

# THE FIORDLAND CRESTED PENGUIN SURVEY: STAGE IV, STEWART AND OFFSHORE ISLANDS AND SOLANDER ISLAND

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## ABSTRACT

In late July and early August, 1993, the survey of Fiordland Crested Penguins on Codfish I. initiated by Department of Conservation personnel in 1992, was completed. From 11-19 August we surveyed the coasts of southern Stewart and the Titi Is, and from 21-23 August we surveyed Solander I. A total of 115 Fiordland Crested Penguin nests and 300 birds were counted: 5 birds on or near Codfish I., 32 birds around southern Stewart I., and 115 nests and 263 birds on Solander I. Solander I. has been added to the small number of locations where more than 100 penguin nests are found annually. The survey has now covered all of the range of the Fiordland Crested Penguin except for the mainland north of Milford Sound; our estimate of nests in the surveyed area is about 1000 annually.

KEYWORDS: Fiordland Crested Penguin, survey, Stewart I., Solander I.

## INTRODUCTION

The Fiordland Crested Penguin (*Eudyptes pachyrhynchus*, Tawaki) survey is an ongoing attempt to provide the first complete survey of the species. Results to date (McLean & Russ 1991, Russ *et al.* 1992, McLean *et al.* 1993) suggest that Fiordland Crested Penguins (henceforth penguins) are considerably less abundant than comments by Henry (1903) indicate for early this century. Also, anecdotal reports for mainland sites such as Jackson Bay and Big Bay, and observations by University of Canterbury personnel on Taumaka I. (Open Bay Islands) over the last decade, suggest that at least some populations are currently in decline.

In this report we present the results of surveys in the most southern parts of the species' range, including Codfish I., Solander I., the Titi Is, and parts of the Stewart I. coastline. Most of Codfish I. was surveyed in 1992 by Department of Conservation personnel (Maloney *et al.*, 1993) using our techniques. That survey was completed in 1993 by BJSS and coworkers who spent two weeks on Codfish I. in late July/early August, and visited several inaccessible sectors on the south coast as part of the boat-based survey. A summary of the complete Codfish I. results is presented here.

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The survey of the Titi Islands immediately offshore of Stewart Island is incomplete. Penguins occur along the western margin of Stewart I. (Bull *et al.* 1985). All islands in that region, except Codfish I., are either owned by local (Rakiura) Maori (the beneficiary islands) or title was about to be transferred to Rakiura Maori (the Crown islands) at the time of the survey. Permission to land was not given by Rakiura Maori. We were therefore limited to small boat surveys of those islands and did not land to check sightings of birds onshore or likely nesting areas.

## METHODS

Survey methodology was outlined in detail in McLean *et al.* (1993) and will only be summarised here. When onshore, groups of 2-4 people worked their way along the coast searching and listening for signs of penguins. When penguins were located, they were approached cautiously and a careful count made of nests and birds. Two birds standing together were treated as a pair. A 'nest' was counted if i) a single bird was prone on a nest site, ii) a single bird was upright but clearly attached to a site (an egg can usually be seen if an incubating bird is upright), iii) eggs were seen in a nest whether or not a bird was present, or iv) a pair was present. On the rare occasions when a pair did not appear to be associated with an obvious nest site, a nest was still counted on the assumption that such birds represented a breeding unit that had not yet settled on a nest site.

Small boat surveys involved a small boat moving slowly along the shoreline searching for penguins or sign, such as tracks into the bush. All surveys of the Titi Is were made from a small boat or from the support vessel.

Minimising disturbance to penguins was given a higher priority than obtaining accurate counts. In some cases we remained on the edge of penguin colonies and obtained counts by watching and listening. Locations at which counts were either rushed, or could not be made precisely, are noted in the results.

## RESULTS

### **Stewart and adjacent Islands: General**

Due to bad weather we did not check the coastline south of Mason Bay to Easy Harbour, including the Ernest Is and Rat I. The coastline north of Mason Bay was not checked by boat because it can be easily walked.

Thirty-two penguins were counted around the south, southwest and southeast coasts of Stewart I. All were on rocky beaches (on islands or in sheltered bays), or in the water. In some cases runs into the bush and entrances to caves could be seen near the birds.

### **11 August, 1993**

We left Bluff in the 27 m *Marine Countess* at 1000 hrs, and headed directly for the south coast of Codfish I.

### **Codfish Island**

Codfish I., a large island on the northwest coast of Stewart I., is an

important breeding location for Fiordland Crested Penguins (Maloney *et al.* 1993). Most of the locations not visited by Maloney *et al.* in 1992 were surveyed in late July/early August by BJSS and coworkers. However, some locations could not be accessed from land, and these were checked by the boat-based survey.

The south/south-east coasts were checked by dinghy. Three penguins were standing outside a shallow cave just north of the most southerly point. The cave had limited nesting potential, with room for no more than a few nests. This coastline is very exposed and rugged, but there were several possible landing sites for penguins.

Two penguins were seen in the water 1.5 nautical miles south of Codfish I.

### **Boat Group**

Four small Titi islands on the southwest coast of Stewart I., just south of South Red Head Point.

*Kundy I.:* On the east side of the island 4 penguins were seen standing on the rocky shore at the bottom of a run into the bush.

*Betsy I.:* Several possible landings but no sign of penguins.

*Big I.:* Four penguins on the east coast at the bottom of a run into the *Olearia*.

*Chimneys I.:* No sign of penguins.

### **Easy Harbour**

On the way into Easy Harbour, one penguin was seen south of the gut on the landward side of the peninsula. There appeared to be an entrance to a cave behind the bird but darkness prevented us from exploring it. There appeared to be many suitable landing and nesting sites in Easy and False Easy Harbours, but we did not check them thoroughly. We spent the night in Easy Harbour.

### **Southwest Titi Is, 12 August**

Gale force winds were forecasted, and so instead of exploring Easy Harbour we headed for the Moggy Islands while the weather held. As we left, two penguins were standing on the shore where one was seen the night before.

*Little Moggy and Big Moggy Islands:* The Moggy Is lie to the west of Easy Harbour. The east coasts of both islands were checked by dinghy for penguins. Despite many possible landings and suitable nesting habitat, only three penguins were seen: in Rewa Bay on the northeast coast of Big Moggy I. where there was sign of a small colony. Fourteen penguins were seen in Rewa Bay during the moult by RBR on 28 February, 1989. The windward side of the Moggys was not checked, but has been visited previously by RBR and offers no suitable landings.

*Kaimohu I.:* A small island, south of the Moggy Is, with several possible landings. We pulled in close to the leeward side and searched the coastline with binoculars from the *Marine Countess*, but found no sign of penguins. The windward side was not checked.

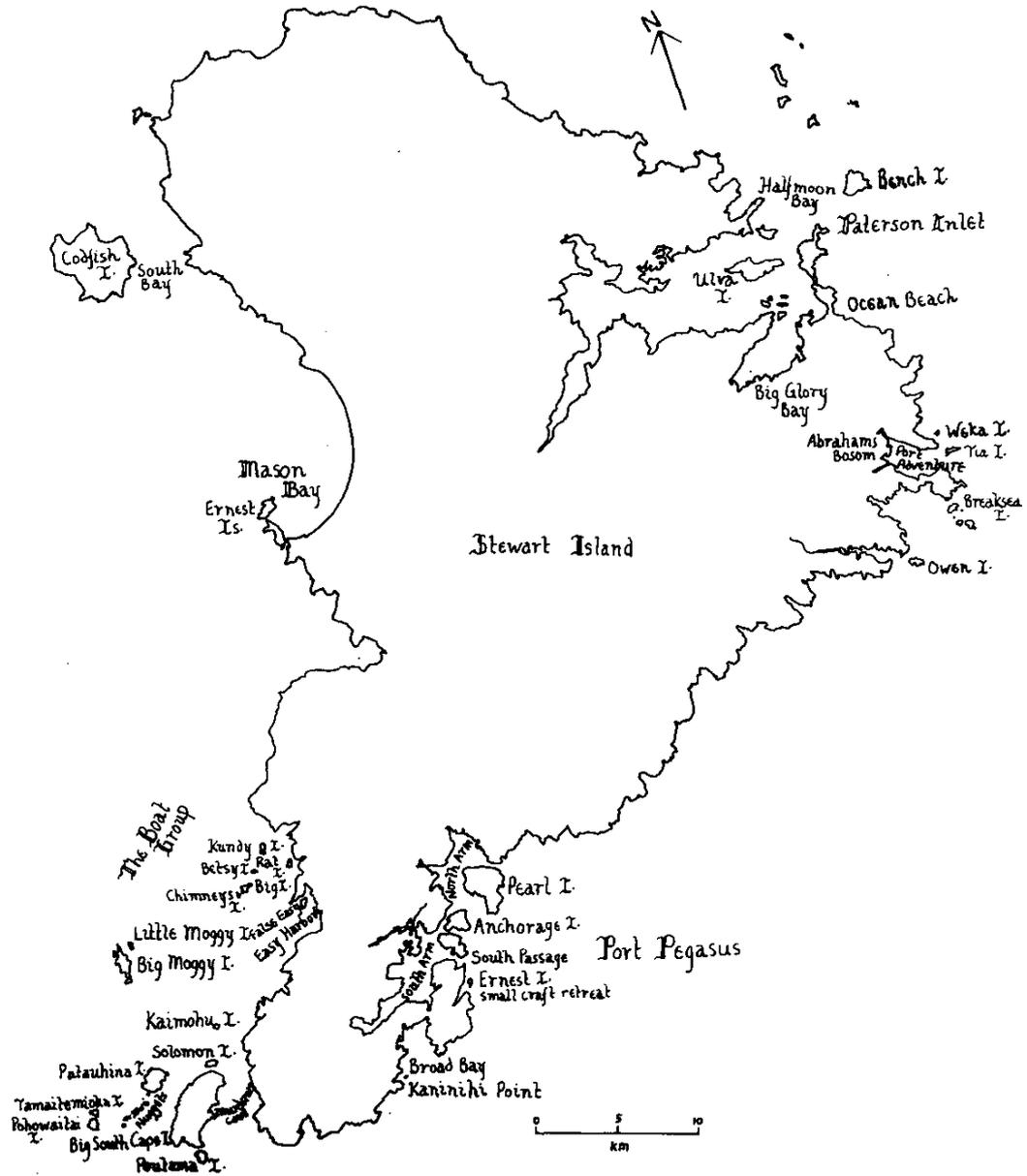


FIGURE 1 – Survey area and place names for the 1993 Fiordland Crested Penguin survey

*Solomon I.:* Two groups of penguins were on the south side of the island. One consisted of three birds standing on the rocks and a lot of penguin sign, suggesting the existence of a small group of nests. The second consisted of one bird standing outside the entrance of a cave, with another four birds inside the cave. Calling could be heard from inside the cave.

*Big South Cape I.:* The eastern side of Big South Cape I. was searched down to Poutama Passage. There were many possible landing areas and considerable nesting habitat down the coast. However, only one penguin was seen, standing amongst a rock tumble next to what looked like a run (possibly a shearwater run) in a bay north of Murderer's Cove. At the end of the day, we steamed to Port Pegasus where we spent the night at the top of North Arm.

### **Port Pegasus, 13 August**

*Broad Bay:* In the morning one penguin was swimming inside South Passage.

One party was dropped near the top of South Arm to walk over into Settlement Cove, Broad Bay. The second party searched Broad Bay from a dinghy. One penguin was standing outside a cave with a very small entrance on the western side of the bay. A fisher in the area reported seeing six penguins in the bay immediately north of Kaninihi Point, but no sign was found. There was no sign of penguins in Settlement Cove. A Hooker's Sealion (*Phocarctos hookeri*) was in the grass above the beach.

On board the *Countess*, the anchor wynch broke down and we steamed to Halfmoon Bay for repairs.

*Ernest I. and Small Craft Retreat:* On the way up the coast we launched a dinghy to check Ernest I. and Small Craft Retreat. Possible nesting habitat was found, but there was no sign of penguins. Overnight at Halfmoon Bay.

### **14 August**

The anchor was fixed and we steamed south to Port Adventure.

*Port Adventure:* Having anchored in Abraham's Bosom, we launched a dinghy from which the coastline out to the entrance of the harbour was explored. One party landed on the beach below the Kaika to do a ground search. No sign of penguins.

*Tia and Weka Is:* Situated at the entrance to Port Adventure, both islands had possible landings but no sign of penguins.

The night was spent in Port Adventure.

### **Port Pegasus, 15-16 August**

Despite rough seas we headed back to Port Pegasus, where we waited out the storm. The following day we split into two groups. One party tramped in the Tin Range; two Kiwi (*Apteryx australis*) were heard on the tops. The other party searched the whole of Port Pegasus by dinghy. Although there was plenty of habitat suitable for penguins, only one penguin was found, on the south coast of Anchorage I. There was no sign of a colony or a nest.

### Southwest Titi Is, 17 August

While the weather held we returned to the west coast of Stewart I. and checked more of the southwest Titi Is.

*Pohowaitai and Tamaitemoka Is:* Two small steep-sided islands west of Big South Cape I. The east coasts of these islands were checked from the *Countess*. No penguins or sign. There were few possible landings and little nesting habitat. RBR has visited the west side of the island previously and saw no suitable penguin habitat. Two bottle-nosed dolphins (*Tursiops truncatus*) escorted the *Countess* part of the way to Putauhina I.

*Putauhina I.:* A medium-sized island lying off the northwest coast of Big South Cape I. The west coast was searched from the *Countess*. No penguins or likely habitat. The east coast was surveyed from a dinghy. There was a possible landing in a rockfall at the northeast end, but no penguin sign. In a small inlet there were eight Pied Shags (*Phalacrocorax varius*) nesting in the *Olearia* (two nests contained large chicks). No sign of penguins in this inlet or down the rest of the eastern coastline.

The Putauhina Nuggets, a line of small steep-sided rocky islands, lie off the south coast of Putauhina I., but these offer very little penguin nesting habitat.

*Big South Cape I.:* The western coastline was searched with binoculars from the *Countess*. Five penguins were seen standing on a rockfall south of Potted Head. We could see no run or signs of nesting from the ship.

On the way back to Port Pegasus one penguin was in the water outside Broad Bay and another was swimming at the entrance of Big Ship Passage. Overnight in North Arm, Port Pegasus.

### 18 August

We headed north up the eastern coast from Port Pegasus, and searched the north-northeast coasts of Owen I. and the Breaksea Is from the *Countess*. No sign of penguins.

After lunch at Paterson Inlet we explored Ulva I.; no penguins. After dinner a party watched a Kiwi feeding on Ocean Beach and a Hooker's sealion was found lying on the path between Glory Cove and Ocean Beach.

Overnight in Glory Cove.

### 19 August

As we left Big Glory Bay a group of more than eight bottle-nosed dolphins followed the boat to the entrance of the bay. The ship steamed north to Bluff.

### Summary: Stewart and adjacent islands

The total of 32 penguins were seen on the Stewart I. coast and adjacent islands, from Kundy I. in the Boat Group on the southwest coast, to Port Pegasus. There was no sign of penguins north of Port Pegasus to Halfmoon Bay, despite extensive searches in Port Adventure. Our observations indicate that penguins breed on Kundy, Big, Big Moggy, Solomon and Big South Cape Is, and in Easy Harbour.

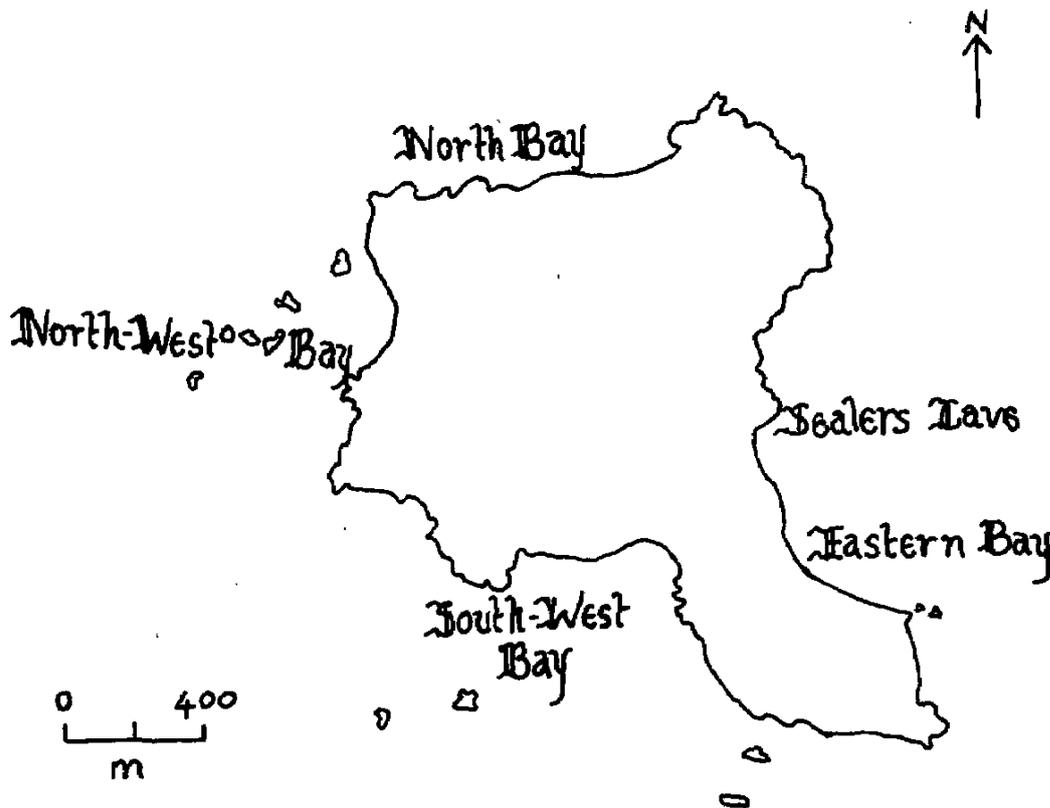


FIGURE 2 – Map of Solander (Hautere) Island with Fiordland Crested Penguin census locations (see Table 1)

### Summary: Codfish Island

A total of 144 penguin nests and 314 birds were found during surveys conducted in late July/early August 1992 (Maloney *et al.* 1993) and 1993 (BJSS, R. Braun & S. Elkington, unpubl.), and the boat-based survey reported here. The majority of these, 134 nests, were found on the northern coastline from Big Bight to Sealers Bay. The other 10 were scattered along the southern coastline. We now consider the survey of Codfish I. to be complete.

### Solander Islands, 21-23 August

The Solander Is consist of two volcanic remnants. Little Solander I. is surrounded by cliffs, and it is unlikely that penguins could land there (Cooper *et al.* 1987). Penguins were not found by either Falla (1948) or Cooper *et al.* (1987), who both visited Little Solander in late July when males and at least some females should be ashore. Solander (Hautere) I. is also extremely steep and rugged, consisting of cliffs rising to over 300 m, knife-edge ridge tops, and a small central plateau. The cliffs and lower margins are covered in a scrubby forest, which, along with ground cover provides foot and hand-holds, allowing some foot access across the island. A fringe of rocky beaches separated by headlands and extensive rockfalls provides landing sites and nesting habitat for penguins. Many caves are also present, providing additional nest sites. Much of the coast is accessible at low tide when seas are calm.

TABLE 1 – Counts of Fiordland Crested Penguins on Solander (Hautere) I. (see Fig. 2 for locations)

Location	Nests	Birds
Southwest Bay	0	2
Eastern Bay		
Bay, south of Sealers Cave	23	51
Sealers Cave	11	20
Coast, north of Sealers Cave	58	131
North Bay		
Headland at east end	4	11
Western end	4	17
Northwest Bay	15	31
Totals	115	263

Weather was mostly cloudy with light winds throughout our stay. Large southwest swells restricted access to some beaches, but low tides in the late morning and use of the helicopter on the last day ensured that we surveyed most of the island, except as noted below.

### General

Most penguins were nesting in large rock falls just above the high tide mark, although nests were found to the base of the cliffs at 25-30 m elevation. Rock falls provided many cavities, ledges, tunnels and small caves, ensuring that nests were rarely exposed to direct sunlight. Some nests were in caves and a small number were under vegetation or in the open. Most of these sites appeared dryer than the burrow and vegetation sites that we routinely observed in Fiordland. However, many would receive salt spray and rain, and the winter of 1993 was unusually dry.

Totals of 115 nests and 263 penguins were recorded (Table 1). A pair was present at many nests where incubation had begun. Of 18 nests in which the number of eggs was determined, 16 contained 2 eggs and 2 contained 1 egg (one was freshly laid). 8 of the 2-egg nests contained at least one clean (i.e. recently laid) egg. Some pairs had not yet laid, although they were attached to a nest site. At least 4 pairs appeared not to have a nest site and one pair was seen copulating. Together, these observations suggest that laying in the nests where incubation had begun had been completed only recently, and that some birds had not yet laid. It is likely that some of the counted birds represented true pairs that were not identified as pairs, and that a few nests deep in rock falls were missed. Thus the count of nests is presumably slightly (perhaps 5%) underestimated.

No birds were handled or measured, but in general, the Solanders penguins looked small to IGM relative to those on Taumaka I. (Open Bay Is).

### Southwest Bay, 21 August

After arrival at Eastern Bay at 0900 hrs after a 46 min helicopter flight from Te Anau, we established base camp at an old sealers camp in a rocky overhang at the base of the cliffs. Space was limited and a tent was placed

in a second overhang nearby. Because the weather was excellent, we immediately crossed the island to Southwest Bay. At Southwest Bay, the party split into two groups of 3 people. One surveyed to the southern-most point. The other attempted to access the northern end of the bay, but were stopped by the tide at a small rocky headland.

The bay consists of a rocky shoreline fringed by tussock-covered slopes that merge with the *Olearia* scrub at 20-30 m elevation. The beach and slopes provided no nesting habitat for penguins. A cave and a rock fall at the northern end of the bay were the only likely breeding locations for penguins that were not checked. Sea washed into the cave at half tide, thus it was unlikely to be used by penguins for breeding.

A stretch of coast between Southwest and Northwest Bay was also not checked. This coast includes a large cave in a small bay immediately south of Northwest Bay that we could see to the back of from the helicopter (no penguins), and a cliffed shoreline that offered no penguin habitat apart from the above-mentioned rock fall.

Two penguins were found by the party that searched to the south. One was under a rock at the high tide mark, and the other was below the high tide mark and headed out to sea. Neither was on a nest.

#### **Eastern Bay, 22 August**

The eastern coastline consists of a shallow bay in the southern half, delimited at the northern end by a headland containing a large cave (Sealers Cave, Fig. 2). North of Sealers Cave is a rocky coastline containing many rock falls. Most penguin nests were found along this coast. A steeply-sloping bush-covered shelf, heavily used by seals, extends from the high tide mark to the base of the cliffs at an elevation of 20-30 m, and up to 150 m from the shore. Penguin nests were scattered in small colonies along the eastern shoreline, either in rock falls or in caves, with a few nests under vegetation or in indentations at the base of the cliffs.

#### **North Bay, 23 August**

A party walked to North Bay at low tide and was picked up by helicopter. Penguins were found in a small cave and rock falls at the eastern end (these birds represent the end point of the scattered colonies along the eastern coast). A colony was found at the western end in rock falls. The intervening beach was a narrow rocky shore abutting the cliffs, and did not provide penguin nesting habitat.

#### **Northwest Bay, 23 August**

A party was landed by helicopter, although walking access was possible from North Bay. Most penguins were at the northern end in rock falls and a small cave. A few were at the southern end in rock falls.

### **DISCUSSION**

Our limited observations of Fiordland Crested Penguins along the western coast of Stewart I. suggest that there are relatively few birds there, with concentrations likely at Solomon I., Big South Cape I. and possibly Easy

Harbour. Unfortunately, our sightings of penguins in Fiordland suggest little relationship between the number of birds on a beach or in the water and the number nesting. Thus we can make little comment on numbers of penguins breeding on the Titi Islands. Comments from Rakiura Maori and local fishers also suggest that penguins are relatively rare in the area, although in recent years Rakiura Maori have not visited the Titi Is during the penguin nesting season.

Solander I. is clearly an important breeding location for penguins. Solander I., Codfish I., Breaksea and adjacent islands, and the Open Bay Is appear to be the only island locations where more than 100 nests occur annually, and represent all the major island breeding locations for the species. The Shelter Is in Doubtful Sound are also an important site. Counts have not yet been made along much of the coastline north of Milford Sound where scattered penguin colonies occur, but these colonies are known to be attacked by predators, and anecdotal reports suggest relatively small numbers of nests in each colony (<50).

Fortunately, all the islands except the Open Bay Is are in specially protected areas or national parks. The Open Bay Islands are privately owned, but at present are administered as a scientific reserve, a status that the owners support. Weka (*Gallirallus australis*) occur on the Open Bay and Shelter Is, and Solander I., and are known to affect breeding of penguins in some years (Cassady St Clair & St Clair 1992) although it is not clear whether that impact is of serious concern in the long term. Stoats (*Mustela nivalis*) could swim to Breaksea and adjacent islands and the Shelter Is, although they are not known to occur at either location. Human visitors to those islands are rare and it is unlikely that the arrival of stoats would be detected in the short term. Thus, although the important breeding locations for the species all enjoy some form of legislative protection, only Codfish I. is fully protected from terrestrial predators (due to physical location and absence of Weka).

The earliest breeding that we have detected was of eggs laid on about July 2 on Coal I., Preservation Inlet (McLean *et al.* 1993). Laying generally peaks on Taumaka I. in the first week of August with the first egg laid on July 25-27. Laying on Solander I. was clearly later than this. Thus our previous suggestion (McLean *et al.* 1993) that the start of laying by penguins may be spread across a two month period is strengthened by the Solanders observations.

To date, 644 nests have been counted for penguins south of Milford Sound. To this count needs to be added nests around southern Stewart I. (unlikely to be more than 100), some additional nests on Breaksea I. (Breaksea Sound; about 50), and an estimate from the Open Bay Is of about 150. The total of about 1000 nests excludes only the mainland colonies north of Milford Sound from the species range. We are delighted to note that our early pessimistic projection of fewer than 1000 nests per year for the species has not been supported. However, it is clear that the final tally will be somewhere between 1000 and 2000 nests, and that a large proportion of these nests are concentrated on a small number of islands. Unfortunately, it is impossible to tell whether Falla's (1948, p.52) report of 'plentiful' penguins on Solander I. indicate greater abundance than the numbers recorded by us.

Observations of marked birds on Taumaka I. indicate that penguins do not begin breeding until 5-6 years old, and individual birds do not breed in every year (IGM & BJSS unpubl. data). A breeding pair produces only one chick when they breed (Warham 1974, Cassady St Clair 1992). Clearly, Fiordland Crested Penguins have a low breeding potential or intrinsic rate of increase. IUCN guidelines suggest that they should be treated as 'vulnerable', using the criteria listed in Mace and Lande (1991). We believe that it is time for a detailed management plan to be drawn up for the species, including consideration of all issues in relation to population counts, monitoring for predators on predator accessible islands, captive breeding, and studies of offshore ecology.

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