

**Hutton’s shearwater (*Puffinus huttoni*):**

**An annotated bibliography**

**Lindsay Rowe (Compiler)**

**Hutton’s Shearwater Charitable Trust Report No 1.**

**A living document: Version 20 August 2015**

**The Hutton’s Shearwater Charitable Trust was established in 2008.**

**Vision:** *To see flourishing populations of our taonga, Hutton’s shearwater/titi in the Kaikoura takiwa; acknowledging the links between the mountains, the sea and the people.*

**Mission:** *To encourage and promote the conservation, research, public education and sustainable management of the Hutton’s shearwater.*

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New Zealand Registered Charity CC37979

**Introduction**

The Hutton’s shearwater (*Puffinus huttoni*) was first described by Mathews (1912). It is a small black and white shearwater (length 36-38 cm; weight 365 gm; Marchant & Higgins 1990) whose breeding grounds were unknown to the scientific community until 1965. Anecdotal reports of “muttonbirds” nesting in burrows high in the Seaward Kaikoura Ranges led to confirmation of the breeding sites of Hutton's shearwater in the headwaters of the Kowhai River at altitudes between 1200 and 1800 m asl by Harrow (1965). Extensive searching led to the discovery of further populations but only two remain today - in the Kowhai River and Shearwater Stream (Marchant & Higgins 1990; Cuthbert 2001; Sommer *et al.* 2009).

Birdlife International (2015) has placed the Hutton’s shearwater in the IUCN Red List “endangered” category and under the New Zealand Threat Classification it is considered to be: D. At Risk. D.1. Declining: Criteria C(1/1) (>100 000 mature individuals; 10-70% population decline); Qualifier OL (one location) (Miskelly *et al.* 2008). The reasons for the decline in population are not definitive. The effects of trampling by deer, goats and chamois breaking through the shallow friable soils into burrows and nest chambers have been observed (Harrow 1976) and stoats, although present in the Kowhai colony, were not considered to be in sufficient numbers there to be a threat (Cuthbert & Davis 2002). Cuthbert (2002) noted accessibility to and presence of pigs in the colonies that had recently become extinct, and the relative inaccessibility to pigs of the Kowhai River and Shearwater Stream breeding sites. Thus, he concluded predation and habitat destruction by pigs was likely to be the main causes of the population decline. Another major threat to the continued existence of the present colonies is potential devastation by natural processes such as snow avalanches or debris avalanches/rock falls resulting from tectonic activity.

This bibliography is a compilation of published and unpublished, mainly scientific, material. Abstracts from original material are given where possible otherwise a brief comment by LKR is given. Where there is material available on the web, a link is given to that source. (LKR) at the end of the reference indicates that I have a paper copy. There are many bird guidebooks that contain references to Hutton's shearwater but unless they are known to contain information other than simple descriptions, photos and location data, they are usually not listed here.

This is a living document and any additional material is welcome. References may be forwarded to admin@huttonsshearwater.org.nz for consideration for inclusion.

**Bibliography**

**BirdLife International. 2015. Species factsheet: *Puffinus huttoni*.** Downloaded from <http://www.birdlife.org> on 20/08/2015. (LKR)

**Comment:** General information and justification for “endangered” ranking

[**Bishop, D.M**](http://www.sciquest.org.nz/elibrary/author/8913)**.;** [**Heath, A.C.G**](http://www.sciquest.org.nz/elibrary/author/19869)**. 1998. Parasites of Birds in New Zealand Part I: Parasite list by host.** [***Surveillance***](http://www.sciquest.org.nz/surveillance) **25 (5): 15-26, 31.** [**Ministry for Primary Industries**](http://www.sciquest.org.nz/elibrary/publisher/4)**. New Zealand.**

http://www.sciquest.org.nz/node/47100 (NOT LKR)

**Comment:** Shearwater Hutton’s ( *Puffinus huttoni)*

Feather mite *Zachvatkinia* sp

*Flea Notiopsylla corynetes*

*Parapsyllus lynnae alynnae*

Tick *Ixodes auritulus* group

**Clark, V.I.; Fleming, C.A. 1948. Hutton's shearwater (*Puffinus gavia huttoni Math.*) in New Zealand. *Notornis 8:* 187-188.**

http://notornis.osnz.org.nz/system/files/Notornis\_2\_8.pdf (LKR)

**Comment:** Reports on early specimens of Hutton's shearwater in Australia and NZ, the differentiation from fluttering shearwaters (*P. gavia*). Refers to the Snares Islands as their breeding grounds but this has been refuted by other authors.

**Crocker, T. 2002. Painted Hutton's shearwater. *Southern bird 12*:8-9.**

http://notornis.osnz.org.nz/system/files/SoBird12\_Dec2002.pdf (LKR)

**Comment:** Reports on a census of Hutton's shearwater. A team colour marked nearly 2000 birds at the Kowhai River colony. Observers on boats then assessed the proportion of birds in flocks at sea of birds that had been colour marked.

**Cuthbert, R.J. 2001. Conservation and ecology of Hutton’s shearwater (Puffinus huttoni). *Conservation Advisory Science Notes No.* 335*.* Department of Conservation. Wellington.**

http://www.doc.govt.nz/documents/science-and-technical/casn335.pdf (LKR)

**Abstract:** Hutton's shearwater *(Puffinus huttoni)* breeds at only two remaining colonies located in the Seaward Kaikoura Mountains. An introduced predator, the stoat *(Mustela erminea),* has been identified as the main potential threat to the continued survival of Hutton's shearwaters and a major aim of this research has been to evaluate that risk. The results showed that average breeding success (46.5%) and adult survival (93.1%) are within the same range as those found for other *Puffinus* species breeding in areas free from introduced predators. An average of 70.5% of burrows were occupied by a bird incubating an egg. This occupancy figure suggests that the population of Hutton's shearwaters may be closer to 106 000 breeding pairs rather than the 134 000 pairs previously estimated. Stoats are estimated to be killing an average of 0.25% of breeding adults and 12% of chicks in each season. This predation leads to a reduction of 0.86 ± 0.22% in the yearly population growth rate of a population model of Hutton's shearwaters. However, the overall population growth rate was still positive (0.44%), suggesting that stoat predation is not likely to be unsustainable for Hutton's shearwaters. Available breeding habitat and competition for breeding resources may be limiting factors for the current population of Hutton's shearwaters. Protecting the remaining colonies from feral pigs *(Sus scrofa)* and establishing new breeding areas should be high management priorities.

**Cuthbert, R.J. 2002. The role of introduced mammals and inverse density dependent predation in the conservation of Hutton’s shearwater. *Biological conservation 108*: 67-78.**

http://www.sciencedirect.com/science/article/pii/S0006320702000915 (LKR)

**Abstract:** This study investigated the impact of stoat Mustela erminea predation on the endangered Hutton's shearwater Puffinus huttoni. Breeding success of Hutton' shearwaters was significantly lower in two seasons of stoat control than in eight seasons with no control: suggesting that natural environmental variation has a greater influence on breeding success than stoat predation. Monitoring Hutton's shearwaters and mainland colonies of sooty shearwaters Puffinus griseus indicated that small colonies suffered higher predation and lower breeding success than large colonies, demonstrating that predation in these two species is inversely density dependent and explaining the low predation rates observed in the very large Hutton's shearwater colonies. The presence of another introduced predator, feral pigs Sus scrofa, within six extinct colonies of Hutton's shearwaters and at the boundaries of the two extant colonies, strongly suggests that this species was responsible for the historic contraction in breeding range. Controlling stoats within the two remaining colonies is unlikely to assist in the conservation of Hutton's shearwater. Conservation efforts would be better spent protecting the two remaining colonies from pigs and in trying to establish new breeding sites.

**Cuthbert, R.J. 2003. Sign left by introduced and native predators feeding on Hutton’s shearwaters (*Puffinus huttoni*)*. New Zealand journal of zoology 30*: 163-170*.***

*http://www.tandfonline.com/doi/abs/10.1080/03014223.2003.9518335#.UmTZ-Sv2\_IU* (LKR)

**Abstract:** The identification of introduced and native predators is important for many conservation studies within New Zealand. Carcasses of Hutton's shearwaters were collected over three field seasons, and where predation was probable, the bodies were autopsied. Paired bites identified stoats as the principal predator of Hutton's shearwater, but also revealed that a feral cat was present within the colony. Stoats killed their prey with a bite to the back of the neck or head, and commenced feeding on the neck or head. Despite the limited number of cat‐killed birds, cats appeared to feed on Hutton's shearwaters differently from stoats, starting on the breast muscles. Harriers and kea left sign that allowed birds killed or scavenged by these native birds to be distinguished from those killed by stoats or cats.

**Cuthbert, R.J.; Davis, L.S. 2002a. Adult survival and productivity of Hutton’s shearwaters. *Ibis* 144: 423-432.**

http://onlinelibrary.wiley.com/doi/10.1046/j.1474-919X.2002.00071.x/abstract (LKR)

**Abstract:** Accurate estimation of breeding and survival parameters is essential to assess the population viability of the endangered Hutton's Shearwater Puffinus huttoni. This study investigated the accuracy of using field signs, an infrared ‘burrowscope’ and inspection hatches to monitor burrow occupancy and breeding success. Inspection hatches proved to be the most reliable means of measuring burrow occupancy and breeding success, and Hutton's Shearwaters appear to tolerate disturbance from this method. Data collected from inspection hatches over a 10-year period indicate that breeding success has averaged 46.5%, and that 70.5% of burrows are occupied by an incubating bird at the start of the breeding season. This occupancy figure suggests that the population of Hutton's Shearwaters may be closer to 106 000 breeding pairs than the 134 000 pairs previously estimated. Annual adult survival is estimated to be 93.1%. These values of breeding success and adult survival are very similar to published data on Puffinus species breeding in environments free from introduced predators.

**Cuthbert, R.J.; Davis, L.S. 2002b. The impact of predation by introduced stoats on Hutton’s shearwaters. *Biological conservation 108*: 79-92**.

http://www.sciencedirect.com/science/article/pii/S0006320702000927 (LKR)

**Abstract:** The Hutton's shearwater Puffinus huttoni is an endangered species of burrowing petrel, that is threatened at its two remaining breeding colonies by the activity of introduced stoats Mustela erminea. Predation of eggs, chicks and adult shearwaters was studied over 10 consecutive breeding seasons (1989/1990–1998/1999) and resident stoats were radio-tracked in two seasons. Stoats were estimated to be killing on average 0.25% of breeding adults and 12% of chicks in each season. Population modeling of Hutton's shearwaters indicated that the estimated impact of this predation was a reduction in the potential yearly population growth rate of 0.86±0.22%. The overall average growth rate derived from the population model of 0.44%, suggests that the population is not in immediate risk of decline and controlling stoats within the colony need not be a priority for management.

**Cuthbert, R.; Davis, R.S. 2002c. The breeding biology of Hutton's shearwater. *Emu 102*: 323-329.** http://www.publish.csiro.au/nid/96/paper/MU01032.htm (LKR)

**Abstract:** Hutton's Shearwater, *Puffinus huttoni,* is a small endangered seabird that breeds at only two sites in the Seaward Kaikoura Mountains, New Zealand. The alpine habitat has restricted access and research on the species' breeding ecology. The extreme breeding habitat may also impose reproductive costs on Hutton's Shearwaters because of the energy needed to fly to colonies. Within the Kowhai Valley colony burrows were located on moderate to steep-angled slopes wherever the soil was deep and friable enough to burrow. Available breeding habitat may be a factor limiting the population. Breeding burrows were generally simple and non-branched. Males were larger than females in all measured body dimensions (bill length, bill depth, bill width, head length, head width and tarsus length), with the exception of wing length. Egg-laying within the colony was non-synchronous and took up to 38 days. The peak of egg laying occurred around 8 and 9 November in the 1998/99 and 1997/98 seasons respectively. The incubation period lasted for an average of 50.3 days and chicks fledged at an average age of 83.8 days. This fledging period is longer than that reported for the closely related Manx Shearwater, *Puffinus puffinus.* There were seasonal differences in the rate of mass gain by Hutton's Shearwater chicks. Mass gain by Hutton's Shearwaters was lower than that found in Manx Shearwaters and this may explain the extended fledging period. However, generally the results indicate that, despite the high altitude and extreme location of the breeding colonies, the breeding biology of Hutton's Shearwater *fits* the pattern observed in other species of *Puffinus.*

**Cuthbert, R.J.; Fletcher, D.; Davis, L.S. 2001. A sensitivity analysis of Hutton’s shearwater: prioritizing conservation research and management. *Biological conservation 100*: 163-172.**

http://www.sciencedirect.com/science/article/pii/S0006320702000927 (LKR)

**Abstract:** Hutton's shearwater Puffinus huttoni is an endangered seabird that breeds at just two colonies, which are subject to predation from introduced mammals. Whether the remaining populations are stable is unknown. In order to help focus future research and management into key areas, we developed a population model of Hutton's shearwaters. The model incorporated environmental variation and also included uncertainty in the estimation of both the mean and the between-year variation of parameters. The sensitivity analysis indicated that the population growth rate of the model was most influenced by the values of mean adult survival, recruitment and the between-year variation in adult survival. In contrast, the model was relatively robust to variation in the mean and between-year variation of most breeding parameters. Future research would best be directed away from measuring breeding parameters alone and focused on determining causes of adult and juvenile mortality such as by-catch at sea and numbers of adults preyed upon by stoats (Mustela erminea). It is important to assess both average rates of mortality and between-year variation in this rate.

**Cuthbert, R.J.; Sommer, E.S. 2002. Home-range and territorial behaviour of stoats (*Mustela erminea*) in a breeding colony of Hutton’s shearwaters (*Puffinus huttoni*)*. New Zealand journal of zoology* 29: 149-160.**

http://www.tandfonline.com/doi/abs/10.1080/03014223.2002.9518298#.UmTapSv2\_IU (LKR)

**Abstract:** We investigated home range size, territorial behaviour and habitat use of stoats in a colony of Hutton's shearwaters. A total of 15 stoats were caught, and radio‐tracking data were obtained from 11 of them. Stoats tracked during the summer had very small home ranges (males 16.0 ha, females 9.4 ha), and with the exception of two immature animals, were defending intrasexual territories. Two males tracked in the spring had larger home ranges (47.9 ha) and were not territorial. Stoats showed a strong preference for areas where shearwaters were concentrated: 80% of tracking fixes were located in burrowed ground. The territorial behaviour of stoats is likely to limit the number of animals present within the colony during the shearwater's breeding season. Consequently, the small number of stoats within the colony (c. 20–30 adults) can kill only a very small proportion of the 100 000 pairs of Hutton's shearwaters present in the area. The low capture rate of stoats observed in this study indicates that capture rate is an inaccurate measure of stoat abundance when comparing areas of different prey availability.

**Cuthbert, R.J.; Sommer, E.S. 2009. 10 year assessment on the status and conservation of Hutton's shearwater. *Occasional Publication No. 77*. Department of Conservation. Wellington. 29p.**

http://www.doc.govt.nz/Documents/conservation/native-animals/birds/sea-and-shore/hutton-10-year-assessment-web.pdf (LKR).

**Abstract:** Monitoring of breeding success in 2006/07 and 2007/08, and visits in December 2007 to assess levels of stoat predation and burrow densities were undertaken in order to assess the status and conservation of Hutton’s shearwaters 10 years after an intensive study. Long-term (20 year) estimates of burrow density within the Kowhai Valley show an increase in five out of seven monitored sub-colonies, and an increase in overall density within this colony. Along with the discovery of a new area of burrowed ground within the Kowhai these results suggest the population of Hutton’s shearwaters has increased in this colony over the last 20 years, at an estimated average rate of increase of 1.7% a year. Burrow density data for Shearwater Stream is less robust, but does not appear to show a decline. Measures of predation rates in the Kowhai colony show no major differences in the numbers of adult shearwaters found on transects in comparison with the late 1990s and the recovery of shearwater carcasses from down burrows in the two recent seasons also does not differ from the late 1990s. Burrow occupancy levels in both colonies in 2006/07 (53-57%, or 66-70% if a correction factor is applied) are similar to the earlier study. In marked contrast, breeding success in both the Kowhai Valley and Shearwater Stream was unprecedentedly low in the 2006/07 breeding season and low (although within the previously recorded range for the Kowhai) in 2007/08. In both years Shearwater Stream suffered consistently lower (12-22%) breeding success than the Kowhai, a pattern also reported from 1987. Continued monitoring of breeding parameters is recommended, along with predator control within Shearwater Stream. Modelling of at-sea factors, colony size and predation rates may help to understand differences between the two colonies and inter-annual variation in breeding parameters.

**Cuthbert, R.J.; Sommer, E.S.; Davis, L.S. 2000. Seasonal variation in the diet of stoats (*Mustela erminea*) in a breeding colony of Hutton’s shearwaters (*Puffinus huttoni*)*. New Zealand journal of zoology 27:* 367-373*.*** http://www.tandfonline.com/doi/abs/10.1080/03014223.2000.9518246#.UmTb4Sv2\_IU (LKR)

**Abstract:** The diet of stoats (*Mustela erminea*) was studied in the Kowhai valley colony of Hutton's shearwaters (*Puffinus huttoni*). Remains of Hutton's shearwaters were found in 785 of 788 scats examined. Scats contained remains of eggs, chicks, near fledging age chicks and adult shearwaters, as well as the remains of skinks (*Oligosoma* sp.) and weta (*Deinacrida* sp.). There was seasonal variation in the frequency of occurrence of all major prey items. Stoats switched from taking predominantly adults during the pre‐egg and incubation periods, to taking almost exclusively chicks during the chick‐rearing period. The impact of stoats on Hutton's shearwaters may as a consequence of this prey switch be reduced, because the population is likely to be more affected by the loss of adults rather than chicks. Stoats continued to feed upon shearwaters, even after all birds had left the colony. Remains of mice (*Mus musculus*) and hares (*Lepus europaeus*) were infrequently found in scats, although the occurrence of these along with the occurrence of skinks and weta increased after all live shearwaters had departed. The results suggest that stoat numbers may be limited by the availability of over‐winter prey within the colony.

**Evans, G.A. 1973. Hutton's shearwaters initiating local soil erosion in the Seaward Kaikoura Range. *New Zealand journal of science 16:* 637-642.** (LKR)

**Abstract:** When Hutton's shearwaters (*Puffinus huttoni)* first occupy a new nesting site the initial destruction of the snowgrass sward (*Chionochloa* spp.) is very rapid. With the continued destruction of these sites by the shearwaters, aided by goats, deer and chamois, the snowgrass swards are killed; this allows severe erosion to proceed at high altitudes in the Seaward Kaikoura Range.

**Falla, R.A. 1965. Distribution of Hutton's shearwater in New Zealand. *Notornis 12:* 66-70.** http://notornis.osnz.org.nz/system/files/Notornis\_12\_2.pdf (LKR)

**Comment:** Discusses the timing of birds in NZ waters noting that at that time there were no specimen records found between May & September. Shows the differences between Hutton’s & fluttering shearwaters, and comments on breeding grounds.

**Hale, M.; Harrow, G.; Bradfield, P.; Cubrinovska, I.; Holdaway, R.N. 1962. Genetic similarity of Hutton’s shearwaters *(Puffinus huttoni*) from two relict breeding populations. *Notornis 62:* 130-134.** http://notornis.osnz.org.nz/system/files/hale%202015.pdf (LKR)

**Abstract:** Hutton’s shearwater (Puffinus huttoni) currently breeds only in 2 colonies in the Seaward Kaikoura mountains, South Island, New Zealand. Conservation measures now include re-locating young to establish a new low altitude colony. To assess the genetic similarity of birds breeding in the 2 colonies as a basis for decisions on sourcing recruits to the present and potentially other new colonies, we genotyped 9 microsatellite loci, with 3-13 alleles, in 30 birds from the Kowhai River catchment colony and 29 from Shearwater Stream. There was no significant population genetic differentiation between the 2 sampling locations. Our results suggest that there would be little genetic risk to mixing birds from both relict colonies in newly established colonies. Future analyses of the former distributions of Hutton’s shearwater, the fluttering shearwater (P. gavia), and the extinct Scarlett’s shearwater (P. spelaeus) will require an analysis of the levels of genetic similarity between birds from the relict colonies and those of former, widely separated colonies.

**Halse, S.A. 1981. Migration by Hutton’s shearwater. *Emu 81*: 42-44.**

http://www.publish.csiro.au/?act=view\_file&file\_id=MU9810042.pdf (LKR)

**Comment:**  Reports a number of occurrences of Hutton's shearwater recoveries in Australia and makes inferences about migration.

**Halse, S.A.; Halse, N.J. 1988. Seabirds and shorebirds at Ningaloo in winter, with comments on Hutton's shearwater. *Western Australian Naturalist 17:* 97-106.** (Not LKR)

**Comment:** Quoted in Cuthbert *et. al.* (2000)

**Harper, P.C.; Kinsky, F.C. 1978. *Southern albatrosses and petrels: an identification guide.*  Victoria University Press. Wellington. P67.** (LKR)

**Comment:** Gives a description and notes immature go to southern Australia and (erroneously?) that adults are sedentary.

**Harrow, G. 1965. Preliminary report on the discovery of the nest site of Hutton’s shearwater. *Notornis 12:* 59-65*.***

http://notornis.osnz.org.nz/system/files/Notornis\_12\_2.pdf (LKR)

**Comment:** Reports the background to and finding Hutton's shearwater breeding grounds in the Kowhai River and on birds found from Peketa to Hapuku River.

**Harrow, G. 1976. Some observations of Hutton’s shearwater. *Notornis 23:* 269-288.**

http://notornis.osnz.org.nz/system/files/Notornis\_23\_4.pdf (LKR)

**Abstract:** The breeding cycle and breeding range of *Puffinus huttoni* in the Seaward Kaikoura mountains are described. Measurements and characteristics of adult birds, their chicks and eggs at the breeding colonies are recorded. The effects of weather, moon phase, and snow on breeding and navigation are noted. Information about mortality and predation is given. Observations of *P. huttoni* near the New Zealand sea coast are outlined, and some historical background is presented.

**Harrow, G. 1985. Hutton's shearwater. *Readers Digest Complete Book of New Zealand Birds.* Readers Digest. Sydney. p99.**  (LKR)

**Comment:** General field guide with description & photo.

**Harrow, G.; Hawke, D.J.; Holdaway, R.N. 2006. Surface soil chemistry at an alpine procellariid breeding colony in New Zealand, and comparison with a lowland site. *New Zealand journal of zoology 33:* 165-174.**  http://www.tandfonline.com/doi/abs/10.1080/03014223.2006.9518441#.UlewVSv2\_IU. (LKR)

**Abstract:** Procellariid seabirds occupied colonies on the pre‐human New Zealand mainland from the lowlands to alpine areas, but the effect of geographic environment on soil nutrient cycling has not been investigated. To facilitate qualitative predictions of seabird breeding effects on terrestrial ecology and biogeochemistry, we compared surface soil (0–15 cm) results from a Hutton's shearwater colony at 1230 m with a Westland petrel colony in lowland forest. Soil acidity, total C, total N, total Cd, and Cdexcess (the soil Cd which cannot be accounted for by parent material weathering) concentrations were all lower at the Hutton's shearwater colony despite higher burrow occupancy and density. Lower δ15N values and higher pH imply that guano was less nitrified in the soil before being lost. At both colonies, parent material contributed a large portion of total P and total Cd. Correlations between total N, Pexcess and Cdexcess with total C suggested that guano nutrient retention is driven by soil organic matter. We conclude that seabird colony location affected the cycling of seabird‐derived nutrients in pre‐human New Zealand.

**Hawke, D.J. 1998. Seabirds around Banks Peninsula (New Zealand) from aerial surveys. *Notornis 45:* 113-125.**

http://notornis.osnz.org.nz/system/files/Notornis\_45\_2\_113.pdf (NOT LKR)

**Abstract:** Aerial surveys for flying seabirds were directed up to 18.3 km offshore from Banks Peninsula during February and July-August 1996. The abundance of Hutton's/fluttering shearwaters (*Puffinus huttoni*/*P. gavia*) increased offshore, consistent with possible offshore increases in pelagic versus benthic productivity The decrease in abundance offshore of spotted/pied shags (*Stictocarbo punctatus*/*Phalacrocorax varius*), black- backed gulls (*Larus dominicanus*), white-fronted terns (*Sterna striata*), and red-billed/black-billed gulls (L. novaehollandiae/L. bulleri) probably reflects their commuting to and from breeding and roosting sites. Hutton's/fluttering shearwaters and white- fronted terns were most common around the area east of Banks Peninsula. The distribution of other species around Banks Peninsula probably reflects breeding site distribution (spotted shags), and feeding opportunities on land (black-backed gulls). Convergent fronts were distributed around Banks Peninsula, and decreased in number offshore. Internal waves were most common toward the eastern end of Banks Peninsula, and were evenly distributed offshore. While the onshore-offshore distribution of the non-procellariiform species matched that of convergent fronts, seabirds and individual convergent fronts did not significantly co-occur.

**Heath, A.C.G. 2010. Checklist of ectoparasites of birds in New Zealand: additions and corrections.  *Surveillance 37 (1):*** 12-16. (Not LKR)

**Comment:** Updates Bishop & Heath with:

Shearwater, Hutton’s (*Puffinus huttoni*) *Ixodes uriae* (tick)

**Holdaway, R.N.; Worthy, T.H. 1994. A new fossil subspecies of shearwater *Puffinus* from the late quaternary of the South Island of New Zealand, and notes on the biogeography and evolution of the *Puffinus gavia* superspecies. *Emu 94:* 201-215.**

http://www.publish.csiro.au/nid/96/paper/MU9940201.htm (LKR)

**Abstract:** A new, extinct species of *Puffinus* (Aves: Procellariidae) is described from fossil bones found in caves in the west and north-west of South Island, New Zealand. The new species is smaller in all dimensions than either *Puffinus gavia* or *P. huttoni*, with which it forms a natural group. It is known from deposits dating from at least 20 000 years b.p. to others less than 600 years old. The distribution as presently known includes the west and north of the South Island, New Zealand, from Takaka Hill (41°s) in north-west Nelson, to near Punakaiki, at 42°S. The three taxa had allopatric breeding distributions. This is the first extinct procellariid to be described from New Zealand. As with other avian taxa that survived to the present millenium, it was probably exterminated by the Kiore *Rattus exulans*, which was introduced by Polynesians less than 1000 years ago.

**Holdaway, R.N.; Worthy, T.H.; Tennyson, A.J.D. 2001. A working list of breeding bird species of the New Zealand region at first human contact. *New Zealand Journal of Zoology 28:* 119-187.**

http://www.tandfonline.com/doi/abs/10.1080/03014223.2001.9518262#.VYoVvnkw\_IU

**Comment:**  Notes Hutton's shearwater would have been present in the South Island at first human contact.

**Imber, M.J.; Crockett, D.E. 1970. Sea birds found dead in New Zealand in 1968. *Notornis 17*: 223-230.**

http://notornis.osnz.org.nz/system/files/Notornis\_17\_3.pdf (LKR)

**Abstract:**  During 1968, 65 members of the O.S.N.Z. patrolled a total of 1,188 miles of coast and found 4,716 dead seabirds of 49 species. A unique factor was the tropical cyclone in April, the effects of which around southern coasts of the North Island have been described elsewhere. There was an unusually protracted period of strong westerly winds from mid-September to end of November which was accompanied by an extensive wreck of short-tailed shearwaters *Puffinus tenuirostris* and several other species. Excluding April specimens, unusual birds were three storm-petrels (Wilson's, *Oceanites oceanicus*; grey-backed, *Garrodia nereis*; black-bellied*, Fregetta tropica*), a sooty tern *Sterna fuscata* and two spine-tailed swifts *Chaetura caudacuta*.

**Comment:** Has comparative data for fluttering shearwaters and Hutton's shearwater collected on Wellington coasts, timing of finds and refers to Australian recoveries.

**Kemp, J. 2001. Predation on Hutton’s shearwaters by stoats: effect of a mast seeding year. *Conservation advisory science notes No. 328.* Department of Conservation. Wellington. 9p.**

http://www.doc.govt.nz/documents/science-and-technical/casn328.pdf (LKR)

**Summary:** Recent research has suggested that predation by stoats *(Mustela erminea)* probably does not threaten the viability of Hutton's shearwater *(Puffinus huttoni)* populations. However, no mast seeding years occurred during this research. As mast seeding is usually associated with irruptions in stoat abundance, the impact of stoats might be greater than has been suggested. Widespread mast seeding in autumn 1999 provided the opportunity to measure the mortality rate of adult shearwaters in a mast year relative to that in 3 nonmast years by comparing the density of shearwater carcasses on the ground surface within a breeding colony in each of these four years. Carcass density was calculated using line transect `distance sampling' techniques. No increase in carcass density was detected following mast seeding in 1999. Although the precision of density estimates was low, it is concluded that mast seeding probably does not increase adult mortality enough to threaten the viability of the shearwater colony.

**Kinsky, F.C.; Fowler, J.A. 1973. A Manx shearwater (*Puffinus p. puffinus* in New Zealand. *Notornis 20:* 14-20.**

http://notornis.osnz.org.nz/system/files/Notornis\_20\_1.pdf (LKR)

**Abstract:** The first recorded occurrence of a Manx Shearwater in the New Zealand region, being also the second record from the Australasian region, is reported. A description of the bird is given and a table presented of the main characters separating the fluttering, Manx, and Hutton's Shearwaters since it seems possible that Manx Shearwaters, when present in New Zealand waters, associate with flocks of fluttering Shearwaters and may be confused, as beach specimens, with both this species and Hutton's Shearwater. The breeding cycle and post-breeding migrations and movements of the Manx Shearwater are outlined and discussed to account for the southern occurrences of this species

**Marchant, S.; Higgins, P.J. (Eds). 1990. *Puffinus huttoni* Hutton’s shearwater. *Handbook of Australian and New Zealand birds. Vol 1:* 655-662*. Oxford University Press. Melbourne.***

http://nzbirdsonline.org.nz/sites/all/files/111\_Hutton%27s%20Shearwater.pdf (LKR)

**Comment:**  When published, this reference was the definitive authority on Hutton's shearwaters collating all known information at that time – hence covers all topics. It is still the first reference to look at on any topic.

**Mathews, G.M. 1912. Snares brown-backed petrel *Puffinus reinholdi huttoni.*  *The Birds of Australia*. *Vol. 2*. H.F. and G. Witherby. London. P77.** (LKR)

**Comment:**  First description of Hutton's shearwater. Note the holotype specimen is said to be from and the birds breed on the Snares Islands. This has been shown to be incorrect – see Miskelly *et al.* (2001) and Tennyson, *et al.* (2014) (*loc. cit.)*

**Mathews, G.M. 1937. A new shearwater for Western Australia. *Emu 37*: 114-115.**

http://www.publish.csiro.au/?act=view\_file&file\_id=MU937114.pdf (LKR)

**Comment:** A description of a bird found at Bunbury by Whitlock and given the name *P. leptorhynchus* but revised by Seventy (1939) to *P.g. huttoni*.

**Millener, P.R. 1991. The Quarternary avifauna of New Zealand. In: Vickers-Rich, P.; Monaghan, J.M.; Baird, R.F.; Rich, T.H. (Eds). *Vertebrate paleantology of Australasia.* Melbourne. Pioneer Design Studio in association with Monash University Publications Committee. P1317-1344.**

**Comment:** From OSNZ (2010): Possible Late Pleistocene-Holocene fossil and midden records from several parts of New Zealand reported here should be treated with caution because of uncertain identification

**Miskelly, C.M.; Dowding, J.E.; Elliot, G.P.; Hitchmough, R.A.; Powlesland, R.G.; Robertson, H.A.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2008. *Conservation status of New Zealand birds, 2008*. *Notornis 55*: 117-135.**

http://notornis.osnz.org.nz/system/files/Notornis\_55\_3\_117.pdf (LKR)

**Abstract:** An appraisal of the conservation status of the post-1800 New Zealand avifauna is presented. The list comprises 428 taxa in the following categories: ‘Extinct’ 20, ‘Threatened’ 77 (comprising 24 ‘Nationally Critical’, 15 ‘Nationally Endangered’, 38 ‘Nationally Vulnerable’), ‘At Risk’ 93 (comprising 18 ‘Declining’, 10 ‘Recovering’, 17 ‘Relict’, 48 ‘Naturally Uncommon’), ‘Not Threatened’ (native and resident) 36, ‘Coloniser’ 8, ‘Migrant’ 27, ‘Vagrant’ 130, and ‘Introduced and Naturalised’ 36. One species was assessed as ‘Data Deficient’. The list uses the New Zealand Threat Classification System, which provides greater resolution of naturally uncommon taxa typical of insular environments than the IUCN threat ranking system. New Zealand taxa are here ranked at subspecies level, and in some cases population level, when populations are judged to be potentially taxonomically distinct on the basis of genetic data or morphological observations. In contrast, IUCN and BirdLife International bird threat rankings are assigned only at species level. This paper represents the first time that the entire modern New Zealand avifauna has been assessed from a conservation perspective. A brief analysis of patterns of extinction, threat, and rarity exhibited by the taxa listed is presented.

**Comment:**

*Appendix 1*Threat rankings for New Zealand birds

Taxa are grouped by threat category, then alphabetically by scientific name. The Criteria column provides each taxon a code for population size and trend justifying placement in that threat category (see Townsend *et al*. 2008 for more detail). Full definitions for Qualifiers are also in Townsend *et al*. (2008), but the abbreviations are: CD, Conservation Dependent; De, Designated; DP, Data Poor; EF, Extreme Fluctuations; IE, Island Endemic; Inc, Increasing; OL, One Location; PD, Partial Decline; RF, Recruitment Failure; RR, Range Restricted; SO, Secure Overseas; Sp, Sparse; St, Stable; TO, Threatened Overseas.

Criteria for New Zealand threat rankings

Declining: A (1/1), 5000-20,000 mature individuals, 10-30% population decline; B (1/1), 20,000-100,000 mature individuals, 10-50% population decline; C (1/1), >100,000 mature individuals, 10-70% population decline.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *D. At Risk* | | | | | | | | | | |
| *D.1. Declining* | | | | | | | | | | |
| *Scientific name* | *Common name* | | *Family* | | Criteria | | Qualifier | |  | |
| *Puffinus huttoni* | | Hutton’s shearwater | | Procellariidae | | C (1/1) | | OL | |

**Miskelly, C.M.; Sagar, P.M.; Tennyson, A.J.D.; Scofield, P.A. 2001. Birds of the Snares Islands, New Zealand. *Notornis 48:* 1-40.**

http://notornis.osnz.org.nz/system/files/Notornis\_48\_1\_1.pdf (LKR)

**Comment:**  The holotype of Hutton's shearwater has been reported as from the Snares Island where the bird breeds. This paper reports evidence that does not back up that statement.

**Miskelly, C.M.; Taylor, G.A.; Gummer, H.; Williams, R. 2009. Translocations of eight species of burrow-nesting seabirds (genera *Pterodroma*, *Pelecanoides*, *Pachyptila* and *Puffinus*: Family Procellariidae). *Biological conservation 142:* 1965-1980.**

http://www.sciencedirect.com/science/article/pii/S0006320709001657 (LKR)

**Abstract:**  Development of seabird translocation techniques is required to meet species recovery objectives, to improve conservation status, and to restore ecological processes. During 1997–2008 we undertook translocation trials on eight petrel species of four genera within the New Zealand region: common diving petrel (*Pelecanoides urinatrix*), fairy prion (*Pachyptila turtur*), grey-faced petrel (*Pterodroma macroptera gouldi*), Pycroft’s petrel (*Pterodroma pycrofti*), Chatham petrel (*Pterodroma axillaris*), Chatham Island taiko (Magenta petrel; *Pterodroma magentae*), fluttering shearwater (*Puffinus gavia*), and Hutton’s shearwater (*Puffinus huttoni*). A total of 1791 chicks within 5 weeks of fledging were moved up to 240 km, placed in artificial burrows and hand-fed until they fledged. Of these, 1546 fledged, and so far at least 68 have returned as adults to the translocation sites. Most birds were crop-fed a puree based on tinned sardines and fresh water. This diet worked well for all species regardless of their typical natural diet (planktonic crustaceans, squid, or fish) with all species fledging above or close to mean natural fledging weights.

**Murray, M.D.; Palma, R.L.; Pilgrim, R.L.C. 1992. Ectoparasites of Australian, New Zealand and Antarctic birds. In: Marchant *S,* Higgins PJ (eds)*. Handbook of Australian, New Zealand and Antarctic birds. Volume 1. Ratites to ducks.Part B, Australian pelicans to ducks*.** Pp 1365-74. Melbourne, Australia; Oxford University Press.

**Comment:** Not sighted.

**Oliver, W.B. 1955. Hutton's shearwater *Puffinus gavia huttoni.*  *New Zealand Birds*. A.H. & A.W. Reed. Wellington. P.130**. (LKR)

**Comment:**  Brief description and measurements of Hutton's shearwater.

**Ornithological Society of New Zealand: Checklist Committee. 2010. *Puffinus huttoni* Mathews. Hutton’s Shearwater. *Checklist of the birds of New Zealand, Norfolk and Macquarie Islands, and the Ross Dependency, Antarctica*. Te Papa Press. P 121**. (LKR).

**Comment:** Reports scientific nomenclature history and distribution. Has references to *Notornis* classified summarised notes and some Australian pelagic sightings.

**Ornithological Society of New Zealand under various contributors. Classified summarised notes. *Notornis.***

**Comment:** Reports of sightings

**Palma, R.L. 1999. Amendments and additions to the 1982 list of chewing lice (Insecta: Phthiraptera) from birds in New Zealand.** ***Notornis 46:* 373-387**.

http://notornis.osnz.org.nz/system/files/Notornis\_46\_3\_373.pdf (NOT LKR)

**Comment:** New species of louse on Hutton's shearwater

*Ancistrona vagelli* (J.C.Fabricius, 1787)

**Petyt, C. 1995. Behaviour of seabirds around fishing trawlers in New Zealand subantarctic waters. *Notornis 42:* 99-115.**

http://notornis.osnz.org.nz/system/files/Notornis\_42\_2\_99.pdf (LKR)

**From text:** Hutton’s shearwater ***Puffinus huttoni***

On 26 Feb 1990 near Bluff, six shearwaters, black above and with white underparts, were thought to have been this species.

**Pilgrim, R.L.C.; Palma, R.L. 1982. A list of the chewing lice (Insecta: Mallophaga) from birds in New Zealand. *Notornis 29 (Supplement).* 32 p.**

http://notornis.osnz.org.nz/system/files/Notornis\_29\_sup.pdf (NOT LKR)

**Comment:** Lists for Hutton's shearwater on p. 12

*Austromenopon paululum* (Kellogg & Chapman, 1899)

*Halipeurus (Halipeurus) spadix* Timmermann, 1961

*Naubates harrisoni* Bedford, 1930 *s. 1.*

*Trabeculus flemingi* Timmermann, 1959

**Powlesland, R.G.; Pickard, C.R. 1992. Seabirds found dead on New Zealand beaches in 1998, and a review of *Puffinus* recoveries, 1943 to 1988. *Notornis 39:*27-46.**

http://notornis.osnz.org.nz/system/files/Notornis\_39\_1\_27.pdf (LKR)

**Abstract:** In 1988, 3603 kilometres of the coast of New Zealand were patrolled and 7545 dead seabirds were found as part of the Beach Patrol Scheme. Two new species were the Tahiti Petrel ***(Pseudobulweria rostrata)*** and the Masked Booby ***(Sula dactylatra).*** Unusual finds were a Black-bellied Storm Petrel ***(Fregetta tropica)*** and a White Tern ***(Gygis alba).***

A summary is given of the coastal and monthly distributions for 10 species of ***Puffinus*** found between 1943 and 1988. Of these shearwaters, the Sooty Shearwater ***(P. griseus)*** was found most frequently overall, mainly in May and November-December. This review of beach-wrecked shearwaters indicates that the information derived from the Beach Patrol Scheme for common seabird species relates reasonably well to the movements of these species about New Zealand coasts.

**Comment:** Reports the coastal regions where, and the months when, 35 specimens of *P. huttoni* were found in 1988, comparison with *P. gavia* (fluttering shearwater) characteristics, and recovery patterns in New Zealand and Australian waters.

Note: There are a number of other annual reports of seabird recoveries to be found in Notornis.

**Robertson, H.A.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; Powlesland, R.G.; Sagar, P.M.; Scofield, R.P; Taylor, G.A. 2013. Conservation status of New Zealand birds, 2012. *New Zealand threat classification series 4.* Department of Conservation. Wellington. 22p.**

http://www.doc.govt.nz/documents/science-and-technical/nztcs4entire.pdf (LKR)

**Abstract:** The first complete audit of the conservation status of the 473 taxa of birds that have been recorded in New Zealand since first human contact (about 1000 years ago) was carried out. Using the same ranking criteria, the assessments made in the audit were compared with those made in 2008 for the 428 taxa recorded post-1800. A total of 20 taxa moved to a more threatened status, while the status of 12 taxa improved, mainly as a result of successful conservation management. Overall, 77 species were assessed as being threatened with extinction, the same as in 2008; however, 25 rather than 24 taxa were now classified as being Nationally Critical. A list of all 473 bird taxa and their conservation status in 2012 is presented.

**Comment:** Updates Miskelly *et al.* (2008) (*loc.cit.)*

**Robinson, R.D. 1973. The white-breasted petrels of southern Australian waters. *Emu 73:* 101-106**

Not found nor checked.

**Rowe, L. K. 2014. Post-translocation movements of pre-fledging Hutton's shearwaters (*Puffinus huttoni)* within a newly established colony (Te Rae o Atiu) on the Kaikoura Peninsula. *Notornis 61:* 84-90.**

http://notornis.osnz.org.nz/system/files/Rowe%202014.pdf (LKR)

**Abstract:** Over 100 Hutton’s shearwater (Puffinus huttoni) nestlings were translocated to the Te Rae o Atiu colony on the Kaikoura Peninsula in February and March 2013. Passive integrated transponder (PIT) tags were implanted in all translocated nestlings and their movements were monitored using both visual observations and recording devices at nest-box entrances. Once nest-box entrances were unblocked about 5 days after birds were translocated, 29 nestlings were resighted 81 times outside their home nest-boxes either in the open (14 nestlings) and/or other nest-boxes (29 nestlings). From the PIT tag records, 37 birds were observed visiting at least 49 nest-boxes on 109 occasions. The most mobile bird made 15 visits to 12 other nest-boxes over 9 nights; another bird visited 6 boxes in one night; and 1 box had 3 visitors in a single night. Nestlings moved within the colony in the period between 1 and 16 nights before fledging, with an average of 8 nights with movement before fledging. The PIT tag readers also showed that the use of pins outside nest-box entrances to determine movements can be misleading as pins were moved up to 13 nights before the nest-box occupant emerged, the pins being moved either by visitors to the nest-boxes or by nestlings wandering past the entrance.

**Scofield, P.; Stephenson, B. 2013. Hutton's shearwater. In *Birds of New Zealand. A photographic guide*. Auckland University Press. Auckland. P186-187.** (LKR)

**Comment:** General field guide with description & photos.

**Serventy, D.L. 1939. The white-breasted petrel of South Australia.  *Emu 39:* 95-107.**

http://www.publish.csiro.au/paper/MU939095.htm .(LKR)

**Comment:** Reports on 2 specimens collected off SA, details literature and other information on collected specimens to that date and concludes these were a distinct subspecies and that described by Mathews (1912), *P. gavia huttoni.*

**Sherley, G. 1992. Monitoring Hutton's shearwater 1986-1989. *Notornis 39:* 249-261.**

http://notornis.osnz.org.nz/system/files/Notornis\_39\_4\_249.pdf (LKR)

**Abstract:** The distribution of Hutton's shearwater *(Puffinus huttoni)* in the Kaikoura ranges is restricted to the upper Kowhai River and Shearwater Stream catchments. Survey quadrats were established and colony boundaries mapped as baseline data for monitoring. The breeding population was estimated to be at most 134 400 pairs, less an unknown number of non-breeding pairs and unmated birds. Productivity in used burrows in the Kowhai River and Shearwater Stream catchments was estimated at 31% and 16% respectively. Numbers have declined since the 1880s. The species fits the IUCN category of 'vulnerable'.

**Comment:** Reports the loss of 2 colonies by slipping and erosion covering burrows with alluvium.

**Smit, F.G.A.M. 1979. The fleas of New Zealand (*Siphonaptera)*. *Journal of the Royal Society of New Zealand 9:* 142-232.**

http://books.google.co.nz/books?id=f7Q4AAAAIAAJ&pg=PA159&lpg=PA159&dq=pilgrim+parasites+puffinus&source=bl&ots=ZLeC2Ji3\_q&sig=zmPkV5-Gv89QTyRUXsisuF36a6c&hl=en&sa=X&ei=nnbtU7KDCNjp8AXX3ILwDQ&ved=0CDgQ6AEwBA#v=onepage&q=pilgrim%20parasites%20puffinus&f=false

**Comment:** Discusses two genera of fleas found on Hutton's shearwaters in the Kowhai River.

**Sommer, E.; Bell, M.; Bradfield, P.; Dunlop, K.; Gaze, P.; Harrow, G.; McGahan, P.; Morrissey, M.; Walford, D.; Cuthbert, R. 2009. Population trends, breeding success and predation rates of Hutton’s shearwater (*Puffinus huttoni)*: a 20 year assessment. *Notornis 56:* 144-153.**

http://notornis.osnz.org.nz/system/files/Notornis\_56\_3\_144.pdf (LKR)

**Abstract:** Monitoring of breeding success in 2006/07 and 2007/08, and visits in Dec 2007 to assess levels of stoat predation and burrow densities were undertaken in order to assess the status of Hutton’s shearwaters (*Puffinus huttoni*) at the 2 remaining breeding colonies. Long-term (20 year) estimates of burrow density within the Kowhai Valley show a consistent increase in burrow density within this colony. Along with the discovery of a new area of burrowed ground, these results suggest the population of Hutton’s shearwater has increased in this colony over the last 20 years. Burrow density data for Shearwater Stream are less robust, but does not appear to show a decline. Measures of predation rates in the Kowhai colony show no major differences in the numbers of adult shearwaters found on transects in comparison with the late 1990s and the recovery of shearwater carcasses from burrows in 2 recent seasons also does not differ from the late 1990s. Burrow occupancy levels in both colonies in 2006/07 are similar to the 1990s. In contrast, breeding success in both the Kowhai Valley and Shearwater Stream were very low in the 2006/07 and 2007/08 breeding seasons. Due to the lack of evidence suggesting an increase in stoat predation, these low values of breeding success are hypothesised to be a result of poor at-sea feeding conditions. The apparently consistent lower breeding success at the Shearwater Stream colony (and lack of evidence for alternative local environmental impacts such as heavy snowfall or rain events within this colony) may well be a consequence of stoats, due to the differential impact of stoats at this small colony (8,000 breeding pairs) in comparison to the far larger Kowhai Valley colony (106,000 pairs). Continued annual monitoring within both colonies and a programme of stoat trapping within the Shearwater Stream colony are recommended in order to better assess breeding success and to determine if trapping can protect the smaller colony. Five-yearly monitoring of burrow densities and predation rates should continue to help evaluate long-term trends and the health of this endemic New Zealand species.

**Stonehouse, B. 1965. Marine birds and mammals at Kaikoura*. New Zealand Journal of Ecology* *65:*13-20.**http://newzealandecology.org/system/files/articles/ProNZES12\_13.pdf (LKR)

**Comment:**  Reference is made to flocks of fluttering shearwaters as below. The only reference to Hutton’s is to dead birds. I believe BS has mistaken flutterers for Hutton’s.

“Large flocks of spotted shags, fluttering shearwaters and other non-breeding species appear regularly off-shore.

Although fluttering shearwaters frequently feed close inshore at Kaikoura and Goose Bay,.............

Fluttering shearwaters *(Puffinus g.* *gavia) ..............* often feed within sight of the shore in large, wheeling flocks; occasionally hundreds of fluttering shearwaters feed among kelp two or three yards off shore.

......... Buller's, Hutton's and sooty shearwaters *(Puffinus bulleri, P. gavia huttoni* and *P. griseus)* have

been recorded dead.

**Tarburton, M.K. 1981. Notes and measurements of Hutton's and fluttering shearwaters found drowned at Kaikoura Peninsula. *Notornis 28:* 9-10.**

http://notornis.osnz.org.nz/system/files/Notornis\_28\_1.pdf (LKR)

**Comment:** Measured *P. gavia & P. Huttoni* picked up in a fishing net. Notes measurements of the w species overlap and only the extremes could be considered diagnostic = small *P. gavia* & larger *P. Huttoni.*

**Tarburton, M.K. 1981. Integrity of diagnostic characters of Hutton’s shearwater. *Notornis 28:*134.** http://notornis.osnz.org.nz/system/files/Notornis\_28\_2.pdf (LKR)

**Comment:** Noted variations in some plumage characteristics – some with white-tipped axillaries and some with all white under tail coverts.

**Taylor, G.A. 2008. Maximum dive depths of eight New Zealand Procellariiformes, including *Pterodroma* species. *Papers and proceedings of the Royal Society of Tasmania 142:* 89-97.**

http://eprints.utas.edu.au/13315/1/2008\_Taylor\_dive\_depths.pdf (LKR)

**Abstract:**Lightweight capillary tube depth gauges were attached to eight petrel species breeding at New Zealand colonies during the period 1998-2008. This paper presents the first information on the diving ability of *Pterodroma* petrels. Grey-faced Petrels, *Pterodroma macroptera gouldi*, recorded maximum dives down to 23 m. Males (6.3 ± 6.3 m SD) dived deeper on average than females (3.6 2.5 m) during the incubation period but not significantly so (P=0.06). Breeding birds dived significantly deeper on average than non-breeders, and breeding males dived significantly deeper on average than non-breeding males. The two small *Pterodroma* species sampled, *Pterodroma pycrofti* and *Pterodroma nigripennis*, only exhibited shallow dives down to 2 m but sample sizes were small. Sooty Shearwaters, *Puffinus griseus*, had mean maximum dive depths of 42.7 ± 23.7 m, with males (53.0 ± 17.3 m) diving significantly deeper on average than females (20.1 ± 20.4 m) during the incubation period. One male Sooty Shearwater dived to nearly 93 m, the deepest dive so far recorded in the order Procellariiformes. Flesh-footed Shearwaters, *Puffinus carneipes*, dived to 28 m, with a mean maximum dive depth of 13.6 ± 7.9 m. Hutton's Shearwaters, *Puffinus huttoni*, had a mean maximum dive depth of 23.0 ± 8.5 m (range 11.1-36.6 m). A single Fluttering Shearwater, *Puffinus gavia*, recovered with a dive gauge had dived to 29 m. Mean maximum dives made by Common Diving-Petrels, *Pelecanoides urinatrix*, of 10.9 ± 6.1 m (range 6.9-22.2 m) were shallower than results reported from other sites but may have been biased by gauge failures. Capillary gauges provide the best means we have at present to understand the diving capability of small seabirds. While studies elsewhere have shown these gauges may overestimate diving performance by about 10-15%, other factors identified in this study indicate that sometimes diving performance will be underestimated using this simple technique.

**Tennyson, A.J.D; Miskelly, C.M.; LeCroy, M. 2014. Clarification of collection data for the type specimens of Hutton’s Shearwater *Puffinus huttoni* Mathews, 1912, and implications for the accuracy of historic subantarctic specimen data. *Bulletinof the British Ornithologists Club 134*: 242-246.**

http://boc-online.org/bulletin/bulletin-index/bulletin-134/(LKR)

**Abstract** Collection information for the type material of Hutton’s shearwater *Puffinus huttoni* Mathews, 1912, has long been debated. Contrary to some previous studies, we conclude that Sigvard Dannefaerd did not collect the holotype, now in the American Museum of Natural History (New York), nor was it collected in 1894. A more plausible scenario is that Henry Travers shot it off the subantarctic Snares Islands in January 1890. A sole paratype of the taxon, previously overlooked in the Natural History Museum (Tring), was perhaps collected in South Australia. Dannefaerd never visited New Zealand’s subantarctic region, so several other specimens supposedly collected there by him in 1894 must also have incorrect collection data.

**Warham, J. 1981. Does Hutton's shearwater circumnavigate Australia? *Emu: 81:* 44.**

http://www.publish.csiro.au/?act=view\_file&file\_id=MU9810044.pdf (LKR).

**Comment:** Suggests Hutton's shearwater may circumnavigate Australia in an anti-clockwise direction.

Gives references not yet located: Australian bird bander 11:85, 1973; Corben *et al.* Sunbird 5: 55-56, 1974; Vernon, D.P., Sunbird 8: 92, 1977.

**Waugh, S.M.; Tennyson, A.J.D.; Taylor, G.A.; Wilson, K.-J. 2013. Population sizes of shearwaters (*Puffinus* spp.) breeding in New Zealand, with recommendations for monitoring. *Tuhinga 24:* 159-204.** http://www.tepapa.govt.nz/SiteCollectionDocuments/TePapaPress/Tuhinga/Tuhinga24/Populationsizesofshearwaters.pdf

**Abstract:** We reviewed population data for the nine taxa of shearwaters *Puffinus* spp. that nest in the New Zealand region. Data for about 350 current breeding colonies were found, and each taxon nested at between three and about 180 localities. We reviewed the information to assess time-series of information for each population and, where possible, to determine trend and total population size. However, few of the species had robust enough information to allow those assessments to be made. We recommend high-priority sites for future monitoring, and encourage other researchers to publish or make available findings from previous work to assist in building a comprehensive picture of the status of shearwater populations.

**West, J.A.; Imber, M.J. 1985. Some foods of Hutton's shearwater (*Puffinus huttoni*). *Notornis 32*: 333-336.**

http://notornis.osnz.org.nz/system/files/Notornis\_32\_4.pdf (LKR)

**Comment:** The stomach contents of 25 Hutton's shearwater (24 males/1 female) caught in a fishing net were examined. Specimens able to be tentatively identified were: fish juvenile clupeid possibly *Sprattus antipodum &* juvenile wrasse *Pseudolabrus* sp.; crustaceans *Nyctiphanes australis* & *Tenagomysis* sp.; juvenile squid *Notodarus* sp.

**Whitlock, F.L. 1937. A new petrel of the genus *Puffinus. Emu 37*:116-117.**

http://www.publish.csiro.au/?act=view\_file&file\_id=MU937116.pdf (LKR)

**Comment:** Reports on a bird found at Bunbury which was named *P. leptorhynchus* by Mathews and that Serventy (1939) ascribes to Hutton's shearwater.

**Wood, F.W. 1940. The white-breasted petrel of southern Australia. *Emu 39*: 277-278.**

http://www.publish.csiro.au/?act=view\_file&file\_id=MU939277.pdf (LKR)

**Comment:**  Reports on petrels found from southern Australia which may/may not be Hutton's shearwaters –See Whitlock (1937) and Serventy (1939).

**Wood, J. 2004. Annual and monthly patterns in recoveries of beach-wrecked Procellariiformes from Southland, New Zealand 1990-2000. *Notornis 51:* 103-112.**

http://notornis.osnz.org.nz/system/files/Notornis\_51\_2\_103.pdf (not LKR)

**Comment:**  Notes only 6 birds were identified in the period.

**Worthy, T.H. 1997. The Quaternary fossil history of South Canterbury, South Island, New Zealand. *Journal of the Royal Society of New Zealand 27*: 67-162.**

**Comment:** From OSNZ (2010): Possible Late Pleistocene-Holocene fossil and midden records from several parts of New Zealand reported here should be treated with caution because of uncertain identification

**Unpublished reports**  (All held by LKR unless stated)

**Cuthbert, R.J. 1999.** *The ecology of Hutton’s shearwaters*. Unpublished Ph.D. Thesis, University of Otago, New Zealand.

LKR has Ch 3. Adult survival and productivity of Hutton's shearwaters.

**Knevel, A. 2005**. Hutton’s shearwater, Mt. Uwerau nature reserve, Kowhai Stream colonies, Kaikoura Peninsula translocation Report 2005. Unpubl. DoC file WGNHO-224119.

**McGahan, P. 2007**. Hutton’s shearwater translocation programme, Kowhai Stream colony, to the Kaikoura Peninsula. March 2007. Unpubl. report. Department of Conservation.

**McGahan, P. 2008**. Hutton’s shearwater translocation programme, Kowhai Stream colony, to the Kaikoura Peninsula. March 2008. Unpubl. report. Department of Conservation.

**Molloy, J.; Davis, A. 1992**. *Setting priorities for the conservation of New Zealand’s threatened plants and animals.* Wellington, Department of Conservation. 44 p.

**WMIL. 2013.** Hutton’s shearwater: Report on the translocations of chicks to Re Rae o Atiu, March 2013. Wildlife Management International Ltd report for Hutton's Shearwater Charitable Trust.

**Williams, R. 2006.** Hutton’s shearwater translocation report, March 2006. Kowhai Stream colony, Mt Uerau to the Kaikoura Peninsula. Report prepared for the Department of Conservation.

**Williams, R. 2012***.* Hutton’s shearwater translocation report, March –April 2012. Report for Hutton's Shearwater Charitable Trust.

**Wragg, G. 1985.** The comparative biology of fluttering shearwater and Hutton's shearwater and their relationship to other shearwater species. M.Appl.Sci. thesis. Lincoln College, University of Canterbury.