

# KNOWN, NEW AND PROBABLE SNOW PETREL BREEDING LOCATIONS IN THE ROSS DEPENDENCY AND MARIE BYRD LAND

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Snow Petrels (*Pagodroma nivea*) breed circumpolarly in Antarctica. Watson *et al.* (1971), Harper *et al.* (1984) and Marchant & Higgins (1990) list breeding sites in the Ross Dependency (160°E-150°W) and also in the unclaimed region of Antarctica (150°W-80°W), which comprises Marie Byrd Land and Ellsworth Highland. Much of the literature on Snow Petrels mentions that their nests are inaccessible on vertical cliffs (Kinsky 1965, Cowan 1981, Harper *et al.* 1984, Broady *et al.* 1989) and so are almost impossible to count accurately. The birds usually nest in holes and on ledges on exposed, snow-free cliff faces, although some nests have also been found on gentle slopes below (Strandtman 1978, Broady *et al.* 1989).

Many more expeditions, predominantly geological, have been made to Northern Victoria Land in the Ross Dependency than to Marie Byrd Land, where only five expeditions with accompanying biologists have been made (Siple 1938, Perkins 1945, Rudolph 1967, Strandtman 1978, Broady *et al.* 1989). Consequently more Snow Petrel breeding sites are recorded for Victoria Land than for Marie Byrd Land. However, the literature reveals that there are sometimes uncertainties in the criteria used to assign breeding site status. The science, necessarily limited to broad-scale observation and collecting because of remoteness, logistics involved, and bad weather in the case of far-ranging deep field parties, suits many geological and botanical expeditions but hampers precise ornithological observations.

Many expedition reports mention flocks (small <15 and large >15 birds) of Snow Petrels near rock outcrops, but this is not strong evidence of breeding. In our updated list of breeding sites we have used the following criteria: (a) birds settling on ledges and disappearing inside cracks on steep cliff faces and birds flying off these ledges, (b) streaks of guano below these ledges, (c) presence of nearby nesting skuas with regurgitated Snow Petrel bones and feathers as evidence of feeding, and (d) the presence of large flocks of birds constantly wheeling around the same rock outcrop. Prolonged observation with binoculars of suspected nests in cliffs is desirable but largely impossible during wide-ranging trips. We have tried to use all the above criteria but for some colonies have had to use a minimum of two because of incomplete data in the literature. We regard several colonies listed by Harper *et al.* (1984) and Marchant & Higgins (1990) as needing confirmation because they do not satisfy these criteria.

Figure 1 gives the locations of the main areas, and Table 1 is a list of Snow Petrel colonies in the region 160°E-80°W, together with locations for nine new colonies. As far as possible nest numbers are given but these, except for those on gentle slopes, should be regarded as estimates.

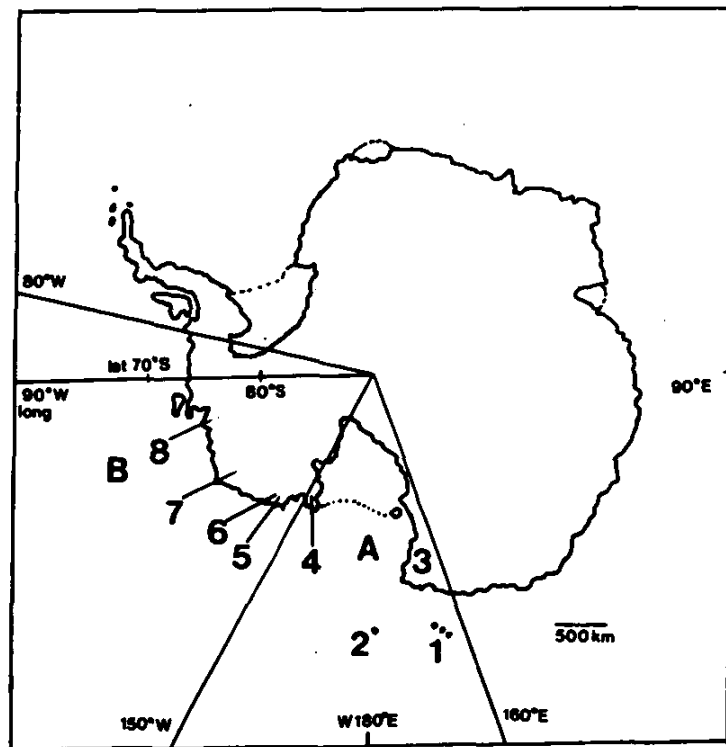


FIGURE 1 — Snow Petrel breeding areas in Ross Dependency (A) and Marie Byrd Land (B). 1. Balleny Islands; 2. Scott Island; 3. Victoria Land; 4. Edward VII Peninsula; 5. Saunders Mountain; 6. Fosdick Mountains; 7. Perry and Demas Ranges; 8. Mount Murphy

One of the new colonies (Cape Washington) is in Victoria Land; the other eight are in Marie Byrd Land. Cape Washington is a large rocky headland with steep cliffs on the eastern and southern sides. Only nests on the southern side could be counted, but many large flocks of Snow Petrels were seen wheeling about the eastern side. Apart from visible guano streaks below entry points on the cliffs, five skua nests with eggs and chicks were observed on a flat area atop the headland. Skuas will breed adjacent to petrel and penguin colonies, where they can get reliable food (P. Harper, pers. comm.).

Kennel Peak in the Demas Range is an exposed vertical rock outcrop; no skuas were seen in the area. It is 20 km east of Mt Prince in the Perry Range where, in addition to nests on slopes, Strandtman (1978) observed many birds nesting in inaccessible cliffs above. P. Cleary (pers. comm.) has confirmed Strandtman's observations during a visit in 1990/91. Cleary reports Snow Petrel nests (100+) on the inaccessible cliffs on the eastern side of Mt McCoy, which is 100 km east of Marujupu Peak in the Fosdick Mountains.

Mount Murphy is a large sprawling mountain, rather like Saunders Mt, with many exposed cliffs and outcrops surrounded by several nunataks. Six previously unrecorded Snow Petrel colonies are in this area. Three pairs of skuas, but no nests or evidence of feeding, were seen on "Notebook Cliffs" (unofficial name of cliffs at 75°23' S; 111°06' W), which contained the

TABLE 1 — Known and new breeding localities of Snow Petrels in the Ross Dependency and Marie Byrd Land

	Locality	Lat.	Long.	Nests	Reference
1	Balleney Islands	66°55'S	163°20'E	5000 plus	Kinsky 1965, Robertson <i>et al.</i> 1980
2	Scott Island	67°24'S	179°55'E	abundant	Harper 1972, pers. comm. 1991
	<u>Victoria Land</u>				
	Cape Hallett area				
3	Edisto Inlet	72°20'S	170°05'E	abundant	Harrington 1960, Maher 1962, Ricker 1964, K.J. Wilson pers. comm. 1992
4	Felsite Island	72°26'S	169°49'E	abundant	Harrington 1960, Maher 1962, Ricker 1964
5	Crater Cirque	72°38'S	169°22'E	abundant	Harrington 1960, Ricker 1964
6*	Cape Washington	74°39'S	165°25'E	27 plus	Greenfield pers. obs. 1984
	<u>Edward VII Land</u>				
7	Washington Ridge	78°06'S	154°48'W	12A	Siple & Lindsey 1937, Siple 1938, Broady <i>et al.</i> 1989
8	Mt Paterson	78°20'S	154°36'W	11B	Friedmann 1945, Perkins 1945, Broady <i>et al.</i> 1989
	<u>Marie Byrd Land</u>				
	Perry Range				
9	Mt Prince	75°58'S	134°11'W	5B	Strandman 1978, Cleary pers. obs. 1990
	Demas Range				
10*	Kennel Peak	75°01'S	133°44'W	60+	Bradshaw pers. comm. 1991
	Mt Murphy				
11*	"Aubyn Ridge"	75°14'S	110°49'W	<50	Smellie pers. obs. 1990/91
12*	Kay Peak	75°14'S	110°57'W	<50	Smellie pers. obs. 1990/91
13*	Hedlin Nunatak	75°19'S	111°17'W	<50	Smellie pers. obs. 1990/91
14*	Sechrist Peak	75°23'S	111°02'W	<100	Smellie pers. obs. 1990/91
15*	"Notebook Cliffs"	75°23'S	111°06'W	1000 plus	Smellie pers. obs. 1990/91
16*	"Petrel Nunatak"	75°23'S	111°14'W	<100	Smellie pers. obs. 1990/91
	Fosdick Mts				
17*	Mt McCoy	75°52'S	141°10'W	100+	Cleary pers. obs. 1990/91
18	Marujupu Peak	76°31'S	145°37'W	no estimate	Friedmann 1945, Perkins 1945, Siple 1945
19	Saunders Mt	76°53'S	145°42'W	no estimate	Harper <i>et al.</i> 1984

\* New records of breeding localities

A nests on gentle slopes

B nests on gentle slopes but many hundreds in inaccessible cliffs above these slopes

Latitude and Longitude from *Geographic Names of the Antarctic*, ed. F.G. Alberts. NSF Washington, 1981. 959 pp.

greatest number of nesting Snow Petrels. At the bases of several cliffs containing nests, the green alga *Prasiola crispa* was growing. This is well known on nutrient-enriched ground elsewhere in Antarctica and was probably growing because of the guano from nests above. Broady *et al.* (1989) made a similar observation on Mt Paterson.

Marchant & Higgins (1990) included Cape Adare, Duke of York Island, Cape Hallett, the Morozumi Range and Ross, Possession and Franklin Islands in their account of Snow Petrel colonies. However, the criteria for nesting are not satisfied for Cape Adare and Duke of York Island based on Sir Raymond Priestley's unpublished notes (cited by Ricker 1964, R. Headland, pers. comm.) or by K.J. Wilson (pers. comm.), an experienced ornithologist, during a visit in 1982. Snow Petrels do not breed at Cape Hallett (Wilson, pers. comm.) but do breed on the western side of Edisto Inlet opposite C. Hallett (Maher 1962, confirmed in 1982 by Wilson, pers. comm.). It is probably wise to refer to Cape Hallett only in a general regional sense. The criteria for nesting are not satisfied in Dow & Neall's (1968) account for the Morozumi Range and hence require confirmation. Several visits to Ross Island by Greenfield and by Wilson (pers. comm.) have not revealed nesting sites; small flocks of Snow Petrels are frequently seen at Capes Bird and Crozier, the most likely breeding areas on Ross Island, but we have found no reference to breeding sites here or on Possession and Franklin Islands (Harrington 1960). No Snow Petrel nests were observed on Franklin Island by Wilson in 1983 (pers. comm.).

However, the presence of large flocks repeatedly seen in localised areas may indicate the presence of nearby breeding colonies. Siple & Lindsey (1937) and Broady *et al.* (1989) saw large flocks of Snow Petrels (together with skua nests and disgorged bones and feathers) at several rock outcrops in the Rockefeller Mts, and flying past Melbert Rocks, which is 2 km west of the major Snow Petrel colony at Mt Paterson in the Rockefeller Mts (Broady *et al.* 1989). Broady *et al.* reported Snow Petrels on 23 out of 46 days spent in Edward VII Land. Many small flocks were seen in the Alexandra Mts but careful searches of all except inaccessible ice-free nunataks did not reveal petrel or skua nests.

The first expeditions to the Guest Peninsula (Siple & Lindsey 1937, Perkins 1945, Siple 1945) reported many Snow Petrels over Buennagel Peak (formerly Mt Haines), McKinley Peak (formerly Mt Grace McKinley) and Swanson Mts (formerly Claude Swanson Mts). They found disgorged bones and feathers on several mountain tops in the Ford Range. Siple & Lindsey (1937) and Siple (1938) saw two 'robbers roosts' of skuas on Saunders Mt and one on Skua Gull Peak, 6 km east of Saunders Mt. Siple & Lindsey suggested that the distance from Saunders Mt to the nearest known petrel colony on Washington Ridge in Edward VII Land was so great (400 km) that it was likely that the skuas on Saunders Mt and Skua Gull Peak were feeding on Snow Petrels from nearby, undiscovered colonies. Perkins (1945) and Siple (1945) reported that a small colony of Snow Petrels was discovered on Marujupu Peak in 1940 in the Fosdick Mts during the 1939-41 U.S. Antarctic Service Expedition but gave no nest estimates. Marujupu Peak is 40 km north of Saunders Mt; Swanson Mts are 15 km south of Saunders Mt and Buennagel Peak and McKinley Peak 80 and 140 km respectively

west of Saunders Mt. Inspection of the Guest Peninsula on the 1:250,000 U.S. Geographical Survey Map indicates numerous ice-free cliffs and bluffs within 100 km of Saunders Mt. Except for Rudolph (1967 and pers. comm. 1992), who made botanical studies, no biological parties have investigated this area since 1940 and Siple (1938) estimated that only 10% of the area had been explored. With at least two known Snow Petrel colonies (Marujupu Peak and Mt McCoy), many skuas and large flocks of Snow Petrels sighted, future explorations in this area will find more nesting sites.

Strandtman (1978) seems to be the only biologist to have visited beyond the Guest Peninsula to Grant Island. At Mt Prince in the Perry Range, he found Snow Petrel nests on gentle slopes and many hundreds in inaccessible cliffs above. Neither Strandtman (1978) nor Cleary (pers. comm.) recorded skuas. Using criteria a, b and d above, about 60+ nesting sites were in the precipitous cliffs of Kennel Peak, 20 km east of Mt Prince (J. Bradshaw, pers. comm.) As maps indicate many other nunataks, one can expect to find further Snow Petrel colonies in this area.

Perry and Demas Ranges, as well as Swanson and Fosdick Mts, are 50-100 km from open water. Siple (1938) noticed many open leads in the fast ice in 1934. Brook & Beck (1972) saw Snow Petrel nests 400 km from open water in the Theron Mts in Coates Land. The six new Snow Petrel colonies in the Mt Murphy area are 130 km from open water. Inspection of the maps of areas adjacent to Mt Murphy suggests that the many snow-free exposed cliffs there could be expected to harbour nests of these birds.

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## SHORT NOTE

### Nocturnal roost behaviour of North Island Kokako

The North Island Kokako (*Callaeas cinerea wilsoni*) is a member of the endemic family of New Zealand wattlebirds, Callaeidae. It is territorial and maintains a pair bond year round (Hay 1981). It has declined greatly in both numbers and distribution since European settlement (Lavers 1978), and it is listed as endangered (Bell 1986). Our observations were inspired by the knowledge that predation is likely to be an important cause of Kokako decline. Kokako may be vulnerable to predation at night.

This note on the nocturnal roosting behaviour of Kokako is based on observations from January to March 1991 in the Rotoehu State Forest.

Rotoehu State Forest is about 45 km northeast of Rotorua in the central North Island. The forest at Rotoehu is dominated by tawa (*Beilschmiedia tawa*), while kohekohe (*Dysoxylum spectabile*), mangleo (*Litsea calicaris*), rewarewa (*Knightia excelsa*), and hinau (*Elaeocarpus dentatus*) are also common canopy species. Emergent podocarps, predominantly rimu (*Dacrydium cupressinum*), were once moderately abundant but almost all were removed by logging in the 1940s (Leathwick 1984).

The roosts of six Kokako (two pairs and two breeding females) were located once a week by radiotelemetry. We located the Kokako just before or at dusk and stayed with them until after dark. The species of the roost tree and its height relative to canopy height were recorded when possible. The tree height and the strength of the transmitter signal were used to estimate the height that the Kokako were roosting.

Additional roosting observations were made casually of a further nine Kokako, including adults and dependent young.

The roost sites of one pair, Hika and Tikka, were found once in each of nine consecutive weeks. Each time Hika and Tikka roosted together in a different place within their known territory.

Another pair, Pop and Tringle, were together the first occasion they were found roosting. Unfortunately Tringle died. Pop was then found to