

Medium to large seabirds with long slender bill and nostrils encased in a short flattened tube. Sexes and ages alike; most are dark above and mainly white below, but some are all dark. Many species form large feeding flocks. Usually fly close to the surface, often with a series of rapid wingbeats followed by a glide, but in windy conditions can wheel high on stiffly held wings. Clumsy on ground; legs and webbed feet set well back. Range from coastal to oceanic. Some species are highly migratory. Most species very vocal at breeding colonies at night. Lay 1 large white egg, usually deep in a burrow. Long incubation and fledging periods.

**FLESH-FOOTED SHEARWATER** *Puffinus carneipes*

Common native

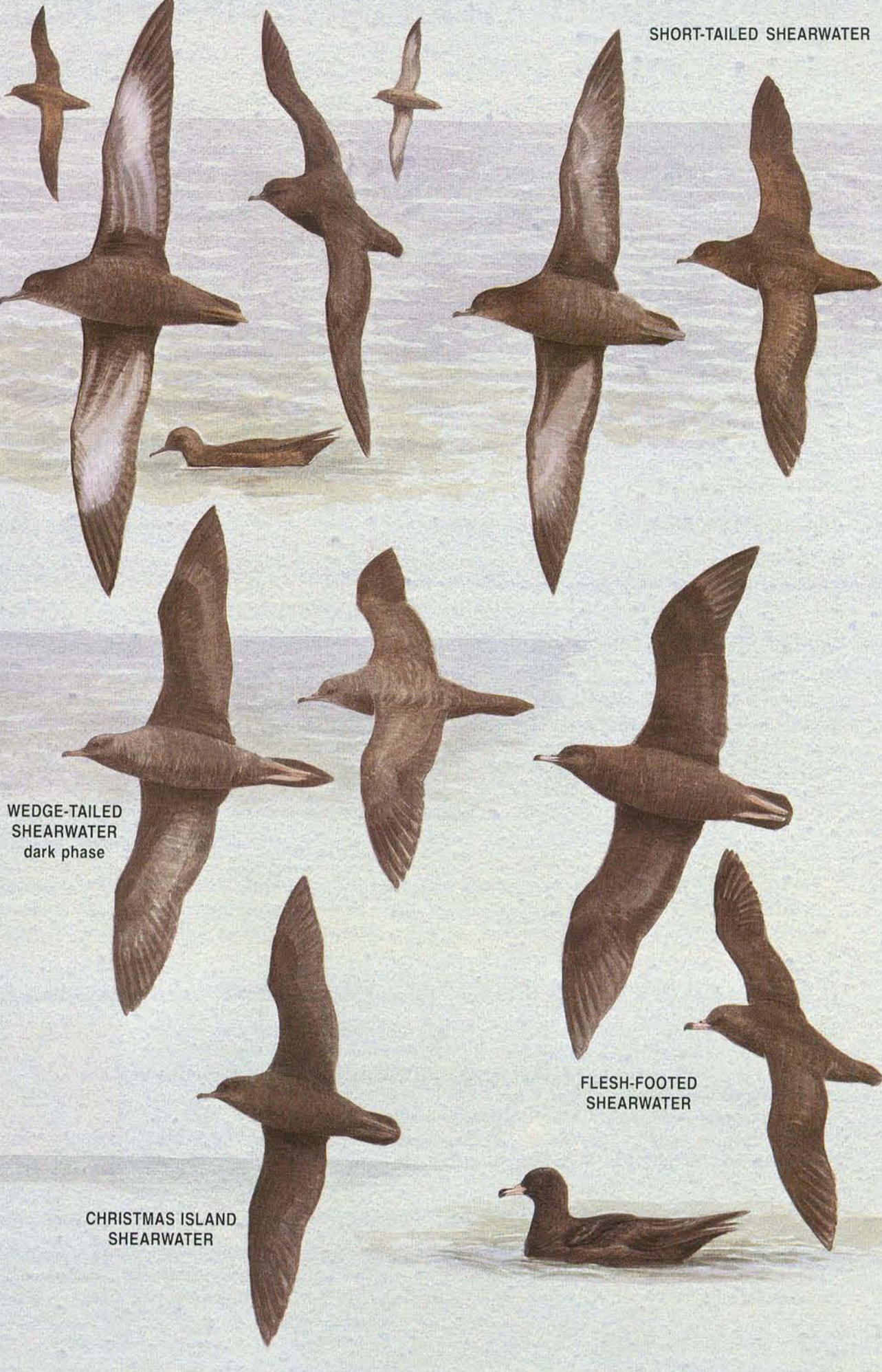
44 cm, 600 g. Large, bulky chocolate-brown shearwater with pale bill (42 x 13 mm), darker at tip, and flesh-pink legs and feet. Main call a series of high-pitched moans, resembling sound of cats fighting. **Habitat:** Breeds in western Indian Ocean, southern Australia, Lord Howe I, northern NZ and in Cook Strait. Main NZ colonies at Hen and Chickens, Mercury group, Karewa I, Saddleback I (near New Plymouth), and Trio and Titi Is (Cook Strait). Ranges through coastal waters of North I, occasionally south to Foveaux Strait in the west and Banks Peninsula to Chathams in the east. Migrates to N Pacific. **Breeding:** Nov–May.



[Sp 19]

SOOTY SHEARWATER

SHORT-TAILED SHEARWATER



WEDGE-TAILED SHEARWATER dark phase

FLESH-FOOTED SHEARWATER

CHRISTMAS ISLAND SHEARWATER

**SHEARWATERS, FULMARS, PRIONS and PETRELS**

Procellariidae

The Procellariidae is the largest and most diverse family of seabirds, with about 72 species. In the New Zealand region, 49 species have been recorded, including 11 endemic species and 23 other breeding species.

The Procellariidae includes a wide variety of seabirds from the giant petrels to the diving petrels. All have distinctive external nostrils encased in a tube on the top or sides of the bill. They have 11 primaries. The 11th (outermost) is minute, but the 10th is at least as long as the 9th, giving the wing a pointed tip. All seabirds have webbed feet with three forward-pointing toes of about the same length.

Most species nest in burrows or crevices, normally clumped into colonies. Birds return

being chilled for six days. Incubation stints shorten as incubation proceeds, and when the egg hatches the downy chick is brooded and guarded for only a few days in hole-nesting species, but for several weeks in surface-nesting species, until it is able to maintain body temperature.

Throughout its development, the chick is fed large meals at irregular intervals. It gains weight rapidly, becoming much heavier than its parents, but this declines towards adult weight before it fledges. Chicks normally spend some time on the surface exercising their wings before they eventually leave the colony. Once they have flown, they are completely independent of their parents. Young birds usually return to their home colony at 2–7 years old, and spend several years visiting the colony, especially when breeders are incubating or feeding chicks, before attempting to breed. The Procellariidae are typically long-lived, with several species known to live over 25 years.

Most species now breed only on offshore and outlying islands because mainland colonies have been ravaged by introduced mammalian predators. They generally return to their colonies at night, and once on land they are clumsy and unable to take flight rapidly; their only defence is by biting or by spitting stomach oil. The nestling is particularly vulnerable to predators because it is often left unattended for long periods while the parents feed at sea and it emerges from the nest at night to exercise its wings in the week or two before it can fly.

The Procellariidae feed on a wide variety of life, ranging from some of the prions, which sieve zooplankton on comb-like lamellae along the edge of their bills, to the giant petrels, which scavenge on dead marine mammals and occasionally kill small seabirds. Most species feed within a few metres of the sea surface, but some shearwaters dive to at least 20 m. These seabirds have well-developed nasal glands for extracting salt from their blood and exuding it out of the prominent nostrils.

The shearwaters (*Calonectris*, *Puffinus*) include about 15 medium to large species with long slender bills and flat nasal tubes. They

to their colony months before egg-laying to claim their nest sites (usually the same site is used year after year) and to court. After copulation, females leave the colony for one to six weeks on a 'pre-laying exodus' to form the egg. Males also leave but often make occasional visits to the nest site.

All species lay one white egg, which is very large relative to the female's size. The few instances of two eggs in a nest are from two females using the same site. A long incubation period is typically split up into several incubation stints lasting from several days to several weeks between changeovers. Occasionally the changeovers do not coincide and the egg is left unattended for several days; however, eggs have hatched successfully after

are usually brown to black above and white or brown below. Some have large sternums and dive well for fish and squid, using their wings for propulsion, while others have small sternums and feed on, or close to, the surface.

The four species of diving petrel (*Pelecanoides*) are small, stocky black and white seabirds with short wings adapted for propulsion under water. They have a fast, direct, whirring flight and readily dive for small krill and copepods.

The four species of *Procellaria* are large stocky seabirds with large, heavily hooked pale bills with dark markings and prominent nostrils. They feed mainly at night on bioluminescent squid but also now take offal discarded from fishing boats.

The three species of *Pseudobulweria* are medium-sized seabirds with exceptionally large feet and a notch on the cutting edge of the upper bill caused by the latericorns having blunt ends.

The fulmarine petrels (*Lugensa*, *Pagodroma*, *Daption*, *Thalassoica*, *Fulmarus* and *Macronectes*) are a diverse group of 8 species, all of which have robust bills with prominent joined nasal tubes, rising from the base.

The six species of prion (*Pachyptila*) are small seabirds pale blue above and white below with a prominent M-shaped mark across the upperwings and a dark-tipped tail. Comb-like lamellae on the inside of the bill are used to filter zooplankton.

The single *Halobaena* species looks like the prions but has a white-tipped tail and the upper bill has small tooth-like serrations at the base.

The gadfly petrels (*Pterodroma*) consist of 29 species of highly agile seabirds with long wings and short, laterally compressed black bills with a strongly hooked nail. They feed mainly on squid and small fish.

**Reading:** Harrison, P. 1987. *Seabirds of the World: a photographic guide*. London: Christopher Helm. Harrison, P. 1988. *Seabirds: an identification guide*. London: Christopher Helm. Imber, M.J. 1985. *Ibis* 127: 197–229. Murphy, R.C. 1936. *Oceanic Birds of South America*. New York: MacMillan. Serventy, D.L. et al. 1971. *The Handbook of Australian Seabirds*. Sydney: Reed. Warham, J. 1990. *The Petrels: their ecology and breeding systems*. London: Academic Press.

**19. FLESH-FOOTED SHEARWATER** *Puffinus carneipes*

Plate 8

**Other name:** Toanui

**Size:** 44 cm, 600 g

**Distribution:** Breed on subtropical islands at St Paul Island (Indian Ocean), around the southern coast of Western Australia, off Eyre Peninsula (South Australia), at Lord Howe Island and in northern New Zealand. The main colonies in the New Zealand region are off the eastern coast of the North Island from Northland to East Cape, especially at Coppermine, Whatupuke and Lady Alice Islands in the Hen and Chickens group, and Middle Islands of the Mercury group, and Karewa Islands of the western Bay of Plenty. Smaller colonies are at Kauwahaia Island (Bethells Beach), Ohinau Island, East Island,

Saddleback Island (off New Plymouth) and the Titi Islands in Cook Strait.

During the breeding season, they range over continental-shelf waters of the North Island and Cook Strait, but non-breeders also move south to the eastern Cook Strait and to the Subtropical Convergence from Foveaux Strait east to the Chathams. New Zealand birds migrate north in March to late May to winter in the North Pacific Ocean, mainly off the eastern coast of Korea and off Japan, but some winter off the western coast of North America. They return to New Zealand waters in late September.

**Population:** 25–50,000 pairs in New Zealand. Often seen in inshore waters off eastern New

Zealand in summer. The largest New Zealand colony is of 20,000+ birds on Coppermine Island.

**Conservation:** Protected native. Subfossil and Chatham records indicate a wider breeding distribution in the past, and this has probably been reduced by predators and 'mutton-birding'. Current breeding colonies are largely protected, and only a few chicks are illegally harvested. Flesh-footed Shearwaters are attracted to feed on offal behind fishing boats and are sometimes drowned after being hooked on baited fishing lines or becoming entangled in nets. Little data are available to determine population trends, and banding studies and monitoring of key breeding colonies are needed.

**Breeding:** No detailed studies in New Zealand. Birds return to their colonies in late September to early October, and eggs are laid over about three weeks from 21 November to 12 December. They lay 1 white egg (69 x 46 mm, 75 g) in a burrow c. 1 m long. Both sexes incubate for c. 53 days. The chick is initially covered in pale grey down and is guarded by either parent for 2–3 days and fed about every second night for 12 days, then increasingly infrequently until the chick fledges in late April or early May, at c. 92 days old. It is immediately independent of its parents. The oldest bird recorded was an

Australian one over 30 years old.

**Behaviour:** Breed on some islands in large dense colonies, on others interspersed with Grey-faced Petrels, Sooty Shearwaters and Little Shearwaters. Early in the season, they sometimes take over a burrow occupied by a Grey-faced Petrel chick (winter bred) that is about to leave, and at some northern colonies they share burrows with tuatara. Grey-faced Petrels in turn often oust Flesh-footed Shearwater chicks when they return to their colonies in April.

At sea, Flesh-footed Shearwaters are usually solitary, but they form feeding flocks and rafts off their colonies. They are generally silent at sea except when they are fighting for scraps. At their colonies, they are noisy on moonless nights, especially just after dusk and before dawn. The main call, given on the ground and sometimes in the air, is a series of high-pitched moans somewhat resembling the sound of cats fighting.

**Feeding:** Diet is mainly squid and fish. Much food is probably caught at night on the surface or by pursuit-plunging, but during the day food is scavenged from around whales and dolphins, and recently from behind boats, which makes them vulnerable to accidental capture on baited fish-hooks and in seine nets.

**Reading:** Brown, R.G.B. et al. 1978. *Condor* 80: 123–125. Falla, R.A. 1934. *Rec Auck Inst Mus* 1: 245–260. Warham, J. 1958. *Auk* 75: 1–14.