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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 black-tailed godwit *Limosa limosa* (Linnaeus, 1758) as an ENDANGERED SPECIES in Part 2 of Schedule 1 of the Act and, as a consequence, to omit reference to the black-tailed godwit *Limosa limosa* (Linnaeus, 1758) in Part 3 of Schedule 1 (Vulnerable species) of the Act on the basis of its extinction risk in Australia. Listing of Endangered species is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee is satisfied that the black-tailed godwit *Limosa limosa* (Linnaeus, 1758) 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 Endangered on the basis of its extinction risk in Australia.

Summary of Conservation Assessment

The black-tailed godwit *Limosa limosa* (Linnaeus, 1758) was found to be Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.2(1 b)(2 b) because: (1) the species has undergone a severe reduction in population size of 52–77.5% over a three-generation timespan (23 years); and (2) 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 black-tailed godwit *Limosa limosa* (Linnaeus, 1758) (family Scolopacidae) is 40–44 cm long, has a wingspan between 63–75 cm, and weight between 200–300 g. The species shows marked seasonal variation in plumage. It also shows slight variation between sexes, with females being slightly larger than males and exhibiting duller breeding plumage. Adult non-breeding or juvenile plumage is the typical appearance of birds in Australia. Non-breeding black-tailed godwits have dark grey-brown upperparts which grade into a slightly paler face, foreneck, and breast. The centre of the breast is often darker, and the rest of the upperparts are white. The inner-wing coverts are dark grey-brown, narrowly fringed white when fresh. A short white supercilium is prominent in front of the eye, contrasting with a dark loral stripe. Juveniles appear similar to breeding adults except they exhibit no ventral barring. The forehead and crown are a cinnamon colour and are streaked black. They have a whitish supercilium which is prominent above a dusky loral stripe. The rest of the head is grey with a varying buff tinge. This grades to a white chin and throat. The neck, breast and fore-flanks are cinnamon-buff, grading to white on the rest of the underbody. Faint brown mottling is present on the centre of the hindneck and on the sides of the breast. The mantle and scapulars are black with narrow cinnamon fringes and subterminal dots, producing a tortoiseshell pattern. The tertials are dull grey, grading to dark grey at the tips. The inner-wing

coverts are grey with dark shafts and cinnamon fringes (Commonwealth DCCEEW 2024).

2. The black-tailed godwit is a migratory species. During the austral summer non-breeding season, black-tailed godwits are found in all states and territories of Australia. The species is widespread around Australian coastlines and occasionally occurs inland (Weller *et al.* 2020). In NSW, the black-tailed godwit is regularly recorded only at Kooragang Island (Newcastle), however there are usually scattered sightings from both other coastal and inland areas (Higgins and Davies 1996; NPWS 1996). Inland records in western NSW indicate regular inland passages also occur as it may be recorded around many large lakes in the western inland during summer with exposed muddy shores (Pizzey 1991). This species is found across the Murray-Darling Basin from Narran Lake in the north to the Riverina in the south, and west to Dareton (NPWS 1996). It has also been recorded at times on the Northern Tablelands and in the far northwest corner of NSW at places such as Cobham Lake south of Milparinka (Higgins and Davies 1996). The largest populations are found on Australia's north coast between Darwin and Weipa. The black-tailed godwit has a large discontinuous breeding range extending from Iceland to the Russian Far East. For populations occurring in the East Asian-Australasian Flyway (EAAF), breeding probably occurs mostly in the Russian Far East parts of the breeding range. Wintering populations occur throughout Europe, Africa, the Middle East, and Australasia.

3. The Australian Extent of Occurrence (EOO) for the black-tailed godwit is estimated at 9,400,000 km^2, and the Australian Area of Occupancy (AOO) is estimated at 13,000 km^2. 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 2023) 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 is not severely fragmented and is not subject to extreme fluctuations in EOO, AOO, number of subpopulations, locations, or mature individuals (Clemens *et al.* 2021).

4. The estimated Australian population of black-tailed godwits reaching Australia annually in 2020 was 42,900 mature individuals (Clemens *et al.* 2021), based on an extrapolation of 2016 data using trends derived from Clemens *et al.* (2016, 2019). Several studies have recorded declines of the black-tailed godwit with the following change over three generations (23 years): -72% (Clemens *et al.* 2016), -57% (waterbird meta-analysis; Clemens *et al.* 2019) and -52% (Clemens *et al.* 2019). The trend is consistent with declines described a decade ago (Garnett *et al.* 2011). The most recent analysis by Rogers *et al.* (2023) estimated the mean change in population was -5.5% annually (1993–2021) for an estimated total decline of -77.5% over three generations. These declines are likely reflective of the species' population trends trends in NSW as well, given the species migratory ecology.

5. Black-tailed godwits exhibit substantial site-specific differences in their foraging behaviour. Feeding habitat includes areas of mud or soft, wet sand within sandflats, intertidal mudflats, saltmarshes, and the beaches of oceanic coastlines, bays, and estuaries (Johnsgard 1981; del Hoyo *et al.* 1996). In general, feeding takes place

over the whole tidal range; however, most populations will likely spend disproportionately large amounts of time foraging on the upper tidal flats (Wu and Wilcove 2020). Black-tailed godwits are omnivorous and are both diurnal and nocturnal. They locate food by touch and sight, using a probing technique, and glean from the ground and vegetation. Their diet consists mainly of insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles, which they probe from soft mud or shallow water (Higgins and Davies 1996).

6. Black-tailed godwits are primarily a coastal species. They are usually found in sheltered bays, estuaries, and lagoons with large intertidal mudflats and/or sandflats. Further inland, the species can also be found around muddy lakes and within wetlands with water less than 10 cm deep. The species has also been recorded in wet fields and sewerage treatment works. This roosting behaviour is mirrored through the EAAF, where anthropogenic wetlands such as agriculture, aquaculture, saltworks, port, power and wastewater sites often provide alternative coastal habitat (Jackson *et al.* 2020; Lei *et al.* 2021). Roosting groups are frequently recorded in mixed flocks with Bar-tailed Godwits (*Limosa lapponica*; Office of Environment and Heritage 2021).

7. Black-tailed godwits nest in the northern hemisphere summer. Black-tailed godwits depart their breeding locations in Russia by late August and rely on a network of suitable habitat along the migration route, temporarily occupying stopover sites between breeding and non-breeding grounds (Xu *et al.* 2019). Black-tailed godwits first arrive in north-west Australia from late August (Lane 1987). Most individuals stay in north Australia, especially coastal Arnhem Land and south-east Gulf of Carpentaria, and some move to east and south Australia. Small numbers move down the east coast as far south as the estuary of the Hunter River. During the non-breeding season, numbers are rather stable in the estuary of the Hunter River in December to February (Lane 1987), although some dispersive movements occur (Higgins and Davies 1996). There are few records of black-tailed godwits in Victoria after May (Emison *et al.* 1987). Black-tailed godwits move up the east coast of Queensland to begin the return migration during March and April. Substantial numbers of non-breeders remain in north Australia during winter, e.g., in the Gulf of Carpentaria (Garnett 1989). Generally, those individuals wintering further south are found in small numbers, and occasionally in flocks of hundreds. Winter records reach as far south as Corner Inlet, Victoria (Higgins and Davies 1996).

8. The population decline of the black-tailed godwit is thought to be due to changes to the species' coastal stopover locations within the EAAF, particularly along the coast of the Yellow Sea. Rapid development for aquaculture, industry, and rapidly increasing human populations are a major driver of these changes. The degradation and loss of stopover locations is amplified by the invasion of cordgrass (*Spartina alterniflora*) and by excessive domestic, industrial, and aquaculture discharges. '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. Wetland loss and degradation, and the subsequent loss of feeding and roosting habitat for the black-tailed godwit 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 due to development, especially in the southern parts of the continent, including NSW (Lee *et al.* 2006). Shoreline development and changes in local hydrology are the biggest driver 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 solar salt production; damage to wetland areas by rubbish dumping, storm water draining, as well as run-off from 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 throughout the EAAF, affecting the black-tailed godwit's ability to rest and feed en route to breeding and non-breeding areas. Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, which provides important habitat for the black-tailed godwit in NSW, is listed as an Endangered Ecological Community in NSW.

10. 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 such as the black-tailed godwit, and may inhibit successful shorebird foraging (Fuller *et al.* 2019).

11. Invasive plant species can cause major changes in the geomorphology of coastal systems (Kennedy *et al.* 2017). Along the coasts of the Yellow Sea, *Spartina alterniflora* has spread rapidly throughout intertidal wetlands and now occupies half of all important coastal shorebird sites in mainland China (Hua *et al.* 2015; Jackson *et al.* 2021). Hybrids of this species, namely *S. anglica,* have also become established in the southern hemisphere, especially in Victoria and Tasmania in Australia and in New Zealand. *Spartina* spp. generally grow seaward from the edge of marshes, facilitating the accumulation of sediment, and eventually replacing open tidal flats with dense, elevated *Spartina* marshes (Kennedy *et al.* 2017; Jackson *et al.* 2021). The prolific growth of *Spartina* spp. reduces the availability of foraging and roosting habitat for shorebirds and hinders their movement through the environment (Jackson *et al.* 2021).

12. Black-tailed godwits that overwinter in Australia depend on multiple types of aquatic ecosystems throughout the EAAF. 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 habitat areas 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). As such, population changes experienced across Australia (including NSW)

may be driven by processes occurring thousands of kilometres away and during different life stages for the species (Murray *et al.* 2018).

13. 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 black-tailed godwit, 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 migratory species' exposure to HPAI, international evidence from migratory bird species 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 the lack of evidence internationally of significant population level effects of H5N1 on migratory shorebirds, the black-tailed godwit 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 black-tailed godwit in the future.

14. Due to the above threats, the black-tailed godwit is estimated to have undergone a severe reduction in the number of mature individuals over three generations (*c.* 23 years), possibly as high as 77.5%, and the causes, especially coastal development in the EAAF and in Australia, have not ceased.

15. *Limosa limosa* (Linnaeus, 1758) is not eligible to be listed as a Critically Endangered species.

16. *Limosa limosa* (Linnaeus, 1758) is eligible to be listed as an Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing a very high risk of extinction in Australia in the near 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: Endangered under Clause 4.2(1 b)(2 b)

Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)
Assessment Outcome: Endangered under Clause 4.2(1 b)(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
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Supporting Documentation:

Commonwealth DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2024). Conservation advice for *Limosa limosa* (Black-tailed Godwit). Australian Government, Canberra, ACT.

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