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SHORT NOTE

A mainland breeding population of fairy prions (*Pachyptila turtur*), South Island, New Zealand

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In July 1990, during a blue penguin (*Eudyptula minor*) survey, I noticed seabird burrows on an inaccessible cliff ledge near Tunnel Beach (45° 55′ S, 170° 29′ E) between Blackhead and St Clair, Dunedin. In January 1991, the ledge was reached by rope, descending 24 m from the top of this 70 m-high overhanging cliff face. The earth bank was pockmarked with burrows (entrance 70-75mm wide x 50-55mm high) about 500 mm long. Few appeared to be in use and most were shallow, dug into each other, and so appeared unsuitable for breeding. I also found the remains of a prion and prion feathers.

Breeding was confirmed in late January 1993, when a well-feathered downy prion chick was seen under blocks of rock and 11 burrows showed signs of occupation. In September 1994, I visited the ledge at night and counted over 70 prions on the ground. From the photographs I took that night Alan Tennyson (Museum of New Zealand Te Papa Tongarewa) identified the birds as fairy prions (*Pachyptila turtur*) by the broad black tail bar and the size and shape of the bill. Since 1994 I have explored the cliffs from Blackhead to Cargill's Castle and found two more small colonies nearby. This note describes the colonies and discusses their significance and their conservation implications.

Description of site and colonies

The rocks of the Tunnel Beach coastline are Caversham sandstone (Benson 1968; McKellar 1990), a soft, calcareous Oligocene sandstone that has sparse vertical and horizontal jointing. The cliffs are vertical or overhanging, 70-120 m high, with many ledges and crevices occupied by roosting and breeding spotted shags (*Stictocarbo punctatus*), black-backed gulls (*Larus dominicanus*), rock pigeons (*Columba livia*), and starlings (*Sturnus vulgaris*). A photograph in Peat & Patrick (1995: 12) illustrates the cliffs where prions occupy three sites.

The main ledge of the 'prion cliff' colony discovered in July 1990, is 52 m long and up to 8 m wide. The rock base slopes towards the sea with a covering of up to 0.5 m of sand and rock debris. There are two other occupied areas nearby. One, 12 m above the main site is a ledge about 5 m long and 1.5 m wide, the other is a talus pile about 5 m wide and 7 m high, on a ledge in a joint corner 10 m below the main ledge. Vegetation is sparse and fluctuates seasonally. The only perennial plant is a single *Hebe elliptica*. *Crassula moschata* and several other species of common native and exotic salt-tolerant herbs are present. Rye grass (*Lolium perenne*) flourishes in wet years after the peak of prion activity in October. The site faces southwest and is exposed to late afternoon sun and the full force of winds from that quarter. Burrowing activity is concentrated on a northwest-facing slope, but there are burrows anywhere there is enough soil. Only a few burrows are long enough to be occupied. The debris substratum is continually falling away as a result of prion burrowing and water erosion, but is replaced by spalling erosion of the cliff above. I tried to count the number of occupied burrows on this site in January 1993, but difficult access prevented an accurate count. I found 14 burrows with clear signs that they were occupied by a chick; either

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a chick was seen, flies were present indicating excreta inside, or there were fresh scratch marks at the entrance. Other burrows may have held chicks but in all there were fewer than 100. In this area, I counted 160 birds on the surface early one evening in October 1998. I have installed nest boxes and artificial burrows at this site since 1994 to assist breeding at the colony and the study of the birds.

The 'prion cleft' was found 200 m to the west in the same cliff system, in August 1996. It is a 50 m-high, 10 m-wide slot that has been formed by blocks falling away between two vertical lines of jointing. The cleft is topped by a 15 m roof and is undercut at its base by a large sea-cave. The cleft faces southeast has no vegetation, and only early morning summer sun reaches it. Wind does not directly blow into the cleft, which has a variety of deep vertical crevices and narrow ledges that are used by rock pigeons, starlings, and prions. The 'prion cleft' colony has not been visited because of the challenging overhang, but the volume of noise from prions calling on an active night indicates that there may be as many birds here as at the 'prion cliff'.

In February 1997, I found the 'prion cave', a third site. It has 8 burrows in the floor of a small cave (4 m long, 1.5 m diameter at entrance). The cave is formed on a joint line only 3 m below the top of the cliff, on the south face of the headland about 300 m east of the 'prion cliff'.

I have found no other sites between Blackhead and Cargill's Castle, and none on the Caversham sandstone cliffs from Cornish head to Shag Point, north of Dunedin.

Population status

Fairy prions are very abundant and have many colonies on islands in the southern oceans, including colonies throughout the length of New Zealand coastal waters (Marchant & Higgins 1990), so their IUCN rank is "lower risk - least concern". Even though they are confined to predator-free islands they are secure from extinction because of the number and size of colonies. In these terms, the mainland cliff colonies are of minor significance. In the Otago region there are other fairy prion colonies near Dunedin on Green Island, Wharekakahu Island (Ward & Munro 1989), and Gull Rock (author's unpubl. data). The cliff colonies may not be independent of the Green Island colony, only 8 km distant. Further small colonies are found on rock stacks, 100 km south, in the Catlins area. None of these colonies is large, so the number of birds at the cliff colonies is significant in a regional context.

Threats

The future of the cliff colonies is not assured because of several threats. The sites are small and undercut by the sea. Every year along this coast, slabs of cliff collapse into the sea. Such an event could remove the sites or create access for rats and other predators. The soil on the ledge slumps away during storm winds and rain. Black-backed gulls (*Larus dominicanus*) nest on the ledges and have pecked at nest boxes and into the chambers of natural burrows, and I have found prion remains near nests. The number of gulls is maintained at an elevated level by the waste generated in the surrounding agricultural and urban land. Gulls are present continuously around the colonies and I suspect that they prey on the prions and have some impact on fledgling survival.

The south coast within the boundaries of Dunedin City is being subdivided for residential and "lifestyle" housing, with recent developments on the hills above the coastal cliffs. The lights on the dwellings will increase the risk of prions becoming dazzled and flying into the lights, and so becoming the prey of pets (Department of Conservation, Dunedin Conservancy file: injured bird callouts). Finally, careless visitors to the site can destroy burrows and disturb the birds.

DISCUSSION

These are the only known mainland colonies of fairy prions still extant. This discovery adds to the Procellariidae that Oliver (1955) lists as having bred on the mainland of New Zealand in European times. The studies of fossil faunas by Worthy & Holdaway (1993, 1995, 1996), Worthy (1997, 1998a, 1998b, 1998c), and Hawke *et al.* (1999) provide evidence to suggest that many seabirds bred on mainland New Zealand until the arrival of humans and rodents. Surveys of the South Island reveal fossil evidence of mainland breeding of fairy prions in the Punakaiki area (Worthy & Holdaway 1993).

Prions cannot survive in the presence of rats (Heather & Robertson 1996). The mainland prion colonies do not contradict this observation because the overhangs of soft featureless rock provide an obstacle to access by rats. Similarly, the cliffs prevent access to other predatory and trampling mammals that can destroy seabird colonies.

The age of the colonies is hard to determine. Petrels are usually philopatric (Warham 1990: 228-230), so it is possible that this colony has been here for a long time. They may be relict from a much larger colony that predates the arrival of humans, or have been started by recently arrived birds from places like Green Island. It is also possible that the birds were always limited to cliffs and islands by terrestrial predators such as weka (*Gallirallus australis*) and other flightless rails. The ledge itself is likely to be geologically young as the cliffs are eroding rapidly (Gibb 1978), but similar ledges and caves would have been present since the beginning of the Holocene when the coastline returned to this area. Preliminary evidence from nest boxes placed 12 m away from the colony shows that prions have some ability to adopt new sites. However, a nearby rock stack has not been colonised by prions so far. This rat-free stack was created in 1950 (New Zealand Aerial Mapping 1942) by the collapse of the peninsula connecting it to the mainland and has a suitable covering of soil and vegetation.

There may be other mainland colonies of prions. Sites with tall cliffs, substantial overhangs, featureless rock faces and substantial ledges with some soil are worth exploring. Proximity to the sea might not be essential as there have been inland colonies of several Procellariidae, including mottled petrel (*Pterodroma inexpectata*), black petrel (*Procellaria parkinsoni*), Westland petrel (*Procellaria westlandica*), Hutton's shearwater (*Puffinus huttoni*) (Heather & Robertson 1996), and fairy prions (Worthy 1997, 1988a, 1988b; Worthy & Holdaway 1993). Suitable cliffs might be found in sandstone, limestone, and perhaps mudstone areas. A search of canyon walls in Buller District where prions bred in the past (Worthy & Holdaway 1993) would be of particular interest.

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