Conservation Assessment of Lord Howe Pied Currawong *Strepera graculina crissalis* Sharpe, 1877 (Artamidae)

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NSW Threatened Species Scientific Committee

Lord Howe Pied Currawong *Strepera graculina crissalis* Sharpe, 1877

Distribution: Endemic to Lord Howe Island (NSW)
Current EPBC Act Status: Vulnerable
Current NSW BC Act Status: Vulnerable

Proposed listing on NSW *BC Act* and *EPBC Act*: Vulnerable

Conservation Advice: Lord Howe Pied Currawong *Strepera graculina crissalis* Sharpe, 1877 (Artamidae)

Summary of Conservation Assessment

The Lord Howe Pied Currawong *Strepera graculina crissalis* was found to be eligible for listing as Vulnerable under Criterion D1 (NSW *Biodiversity Conservation Act 2016* (BC Act) Clause 4.5 (c)) because the total population is greater than 250 and less than 1,000 mature individuals. A previous assessment of this subspecies by Carlile *et al.* (2021) considered the taxon to be Endangered. However, the population of Lord Howe Pied Currawong has increased following the successful rodent eradication program on Lord Howe Island in 2019.

Description and Taxonomy

The Lord Howe Pied Currawong *Strepera graculina crissalis* (Sharp 1877), is a sub-species (endemic to Lord Howe Island) of the Pied Currawong *Strepera graculina.* There are an additional five recognized sub-species of Pied Currawong that occur on mainland Australia.

The Lord Howe Pied Currawong is “a large bird about 46 cm in length (Hutton 1991). It is mostly glossy black, but has bright orange irides, a small patch of white on each wing (at the base of the primary feathers), a large patch of white around the undertail coverts, a small patch of white at the base of the tail, and a white tip on its tail (Higgins *et al.* 2006; Hutton 1991). The sexes are alike, but females are slightly smaller than males (Higgins *et al.* 2006; Schodde and Mason 1999). Juvenile and immature birds are similar to the adults, but they have a duller and (especially in juveniles) browner plumage, and juvenile birds also exhibit pale markings on the head, neck, upper body, breast and wings, and have a yellow gape and, for the first eight months, a yellow tip on the bill (Nicholas Carlile pers. comm. February 2024, Higgins *et al.* 2006).”

Distribution and Abundance

Abundance
The population of Lord Howe Pied Currawong was stable up to 2020, at around 235 mature individuals (Carlile *et al.* 2021, O’Dwyer *et al.* 2024), all in one subpopulation. A high proportion (60%) of the islands’ Currawongs were banded with colour bands (Carlile *et al.* 2021, O’Dwyer *et al.* 2024, Segal *et al.* 2021), which allowed detailed estimates of abundance to be made. In 2006, the population was estimated using mark–recapture methods using 169 banded birds to be 215±11 birds, of which 42 were

juveniles (Carlile and Priddel 2007). The total population appears to have been relatively stable between 2006 and 2020 (Carlile *et al.* 2021). Previous estimates, from the 1970s and 1980s of <100 birds (Recher and Clark 1974; Fullagar *et al.* 1974; Knight 1987; McFarland 1994) are considered the likely result of counting inaccuracy rather than recent population growth (Carlile *et al.* 2021). The extent of the island and topography impose a limitation on the number of breeding territories. The number of modelled territories was estimated as 84, based on nests located in 2017 and 2018 (Segal *et al.* 2021), prior to the 2019 rodent eradication program.

A minimum of 255 Lord Howe Pied Currawong, including adults and juveniles, were trapped and banded over the duration of the rodent eradication program that was undertaken across Lord Howe Island in 2019 (O'Dwyer *et al.* 2024). Over 200 individuals were captured and banded in 2019, with a subset (129 individuals) held as a captive insurance population during the eradication program and subsequently released (O'Dwyer *et al.* 2024). Trapping and banding of Currawongs continued throughout the eradication (leaving very few unbanded individuals), resulting in the identification of an additional 126 free-living adults and juveniles, providing a total minimum overall population of 255 individuals prior to rodent eradication (O'Dwyer *et al.* 2024). Survival of the >70 wild individuals during the eradication program was 65-85%, with at least six confirmed or suspected to have died due to non-target brodifacoum toxicity (Carlile *et al.* 2021, O'Dwyer *et al.* 2024).

Despite the absence of ongoing population monitoring, evidence indicates that the Lord Howe Pied Currawong population has increased to greater than 250 mature individuals since the rodent eradication program undertaken in 2019. Mark-recapture surveys, and additional surveys of breeding territories soon after the eradication (September–November 2020), suggest that the population was 213 (+/-15) mature individuals; a slight decrease on pre-rodent eradication program numbers (235 +/- 11) (O'Dwyer *et al.* 2024). However, plot surveys performed a further 12 months later in 2021 indicated that Lord Howe Pied Currawong numbers had subsequently increased, based on an increased frequency of occurrence in observational plots (O'Dwyer *et al.* 2024). The frequency of sightings of the Lord Howe Pied Currawong in plots increased from 0.45 pre-rodent eradication to 0.63 by late 2021 (T. O'Dwyer *in litt* April 2022). When compared to the 2019 population estimate of 235 mature individuals (O'Dwyer *et al.* 2024) this would equate to a population estimate of 329 mature individuals (235 x 1.4) in 2021. This is further supported by observational and anecdotal evidence. Banding ceased in 2020 and the proportion of banded adults in the population has subsequently declined, with large groups of unbanded adult and juvenile birds observed in 2023 (Nicholas Carlile pers. comm. February 2024). The last banding event in September and October 2020 resulted in 44 juveniles being banded, more than any of the three years (2016–2018) prior to the rodent eradication, indicating that the Currawongs were productive in the year following eradication (O'Dwyer *et al.* 2024). Larger flocks of Lord Howe Pied Currawongs have been observed across the island since the rodent eradication, including in areas where few birds previously occurred. This includes a group of 22 birds at Boat Harbour in May 2023—an area where only one pair of adults and up to three juveniles had been observed in the decade prior (Leon Brice pers. comm. February 2024). Given that the estimate for just prior to the rodent eradication was 235 (+/- 11), it is highly likely that the population of mature individuals on the island is now greater than 250. The work by Segal *et al.*

(2021) identifies that there are limits in terms of nesting habitat across the island that will cap the total population, and this limit is less than 1,000 mature individuals.

Extent of occurrence and area of occupancy

Carlile *et al.* (2021) provide a maximum, minimum and best estimate of extent of occurrence (EOO) and area of occupancy (AOO) as well as an indication of reliability. The EOO of the Lord Howe Pied Currawong was estimated to be 26 (24–27) km^2 with a high reliability. The EOO is based on a minimum convex polygon enclosing all known mapped occurrences of the subspecies, the method of assessment recommended by IUCN (2022). Area of occupancy was estimated to be 16 (12–17) km^2 with a high reliability, based on the taxon occupying four 2 km x 2 km grid cells, the spatial scale of assessment recommended by IUCN (2022). Both AOO and EOO are stable (Carlile *et al.* 2021).

Ecology

The Lord Howe Pied Currawong occurs in all habitat types of Lord Howe Island, although nesting is confined to forested areas, typically tall rainforests and palm forests, near creek lines below ~120 m above sea level (SPRAT 2021; Segal *et al.* 2021). Life expectancy and the age of maturity are unknown, however, the subspecies is likely capable of living to more than 20 years of age (Higgins *et al.* 2006; SPRAT 2021). Breeding has been recorded from October to December (Hindwood 1940; McAllan *et al.* 2004; McFarland 1994; Mills undated; SPRAT 2021) but possibly commences in September (McAllan *et al.* 2004) or, even as early as July (Hull 1909).

The nest is cup-shaped and constructed from sticks and twigs, occasionally vines, between 3 m to 25 m off the ground under a high canopy and within an open vegetation structure of palms (*Howea* spp.) and *Pandanus forsteri* (Forky Tree) (SPRAT 2021; Segal *et al.* 2021). Nest trees reported by Segal *et al.* (2021) included *Cryptocarya triplinervis* (Blackbutt), *Drypetes deplanchei* (Greybark), *Syzygium fullagarii* (Scalybark), *Olea paniculata* (Maulwood) and *Ficus macrophylla columnaris* (Banyan). Nesting occurs in various vegetation communities including Greybark and Blackbutt rainforest, and Scalybark, Curly Palm (*Howea belmoreana*), Greybark, Cedar (*Guioa coriacea)*, Maulwood and Forky Tree lowland mixed forest (Segal *et al.* 2021). Two to three eggs, which are light brown to rufous-brown in colour, with darker spots and blotches of brown and grey are laid in the nest and nestlings are fed by both parents (Hindwood 1940; Hutton 1991; Carlile *et al.* 2021). Incubation period is 21 days and the young stay with the parents for about two months after fledging (SPRAT 2021; Segal *et al*. 2021). Breeding success was measured in the 2005–2006 breeding season, when five of twelve clutches observed produced at least one fledgeling, and one pair successfully reared two broods (a total of five fledgelings) (Carlile 2007, pers. comm. in SPRAT 2021). Generation length is estimated as 6.3 (range 4.7–7.9) years (Bird *et al.* 2020; Carlile *et al.* 2021).

The Lord Howe Pied Currawong is omnivorous and eats a variety of food items including fruits and seeds, insects and other invertebrates, small vertebrates, domestic poultry and the chicks of land and sea birds (Auld *et al*. 2010; Carlile and Priddel 2015; SPRAT 2021). Invertebrates comprise 65% of the diet, and vertebrates 21%, with the introduced skink *Lampropholis delicata* the most common vertebrate prey item (Carlile and Priddel 2007; Carlile *et al.* 2021). This subspecies is sedentary and breeding pairs

defend a territory year-round, with occasional excursion outside of forested habitats to forage in areas across the island, such as orchards, seabird colonies and bird feeders (Higgins *et al.* 2006; Segal *et al.* 2021). Average territory size ranges between 2.48 ha and 5.23 ha (Segal *et al.* 2021).

Threats

Carlile *et al.* (2021) identified there are no plausible existential threats, but noted the restricted area of occupancy makes the subspecies susceptible to catastrophes, such as the introduction of another predator or disease. Such an event could adversely affect the entire population of Lord Howe Pied Currawong within one generation, meaning that the species has only one threat-defined location. However, the risk of these catastrophes was assessed by Carlile *et al.* (2021) as low, owing to quarantine procedures that minimise the probability of alien invasions. Historically (until the 1980s) local residents persecuted currawongs for attacking poultry, white terns and woodhens but this is now a rare occurrence (Carlile and Priddel 2015; McAllan and Hutton 2020). Introduced species including black rats *Rattus rattus* (introduced in 1918), and masked owls *Tyto novaehollandiae* (introduced 1920s) (Hindwood 1940; McAllan *et al.* 2004), were thought to have little to no impact on this species, and have now been eradicated or are being actively managed (Carlile *et al.* 2021), however, the response of the subspecies post the rodent eradication suggests that rats and mice had a suppressing effect on the population.

Assessment against IUCN Red List criteria

For this assessment it is considered that the survey of Lord Howe Pied Currawong *Strepera graculina crissali* has been adequate and there is sufficient scientific evidence to support the listing outcome.

Criterion A *Population Size reduction*

Assessment Outcome: Not met

Justification: The population appears to be increasing since the successful rodent eradication program, with all breeding habitat occupied and a growing floating (non-breeding) population present (Segal *et al.* 2021, O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024).

Criterion B *Geographic range*

Assessment Outcome: Not met

Justification: The geographic distribution of this subspecies is very highly restricted (Carlile *et al*. 2021 list the AOO as 12-17 km^2 and the EOO as 24-27 km^2) and there is only one location, however, there is no evidence of decline or extreme fluctuation.

In addition to these thresholds, at least two of three other conditions must be met. 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 for critically endangered

   Justification: There is a single threat defined location. The island has a high proportion of forest cover and the currawong population is not fragmented.

b) 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: There is no evidence of ongoing decline. The population appears to be increasing since the successful rodent eradication program, with all breeding habitat occupied and a growing floating (non-breeding) population present (Segal *et al.* 2021, O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024). There is one subpopulation.

Criterion C Small population size and decline

Assessment Outcome: Not met

Justification: Prior to the rodent eradication completed in 2019 the population of Lord Howe Pied Currawongs LHI was assessed as being 235 (+/- 11) mature individuals (Carlile *et al.* 2021, O'Dwyer et al. 2024). The frequency of sightings of the Lord Howe Pied Currawong in plots increased from 0.45 pre-rodent eradication to 0.63 by late 2021 (T. O'Dwyer *in litt* April 2022). When compared to the 2019 population estimate of 235 mature individuals (O'Dwyer *et al.* 2024) this would equate to a population estimate of 329 mature individuals (235 x 1.4) in 2021. This is supported by further observational and anecdotal evidence of increasing population since the rodent eradication (O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024), which indicates no continuing decline.

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: The population appears to be increasing since the successful rodent eradication program, with all breeding habitat occupied and a growing floating (non-breeding) population present (Segal *et al.* 2021, T. O'Dwyer *in litt* April 2022, O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024).

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

Assessment Outcome: Not met

Justification: The population appears to be increasing since the successful rodent eradication program, with all breeding habitat occupied and a floating (non-breeding) population present (T. O'Dwyer *in litt* April 2022, O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024).

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: Met for Vulnerable

Justification: There is only one subpopulation. Prior to the rodent eradication completed in 2019 the population of Lord Howe Pied Currawongs was assessed as being 235 (+/- 11) mature individuals (Carlile *et al.* 2021, O'Dwyer et al. 2024). The frequency of sightings of the Lord Howe Pied Currawong in plots increased from 0.45 pre-rodent eradication to 0.63 by late 2021 (T. O'Dwyer *in litt* April 2022). When compared to the 2019 population estimate of 235 mature individuals (O'Dwyer *et al.* 2024) this would equate to a population estimate of 329 mature individuals (235 x 1.4) in 2021. Evidence of increasing population since the rodent eradication means that the upper bound of this assessment is highly likely to have been exceeded and the population is greater than 250 mature individuals, but not above 1000.

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

Assessment Outcome: Clause met for Critically endangered

Justification: 100% of individuals occur in a single subpopulation.

b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: Not met

Justification: Carlile *et al.* (2021) found no evidence for extreme fluctuations in the number of mature Lord Howe Pied Currawongs.

Criterion D Very small or restricted population

Assessment Outcome: Vulnerable (<1000 individuals)

Justification: The population is greater than 250 individuals and increasing since the successful 2019 rodent eradication program (Carlile *et al.* 2021, O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024).

To be listed as Vulnerable under Criterion 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: Met for Vulnerable.

Justification: Prior to the rodent eradication completed in 2019 the population of Lord Howe Pied Currawongs was assessed as being 235 (+/- 11) mature individuals (Carlile *et al.* 2021, O'Dwyer *et al.* 2024). The frequency of sightings of the Lord Howe Pied Currawong in plots increased from 0.45 pre-rodent eradication to 0.63 by late 2021 (T. O'Dwyer *in litt* April 2022). When compared to the 2019 population estimate of 235 mature individuals (O'Dwyer *et al.* 2024) this would equate to a population estimate of 329 mature individuals (235 x 1.4) in 2021. This is supported by further

observational and anecdotal evidence of increasing population since the rodent eradication (O'Dwyer *et al.* 2024, Nicholas Carlile pers. comm. February 2024, Leon Brice pers. comm. February 2024), which means that the upper bound of this assessment is highly likely to have been exceeded by 2024, and the population is greater than 250 mature individuals.

D2. Restricted area of occupancy (typically <20 km^2) 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: The AOO is less than 20km^2 and there is only one location, however, Carlile *et al.* (2021) identified there are no plausible future threats that would drive the subspecies to CR or EX in a very short time. Carlile *et al.* (2021) noted the restricted area of occupancy makes the subspecies susceptible to catastrophes, such as the introduction of another predator or disease, but that the risk is of such catastrophes was assessed as low, owing to quarantine procedures that minimise the probability of alien invasions. Furthermore, the presence of Black Rats on the island in very large numbers for over 100 years did not result in a listing of Critically Endangered, so a re-invasion of this species (which is unlikely to occur) is not likely to result in decline in Lord Howe Pied Currawongs to that status in a very short period of time.

Criterion E Quantitative Analysis

Assessment Outcome: Data Deficient

Justification: No population viability analysis available.

Conservation and Management Actions

Conservation objectives

- Stable population (Carlile *et al.* 2021)

Conservation actions under way

- Most habitat conserved as World Heritage Area (Carlile *et al.* 2021)
- Listed as threatened under appropriate legislation (Carlile *et al.* 2021)
- Quarantine procedures that minimise the probability of alien invasions (Carlile *et al.* 2021)
- Rodent eradication completed (Carlile *et al.* 2021, O'Dwyer *et al.* 2024)
- Area of forested habitat increasing with plantings by local residents (Carlile *et al.* 2021)

Research required

- Track population recovery following removal of rodents (Carlile *et al.* 2021, O'Dwyer *et al.* 2024)

Management actions required

- Maintain quarantine procedures (Carlile *et al.* 2021)

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Experts consulted

Nicholas Carlile, Senior Research Scientist, Conservation and Restoration Science Branch, DCCEEW.

Terry O'Dwyer, Gadfly Ecological Services, seabird ecologist and consultant.

Leon Brice, Lord Howe Island resident.

APPENDIX 1

Assessment against *Biodiversity Conservation Regulation 2017* criteria
Overall Assessment Outcome: The Lord Howe Pied Currawong *Strepera graculina crissalis* was found to be Vulnerable under Clause 4.5 (c)

Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)
Assessment Outcome: Not met

(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)
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,	
	(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: Vulnerable under Clause 4.5 (c)

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.