

NSW Threatened Species Scientific Committee

Conservation Assessment of *Zosterops lateralis tephroleurus* Gould (Zosteropidae)

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Silvereye (Lord Howe Is. subsp.) *Zosterops lateralis tephroleurus* Gould (Zosteropidae)

Distribution: Endemic to Lord Howe Island, NSW

Current EPBC Act Status: Not listed

Current NSW BC Act Status: Vulnerable

Proposed listing on NSW BC Act: Delist

Reason for change: Genuine change resulting from threat management and conservation programs on Lord Howe Island which has led to a population increase.

Summary of Conservation Assessment

Zosterops lateralis tephroleurus was found to be ineligible for listing as a threatened species as none of the criteria were met.

Description and Taxonomy

Zosterops lateralis tephroleurus was first described as a valid species in 1855 by Gould, in Proceedings of the Zoological Society of London Volume 23, page 166:

“Head and upper surface bright olive-green, with a wash of grey across the shoulders; wings and tail slaty brown, margined with olive-green; throat dull yellow; around the eyes a circle of white feathers, below which is a mark of black; under surface pale vinaceous brown, becoming gradually paler on the lower part of the abdomen, and passing into the pale yellow of the under tail-coverts.”

Later studies have recognised that Gould's species is one island form of a species complex, and it is currently regarded as a subspecies of the widespread *Zosterops lateralis* (Latham, 1801) (Schodde and Mason 1999). *Zosterops* is the second largest avian genus and is thought to have speciated rapidly, with the age of the entire family estimated to be only two million years old (Black 2010), although later research dates species divergence in *Zosterops* to at least 3 Mya (Cornetti *et al.* 2015). Species within this genus share strong morphological traits, making taxonomic relationships difficult to discern using only phenotypic characters (Black 2010). *Zosterops* contains two widely distributed subspecies groups; the *Z. griseotinctus* group (Mees 1957) and the *Z. lateralis* group (Mees 1969).

Common names for *Zosterops lateralis tephroleurus* include the Lord Howe silvereye, Lord Howe white-eye, and little grinnell. The other species of *Zosterops* known from Lord Howe Island, *Z. strenuus* Gould, 1855, is extinct (PCO 2023).

Distribution and Abundance

The Lord Howe silvereye *Zosterops lateralis tephroleurus* is found only on Lord Howe Island. Lord Howe Island (-31.54°S, 159.08°E) is located 760 km northeast of Sydney in the Tasman Sea. The main island is approximately 11 km long, and only 2.8 km at the widest point, with a total land size of 14.55 km² and a maximum elevation of 875 m

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on its highest peak, Mt. Gower (DECC 2007; Hutton *et al.* 2007). The island was uninhabited by humans, including first nations people, until 1788, and was first settled in 1834. The island is a remnant of a large shield volcano which erupted 6.9-6.3 million years ago, making it topographically and geographically complex (Hutton *et al.* 2007; Williams and Jones 2022). The Lord Howe Island Group was colonised by lineages of flora and fauna from mainland Australia, New Zealand, and New Caledonia, and this diversity of sources combined with the island group's isolation has led to the evolution of a high number of endemic species and unique ecosystems (Auld and Leishman 2015). While there is a small town on the main island, development and tourism are strictly controlled; 75% of the main island, and all other islands in the Lord Howe Island Group, are conservation protected, and the island group is UNESCO world heritage listed (DECC 2007).

The Area of Occupancy (AOO) for *Zosterops lateralis tephroleurus* is 32 km², based on 2 x 2 km grid cells, the scale recommended for assessing AOO by the IUCN (2022). The Extent of Occurrence (EOO) is 17.69 km² and is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by the IUCN (2022). In this restricted setting the EOO is constrained by the size of the Island and is less than the estimates of the AOO. Where the EOO is less than or equal to the AOO, the IUCN guidelines recommend EOO estimates be changed to be equal to AOO to ensure consistency with the definition of AOO as an area that fits within EOO (IUCN 2022); as such, the EOO under this scenario is also 32 km². The EOO and AOO were estimated based on records available from Atlas of Living Australia (ALA) and BioNet.

There has been minimal reporting or monitoring of the abundance for *Zosterops lateralis tephroleurus*, making population estimates uncertain. Higgins *et al.* (2006) roughly estimated a total population of 30,000 individuals on the island. In preparation for the Rodent Education Program (REP) on Lord Howe Island in 2017, the Department of Planning and Environment (DPE) and Canberra Ornithological Group (COG) developed a formula for crudely approximating the population of *Z. l. tephroleurus* (N. Carlile pers. comm. March 2023; COG and LHIB 2018). The recorded occurrence frequency, defined as the number of plots on which a particular species was recorded divided by the total number of plots, was measured across Lord Howe Island in 96 survey plots with a 50 m radius, monitored for ten-minute periods, which was repeated four times (N. Carlile pers. comm. March 2023; COG and LHIB 2018). In 2017 survey results gave an occurrence frequency for *Z. l. tephroleurus* of 1.97. For planning purposes (rather than ecological certainty) they estimated a total of 15,917 individuals at that time (N. Carlile pers. comm. March 2023; COG and LHIB 2018). The plausible range based on these counts is 14,973–16,860 (N. Carlile *in litt.* November 2023).

In 2019, the Lord Howe Island Rodent Eradication Program (REP) was implemented. Using the same methods as the 2017 surveys, the estimated occurrence frequency of *Zosterops lateralis tephroleurus* was recorded in 2021 (post-REP) and produced an occurrence frequency of 4.0 (O'Dwyer *et al.* 2023). This does not necessarily equate to a doubling of the population due to low confidence from the method; however, the figures clearly indicate that the population has increased (N. Carlile pers. comm. March 2023).

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Zosterops lateralis tephropleurus occurs in one threat-defined location, as per the IUCN definition (2022) This is due to being endemic to Lord Howe Island and the threat posed by the most serious plausible threat of avian pox *Avipoxvirus*.

Ecology

Habitat

Zosterops lateralis tephropleurus can reach elevations of 1850 m and occupy most habitats on Lord Howe Island with moderate cover of vegetation, including shrublands, heath woodlands, forests, rainforests, mangroves, and coastal areas (Higgins *et al.* 2006). As *Zosterops lateralis* is considered a highly tolerant species and common in suburban areas, *Z. l. tephropleurus* is most frequently observed within the settlement area of Lord Howe Island (Blair 1996). However, the major part of its distribution on Lord Howe Island is in areas protected under the Lord Howe Island Act, 1953 (DECC 2007).

Diet

Zosterops lateralis tephropleurus is an omnivorous, opportunistic species (Rooke 1984), feeding on a wide variety of fruits, insects and other invertebrates, as well as nectar, flowers, seeds and food scraps (Higgins *et al.* 2006). Foraging occurs in small groups from ground up to canopy of trees as well as in air, using a variety of foraging methods, including gleaning of shrubbery and grasses (Higgins *et al.* 2006). It can be inferred from what is known about the general *Z. lateralis* species, that *Z. l. tephropleurus* may travel across the landscape to utilise a variety of food sources, with a specialist skill adaption that allows them to recognise the richest sources of arthropod prey on plants (Waite *et al.* 2013).

Reproductive ecology

Zosterops lateralis tephropleurus has an estimated generation length of 4 years. This estimate has been inferred using data from the closely related Heron Island subspecies *Zosterops lateralis chlorocephalus* (Knape *et al.* 2011) and calculated using IUCN (2022) methods.

Zosterops lateralis tephropleurus breeds in spring and summer. The full breeding cycle lasts approximately 10 weeks and breeding pairs can raise up to three clutches during a single season (Higgins *et al.* 2006). Clutch sizes are usually between two to four (Higgins *et al.* 2006). Pair bonds are maintained throughout the year and individuals within the pair actively seek contact through allopreening and huddling to strengthen their bond (Higgins 2006). *Zosterops lateralis tephropleurus* are reproductively capable at 9 months of age and juveniles usually pair permanently during their first winter (Catterall *et al.* 2008).

Breeding pairs defend large areas in which both feeding and breeding activities occur (Catterall *et al.* 2008). During breeding, adults have been observed feeding on smaller insects while carrying larger arthropods and figs back to feed the nestlings (Catterall *et al.* 2008). The defence of breeding areas is undertaken by both members of the breeding pair, with the most aggressive defence seen at the earlier stages of breeding and incubation. As a result, the exclusion of potential competitors for food provides the territory holding breeding pair with a guaranteed food supply. The provision of consistent food is vital, as the survival of juveniles is strongly associated with good rainfall and food availability (Ford 1989; Catterall *et al.* 2008). Ford (1989) found that

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the similar subspecies population which occupies Heron Island, *Zosterops lateralis chlorocephalus*, can be highly influenced by changes in weather patterns. Storms and cyclones can impose high mortality and reduce the breeding density, as a result of reduction in food and resource abundance (Ford 1989).

Threats

While there may be several threats operating on *Zosterops lateralis tephroleurus*, there is no evidence to suggest that these threats are contributing to population decline, nor are they likely to drive the species to near extinction within a very short time.

Threats listed for *Zosterops lateralis tephroleurus* include clearing of lowland forest areas, invasive plant species, introduction of non-native invertebrates, and competition and predation from other introduced species (OEH 2019). However, biodiversity conservation agreements and management plans have been created for Lord Howe Island. Under the Lord Howe Island Regional Environmental Plan (PCO 2005), no development can result in any damage or removal of significant vegetation; therefore, the clearing of lowland forest areas is no longer considered a threat. Avian Pox is a plausible future threat.

Avian Pox *Avipoxvirus*

Avian Pox *Avipoxvirus* has been reported around the world in more than 278 avian species and is most frequently observed in passerine birds, including *Zosterops lateralis* (Sarker *et al.* 2017). It is commonly characterised by proliferative cutaneous lesions and is transmitted through a break in the skin or biting insects (Carrete *et al.* 2009). Susceptibility to Avian Pox varies between species (Kleindorfer and Dudaniec 2006; Zylberberg *et al.* 2012) and has been correlated with feeding behaviour (Carrete *et al.* 2009), habitat (Kleindorfer and Dudaniec 2006; Zylberberg *et al.* 2012), and innate immune function (Zylberberg *et al.* 2012). In general, poxviruses have been present in bird populations for long periods of time, which has led to low levels of infection and relatively mild and slow distribution of disease (Wildlife Health Australia 2012). Avian pox in wild populations (~1%) has been proposed as a contributing factor in the extinction of endemic island birds in both Hawaii and the Galapagos (van Riper *et al.* 2002; Wikelski *et al.* 2004; Carrete *et al.* 2009), although the disease rarely results in mortality (van Riper *et al.* 2002).

Avian Pox has been previously reported on Lord Howe Island, occurring in pacific shearwaters *Ardenna* spp., flesh-footed shearwaters *Ardenna carneipes* and wedge-tailed shearwaters *Ardenna pacificus*; however, transmission pathways are not well understood (Sarker *et al.* 2017). Rodents and other invasive pests, as well as raptor predator-prey interactions, have been identified as potential modes of Avian Pox transmission (Sarker *et al.* 2017).

There is limited information available on the effects of Avian Pox on *Zosterops lateralis*. One study from New Zealand found infected individuals to have lower body mass, less fat reserves, and altered white blood cell counts, relative to healthy individuals, although the sample size was small, and differences were not statistically significant (Taylor 2012). Given the available information, Avian Pox does not appear to pose a significant threat to the established *Z. l. tephroleurus* population on Lord Howe Island.

Introduction of non-native species

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The Lord Howe Island Biodiversity Management Plan states that “the impact of introduced invertebrates is potentially one of the most critical threatening processes affecting the survival of native species and ecosystems of the Lord Howe Island Group (LHIG)... Alien invertebrate species have the potential to have severe impacts on the native biota” (DECC 2007). The introduction of the African big-headed ant (*Pheidole megacephala*) on Lord Howe Island has caused severe environmental impacts through aggressive predation that has reduced diversity and abundance of native invertebrate species (LHIB 2023). It is inferred that *P. megacephala* has both direct and indirect impacts on *Zosterops lateralis tephropleurus*. In Hawaii, *P. megacephala* worker ants have been observed attacking, killing, and feeding on three-week old Japanese white-eye *Zosterops japonicus* hatchlings (Wetterer 2007). As well, *P. megacephala* are known to displace a variety of native invertebrate species and consequently reduce food abundance for *Z. l. tephropleurus* (Wetterer 2007).

In 2007, the Lord Howe Island Board (LHIB) began an eradication program to remove *Pheidole megacephala* from the island. Using a targeted mapping and baiting technique, the last colony of *P. megacephala* was killed in 2016, and as of April 2018 the LHIB declared the Island free from the ants (Hoffman 2018). However, in October of 2018 and again in May of 2019, single infestations of *P. megacephala* were found and immediately delimited, treated, and removed (IUCN 2020).

Stringent biosecurity protocols and ongoing monitoring have also been put in place to prevent the *Pheidole megacephala* population from returning (Hoffman 2018); therefore, the introduction of non-native species presents a potential but not significant concern for this species at this time.

Predation by ship rats *Rattus rattus*

The introduction of rodents, specifically the ship rat *Rattus rattus*, has had a devastating effect on the native fauna on Lord Howe Island. After being accidentally introduced by a supply ship in 1918, the rat population increased dramatically and up to the commencement of the Rodent Eradication Program rats and mice were widely distributed in all terrestrial habitats on the island (O’Dwyer *et al.* 2023). The presence of ship rats has been implicated in the decline and extinction of two lizard species, ten invertebrate species, and five bird species on the island, including the robust white eye *Zosterops strenuus* (DECC 2007; O’Dwyer *et al.* 2023). Rat consumption of plants and seeds has also driven habitat and floristic change (O’Dwyer *et al.* 2023). Predation by ship rats on *Zosterops lateralis tephropleurus* has not been directly observed on Lord Howe Island; however, the bird lays its nest in shrubs close to or on the ground, leaving the nests and fledglings potentially vulnerable to predation (Garnet *et al.* 2011; van Heezik *et al.* 2008).

In response to the ongoing challenge of introduced rodents on Lord Howe Island, a Rodent Eradication Program (REP) was implemented in 2019 (Harper *et al.* 2020). This has led to an elimination of both house mouse and ship rat populations, with continuous rodent monitoring and detection indicating that the rodents have been removed from the main island (Harper 2023). While still considered a plausible future threat, the stringent biosecurity and monitoring protocols established on the Island means there is a low probability of a reintroduction. Furthermore, the lack of evidence to suggest prior predation by rodents on *Zosterops lateralis tephropleurus* mean the species is unlikely to be threatened with extinction by rodents within a very short timeframe.

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Invasive plant species

Invasive plants threaten biodiversity on Lord Howe Island by competing with native vegetation and transforming habitats to the detriment of native species. Invasive plants on Lord Howe Island include herbaceous and ground layer plants, shrubs, trees, vines, and epiphytes, and occur in all structural layers of forested ecosystems on the island (LHIB 2016). There are seventeen formally listed species of noxious weeds on Lord Howe Island, with a further 28 species that may lead to further potential problems (Hutton *et al.* 2007).

According to the Lord Howe Island Weed Management Strategy 2016-2025 (LHIB 2016), all invasive plants on Lord Howe Island potentially have an indirect impact on the *Zosterops lateralis tephroleurus* population; however, evidence is lacking that this threat has caused or will cause declines in the species. Invasive plants present a plausible threat, by outcompeting native vegetation and simplifying plant community composition, which results in a loss of biotic interactions, decreases in suitable habitat, and alterations in the seasonality and availability of food resources (LHIB 2016). However, *Z. l. tephroleurus* is also regarded as one of the main vectors of fleshy fruited plants on Lord Howe Island, including those of invasive weed species (LHIB 2016). The species is a habitat generalist (Higgins *et al.* 2006), opportunistic (Rooke 1984), and feeds on a wide variety of fruits, amongst other resources (Higgins *et al.* 2006). It is considered highly tolerant, common in suburban areas and most frequently observed within the settlement area of Lord Howe Island (Blair 1996). These behavioural traits suggest that *Z. l. tephroleurus* is unlikely to be as disadvantaged as other birds from the presence of invasive plants. Furthermore, the presence of invasive plants is not considered to be contributing to continuing decline in either abundance or in habitat extent and quality. Therefore, invasive plants are not considered to be causing decline in the population of *Z. l. tephroleurus*, and this threat is unlikely to drive the population of *Z. l. tephroleurus* to extinction within a short period of time if it were to become apparent.

Assessment against IUCN Red List criteria

For this assessment it is considered that the survey of *Zosterops lateralis tephroleurus* has been adequate and there is sufficient scientific evidence to support the listing outcome.

Criterion A Population Size reduction

Assessment Outcome: Data deficient.

Justification: There are insufficient data to estimate, infer or project the magnitude of past or future reductions in the population size of *Zosterops lateralis tephroleurus*. As such, under a three-generation timespan, a population size reduction of $\geq 50\%$ for reversible, understood, and ceased causes (A1) or $\geq 30\%$ for continuing, not understood, or irreversible causes (A2, A3 and A4) has not been observed, nor is it predicted with confidence to occur up to 12 years (a three-generation timeframe) into the future.

Criterion B Geographic range

Assessment Outcome: Not met.

Justification: *Zosterops lateralis tephroleurus* is endemic to Lord Howe Island. The Area of Occupancy (AOO) has been calculated as 32 km², meeting the threshold for

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Endangered. The Extent of Occurrence (EOO) of *Z. l. tephroleurus* has been calculated as 17.69 km², which meets the threshold for listing as Critically Endangered. However, where EOO is less than or equal to AOO the IUCN guidelines recommend EOO estimates be changed to be equal to AOO to ensure consistency with the definition of AOO as an area that fits within EOO (IUCN 2019); therefore, the EOO under this scenario is also 32 km².

In addition to these thresholds, at least two of three other conditions must be met to satisfy listing under Criterion B. These conditions are:

- a) The population or habitat is observed or inferred to be severely fragmented or there is 1 (CR), ≤5 (EN) or ≤10 (VU) locations.

Assessment Outcome: Met.

Justification: *Zosterops lateralis tephroleurus* is not considered to be severely fragmented as >50% of its AOO is considered sufficient to support a viable population (IUCN 2022)

Zosterops lateralis tephroleurus occurs in one threat-defined location, as per the IUCN definition (2022) This is due to being endemic to Lord Howe Island and the threat posed by the most serious plausible threat of Avian Pox *Avipoxvirus*. With only one location *Z. l. tephroleurus* meets the threshold for Critically Endangered under this condition.

- a) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals

Assessment Outcome: Not met.

Justification: As an endemic island species, it is inferred the AOO and EOO of *Zosterops lateralis tephroleurus* will remain stable, as will the number of locations. In 2017, prior to the implementation of the Lord Howe Island Rodent Eradication Program (REP), the Canberra Ornithological Group estimated the *Z. l. tephroleurus* population to be 14,973–16,860 individuals (N. Carlile *in litt.* November 2023). In 2019, the REP was implemented. In 2021, surveys were undertaken again and found an increase in the occurrence frequency of *Z. l. tephroleurus* (O'Dwyer *et al.* 2023), indicating a population increase (N. Carlile pers. comm. March 2023).

Despite the inferred decline in habitat quality from invasive plants (LHIB 2016), since monitoring has commenced, there has been an observed increase in the number of mature individuals (N. Carlile pers. comm. March 2023). As one of the main vectors of fleshy fruited plants on Lord Howe Island, including those of invasive weed species (LHIB 2016), *Zosterops lateralis tephroleurus* is unlikely to be as disadvantaged as other birds from the presence of invasive plants. Furthermore, the presence of invasive plants is not considered to be contributing to continuing decline in either abundance or habitat extent and quality. The species is a habitat generalist (Higgins *et al.* 2006), opportunistic (Rooke 1984), and feeds on a wide variety of fruits, amongst other resources (Higgins *et al.* 2006). It is considered highly tolerant, common in suburban areas and most frequently observed within the settlement area of Lord Howe Island (Blair 1996). Therefore, it is inferred that

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any decline in habitat quality resulting from invasive plants that is likely to adversely affect other species on Lord Howe Island is unlikely to adversely affect *Z. l. tephroleurus*.

b) Extreme fluctuations.

Assessment Outcome: Not met.

Justification: *Zosterops lateralis tephroleurus* is not known or likely to undergo extreme fluctuations in its population.

Criterion C Small population size and decline

Assessment Outcome: Not met.

Justification: Although there are no accurate estimates for the population size of *Zosterops lateralis tephroleurus*, a rough approximation was produced by the Canberra Ornithological Group in 2017, which indicated there were estimated to be 14,973–16,860 individuals on the island in 2017 (N. Carlile *in litt.* November 2023). Since this estimate, further surveys conducted in 2021 have shown the occurrence frequency of the species to have doubled (O'Dwyer 2022). These figures indicate that, despite not having accurate figures for the number of mature individuals, it is almost certain that population size exceeds the threshold for Vulnerable.

At least one of two additional conditions must be met. These are:

- C1. An observed, estimated or projected continuing decline of at least: 25% in 3 years or 1 generation (whichever is longer) (CR); 20% in 5 years or 2 generations (whichever is longer) (EN); or 10% in 10 years or 3 generations (whichever is longer) (VU).

Assessment Outcome: Not met.

Justification: There is no evidence to support an observed, estimated or projected continuing decline of *Zosterops lateralis tephroleurus* population. Rather, there is evidence that demonstrates an increase in population size between 2017 and 2021 as a result of the Rodent Eradication Program on the island.

- C2. An observed, estimated, projected or inferred continuing decline in number of mature individuals.

Assessment Outcome: Not met.

Justification: There is no estimate of population dynamics of *Zosterops lateralis tephroleurus*. However, the total population size was estimated to be 14,973–16,860 in 2017 and there is evidence that demonstrates a significant increase in population size between 2017 and 2021 following the success of the Rodent Eradication Program.

In addition, at least 1 of the following 3 conditions:

- a (i). Number of mature individuals in each subpopulation ≤ 50 (CR); ≤ 250 (EN) or ≤ 1000 (VU).

Assessment Outcome: Not met.

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Justification: The estimated total population in 2017 was 14,973–16,860 and this has since increased. With this population estimate, it can be inferred that the number of mature individuals exceeds the threshold for Vulnerable.

- a (ii). % of mature individuals in one subpopulation is 90-100% (CR); 95-100% (EN) or 100% (VU)

Assessment Outcome: Met.

Justification: As an endemic species, *Zosterops lateralis tephroleurus* is restricted to Lord Howe Island and 100% of mature individuals occur in one population; therefore, meeting the threshold for Vulnerable under this condition.

- b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: Not met.

Justification: *Zosterops lateralis tephroleurus* is not known or likely to undergo extreme fluctuations in its population.

Criterion D Very small or restricted population

Assessment Outcome: Not met.

Justification: The *Zosterops lateralis tephroleurus* population is endemic to Lord Howe Island and the number of locations has been assessed as one and the estimated total population in 2017 was 14,973–16,860 and has since increased.

To be listed as Vulnerable under D, a species must meet at least one of the two following conditions:

- D1. Population size estimated to number fewer than 1,000 mature individuals

Assessment Outcome: Not met.

Justification: There is little information regarding the number of mature individuals in the population; however, total population is estimated to be 14,973–16,860 in 2017 and this has increased. Therefore, *Zosterops lateralis tephroleurus* does not meet the threshold for this condition.

- D2. Restricted area of occupancy (typically <20 km²) or number of locations (typically <5) with a plausible future threat that could drive the taxon to CR or EX in a very short time.

Assessment Outcome: Not met.

Justification: *Zosterops lateralis tephroleurus* is endemic to Lord Howe Island and as such, there is only one subpopulation. Furthermore, there is only one threat-defined location. The identified plausible future threat of Avian Pox *Avipoxvirus* may negatively impact the *Z. l. tephroleurus* population; however, as a slow spreading disease with low mortality rates it is unlikely that this threat will cause significant declines in population or rapidly drive the species to Critically Endangered or Extinct within a very short period of time. Given the available information, Avian Pox does not appear to pose a significant threat to the established *Z. l. tephroleurus* population on Lord Howe Island.

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Criterion E Quantitative Analysis

Assessment Outcome: Data deficient

Justification: No quantitative analysis has been carried out to assess the probability of extinction in this taxon.

Conservation and Management Actions

Zosterops lateralis tephroleurus is currently listed on the NSW *Biodiversity Conservation Act 2016* and a conservation project has been developed by the NSW Department of Planning and Environment under the Saving our Species program. The conservation project identifies priority locations, critical threats and required management actions to ensure *Z. l. tephroleurus* is extant in the wild in 100 years. *Zosterops lateralis tephroleurus* sits within the Site-managed species stream of the SoS program and the conservation project can be viewed here:

<https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10899/>.

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Expert Communications

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APPENDIX 1

Assessment against *Biodiversity Conservation Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: *Zosterops lateralis tephroleurus* was found to be ineligible for listing as a threatened species as none of the Clauses were met.

Clause 4.2 – Reduction in population size of species (Equivalent to IUCN criterion A)

Assessment Outcome: Data deficient.

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions (Equivalent to IUCN criterion B)

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Assessment Outcome: Not met.

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
	(i)	an index of abundance appropriate to the taxon,	
	(ii)	the geographic distribution of the species,	
	(iii)	habitat area, extent or quality,	
	(iv)	the number of locations in which the species occurs or of populations of the species,	
	(f)	extreme fluctuations occur in any of the following:	
	(i)	an index of abundance appropriate to the taxon,	
	(ii)	the geographic distribution of the species,	
	(iii)	the number of locations in which the species occur or of populations of the species.	

Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion C)

Assessment Outcome: Not met.

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low,
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
	(i)	for critically endangered species	very large, or
	(ii)	for endangered species	large, or
	(iii)	for vulnerable species	moderate,

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	(e)	both of the following apply:		
	(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and		
	(ii)	at least one of the following applies:		
	(A)	the number of individuals in each population of the species is:		
	(I)	for critically endangered species	extremely low, or	
	(II)	for endangered species	very low, or	
	(III)	for vulnerable species	low,	
	(B)	all or nearly all mature individuals of the species occur within one population,		
	(C)	extreme fluctuations occur in an index of abundance appropriate to the species.		

**Clause 4.5 - Low total numbers of mature individuals of species
(Equivalent to IUCN criterion D)
Assessment Outcome: Not met.**

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

**Clause 4.6 - Quantitative analysis of extinction probability
(Equivalent to IUCN criterion E)
Assessment Outcome: Data deficient.**

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

**Clause 4.7 - Very highly restricted geographic distribution of species–vulnerable species
(Equivalent to IUCN criterion D2)
Assessment Outcome: Not met.**

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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APPENDIX 2

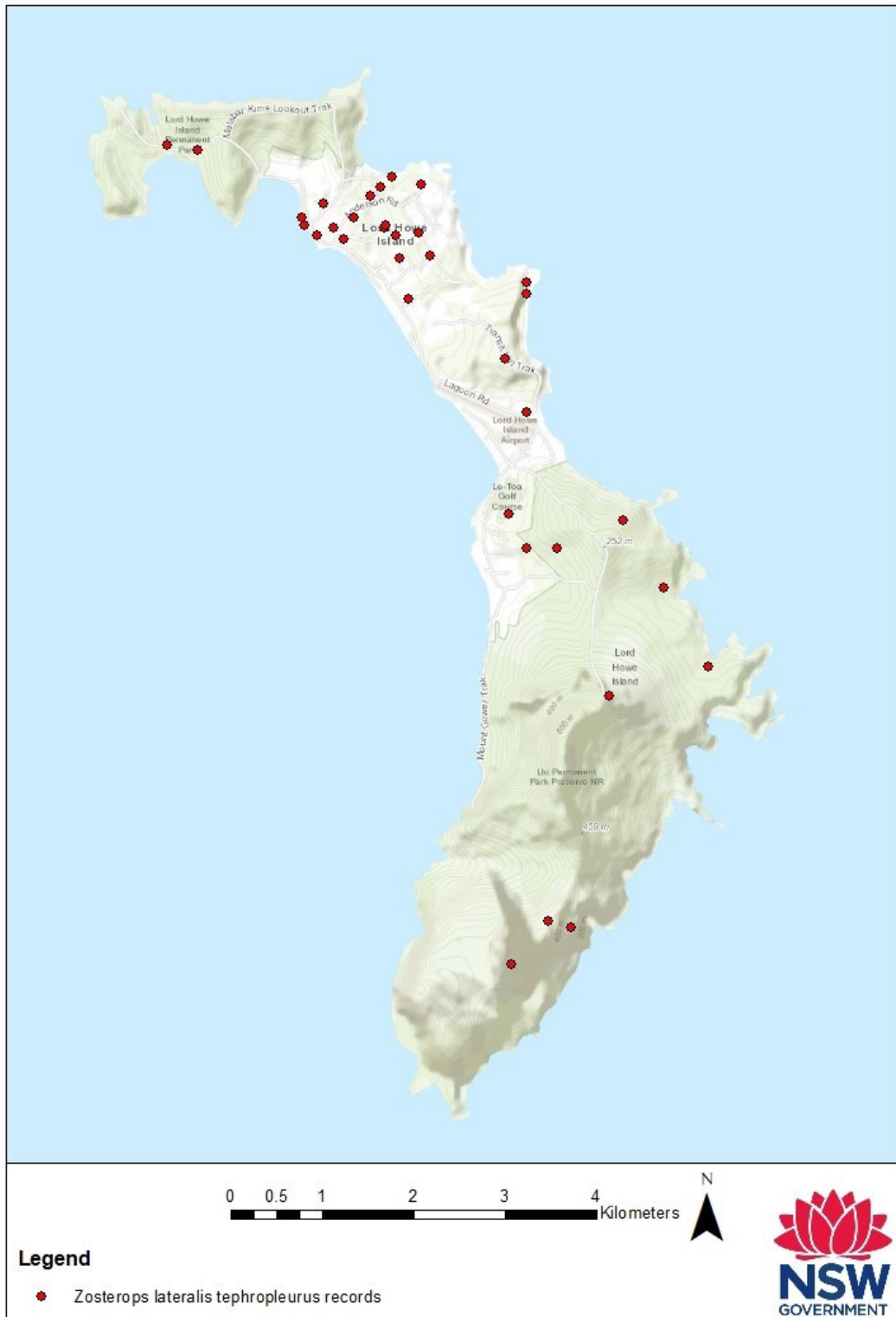


Figure 1. Records of *Zosterops lateralis tephroleurus* on Lord Howe Island. Data collated from Atlas of Living Australia (ALA) and BioNet.