Publication date: 05/04/2024

Notice of and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the White-throated Needletail *Hirundapus caudacutus* (Latham, 1801) as a VULNERABLE SPECIES in Part 3 of Schedule 1 of the Act. Listing of Vulnerable species is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee is satisfied that *Hirundapus caudacutus* (Latham, 1801) has been duly assessed by the Commonwealth Threatened Species Scientific Committee under the Common Assessment Method as provided for by Part 4.14 of the Act. After due consideration of TSSC (2019), the NSW Threatened Species Scientific Committee has made a decision to list the species as Vulnerable.

Summary of Conservation Assessment

White-throated Needletail *Hirundapus caudacutus* (Latham, 1801) was found to be Vulnerable in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.2 (1)(c)(2)(b). The main reason for this species being eligible for listing in the Vulnerable category is the substantial decline in population, as observed in a decline (30-50%) in the mean number of individuals per flock over three generations (25.5 years).

The NSW Threatened Species Scientific Committee has found that:

1. There are two recognised subspecies of White-throated Needletail. Subspecies *caudacutus* occurs in central and eastern Siberia, northern Mongolia, northern China and the Korean Peninsula, Sakhalin and Japan, and migrates to spend the non-breeding season in Australasia. Subspecies *nudipes* is largely resident in the Himalayan region of Central Asia and does not occur in Australasia (Chantler 1999; Higgins 1999). Other common names for the White-throated Needletail include: Needle-tailed, Spine-tailed or White-throated Swift, Needletail or Northern Needletail, Needle-tailed, Pin-tailed or Prickly Swallow, Prickly Tail, Prickly Swift or Storm Bird (Higgins 1999).

2. The White-throated Needletail is a large swift with a thickset, cigar-shaped body, stubby tail and long pointed wings (20 cm in length and approximately 115–120 g in weight). Sexes are alike, with no seasonal variation in plumage. The adults have a dark-olive head and neck, with an iridescent gloss on the crown; the mantle and the back are paler, greyish; and the upperwings are blackish, sometimes with a greenish gloss, with a contrasting white patch at the base of the trailing edge; the uppertail is black with a greenish gloss. The face is dark olive with a narrow, white band across the forehead and lores and a white patch on the chin and throat. The underparts are generally dark-olive except for a U-shaped band across the rear flanks, the vent and the undertail coverts, and the undertail is black with a greenish gloss. The underwing is black brown with glossy grey-brown flight feathers. The bill is black, the eyes black-brown and the legs and feet are dark grey, sometimes with

a pinkish tinge. Juveniles have a similar appearance to the adults, but can be separated by duller plumage, with little gloss. The pale saddle is duller, contrasting less with the head, neck and uppertail; and the white band across the forehead and white patches on the upperwings and the vent and undertail coverts are all less prominent and duller (Higgins 1999).

3. In Australia, White-throated Needletails are mostly aerial, from heights of less than 1 m up to more than 1000 m above the ground (Coventry 1989; Tarburton 1993). Although they occur over most types of habitat, they are recorded most often above wooded areas, including open forest and rainforest, and may also fly below the canopy between trees or in clearings (Higgins 1999). When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (Emison and Porter 1978; Friend 1982; Tarburton 1993). In coastal areas, they have been observed flying over sandy beaches or mudflats (Cooper 1971; Crompton 1936; Davis 1965), and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (Cooper 1971; Dawson *et al.* 1991; Loyn 1980; Mitchell *et al.* 1996; Schulz and Kristensen 1994).

4. The White-throated Needletail is a trans-equatorial migrant, breeding in the Northern Hemisphere and flying south for the boreal winter (Higgins 1999). The species is generally gregarious when in Australia, sometimes occurring in large flocks, though they are occasionally seen singly. Occasionally the species occurs in mixed flocks with other aerial insectivores, including Fork-tailed Swifts (*Apus pacificus*) and Fairy Martins (*Hirundo ariel*) (Learmonth 1950, 1951; McMicking 1925; Wheeler 1959).

5. White-throated Needletails mainly enter Australia via the Torres Strait, usually during September and October, and sometimes in early November (Draffan *et al.* 1983; Warham 1962), and less often via the Arafura Sea (Warham 1962). The mean date of the first sighting in Australia is 22 October ± 27.62 days (range of 1 September and 27 December (Higgins 1999)), though over the last 50 years they have been noted as arriving earlier and leaving earlier in southeastern Australia (Beaumont *et al.* 2006). After reaching Australia, they move south along both sides of the Great Dividing Range in Queensland and NSW in October and November, usually arriving in southern parts of their range (Victoria and Tasmania) in November, with increasing numbers recorded from December and peaking in March (Emison *et al.* 1987; Higgins 1999).

6. The White-throated Needletail is widespread in eastern and south-eastern Australia (Barrett *et al.* 2003; Blakers *et al*. 1984; Higgins 1999). In eastern Australia, the species is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains. Further south on the mainland, it is widespread in Victoria, though more so on and south of the Great Dividing Range, and there are few records in western Victoria. The species occurs in adjacent areas of south-eastern South Australia, where it extends west to the Yorke Peninsula and the Mount Lofty Ranges. It is widespread in Tasmania (Barrett *et al*. 2003; Blakers *et al*. 1984; Higgins 1999). While the northern tropical coast may be a more regular migration route than previously realised (Tarburton 2021), White-throated

Needletails are often recorded as vagrants in the Northern Territory and in Western Australia (Barrett *et al.* 2003; Blakers *et al*. 1984; Brooker *et al.* 1979; Sedgwick 1978; Slater 1964; Storr 1987; Storr *et al.* 1986; Wheeler 1959) as well on various outlying islands, including Norfolk, Lord Howe, Macquarie, Christmas and Cocos-Keeling Islands (Barrand 2005; Green 1989; McAllan *et al.* 2004; Schodde *et al.* 1983; Stokes *et al.* 1984; Warham 1961).

7. Northward migration from Australia by White-throated Needletails begins between mid-March and April (Higgins 1999). A few birds occasionally remain in Australia during the breeding season (Higgins 1999). When undertaking northern migration to return to their breeding grounds in the Northern Hemisphere, the majority of the White-throated Needletail population passes through New Guinea in March and April (Eastwood and Gregory 1995; Hicks 1990) and are thought to mostly travel east of Borneo (Smythies 1957, 1981). There are records of birds on northward passage through Indonesia in March and April (Coates and Bishop 1997; Smythies 1957, 1981; White and Bruce 1986), and there are records from the Malay Peninsula, between March and mid-May (Medway and Wells 1976; Wells 1999). They are also recorded passing through Hong Kong between mid-March and mid-May (Chalmers 1986; Chantler and Driessens 1995), and eastern China in May. White-throated Needletails arrive back at their breeding grounds in the Northern Hemisphere in mid-May (Chantler 1999; Chantler and Driessens 1995; Dement'ev and Gladkov 1951).

8. The White-throated Needletail breeds in wooded lowlands and sparsely vegetated hills as well as mountains covered with coniferous forests in eastern Siberia, north-eastern China, the Korean Peninsula and Japan, with recent severe range contractions noted in some of these areas such as northern Japan (Tamada 2020). The species leaves the breeding grounds between late August and October, flying singly or in scattered flocks (Chantler 1999; Dement'ev and Gladkov 1951).

9. White-throated Needletails lay eggs from late May to early June in their breeding grounds in the Northern Hemisphere (Chantler 1999). They roost in trees amongst dense foliage in the canopy or in hollows (Corben *et al.* 1982; Day 1993; Quested 1982; Tarburton 1993, 2015). The nest is placed in a vertical hollow in a tall coniferous tree or on a vertical rock-face, either comprising a small bracket or half-cup of thin twigs and straw cemented together by the bird's saliva and glued to the side of the hollow or rock (Roberts 1991), or a shallow scrape among debris accumulated at the bottom of a tree hollow (Chantler 1999). White-throated Needletails will also utilise artificial nest boxes when they are made available (Yamaguchi *et al.* 2020). Clutches usually comprise two eggs (Dement'ev and Gladkov 1951; Yamashina 1962) but some may be as large as seven eggs (Chantler 1999), and these are incubated by both sexes for 40 days (Chantler 1999). The chicks fledge after 40–42 days (Chantler 1999; Dement'ev and Gladkov 1951; Yamashina 1962).

10. During the non-breeding season in Australia, White-throated Needletails have been recorded eating a wide variety of insects, including beetles, cicadas, flying ants, bees, wasps, flies, termites, moths, locusts and grasshoppers (Cameron 1968; Madden 1982; Rose 1997; Tarburton 1993).

11. There are no published details of the ages of sexual maturity or life expectancy of the White-throated Needletail; however, the estimated generation time is 8.5 years (BirdLife International 2018).

12. In Australia, the extent of occurrence for the White-throated Needletail is estimated at >20,000 km^2, and the area of occupancy estimated at >18,000 km^2. These figures are based on the mapping of point records from post 1997 species observations, obtained from state governments, museums, CSIRO, and Birdlife Australia. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014 (DAWE 2015).

13. The White-throated Needletail population size in Australia has not been quantified, but it is not believed to be less than 10,000 mature individuals (BirdLife International 2018).

14. There has been substantial and continuous decline in the number of recorded counts of individuals of White-throated Needletails in Australia. Tarburton (2014) reported that based on data collected between 1998 and 2002, the *New Atlas of Australian Birds* (Barrett et al. 2003) indicated a 49 per cent decline in reporting rates (number of records as a proportion of number of surveys, adjusted for the survey method, season and size of area searched) compared with those of the first *Atlas of Australian Birds* conducted between 1977 and 1981 (Blakers *et al*. 1984). Each decade after 1950, a progressive decline in the mean number of White-throated Needletails counted per flock has occurred (Tarburton 2014, 2021). Australia-wide trends in mean number of White-throated Needletails counted per flock have fallen from 164 ± 37.3 in 1951-1960 to 42 ± 1.7 in 2001-2010 (Tarburton 2014). These declines are continuing with more recent data indicating that the mean number counted per flock between 2011-2020 has fallen to 33 ± 0.6 (Tarburton 2021). Tarburton (2014) demonstrated that from three sites in Victoria, at the level of each eastern state and at the national scale, a 30-50 per cent decline in the species flock size has occurred over three generations (25.5 years).

15. A suspected, current threat to the White-throated Needletail is habitat loss and fragmentation through logging of breeding habitat and loss of habitat in the non-breeding range. It is thought that logging of taiga forests in Siberia, where most of the population breeds, poses the greatest risk by removing old trees and stumps that contain hollows which this species uses to breed (Newell *et al*. 2000; Crowley 2005; Smirnov *et al*. 2013). The loss of roosting sites in Australia may also be contributing to the decline of the species. Loss of forest and woodland habitats may have resulted in the reduction of invertebrate prey (Tarburton 2014).

16. Direct mortality from wind turbines and overhead wires is a known, current threat to White-throated Needletails. Impacts from wind farms can be categorised as direct, through collisions with wind turbines, and indirect, through barrier and alienation, with the potential to reduce access to habitat. In Australia there is evidence of collision with wind turbines, (Hull 2013), overhead wires (Cameron and Hinchey 1981; Campbell 1930; Wheeler 1965), windows (Slater 1964) and lighthouses (Draffan *et al*. 1983; Stokes 1983) but the scale of impact at the population level requires further investigation. However, collision with wind turbines

and overhead wires is of low severity and affects a small number of birds (Hull 2013).

17. Poisoning from insecticides, particularly organochlorines is a potential threat to White-throated Needletails. Tarburton (2014) identified the use of insecticides, particularly organochlorines, as a possible cause of decline of White-throated Needletails, either through a decrease in the abundance of invertebrates from wide use of insecticides or from secondary poisoning by insecticides accumulated as sublethal doses in the prey.

18. Climate change is a threat to White-throated Needletails as it is to many long-range migratory species, especially if changes at breeding, non-breeding and stop-over sites vary in the extent of change (Beaumont *et al.* 2006). Shifts in migration times, such as already observed in the White-throated Needletail, can result in migration arrival and optimal food availability no longer coinciding (Beaumont *et al.* 2006). This stems from an ecological mismatch between migratory insectivorous species and their prey, as insects may not change in emergence time at the same rate as shifts in bird migration time as climate change effects can differ at either end of long-range migration routes (Beaumont *et al*. 2006; Bairlein 2016).

19. White-throated Needletail *Hirundapus caudacutus* (Latham, 1801) is not eligible to be listed as an Endangered or Critically Endangered species.

20. White-throated Needletail *Hirundapus caudacutus* (Latham, 1801) is eligible to be listed as a Vulnerable species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing a high risk of extinction in Australia in the medium-term future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Assessment against *Biodiversity Conservation Regulation* 2017 criteria
The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: Vulnerable under Clause 4.2 (1)(c)(2)(b)

Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)
Assessment Outcome: Vulnerable under Clause 4.2 (1)(c)(2)(b)

(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 Clause 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: 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.

Senior Professor Kristine French
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation

TSSC (Threatened Species Scientific Committee) (2019). Conservation Advice for *Hirundapus caudacutus*. Department of Environment and Energy, Canberra.

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