

## SHORT NOTE

### Distribution of New Zealand falcon (*Falco novaeseelandiae*): Results of a 10-year survey 2006-2016

DAVE BELL

Native Birds Taranaki, 9 Spencer Place, New Plymouth 4312, New Zealand

The New Zealand falcon (*Falco novaeseelandiae*) is the only endemic bird of prey remaining in New Zealand. It has traditionally been regarded as a variable species with three forms recognized (bush, eastern and southern), differing in size, colour, habitat and range (Fox 1977, 1988; Heather & Robertson 2015). Recent research, however, indicates a genetic divide coinciding with the Cook Strait, between the North and South islands (Trewick & Olley 2016). It has therefore been proposed that there be recognised a South Island subspecies (*Falco novaeseelandiae novaeseelandiae*) and a smaller North Island subspecies (*Falco novaeseelandiae ferox*) (Trewick & Olley 2016).

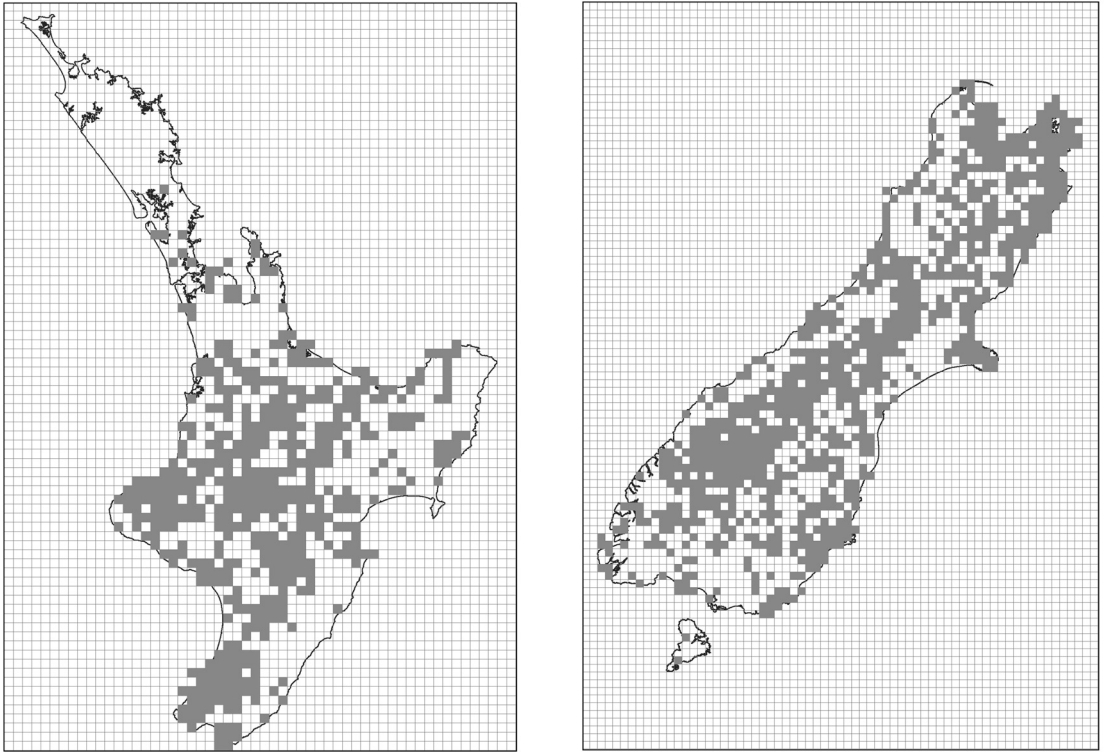
The threat classification for 2 of the forms/subspecies, the bush falcon (*Falco novaeseelandiae ferox*) and the eastern falcon (*Falco novaeseelandiae novaeseelandiae*), has recently been changed to 'Taxonomically Determinate' and 'At Risk – Recovering', although with the 'Data Poor' qualifier (Robertson *et al.* 2017). The southern falcon (*Falco novaeseelandiae* "southern") has remained as 'Taxonomically Indeterminate', 'Nationally Vulnerable' and also with the 'Data Poor' qualifier (Robertson *et al.* 2017).

The known distribution of the New Zealand falcon is based on 2 nationwide studies, 1 from the 1970's (Fox 1978), the other from 2006-2009 (Bell & Lawrence 2009). Additional relevant data is also included in the Ornithological Society of New Zealand atlases of bird distribution (Bull *et al.* 1985; Robertson *et al.* 2007).

Initially launched on 1 June 2006 at the Ornithological Society of New Zealand (OSNZ) Annual General Meeting in Wellington, under the auspices of the now defunct Raptor Association of New Zealand, the 3 years of the New Zealand Falcon Distribution Survey (NZFDS) were reported on in 2009 (Bell & Lawrence 2009). The collection and collation of New Zealand falcon observation records has since continued as the New Zealand Falcon Survey (NZFS), and recently completed a combined eleventh year of surveying.

Here, I present a more current and complete representation of the distribution of the New Zealand falcon utilising 10 years of data (1 June 2006 – 31 May 2016), together with additional information gathered during the survey.

The survey was conducted mainly through electronic means with an online report form and the extensive use of email, though there were several respondents that used the written format. Promotion and awareness of the survey was undertaken that



**Fig. 1.** Distribution of New Zealand falcon on the North Island (left) and South and Stewart islands (right). Shaded squares indicate the confirmed presence of falcons. Each grid square encloses an area of 10 km x 10 km.

included the printed media, presentations and talks (including OSNZ and Forest & Bird branches) and advertising in suitable publications. Numerous requests were also made directly to known and likely sources of New Zealand falcon records, and a number of press articles and news items were followed up on for suitable data. Data collected included the date, location, the number of falcon encountered and what activity was observed, with an additional option to provide comments/thoughts on the observation. All data received was entered in a Microsoft<sup>TM</sup> Access database with key information also copied to a Microsoft<sup>TM</sup> Excel spreadsheet.

Over the 10-year period (1 June 2006 – 31 May 2016), a total of 7,083 records were received or collected for mainland New Zealand, with an additional 21 for the Auckland Islands. The records came from a wide variety of sources (Table 1) involving many individuals and a number of organisations, that included 1,462 records from eBird (eBird Basic Dataset 2016).

The results of the survey confirm the widespread presence of the New Zealand falcon throughout both main islands (Fig. 1). However, New Zealand falcon are now considered locally extinct from Stewart Island (Harper 2009), with only 2 reports received during the survey (4 March 2007 and 17 October 2008).

Regional distribution of observation records (Table 2) shows that 3 regions accounted for 51% of all records; those being Otago ( $n = 1,239$ ), Canterbury ( $n = 1,210$ ) and Wellington ( $n = 1,168$ ). The Otago and Canterbury records would be of eastern falcon, which inhabits more open country and therefore is easier to encounter. These regions are also geographically large in comparison to the others. The Wellington records could be attributed to the considerable predator control undertaken in and around the capital providing increased availability of prey.

Note that a blank 10 km square on the survey maps (Fig. 1 and Fig. 2) does not necessarily indicate that falcon were not present, only that no reports

**Table 1.** Sources of observation records of New Zealand falcon. Abbreviations: DOC, Department of Conservation; TA(E), Technical Advisory (Ecology); OSNZ, Ornithological Society of New Zealand; NZ, New Zealand.

Source	Records
DOC – Queenstown Area Office	119
DOC – Sounds Area Office	126
DOC – TA(E) Central North Island	76
DOC – Taranaki Area Office	32
DOC – Te Kuiti Area Office	38
DOC – Twizel Area Office	329
DOC – Wanaka Area Office	158
Ernslaw One Ltd	31
FishnHunt Forum	131
Hancock Forest Management (NZ) Ltd	327
NZ Biodiversity Recording Network	173
NZ Falcon Survey	3,971
OSNZ – eBird	1,462
Wingspan Birds of Prey Trust	110
TOTAL	7,083

were received during the period of the survey. There were several large areas from which no or few records were received (Table 2). For the North Island, this included Northland with only 1 record, northern Waikato, East Cape and Southern Hawke's Bay, and Northern Wairarapa. Whilst in the South Island records were lacking for Kahurangi National Park, inland Buller, the plains of Canterbury and Southland and from Fiordland. It is considered that several factors could have contributed to this which include unsuitable habitat, tracts of uninhabited/tracked areas with infrequent human visitations, and the lack of local knowledge of the benefits of reporting observations.

Rather than being “*definitely unsatisfactory for falcons*” (Fox 1978 p. 328), exotic plantation forests have proven to be suitable habitat for the New Zealand falcon, which have adapted well to life in these forests. For example, in Kaingaroa Forest 84 nests were located over 3 breeding seasons (Seaton 2007). Other studies and local surveys throughout the country have likewise found New Zealand falcon inhabiting exotic pine forests, including

**Table 2.** Regional distribution in the observation records of New Zealand falcon.

Region	Records	% total
<i>North Island</i>		
Northland	1	0.01
Auckland	36	0.51
Waikato	525	7.41
Bay of Plenty	285	4.02
Taranaki	275	3.88
Gisborne	64	0.90
Hawke's Bay	140	1.98
Manawatu-Wanganui	686	9.69
Wellington	1,168	16.49
<i>South Island</i>		
Marlborough	385	5.44
Nelson	69	0.97
Tasman	315	4.45
West Coast	322	4.55
Canterbury	1,210	17.08
Otago	1,239	17.49
Southland	363	5.12
TOTAL	7,083	100

Waikato, Bay of Plenty, Central North Island and Nelson/Tasman (Hancock Forest Management (NZ) Ltd unpubl data), Gisborne (Sawyer 2013), Hawke's Bay (Addison *et al.* 2006), Otago (Lawrence 2010; Parker Conservation 2015) and Southland (Ernslaw One Ltd *unpubl. data*).

Further examination of the records received has provided a number habitat types that proved popular for regular observations, such as golf courses (Hamilton, Whakatane, Kawerau, Taupo, Urenui, Inglewood, Oakura, Wellington, Lower Hutt, Kaikoura, Westport, Christchurch, Methven, Dunedin, Arrowtown and Te Anau) and Botanical/Public Gardens (Hamilton, Whakatane, Napier, New Plymouth, Palmerston North, Masterton, Wellington, Christchurch, Dunedin and Gore).

The monthly totals (Table 3) of reported observations show that the autumn months of March, April and May provided the equal highest number of records each and total 30% of all the records received. This can likely be attributed to the dispersal of the juvenile falcon from their natal territories and subsequent human-wildlife conflicts.



Fig. 2. Breeding distribution of New Zealand falcon on the North Island (left) and South and Stewart islands (right). Lightly shaded squares indicate suspected breeding of falcon; dark shaded squares indicate confirmed breeding of falcon. Each grid squares encloses an area of 10 km x 10 km.

The number of records then reduces over winter, when reduced human activity and the shortened days may contribute to fewer observations. Spring and summer months again bring higher rates of reporting during the height of the New Zealand falcons' breeding season and conspicuous territorial falcon behaviour.

The breeding status was also determined for each observation record, with confirmed breeding taken as a nest being reported and/or observers being dive-bombed; 240 (4%) of the 7,083 records were confirmed for breeding. Suspected breeding was taken as 2 or more falcons seen together, with 1,177 observations (16%) for suspected breeding. The remaining 5,666 (80%) records were for single falcons and recorded as non-breeding observations.

The breeding and suspected breeding records (Fig. 2) display a wide distribution throughout the known range of the New Zealand falcon. However, there are large tracts of the country with no confirmed breeding records (e.g. Wairarapa, Kahurangi National Park and Canterbury) and other areas where there are suspected breeding but

Table 3. Seasonal variation in the number of observation records of New Zealand falcon.

Month	Records	% total
January	662	9
February	583	8
March	707	10
April	743	10
May	697	10
June	500	7
July	484	7
August	472	7
September	503	7
October	588	8
November	603	9
December	541	8
TOTAL	7,083	100

none confirmed (e.g. Taranaki and Banks Peninsula).

The New Zealand falcon clearly continues to be consistently present (with breeding) over much of New Zealand, with the lack of records in some areas not necessarily indicative of the absence of the New Zealand falcon.

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