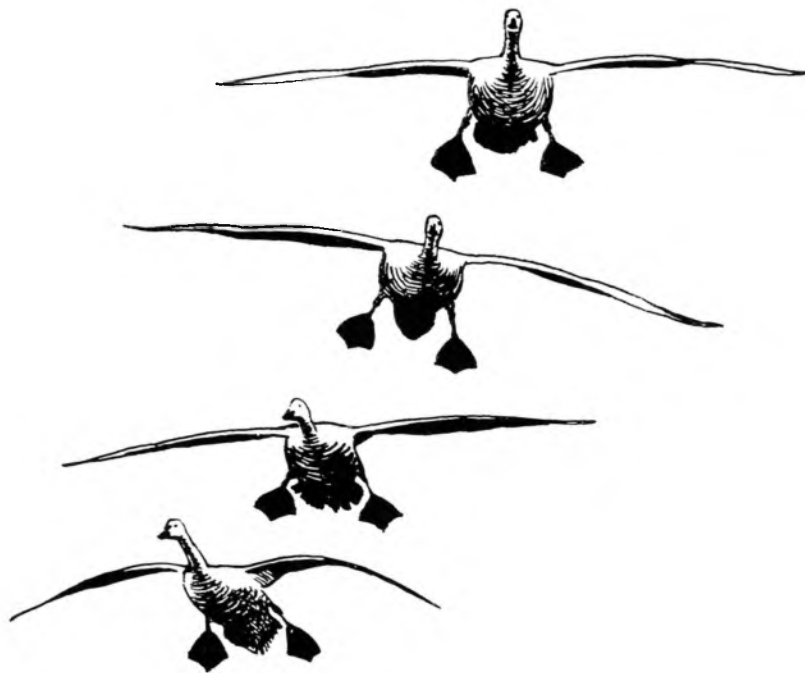


# PROGRESS REPORTS



P.S.



# Auckland Island Teal *Anas aucklandica aucklandica* revisited



PETER J. MOORE and KATH WALKER

*The population of Auckland Island Teal on Ewing Island was surveyed in November 1989. A mark-recapture study on the coast repeated surveys conducted in 1982 and 1983. Thirty-three Teal were banded and the total population was estimated at 100-169. Seventy-eight Teal were counted along the shoreline of Adams Island. Allowing for birds that were inland or using stream habitats, this figure may represent a population of 160-220 birds. Teal were also seen on Enderby, Rose and Ocean Islands but not on Auckland Island, where they are probably excluded by cats and pigs. The surveys support previous estimates that there are probably less than 600 Teal on the Auckland Islands, and that the population is probably stable.*

The Auckland Island Teal *Anas aucklandica aucklandica* is a flightless duck restricted to the Auckland Islands (Turbott 1990), which lie at 50° south latitude, 450 km south of New Zealand. There are two other subspecies, the Brown Teal *A. a. chlorotis*, a flying subspecies which is restricted mainly to northern New Zealand (Hayes & Williams 1982), and the Campbell Island Teal *A. a. nesiotis*, a flightless form found only on Dent Island, off Campbell Island, about 290 km southeast of the Auckland Islands (Robertson 1976).

The Auckland Island Teal has been reported since the 1970s breeding at Ewing, Enderby, Rose, Ocean, French, Dundas, Disappointment and Adams Islands (Falla 1975, Falla *et al.* 1979, Weller 1975, Williams 1986, see Fig. 1). Other sightings have been on the small Shoe and Passage (= Friday) Islands (Falla 1975) and on Monumental Island (Williams 1986). These islands are free from introduced mammals and predators, except for Enderby Island which has been extensively modified by feral cattle *Bos taurus* and rabbits *Oryctolagus cuniculus*, reducing the habitat available to Teal (Williams 1986). There are also mice *Mus musculus* on Enderby Island and rabbits on Rose Island. Teal have not been recorded on the large Auckland Island since the 1940s (Scott 1971), presumably because of predation by introduced cats and pigs (Williams 1964, Kear & Williams 1978). The main natural predator of Teal is the Brown Skua *Stercorarius skua lonnbergi*.

On smaller islands, Auckland Island Teal are

found on or near the coast, usually on wave platforms and bays with easy access to vegetation cover (Weller 1975, Williams 1986). Most feeding is by probing washed-up seaweed for invertebrates, or by diving and dabbling in coastal shallows or pools. They also eat algae such as sea lettuce *Ulva*. On larger islands, in addition to using the coast, Teal are also found inland, dispersed along water courses, small lakes and boggy areas.

The Auckland Island Teal is rare (Bell 1986). Falla (1975) considered that the population had been stable at about 500 birds (excluding Disappointment Island) for at least 50 years. Surveys of the Port Ross islands of Ewing, Rose, Enderby and Ocean in the early 1980s (Williams 1986) confirmed that there were no more than 600 birds (Williams 1985) and discounted previous estimates of 1200-1500 (Weller in Kear & Williams 1978) or possibly more than 1000 (Weller 1980).

In November 1989, we repeated the 1982 and 1983 surveys on Ewing Island and conducted a less intensive census of Teal on Adams Island, which had not previously been surveyed.

## Methods

Ewing Island was visited from 2-9 November 1989. Because only some of the Teal were found foraging on the shoreline at any one time, the total population was estimated using capture-recapture techniques. Methods closely

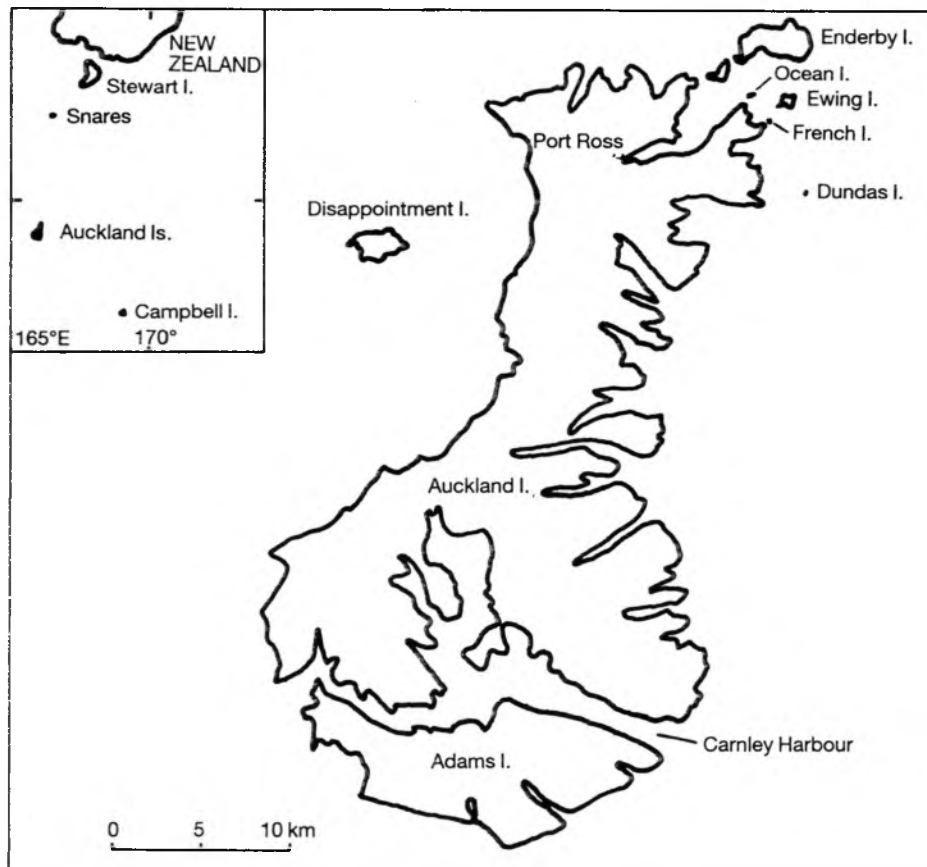


Figure 1. Auckland Islands.

followed those of Williams (1986), with two consecutive nights of capture, a night of no disturbance, followed by a night of "recapture". On the first two nights, birds were captured with hand-nets and banded with a stainless steel band on one leg and a single colour band on the other leg, to identify the night of capture. In contrast to Williams (1986), "recaptures" were sightings of the colour-banded birds rather than actual recaptures. On each night the number of birds was recorded, including those banded previously, those caught and banded that night, and unbanded birds that were not captured. This survey was conducted at low tide on the western side of Ewing Island, between points A and C (Fig. 2). Birds were also counted on a night-time survey of remaining coastline, and incidental observations were made at other times.

Population size was estimated using the standard Petersen Estimate corrected for small samples (Begon 1979). The formula used was:

$$\text{Population Estimate} = \frac{r(n+1)}{(m+1)}$$

where  $r$  = the number of birds originally banded,  $n$  = the total number of birds caught or seen, and  $m$  = the number of banded birds seen.

A weighted mean version of the Petersen Estimate was used for an overall population estimate for the three nights of survey (Begon 1979):

$$\text{Population Estimate} = \frac{\sum Mn}{(\sum m)+1}$$

where  $M$  = the original number of banded birds released on Day 1 ( $r$ ) plus the additional numbers of banded birds released in subsequent days. Standard errors were calculated using formulae from Begon (1979) and 95% confidence intervals were calculated as  $\pm 1.96$  standard errors.

Adams Island was visited from 2 November

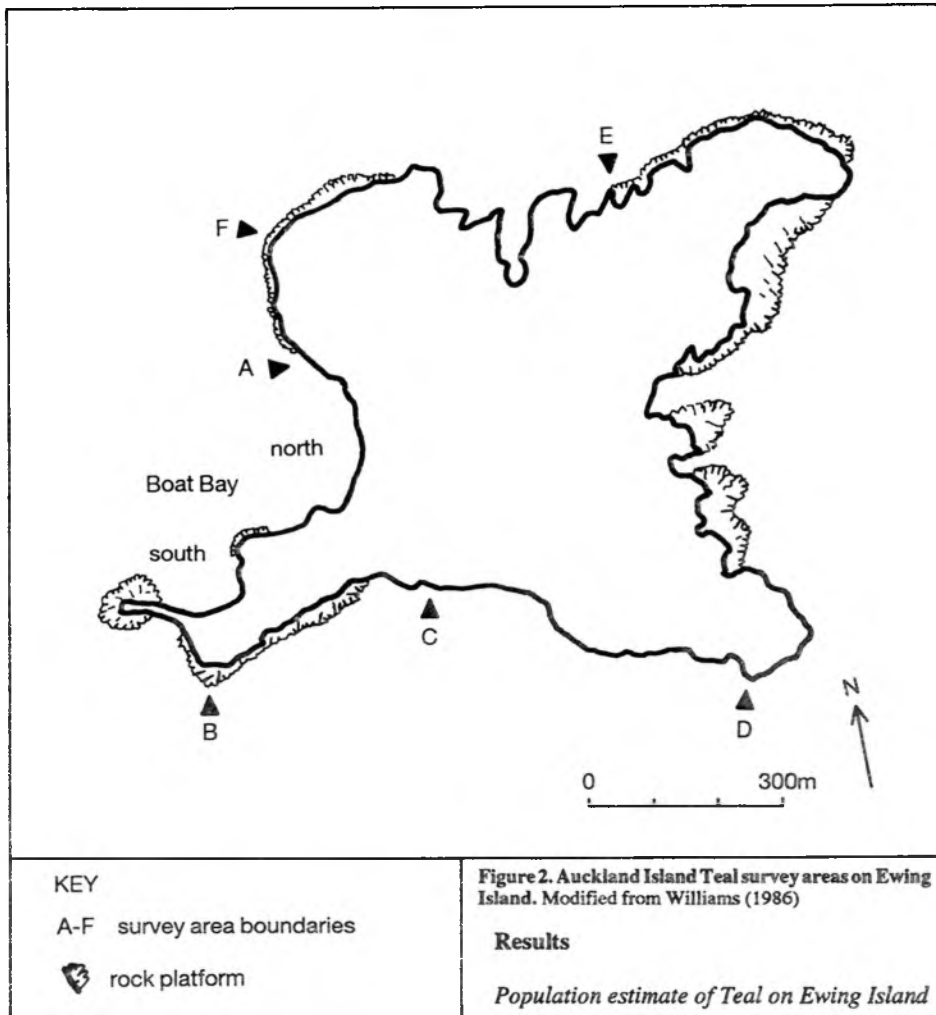


Figure 2. Auckland Island Teal survey areas on Ewing Island. Modified from Williams (1986)

### Results

#### Population estimate of Teal on Ewing Island

to 6 December 1989. Most of the northern shore was surveyed for Teal, except for 5 km of shoreline west of Gilroy Point, which was too steep and exposed to survey. Most of the apparently suitable habitat on the southern coast was also visited. The Adams Island surveys were conducted by counting Teal while slowly walking along the shoreline at low tide or when travelling by boat in calm seas between the kelp beds and the shoreline. Most bays were surveyed only once, but Magnetic, Maclaren and Fleming Bays were surveyed at least three times.

A survey by boat of part of the Auckland Island shoreline (western arm of Carnley Harbour) was conducted on 8 November 1989.

Incidental observations of Teal were made on Enderby, Rose and Ocean Islands.

The coastline of Ewing Island comprised boulder beaches, wave-cut platforms, rock pools and cliffs. The coastal vegetation was mainly *Olearia lyallii* forest, with some areas of shrubs (e.g. *Hebe elliptica*), tussock grass (e.g. *Poa foliosa*) and herbs (e.g. *Stilbocarpa polaris*). The interior of the island is largely dry, with only two very small streams.

On the western side of the island, Teal were mainly seen on the boulder beaches of Boat Bay and also on rocky platforms, pools, kelp beds or swimming in the bays. They were also disturbed from dense vegetation near the water's edge and seen inland under the *Olearia* forest. Table 1 summarises the results of the intensive coastal survey (between points A-C, Fig. 2) on Ewing Island. The minimum number of birds in this area was 49 (33 were banded

Table 1. Population estimates of Auckland Island Teal on Ewing Island, November 1989.

	Shoreline A-B <sup>1</sup>			Shoreline A-C <sup>2</sup>		
	2 Nov	3 Nov	5 Nov	2 Nov	3 Nov	5 Nov
Total caught and/or seen	26	19	19	29	27	29
Unbanded <i>n</i>	26	16	10	29	23	16
Previously banded <i>n</i>						
on day 1		3	7		4	9
on day 2			2			4
New bands released <i>n</i>	18	9		20	13	
Total banded in population	18	27		20	33	
Peterson estimates (±95% confidence intervals)						
Day 1-2		90.0 ± 70.6			112.0 ± 81.2	
Day 2-3		60.0 ± 54.2			78.0 ± 57.0	
Day 1-3		45.0 ± 22.8			60.0 ± 29.0	
Day (1+2)-3		54.0 ± 22.6			70.7 ± 26.1	
weighted mean		65.8 ± 38.4			83.2 ± 40.5	

<sup>1</sup>Area surveyed in 1982 and 1983 (Williams 1986) - see Fig. 2 for details.

<sup>2</sup>Larger area surveyed in 1983 (Williams 1986).

and 16 unbanded birds were seen on the third night).

During the first three hours of darkness on 4 November 1989, 21 Teal (including at least four pairs) were counted between points C and E on the southern and eastern coasts, mainly in the sheltered bays and rock platforms with good access to vegetation cover. On 5 November 1989, a further nine Teal (including four pairs) were seen on low rocky platforms between points A and F. This area was not surveyed by Williams (1986). The coastline between points E and F was mainly small cliffs, which were not suitable habitat, and therefore not surveyed.

The most birds seen in the intensive survey area (A-C) on a single night was 29. This is 59% of the minimum population of 49 birds, or 35% of the weighted mean population estimate of 83. Using these ratios, the 30 Teal seen on the remaining shoreline could represent 51-86 birds, bringing the total for the whole island to 100-169.

#### Population estimate of Teal on Adams Island

Seventy-four birds, including 24 pairs, were found spread along the Carnley Harbour shoreline of Adams Island (Fig. 3, Table 2). The coastline comprised stony beaches, a small number of narrow wave-cut platforms, and extensive rocky shores with occasional low cliffs. The coastal vegetation was either southern rata *Metrosideros umbellata* and inaka *Dracophyllum longifolium* forest, or a community of tussock grass *Poa foliosa*, sedge *Carex appressa* and megaherbs *Stilbocarpa polaris*, *Pleurophyllum criniferum*, *Anisotome latifolia*. The highest concentration of Teal was at Fleming

Bay, the largest and most sheltered inlet on the northern shore of Adams Island. Up to 11 Teal fed in sea lettuce *Ulva* on the delta at the head of this bay. The 5 km west of Gilroy Head which was not surveyed was less-suitable habitat because of its steepness and exposure. On the south coast, a few ducks were found near the outlet of Lake Turbott, and one was seen upstream of Bollons Bay. None was seen at the head of the steep-sided Fly Harbour.

If it is assumed that the proportion (relative to the total population) of Teal counted on the shoreline of Adams Island was similar to that found on Ewing Island, the 78 birds counted would represent a total population of 132-223 birds. However, Ewing Island is essentially a dry island, and almost all birds concentrate around the coastline (Williams 1986). Birds on Adams Island are unlikely to be as restricted to the coastal zone because of the availability of streams and wetlands. There was evidence that some birds lived only on streams and did not frequent the coast. One bird was accidentally caught in a drop trap in a boggy wetland, about 1 km from the coast, and in January 1991, two were seen in dense megaherb gullies on the south side of Adams Island (G. Elliott pers. comm.). There are about 15 streams on the northern coast of Adams Island and at least six streams accessible to Teal on the south coast. Assuming that at least two pairs of Teal will occupy each stream, as suggested for Enderby Island (Williams 1986), there may be a further 42 pairs and a total population of 162 birds on Adams Island. Numbers will be even higher if Teal lived permanently away from streams in boggy ar-

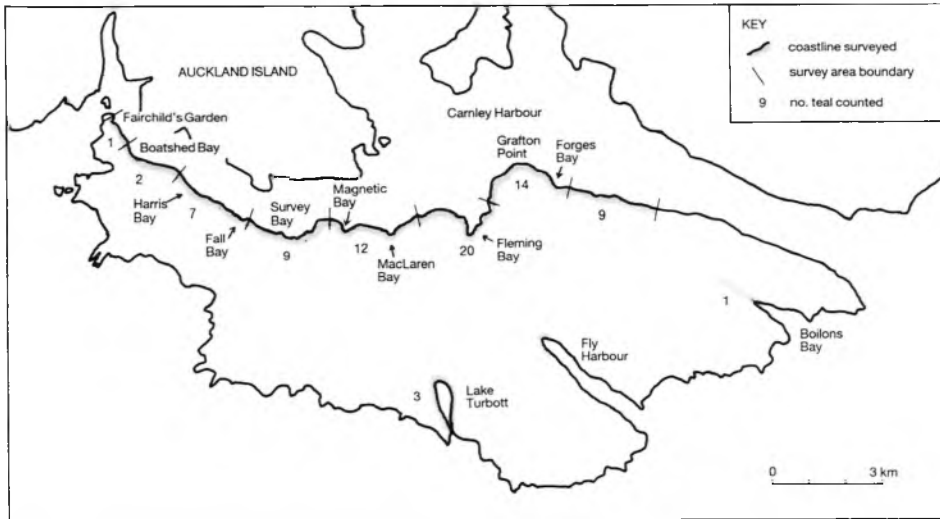


Figure 3. Auckland Island Teal survey area on Adams Island, November 1989.

Table 2. Number of Auckland Island Teal on Adams Island, November 1989.

Shoreline	Date	Pairs <i>n</i>	Singles <i>n</i>	Total Birds
Fairchild's Garden	19.11.89		1	1
Boatshed Bay	19.11.89		2	2
Harris-Fall Bays	19.11.89	3	1	7
Survey Bay	5.11.89	4	1	9
Magnetic-MacLaren Bays	4,9,29.11.89	4	4	12
Fleming Bay	5,9,14.11.89	4	12	20
Grafton Point	9,22.11.89	6	2	14
East of Forges Bay	22.11.89	2	5	9
Bollons Bay stream	18.11.89		1	1
Lake Turbott	4,5,12.11.89	1	1	3
		24	30	78

eas, as they apparently do on Disappointment Island (Weller 1975).

#### *Teal on other islands*

Surveys for Teal were not conducted on other islands; but casual observations were made. At dusk on 27 November 1989 at least ten, including two that were banded in 1982 or 1983, were seen on the northeast coast of Rose Island. A daytime search of Ocean Island on 30 November found seven Teal at six localities. Teal were also seen in several parts of the southern, eastern and northern sides of Enderby Island, mostly in small streams or gullies, but also on the shore and coastal sward. No Teal were found on the southern or northern coasts of Auckland Island.

#### *Teal behaviour*

Teal were active on the beaches of Ewing Island

at all hours of the day but especially after dawn, and before and after dusk. More birds were seen roosting along the coast during the middle of the day than at other times.

The number of birds encountered in any bay varied (e.g. Table 3) with the time of day, tide and weather conditions. Fewer birds were encountered at high tide (e.g. 2 November 1989, Table 3), during the middle of the day, or in poor weather conditions on exposed beaches (e.g. northern Boat Bay on 3 and 5 November 1989). At these times birds were presumably hidden in coastal vegetation or were further inland.

Pairs or individual Teal occupied territories on the beaches of Ewing and Adams Islands. These were apparently advertised by calling (repeated rasping notes), with heads held erect and beaks inclined upwards. Intruders were chased away at the water's edge by rapidly paddling towards them using both wings and feet. Most disputes were brief as the intruder

Table 3. Numbers of Teal counted in bays of Ewing Island, November 1989.

Date	Time (NZST)	Boat Bay north	Boat Bay south	South Coast B-C	South Coast C-D	East Coast D-E	North Coast A-F	Tide
2.11.89	1300-1500	6	5	7				high
2.11.89	1730	12						high
2.11.89	2100-0130	23	3	3				low
3.11.89	2100-0030	13	6	8				low
4.11.89	2100-0000				14	7		low
5.11.89	2100-2115						9	low
5.11.89	2115-2300	13	6	10				low
8.11.89	0715	22						low
9.11.89	0500		11					low
9.11.89	0630		14					low

either dived or paddled quickly away but some fights lasted several minutes. Aggressors sometimes grabbed intruders with their beaks, while they tried frantically to escape. At other times the contest was more equal, with both birds grasping each others' necks and beating with their wings until one bird managed to escape. Some birds were more aggressive than others and patrolled up to 50 m of the water's edge, despite the presence of Teal on the adjacent beach. Other birds, possibly immature birds, exhibited little territorial behaviour, and gathered in loose flocks. For example, on one occasion, eight birds were seen roosting within 10 m of each other in the southern part of Boat Bay, Ewing Island. A similar number was regularly seen together in Fleming Bay, Adams Island.

Copulation was observed on Adams Island in mid November-early December, and one pair at Magnetic Bay was seen on several occasions copulating in the stream. Prior to each copulation attempt, both birds bobbed their heads and swam around each other. After copulation the male strutted around, calling loudly, while the female washed herself.

Teal were very wary of Brown Skuas flying overhead and usually sought cover, or moved into open water. Other birds were generally ignored, although swoops overhead by New Zealand Falcons *Falco novaeseelandiae* caused some nervousness. Falcons were widespread on Adams Island and possibly preyed on Teal, because unidentified duck remains were found in their regurgitated pellets (N. Hyde pers. comm.). Despite this, at Fleming Bay, Teal frequently roosted near a Falcon nest. Teal usually ignored Hooker's sealions *Phocarctos hookeri*, even when they passed close by in open water, although on one occasion a sea lion was observed chasing two ducks for a short distance.

Teal were observed almost "flying" when being chased by other Teal, or a sea lion on one

occasion. They flapped their wings and ran across the surface of the water for several metres. On Adams Island Teal were also seen swooping down to the sea from 5-m-high cliffs.

## Discussion

Results of the intensive survey of Teal on Ewing Island were very similar to those of Williams (1986). The weighted mean Petersen Estimates for shoreline A-B were 66 birds in 1982, 54 in 1983 and 66 in 1989; for the larger survey area A-C the weighted mean estimates were 87 birds in 1983 and 83 in 1989. Total estimates for the whole island were 109-184, 81-131 and 100-169 for the three respective surveys. These results suggest a stable population on Ewing Island.

Of the northern islands, Ewing Island appears to offer the best habitat, with extensive wave platforms and large areas of washed-up seaweed (Williams 1986); most authors (e.g. Falla 1975) have acknowledged the high density there. This has probably been the case for at least 100 years; for example, Chapman (1891) saw "considerable flocks, sometimes of a dozen birds, close to the shore" but only saw them occasionally on other islands.

At least 78 Teal (including 24 pairs) were seen on the Adams Island shoreline in 1989. Allowing for underestimating the number of birds using the coastal zone and those occupying stream and inland wetland habitats, there must be at least twice that number in the total population - possibly 160-220 birds. There is little previous information for Adams Island. As we found in 1989, C.A. Fleming found the largest number of Teal at Fleming Bay, 30-40 on one occasion (in Scott 1971). Falla (1975) reported the breeding stock to be restricted to the shoreline and lower level stream beds and forests. His conservative estimate of 50+ pairs



Table 4. Population estimates of Auckland Island Teal.

Island	Falla (1975) (pairs)	Williams (1985-86) (birds)	This study (birds)
Ewing	40	81-184	100-169
Enderby	30-40	76	*
Rose	30	50	*
Ocean	10	8-20	*
French	3	*	*
Adams	50+	*	78-162
Disappointment		7-30	*
Dundas		14	*
Total	173+ "at least 500 birds"	365-480 "no more than 600"	362-527

\*Estimates were made using information in preceding columns to fill gaps in knowledge for each study.

NOTE: Other population estimates include: 56 birds on Ewing Island in 1972 (Weller 1975); 1200-1500 total population (Weller in Kear & Williams 1978); hundreds, and possibly exceeding 1000 birds (Weller 1980).

seems appropriate although surveys of selected streams and wetlands would help clarify this.

Casual observations of at least ten Teal on the northeast coast of Rose Island are consistent with surveys of the entire east coast in 1982 and 1983, when the most birds seen per night was seven and 16 respectively (Williams 1986). Similarly, the seven birds seen during the day on Ocean Island compares with eight seen during a full survey in 1983 (Williams 1986).

The 1989 expedition to the Auckland Islands supports the estimates by Falla (1975) and Williams (1985, 1986) that there are probably fewer than 600 Teal on the Auckland Islands (Table 4). Teal were seen on Enderby, Rose and Ocean Islands, and although detailed surveys were not conducted, there was no evidence for dramatic changes in the populations. The total population of Auckland Island Teal appears to have remained stable, and as long as cats and rats are not introduced to the offshore islands, the species is probably secure. Rats do not occur on any

of the islands, but cats and pigs on the main Auckland Island prevent reintroduction of Teal there.

Some writers have suggested that Auckland Island Teal are not completely flightless. For example the species has been described as having "only weak powers of flight" (Williams 1964) and Captain Bollons, a frequent visitor to the islands early this century, reported them flying short vertical distances to nest holes in cliffs (Waite 1909, Guthrie-Smith 1936). However, Weller (1975) states that Teal are incapable of true flight. They skitter across the water or land using both feet and wings and can jump onto ledges, usually by synchronising with incoming waves (Weller 1975). Similarly, in 1989 we did not see Teal flying but they used their wings to assist their locomotion over short distances, as do other flightless species. This suggests that Auckland Island Teal wings cannot provide lift and the species is incapable of true flight.

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