AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITIONS

ANARE RESEARCH NOTES 70

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ANTARCTIC DIVISION
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THE DISTRIBUTION AND ABUNDANCE OF ADÉLIE PENGUINS, *PYGOSCELIS ADELIAE,* AT THE VESTFOLD HILLS IN 1973

by

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ABSTRACT

Adélie penguins, *Pygoscelis adeliae,* were censused in November 1973 along the Vestfold Hills coast, Princess Elizabeth Land. The census included all colonies on the mainland and offshore islands from the Wyatt Earp Islands to the Sørsdal Glacier. Colonies were photographed and individual penguins counted from the ground. An estimated total of 174 178 ± 26 127 breeding pairs was obtained.

1. INTRODUCTION

The Vestfold Hills (68°33'S, 78°15'E) form the second largest coastal ice-free area in Australian Antarctic Territory (AAT), with an area of approximately 400 km^2, including numerous offshore islands (Johnstone *et al.* 1973). The region is biologically diverse and since the early 1970s has been the focus of Australian Antarctic ornithological research.

Census data of Adélie penguins, *Pygoscelis adeliae*, were collected at Magnetic Island in the 1954-55 summer, prior to the establishment of Davis station in January 1957 (Horne 1983). Opportunistic surveys of Adélie penguins and other seabird populations near Davis were initiated in the 1960-61 summer and continued for the next decade. These data, together with those collected during a survey in 1971-72, provided the first estimate of seabird populations in the region (Johnstone *et al.* 1973). The latter survey estimated the total population of Adélie penguins to be 130 000 breeding pairs.

In 1978 the ICSU Scientific Committee for Antarctic Research Subcommittee on Bird Biology initiated the International Survey of Antarctic Seabirds (ISAS) based on an increased awareness of the need to determine accurately the numbers of major seabird populations in the Antarctic and subantarctic. Adélie penguins were the species of highest priority in the Antarctic, and Macaroni penguins, *Eudyptes chrysolophus*, in the subantarctic.

ISAS generated many studies of the distribution and abundance of Antarctic and subantarctic penguins. Croxall and Kirkwood (1979) reported the results of surveys in the Antarctic Peninsula, Horne (1983) documented the distributions at Heard, McDonald and Macquarie Islands and within AAT, and Wilson (1983) synthesised the available data up to 1980 for populations in the Antarctic and subantarctic. Surveys are now undertaken regularly and data constantly updated (for example Croxall *et al.* 1984, Harper *et al.* 1984, Jablonski 1986, Ensor and Bassett 1987 and Parmalee and Parmalee 1987).

For many areas in the Antarctic the baseline datum for population data with which to compare future census data was collected during the 1980s. The data set reported here was collected in the early 1970s and extends the time frame in which population trends can be assessed. The data take on further significance since it has been subsequently shown that the Vestfold Hills are the site of the greatest concentration of seabird biomass in AAT, and probably East Antarctica (Woehler in press, Woehler and Johnstone in press).

2. METHODS

The census was undertaken by Tierney between 8 and 14 November 1973 when Adélie penguin nests were occupied by both parents. The Vestfold Hills were surveyed from south (Sørsdal Glacier) to north (Wyatt Earp Islands). Colonies were visited by foot over the sea-ice and exact counts were made of individual penguins at small colonies. The numbers of penguins at larger colonies were estimated by sub-dividing colonies into units of 10, 100 or 1000 birds. This method was repeated at each colony until a duplicate estimate was obtained. The totals were halved to obtain the numbers of breeding pairs. The error estimated for this census is ±15%, based on the repeated counts made at the larger colonies.

Black and white photographs were taken by Tierney as part of the census, providing on-ground detail of the colonies. Copies of the photographs, together with the original field report detailing positions and aspects, are held in the Australian Antarctic Division library.

3. RESULTS

Map 1 shows the location of the detail maps in the survey region. Maps 2 to 34 present the results of the survey. Each map shows the distribution of Adélie penguin colonies and the date of the census. The absence of mapped colonies on any island indicates no colonies were present during the survey. The contours on the maps are based on field observations and should be regarded as form lines only. They are not based on cartographic survey data. The results for all islands are summarised in Table 1. A total of 174 178 ± 26 127 breeding pairs was counted.

4. DISCUSSION

Detailed knowledge of the distribution and abundance of penguins is fundamental to understanding the dynamics of the Antarctic and Southern Ocean ecosystem, and will be important for managing marine resources in the Southern Ocean in the future. This knowledge allows changes in population size to be more readily detected, and estimation of the biomass of prey and predator species.

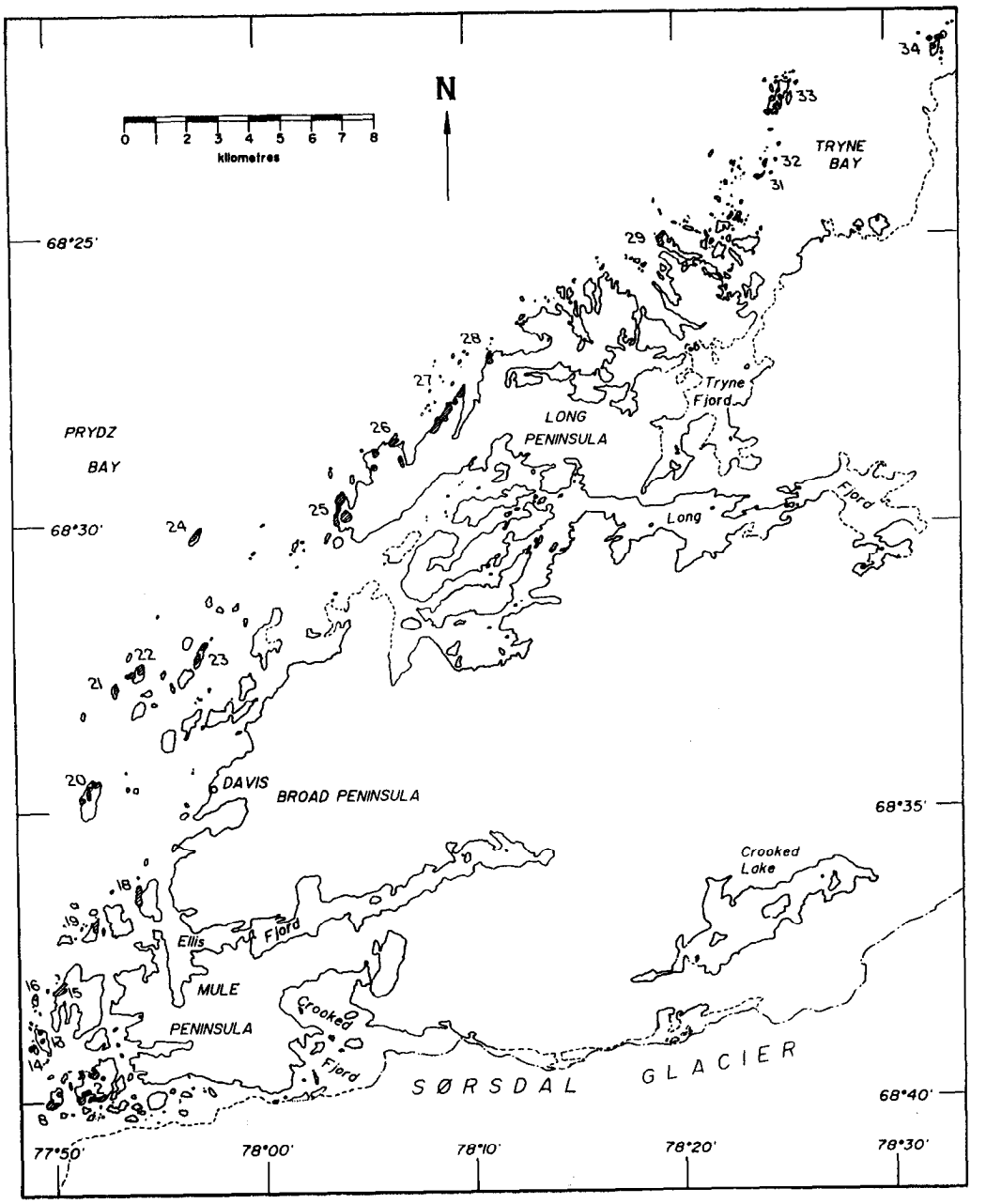
Increases in the numbers of breeding pairs of Adélie penguins, the 'key' predator species of krill for the CCAMLR Ecosystem Monitoring Program (SC-CAMLR 1986, 1987, 1988), have been reported at several sites in AAT and at other sites around the Antarctic continent. Increases were reported for Dumont d'Urville between 1958 and 1984 by Thomas (1986). In the Rookery Islands Specially Protected Area near Mawson, the number of breeding pairs appears to have increased by approximately 15.4% between 1972-73, 1981-82 and 1988-89 (Horne 1983, Woehler *et al.* in press).

Aerial photography at Davis was undertaken in 1981-82 and 1987-88, and is currently being examined (M.D. Whitehead, personal communication, 1989). Census data from these surveys, when compared with the data presented here, will enable estimates of the population growth of Adélie penguins at the Vestfold Hills to be made. The data will also allow the rates of increase between Mawson and Davis to be compared.

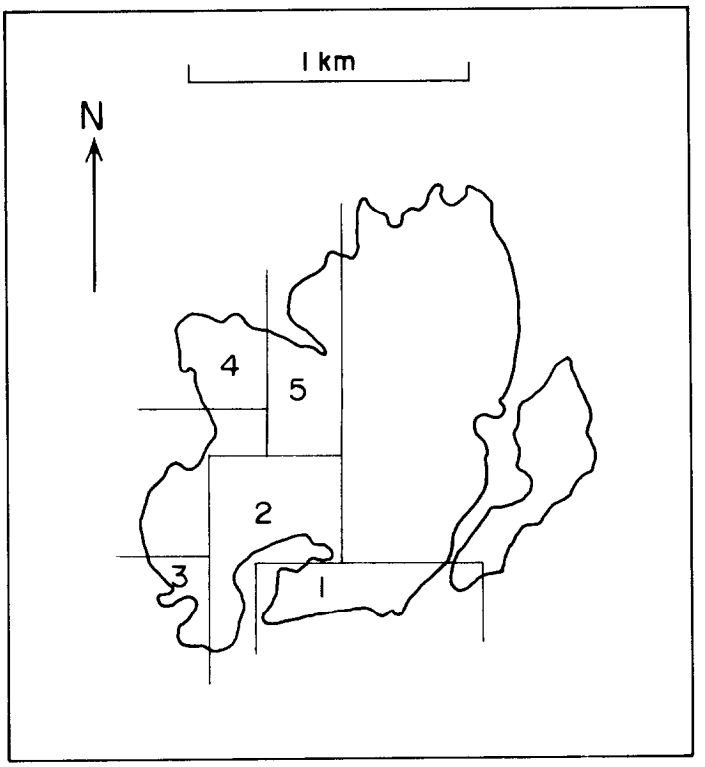
The increase in population of Adélie penguins at most localities in East Antarctica implies an increasing demand for marine resources by these birds.

ACKNOWLEDGMENTS

D.E. Rounsevell suggested this work and helped in discussions on methods. B. Bromham assisted in the field. M. Jackson skillfully translated field sketches into the maps used in this report. M.D. Whitehead made comments on the report.



Map 1. Adélie penguin census data, Vestfold Hills.

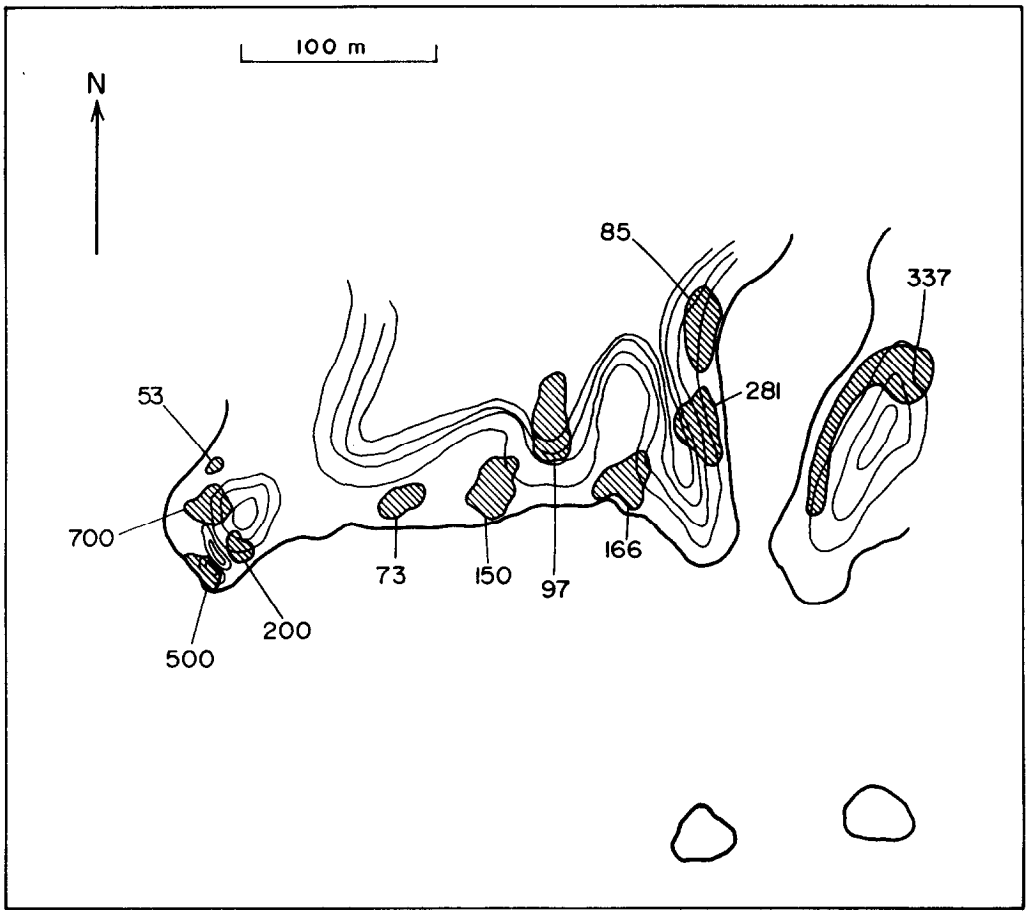


Map 2

Zolotov Island 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 15 844 breeding pairs

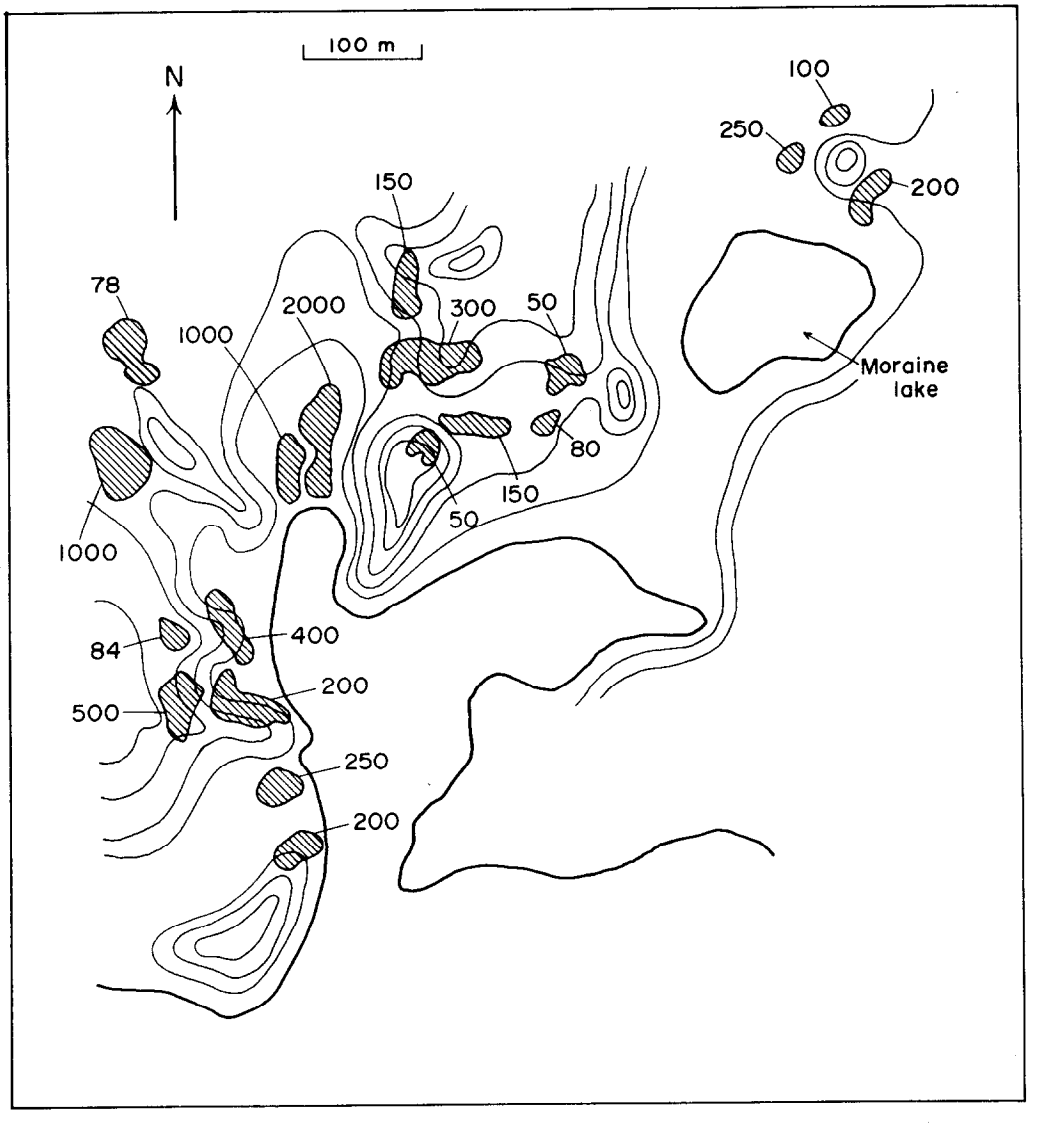


Map 3

Zolotov Island (1) 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 1321 breeding pairs

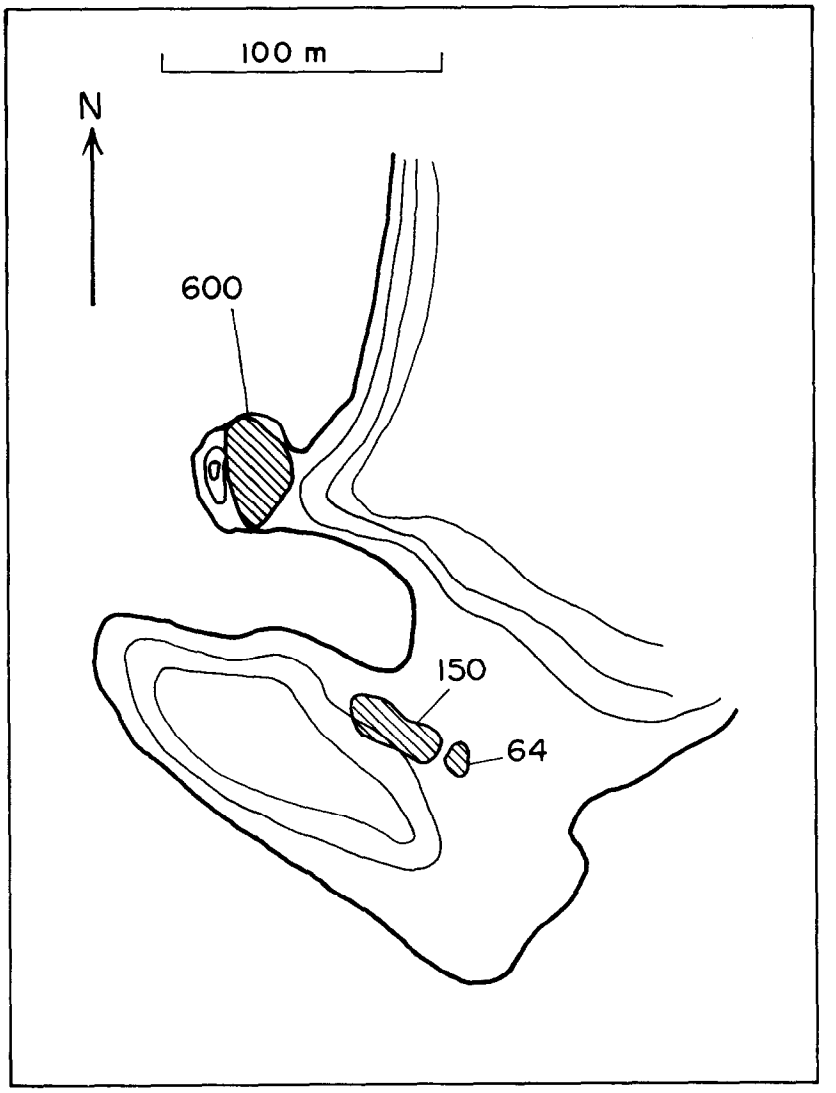


Map 4

Zolotov Island (2) 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 3521 breeding pairs

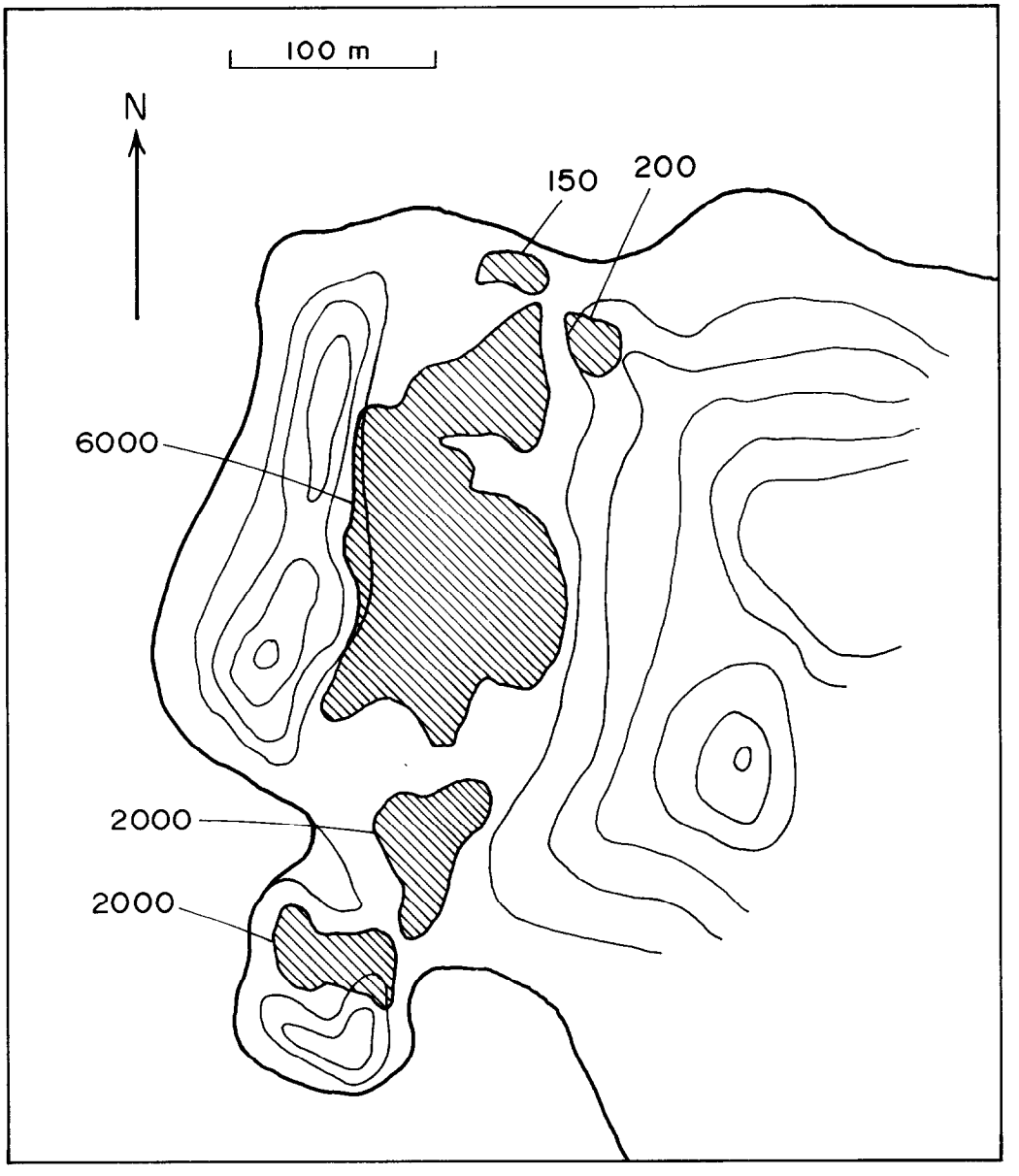


Map 5

Zolotov Island (3) 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 407 breeding pairs

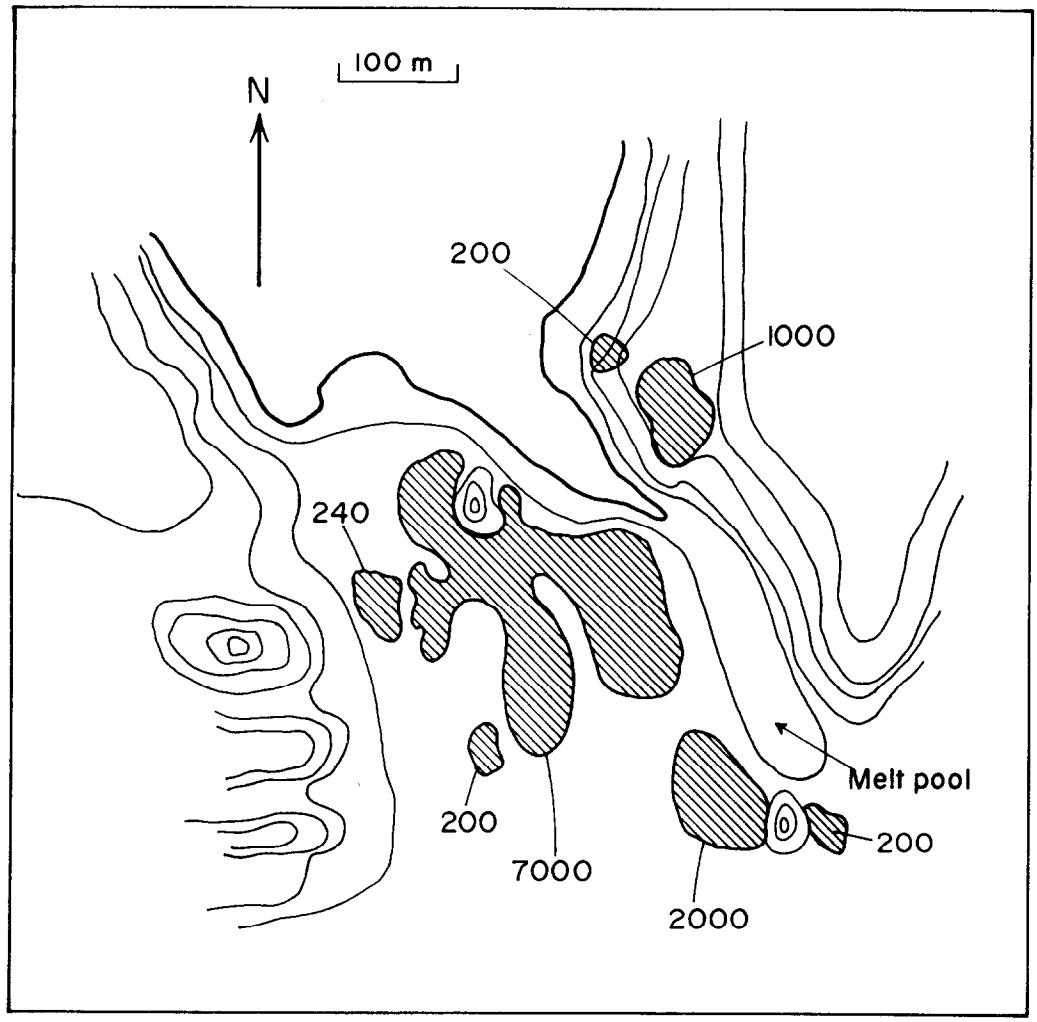


Map 6

Zolotov Island (4) 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 5175 breeding pairs

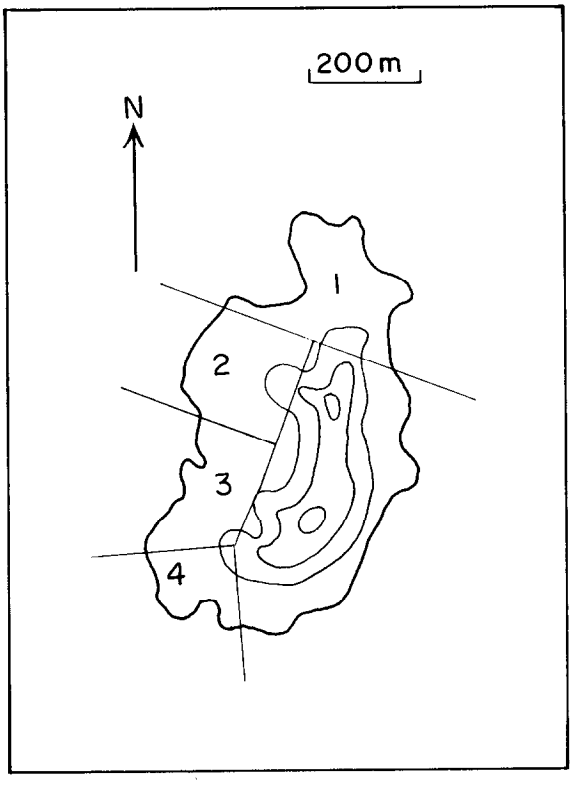


Map 7

Zolotov Island (5) 68°40'S 77°52'E

Date censused: 8 November 1973

Total count: 5420 breeding pairs

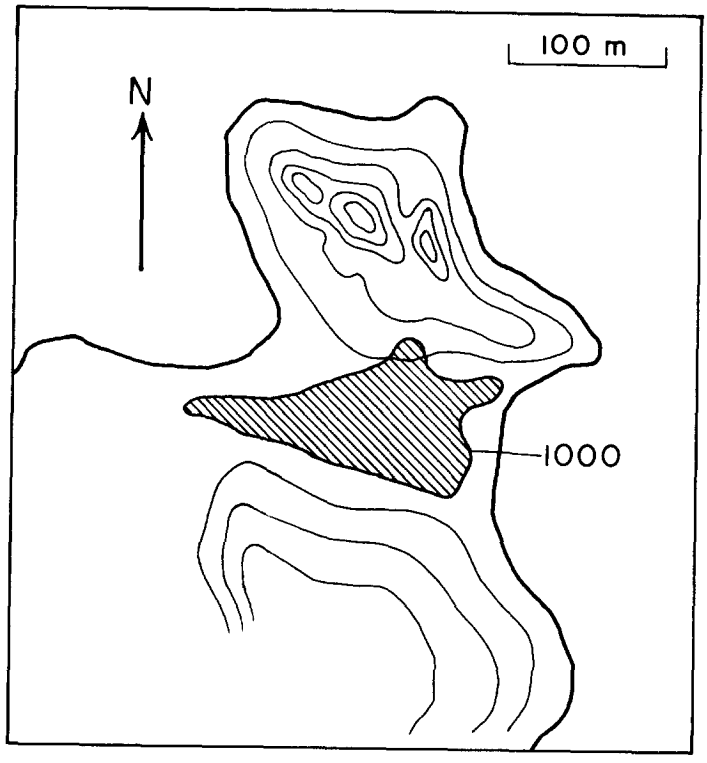


Map 8

Kazak Island 68°40'S 77°50'E

Date censused: 8 November 1973

Total count: 7552 breeding pairs

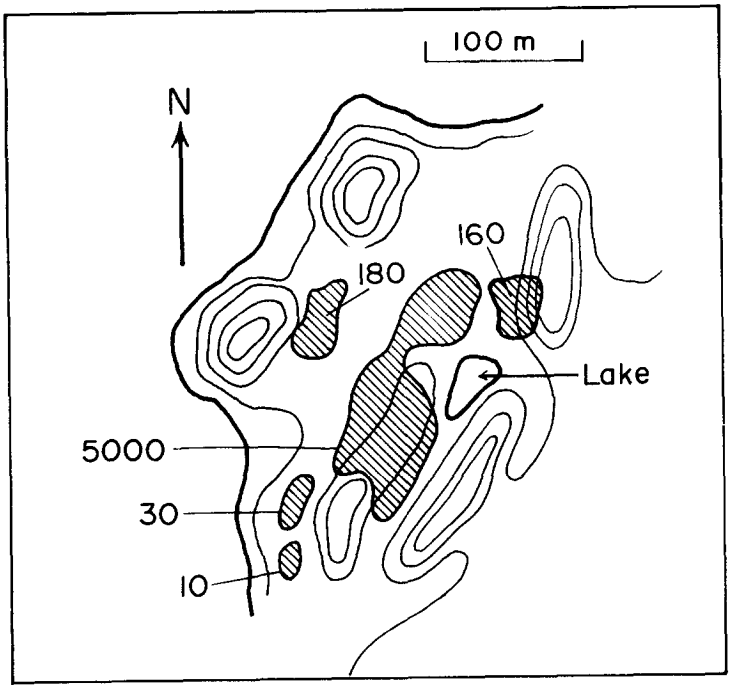


Map 9

Kazak Island (1) 68°40'S 77°50'E

Date censused: 8 November 1973

Total count: 500 breeding pairs

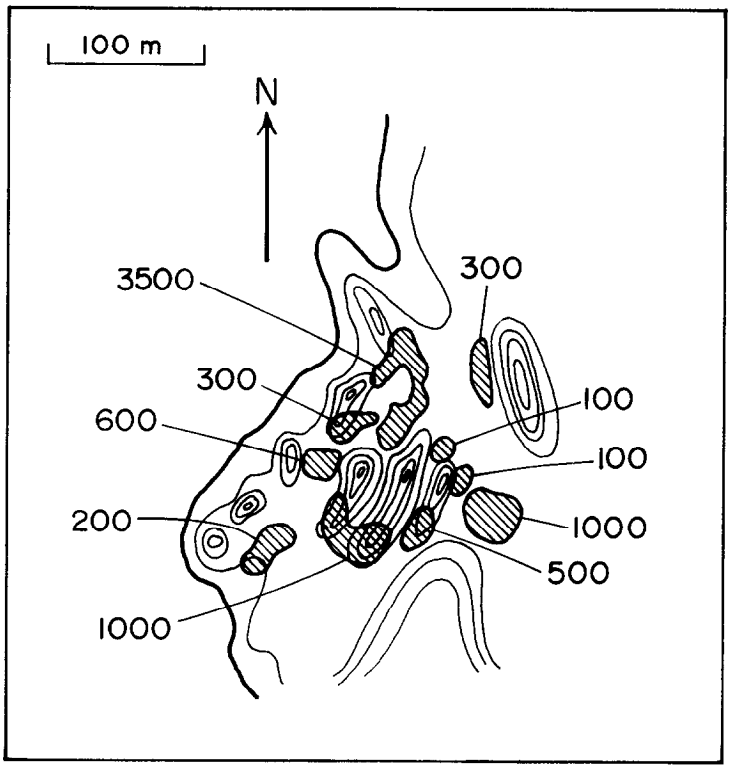


Map 10

Kazak Island (2) 68°40'S 77°50'E

Date censused: 8 November 1973

Total count: 2690 breeding pairs

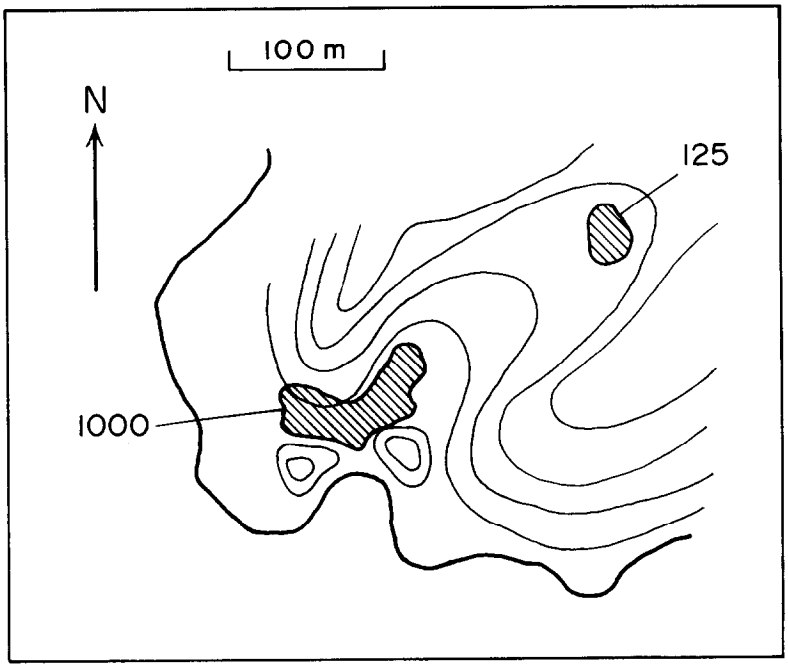


Map 11

Kazak Island (3) 68°40'S 77°50'E

Date censused: 8 November 1973

Total count: 3800 breeding pairs

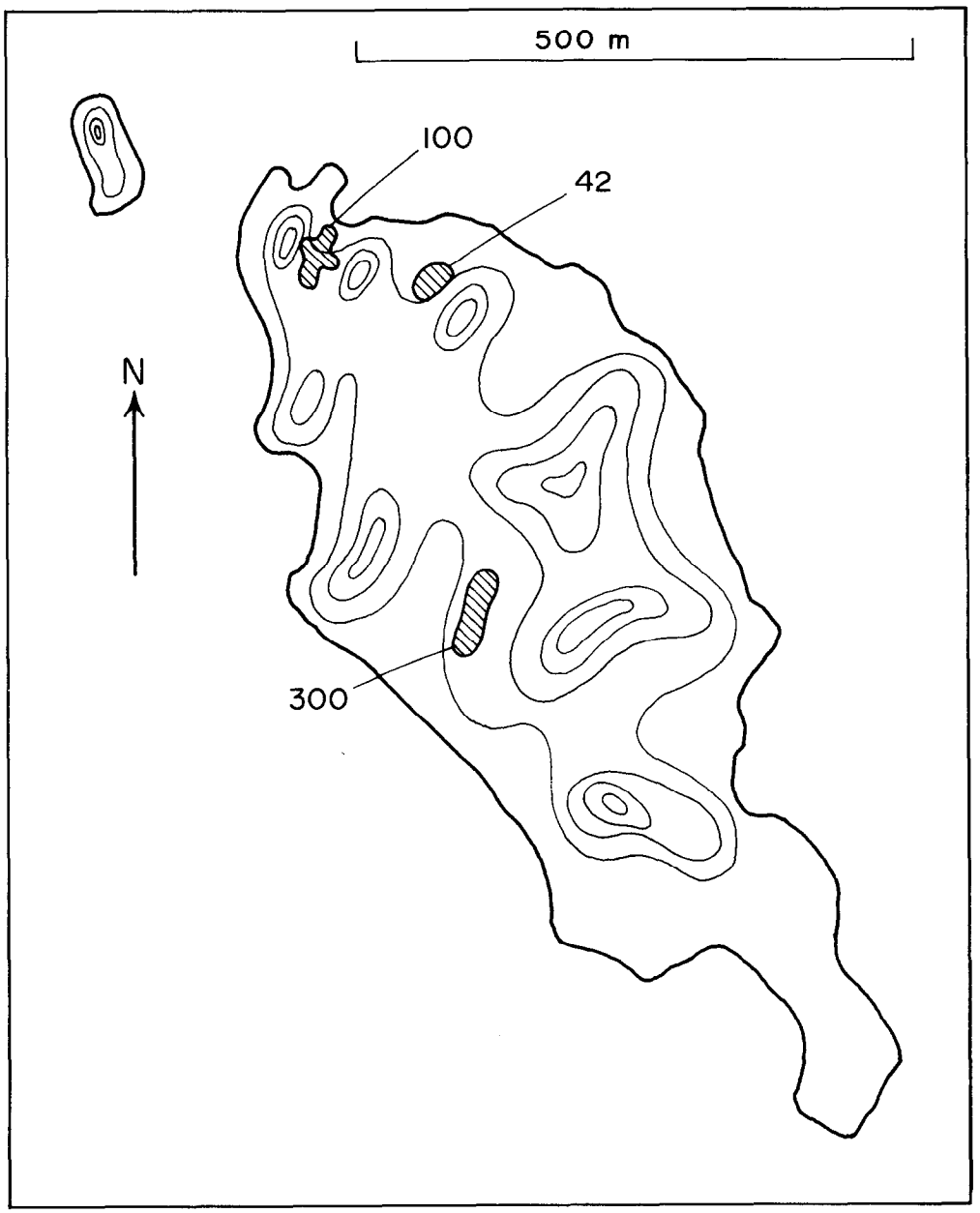


Map 12

Kazak Island (4) 68°40'S 77°50'E

Date censused: 8 November 1973

Total count: 562 breeding pairs

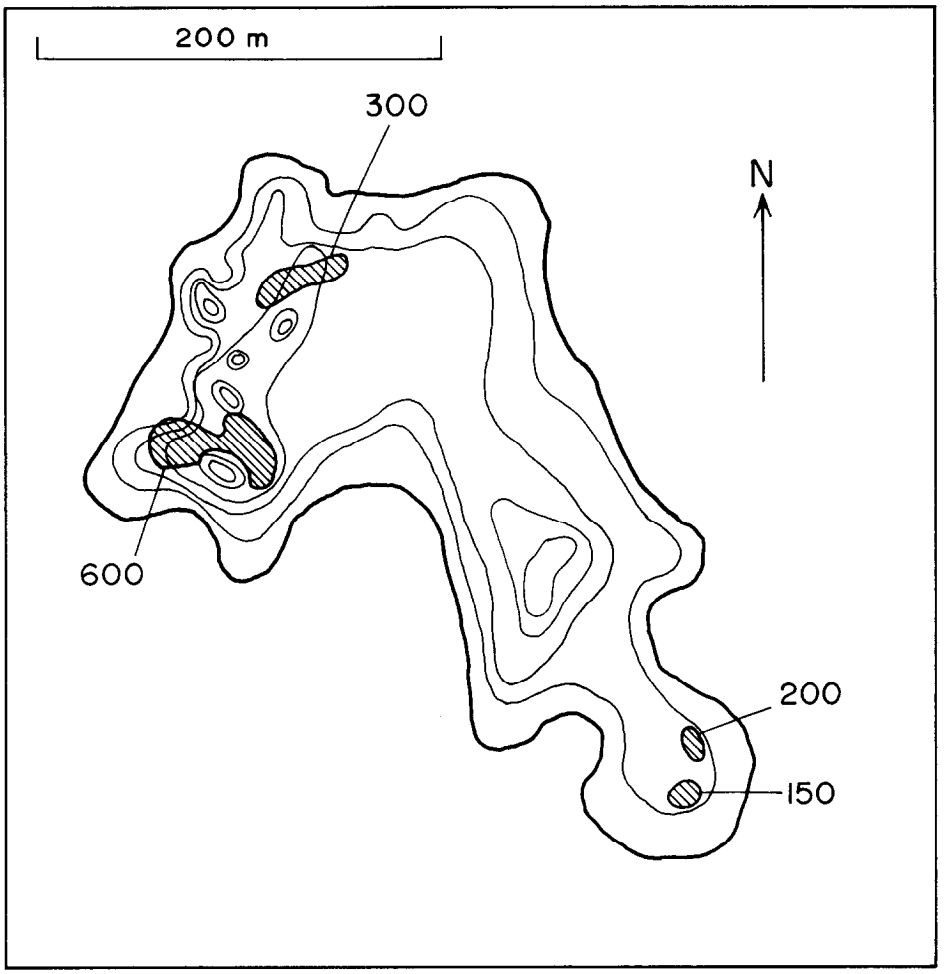


Map 13

Mule Island 68°39'S 77°49'E

Date censused: 8 November 1973

Total count: 221 breeding pairs

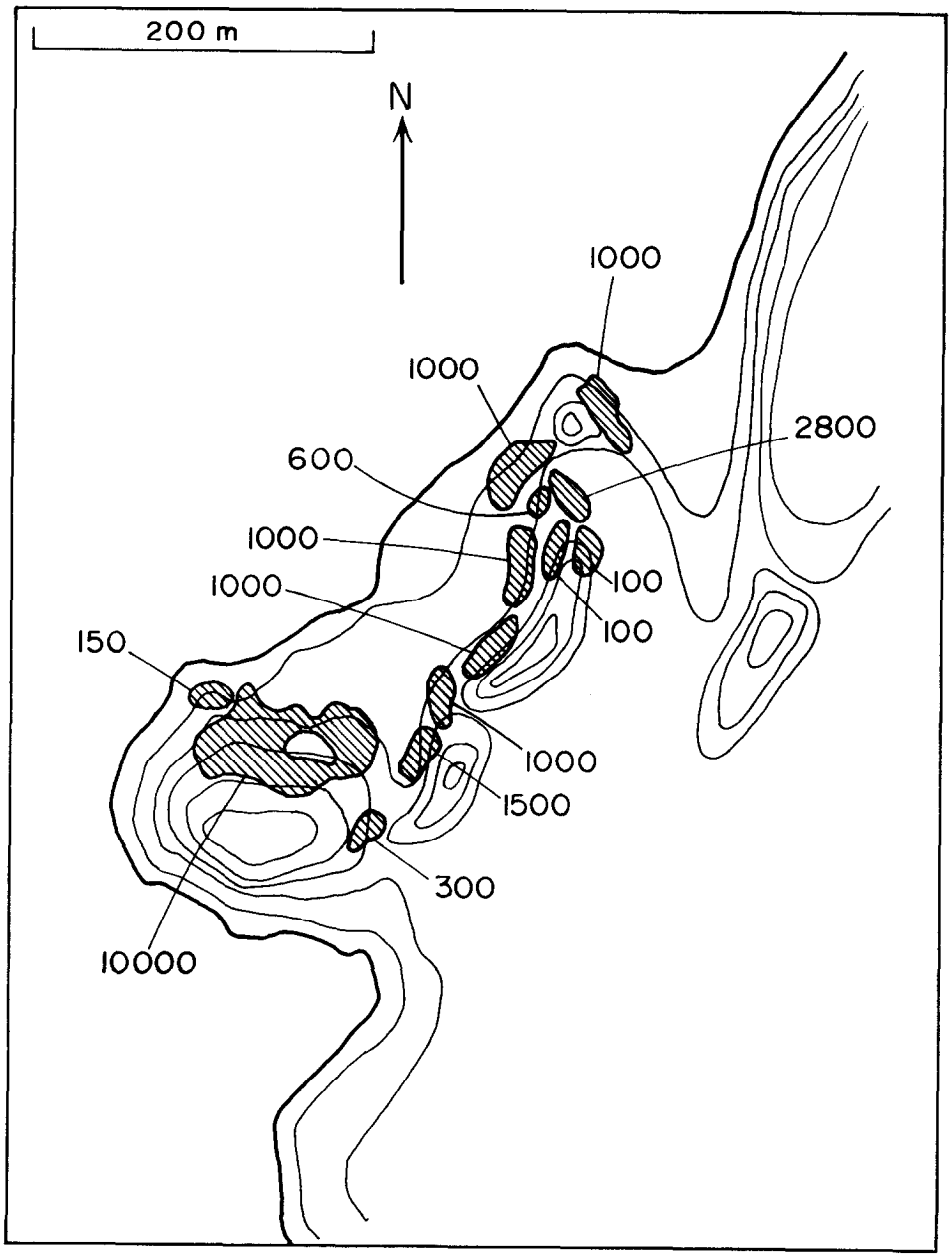


Map 14

Un-named Island 100m south west of Mule Island 68°39'S 77°49'E

Date censused: 8 November 1973

Total count: 625 breeding pairs

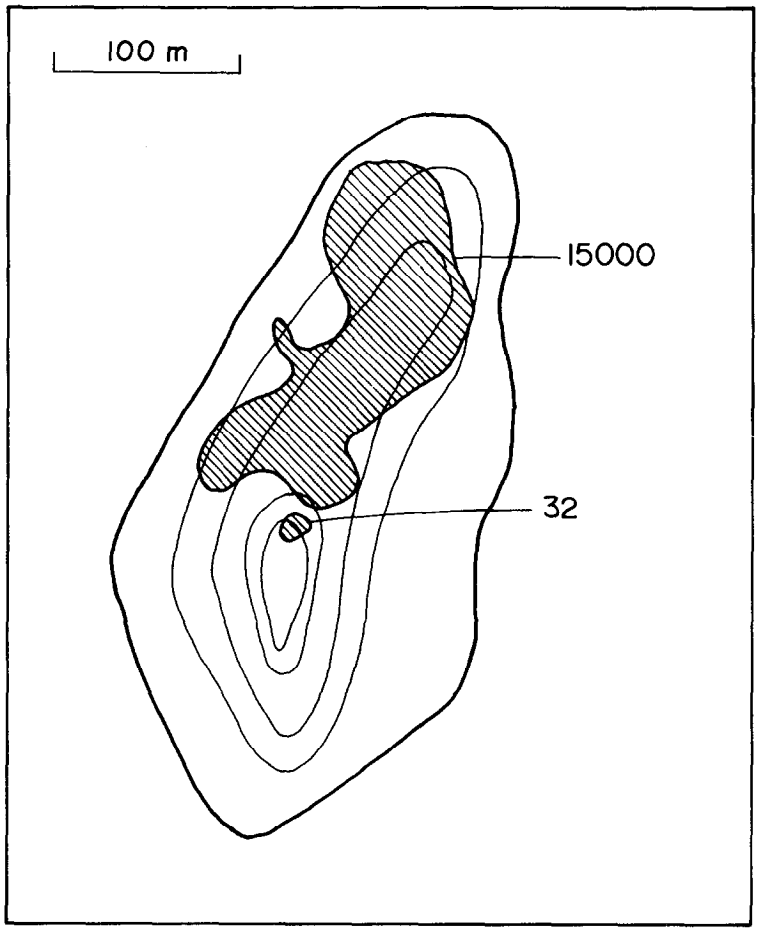


Map 15

Hawker Island 68°38'S 77°51'E

Date censused: 8 November 1973

Total count: 10 275 breeding pairs

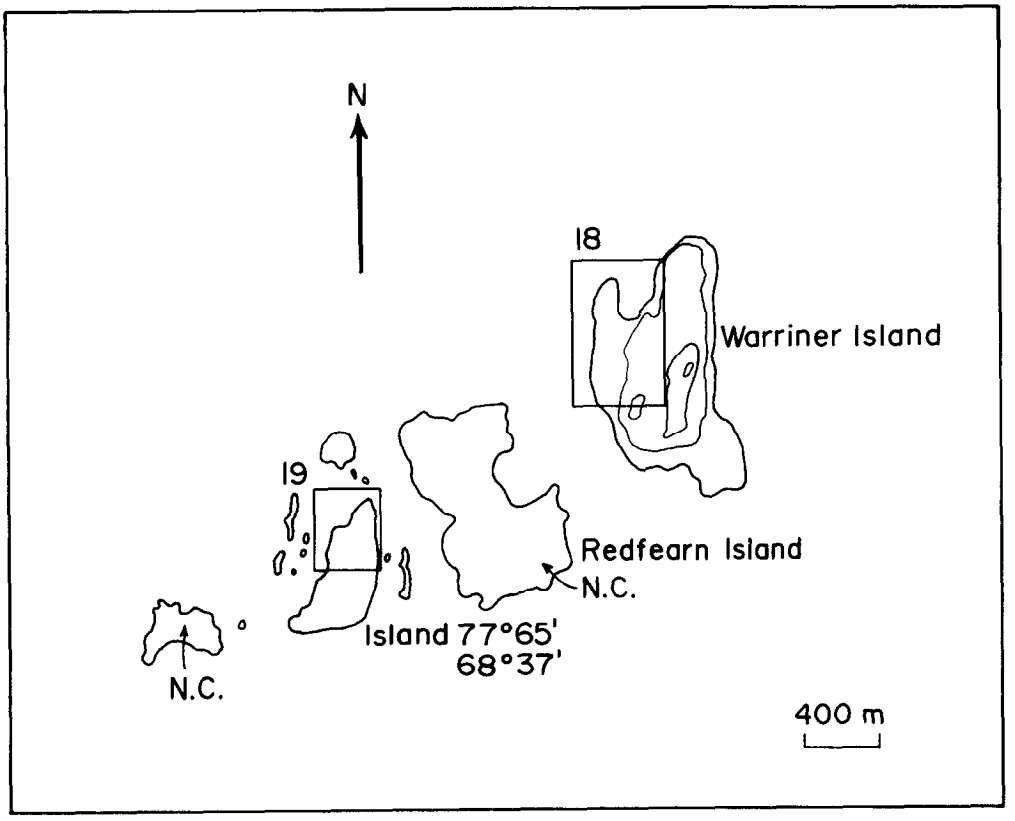


Map 16

Un-named Island 500m west of Hawker Island 68°38'S 77°49'E

Date censused: 8 November 1973

Total count: 7516 breeding pairs

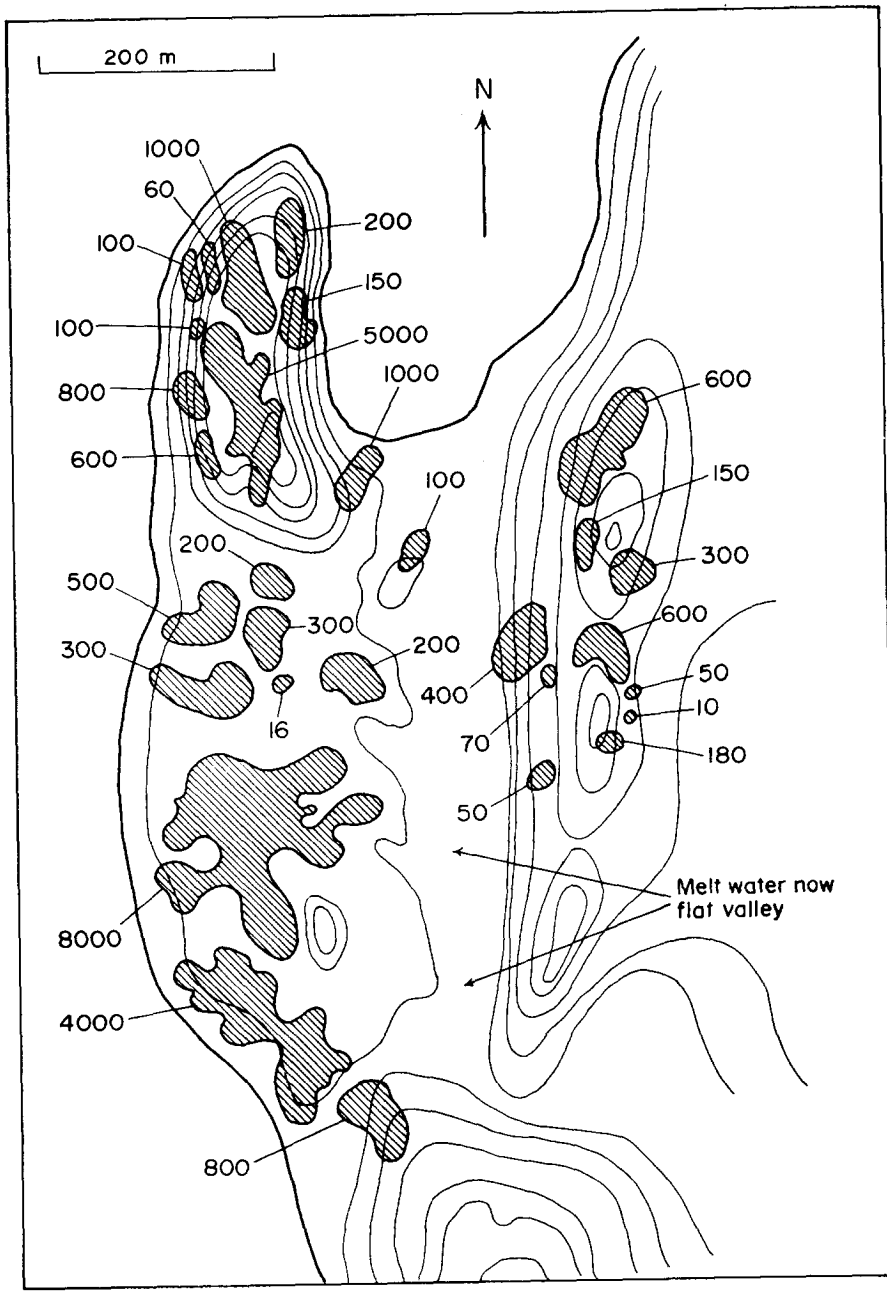


Map 17

Warriner and Redfearn Islands

Date censused: 8 and 10 November 1973

The location of maps 18 and 19 are indicated. NC denotes 'No Colonies'.

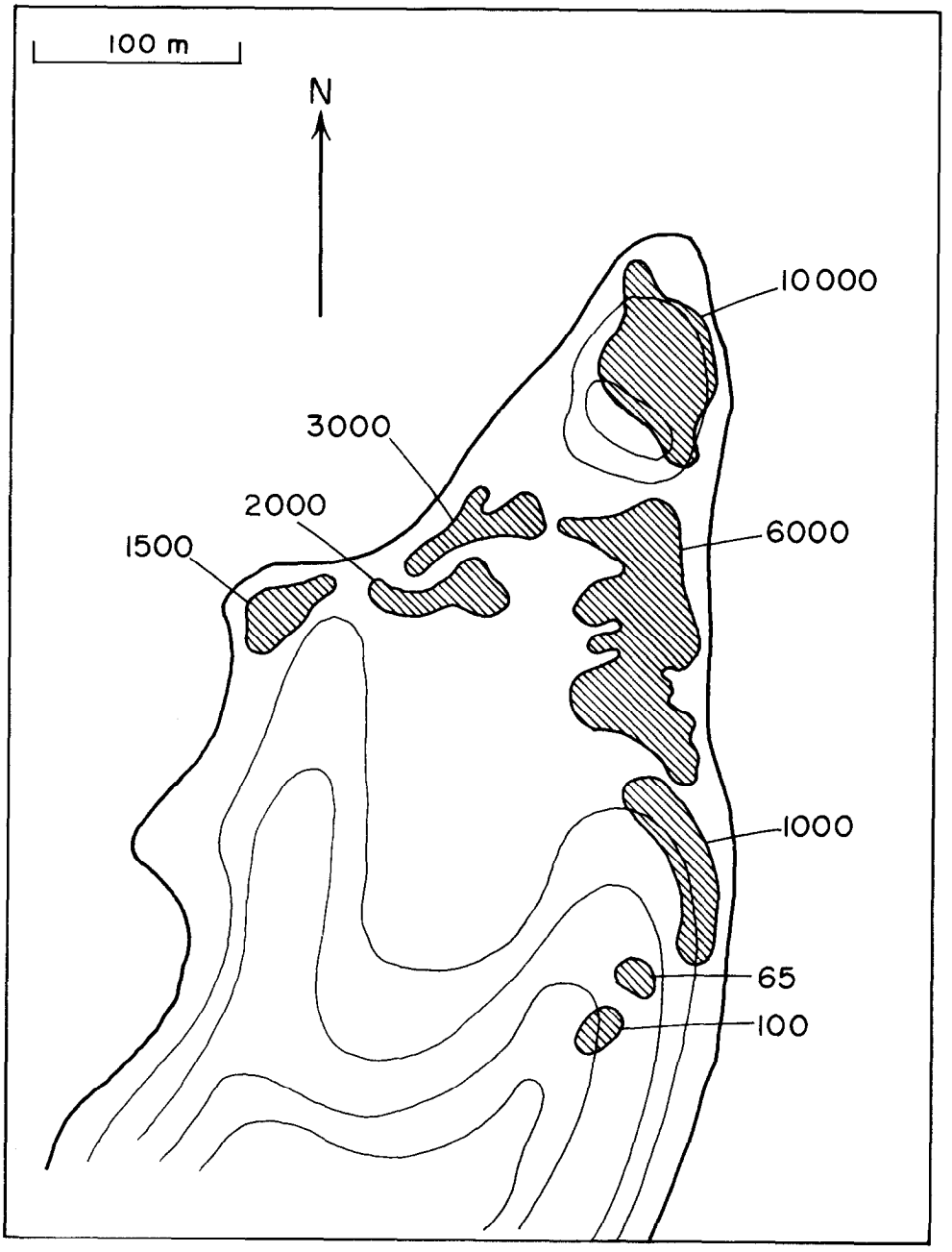


Map 18

Warriner Island 68°37'S 77°54'E

Date censused: 8 November 1973

Total count: 12 918 breeding pairs

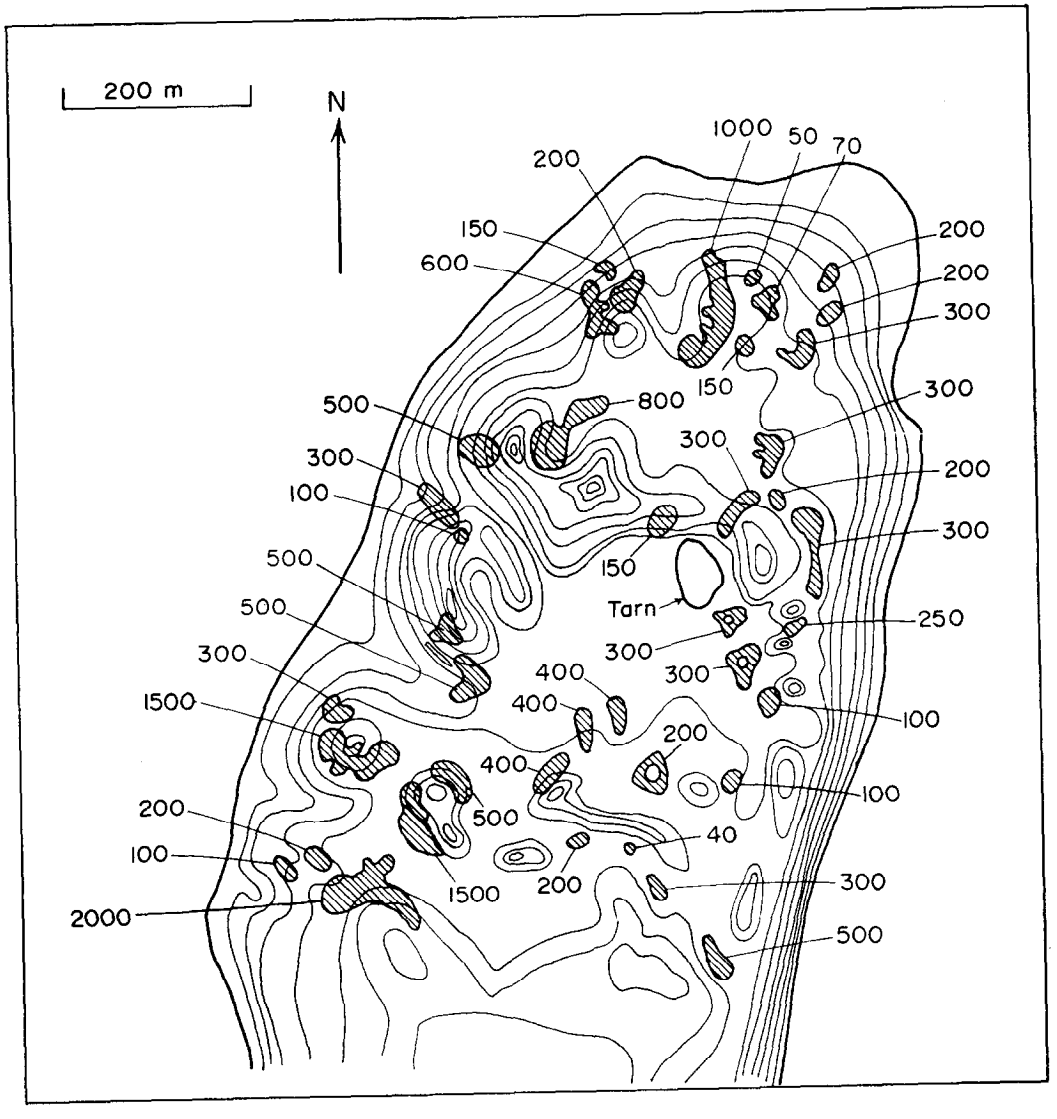


Map 19

Un-named Island 500m west of Redfearn Island 68°37'S 77°52'E

Date censused: 10 November 1973

Total count: 11 832 breeding pairs

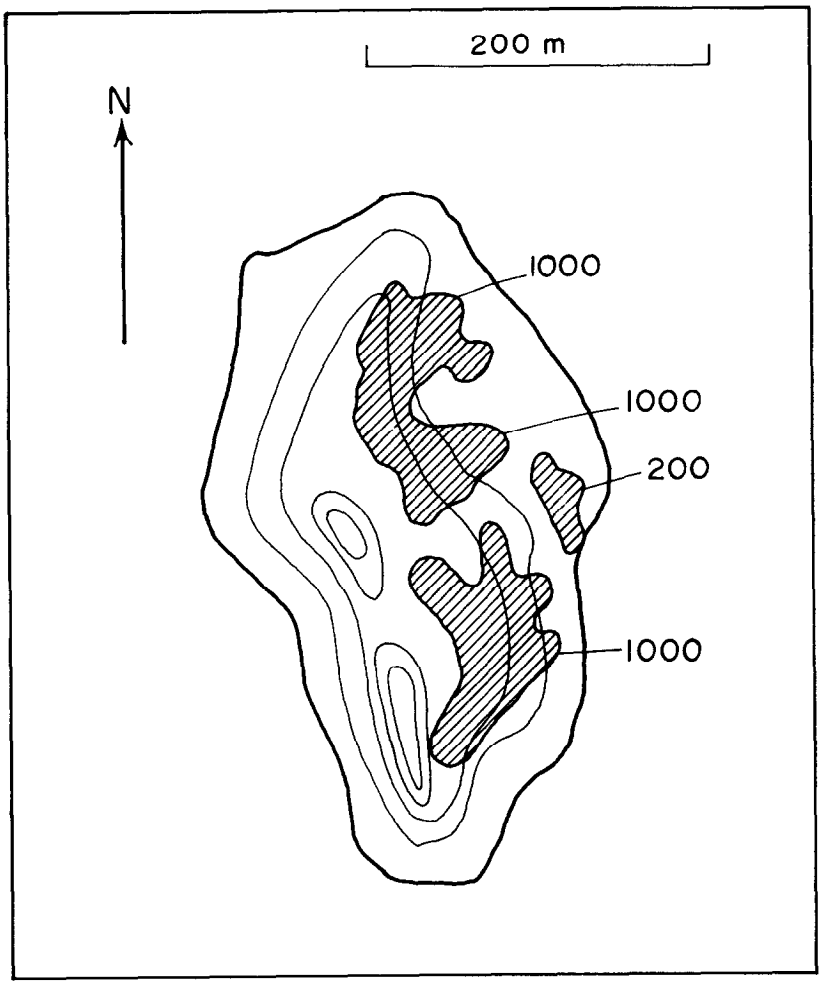


Map 20

Gardner Island 68°35'S 77°52'E

Date censused: 10 November 1973

Total count: 8230 breeding pairs

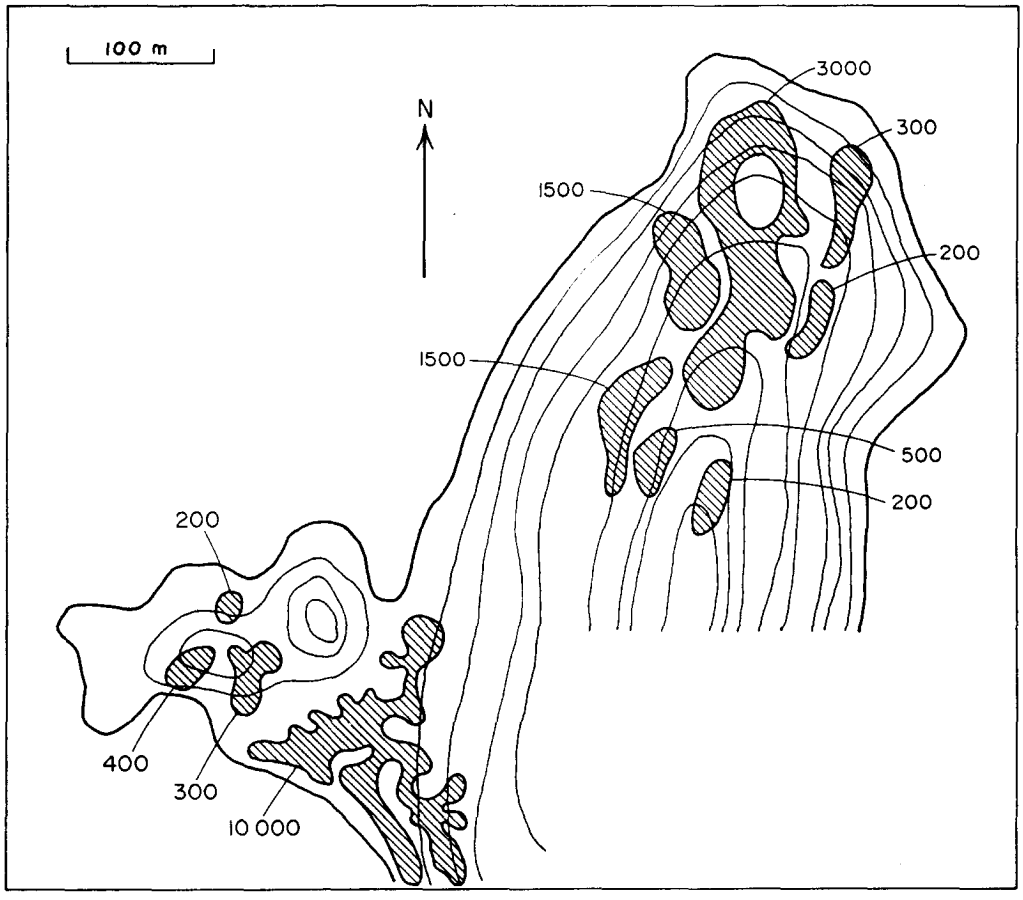


Map 21

Turner Island 68°33'S 77°53'E

Date censused: 14 November 1973

Total count: 1600 breeding pairs

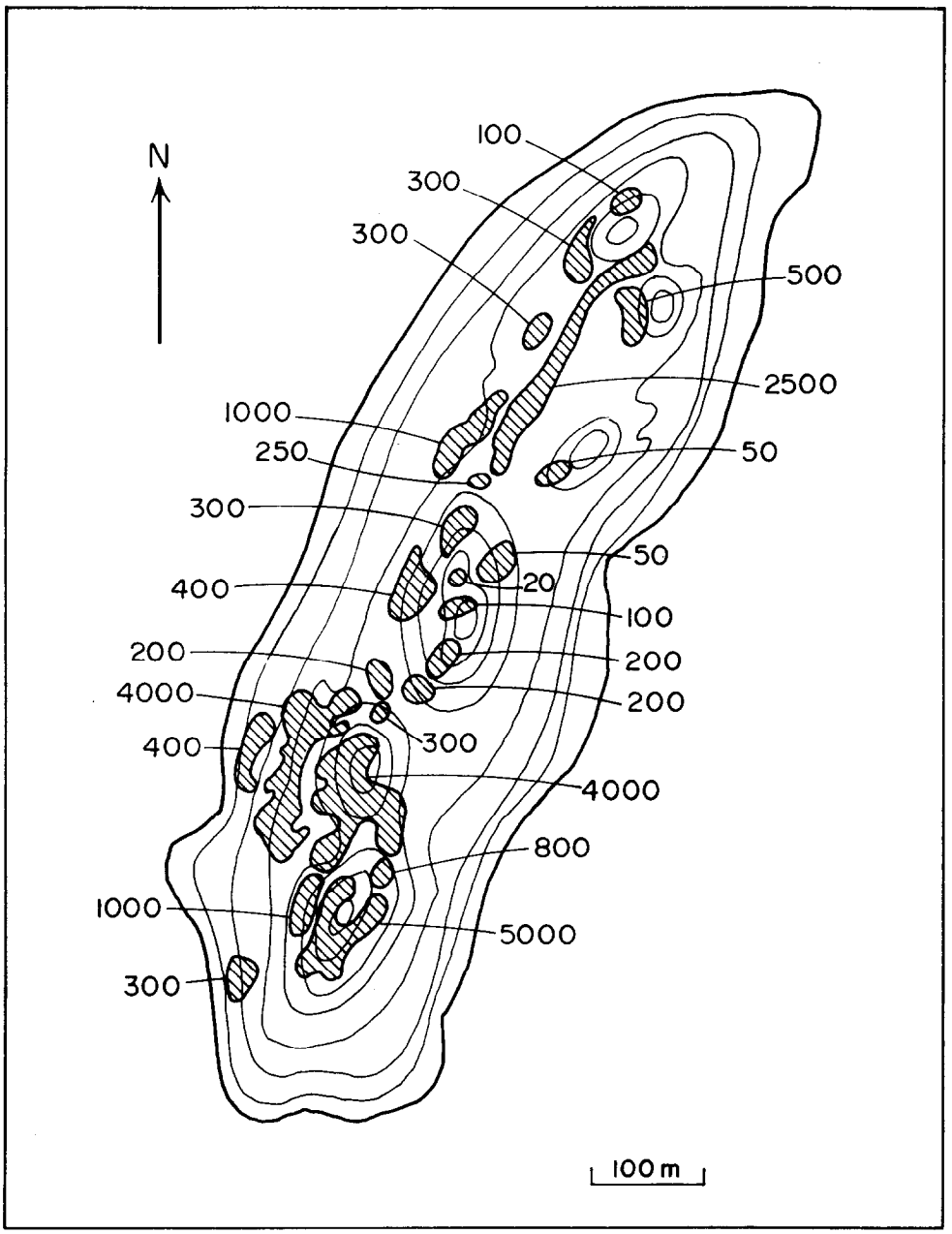


Map 22

Magnetic Island 68°33'S 77°54'E

Date censused: 14 November 1973

Total count: 9050 breeding pairs

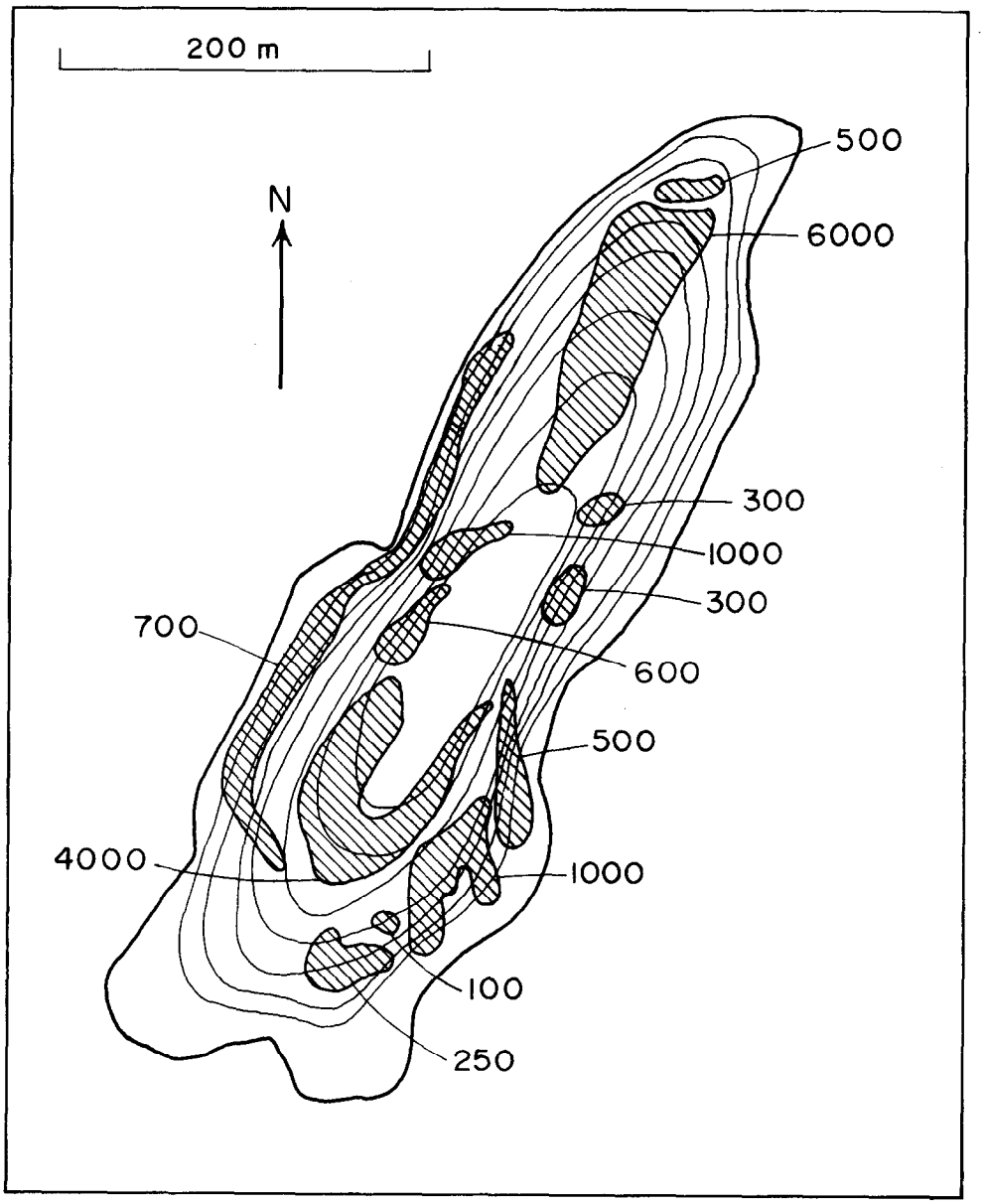


Map 23

Lugg Island 68°32'S 77°57'E

Date censused: 14 November 1973

Total count: 11 135 breeding pairs

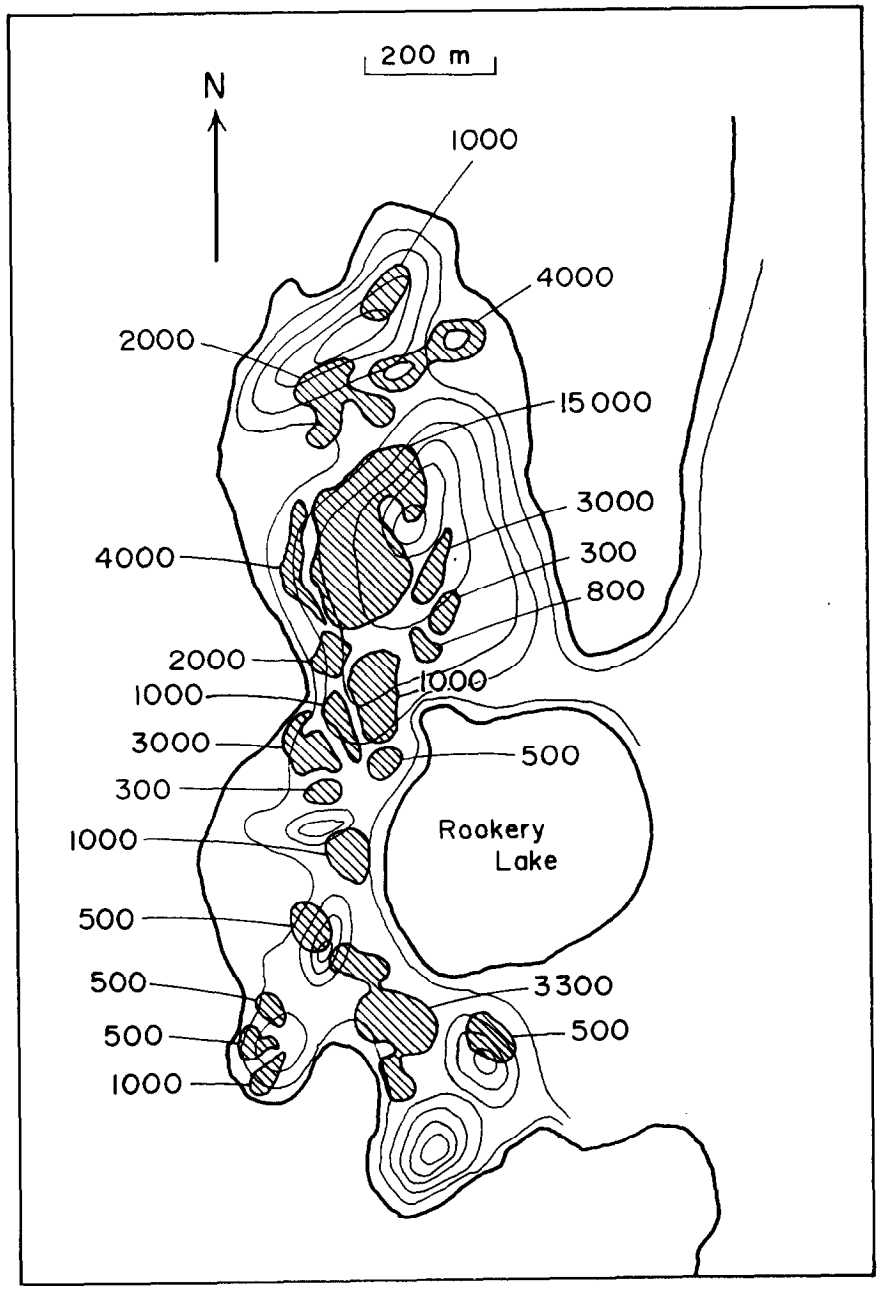


Map 24

Lucas Island 68°30'S 77°58'E

Date censused: 14 November 1973

Total count: 7625 breeding pairs

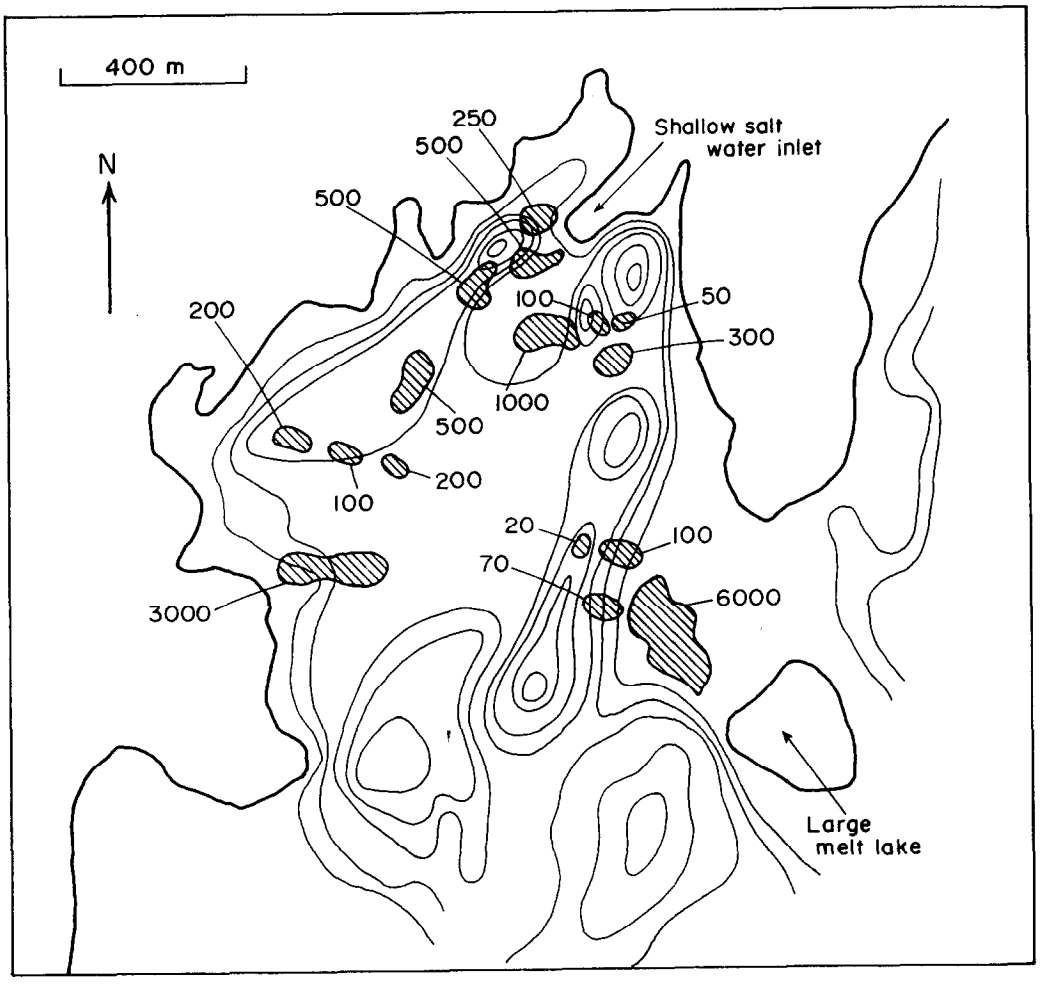


Map 25

Long Peninsula (1) Rookery Lake 68°30'S 78°04'E

Date censused: 13 November 1973

Total count: 22 600 breeding pairs

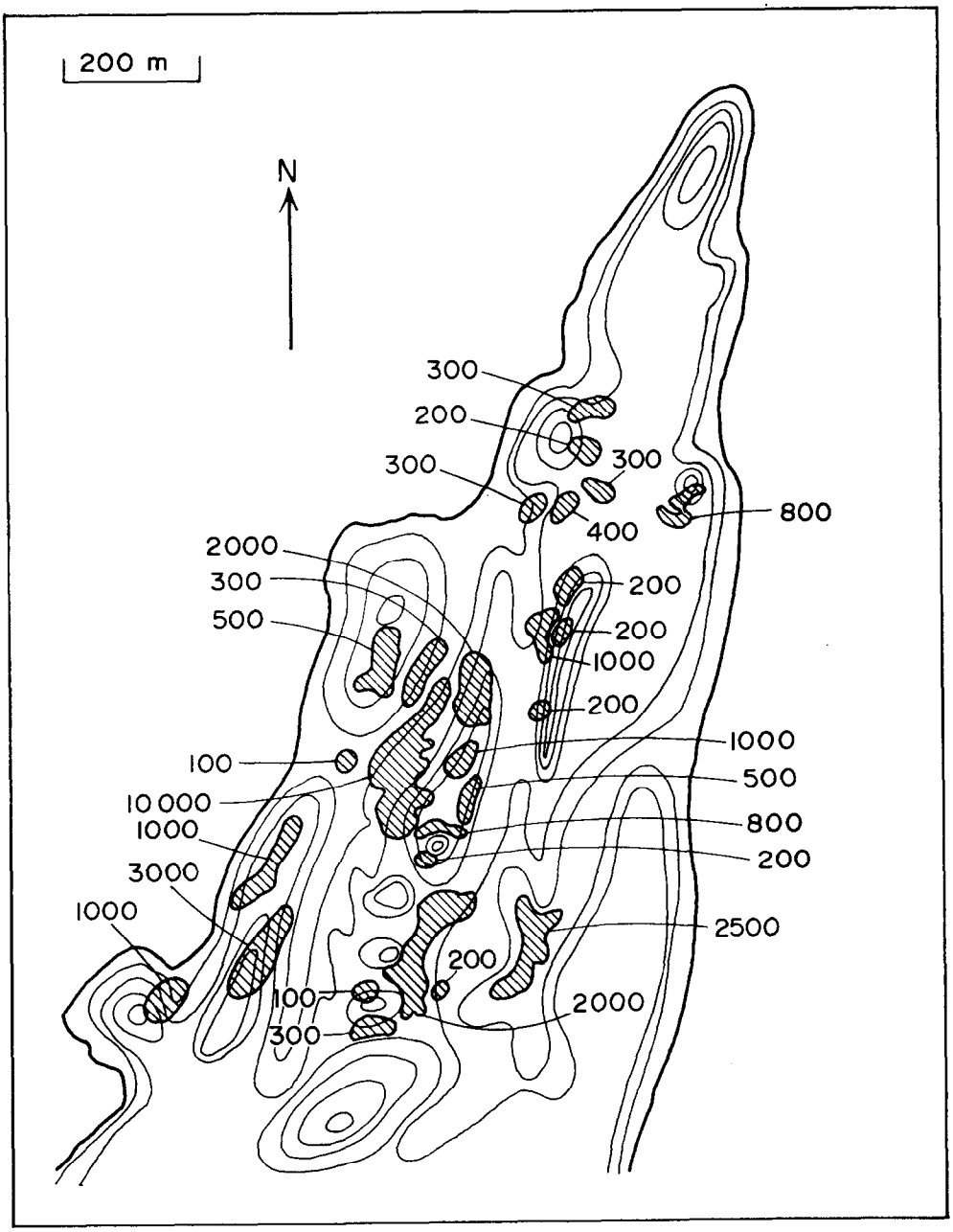


Map 26

Long Peninsula (2) 68°29'S 78°06'E

Date censused: 13 November 1973

Total count: 6445 breeding pairs

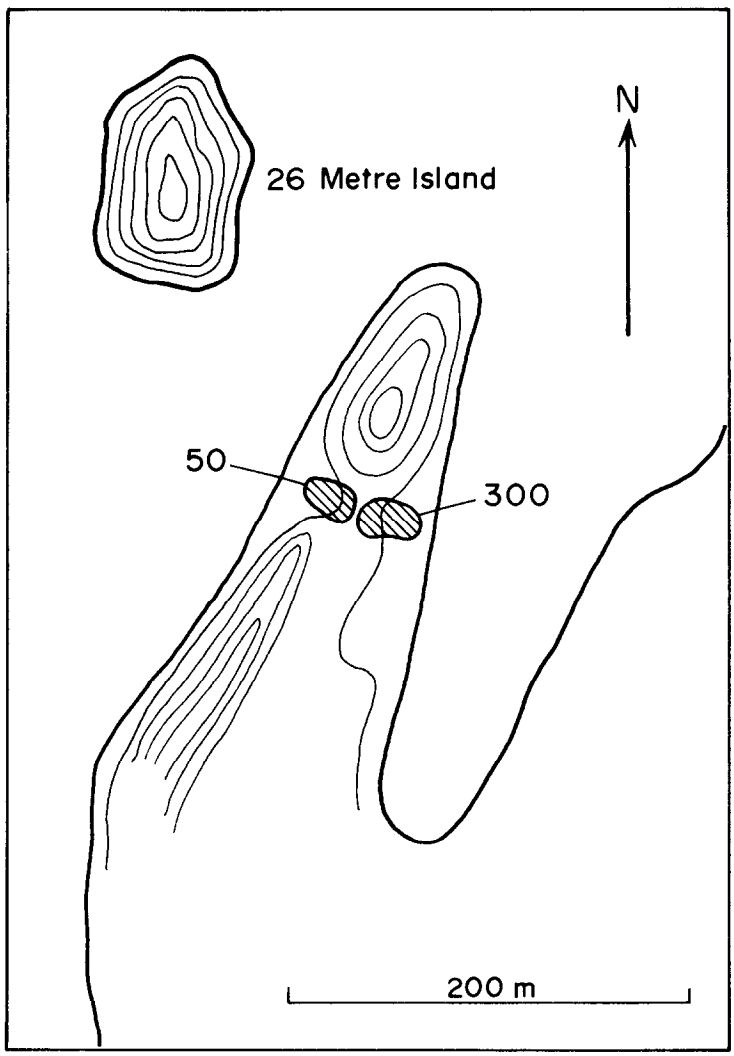


Map 27

Long Peninsula (3) Albino Rookery 68°28'S 78°09'E

Date censused: 13 November 1973

Total count: 14 700 breeding pairs

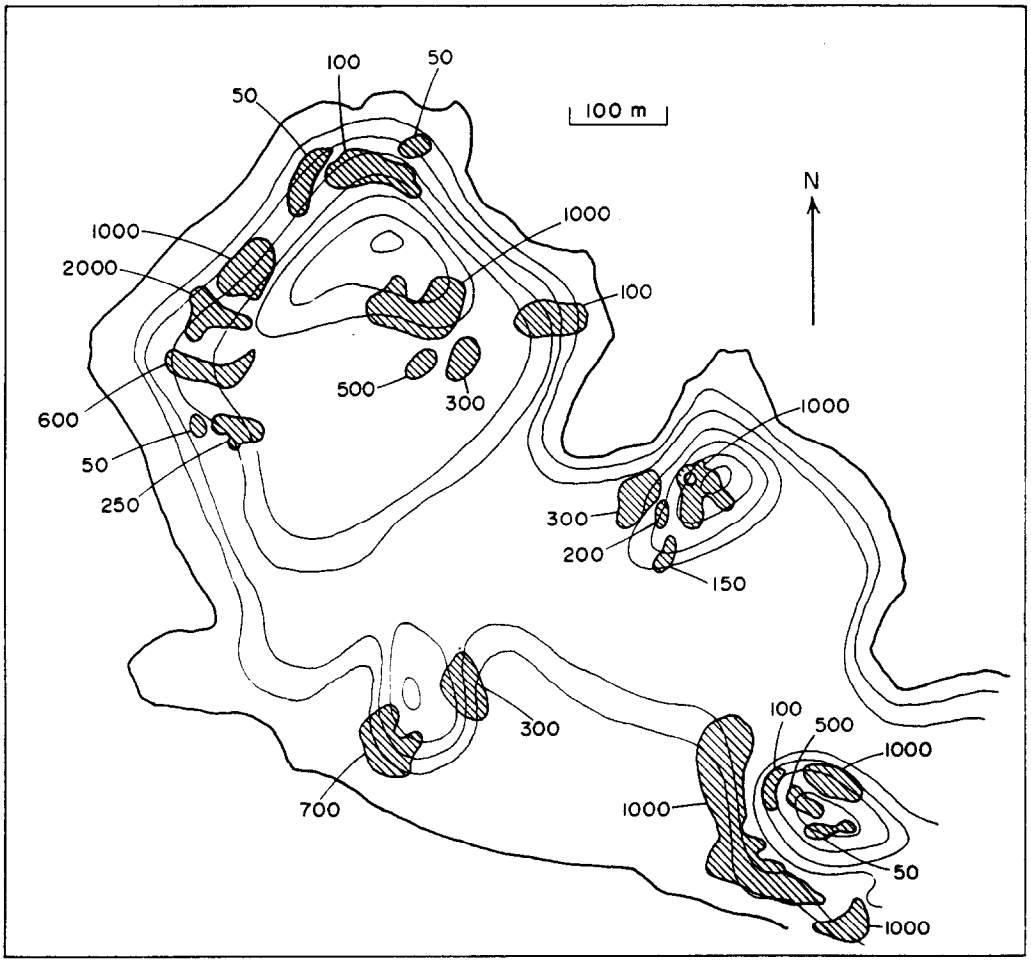


Map 28

Long Peninsula (4) 68°27'S 78°11'E

Date censused: 13 November 1973

Total count: 175 breeding pairs

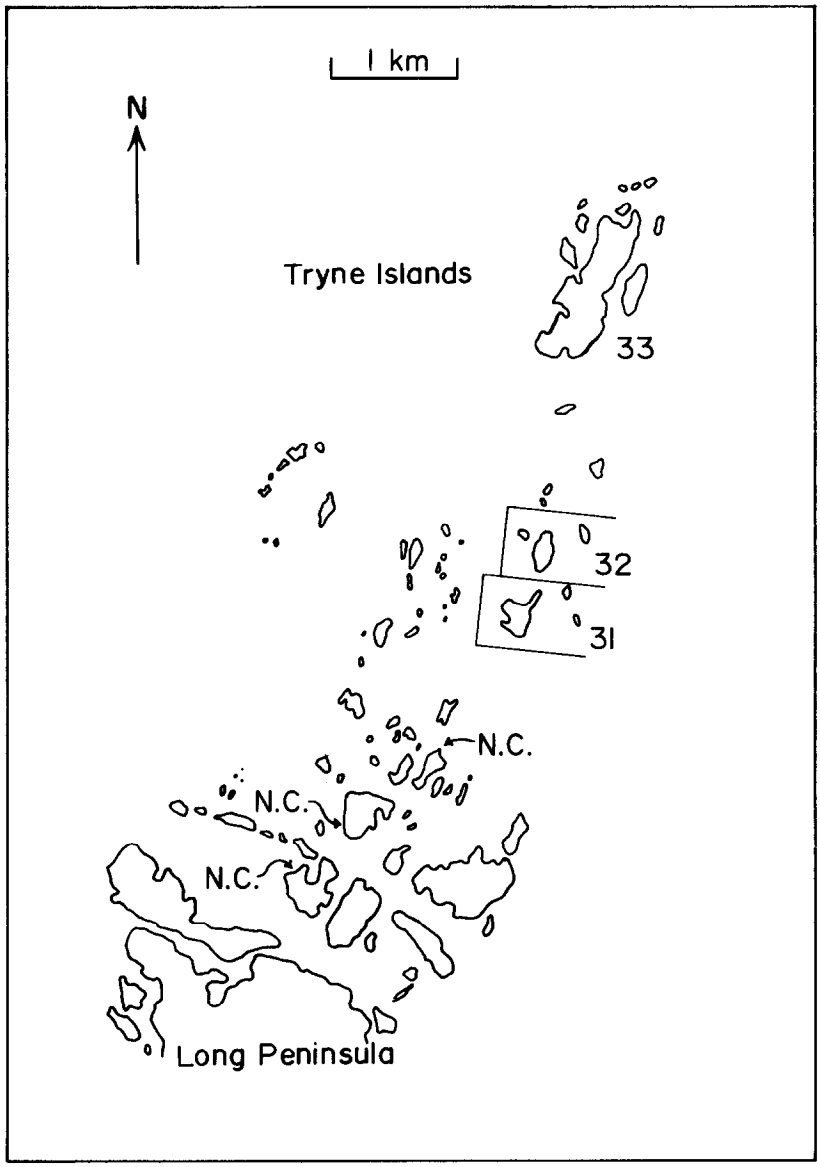


Map 29

Un-named Island 50m west of Long Peninsula 68°25'S 78°20'E

Date censused: 13 November 1973

Total count: 6150 breeding pairs

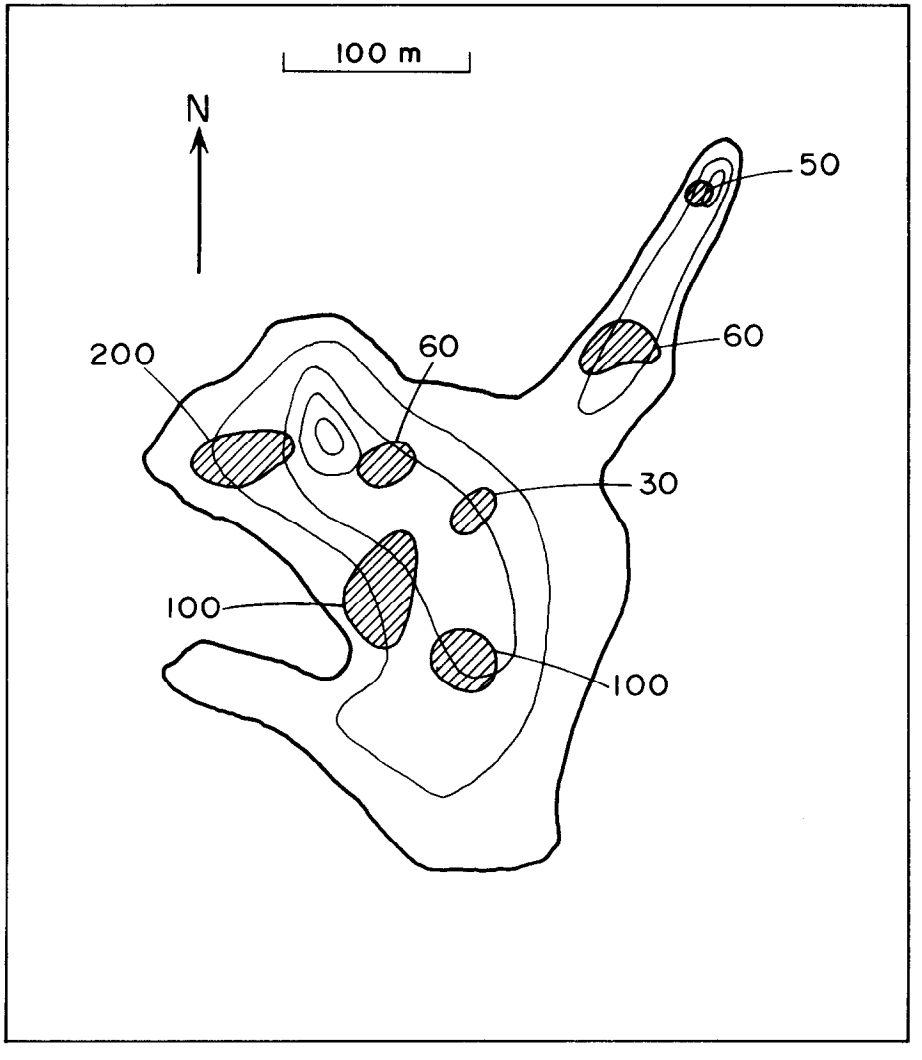


Map 30

Tryne Islands 68°24'S 78°24'E

Date censused: 11 November 1973

The location of maps 31, 32 and 33 are indicated. NC denotes 'No Colonies'.

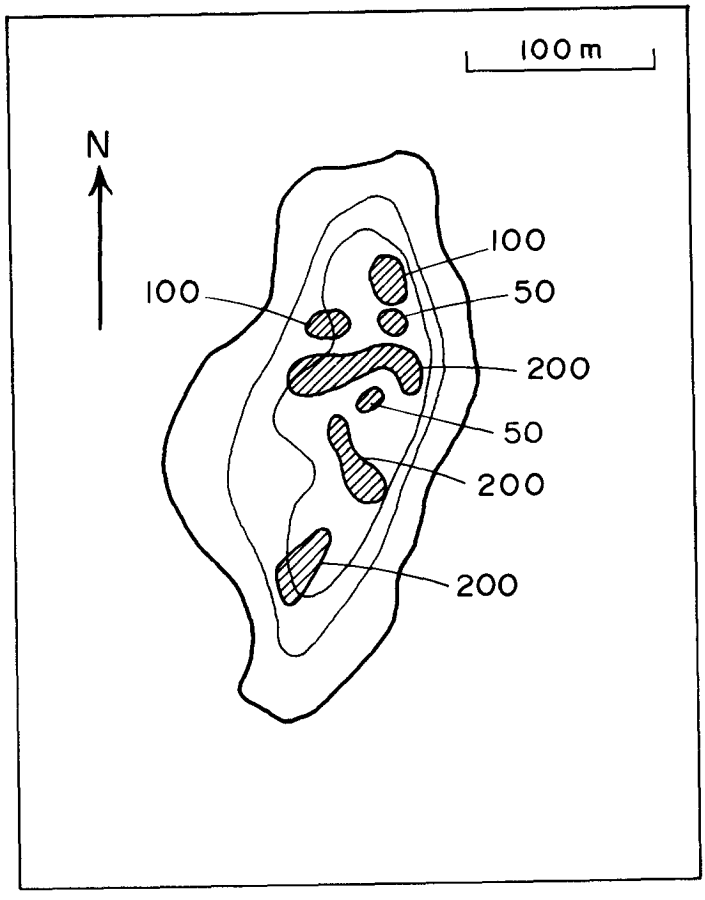


Map 31

Tryne Islands (1) 68°24'S 78°24'E

Date censused: 11 November 1973

Total count: 300 breeding pairs

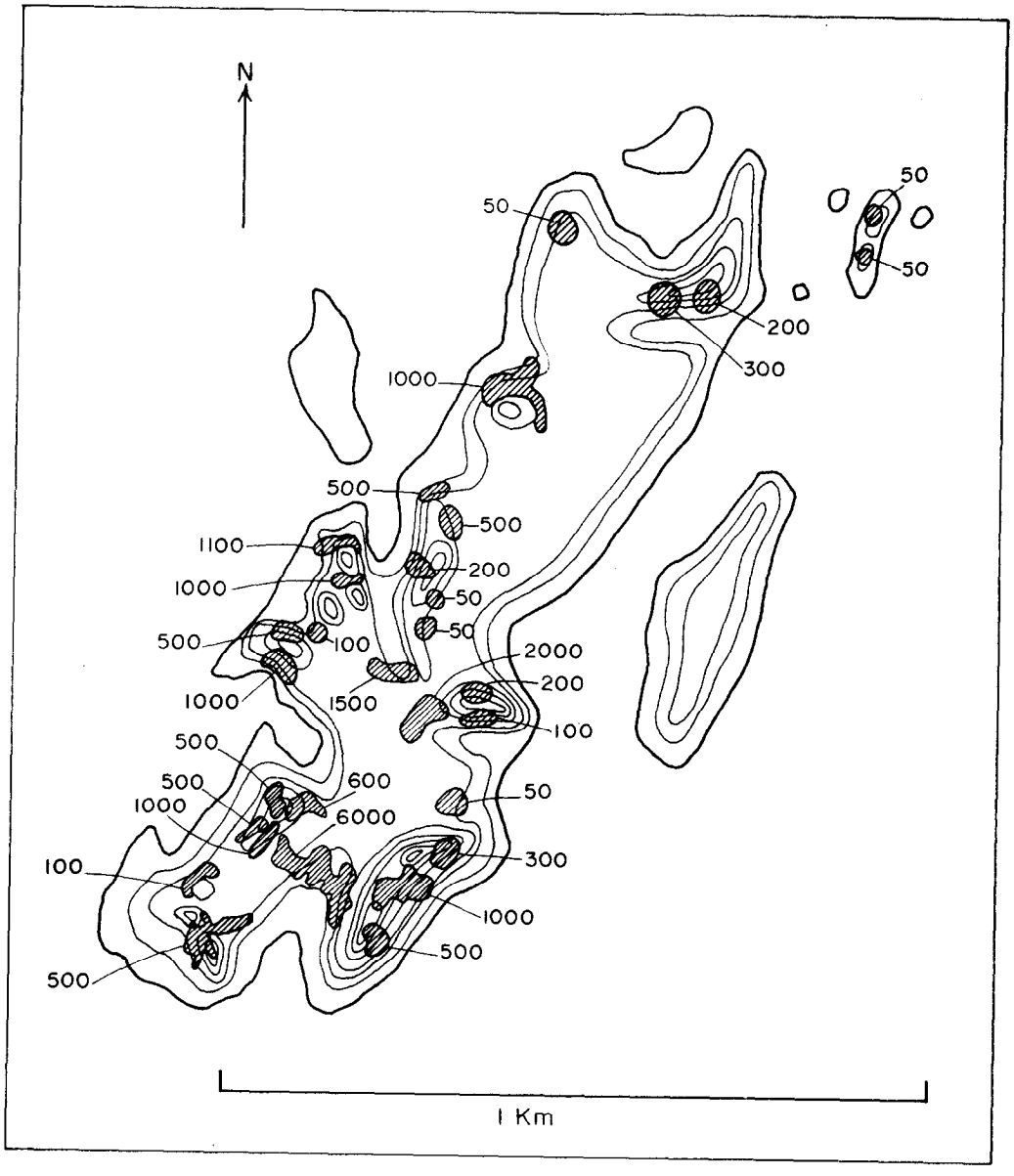


Map 32

Tryne Islands (2) 68°24'S 78°24'E

Date censused: 11 November 1973

Total count: 450 breeding pairs

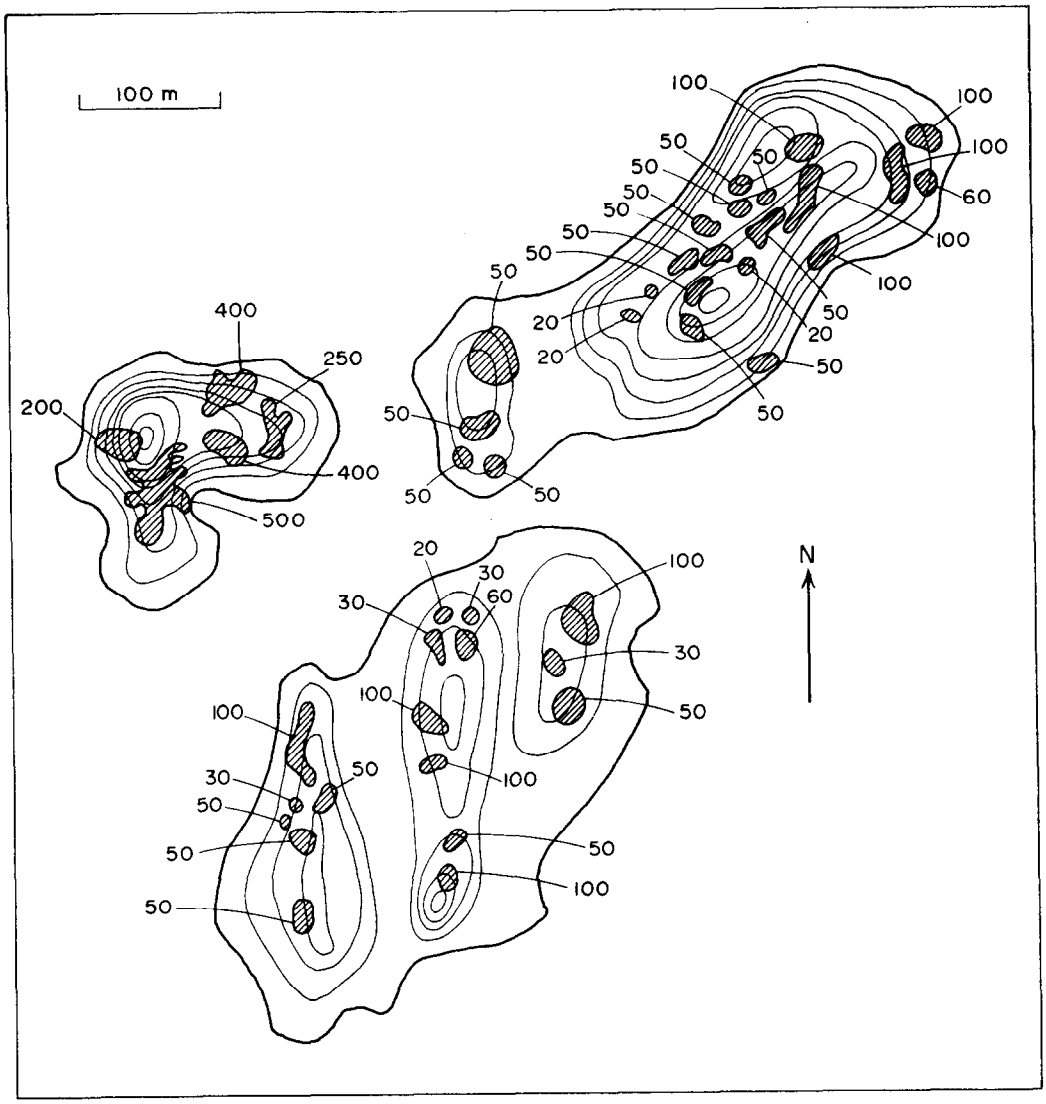


Map 33

Tryne Islands (3) 68°22'S 78°25'E

Date censused: 11 November 1973

Total count: 10 750 breeding pairs



Map 34

Wyatt Earp Islands 68°22'S 78°32'E

Date censused: 11 November 1973

Total count: 2035 breeding pairs

Table 1. Adélie penguin census data, Vestfold Hills, 1973.

Island/area number(s)	Breeding pairs	Map(s)
Zolotov Island	15 844	2,3,4,5,6,7
Kazak Island	7 552	8,9,10,11,12
Mule Island	221	13
Un-named Island SW of Mule	625	14
Hawker Island	10 275	15
Un-named Island W of Hawker	7 516	16
Warriner Island	12 918	18
Un-named Island SW of Warriner	11 832	19
Gardner Island	8 230	20
Turner Island	1 600	21
Magnetic Island	9 050	22
Lugg Island	11 135	23
Lucas Island	7 625	24
Long Peninsula	50 070	25,26,27,28
Un-named Island W of Long Peninsula	6 150	29
Tryne Islands	11 500	31,32,33
Wyatt Earp Islands	2 035	34
Total	174 178 ± 26 127 (15%)	

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