Distribution and Abundance of the New Zealand Fur Seal, *Arctocephalus forsteri*

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Introduction

Existing accounts of the distribution and abundance of the New Zealand fur seal (*Arctocephalus forsteri* Lesson 1828) are either superficial (for example, King 1964, Turbott 1952) or limited to specific localities (see Table 1). Estimates of the total population have been made by Falla (*in* Sorensen 1969b) and by Gaskin (1972), but Falla's estimate of less than 20 000 was based on visits to Snares Islands, Solander Islands, and parts of Fiordland in 1947–48, and Gaskin's figure of 20 600 relied mainly on Falla's work and added few new data. The information on distribution and abundance of the New Zealand fur seal presented here is the result of a study which was both more intensive and more extensive than earlier studies, and it is the first attempt to locate and make a census of all fur seal colonies throughout the New Zealand region.

The main aims of this study were to determine the distribution of fur seal breeding colonies (rookeries), bachelor bull colonies (hauling grounds), and colonies comprising young animals (immature colonies) throughout the New Zealand region and to estimate the size of the total population. In addition, information on former distribution was reviewed and the possible influence of some environmental factors on the distribution of fur seals examined. Population estimates had previously been made at some colonies within the breeding range and these were compared with recent counts to show the extent of recent population increases. Appendix 1 is a check-list of the locations and estimates of population size for all fur seal colonies found.

This study was part of an M.Sc. thesis (Wilson 1974b), which itself formed part of a long-term programme begun in 1969 by the Department of Zoology, University of Canterbury to study the biology of the New Zealand fur seal. Most previous work has been carried out on Open Bay Islands, South Westland and has been concerned with behaviour or breeding biology. Work up to 1974 has been reviewed by Crawley and Wilson (1976). Since 1974 further behavioural studies have been published (McNab and Crawley 1975, Crawley, Stark, and Dodgshun 1978, Miller 1974, 1975a, 1975b, 1975c), and pup mortality has been described (Mattlin 1978a). Pups have been tagged at Taumaka Island, Open Bay Islands, and population estimates made for Taumaka Island (Crawley and Brown 1971), Snares Islands (Crawley 1972), and Auckland Islands (Wilson 1974a).

The fur seal in south and west Australia is now known to be *A. forsteri* (Repenning, Peterson, and Hubbs 1971, Shaughnessy 1970, Stirling and Warneke 1971), and a general account of the distribution of Australian colonies appears in Marlow and King (1974).

TABLE 1: Previous studies of the distribution and abundance of New Zealand fur seals

Areas visited	Estimated total	Date	Authority
Three Kings Is.	70–80	1968–69	Singleton 1972
Kaikoura, Canterbury, and Otago	up to 1 000	1959–60	Street (unpublished)
Kaikoura	520	1964	Gaskin *in* Sorensen 1969a
Westland and parts of Fiordland	1 616	1964	Gaskin *in* Sorensen 1969a
Taumaka I., Open Bay Is.	2 000–3 000	1970	Crawley and Brown 1971
Parts of Fiordland, Solander Is., and Snares Is.	20 000*	1947–48	Falla *in* Sorensen 1969b
New Zealand mainland and subantarctic islands	20 600†	various	Gaskin 1972
Codfish I.	100	1948	Dell 1948 (unpublished)
Snares Is.	1 156	1970	Crawley 1972
Auckland Is.	1 000	1972–73	Wilson 1974a
Campbell I.	778	1958	Bailey and Sorensen 1962
Antipodes Is.	1 100	1969	Taylor *in* Sorensen 1969b
Macquarie I.	620	1950–63	Csordas and Ingham 1965

*Estimate of the total population in the New Zealand region based on counts made in the areas listed.
†Estimate of the total population in the New Zealand region based on various counts available up to 1970.

Methods

Visits were made to as many fur seal colonies as possible throughout New Zealand and Chatham Islands. The location and extent of each colony were recorded, and an estimate of the number of seals was made. Population estimates for the subantarctic islands and for colonies in New Zealand that were not visited were based on published or unpublished accounts for each locality. Most colonies were visited between November 1971 and February 1973, though some were visited in July, August, or September 1973 and in February or December 1974.

The locations of fur seal colonies were found by searching published and unpublished reports relating to coastal areas. Files concerning fur seals, held by Fisheries Management Division, Wellington and the National Museum, were also searched for relevant information. A questionnaire was sent to zoology departments of all New Zealand universities, some national and maritime parks, selected government research organisations, and the major museums throughout New Zealand. About 860 copies were sent to 26 institutions and 80 were returned. Most information on the location of seal colonies was obtained through personal contact with fishermen and others who knew parts of the New Zealand coast. The location of colonies was generally given accurately, but estimates of numbers were less reliable and these were used with discretion.

Visiting the seal colonies was the major difficulty in this study. Most of them are on off-shore islands in latitudes renowned for rough seas and frequent gales. Bad weather often prevented visits to seal colonies or delayed my departure from them, and the time spent at some colonies was inadequate. Transport to many seal colonies was provided by local fishermen, but other means were also used.

The reliability of counts varied greatly from colony to colony and depended on the time spent at each colony, accessibility, weather, sea conditions, visibility, nature of the terrain, and the distance of the observer from the seals. To make counts comparable, the accuracy of each count was estimated in the field. These estimates were subjective, but a check on their accuracy was possible at some colonies where several counts were made under different circumstances.

At some islands, detailed study of the seal colonies was possible, but at other places only clifftop observations could be made. At some colonies landing was impossible, and only a rough idea of numbers could be gained from a rolling boat. Every opportunity was taken to visit rocky coasts even if seals had not been reported there.

Only general statements can be made about the accuracy of the different census methods. Except on very regular terrain, less than half the seals ashore can be seen from a boat, and on rookeries less than one-tenth of the seals may be seen. In good conditions three-quarters of seals ashore may be seen from clifftops, but sometimes only a third of those on rugged terrain are visible.

Weather and sea conditions, nature of the terrain, and the distance from the seals were recorded each time a count was made. Brief studies have been made at some colonies of the influence time of day, season, and weather had on the number of seals ashore (Crawley 1972, Stirling 1968, Wilson 1974b). These have enabled estimates to be made of the number of seals absent from colonies at the times counts were made and of the number of seals present in January-February 1973.

Some of the terms used in this study are defined below.

The New Zealand region includes New Zealand, Campbell Island group, and Chatham, Snares, Auckland, Bounty, Antipodes, and Macquarie Islands.

New Zealand includes North, South, Stewart, Solander, Ruapuke, and Three Kings Islands and all the small islands surrounding these.

Stewart Island includes the off-lying islands surrounding the main island, but does not include Ruapuke Island or Solander Islands.

The subantarctic islands include Snares, Auckland, Campbell, Bounty, Antipodes, and Macquarie Islands.

The outlying island groups include Chatham Islands as well as the subantarctic islands.

Unless otherwise indicated, place names used are listed in the Gazetteer of New Zealand Place Names, published by the Department of Lands and Survey in 1968. Unofficial place names, when first mentioned, are enclosed in quotation marks. Some names, though not appearing in the Gazetteer, are on the most recent

N.Z.M.S. 1 Topographical Maps (for example, Many Islands in Dusky Sound) and others are local names (The Knobbies).

Whenever possible, the seals counted were recorded in the appropriate age class or sex class.

Four classes were usually recognisable and these corresponded to the classes used by Miller (1971, 1975c) and Crawley and Wilson (1976). They were:

Pups—less than 1 year old and easily distinguished by their size (about 40 cm at birth and less than 1 m at weaning), facial characteristics, and plaintive call;

Females—females of breeding age, distinguished by light build, slender neck, and facial features;

Sub-adult males (SAMs)—large enough to be identified as males, but lacking the large heavy neck characteristic of adult males;

Adult males—fully grown males capable of holding territories and distinguished by their large size, heavy necks, and longer guard hairs on neck and shoulders.

Young animals could not be sexed and have been simply listed as Immatures.

The year ranges for each class are not known.

Distribution

Pre-European Distribution

Sealers seldom revealed where they caught fur seals and so there is little information on the location of seal colonies during the sealing period (1792–1830).

During this period the most important sealing bases on Stewart Island were at Port William and Port Pegasus. Sealers' camps were probably established at "Wilson" (Broad) Bay and "Yankee Boat Harbour" in the south and Easy "Cove" (Harbour), Doughboy Bay, Mason Bay, and Codfish Island in the west (Howard 1940). Several sealing gangs visited the South Cape area (McNab 1907) and probably took seals from the islands off South West Cape. At least one party is known to have sealed on Big South Cape Island (Begg and Begg 1973). Camps were established at various places along the Foveaux Strait coast, but these were probably used by sealers based at Port William (Howard 1940).

Of these sites, only the islands off South West Cape, Yankee Boat Harbour, and Easy Harbour are close to present day concentrations of seals. A few seals are found on Codfish Island and close to Port Pegasus and Broad Bay, but today only stragglers are found close to the other localities. Howard (1940) indicates that Seal Creek, north of Port Pegasus, was a "favourite haunt of the animal", but there is no colony there today. This suggests fur seals were once more widely distributed around Stewart Island. However, competition between gangs may have meant that bases were not always established near seal colonies, and the location of a camp need not indicate the former presence of seals.

Solander Islands were one of the most important New Zealand sealing grounds (McNab 1907).

In Fiordland, Dusky Sound was the best known haunt of the fur seal, and the log of Captain Cook and the diary of Robert Murry (McNab 1907) refer to colonies on Seal Islands and Seal Rocks and also on Breaksea Island (Breaksea Sound). There are few other references to specific sites used by sealers in Fiordland, but it is known that fur seals were taken at West Cape (McNab 1908), Chalky Inlet, and Gates Boat Harbour (Begg and Begg 1973). Hector (1871) collected several fur seals at Milford Sound.

The seal colony at Three Steeples, Cape Foulwind was visited by explorers in 1846 and seals were taken there some years earlier (Chapman 1893).

Seals were taken at Cape Saunders (Chapman 1893) and sealers visited an area referred to as South East Cape (probably south-east Otago) as well as other points along the east coast of the South Island

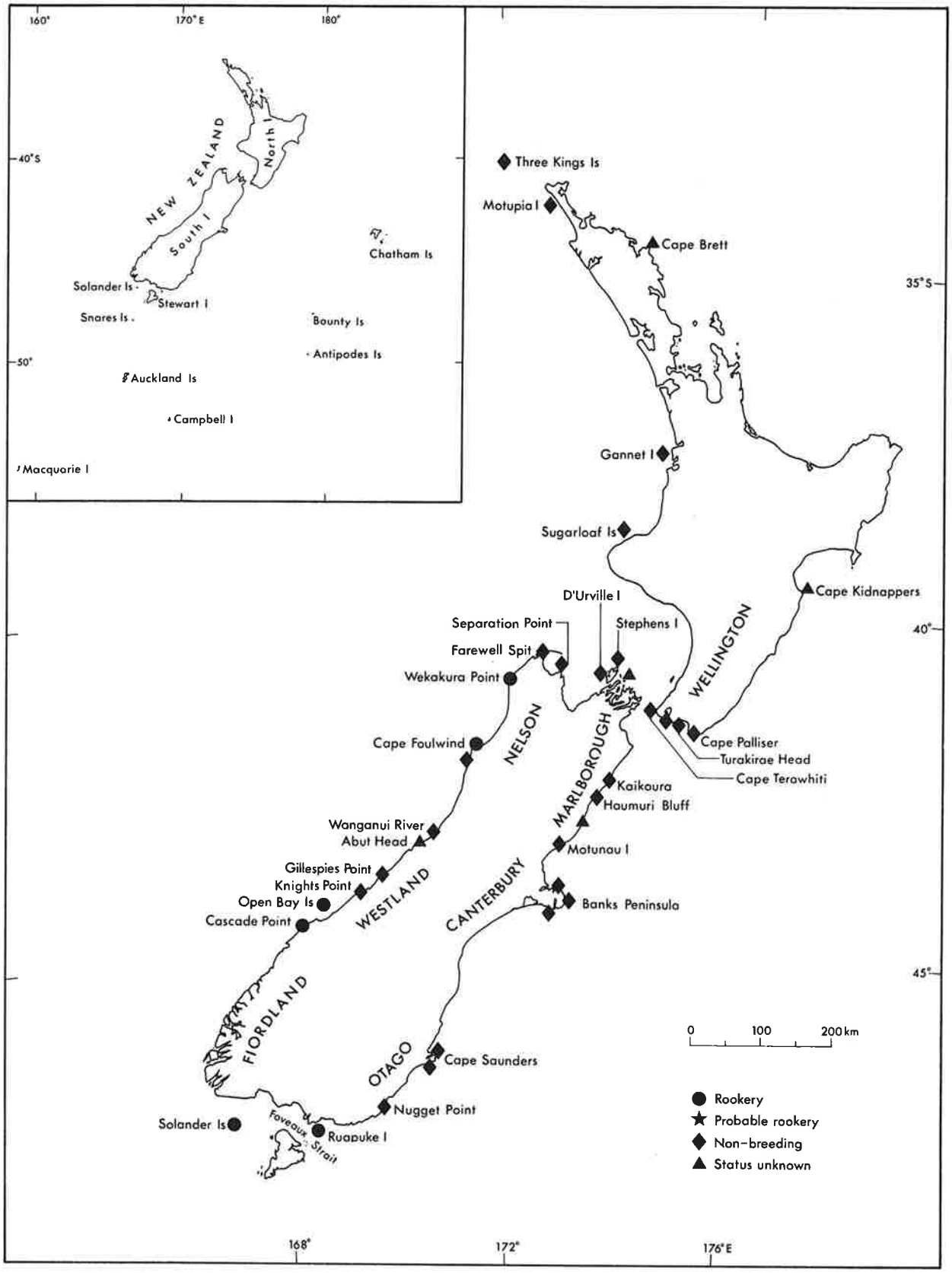

Fig. 1: The New Zealand region (inset) and locations of fur seal colonies around the New Zealand mainland.

(McNab 1908). There are few seals in south-east Otago today, but there is a hauling ground at Cape Saunders.

At Chatham Islands seals were taken at The Sisters (Richards 1952), The Forty Fours (McNab 1914), and Star Keys and on the southern coast of Chatham Island (Richards 1971). There have been no recent reports of seals at the last locality, but colonies are found at the other three sites.

Present Distribution

Rookeries

Around New Zealand rookeries (breeding colonies) are present in Westland and Fiordland, on Solander Island, and around Stewart Island and Ruapuke Island (Fig. 1). With the exception of isolated rookeries at Three Steeples (Cape Foulwind) and Wekakura Point (near Cape Farewell), the northern-most rookeries are on Open Bay Islands (west coast) and Green Island, near Ruapuke Island (east coast). All colonies visited north of this range were of typical non-breeding population structure.

Fur seal pups have been seen north of the breeding regions, but mainly in July or later when pups begin leaving their natal rookeries. A few pups are born away from breeding colonies.

Beyond the New Zealand mainland rookeries are known on Snares Islands (Crawley 1972), Auckland Islands (Wilson 1974a), Campbell Island (Bailey and Sorensen 1962), Bounty Islands (Darby 1970), and Chatham Islands (Sorensen 1969b). Since 1955 a few pups have been born at Macquarie Island, but it is not known if copulation has occurred there (Csordas and Ingham 1965).

Around Stewart Island (Fig. 2) rookeries are present on six of the islands along the east coast and on many of the islands between South Cape and Boat Group. There is at least one rookery on Codfish Island and possibly another on Ernest Islands.

Solander Island (Fig. 3) is New Zealand's largest fur seal colony, with an estimated 5000 animals.

Fur seals breed at many sites between Open Bay Islands and Foveaux Strait (see Figs. 1 and 4). The major concentration of seals in Fiordland is in Dusky Sound and on the southern part of the Five Fingers Peninsula, where most suitable islets and boulder beaches support rookeries.

At Chatham Islands (Fig. 5) breeding colonies occur on South East Island, The Sisters, and The Forty Fours and probably on Star Keys and Eastern Reef.

At Snares Islands Crawley (1972) found rookeries on the western coast of the main island and he suspected their presence on Broughton Island. At Auckland Islands rookeries were found along the western coast of the main island, on Disappointment Island, and possibly on the south coast of Adams Island (Wilson 1974a). The rookeries at Campbell Island are on the south and east coasts (Bailey and Sorensen 1962).

With few exceptions, rookeries were found on exposed coasts; non-breeding seals were usually found on more sheltered coasts. In New Zealand and the subantarctic islands the prevailing winds are westerly, and coasts with a southerly aspect are generally more exposed than northerly coasts. The only east coast rookeries are around Stewart Island and Ruapuke Island (Figs. 1 and 2) and these are in exposed situations. The rookeries on the subantarctic islands, except those on Campbell Island, are on westerly or southerly coasts. All Chatham Islands rookeries are exposed, those on reefs such as The Sisters and Star Keys being subjected to winds and seas from all directions.

Hauling grounds

Hauling grounds are found throughout the range of the fur seal. Around Stewart Island there are hauling grounds on all islands with rookeries and also on other islands and islets on the east and west coasts (Fig. 2). The only known mainland colony is near Broad Head. No colonies were found along the north-east coast of Stewart Island.

In Fiordland hauling grounds occur near most rookeries and also elsewhere along the coast (Fig. 4). Between Open Bay Islands and the Wanganui River there are several colonies (Fig. 1) and all those visited were hauling grounds. North of Wanganui River a few seals haul ashore at Point Elizabeth and perhaps also at Constant Bay. Concentrations of seals occur near Cape Foulwind and Cape Farewell. Near Cape Foulwind there is a hauling ground at Tauranga Bay. Near Cape Farewell there are hauling grounds on the Archway Islands and at Pillar Point.

Along the northern coast of the South Island there are hauling grounds at Separation Point and on Stephens, D'Urville, and Chetwode Islands and probably on Jag Rocks.

On the east coast of the South Island there are hauling grounds at Nugget Point, Otago Peninsula, Banks Peninsula, Haumuri Bluffs, and Kaikoura Peninsula.

Only hauling grounds are found around the North Island. The largest are on the four major headlands along the Wellington coast. On the west coast there are colonies on Sugar Loaf Islands (Merton 1961), Gannet Island, Motupia Island, and Three Kings Islands (Singleton 1972). On the east coast of the North Island there are only two places where groups of fur seals have been reported, and neither is likely to be a permanent colony. These are on an island near

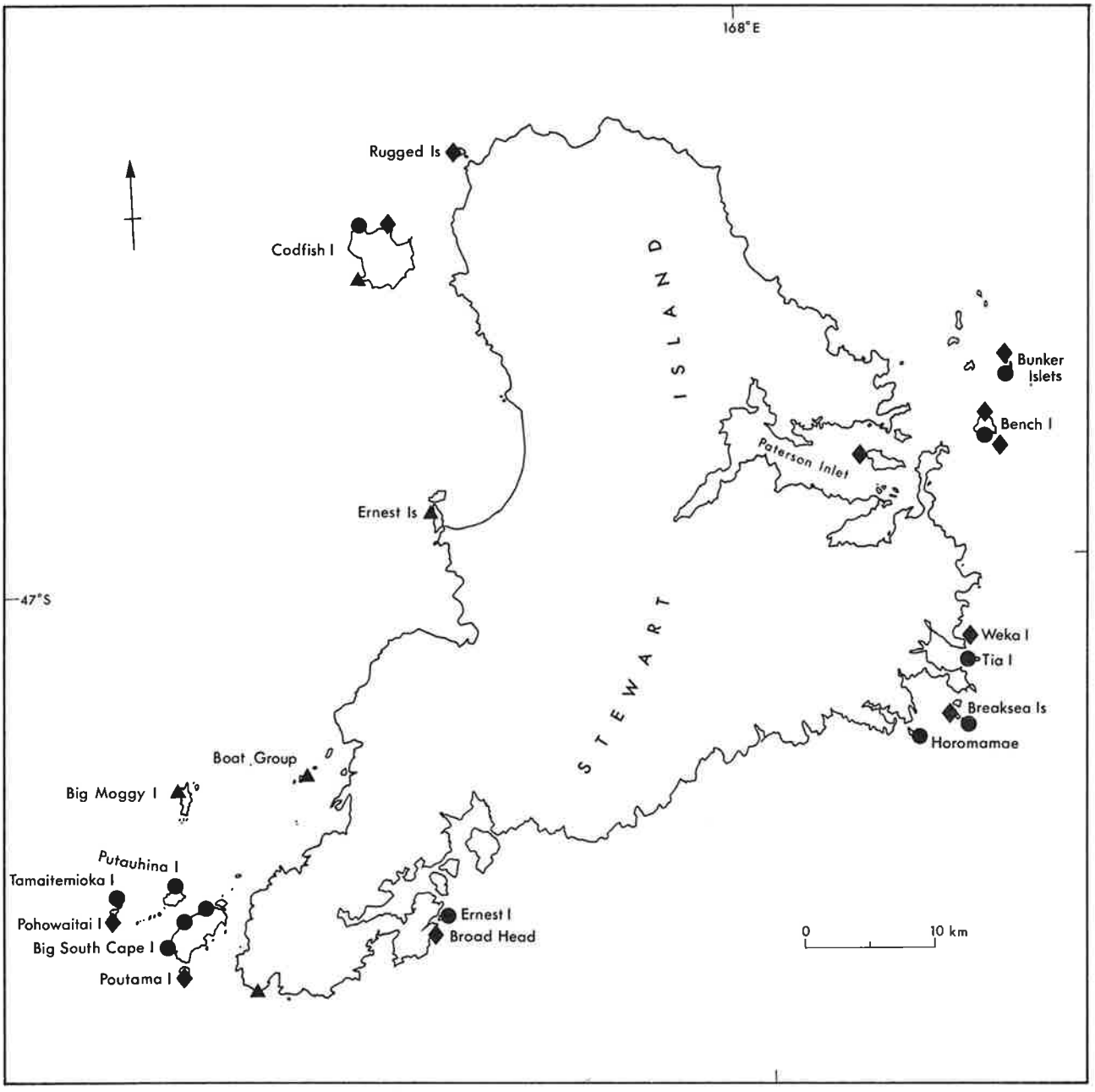

Fig. 2: Location of fur seal colonies around Stewart Island.

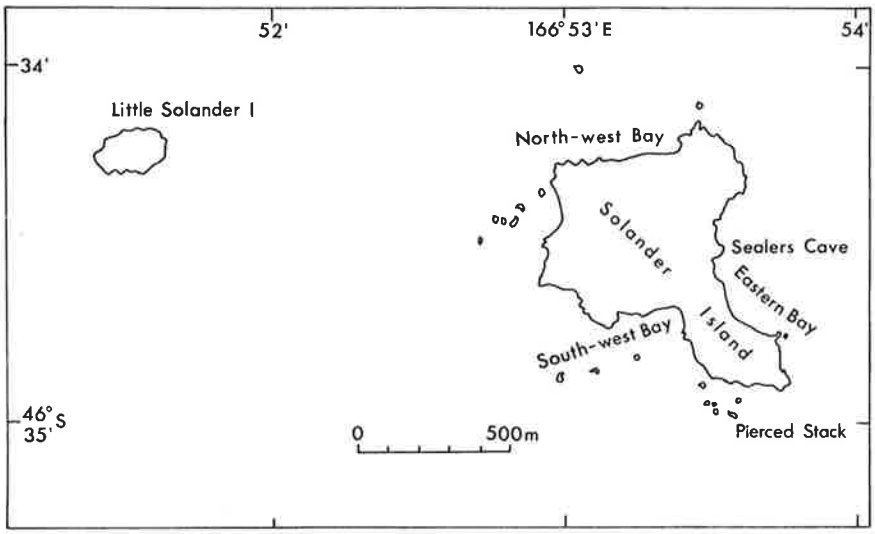

Fig. 3: Solander Islands, showing place names. (After Harrington and Wood 1958.)

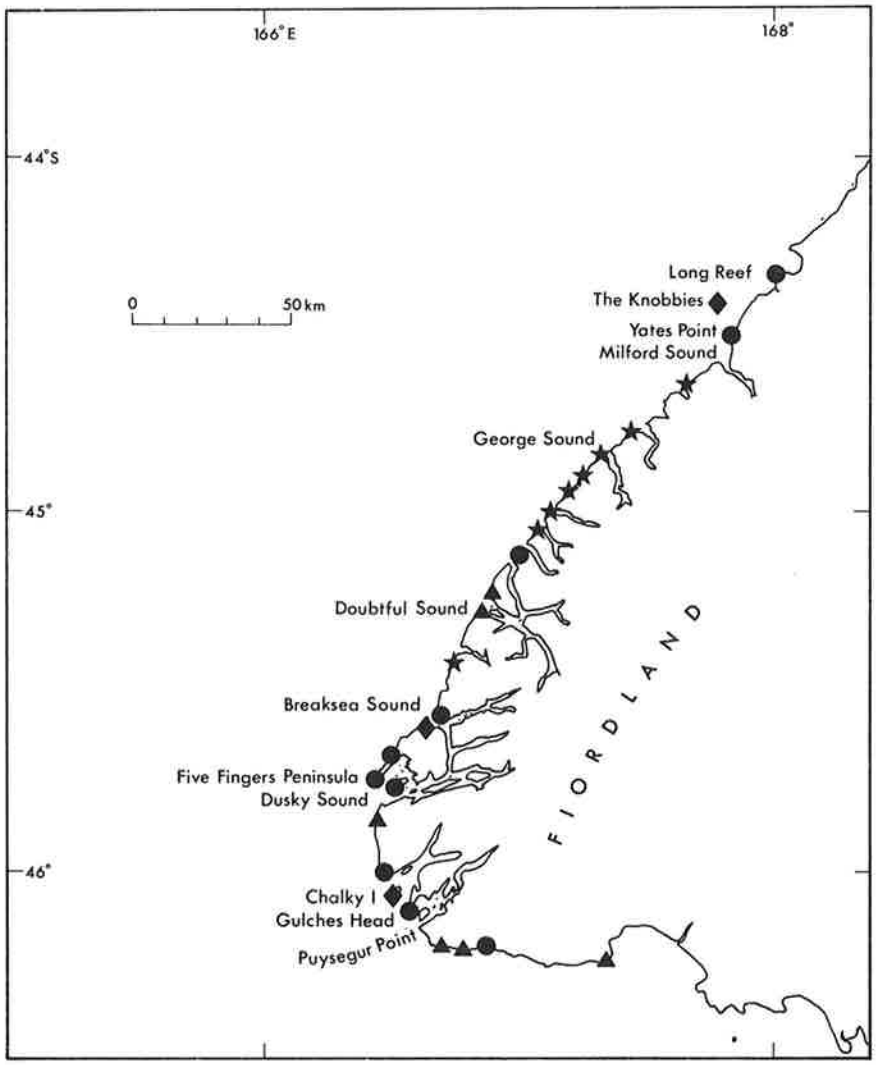

Fig. 4: Location of fur seal colonies in Fiordland.

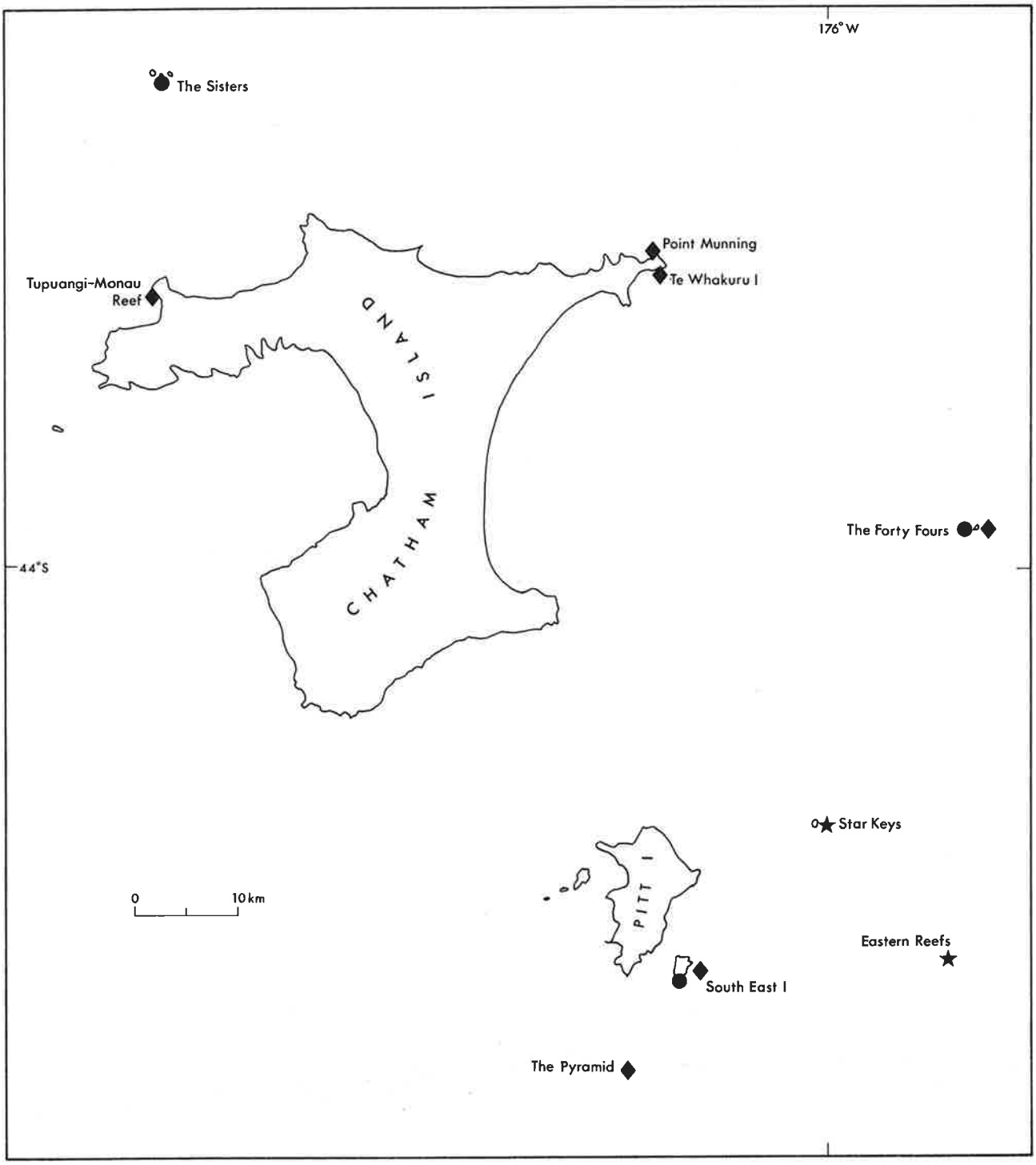

Fig. 5: Location of fur seal colonies at Chatham Islands.

Cape Kidnappers (*Daily Telegraph*, Napier, 22 August 1972) and near Cape Brett, Bay of Islands. The east coast of the North Island is seldom visited by fur seals and sightings are rare north of Castlepoint.

At Chatham Islands (Fig. 5) non-breeding colonies are present on South East Island and on all the outlying islets and reefs with rookeries. There are also hauling grounds at Point Munning, Te Whakuru Island, and Tupuangi-Monau Reef on the main island. Further small colonies may occur on The Pyramid (Dawson 1973) and some of the other outlying islets.

At Snares (Crawley 1972), Auckland (Wilson 1974a), Antipodes (Taylor *in* Sorensen 1969b), and Macquarie Islands (Csordas and Ingham 1965) most hauling grounds are on the comparatively sheltered northern and eastern coasts. However, at Campbell Island several hauling grounds occur on the exposed western and southern coasts (Bailey and Sorensen 1962).

Habitat requirements are less specific for hauling grounds than for rookeries (Wilson 1974b). On most islands with both types of colony, hauling grounds are on the more sheltered side of the island and rookeries on more exposed coasts. The distribution of different types of colonies around an island is probably determined by the availability of suitable habitat. Erosion on exposed coasts would tend to produce the tumbledown beaches preferred by breeding seals (Wilson 1974b). Non-breeders, with less stringent habitat requirements, may be found on other parts of the island.

Immature colonies

Immature colonies are non-breeding colonies where immature seals make up 40% or more of the seals present, and they were first described by Wilson (1974a, 1974b). These colonies vary in population structure and to some extent are probably seasonal phenomena.

The only readily distinguishable immature colonies seen during this study were around Stewart Island—on Bunker Islets and Tia, Wharepuaitaha, and Ernest Islands—and in Fiordland—on Chalky Island, Seal Island (Breaksea Sound), and "The Knobbies". Groups of immature seals were seen near the main colony at Gillespies Point in August 1972 and at Horseshoe Bay (Banks Peninsula) in July 1973. At Solander Island large numbers of immature seals were associated with breeding colonies, but there were no distinct immature groups.

At Auckland Islands one immature colony was found adjacent to a rookery on Disappointment Island (Wilson 1974a).

Other sightings

Lone fur seals have been sighted around most of the New Zealand coast, most frequently close to colonies, and more often in the south than in the north. Few sightings have been reported between Castlepoint and the Hauraki Gulf. At some localities single seals are seen frequently; elsewhere up to 10 (mainly males) may be seen at the same time each year. These places are listed in Appendix 1. It is unlikely that all places where lone seals or small groups regularly haul out have been recorded.

Use of Sheltered Waterways

Although New Zealand fur seals are usually found on exposed coasts, individuals sometimes enter sheltered waterways, including fiords, inlets, harbours, and rivers. The only known colony in a sheltered waterway is in Paterson Inlet (Stewart Island), where seals regularly haul out on Pillar Rock and Tamihau Island. Occasionally, they are seen as far up the inlet as South West Arm.

In Milford Sound one or two fur seals are often seen on a rocky ledge near Stirling Falls. In Dusky Sound they may be seen near "Anchor Point", Seal Rocks (Begg and Begg 1966), and Indian Island, and in March 1972 seven were seen on a small rock among Many Islands near Luncheon Cove. Fur seals probably enter most of the Fiordland sounds.

Each winter a few fur seals enter Pelorus Sound and are regularly seen at Te Puraka Point in Beatrix Bay. Lone seals have been seen at Andersons Bay, Otago Harbour (1957); Manukau Harbour (July 1972); Hokianga Harbour (*Hawera Star*, 18 August 1956); and several times in Whangarei Harbour. Seals have been seen at New Plymouth during winter in the area sheltered by the breakwater, and in the Hauraki Gulf single seals have been reported at Kawau Island and Waiomu.

Files held by Fisheries Management Division contain records of fur seals entering rivers. In Otago they have been seen in the Clutha (1944), Puerua (1944), and Catlins (1938) Rivers and in the Waihopai Stream (1962). In Canterbury single seals have been seen in the Halswell (1957) and Avon (1973) Rivers. In Marlborough a fur seal entered the Pelorus River (*Christchurch Press*, 5 November 1971) and another the Aorere River in Nelson (1941). These last two swam several miles up stream. When in rivers, seals are usually reported to the authorities by concerned anglers.

The reasons why fur seals enter sheltered waterways are unknown. They have been seen feeding

on flatfish and octopus in Paterson Inlet, and when in rivers they have been accused, rightly or wrongly, of taking trout. Of the nine localities in which they have been reported in the Auckland and Northland areas, five have been sheltered waterways.

Discussion of Factors Influencing Distribution

The distribution of pinnipeds is influenced by a variety of marine and terrestrial factors and by the effects of marine factors on the distribution of their prey. In this study it was possible to examine only a few of these factors and to look for any obvious correlations with fur seal distribution.

At present, any attempt to correlate distribution of New Zealand fur seals with oceanographic factors is limited by the meagre knowledge of their pelagic distribution. Only a few pelagic sightings have been recorded (see Appendix 2) and these are insufficient to show differences between pelagic and terrestrial distribution. The pelagic distribution of South American fur seals (*Arctocephalus australis*) extended further north than the terrestrial range (Vaz Ferreira and Palerm 1961). South American and Cape fur seals (*A. pusillus pusillus*) fed up to 320 km and 160 km respectively off shore (Vaz Ferreira 1965, Rand 1959). However, in this study it was assumed that the terrestrial and pelagic distributions of New Zealand fur seals were similar, though future pelagic sightings may prove this assumption unjustified.

Present knowledge of oceanography in the New Zealand region has been reviewed by Heath (1973). Gaskin (1972) described the marine environment around New Zealand and indicated how various factors may influence marine mammal distribution.

In New Zealand fur seals are generally found on coasts affected by northward-moving ocean currents and the northern distribution of seals coincides with the 35.4‰ isohaline shown by Heath (1973).

Areas of upwelling of cool, nutrient-rich water occur near Three Kings Islands, Cape Farewell, Cape Foulwind, East Cape, and Cook Strait, between Kaikoura and Cape Campbell, and in the Mernoo Gap (north-east of Pegasus Bay) (Heath 1973). These may account for the apparently anomalous positions of colonies in the far north and the rookeries near Cape Farewell and Cape Foulwind. They may also explain the abundance of fur seals along the Kaikoura and Wellington coasts during winter. There are no seals, however, in the region of upwelling near East Cape. Other areas of upwelling have been reported near Cape Egmont and Raglan (Knox 1960), and these are close to the colonies near New Plymouth and on Gannet Rock.

Any influence oceanographic factors have on seal distribution is probably through their effect on the dispersion of food organisms. Knowledge of the foods of New Zealand fur seals (Crawley and Wilson 1976, Street 1964) and the distribution of likely food species is so limited that consideration of the influence of food or oceanographic factors on seal distribution is not warranted at this stage.

Meteorological stations are usually far from seal colonies and have different meteorological regimes from those of nearby rocky coasts. Consequently, the data available only roughly indicate the meteorological conditions that would affect seals in the area, and these are insufficient to warrant a comparison with fur seal distribution. Meteorological factors appear to influence the distribution of other pinnipeds. High air temperatures may limit the distribution of the South American fur seal (Vaz Ferreira and Palerm 1961) and the walrus (*Odobenus rosmarus*) (Fay and Ray 1968). Bartholomew and Wilke (1956) suggested that sensitivity to solar radiation or high temperatures could limit the southerly distribution of the northern fur seal (*Callorhinus ursinus*). However, northern fur seals began breeding on San Miguel Island, California about 1968 (Peterson, Le Boeuf, and Delong 1968); this extended their previous breeding range south by 22° of latitude.

Although habitat limits the number of sites where seal colonies may exist, it is unlikely to determine the limits of distribution. Species of southern fur seal occur either north or south of the Antarctic Convergence and only occasionally cross the convergence (Payne 1979). Macquarie Island, the southern limit of the New Zealand fur seal, lies just north of the Antarctic Convergence; so even if there were suitable islands south of Macquarie, it is unlikely that they would be used.

There are suitable rookery sites on Banks Peninsula and Otago Peninsula; so habitat does not limit the northerly range of breeding on the east coast. Habitat may, however, restrict breeding distribution on the west coast. The rookeries at Cape Foulwind and Wekakura Point suggest that other conditions would permit breeding along this coast if habitat were more suitable. The habitat used on the west coast of the North Island is suitable only for hauling grounds, but climatic or oceanographic factors are probably also important in preventing the establishment of rookeries this far north.

The only part of New Zealand where there are no hauling grounds is the east coast of the North Island. As habitat used by non-breeding fur seals is variable (Wilson 1974b), it is unlikely to be the factor that limits distribution along this coast.

Abundance

The counts on which this population estimate is based were, of necessity, spread over a long period (November 1971 to February 1974), and they varied greatly in accuracy. Estimates of numbers for some colonies not visited by the author and for the outlying islands, except Chatham and Auckland Islands, were made by other authors whose methods differed from those used in this study. The estimates of abundance for colonies where reliable counts have not been made are based on unpublished information which may not be reliable.

It was impossible to visit personally all colonies in any of the provincial areas or island groups listed in Table 2. However, with the exception of those on the "Ruapuke Islands"*, most major seal colonies, and many smaller ones, in each area were visited. Around the New Zealand mainland the coverage was best for Stewart Island and Westland; most colonies were visited and reliable censuses were made on many. Coverage was poorest for Fiordland, where colony visits were often brief and many areas could not be visited. Of the off-lying islands, only the Chatham and Auckland Islands were visited during this study, though reliable counts have been made since 1969 by other workers at Snares Islands, Antipodes Island, and Macquarie Island. No recent estimates are available for Campbell Island or Bounty Islands.

Despite these limitations, the estimates given here are the most reliable possible with the present state of knowledge. Many estimates are probably conservative, but the true population is unlikely to lie outside the ranges indicated in Table 2.

Counts made at each colony were corrected to give an estimate of the numbers present during January or February, and the population estimates given in Table 2 are for January-February 1973. It was assumed that the overall population remained constant during the period when counts were made and that no change has occurred since the most recent estimate for colonies not visited during this study.

TABLE 2: Population estimates for *A. forsteri* in the New Zealand region

Locality	Estimated total*	Range	Authority	Date
Stewart I.	3 300	2 500–4 500	This study	1971–74
Fiordland	8 750	6 250–13 500	This study	1971–72
Solander I.	5 000	4 000–6 750	This study	1973
Ruapuke Is.	100	50–200	This study	–†
Westland	6 550	4 950–8 250	This study, also Crawley & Brown 1971	1970–72
Otago-Southland	950	850–1 100	This study	1971–72
Canterbury-Kaikoura	350	300–400	This study	1973
Nelson-Marlborough	75	40–110	This study	1972
North I.	200	100–350	This study	1972
Total for New Zealand mainland	25 500	19 000–35 250		
Snares Is.	1 150		Crawley 1972	1970–71
Auckland Is.	1 000	750–1 500	Wilson 1974a	1972–73
Campbell I.	2 000		Bailey & Sorensen 1962	1958
Bounty Is.	5 500	5 000–6 000	Falla (FMD files)	1950
Antipodes Is.	1 100		Taylor *in* Sorensen 1969b	1969
Macquarie I.	625		Johnstone 1972	1970–71
Chatham Is.	2 100	1 800–2 700	This study	1972
Grand total	39 000	30 000–50 000		

*Correction factors have been applied to New Zealand mainland counts to give population estimates for January-February 1973.
†Islands not visited but estimate for 1973.

*Unofficial name for islands surrounding and including Ruapuke Island.

A Population Estimate for January-February 1973

The total number of fur seals in the New Zealand region was estimated to be about 39 000 (range 30 000 to 50 000), of which 25 500 (range 19 000 to 35 250) were around the New Zealand mainland and Stewart and Solander Islands. About 35 750 occurred in the breeding range during summer (Crawley and Wilson 1976). The estimated number of seals in each provincial area and island group during January-February 1973 is shown in Table 2. The estimated population in each colony during these months is shown in Appendix 1.

Falla (*in* Sorensen 1969b) suggested after his 1947–48 survey that the total population was less than 20 000, and Gaskin (1972) estimated that the total population was about 20 600. Although the current estimate is 89% higher than Gaskin's, the difference probably reflects the more intensive field work rather than the recent increases suggested by some writers (Csordas and Ingham 1965, Stirling 1968, Stonehouse 1965).

Ray (1970) has discussed the limitations of direct counts and pointed out that true numbers cannot be assessed without an understanding of behaviour, physiology, and ecology of the species concerned. The reaction of seals to weather, and the daily and seasonal rhythms of activity, must be known to assess the number of seals in the water when counts were made. In this study some allowance has been made for the influence of these factors, but further work of this type is needed.

Discussion of Abundance, Population Recovery, and Recolonisation

New Zealand fur seals suffered heavily during sealing in the early nineteenth century. Numbers were reduced to very low levels throughout their range and they were exterminated in some areas. They were protected in 1894 and since then protection has been lifted only rarely and numbers have increased (Falla 1962). It has generally been assumed that this increase has continued in recent years.

Counts made on some hauling grounds suggest dramatic increases during the last 20 years (Sorensen 1969a, Stonehouse 1965). The range has also been extended by recolonisation of Macquarie Island (Csordas and Ingham 1965) and Three Kings Islands (Singleton 1972). Gaskin (1972), however, suggested that the apparent increases reported by these authors may be due to the redistribution of an otherwise stable population and may not reflect an overall increase in numbers.

Table 3 shows recent and previous estimates of fur seal numbers at some rookeries and hauling grounds within the breeding range. Unfortunately, at most colonies these estimates are not strictly comparable, as all are subject to the personal bias of the observer, and this is impossible to evaluate. Errors are largest where estimates have been made from a boat cruising slowly along the coast, the method used at Five Fingers Peninsula and Cascade Point. With the exception of the earlier counts made at Open Bay Islands and Chalky Island, where the actual numbers counted are shown, figures given are estimates of the total numbers using the colony. Crawley (1972) corrected for the time of day that counts were made on Snares Islands, and the recent estimate for Open Bay Islands (Crawley and Brown 1971) was based on a pup count. At Snares Islands Falla's estimate included the Western Chain, which was not visited by Crawley. However, D. S. Horning (pers. comm.) reported only 26 seals on these reefs when he visited them on 21 November 1976.

Recent estimates at all localities, except Snares Islands, are greater than previous ones. The increases vary from less than half at Bench Island to two-and-a-half times the earlier estimate at Solander Islands.

Larger increases have occurred on some hauling grounds north of the breeding range. Between 1956 and 1964 there was a tenfold increase at Kaikoura (Stonehouse 1965, Sorensen 1969a), but this increase has not continued during the last decade (pers. obs.). Street (unpublished report) made eight counts of the fur seals at Cape Saunders in 1958 and 1959 and the numbers ranged from 8 to 100. Ten counts made there during this study (1971–73 and May 1978) varied from 47 to 277.

These counts indicate that an increase in the population has occurred in the last 20 years. However, counts made within the breeding range show that this increase has been much smaller than counts on some more northerly hauling grounds suggested.

At South Georgia (55° S, 37° W) and Heard Island (53° S, 73° E) there has been an exponential increase in the numbers of Antarctic (Kerguelen) fur seals (*Arctocephalus gazella*) after several decades of very slow growth (Bonner 1964, Budd 1970). The growth of the South Georgia population has been described by Payne (1977), and it provides an interesting comparison with the New Zealand fur seal population. Only 59 Antarctic fur seals were seen at Bird Island in 1936, yet 5330 pups were counted on the main rookeries (Bird Island and adjacent mainland) in 1957, and 61 234 pups were counted there in 1975

TABLE 3: Previous counts and recent estimates of New Zealand fur seals within the breeding range

Locality	Previous count	Date	Authority	Recent count	Date	Authority
Snares Is.	3 000	Dec 1947	Falla *in* Sorensen 1969b	1 150	Nov-Dec 1970	Crawley 1972
Solander I.	1 000	Dec 1947	Falla *in* Sorensen 1969b	5 000	Jan-Feb 1973	This study
	2 000	Aug 1948				
Five Fingers Pen.	2 000	Dec 1947	Falla *in* Sorensen 1969b	3 500	Mar 1972	This study
Cascade Pt.	500	1934 and Dec 1947	Falla *in* Sorensen 1969b	2 000	Aug 1972	This study
Bench I.	300	1948	Falla *in* Sorensen 1969b	425	Nov 1971	This study
Chalky I.	1 000	Dec 1947	Falla *in* Sorensen 1969b	1 550	Mar 1972	This study
	1 200	1963	N. S. Murrell (unpub. report)			
Open Bay Is.	1 300	1964	Gaskin 1972	2 000–3 000	Jan 1970	Crawley & Brown 1971

(Payne 1977). The rapid population growth has resulted both in increased density on previously existing rookeries and in colonisation of new rookeries, mainly within 35 km of the main group, but also elsewhere on South Georgia and on other islands in the Scotia Arc (Payne 1977).

A similar trend is evident in the New Zealand fur seal population at the Bounty Islands, where there has also been a rapid increase in numbers. About 60 were seen by Cockayne in 1904 (Darby 1970) and about 50 in February 1926 by the Whitney South Sea Expedition (according to the Journals of J. C. Correira and R. H. Beck, lodged in the American Museum of Natural History), but in November 1950, 5000–6000 were seen (R. A. Falla's unpublished report). Further increases are suggested by Darby (1970), who comments that seals were "some 10 000 strong" on 12 January 1968. The large increase in numbers between 1926 and 1950, though unlikely to have occurred by natural increase alone, is of a similar size to that observed at South Georgia between 1936 and 1957. Generally, however, New Zealand's fur seals are increasing in numbers at a much slower rate.

At Macquarie Island and South Georgia the colonisation of new areas has taken place while existing colonies were still growing (Csordas and Ingham 1965, Payne 1977). Thus, though the formation of new colonies indicates a growing population, it does not indicate that existing colonies have attained their pre-sealing population levels.

Where recolonisation of hauling grounds has occurred, it has often been followed by a rapid increase in the numbers of seals. At Three Kings Islands fur seals were first seen in 1967, about 30 were seen in 1968, and 70–80 in 1969 (Singleton 1972). At Antipodes Islands only 1 fur seal was seen in November 1950, but 1100 were counted there in February 1969 (Taylor *in* Sorensen 1969b).

The formation of new pinniped colonies is hindered by two aspects of their biology. Land-breeding species tend to return to their natal rookeries (Nicholls 1970, Vaz Ferreira 1960) and females to colonies where they have previously pupped (Kenyon 1960, Payne 1977, Stirling 1971). Thus, existing colonies grow while other areas remain unoccupied, and colonisation depends largely—perhaps entirely—on primiparous females (Payne 1977).

New breeding colonies are occasionally formed and there are perhaps two ways in which this may take place. They may develop by small groups of seals using previously unoccupied areas (for example, southern sea lions (*Otaria flavescens*)* (Vaz-Ferreira 1960) and Antarctic fur seals (Payne 1977)) or they may evolve from non-breeding colonies. The population structure at most hauling grounds in this study comprised at least 80% males. However, a few colonies were visited where 40% or more of the seals were immature animals, and pups were born on some of these. One colony on Ernest Island was visited in February and December 1974. Pups were born there, and territories were established, but on both occasions the population structure was intermediate between the typical rookeries and hauling grounds described by Wilson (1974b).

At Macquarie Island recolonisation occurred by the establishment of a non-breeding colony. As the colony grew, females began pupping on the island, though males had not established territories (Csordas and Ingham 1965).

Perhaps colonies such as those on Ernest and Macquarie Islands represent stages in the evolution of a breeding colony, after the colonisation of a suitable island by a non-breeding population. Perhaps rookeries will evolve as pups born on these colonies return to breed as adults.† The habitat requirements of rookeries and hauling grounds differ and this will restrict the number of colonies where the evolution of a rookery is possible.

*O. *byronia* in Vaz-Ferreira (1960).

†This was confirmed during a visit to Ernest Island on 28 February 1979, when the population structure observed was typical of rookeries described by Wilson (1974b).

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Appendix I

A Check-list of New Zealand Fur Seal Colonies

In this check-list the location, an outline description, a summary of counts made, and a population estimate are given for each fur seal colony on the New Zealand mainland and on Chatham Islands, and the accounts of fur seal distribution and abundance on each of the subantarctic islands are reviewed. An estimate is made of the number of seals present on each New Zealand mainland colony within the breeding range, and in each provincial area north of the breeding range, during January-February 1973. The population estimates for the colonies on Chatham Islands are for November 1972, the month these colonies were visited. Reference is made to localities where small groups of fur seals have been seen, but sightings of individual seals are recorded only where these are of particular interest.

For an explanation of the use of place names on the New Zealand mainland see page 4.

The co-ordinates given for each site refer to the precise location of the seal colony there and sometimes differ from those given in the Gazetteer. This applies particularly to localities in Fiordland, for which new N.Z.M.S. 1 Topographical Maps (1 inch to 1 mile) have appeared since the publication of the Gazetteer.

In areas covered by the N.Z.M.S. 1 maps six-figure grid references are given where these are considered useful. The N.Z.M.S. 1 map series was used wherever possible, but in areas for which these maps were not available, maps in the N.Z.M.S. 18 series (1 inch to 4 miles) were referred to. The following maps were also used: N.Z.M.S. 219 (Stewart Island), N.Z.M.S. 220 (Auckland Islands), and N.Z.M.S. 240 (Chatham Islands).

Stewart Island

Herekopare Island (Te Marama) (46° 52′ S, 168° 13′ E)

Fur seals have occasionally been seen on this island. Observations were made from a boat close to shore several times during this study, but no seals were seen.

Bunker Islets (46° 52′ S, 168° 16′ E)

"Western Bunker Islet"

This islet was visited six times and the counts made on each visit are shown in Table 4. The January-February population estimate is based on counts made on 24 January 1973.

Rookery. This is situated on the eastern part of the south coast on an area of poorly sorted angular boulders. The beach profile slopes gently, but the surface is broken by the jumbled, bouldery terrain.

Non-breeding colonies. Non-breeding seals were most numerous on areas of broken, irregular terrain on either side of a boulder beach on the western half of the southern coast. An immature colony is located on

TABLE 4: Seal counts made on Western Bunker Islet between November 1971 and September 1973

Date	No. ashore	No. in water	Pups	Immatures	Females	SAMs	Adult males	Unknown
Rookery								
26 Nov 1971	18	1	0	6	2	5	5	0
2 Jan 1972	42	1	10	4	15	8	4	1
13 Feb 1972	55	2	12	7	24	4	2	6
16 Apr 1972	40	4+	11	10	10	1	0	8
24 Jan 1973	61	0	17	7	33	2	2	0
5 Sep 1973	29	1	16	3	7	2	0	1
Non-breeding colonies								
26 Nov 1971	27	2	0	8	1	8	5	5
2 Jan 1972	54	4	1	14	2	28	4	5
13 Feb 1972	45	3	0	20	4	14	0	7
16 Apr 1972	24	1	0	14	2	5	0	3
24 Jan 1973	61	2	2	38	6	6	0	9
5 Sep 1973	19	0	3	9	2	1	2	2

one area where angular boulders are piled on top of one another and extend to about 15 m above sea level. One pup was born on this area in 1971–72 and two were born there in 1972–73.

Seals came ashore in smaller numbers along the narrow boulder beaches on the northern coast of this islet. Many of these were immatures, and females were seen on some visits.

Nugget at western end of islet. Around this nugget angular boulders piled on top of one another were used by fur seals. The area was visited once on 24 January 1973. This count is not included in Table 4.

Immatures	20	Unknown	3
Female	1	In water	2
SAM	1		
		Total	27

Total seen on Western Bunker Islet on 24 January 1973 was 124 plus 27 on the nugget. Estimated total for January-February 1973 was 175, range 170–200.

"Eastern Bunker Islet"

This islet was visited several times, but only the counts made on 24 January 1973 are shown here.

Western coast and southern headland. Along this coast there is a boulder beach with small, rounded boulders in some areas and angular boulders 1–2 m across in others. Fur seals breed along most of this coast and there is an immature colony on the southern extremity of the islet where the terrain is most rugged.

On 24 January 1973 seals were counted during a walk through the colony.

Pups	27	SAMs	3
Immatures	34	Adult male	1
Females	19	Unknown	10
		Total	94

Eastern coast. Fur seals breed on angular boulders at both ends of this beach, but only a few non-breeders were seen on the rounded boulders at the head of the bay.

Visits were made on 24 January 1973 and 5 September 1973, but no counts were taken; however, in January there were probably about 150 fur seals ashore.

Northern end of islet. On this part of the islet there is a boulder beach with angular boulders. Fur seals were breeding on gently sloping terrain and immature seals were seen where boulders were piled on top of one another.

On 24 January 1973 seals were counted on a walk through the colony.

Pups	5	SAMs	2
Immatures	20	Adult male	1
Females	5		
		Total	33

Estimated total for January-February 1973 for Eastern Bunker Islet was 300, range 275–350.

Estimated total for January-February 1973 for the Bunker Islets was 475, range 445–550.

Kanetetoe Island and reefs (46° 53′ S, 168° 17′ E)

Each summer a few seals haul out on the low-lying reefs, but none have been seen on the island.

On 24 January 1973, six seals were counted from a boat about 150 m from the reefs.

Estimated total for January-February 1973 was 10, range 6–15.

Bench Island (46° 55′ S, 168° 14′ E)

South coast. Fur seals were found along most of this coast. Rookeries were on beaches with angular boulders, and hauling grounds were on beaches with rounded boulders and on shelving, rocky coast. Stony beaches were seldom used.

On 11 November 1971 seals were counted during a walk along the western half of this coast.

Immatures	23	Adult males	16
Females	2	Unknown	29
SAMs	11		
		Total	81

On 20 November 1971 counts were continued along the eastern half of this coast.

Pup	1	SAMs	7
Immatures	24	Adult males	16
Female	1	Unknown	2
		Total	51

On 12 February 1972 areas not already visited were observed from a boat 50 m off shore. About 20 fur seals were seen.

Other areas of Bench Island. Most parts of the coast consist of boulder beaches, usually with well-rounded boulders, though there are some rocky areas on the northern part of the island. Nineteen male fur seals were seen on these beaches on 20 and 21 November 1971.

Estimated total for January-February 1973 for Bench Island was 425, range 375–475.

Previous accounts. Falla estimated there were about 300 fur seals on Bench Island in 1948 (Sorensen 1969b), and Street (1964) estimated there were about 150 in January 1961. Fur seals first appeared on Bench Island in 1943 and R. H. Traill discovered a colony there in 1945 (Fisheries Management Division (FMD) files).

Flat Rock (46° 54′ S, 168° 15′ E)

This large sloping rock platform is about 4 m high and is used by non-breeding fur seals. All observations were made from a boat close to the rock.

On 20 November 1971, 6 seals were seen; on 16 January 1972, at least 12 (R. H. Traill pers. comm.); on 12 February 1972, at least 17; and on 2 September 1973, 9.

Estimated total for January-February 1973 was 25, range 20–30.

The Haystacks (46° 55′ S, 168° 15′ E)

On this islet there is a hauling ground on a small reef and its adjacent rocks. Fur seals sometimes haul out on nuggets between The Haystacks and Bench Island. Observations were made from a boat 25 m off shore.

On 20 November 1971, 2 seals were seen; on 12 February 1972, 19 were seen on The Haystacks and 2 on the nuggets.

Estimated total for January-February 1973 was 25, range 20–30.

Paterson Inlet (46° 56′ S, 168° 07′ E)

Ulva Island

Fur seals sometimes haul out on One Tree Rock or on the western extremity of Ulva Island. Observations were made of both areas on five occasions from a boat close to the island; no seals were seen on 12 November 1971, 9 February 1972, or 5 September 1972, but one was seen at One Tree Rock on 23 March 1972 and on 19 June 1972. One seal was seen on the western end of Ulva Island on 7 March 1972 (R. H. Traill pers. comm.) and 6 to 10 on 14 May 1973 (R. Mace pers. comm.).

Tamihau Island

Fur seals frequently haul out on the rocky areas along the southern coast of this island; this was the locality in Paterson Inlet most often used by them. The following counts were made from a boat close by.

On 13 November 1972, no seals; in January 1972, 1 (R. H. Traill pers. comm.); on 6 February 1972, 2 in water (A. Traill); on 9 February 1972, 1; on 7 March 1972, 1 (R. H. Traill); on 23 March 1972, none; on 19 June 1972, 3; on 14 May 1973, more than 35 (R. Mace); and on 1 September 1973, 3.

Pillar Rock

Fur seals often haul out on this islet and observations were made on seven occasions from a boat just off shore; no seals were seen on 13 and 19 November 1971, 23 March 1972, or 1 September 1973, one was seen on 9 February 1972, two on 7 March 1972 (R. H. Traill pers. comm.), and three on 19 June 1972.

Fur seals have been seen elsewhere in Paterson Inlet, and they have been reported as far up the inlet as South West Arm.

R. H. Traill has kept a record of fur seal sightings in Paterson Inlet for several years. His counts and those made during this study indicated that seals did not occur in Paterson Inlet during November and December, a few were seen in January and February, and they were regularly seen between March and June.

Weka Island (47° 04′ S, 168° 13′ E)

Fur seals haul out along most of the eastern coast of this island and on an islet off the north-eastern point.

On 28 November 1971, 20 fur seals, mainly males, were counted from the rocks above the colony.

Estimated total for January-February 1973 was 50, range 35–65.

Tia Island (47° 04′ S, 168° 13′ E)

This island was visited five times and the population composition and the numbers seen on each visit are shown in Table 5. The population estimate for January-February 1973 was based on counts made on 3 January 1972.

Rookery. This rookery is situated on large, angular

TABLE 5: Seal counts made on Tia Island between January 1972 and August 1973

Date	No. ashore	Pups	Immatures	Females	SAMs	Adult males	Unknown
Rookery							
3 Jan 1972	32	11	2	12	0	4	3
8 Feb 1972	19*	8	0	6	1	3	1
2–6 Sep 1972	18	10	1	6	1	0	0
6 Feb 1973	30	13–14	1	13	1	1	1
27–29 Aug 1973	18	10	2	5	1	0	0
Non-breeding colonies							
3 Jan 1972	78	0	4	1	30	2	41
8 Feb 1972	93	0	6	2	45	2	38
2–6 Sep 1972	44	2	2	1	28	10	1
27–29 Aug 1973	67	5	6	4	36	10	6

*Heavy rain, strong wind.

boulders overlying sloping rock shelves about half way along the northern coast of Tia Island.

Non-breeding colonies. The main aggregations of non-breeding seals are on two boulder beaches and a rock platform near the north-eastern point of Tia Island and on a large rocky islet a few metres off this point. Smaller groups of non-breeding seals occur on a rock platform and an adjacent islet midway along the southern coast. Fur seals were occasionally seen elsewhere on Tia Island.

The seal counts shown in Table 5 were made from observation points overlooking each colony.

Estimated total for January-February 1973 for Tia Island was 180, range 165–200.

Breaksea Island (47° 07′ S, 168° 12′ E)

Wharepuaitaha Island

This island was visited on 2 February 1972.

Rookeries. No. 1. This rookery is on steep broken terrain on the eastern coast of the island. Seals were counted from a nearby observation point.

Pups	4	Adult male	1
Immature	1	Unknown	2
Females	3	In water	1
SAM	1		—
		Total	13

No. 2. This rookery was on a talus beach on the south coast. Females and pups were also seen on an adjacent steep, rocky headland and on an adjoining tussock slope where some animals had climbed up to 40 m above sea level. A few non-breeders were also seen on a boulder beach close by. The seals counted in this area are listed below.

Pups	23	Adult male	1
Immatures	8	Unknown	3
Females	26+		—
SAMs	2–3	Total	64+

No. 3. A third rookery was found on a boulder beach at the head of a narrow bay on the west coast. Observations were made from the 50-m high cliffs behind the rookery and 22 seals (including 2 pups) were seen, but others would have been obscured by rocks.

Non-breeding colonies. Further groups of non-breeding seals were seen on an islet off the south-east point of Wharepuaitaha Island (26 to 28 seals) and on the low-lying rock shelf at the northern end of this island (54 seals). Most of these were SAMs or immatures, but one pup was seen on the northern coast.

There is an immature colony adjacent to Rookery No. 1, where 16 immature seals and 4 SAMs were seen.

Total number of seals seen on 2 February 1972 was 200.

Estimated total for January-February 1973 for Wharepuaitaha Island was 310, range 275–375.

Other Breaksea Islands

The coasts of these islands have been scanned on several occasions from a boat close to shore. There were no established colonies, but up to seven seals were seen on Kaihuka Island and up to three on Pomatakiarehua Island.

Estimated total for January-February 1973 for these islands was 30, range 20–50.

Horomamae (Owen Island) (47° 07′ S, 168° 09′ E)

Horomamae was not visited and the population estimate is based on information supplied by muttonbirders and fishermen. Fur seals breed on this island.

Estimated total for January-February 1973 was 200, range 100–300.

Mainland Stewart Island, Shelter Point (47° 06′ S, 168° 13′ E) to South Passage, Port Pegasus (47° 14′ S, 167° 40′ E)

The coast between Shelter Point and Lords River was surveyed on several occasions, but few reliable observations were made between Lords River and South Passage. No seals were seen and there have been no reports of them along this coast. Port Pegasus was a favourite sealing base in the early nineteenth century (Howard 1940).

Ernest Island (47° 14′ S, 167° 39′ E)

Breeding colony*. There was a colony intermediate in population structure between an immature colony and a rookery on a talus beach and on the adjacent rocks on the northern coast of the island.

On 6 February 1974 seals were counted while I was ashore in the colony.

Pups	9+	1 dead	SAMs		4
Immatures	22		Unknown		2
Females	5				—
			Total		42

On 3 December 1974 seals were counted from cliffs above the colony.

*At the time of study the population structure of this colony did not conform to the definition of a rookery, but pups were born on it. However, in February 1979 the population structure was that of a rookery.

Pup	1	Territorial males	5
Immatures	6	Unknown	3
Females	3	In water	2
SAMs	2		
		Total	22

On 14 December 1974 seals were counted from cliffs above the colony.

Pups	5	SAM	1
Immatures	3	Territorial males	6
Females	4	Unknown	1
		Total	20

Non-breeding colony. There was a small non-breeding colony on a boulder beach on the southern coast. Three counts were made: 15 seals were seen on 6 February 1974, 13 on 4 December 1974, and 11 on 14 December 1974. Only immatures and SAMs were seen and on each occasion immatures were most numerous. A few seals haul out elsewhere on this island.

Estimated total for January-February 1973 for Ernest Island was 75, range 70–90.

Mainland coast, Ernest Island to Broad Head (47° 16′ S, 167° 38′ E)

Along this coast there are broad, gently sloping rock slabs and a few small boulder beaches. On 3 February 1974 fur seals, probably non-breeders, were seen on most points and in some bays from a small boat a few metres off shore.

Estimated total for January-February 1973 was 225, range 200–275.

Mainland coast, Broad Head to South West Cape (47° 17′ S, 167° 28′ E)

This coast, which has rock shelves and boulder beaches suitable for fur seals, was examined on 12 February 1974 from a boat less than 150 m off shore. Four seals were seen 800 m north of South Cape and nine on a boulder beach near South West Cape; three were seen between South Cape and South West Cape.

Estimated total for January-February 1973 was 30, range 20–50.

Poutama Island (47° 16′ S, 167° 24′ E)

The northern and eastern coasts of this island are fairly steeply sloping, but fur seals, probably non-breeders, haul out on some areas.

On 15 and 16 November 1971 five seals were counted from a boat close to the island. Fishermen indicated that more are usually seen.

Estimated total for January-February 1973 was 25, range 15–50.

Big South Cape Island (47° 14′ S, 167° 24′ E)

Most of the coast of Big South Cape Island was observed at least once during coastal surveys between 15 and 17 November 1971, but accurate counts were not possible.

Both rookeries and hauling grounds occur right along the west coast on a variety of rocky terrain and on boulder beaches. It was estimated that up to 175 seals would be present during the height of the breeding season. There is probably a small colony near Puwai Bay on the southern coast and seals regularly haul out along the east coast, though there are probably no established colonies there.

Estimated total for January-February 1973 for Big South Cape Island was 250, range 150–350.

Solomon, Pukeweka (47° 13′ S, 167° 26′ E), Pukuparara (47° 13′ S, 167° 27′ E), and Kaimohu (47° 12′ S, 167° 27′ E) Islands

According to muttonbirders and fishermen, fur seals are seldom seen on these islands. None were seen during circumnavigation of the islands in November 1971.

Putauhina Island and Nuggets (47° 13′ S, 167° 23′ E)

On the western coast of the main island there is suitable terrain for both breeding and non-breeding colonies, but other coasts of this island appear to be too steep. Seals also occur on some of the nuggets.

On 15 and 16 November 1971, 10 to 14 seals were seen on the west coast of the main island and on some of the nuggets. Counts were made from a boat about 200 m off shore.

Estimated total for January-February 1973 was 125, range 75–175.

Tamaitemioka Island (47° 13′ S, 167° 20′ E)

On the west coast there is a rookery on a tumbledown beach at the base of cliffs. Seals were also seen hauled out on the steep, rocky eastern and northern coasts of this island. They were counted from a boat close to the shore.

On 15 November 1971 four seals were seen on the rookery, three elsewhere on the island, and six or seven in the sea.

On 17 November 1971 five seals were seen on the rookery and five elsewhere on the island.

Estimated total for January-February 1973 was 100, range 75–150.

Pohowaitai Island (47° 13′ S, 167° 20′ E)

Most of the coast is steep, but seals were seen hauled out on rocky areas and on islets on the eastern coast of this island.

On 17 November 1971 seals were counted from a boat close to the island; five were seen on the mainland and three on the islets.

Estimated total for January-February 1973 was 40, range 25–60.

In 1939 seals were reported as being "plentiful" on Pohowaitai Island and on another small island nearby (probably Tamaitemioka) (FMD files). Blackburn (1965) and Fineran (1973) saw seals on both these islands in 1965.

Big Moggy (47° 09′ S, 167° 25′ E) and Little Moggy (47° 08′ S, 167° 25′ E) Islands

Fur seal colonies evidently occur on both Moggy Islands, and B. D. Bell (pers. comm.) suggested that this may be the largest seal colony in the south-west Stewart Island area. D. S. Horning Jr. (pers. comm.) saw three seals on the east coast of Big Moggy Island on 21 December 1970, and Falla (*in* Sorensen 1969b) saw seals on that island in 1948. Fineran (1973) found seals on Little Moggy Island in 1965.

Estimated total for January-February 1973 for the Moggy Islands was 250, range 100–400.

Boat Group

There are probably fur seal colonies on at least two of the Boat Group islands, most likely Kundy Island (47° 07′ S, 167° 33′ E) and Big Island (47° 08′ S, 167° 32′ E), but seals do not appear to be numerous on these islands (B. D. Bell pers. comm.).

Estimated total for January-February 1973 for Boat Group was 75, range 40–150.

West coast of Stewart Island mainland

There are suitable areas for breeding and non-breeding colonies along this coast, but there appear to be few, if any, actual colonies. Fur seals were reported on the Ernest Islands (46° 57′ S, 167° 41′ E) and at South Red Head Point (47° 05′ S, 167° 34′ E) in the 1940s (R. A. Falla, R. H. Traill pers. comm.), but there have been no recent reports from either locality.

This coast was poorly investigated. Surveys were made between Ruggedy Passage (46° 42′ S, 167° 43′ E) and Waituna Bay (46° 47′ S, 167° 43′ E) (28 December 1971) and near Tupari Bay (47° 13′ S, 167° 29′ E) (16 November 1971), but no seals were seen.

Estimated total for January-February 1973 for the west coast of Stewart Island was 100, range 25–300.

Codfish Island (46° 46′ S, 167° 38′ E)

The only part of this island visited was the eastern coast between South Bay and Roger Head. Six to eight seals were seen on 28 December 1971 from a boat close to shore. Most of these were seen on a small stony beach on Roger Head, where M. McArthur, who spent several months on Codfish Island in 1963, regularly saw up to eight seals (National Museum files).

Fur seals are more numerous on the western side of Codfish Island. About 100 were seen in North West Bay in December 1966 (Blackburn 1968), and 32 were counted there, from a dinghy close to shore, on 21 January 1972 (R. J. Nilsson pers. comm.). Dell (1948) estimated there were about 100 seals opposite The Knobbies on 7 November 1948, and from his description it is evident this was a rookery. At least 20 seals were seen on the south end of Big Bight on 22 January 1972 (R. J. Nilsson pers. comm.).

Estimated total for January-February 1973 was 230, range 200—300.

Rugged Islands (46° 42′ S, 167° 43′ E)

The coast of these islands is generally fairly steep or narrow, but a few seals were found scattered along the eastern coast of the outer island. Near McArthurs Head there is a stony beach under an overhang where seals have been reported.

On 28 December 1971 eight seals were seen from a boat close in shore.

Estimated total for January-February 1973 was 15, range 10–20.

Bishop and Clerks Islands (46° 40′ S, 167° 48′ E)

These were not visited, but according to fishermen, seals are occasionally seen there.

North-east coast of Stewart Island

There are few suitable localities between Halfmoon Bay (46° 54′ S, 168° 08′ E) and Saddle Point (46° 43′ S, 167° 59′ E), though lone seals are often seen. Seals sometimes haul out on boulder beaches at Saddle Point and Lucky Point (46° 42′ S, 167° 57′ E), and there are other suitable beaches between Lucky Point and Ruggedy Passage (46° 42′ S, 167° 43′ E). Seals were seen at Cave Point (46° 41′ S, 167° 47′ E), and no doubt small groups occur elsewhere.

On 14 November 1971 a coastal survey was made from Halfmoon Bay to Ruggedy Passage. Two male seals were seen at Saddle Point and one at Lucky Point.

On 28 December 1971, on a coastal survey from Cave Point to Ruggedy Passage, five male seals were seen at Cave Point and two near Ruggedy Passage.

Estimated total for January-February 1973 was 15, range 10–25.

Estimated grand total for January-February 1973 for Stewart Island and off-lying islands was 3300, range 2500–4500.

Ruapuke Islands

Seals are occasionally seen on Ruapuke Island (46° 46′ S, 168° 31′ E). The only rookery in this area, however, is on Green Island (46° 46′ S, 168° 34′ E) (G. S. Crowther pers. comm.), but the size of the colony is unknown. Seals may haul out on the Hazelburgh Group (46° 49′ S, 168° 28′ E).

Estimated total on the Ruapuke Islands was 100, range 50–200. This estimate may be inaccurate.

Solander Islands

Solander Island (46° 34′ S, 166° 52′ E)

Fur seals occur on virtually all boulder beaches on this island. The beaches vary from those with stones less than 0.2 m in diameter to those with angular boulders several metres across. Seals were breeding on most types of boulder beach, though only non-breeders were seen on stony beaches and in the cave in Eastern Bay. South-west Bay was more densely populated than Eastern Bay. The density of seals on Solander Island was probably as great as that observed anywhere in New Zealand.

Eastern Bay

Sealers Cave to south-eastern headland. On 26–27 January 1973, 207 pups and 385 other seals were counted from the beach.

The population composition on one part of this beach was determined and is shown below.

Pups	130	Females	87
Immatures	121	SAMs	22
Unknown	38	Adult males	6

Estimated total on this beach was 675–725, with about 250 pups.

Sealers Cave. Fur seals inhabited rocky areas at the entrances to the cave and penetrated into it beyond the limit of daylight.

On 27 January 1973 the following seals were counted while the cave was being explored.

Immatures	14	SAMs	15
Females	3	Adult males	2
Unknown	11		
		Total	45

Sealers Cave to northern headland. Most of this beach has large angular boulders piled on top of one another, but there are also several "amphitheatres" with more regular terrain. Seals were particularly numerous on this beach.

On 26–27 January 1973 seal counts were made on part of this coast while ashore, but most seals were observed from a dinghy a few metres off shore. Estimated population on this area was 1000, range 800–1100.

Estimated total for January-February 1973 for Eastern Bay was 1750, range 1500–1900.

South-west Bay

Stony beach near Pierced Stack to south-eastern headland. Only non-breeders were seen on the stony beach near Pierced Stack. However, the rest of this coast consists of a boulder beach with large, angular boulders where seals breed.

On 31 January 1973 seals were counted on a walk along the beach.

Pups	143	SAMs	9
Immatures	30	Adult males	2
Females	66	Unknown	46
		Total	296

Estimated total on this beach was 350, range 310–375, including about 160 pups.

Pierced Stack and nearby islets. Several small talus beaches on these islets were used by fur seals.

On 31 January 1973 seals were counted from the mainland. Nineteen were seen including two pups. Estimated total was 60.

Stony beach to head of bay. On 31 January 1973, a count was made on the beach. The total seen was 425 and the estimated total was 550, range 475–600.

Other parts of South-west Bay were not visited and the population estimate is based on observations made from the spur, where counts finished. Estimated total was 800, range 550–950.

Estimated total for January-February 1973 for South-west Bay was 1750, range 1400–2000.

North-west Bay and western end of island

There are some areas of stony beach in North-west Bay, but most of the coast consists of boulder beaches with angular boulders. Access to these beaches proved impossible, but the island was circumnavigated and the extent of each type of habitat noted on 30 January 1973. The population estimate is based on the relative abundance of seals on similar habitats in Eastern and South-west Bays.

Estimated total for January-February 1973 was 1500, range 1200–2850.

Estimated grand total for January-February 1973 for Solander Island was 5000, range 4000–6750.

Little Solander Island

The coast of Little Solander Island is steep, though there are two areas where fur seals could haul ashore. Only one seal was seen on the island on 30 January 1973, but according to fishermen, many seals haul out on this island in November and December.

Other reports of fur seals at Solander Islands

Ninety-five fur seals were taken at Solander Islands by the sealing vessel *Kekeno* in July 1946 (Sorensen 1969b). Other sealing expeditions visited these islands in 1946, but the number of seals taken is not known. R. A. Falla estimated that there were about 1000 fur seals on Solander Islands in December 1947 and about 2000 there in August 1948 (Sorensen 1969b).

On 14 November 1973 R. J. Nilsson counted 440 seals ashore and about 40 in the sea in South-west Bay. He estimated the total number on the island would have been 2500–3000. If allowance is made for seasonal variations in numbers (Wilson 1974b), this estimate is fairly compatible with that made in January 1973.

Fiordland

Centre Island (46° 28′ S, 167° 52′ E)

Gaskin (1972) indicated that there were several hundred fur seals on Centre Island, but R. Johnstone, the principal lighthouse keeper on the island, reported that seals are seldom seen there.

Sand Hill Point (46° 15′ S, 167° 19′ E)

According to fishermen, there is a seal colony on the rocks near this point, but its size is not known.

Big River (46° 13′ S, 166° 56′ E)

Fur seals were here in 1947–48 (R. A. Falla pers. comm.) and recent photographs taken by P. K. Dorizac showed pups among large boulders. There may be several hundred seals on this rookery.

Green Islands (46° 14′ S, 166° 47′ E) and Windsor Point (46° 12′ S, 166° 39′ E)

Fur seals have been reliably reported at both these localities, but the number was not known.

Estimated total for January-February 1973 for the south coast (Sand Hill Point to Windsor Point) was 400, range 250–800.

Puysegur Point (46° 09′ S, 166° 36′ E) and Coal Island (46° 07′ S, 166° 38′E)

Fur seals occasionally haul out at Puysegur Point and on Coal Island. One male was seen during the four days spent at Puysegur Point (29 February–3 March 1972) during this study.

Gulches Head (46° 05′ S, 166° 34′ E)

There are tumbledown beaches on both the northern and southern sides of Gulches Head, and both probably support seal colonies.

On 6 March 1972 observations were made from a boat up to 400 m off shore in rough seas. No seals were seen, but there was suitable breeding habitat.

Kekeno took 39 fur seals, including 17 pups, at Gulches Head in 1946 (Sorensen 1969b) and M. Schofield (pers. comm.) has seen seals there in recent years.

Estimated total for January-February 1973 was 100, range 50–175.

Chalky Island (46° 03′ S, 166° 31′ E)

Three fur seal colonies were found on the western coast of Chalky Island.

Colony No. 1 (western coast, south of "Boat Cove"). Many fur seals haul out on the extensive limestone platforms and a few on adjacent boulder beaches.

On 8 March 1972 seals were counted from a boat 30 m off shore; 225 were seen, predominantly SAMs.

Estimated total for January-February 1973 was 500, range 350–600.

Colony No. 2 (Boat Cove colony). There is a large colony on limestone platforms on either side of Boat Cove. Although the terrain is essentially fairly regular, the contour is broken in some areas by scarp ridges. Immature seals were numerous in these areas.

On 8 March 1972 seals were counted from observation points around the colony; 475 were counted and the estimated number present was 600. The population composition was estimated to be:

Immatures	40%	SAMs	45%
Females	5%	Adult males	10%

Estimated total for January-February 1973 was 1000, range 700–1200.

Colony No. 3 (north of Boat Cove). This colony was on a boulder beach at the head of a narrow bay near the western headland of Chalky Island. It was possibly a rookery.

On 8 March 1972, 10 to 15 seals were seen from a boat 250 m off shore.

Estimated total for January-February 1973 was 40, range 30–70.

Estimated total for January-February 1973 for Chalky Island was 1550, range 1100–1875.

Falla (*in* Sorensen 1969b) estimated there were about 1000 fur seals on Chalky Island in December 1947 and 1200 were counted by N. S. Murrell in February 1964 (National Museum files).

Cape Providence (46° 01′ S, 166° 28′ E)

Both R. A. Falla (pers. comm.) and R. J. Street (FMD files) knew of this colony, but neither was able to visit it. About 150 seals were seen there in December 1969 (Begg and Begg 1973), and photographs taken at this colony indicate that breeding occurred there.

Estimated total for January-February 1973 was 200, range 100–400.

West Cape (45° 55′ S, 166° 26′ E)

R. J. Street saw seals at West Cape in July 1958 (FMD files), but no seals were seen there during a coastal survey on 9 March 1972.

South of Dusky Sound

There is apparently a small seal colony a few kilometres south of Dusky Sound, but its precise location and the number of seals present could not be determined.

Estimated total for January-February 1973 was 50, range 25–100.

Seal Islands, Dusky Sound (45° 47′ S, 166° 29′ E)

There are colonies on most boulder beaches and suitable areas of rocky coast on all these islands. There were more rookeries, and seals appeared to be more numerous, on the northerly coasts than on the southerly coasts.

On 10 March 1972 the coasts of most islands were observed from a boat a few metres off shore, and a few minutes were spent ashore at one rookery. About 145 seals were seen.

Estimated total for January-February 1973 for these islands was 500, range 450–750.

Indian Island, Dusky Sound (45° 47′ S, 166° 35′ E)

One or two fur seals often haul out on the western end of this island. One seal was seen on 15 March 1972.

"Seal Rocks", Dusky Sound (45° 45′ S, 166° 34′ E)

A few fur seals haul out on these islets, where Captain Cook's crewmen killed several seals in 1769 (Begg and Begg 1966).

Many Islands, Dusky Sound (45° 46′ S, 166° 31′ E)

On 12 March 1972 seven fur seals were seen on a small low-lying nugget among Many Islands, about 400 m from Luncheon Cove. According to fishermen, seals had used this rock since December 1971.

Five Fingers Peninsula

Five Fingers Peninsula forms the coast between Dusky and Breaksea Sounds and appears to have always supported a large number of fur seals.

Five Fingers Point (45° 45′ S, 166° 27′ E, S156, 703744)

On the inside of Five Fingers Point there is a small talus beach where a few seals regularly haul out.

On 9 March 1972 seven seals were counted from a boat 100 m off shore.

Five Fingers Point to "Konini"* (45° 40′ S, 166° 31′ E)

Along the southern two-thirds of the peninsula fur seals were extremely abundant and there were rookeries on most boulder beaches.

These beaches are often at the base of cliffs and are separated from one another by inaccessible bluffs. Seals bred on all types of boulder beach, including some with rounded boulders. Near Konini there were fewer seals and some beaches were used by non-breeders.

On 9 March 1972 observations were made from a boat which cruised slowly along the coast and stopped briefly at each bay. Observations were made while ashore on one beach, where 72 pups and 20 other seals were counted. The total seen was 597, plus 30 in the sea.

Estimated total for January-February 1973 between Five Fingers Point and Konini was 3500, range 2500–5000.

In July 1946 *Kekeno* took 1047 fur seals from Five Fingers Peninsula and in November 1947 Falla estimated there were about 2000 seals on the Peninsula (Sorensen 1969b).

Konini to Woodhen Cove (45° 38′ S, 166° 33′ E)

Although there are areas of suitable terrain, there did not appear to be many fur seals north of Konini.

On 4 and 7 December 1971 observations were made from a boat close to shore, but few seals were seen.

Estimated total for January-February 1973 from Konini to Woodhen Cove was 50, range 35–75.

"Seal Island"†, Breaksea Sound (45° 35′ S, 166° 38′ E, S147, 849937)

There are extensive areas of sloping, rocky coast on this island and fur seals hauled out on all but the more steeply sloping areas.

A few pups were born here, but the population structure was intermediate between an immature colony and a rookery.

On 5 December 1971 a count was made on a walk round the island.

Pup	1	SAMs	24
Immatures	17	Adult males	7
Females	5	At sea	2
Unknown	12		
		Total	68

*Local name for a bay about two-thirds of the way along the peninsula.

†Place name used by local fishermen.

Estimated total for January-February 1973 was 140, range 125–160.

Falla (*in* Sorensen 1969b) estimated that there were about 100 seals here and on nearby islets in December 1947. Forty-eight, including several pups, were seen on this island on 11 December 1974 (K. Morrison pers. comm.).

Breaksea Island (45° 35′ S, 166° 38′ E)

The main colonies on this island are on a series of boulder beaches, small rocky peninsulas, and a rocky islet on the north-eastern corner of the island (S147, 856962). Both breeding and non-breeding colonies were found.

Rookery. The terrain was exceptionally rugged and consisted of jumbled, angular boulders 3–4 m across.

On 8 December 1971 observations were made from cliffs above the colony. No count was possible because of the nature of the terrain, but it was estimated that 30 to 40 seals were present.

Non-breeding colonies. Hauling grounds were established on a small, rocky islet and on a rocky peninsula adjacent to the rookery. Seals were also seen on nearby boulder beaches.

On 8 December 1971 seals were counted from nearby observation points; 41 were seen and most were males.

On 8 December 1974 K. Morrison (pers. comm.) counted 105 seals on the non-breeding areas and 27 on the rookery.

Estimated total for January-February 1973 for these colonies was 175, range 150–200.

There is a smaller colony on the south-western peninsula of Breaksea Island, where K. Morrison counted 37 seals, including 1 pup, on 10 December 1974.

The coast between Breaksea Sound and Milford Sound was not visited and the descriptions of these colonies are based largely on unpublished information. Details of distribution are probably fairly accurate, but estimates of numbers may be poor.

Dagg Sound (45° 23′ S, 166° 46′ E) and Secretary Island (45° 13′ S, 166° 46′ E)

Fur seals have been reported on the outer coast of Secretary Island and just south of Dagg Sound, but there do not appear to be permanent colonies at either place.

Hares Ears Point, Doubtful Sound (45° 16′ S, 166° 51′ E)

Fur seals have been reported on Hares Ears Point in the entrance to Doubtful Sound, but no indication of numbers was given.

"Seal Islands", Doubtful Sound

These two small islands lie between Nee Island (45° 15′ S, 166° 52′ E) and Shelter Islands (45° 16′ S, 166° 52′ E). Fishermen indicated that up to 500 seals may be seen on these islands. K.Morrison (pers. comm.) made a seal count here on 10 January 1975 from a boat close to shore. He counted 31 seals on the northernmost island, 65 on the southern island, and 5 on a nearby rock.

Estimated total for January-February 1973 for Doubtful Sound was 175, range 125–400.

Nancy Sound (45° 06′ S, 167° 01′ E)

There are colonies (probably rookeries) on two small islands off Anxiety Point. Estimates of population size varied from 150 to 400.

Estimated total for January-February 1973 was 200, range 100–400.

Charles Sound (45° 02′ S, 167° 04′ E) to Caswell Sound (45° 00′ S, 167° 08′ E)

Fur seals were seen at Charles Sound in 1946 (N. Roderique pers. comm.), and more recently M. Schofield (pers. comm.) saw a few seals between Charles Sound and Caswell Sound. Falla (*in* Sorensen 1969b) and Gaskin (1972) have seen seals at Caswell Sound. The precise locations and the sizes of colonies in this area were not determined.

Estimated total for January-February 1973 between Charles and Caswell Sounds was 100, range 50–300.

Caswell Sound to Bligh Sound (44° 46′ S, 167° 29′ E)

Fur seals are numerous between Caswell Sound and George Sound, but reports of their distribution in this area were often conflicting. Colonies were reported at the following places.

Two Thumb Bay (44° 56′ S, 167° 12′ E)

Some fishermen have seen a few seals in this bay.

Looking Glass Bay (44° 53′ S, 167° 17′ E)

The colony at Looking Glass Bay is well known to fishermen, and Gaskin counted 63 seals there on 8 May 1964 (Sorensen 1969a).

"Seal Bay" (between Looking Glass Bay and Houseroof Rock)

A fisherman once counted 54 seals here and others indicated that seals may be very numerous.

Houseroof Rock (44° 52′ S, 167° 17′ E)

This is another well known colony and apparently there are several hundred seals here.

George Sound (44° 50′ S, 167° 21′ E)

Street (FMD files) mentions a colony on the

southern side of the entrance to George Sound, and a small group of seals (probably 10 to 20) has been seen on the northern side of the sound.

Street (1964) counted about 300 seals between Bligh Sound and Looking Glass Bay in July 1958. Other colonies have been reported at "South Point", "Blanket Bay", and "Monument Rock", all unmapped localities somewhere along this coast. Seals may also occur on the south side of the entrance to Bligh Sound.

As these sites are all fairly close together, two or more place names may refer to the same colony, or seals may use every suitable boulder beach, as they do on Five Fingers Peninsula.

Estimated total for January-February 1973 between Caswell Sound and Bligh Sound was 750, range 500–1500.

Poison Bay (44° 39′ S, 167° 38′ E)

Falla (Sorensen 1969b) saw seals at Poison Bay in 1947 and many Milford fishermen knew of a colony on an island in this bay. M. Schofield (pers. comm.) has also seen seals about 3 km north of Poison Bay.

Estimated total for January-February 1973 was 150, range 100–300.

Milford Sound (44° 34′ S, 167° 48′ E)

Up to six seals often haul out near Stirling Falls and lone animals were seen near Dale Point and Anita Bay. Seals have previously been recorded at Milford Sound by Gaskin (1972) and Sorensen (1969b).

Yates Point (44° 30′ S, 167° 49′ E)

Fur seals were seen on rough, bouldery terrain on both sides of Yates Point, but appeared to be most numerous on the southern side.

On 15 December 1971 and 18 January 1972 observations were made from a boat about 200 m off shore. No count was possible, but some seals were seen. A. Cragg estimated that there were 250 to 300 pups at Yates Point on 4 September 1972 (pers. comm. to Dr V. Stout).

Estimated total for January-February 1973 was 400, range 300–650.

"The Knobbies"* (exact position unknown)

Fur seals haul out on one rock in this group of small islets midway between Yates Point and Martins Bay.

On 15 December 1971, 22 seals were counted from a boat 50 m from one of the islets.

Estimated total for January-February 1973 was 50, range 35–60.

*An unofficial name used by local fishermen.

Long Reef (44° 20′ S, 167° 59′ E)

This exposed, bouldery reef is only 2–3 m above sea level and more than 100 m long. Recent photographs of this colony showed that fur seals bred there.

On 20 January 1972 seals were seen from a boat 500 m off shore, but no count was possible.

Estimated total for January-February 1973 was 200, range 100–300.

Estimated grand total for January-February 1973 for Fiordland was 8750, range 6250–13 500.

Westland

Cascade Point (44° 01′ S, 168° 22′ E)

A tumbledown boulder beach extends from the Cascade River around Cascade Point and about 3 km along the coast, but it is intersected in places by sheer cliffs. Most of this beach is occupied by breeding seals and a nearby reef is apparently used by non-breeding animals.

On 7 August 1972 many seals were seen from a boat cruising slowly along the coast, but no count was possible.

Estimated total for January-February 1973 was 2000, range 1500–3000.

This colony was first recorded by Waite (1909). R. A. Falla visited Cascade Point on 26 November 1934 and estimated there were about 500 fur seals, including about 200 on the reef (FMD files). N. H. Roderique (pers. comm.) took about 300 seals there in 1946 and when Falla visited the colony on 15 December 1947 he estimated there were fewer than 500 seals (Sorensen 1969b). D. E. Gaskin counted 132 fur seals at Cascade Point on 6 May 1964, but did not go ashore (Sorensen 1969a).

Smoothwater Bay "Point" (43° 58′ S, 168° 36′ E)

A few seals often haul out on a boulder beach and on rock ledges near this point. Four were seen there on 7 August 1972.

Jackson Head (43° 58′ S, 168° 37′ E)

J. Warham (pers. comm.) has seen up to four seals on the eastern side of Jackson Head and a few may also haul out on the western side of the headland.

Open Bay Islands (43° 52′ S, 168° 53′ E)

There are large rookeries on rough, eroded limestone on both Taumaka and Popotai Islands. Most of the recent studies on New Zealand fur seals have been carried out on Taumaka Island and this is now one of New Zealand's best known colonies. Work up to 1974 has been reviewed by Crawley and Wilson

(1976), and more recent studies include Crawley, Stark, and Dodgshun (1978), Mattlin (1978a, 1978b), McNab and Crawley (1975), and Miller (1974, 1975a, 1975b, 1975c).

Crawley and Brown (1971) counted 545 pups on Taumaka Island on 24 January 1970 and estimated that there were about 2750 (range 2000–3000) fur seals on this island. A more recent population estimate has been made by Mattlin (1978b), who estimated that there were more than 3500 seals on Taumaka Island during the 1974–75 and 1975–76 breeding seasons. The difference between this estimate and that of Crawley and Brown (1971) is due largely to the fact that recent studies allowed a more accurate estimate of the total population to be made from pup counts. On 22 February 1973, 156 pups were counted on Popotai Island and the total population was estimated to be 825 (range 750–900).

Estimated total for January-February 1973 for Open Bay Islands (based on counts made by Crawley and Brown (1971) on Taumaka Island and in this study on Popotai Island) was 3575, range 2700–3900.

Haast River to Paringa River

Fur seals occur on a sandy point and a few on the adjacent rocky islets at Arnott Point (43° 43′ S, 169° 13′ E). This is the only known fur seal colony on a sandy beach. About 90 seals were seen there on 10 December 1973, about 65 on 8 April 1978, and 41 on 10 October 1978. The boulder beach at Knights Point (43° 43′ S, 169° 14′ E) was inspected on several occasions, but no seals were seen.

An aerial survey of the colonies in this area was made on 12 September 1957 (FMD files); 50 to 55 seals were seen at Arnott Point and 40 to 45 on Piakatu Point (43° 39′ S, 169° 22′ E). Seals have also been seen on Abbey Rocks (43° 40′ S, 169° 20′ E) (FMD files).

Estimated total for January-February 1973 between Haast River and Paringa River was 175, range 125–225.

Gillespies Beach (43° 24′ S, 169° 50′ E)

Waikowhai Bluff (S70, 550719)

Fur seals haul out on fairly well rounded boulders overlying a sandy beach and on adjacent stony areas. There is a sandy beach between the rocks and the sea at low tide.

Monthly counts were made at Waikowhai Bluff by Westland National Park staff from March 1972 until March 1973 and these are shown below.

Date	No. of seals	Date	No. of seals
19 Mar 1972	14	27 Sep 1972	528
20 Apr 1972	8	28 Oct 1972	45
20 May 1972	49	21 Nov 1972	30
16 Jun 1972	52	Various dates	
24 Jul 1972	212	in Jan 1973	10–40
5 Aug 1972	501+10 in sea	10 Feb 1973	15+3 in sea
21 Aug 1972	487+30 in sea	28 Mar 1973	6

Estimated total for January-February 1973 was 20, range 15–25.

Gillespies Point (S70, 531718)

During August 1972 seals were seen on a small, tumbledown beach on Gillespies Point, but none were seen there at other times of the year. According to local residents, seals were first seen at Gillespies Point, but in recent years they have hauled out at Waikowhai Bluff.

On 5 August 1972 seals were counted during a walk past the colony.

Immatures	27	Unknown	1
SAMs	5	In sea	2
		Total	35

Okarito (43° 14′ S, 170° 10′ E)

Fur seals are often seen between Okarito and Three Mile Lagoon and two immatures were seen on this beach on 3 August 1972.

Abut Head (43° 07′ S, 170° 16′ E)

There is a colony at Abut Head and one report suggested it may be a rookery. It was not possible to visit this colony and there are no reliable data on the numbers of seals there.

Estimated total for January-February 1973 was 100, range 40–200.

Wanganui River (43° 02′ S, 170° 26′ E)

"Poerua Bluff" (S63, 035160)

Fur seals sometimes haul out between the Wanganui River and Poerua River and one was seen there on 31 July 1972.

Two unnamed points north-east of Wanganui River

Two groups of seals were seen on small boulder beaches during a walk from Wanganui River to Greens Beach on 1 August 1972.

Point No. 1 (S63, 072181) total seen 36.

Point No. 2 (S63, 075181)

Pup	1	SAMs	11
Immatures	2	Adult males	3
Female	1	Unknown	3
		Total	21

"Greens Beach" (S63, 099189)

Seals were seen on a boulder beach with boulders which vary from small and rounded to large and angular. At this colony, and at the two unnamed points nearby, there is a sandy beach between the rocks and the sea at low tide.

On 1 August 1972 on a walk through the colony, 385 seals were counted. A few were pups. SAMs were

the dominant class, but some immatures and adult males were also present.

In 1956, 200 seals were counted at Greens Beach; only 12 were seen on 27 November 1956, but about 300 were present some time in 1957 (FMD files).

Estimated total for January-February 1973 for the Wanganui River area was 25, range 20–30.

Point Elizabeth (42° 23′ S, 171° 13′ E; position of nugget S44, 746971)

On 2 January 1974 two or three seals were seen on a nugget near Point Elizabeth. Nine were seen there on 3 July 1955 (FMD files).

Tauranga Bay (41° 46′ S, 171° 27′ E)

Mainland colony. Fur seals were seen on a low rocky headland on the northern side of Tauranga Bay (S23, 959716) and on an adjacent boulder beach (S23, 960716).

On 15 October 1972 seals were counted from the headland.

Immature	1	SAMs	13
Unknown	3	Adult males	3
		Total	20

Island colony. Fur seals were seen on rocky terrain along the south-eastern side of the island in Tauranga Bay.

On 15 October 1972 seals were counted from the mainland by use of a telescope and binoculars. The number seen was 49; estimated number ashore was 60 to 75.

Estimated total for January-February 1973 for Tauranga Bay was 40, range 30–60.

Cape Foulwind (41° 45′ S, 171° 28′ E)

Small groups of seals have been seen on the mainland opposite Three Steeples, but there does not appear to be a permanent colony there. Seven seals were seen at Cape Foulwind by Gaskin in May 1964 (Sorensen 1969a). Thomson (1921) mentioned a hauling ground at Cape Foulwind, but he was probably referring to colonies at Tauranga Bay or Three Steeples.

Three Steeples (41° 44′ S, 171° 28′ E; S23, 974756)

There is a rookery on a low, rocky islet 100–150 m long, about 2 km north of Cape Foulwind.

On 15 October 1972 seals were counted from the mainland by use of a telescope. The number seen was 168, but there were probably 200 or more ashore.

Estimated total for January-February 1973 was 350, range 250–450.

This colony is well known, but no accurate counts appear to have been made. It was known to early naturalists (for example, Chapman 1893, Waite 1909). Seals bred there in the 1940s (R. A. Falla pers. comm.) and Gaskin saw "a dozen or so" when sailing past these rocks in May 1964 (FMD files).

Wekakura Point (40° 55′ S, 172° 05′ E; S7, 548745)

This colony is the northernmost rookery in New Zealand and is on a rocky beach on the northern side of Wekakura Point.

On 28 June 1974 about 250 seals were seen by J. Meredyth-Young (pers. comm.). He estimated there were 100 to 120 pups.

Estimated total for January-February 1973 was 250, range 200–300.

Other localities on the West Coast

Lone fur seals have been seen at Hokitika Beach (42° 43′ S, 170° 57′ E) (Gillham 1965) and Punakaiki Rocks (42° 07′ S, 171° 20′ E) and near Heaphy River (41° 01′ S, 172° 06′ E); a small group has been seen at Constant Bay (41° 54′ S, 171° 26′ E).

Estimated total for January-February 1973 for Westland was 6550, range 4950–8250.

East Coast South Island

Riverton to Nugget Point

Lone fur seals are regularly seen on Black Point (46° 40′ S, 168° 58′ E), Slope Point (46° 41′ S, 169° 00′ E), and Tautuku Peninsula (46° 37′ S, 169° 26′ E). They are most common during winter and none were seen when these places were visited on 27–28 February 1972. There are small colonies at Chaslands Mistake (46° 38′ S, 169° 22′ E), Toetoes Bay (46° 37′ S, 168° 40′ E) (Gaskin 1972), and possibly Cosgrove Island (46° 34′ S, 169° 37′ E). Two seals were seen on Long Point, near Cosgrove Island, on 25 August 1959 (FMD files).

Nugget Point (46° 27′ S, 169° 49′ E; S179, 585007)

Fur seals haul out on a rock platform between two rocky spurs on the northern side of Nugget Point. This colony is in a sheltered situation and the terrain is even and featureless.

On 22 June 1972, 14 males were seen from an observation point above the colony.

Estimated total for January-February 1973 was 6, range 5–8.

Fur seals were first reported from Nugget Point in 1934 (FMD files) and more recently by Street (1964) and Gaskin (1972). Street found that up to 30 seals sometimes came ashore at Nugget Point. According to

the lighthouse keeper, there were sometimes as few as 4 or 5 seals, but in November 1971 he had counted 62 in this colony.

Nugget Point to Dunedin

Fur seals sometimes haul out on Green Island (45° 57′ S, 170° 23′ E) and White Island (45° 56′ S, 170° 30′ E). Two were seen on each of these islands by Gillham (1965) and 30 to 40 were seen on Green Island in January 1978 (J. Darby pers. comm.). Fur seals may also occur on Taieri Island (46° 03′ S, 170° 13′ E). Stray seals are occasionally seen on the beaches along this coast.

Estimated total for January-February 1973 for the east coast south of Dunedin was 50, range 30–100.

Otago Peninsula

Cape Saunders (45° 53′ S, 170° 44′ E; S164, 348716)

The main part of this colony is on a boulder beach with fairly well rounded boulders. Seals also haul out on a smaller beach with large, angular boulders and on a rock shelf below the lighthouse. A female with a pup was seen on the smaller beach on 11 May 1978.

This colony was visited nine times between August 1971 and January 1973, and in May 1978. The counts made are shown in Table 6.

Estimated total for January-February 1973 was 280, range 270–290.

Taiaroa Head (45° 46′ S, 170° 44′ E)

The main group of seals is on a tumbledown boulder beach on the western side of the headland (S164, 343839). Some reports suggested pups had been born here, though the population structure was typical of a hauling ground. Seals also occur on a rock platform below the lighthouse, and a few may be seen on stony beaches and rock ledges between Pilots Beach and the cliffs east of the lighthouse.

On 11 May 1978 seals were observed from observation points either side of the headland; 36 were seen on the main beach, 8 on the rock platform, and 8 on other beaches and ledges. It was estimated that there were at least 100 present.

Other localities on Otago Peninsula (45° 51′ S, 170° 45′ E)

Seal counts were made on Otago Peninsula by R. J. Street and those shown below have been extracted from his unpublished report held by FMD, Wellington.

Estimated total for January-February 1973 for Otago Peninsula, excluding Cape Saunders, was 625, range 550–700.

There is a colony at Penguin Beach (S164, 355816), where 11 seals were seen on 28 August 1971, and seals are often seen at Sandfly Bay (S164, 281684). Fur seals were first reported on the Otago Peninsula in 1913 by the lighthouse keeper at Taiaroa Head.

Shag Point (45° 28′ S, 170° 50′ E)

A few seals may be seen on wave-cut platforms around Shag Point, but they are most often seen on rocky spurs and on a nugget near "Boat Harbour" (S146, 427205).

On 25 June 1972 four seals were counted during a walk around the peninsula.

Up to eight seals may be seen on Shag Point (FMD files) and several were seen in January 1972 (C. Young pers. comm.).

Moeraki Point (45° 21′ S, 170° 51′ E)

Up to six fur seals may be seen around this point (FMD files) and the number of seals present is probably similar to that at nearby Shag Point.

Other sightings, Otago Harbour to Banks Peninsula

A fur seal pup (curvilinear length about 50 cm) was found alive at Waikouaiti beach (45° 37′ S, 170° 41′ E) about 1 January 1976. It died a few days later and is now in the Otago Museum. Seals were reported from Purakanui Bay (45° 44′ S, 170° 37′ E) in 1923 (FMD files) and lone seals have been seen at Cape Wanbrow (45° 07′ S, 170° 59′ E), Timaru (44° 24′ S, 171° 15′ E), and the Rakaia River mouth (43° 45′ S, 172° 47′ E).

Estimated total for January-February 1973 for Otago and Southland was 950, range 850–1100.

Banks Peninsula

Horseshoe Bay (43° 53′ S, 172° 50′ E; S94, 176128)

Fur seals haul out on the eastern side of Horseshoe Bay. Immature seals were seen on areas where large, angular boulders were piled on top of one another, and males were seen on flatter terrain with rounded boulders.

		No. of seals	N.Z.M.S. 1, S164 grid ref.
Taiaroa Head-Rerewahine Point	16 Jan 1959	336	343839–360823
Pipikaretu Point	7 May 1958	12	364805
Papanui Inlet-Puddingstone Rock	3 Jan 1959	223	361752–361720
Cape Saunders	8 counts	8–100	348716
Hoopers Inlet-Gull Rocks	4–5 Feb 1959	42	306698–279679
Seal Point boulder beach	4 Feb 1959	1	Unsure of locality
Total excluding Cape Saunders		614	

TABLE 6: Seal counts made at Cape Saunders between August 1971 and January 1973 and in May 1978

Date	No. ashore	No. in water	Pups	Immatures	Females	SAMs	Adult males	Unknown
28 Aug 1971	115*	–	–	–	–	–	–	–
7 Nov 1971	43	4	0	8	0	11	21	3
17 Dec 1971	82	2	0	2	0	67	6	7
23 Feb 1972	238	5	0	3	5	209	20	1
26 Mar 1972	163	6	0	13	3	121	8	18
3 May 1972	85	2	0	18	0	46	12	9
24 Jun 1972	74	0	0	9	0	42	12	11
11 Sep 1972	131	0	0	15	0	73	25	18
17 Jan 1973	226	51	0	23	2	146	26	29
11 May 1978	144	6	1	22	1	105	12	3

*Only part of the colony was counted; this figure is an estimate of the total number ashore. Seals were not aged or sexed.

On 4 August 1973 seals were counted on a walk through the colony.

Pups	4	Adult males	3
Immatures	12	Unknown	1
Female	1	In sea	2
SAMs	9		
		Total	32

Two others were seen on a tumbledown beach near Snuffle Nose (S94, 164124).

Two seals were collected at Horseshoe Bay by R. J. Street between 1958 and 1960 (FMD files) and three were seen by G. Fenwick (pers. comm.) on 20–21 January 1973.

Pompeys Pillar (43° 51′ S, 173° 04′ E; S85/95, 388163)

Fur seals haul out on a reef-like point rising to about 6 m above sea level.

On 23 September 1973 seals were counted from cliffs above the colony.

Immatures	20	SAMs	22
Unknown	5	Adult males	2
		Total	49

Estimated total on 23 September 1973 was 55 to 65.

Goughs Bay to Hickory Bay (43° 47′ S, 173° 07′ E)

There is a small colony on the mainland opposite Crown Island (S85/95, 419230), where seals were seen on a stony beach under an overhang and on an adjacent rock platform.

On 27 July 1973 seals were counted.

Immature	1	Adult males	7
SAMs	3	Other males	2
		Total	13

On 21 June 1974 seals were counted.

Immature	1	Adult males	2
SAMs	2	In sea	1
		Total	6

Both counts were made from observation points near the colony. On each visit one seal was seen at Goughs Bay.

Four seals were seen near Crown Island in January 1972 (J. R. Jackson pers. comm.).

"Pa Bay"* to Ducksfoot Bay (43° 42′ S, 173° 06′ E)

Three groups of seals were seen in this area.

Ducksfoot Bay Colony (S85/95, 416345). Fur seals were seen on a boulder beach with large, angular boulders on the point north of Ducksfoot Bay.

On 23 September 1973 seals were counted from cliffs above the colony; 46 were seen, of which most were males. Estimated total was 55 to 70.

Southern headland of Pa Bay (S85/95, 417348). Fur seals hauled out on boulder beaches between Pa Bay and the Ducksfoot Bay colony and on a rocky spur on the southern headland of Pa Bay.

On 23 September 1973 seals were counted on a walk through the colony.

Immatures	3	Unknown	3
SAMs	11	In sea	2
Adult males	23		
		Total	42

Twenty seals were seen here on 12 September 1971 by H. Best (pers. comm.).

Head of Pa Bay (S85/95, 412347). Seven seals were seen at one end of the boulder beach on the southern side of Pa Bay on 23 September 1973.

Other localities on Banks Peninsula

Seal colonies may occur near Akaroa (Gaskin 1972), at Flea Bay (43° 52′ S, 173° 00′ E), Island Bay (43° 53′ S, 172° 52′ E), and "Penny's Hat" (location not traced). Lone seals have been seen at Birdlings Flat (43° 49′ S, 172° 43′ E), Tumbledown Bay (43° 51′ S, 172° 46′ E), and Taylors Mistake (43° 35′ S, 172° 47′ E).

Estimated total for January-February 1973 for Banks Penisula was 75, range 50–100.

*Unofficial place name; an island in this bay is called Pa Island.

Motunau Island (43° 04′ S, 173° 05′ E)

A few seals hauled out on this island between April and October each year and were most numerous in September (Cox, Taylor, and Mason 1967).

Haumuri Bluffs (42° 33′ S, 173° 31′ E)

Three seal counts have been made at Haumuri Bluffs.

29 Jun 1972	27 seals	Observer C. H. Hay
16 Jul 1972	108 seals	Observer C. H. Hay
22 Sep 1973	62 seals	Observer C. H. Challies

Estimated total for January-February 1973 was 30, range 20–50.

Cheviot

There is apparently a colony near Cheviot, but its location and size are unknown.

Kaikoura Peninsula (42° 25′ S, 173° 42′ E)

This is one of the best known seal colonies in New Zealand. It has been described by Stonehouse (1965, 1969), and work carried out there, including seal counts, has been described by Stirling (1968, 1970) and Miller (1971, 1974). The history of this colony is discussed by Sorensen (1969a) and Wilson (1974b).

Two seal counts of the entire peninsula were made during this study.

	23 Jan 1973 (C. H. Hay observer)	4–5 Jun 1978 (G. J. Wilson observer)
Seal Reef (S49, 996889)	55	113
Spaniards Bay (S49, 988881)	4	0
Rhinohorn Point (S49, 983878)	135	84
Western point of Whalers Bay (S49, 971874)	39	22
Total	233	219

From May 1977 to March 1978 monthly counts were made at "Rhinohorn Point" by J. van Berkel. These counts, with the two counts shown above, indicate that there are two peaks of abundance—July to September and late January to March—when 100 to 200 seals are usually present. They are least numerous from October to December.

Estimated total for January-February 1973 was 240, range 235–250.

Fur seals are often seen at various places along the Kaikoura coast, and they were seen at the following localities by Street between 1958 and 1960 (FMD files).

	No. of seals
Paparoa Point (north of Ohau Point) (42° 14′ S, 173° 51′ E)	1–6
Port Robertson (location untraced)	*
Ohau Point (42° 15′ S, 173° 50′ E)	1–6
Iron Gate Stream (42° 16′ S, 173° 46′ E)	6–10
Pinnacle Rock (42° 27′ S, 173° 35′ E)	1–6
Rileys Lookout (42° 28′ S, 173° 33′ E)	*

*Seals were seen, but not counted.

Estimated total for January-February 1973 for Canterbury-Kaikoura was 350, range 300–400.

Nelson

Archway Islands (40° 30′ S, 172° 40′ E; S1, 087242)

Fur seals use a series of ledges on the south-west point of the largest of the Archway Islands.

On 19 July 1972 seals were counted from the mainland opposite the islands; 47 were seen, but there may have been up to 55 present.

Thirty-five were counted here on 25 August 1968 (R. H. Taylor pers. comm.).

Pillar Point (40° 30′ S, 172° 43′ E; S1, 123239)

Fur seals haul out on a steeply sloping limestone shelf that curves around Pillar Point. The terrain at this colony, and at Archway Islands, is steeper and more regular than habitat used by fur seals elsewhere in New Zealand.

On 18 July 1972 a count was made from the cliffs above the colony and 21 seals were seen.

Patons Rock (40° 50′ S, 172° 46′ E)

Up to six seals haul out on this point during winter, but they are seldom seen during summer. None were seen when this locality was visited on 30 March 1972, but one was seen there in May 1973 (R. E. Fordyce pers. comm.).

Separation Point (40° 47′ S, 173° 00′ E)

Fur seals haul out on a small boulder beach and on rock ledges near the beacon (S9, 383896 and 385896).

On 17 July 1972 seals were counted on a walk around the point; 17 were seen, most of which were males, but there were 5 immatures.

Six were seen at Separation Point in 1950 (FMD files).

Farewell Spit (40° 31′ S, 172° 45′ E)

Stray seals occasionally come ashore on Farewell Spit and about 10 were seen at the base of the spit by P. H. Ensor in April 1976.

Estimated total for January-February 1973 for the Nelson area was 20, range 10–30.

Marlborough Sounds-Cook Strait Islands

Stephens Island (40° 40′ S, 174° 00′ E)

Stephens Island is the place in the Marlborough Sounds where fur seals are most numerous. There are four colonies on the island, and daily counts were made at three of these between 4 and 7 July 1972. All counts were made from observation points above the colonies.

Colony No. 1 (S5/6, 317013).

	4 Jul 1972	5 Jul 1972	6 Jul 1972	7 Jul 1972
Immatures	4	3	2	0
SAMs	8	7	13	7
Adult males	6	2	3	3
Unknown	5	2	1	0
In sea	4	0	0	0
Total	27	14	19	10

Colony No. 2 (S5/6, 317011).

	4 Jul 1972	5 Jul 1972	6 Jul 1972	7 Jul 1972
Total	17	9	10	15

These were mainly SAMs, but each day two immatures were seen.

The two colonies were on boulder beaches on either side of the razorback ridge on the north-eastern part of the island.

Colony No. 3 (S5/6, 313019). Seals were seen on an inaccessible boulder beach at the base of 100-m high cliffs below the lighthouse.

	4 Jul 1972	5 Jul 1972	6 Jul 1972	7 Jul 1972
Total	30	27	31	26

Colony No. 4 (S5/6, 308019). On 5 July 1972, 24 seals were seen on a tumbledown boulder beach on the western coast of the island. Six others were seen elsewhere on Stephens Island.

Estimated total for Stephens Island for 4–7 July 1972 was 125, range 110–135.

D'Urville Island (40° 50′ S, 173° 51′ E)

Every winter fur seals haul out on the islets off Manawakupakupa (40° 55′ S, 173° 46′ E), and this appears to be the only locality round D'Urville Island where they appear every year. Seals are occasionally seen at Cape Stephens (40° 42′ S, 173° 57′ E) and on the northern and southern coasts of the island. They have been seen on the D'Urville Peninsula (40° 52′ S, 173° 54′ E) (1 on 20 February 1972), at Port Hardy (40° 45′ S, 173° 53′ E) (2 in 1949), on the Rangitoto Islands (40° 46′ S, 173° 59′ E) (2 in 1949), and on The Sisters (about 40° 42′ S, 173° 57′ E) (22 in July 1949).

On 11 July 1972, 7 to 10 fur seals were counted on the islets near Manawakupakupa, and 2 were seen near French Pass (40° 55′ S, 173° 51′ E).

Estimated winter total for D'Urville Island was 25, range 15–40.

Jag Rocks (40° 47′ S, 174° 03′ E)

There is apparently a hauling ground on Jag Rocks and one Nelson fisherman suggested seals may be as numerous here as they are on Stephens Island. Fur seals were first reported on Jag Rocks in 1955, and in April 1957, 50 were seen (FMD files).

Chetwode Islands (40° 54′ S, 174° 05′ E)

"Outer Chetwode" (Te Kakaho) Island (40° 53′ S, 174° 06′ E; S11, 403748)

Each winter fur seals haul out on a series of small rocks on the northern point of Outer Chetwode Island.

On 11 June 1978, 21 fur seals (2 immatures, 16 SAMs, and 3 adult males) were seen from the cliffs above the colony.

Thirty-three seals were seen in October 1974 (M. Shepard pers. comm.) and 27 in September 1976 (J. N. Jolly pers. comm.). R. J. Street (FMD files) counted 36 seals at Chetwode Islands in 1955.

"Inner Chetwode" (Nukuwaiata) Island (40° 54′ S, 174° 04′ E)

Fur seals haul out on small rock ledges along the southern third of the west coast of this island.

On 12 June 1978, 6 groups of seals (total 18) were seen from a boat close to shore.

Cape Jackson (41° 00′ S, 174° 19′ E)

There is a colony at Cape Jackson which is apparently similar in size to the one at Chetwode Islands (B. D. Bell pers. comm.).

Other localities in the Marlborough Sounds

Up to 10 fur seals sometimes come ashore on Trio Islands (40° 50′ S, 174° 00′ E) (D. J. Campbell pers. comm.), and stragglers have been seen on The Brothers (41° 07′ S, 174° 26′ E). Small groups sometimes occur at West Entry Point (40° 57′ S, 174° 00′ E), where two were seen on 6 June 1978, and R. J. Street (FMD files) saw six in 1955. They regularly enter Pelorus Sound and in recent years two to four have often been seen on Te Puraka Point (41° 03′ S, 174° 01′ E) and stragglers on Duffers Reef (40° 57′ S, 174° 03′ E), Danger Point (40° 58′ S, 173° 57′ E), and in Ketu Bay (40° 59′ S, 173° 59′ E) (H. McCrystal and W. Ford pers. comm.). In July 1949 C. Jacobsen saw one seal in Admiralty Bay (40° 59′ S, 173° 51′ E) and two at French Pass (40° 55′ S, 173° 51′ E) (FMD files).

Estimated total for January-February 1973 in the Marlborough Sounds and on the Cook Strait islands was 50, range 30–75.

North Island

Wellington coast

There are four hauling grounds on the Wellington coast: Cape Terawhiti (41° 17′ S, 174° 37′ E), Sinclair Head (41° 22′ S, 174° 42′ E), Turakirae Head (41° 26′ S, 174° 55′ E), and Cape Palliser (41° 37′ S, 175° 16′ E). (Stragglers occur as far north as Paekakariki (40° 59′ S, 174° 57′ E) and Castlepoint (40° 54′ S, 176° 13′ E).) These are the largest North Island hauling grounds, each having winter totals of at least 150 seals. Counts have been made at these localities by A. H. Whitaker (Ecology Division, DSIR, Lower Hutt), who has also made monthly counts at Turakirae Head over a 2-year period (see Gibb and Flux 1973). This material is being prepared for publication and so only the counts made during this study are given here.

Sinclair Head

On 14 May 1972 seals were counted from an observation point near the colony. At least 21 were seen on land, plus about 11 in the sea.

Turakirae Head

On 12 May 1972 seals were counted during a walk along the coast; 125 were seen ashore and 17 at sea. Most were SAMs, but there were some adult males.

Cape Palliser

On 27 May 1972 seals were counted from observation points near the two colonies.

Main colony. Islets close to shore (N168, 796821).

Immatures	14	Unaged males	18
SAMs	100	Unknown	18
Adult males	5	In sea	2
		Total	157

Mainland colony (N168, 791831). Forty-seven fur seals were seen and most were SAMs.

Estimated total for January-February 1973 for the Wellington coast was 150, range 75–275.

Sugar Loaf Islands, New Plymouth (39° 04′ S, 174° 01′ E)

Lion Rock (N108, 605925)

Fur seals haul out on a rock platform on Lion Rock and on a low-lying rock between Lion Rock and Moturoa Island.

On 23 May 1972 seals were counted from a boat about 20 m off shore and later from the Ministry of Works and Development observation tower at Paritutu. Twenty-three seals were seen on each occasion.

Moturoa Island (N108, 606926)

On 23 May 1972 one seal was seen.

Seal Rocks (N108, 583187)

On 23 May 1972 one seal was seen.

Saddleback Island (N108, 593931)

On 23 May 1972 six seals were seen on a steeply sloping rock face where ledges and other irregularities allowed them to climb up to 15 m above sea level.

In May 1927 four seals were seen on the Sugar Loaf Islands and these were the first recorded there for many years (FMD files). In September 1951, 12 were seen on Lion Rock, and Merton (1961) saw 30 seals on Lion Rock and over 200 on Saddleback Island on 17–18 September 1960. Seals are most numerous in July and only a few are seen during summer (R. Allen pers. comm.).

Seals occasionally come ashore at New Plymouth and a few are sometimes seen on the coast near Cape Egmont.

Gannet Island (37° 58′ S, 174° 34′ E)

Fur seals haul out on the western coast of this island.

On 20 May 1972 the number of seals was estimated from a light aircraft circling the island. Estimated total on land was 70 to 100 and at sea about 10.

In 1958, 300 to 400 seals were reported on this island (FMD files) and in December 1971, 30 to 40 were seen (*Waikato Times*, 18 December 1971).

Seals are sometimes seen near Kawhia Harbour (38° 05′ S, 174° 50′ E) and Raglan Harbour (37° 47′ S, 174° 54′ E), where there is possibly a small colony (National Museum files).

Motupia Island (34° 36′ S, 172° 48′ E)

About 130 fur seals were seen on this island during the winter of 1969 (Singleton 1972).

Three Kings Islands (34° 10′ S, 172° 08′ E)

The colony on Three Kings has been described by Singleton (1972). Fur seals were first seen there in December 1967, up to 30 were seen in 1968, and 70 to 80 in 1969. Singleton counted 20 on Princes Islands on 14 October 1968. They are most numerous between June and October.

West coast of Northland

There may be a hauling ground on Oaia Island (36° 50′ S, 174° 25′ E) off Muriwai Beach (B. D. Bell pers. comm.). There are only three other reported sightings of fur seals along the western coast of Northland. These were at Blockhouse Bay, Manukau Harbour (36° 56′ S, 174° 42′ E) in July 1972, Dargaville (35° 56′ S, 173° 52′ E) in September 1971, and Hokianga Harbour (35° 32′ S, 173° 21′ E) where a pup was seen in 1956 (*Hawera Star*, 8 August 1956).

East coast of Northland

There have been two reported sightings of fur seals near Cape Brett (35° 10′ S, 174° 20′ E). A lighthouse keeper counted 22 at Stonewall Creek on 1 June 1959 (FMD files), and on 12 January 1972 S. A. Nielsen (pers. comm.) saw about 12 near the lighthouse. A few seals come ashore on the Moturoa Islands (34° 47′ S, 173° 22′ E) (J. C. Smuts-Kennedy pers. comm.). Seals entered Whangarei Harbour (35° 47′ S, 174° 24′ E) in 1948 (FMD files). In the Hauraki Gulf lone animals have been seen at Waiomu (37° 02′ S, 175° 31′ E) in September 1952 (FMD files) and near Kawau Island (36° 25′ S, 174° 51′ E) on 10 July 1972. In October or November 1974 two seals were seen some miles up the Waihou River (37° 16′ S, 175° 36′ E).

Napier (39° 29′ S, 176° 55′ E)

Fur seals are rarely seen between the Hauraki Gulf and Castlepoint, but have been reported near Napier. They were seen on the Sugar Loaf Rocks near Cape Kidnappers (39° 38′ S, 177° 06′ E) in August 1972 (*Daily Telegraph*, Napier, 22 August 1972), but none were seen by P. Wilson (pers. comm.), who flew over these islands on 28 August 1972. Seals occasionally come ashore near Napier.

Estimated total for January-February 1973 for the North Island, excluding the Wellington coast, was 40, range 20–75.

Chatham Islands

The seasonal fluctuations in the numbers of fur seals ashore at Chatham Islands appeared to differ from those in New Zealand (Wilson 1974b). Consequently, it was impossible to allow for the time of year counts were made, and the population estimates for Chatham Islands are for November 1972, the month these colonies were visited.

South East Island (44° 21′ S, 176° 10′ W)

There are three fur seal colonies near the south-eastern point of South East Island.

Colony No. 1, Seal Rock. This small island is about 150 m from South East Island. On its seaward side the rock is too steep to allow seals to come ashore, but the whole of the coast facing South East Island is used by them. The terrain is generally fairly regular, but there are some irregular areas where pups were seen and seals may have bred.

On 6 November 1972 seals were counted from South East Island; 157 were seen and the estimated total was about 200. Most were SAMs or immatures, but 25 to 30 pups were also seen.

In 1953 L. C. Bell estimated that there were about 200 seals on Seal Rock (FMD files) and in March 1972 a similar estimate was made by D. Flack (pers. comm.). On 11 February 1973, 103 seals were counted by J. N. Jolly (pers. comm.).

Colony No. 2, Gut Colony. This small rookery is in a boulder-filled gut opposite the southern end of Seal Rock. At its seaward end the gut fans out on to a rocky coastline where non-breeders were seen.

Seal counts were made on three days from an observation point above the colony.

	6 Nov 1972	7 Nov 1972	8 Nov 1972
Yearlings*	15	15	13
Immatures	3	2	2
Females	5	1	6
SAMs	7	5	3
Adult males	4	1	1
Unknown	4	0	2
In sea	2	0	4
Total	40	24	31

*Born summer of 1971–72.

Colony No. 3, South East Colony. This rookery is in a small bay near the southern headland of South East Island and is situated on a broad expanse of uneven, shelving rock with tide pools and areas of more broken terrain.

On 6 November 1972 a count was made from the clifftops above the colony.

Yearlings	44	SAMs	15
Immatures	12	Adult males	11
Females	31	Unknown	54
		Total	167

On 7 November 1972, 180 seals were counted.

Estimated total for this colony for 6–7 November 1972 was 210, range 190–230.

Other areas on South East Island

Forty-eight seals were seen between Seal Rock and the cliffs on the western coast, and four on the shelving, rocky coast along the northern part of the island.

Estimated total for South East Island for 6–8 November 1972: main island 310, range 280–350; Seal Rock 200, range 180–230.

About 20 seals were seen on South East Island in September 1948 (Falla *in* Sorensen 1969b). About 350 to 400 were seen on the island (including Seal Rock) by R. H. Taylor on 2 November 1970, and on 11 February 1973 J. N. Jolly saw 340 to 360 on the mainland of South East Island.

Star Keys (44° 13′ S, 176° 01′ W)

Island

This island was not visited during this study. However, G. C. Kelly (pers. comm.) saw about 30

seals there in September 1968, and C. Huntington (pers. comm.) saw at least 20 in November 1977.

Estimated total for November 1972 was 30, range 25–50.

Reef

This low-lying reef is generally less than 2 m above sea level and has flat, regular terrain. However, seals probably bred on higher areas with broken terrain.

On 17 November 1978 observations were made from a dinghy close to shore. Estimated number ashore was 350, range 300–500.

There were seals at Star Keys in 1936 (FMD files) and this colony was known to Gaskin (1972).

Chatham Island

There are three hauling grounds on Chatham Island and these are described below.

Point Munning (43° 43′ S, 176° 13′ W)

Fur seals were seen on rough, eroded terrain on the mainland and on an islet a few metres off shore. Although several yearlings were seen, this was probably a non-breeding colony.

On 10 November 1972 seals were counted from an observation point nearby.

Yearlings	4	SAMs	4
Immatures	6	Adult males	5
Females	2	Unknown	4
		Total	25

Estimated total was 40, range 30–55.

On 23 November 1970 R. H. Taylor (pers. comm.) saw 150 to 200 seals at Point Munning.

Te Whakuru Island (43° 44′ S, 176° 12′ W)

On 10 November 1972 eight adult males were seen.

Tupuangi-Monau Reef (43° 45′ S, 176° 50′ W)

This colony was not visited, but according to local residents there were fewer seals here than at Point Munning.

Estimated total for November 1972 was 25, range 20–50.

Other areas on Chatham Island

Seals were taken on the south coast of Chatham Island in 1807 (Richards 1971), but there have been no recent reports of colonies on this coast. Stray seals may come ashore on various rocky points on Chatham Island. They are sometimes seen near Kaingaroa Harbour (43° 43′ S, 176° 16′ W) and four were seen at Matarakau (43° 43′ S, 176° 21′ W) in September 1974 (G. Van Tets pers. comm.).

The Forty Fours (43° 57′ S, 175° 50′ W)

Fur seals haul out wherever the terrain allows around this cliff-bound group of islands.

On 12 November 1972 observations were made at each colony from a boat a few metres off shore.

Main colony. This colony is on the north-western corner of the main island and is on irregular, broken terrain rising to about 12 m above sea level. It is probably a rookery.

Fifty-five seals were seen; estimated total was 100, range 80–125.

Northern colony. This colony is in a bay on the northern side of the main island and is on a rock platform under an overhang.

Thirty-one seals were seen, all of which were males; estimated total was 33, range 31–35.

Cave colony. This colony is in a bay on the south side of the main island. Twenty-seven seals were seen in a small cave and on adjoining rock ledges. Most were males, but there were three pups and several immatures and females. Estimated total was 30, range 27–35.

Another 32 seals were seen on various rock ledges on the main island.

Islets. There are four islets off the eastern end of the main island and small groups of seals were seen on all suitable ledges.

Thirty-seven were seen; estimated total was 65, range 45–75.

Estimated total on The Forty Fours for November 1972 was 270, range 220–320.

Seals were seen on The Forty Fours in 1936 (FMD files). Gaskin (1972) reported a densely populated breeding colony on these islands, but it now appears that very few pups are born there.

The Sisters (43° 34′ S, 176° 48′ W)

Fur seals breed on the reef in The Sisters group of islands. This reef is generally low lying with extensive tide pools, but some areas consist of irregular terrain rising to 3 m above sea level. Breeding occurred on areas with irregular terrain, but non-breeders used lower-lying parts of the reef.

On 25 November 1972, 582 seals were counted from vantage points in the colony. There were many adult males and females, a few immatures and SAMs, and two newly born pups.

Estimated total for November 1972 was 700, range 650–750.

Many seals were seen on this reef on 29 January 1954 (Dawson 1973) and a few were seen on the Middle Sister in September 1974 (A. Wright pers. comm.).

Eastern Reef (44° 20′ S, 175° 52′ W)

Fur seals were seen on Eastern Reef in 1936 (FMD files) and more than 50 were ashore in July 1969 (J. H. R. Lesser pers. comm.). According to fishermen, there are fewer seals at Eastern Reef than there are at Star Keys.

Estimated total for November 1972 was 100, range 50–250.

The Pyramid (44° 26′ S, 176° 14′ W)

Fur seals were seen on The Pyramid on 17 October 1964 (Dawson 1973) and more than 50 were ashore in September 1974 (A. Wright pers. comm.). This is probably a non-breeding colony.

Estimated total for November 1972 was 75, range 40–90.

Other localities on Chatham Islands

A seal was seen on Mangere Island (44° 16′ S, 176° 18′ W) in February 1973 and in May 1976 (C. H. Hay, P. H. Ensor, pers. comm.), and a few may haul out on the Murumuru Islets (44° 22′ S, 176° 15′ W), the Castle (44° 17′ S, 176° 21′ W), and Western Reef (43° 51′ S, 176° 55′ W).

Estimated total for November 1972 for Chatham Islands was 2100, range 1800–2700.

Subantarctic Islands

Snares Islands (48° 01′ S, 166° 34′ E)

The distribution and abundance of fur seals at Snares Islands has been described by Crawley (1972) and an earlier estimate was made by Falla (*in* Sorensen 1969b). Falla estimated that there were about 3000 seals on Snares Islands in December 1947, but Crawley estimated there were only about 1156 there in November-December 1970. A few also haul out on the Western Chain (Fleming and Baker 1973).

Auckland Islands (50° 45′ S, 166° 00′ E)

Wilson (1974a) mapped the distribution of fur seals at the Auckland Islands and estimated that there were 1000 (range 750–1500) there in December 1972-January 1973.

Campbell Island (52° 30′ S, 169° 10′ E)

The fur seals on Campbell Island were counted by R. J. Street in January and February 1958 (see Bailey and Sorensen 1962). Street counted 778 seals, including 71 pups. He did not estimate the total population, but Sorensen (1969b) estimated that it would be at least 2000.

Fur seals were not reduced to such low numbers on Campbell Island as they were on most other island groups. They were taken by the resident shepherds in 1922 (284) and in 1923 (66) and larger numbers may have been taken in other years (Sorensen 1969b). Captain Bollons estimated that there were less than 1000 seals on Campbell Island in 1927 (Sorensen 1969b).

Antipodes Islands (49° 42′ S, 178° 47′ E)

About 1100 fur seals were counted at these islands in February 1969 (Taylor *in* Sorensen 1969b). Seals were exterminated on Antipodes Islands and mariners shipwrecked there in 1908 did not see any. In 1927 Captain Bollons reported that they were rarely seen on the Antipodes Islands and on 4 November 1950 only one was seen by an expedition visiting the islands (Taylor *in* Sorensen 1969b).

Bounty Islands (47° 42′ S, 179° 03′ E)

About 50 fur seals were seen on Bounty Islands by the Whitney South Sea Expedition in February 1926 (according to the Journals of J. C. Correira and R. H. Beck, lodged in the American Museum of Natural History). Captain Bollons reported that seals were plentiful there in 1927 and on 11 November 1950 Falla estimated there were 5000 to 6000 on these islands (FMD files). Darby (1970) stated that seals were "10 000 strong" on Bounty Islands on 12 January 1968. Although Falla's estimate is old, it is probably the more reliable.

Macquarie Island (54° 30′ S, 158° 57′ E)

Fur seals were exterminated at Macquarie Island by 1820, but reappeared before 1948. Yearly counts have been made since 1950 and the increase in numbers is shown by Csordas and Ingham (1965) and Johnstone (1972). In 1970, 626 seals were counted and in 1971, 621 were seen.

A few seals haul out on the Bishop and Clerk Islands (55° 06′ S, 158° 43′ E) south of Macquarie Island (MacKenzie 1968).

Appendix 2

Pelagic Observations of Fur Seals

Fur seals were often seen in the water close to colonies, but only those seen more than 10 km from a known colony are listed here.

Location	Approx. position	No. of seals	Date	Observer
Between Stewart I. and Auckland Is.	49° 30′ S, 166° 44′ E	1	10 Dec 1972	G. J. Wilson
Off Kopeka River, Stewart I.	47° 10′ S, 168° 00′ E	1	6 Feb 1972	G. J. Wilson
Wreck Reef, Stewart I.	47° 05′ S, 168° 13′ E	5	26 Aug 1973	G. J. Wilson
Between Bunker Islets and Ruapuke I.	46° 50′ S, 168° 23′ E	15–20	20 Feb 1972	G. Fields
Off Dagg Sound, Fiordland	45° 21′ S, 166° 40′ E	1	May 1964	D. E. Gaskin
Off Doubtful Sound, Fiordland	45° 15′ S, 166° 45′ E	1	13 Dec 1971	G. J. Wilson
Off Greymouth, Westland	42° 26′ S, 171° 07′ E	2	20 Mar 1972	J. V. Eade
Off Greymouth, Westland	42° 26′ S, 171° 07′ E	2	May 1964	D. E. Gaskin
Off Kaikoura	42° 22′ S, 173° 50′ E	about 25	Aug 1973	G. D. Fenwick
Off Clarence River, Marlborough	42° 10′ S, 174° 15′ E	1	22 Aug 1972	G. J. Wilson

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