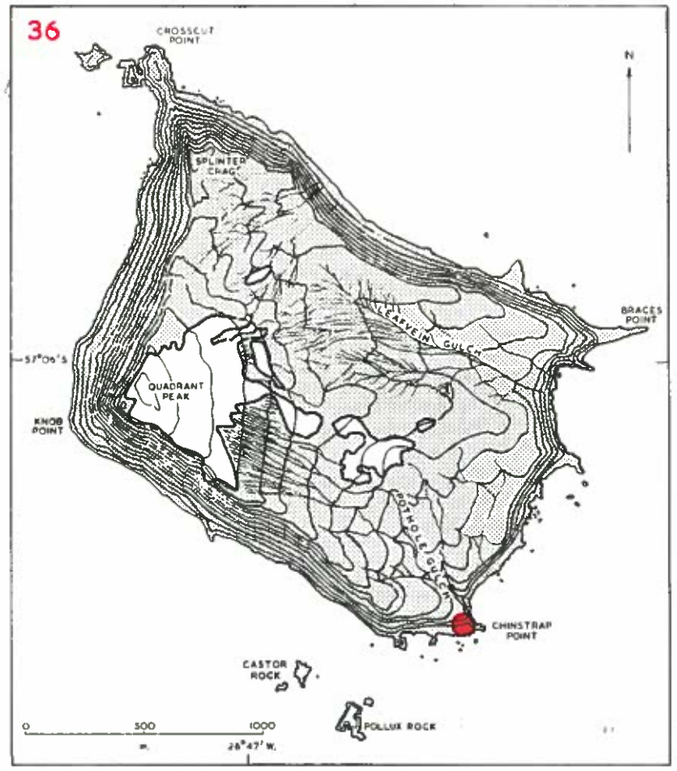
MAP 38.4 MONTAGU ISLAND



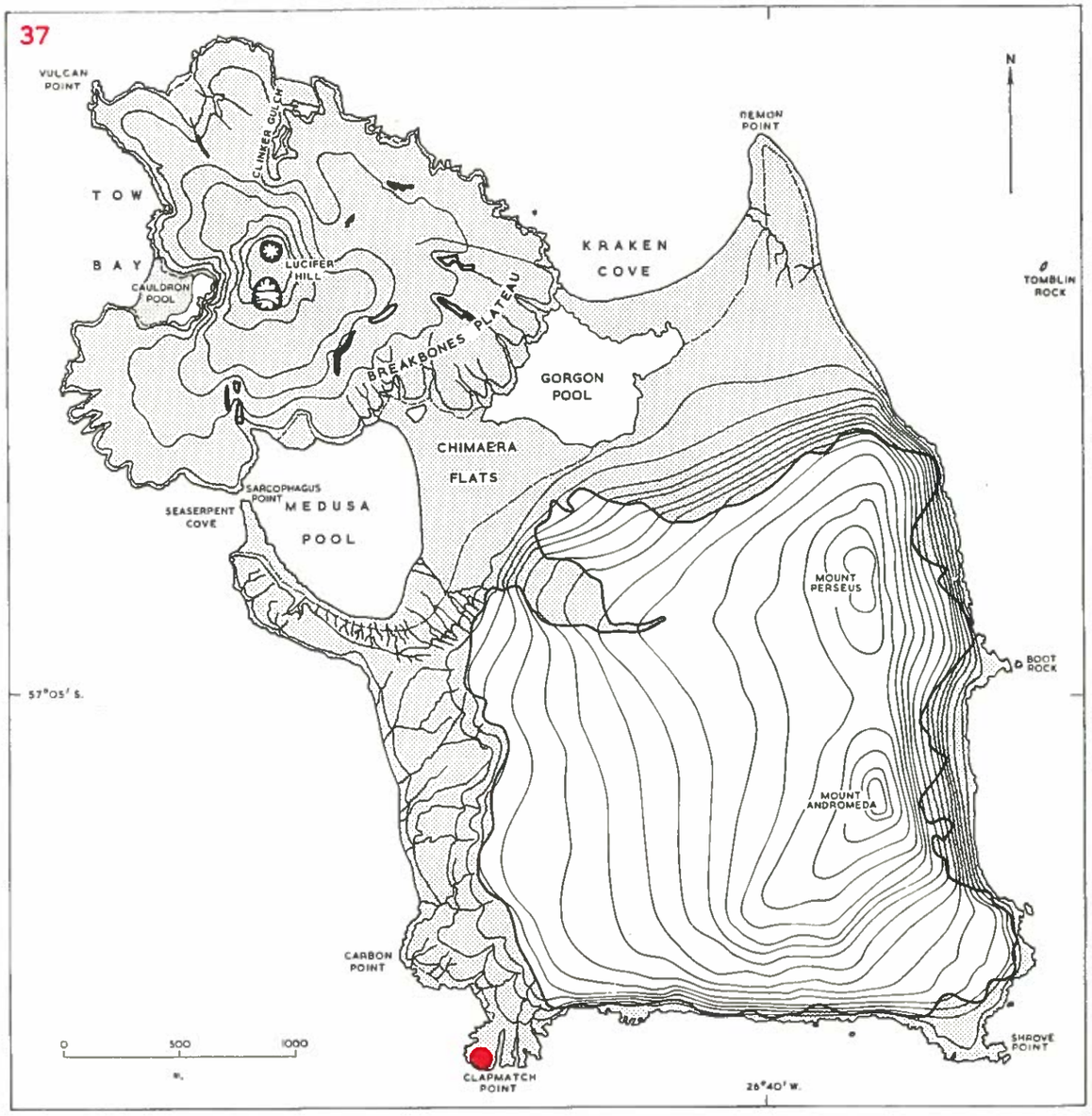
MAP 38.5 SAUNDERS ISLAND



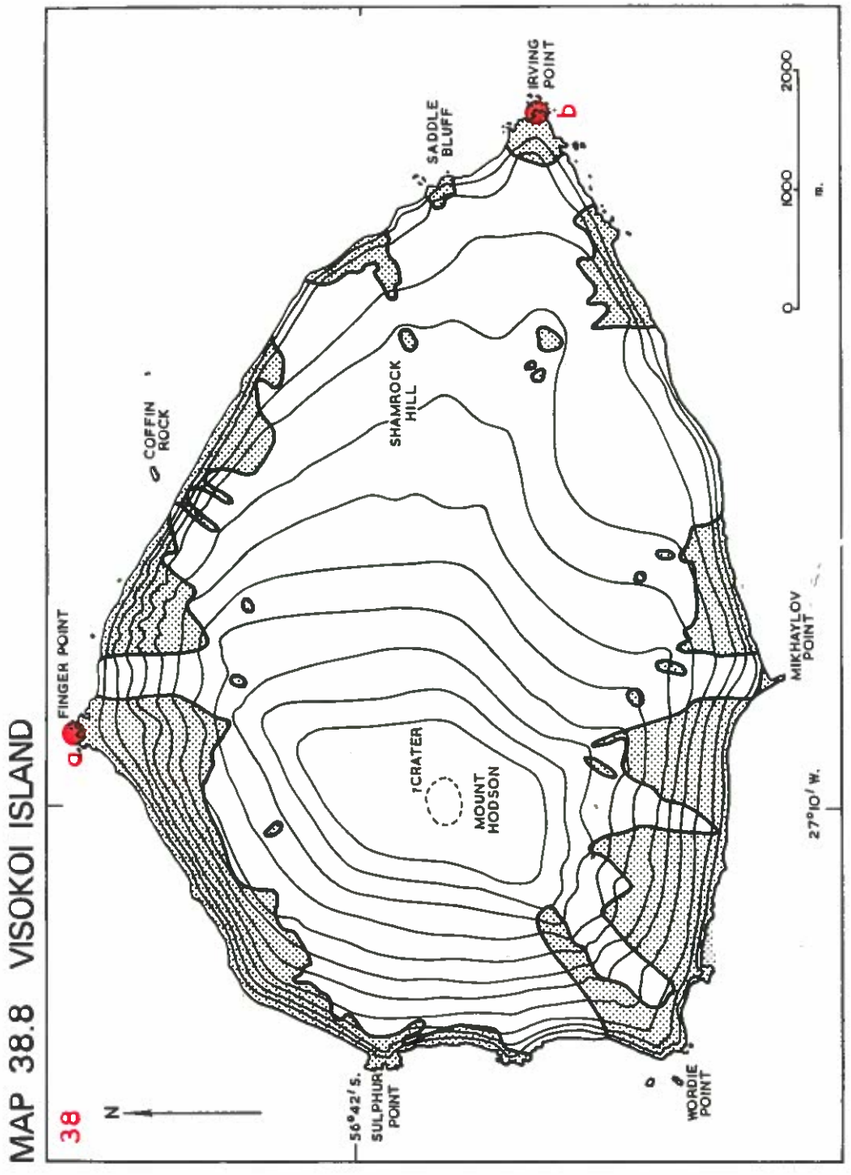
MAP 38.6 VINDICATION ISLAND



MAP 38.7 CANDLEMAS ISLAND



MAP 38.8 VISOKOI ISLAND



7. Rockhopper Penguin *Eudyptes chrysocome*

This smaller edition of Macaroni Penguin takes its place on the more temperate sub-Antarctic islands (e.g. Tristan da Cunha group, Ile Amsterdam and Ile St. Paul, New Zealand sub-Antarctic islands) but overlaps with it at the remaining Indian Ocean sub-Antarctic islands and Heard Island and with Royal Penguin at Macquarie Island.

In the present area, a very few pairs breed at South Georgia (Prince and Payne, 1979) and one pair bred at Cape Bowles, Clarence Island, Elephant and Clarence Islands group (Furse, 1978) in 1976-77.

CONCLUSIONS

In a preliminary account such as this, it would be inappropriate to draw extensive conclusions. Nevertheless, on the basis of the data so far available, a few general comments can be made.

1. Even in terms of identifying the location of colonies, coverage is still far from complete. Particularly poorly surveyed areas are:
   a. South Sandwich Islands (these have not yet been visited at a time when it has been possible to pinpoint the location of breeding colonies).
   b. Islands lying between Livingston Island (southern South Shetland Islands) and Brabant Island.
   c. The coast and islands between the Argentine Islands and southern Adelaide Island.

   We would reiterate that we greatly welcome any supplementary information on penguin colonies; all contributions will be individually acknowledged and revised maps and data tabulations produced at appropriate intervals.

2. Some puzzling, but probably real, gaps in distribution are as follows:
   a. Adelie Penguin: absence from southern South Shetland Islands and from the coast and islands between southern Anvers Island and northern Trinity Peninsula.
   b. Chinstrap Penguin: absence from Joinville Island and the islands to the south on the east coast of the Antarctic Peninsula.
   c. Gentoo Penguin: absence from the coast and islands between northern Anvers Island and northern Trinity Peninsula.
   d. Macaroni Penguin: absence from central and northern South Shetland Islands.

3. Many indications of colony locations are still of the most general nature and for only a few has the mapping of the sub-colonies been of the standard possible for the Elephant and Clarence Islands group. This is probably particularly true for Chinstrap Penguin in the region of its greatest abundance in the South Shetland and South Orkney Islands.

4. For many colonies we have no estimate of size and for many more the estimates are too vague to be of much use and for even fewer can the counts be considered adequate to stand as good base-line data against which future counts can be reliably compared.

5. Despite these deficiencies, variations in counting techniques and differences in timing of counts, a reasonably clear overall impression of the general pattern of population changes can be obtained.
   a. Adelie Penguin
      Nearly all populations without any history of interference have increased. The more northerly populations in the South Shetland and South Orkney Islands appear to have increased most but seldom as fast as Chinstrap colonies in the same area.
   b. Chinstrap Penguin
      Nearly all colonies (save a few subject to interference) have increased substantially, some dramatically. At those for which recent data are available, population increases and the founding of new colonies still continues; some new colonies increase at very high rates, presumably because they are an "overspill" from a nearby colony where further expansion is not possible.
   c. Gentoo Penguin
      Some colonies would appear to have increased somewhat but for most the evidence is not clear-cut and colonies, both in areas where other species are absent, and where they are present and expanding, do not seem to have increased. Bearing in mind the extent of population fluctuations that this species is capable of showing over a series of years (Croxall and Prince, in press *a*), it must be recognized that for only a very few colonies at best is there evidence of population increase.

d. Macaroni Penguin
The data are inadequate to detect any consistent changes in populations and there is also no real sign of range expansion. At South Georgia the increases referred to by Rankin (1951) were based on data from whalers and from rough counts by B. B. Roberts, and Roberts (pers. comm.) did not regard any as sufficiently reliable to demonstrate real increases although he felt that these may well have occurred and that several colonies showed evidence of recent (1936) tussock *Poa flabellata* destruction due to colony expansion. Signs of this can still be seen occurring today. There are recent data for only one South Georgia colony which has increased five-fold in the last 20 years; it is, however, almost certainly partially an "overspill" colony and this rate may be artificially high.

All this is consistent with the now familiar explanation (e.g. Sladen, 1954; Conroy, 1975) that the increased availability of krill, due to the large-scale reduction in whale stocks, whose staple diet it is, permitted increases in the populations of the other krill-eating predators, including penguins. Thus the euphausiid-eating Adelie and Chinstrap Penguins have increased more than Gentoo, which may take a significant amount of fish. Furthermore, the northerly populations of Adelie appear to have increased more than the southern areas and this could reflect their greater proximity to the main whaling grounds. The bulk of the Chinstrap population is in this latter area anyway and it has shown the greatest increase; part of the difference between Adelie and Chinstrap rates of increase may reflect differing ecological abilities to exploit this situation and perhaps also the latter's physical competitive superiority at nest sites where space becomes limiting (Trivelpiece and Volkman, in press). Macaroni Penguins have probably increased substantially in the South Georgia area (very near major whaling grounds) but their expansion and increase further south may have been limited by competition with the full range of three species of pygoscelid penguins.

6. This compilation highlights a number of difficulties which have implications for census and monitoring proposals.

a. Even for straightforward numerical estimates it is obviously desirable to make these as soon after egg-laying as possible so that an accurate assessment of the total number of breeding pairs may be obtained. Since this date is different for each species of penguin, and it will usually be impracticable to return to an area several times during a season, it is unlikely that all counts and estimates will be made at the optimum time. Indeed it is inevitable that some colonies will only be counted after hatching, when it becomes increasingly difficult to obtain reliable figures. In these cases it would be useful to have figures, from detailed studies, for mean mortality (preferably over several seasons), sustained at various stages of the breeding cycle, to use as conversion factors.

b. In the establishment of sites for monitoring studies there will be a temptation to use colonies adjacent to bases. It has been amply demonstrated that such colonies are often atypical, being subject to interference which may reduce both breeding success and colony numbers. Great care must be exercised in selecting sites that will be free from disturbance and in conducting the monitoring work in such a way so as to reduce disturbance to an absolute minimum.

c. Even for Chinstrap Penguin, where some very substantial population increases have occurred, the mean annual rate has rarely exceeded 10%. For Adelie Penguin it has often been only 2-3%. It is even possible that rates of increase, except at new small colonies, are dropping at present. As few counts for monitoring purposes will be accurate to better than 5%, it is clear that such studies call for a long-term commitment.

ACKNOWLEDGEMENTS

Our principal debt is to the many people, named in the text, who provided the records on which this compilation is based and especially to the members of the British Antarctic Survey (and its predecessor the Falkland Islands Dependencies Survey) who contributed the bulk of the unpublished data. We are also grateful to those people who encouraged them to make the observations and who had the foresight to preserve the records.

The late Dr B. B. Roberts kindly made his diaries and notebooks available for study and Mr H. G. R. King and Dr T. E. Armstrong of the Scott Polar Research Institute greatly facilitated access to them. We are grateful to Mrs F. Prince and Mrs C. Romm for typing the text and to Mr A. Sylvester for the onerous task of preparing the final versions of the maps. Dr R. J. Adie gave unstintingly of advice and assistance in the preparation of this account.

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