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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 sharp-tailed sandpiper *Calidris acuminata* (Horsfield, 1821) as a VULNERABLE SPECIES in Part 3 of Schedule 1 of the Act on the basis of its extinction risk in Australia. Listing of Vulnerable species is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee is satisfied that the sharp-tailed sandpiper *Calidris acuminata* (Horsfield, 1821) has been duly assessed by the Commonwealth Threatened Species Scientific Committee under the Common Assessment Method, as provided by Section 4.14 of the Act. After due consideration of Commonwealth DCCEEW (2024), the NSW Threatened Species Scientific Committee has made a decision to list the species as Vulnerable on the basis of its extinction risk in Australia.

Summary of Conservation Assessment

The sharp-tailed sandpiper *Calidris acuminata* (Horsfield, 1821) 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 moderate population reduction estimated at 24-60% that has occurred over a three-generation timespan of *c.* 15 years. Additionally, the causes of this reduction are not fully understood. This species is assessed only on the basis of its extinction risk in Australia because that scale is appropriate to the biology of the taxon due to its annual migratory movements into, and within Australia.

The NSW Threatened Species Scientific Committee has found that:

1. The sharp-tailed sandpiper *Calidris acuminata* (Horsfield, 1821) (family Scolopacidae) is approximately 17–22 cm long, has a wingspan of 36–43 cm, and weighs around 65 g. They are a small to medium sized Sandpiper, with a pot-belly and a drawn-out rear end. They have a small, flat head on top of a short neck. Both sexes appear similar, but show marked seasonal variation in plumage. Adult breeding sharp-tailed sandpipers have a rufous coloured forehead and crown, both of which are streaked black. They have a prominent off-white supercilium, which is also streaked black. A broad, clean-white eye-ring contrasts with the off-white supercilium, dark brown loral stripe, and dark patch on the ear-coverts. The rest of the head and neck is brown, grading to off-white on the cheeks, chin, and throat. The head is covered with fine black streaks, which grade to a fine spotting on the cheeks and sides of chin and throat. The mantle, back, scapulars and tertials are all black, densely streaked by broad rufous edges, and with dull greyish-brown or white tips on the scapulars. The inner wing-coverts are mostly dark grey-brown with narrow white fringes. The foreneck, centre of upper breast, sides of breast, and fore-flanks are all rufous-brown, grading to buff on the mid-flanks. These areas are overlaid with black spots and streaks. The rest of the underbody is white with

bold black chevrons on the lower breast and rear flanks. There are spear-shaped markings on the vent and undertail coverts. The bill is black with a paler grey, yellow-brown, or pink tinge at the base. The legs and feet are olive-grey. Non-breeding sharp-tailed sandpipers are duller than breeding adults. Juveniles are distinct from adults and have a more contrasting head pattern.

2. During the non-breeding season, approximately 91% of the East Asian - Australasian population of sharp-tailed sandpipers occurs in Australia and New Zealand (Bamford *et al.* 2008). Sharp-tailed sandpipers occur within all states of Australia. They are found mostly in the southeast and are widespread in both inland and coastal locations. The species also occurs in both freshwater and saline habitats (Cramp 1985; Higgins and Davies 1996). The species is widespread in most regions of New South Wales and Victoria, especially in coastal areas. The species is widely but sparsely scattered inland (Higgins and Davies 1996).

3. The Australian extent of occurrence (EOO) for the sharp-tailed sandpiper is estimated at 10,900,000 km^2 (range 10,400,000–11,400,000 km^2) and the Australian area of occupancy (AOO) is estimated at 13,000 km^2 (range 13,000–20,000 km^2) (Clemens *et al.* 2021). The AOO is estimated using 2 x 2 km grid cells, the scale recommended by IUCN (2024), encompassing all records of the taxon in Australia since 1990 (Commonwealth DCCEEW 2024) and the EOO is measured by a simple minimum convex polygon around all occurrences at the season when a taxon's range is most constrained (Clemens *et al.* 2021). The species' EOO and AOO are both thought to be stable (Clemens *et al*. 2021). The species' population is not severely fragmented, and the species is not subject to extreme fluctuations in EOO, AOO, number of subpopulations, locations, or mature individuals (Clemens *et al.* 2021).

4. The estimated population of the sharp-tailed sandpiper is 71,000 (range 9,500–268,900) mature individuals, based on an extrapolation of a 2016 population estimate (*Hansen et al*. 2016) using trends derived from Clemens *et al.* (2016) and Clemens (2017). Available sources based on extensive time series count data disagree on the current trends in the population. Several studies have estimated declines of the sharp-tailed sandpiper with the following change over three generations (*c.* 15 years): −60% (Clemens *et al.* 2016), −24% (Clemens 2017), −47% and −52% (Waterbird meta-analysis; Clemens *et al.* 2019). In contrast, the most recent analysis by Rogers *et al.* (2023) estimated the mean change in population was +0.1% annually (1993-2021) for an estimated total increase of +19.8% (95% CI: -51.8, 235.2) over three generations. The mean annual change in the last 10 years (2012-2021) was +1.9% (95% CI: -9.1, 16.7), suggesting the decline may have recently stabilised (Rogers *et al.* 2023). These estimates are markedly at odds with previous studies and suggest that the decline of this species may have slowed and may even have reversed in the past decade. However, given the substantial reduction in population size estimated by four earlier studies, and that the threats driving decline still appear to the operating, a weight of evidence and precautionary approach to interpreting population trends is appropriate until population stabilisation can be confirmed over coming years.

5. The sharp-tailed sandpiper utilises fresh and hypersaline environments, feeding along the edge of water on mudflats, coastal and inland wetlands, and sewage ponds. After rainfall events, the species may also feed on areas of agricultural pasture (Higgins and Davies 1996; Weller *et al.* 2020). sharp-tailed sandpipers are omnivorous. Their diet comprises mostly of seeds, worms, molluscs, crustaceans, and insects, which they prey on by pecking and jabbing their beak into muddy substrate (Higgins and Davies 1996). On migration, the species forages and roosts on rocky and sandy beaches, freshwater habitats, and inland saltwater habitats (Higgins and Davies 1996).

6. The sharp-tailed sandpiper is migratory, breeding in northern Siberia and moving in flocks of less than a thousand individuals to non-breeding areas south of the Equator (Higgins and Davies 1996). Sharp-tailed sandpipers breed from June to August. Sharp-tailed sandpipers are polygynous, with males performing elaborate aerial courtship displays and mating with multiple females. Clutch sizes of four eggs are typical. Females take sole responsibility for incubating the eggs and raising the chicks. The bird nests in shallow hollows hidden on the ground, which are lined with leaves and grass. The chicks hatch in 19-23 days. The fledging period lasts for approximately 18-21 days.

7. During the non-breeding season, most sharp-tailed sandpipers occur in Australia. Small numbers arrive in north-west Australia during mid-August, with larger numbers arriving in early September. Small numbers pass through the Torres Strait, arriving on the coast of the Gulf of Carpentaria during September and December, and on the coast of north-east Queensland from late August. After arriving in Australia, most birds move slowly south across the continent to southeast Australia. Movements occur during the non-breeding period, when birds move between temporary or flooded wetlands, leaving them when they dry. The sharp-tailed sandpiper departs the non-breeding grounds in Australia by April, being one of the first shorebirds to leave. Very few individuals are reported to remain to overwinter in Australia. They begin leaving southern mainland Australia during mid-February. A few remain in the south-east until early May. Many individuals cross inland, with records from the arid inland region between February to April. Some move north from south-east Australia via the coast of Queensland.

8. The main threat to the sharp-tailed sandpiper in Australia and New South Wales (NSW) is the increasing frequency and severity of drought (Clemens 2017), which is predicted to be amplified by climate change (Evans *et al.* 2017). Habitat loss caused by residential and commercial development, and industrial aquaculture are also threats to the species. ‘Anthropogenic climate change’, ‘Clearing of native vegetation’ and ‘Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands’ are listed as Key Threatening Processes under the Act.

9. Clemens (2017) demonstrated lower annual adult sharp-tailed sandpiper survival in drought years than in years of extensive inland rainfall, suggesting that changing Australian climate conditions can impact the overall population of sharp-tailed sandpipers. Global drought extremes are projected to increase

under future warming scenarios. Around Australia, climate warming has contributed towards a southward shift in weather fronts from the Southern Ocean, which typically brings rain to southern Australia including NSW during winter and spring (CSIRO 2020). As these weather fronts shift southwards, rainfall in southern Australia has declined, increasing the risk of drought conditions. The region has also experienced significant warming during the last 50 years, with climate change driving an increase in the intensity and frequency of hot days and heatwaves in Australia, exacerbating drought conditions (Steffen *et al.* 2018).

10. Wetland loss and degradation, and the subsequent loss of feeding and roosting habitat for the sharp-tailed sandpiper in Australia has occurred mainly due to competing land uses and ignorance of the values of wetlands (Geoscience Australia 2021). Due to the distribution of the human population, estuaries and permanent wetlands of the coastal lowlands have experienced most losses, especially in the southern parts of the continent including in NSW (Lee *et al.* 2006). Shoreline development and changes in local hydrology are the biggest drivers of wetland habitat loss. Specific threats include: Landfill or reclamation associated with industrial, housing, port developments, road construction, marinas, canals and resorts. Additional threats include clearing areas of saltmarsh for salt production; damage of wetland areas by rubbish dumping and storm water draining; and damage to wetlands from run-off of urban areas, which alters the natural salinity regime of wetland areas (Geoscience Australia 2021). The increasing requirement for residential housing and urban and coastal infrastructure is also causing the draining and filling of wetlands in NSW and throughout the East Asian - Australasian Flyway (EAAF), affecting the sharp-tailed sandpiper's ability to rest and feed en route to breeding and non-breeding areas.

11. Australia's coastal environment has undergone rapid changes over the last three decades as the aquaculture industry expands and intensifies to meet the rising demand for seafood products (Ahmed and Thompson 2019). Direct and indirect effects may arise from activities including aquaculture, intertidal oyster farming, bait harvesting, the compaction of sediments by vehicles, 'beach nourishment', nutrient enrichment, and the dumping of rubbish or debris (Fuller *et al.* 2019). Any structural modification of soft-sediment feeding habitat may considerably affect deep-probing shorebirds and may inhibit successful shorebird foraging (Fuller *et al.* 2019).

12. Sharp-tailed sandpiper populations have declined because their preferred stopover habitat of food-rich wetlands and mudflats have been replaced by highly managed agricultural monocultures. Throughout the EAAF, large areas of natural wetland have been reclaimed to facilitate the expansion of large-scale industrial farming (Xie *et al.* 2018). The conversion from natural wetland - or traditional farming methods within wetlands – to industrial agriculture has reduced the availability of suitable roosting habitat such as open-water cover areas and bare-mud cover areas. It has also increased the extent of unsuitable roosting habitat, such as concrete-covered areas (Xie *et al.* 2018).

13. Sharp-tailed sandpipers that spend their non-breeding period in Australia are dependent on multiple habitats throughout the EAAF at different points in time. A reduction in the extent or quality of habitat in one part of the Flyway can have far- reaching consequences for the species, even if its other habitats remain in good condition (Dhanjal-Adams *et al.* 2019; Jackson *et al.* 2019). Moreover, events affecting the species during one stage of its annual cycle can carry over to subsequent stages (Murray *et al.* 2018). Therefore, population changes experienced in Australia may be driven by processes occurring thousands of kilometres away and during different life stages for the species (Murray *et al.* 2018).

14. The highest risk for possible arrival of high pathogenicity avian influenza (HPAI) into Australia annually is during September and October each year when millions of migratory seabirds and shorebirds, including the sharp-tailed sandpiper, migrate from Asia and North America to Australia (Wille *et al.* 2024). These migratory species traverse countries where HPAI is present and are known to be gregarious, often forming high-density multi-species flocks while roosting and foraging. While these movement pathways and behaviours increase the potential for these species' exposure to HPAI, international evidence from species in this group is that there have been small numbers of individuals that have died as a result of exposure to the H5N1 strain of HPAI since 2020, rather than large scale population losses. Despite lack of evidence internationally of significant population level effects of H5N1 on migratory shorebirds, the sharp-tailed sandpiper has been identified as being at very high risk of population declines due to HPAI (NSW DCCEEW 2024), and so this threat may compound currently estimated population reductions if it were to affect the sharp-tailed sandpiper in the future.

15. Due to the effects of the above threats, the sharp-tailed sandpiper is estimated to have undergone a moderate reduction in the number of mature individuals over three generations (*c.* 15 years), which is equivalent to at least 24% and may be as high as 60%. While recent studies suggest these reductions may be stabilising (Rogers *et al.* 2023), the substantial reduction in population size estimated by earlier studies (Clemens *et al.* 2016, 2019, 2021; Clemens 2017), and the potentially ongoing nature of threats driving the reductions, support a weight of evidence and precautionary approach to interpreting population trends is appropriate until population stabilisation can be confirmed over coming years. Additionally, the causes of the documented reductions, while likely consisting of the threats listed above operating across the EAAF and Australia, are not fully understood.

16. *Calidris acuminata* (Horsfield, 1821) is not eligible to be listed as an Endangered or Critically Endangered species.

17. *Calidris acuminata* (Horsfield, 1821) 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.

Professor Em Caroline Gross
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Commonwealth DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2024). Conservation advice for *Calidris acuminata* (Sharp-tailed Sandpiper). Australian Government, Canberra, ACT.

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