



Conservation Advice for *Arenaria interpres* (ruddy turnstone)

In effect under the *Environment Protection and Biodiversity Conservation Act 1999* from 5 January 2024.

This document combines the approved conservation advice and listing assessment for the species. It provides a foundation for conservation actions and further planning.



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Conservation status

Arenaria interpres was assessed by the Threatened Species Scientific Committee to be eligible for listing as Vulnerable under criterion 1. The Committee's assessment is at Attachment A. The Committee's assessment of the species' eligibility against each of the listing criteria is:

- Criterion 1: A2bce+3ce+4bce: Vulnerable
- Criterion 2: Ineligible
- Criterion 3: Ineligible
- Criterion 4: Ineligible
- Criterion 5: Insufficient data

The main factor that makes the species eligible for listing is based on recent changes in the estimated rate of population decline. Several studies have recorded declines of ruddy turnstone with the following change over three generations: -72 percent (Clemens et al. 2016), -28 percent (waterbird meta-analysis; Clemens et al. 2019) and -42 percent (Clemens et al. 2019).

The most recent analysis by Rogers et al. (2023) estimated the mean change in population was -2.6% annually (1993-2021) for an estimated total decline of -26% (95%CI: -53.5, 21.8) over

three generations. The mean annual change in the last 10 years (2012-2021) was +2.5% (95%CI: -4.1, 9.5), suggesting the decline may have stabilised (Rogers et al. 2023). This decline is lower than many previous reports. This may indicate that the decline of this species has slowed and may even have reversed in the past decade. However, given the severe reduction in population size estimated by three earlier studies, a listing of Vulnerable is appropriate until population stabilisation can be confirmed over coming years.

The recorded declines are most likely due to changes to coastal stopover locations, particularly along the coast of the Yellow Sea, where there is significant habitat loss caused by residential and commercial development, the expansion of industrial aquaculture, and pollution from oil spills, herbicides, and pesticides. The species' habitat area is also shrinking due to a combination of restricted inflow of sediments from increasingly dammed rivers and sea level rise (Murray et al. 2014; Melville et al. 2016).

There are currently an estimated 18,700 (range 16,900–22,200) mature individuals in the wild with a continuing declining trend (Clemens et al. 2021). The extent of occurrence (EOO) is estimated at 11,600,000 km² (range 11,000,000–12,200,000 km²) and area of occupancy (AOO) is estimated at 9,200 km² (9,200–14,000 km²). Clemens et al. (2021) considers the species' EOO and AOO to be stable.

At the species level, the ruddy turnstone is a listed migratory species under the EPBC Act. The species is listed on the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). Ruddy turnstone is also listed on Appendix II of the Convention on Migratory Species (CMS) as a member of the family Scolopacidae. These legally binding international agreements encourage relevant Contracting Parties to protect ruddy turnstone, their habitats, and to remove barriers to migration. While in Australia, the ruddy turnstone can be found at a number of Ramsar listed wetlands of international significance. Wetlands listed on the Ramsar Convention are listed as Matters of National Environmental Significance under the EPBC Act.

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see the [Species Profile and Threat Database](#).

Species information

Taxonomy

Conventionally accepted as *Arenaria interpres* (Linnaeus 1758), the ruddy turnstone is a polytypic species. Two subspecies are currently recognised. The nominate subspecies, *A. i. interpres*, breeds in western Alaska, the Canadian Arctic, Greenland, and northern Eurasia. The subspecies *A. i. morinella*, breeds in arctic Canada (Higgins & Davies 1996).

Description

Ruddy turnstones are 22–24 cm long, have a wingspan of 50–57 cm, and weigh approximately 115 g. They are a stocky, medium-sized wader, with a short, slightly uptilted bill, and short orange-red legs. Both sexes appear similar but show marked seasonal variation in plumage.

Adult breeding

Ruddy turnstones have a mostly white head with black streaks on the crown. Black spots are present on the sides of the nape, and a black line runs across the forehead between the eyes. A black line also runs from the gape, joining a vertical black band that runs down from the eyes to a broad black breast patch. The species' neck is black with a narrow white hindneck collar that broadens into a white patch on the sides of the breast. The upperparts and innerwing coverts are black with bright chestnut tips, giving a variegated tortoise-shell appearance. The underparts are primarily white except for a black breast, a narrow dark trailing-edge to wings, and a blackish subterminal tail-band. The bill is black, but is paler at the base of the mandible. The legs and feet are bright orange-red.

Adults in full breeding plumage are unlikely to be observed in Australia, however, observers may see vestiges of the breeding plumage on individuals on arrival and before departure from Australia. Adult non-breeding or juvenile plumage is the typical appearance of birds in Australia.

Adult non-breeding

Non-breeding adults are similar to breeding adults, but duller and with no chestnut colour in the upperparts. The upperparts and innerwing coverts are blackish, grading to grey-brown or sandy buff at the margin of the feathers, giving a mottled effect. The head is mostly grey-brown, with a hint of the black facial patterns from the breeding plumage. An indistinct white supercilium is present behind the eye and diffuse pale patches are present on the sides of the head. The chin and throat are white. The breast is mostly duller black with a few paler smudges.

Juvenile

Juvenile plumage is similar to that of non-breeding adults, except that juveniles possess larger pale patches on the head. The upperparts and innerwing-coverts are blackish-brown scaled white. The breast has more pale smudging and fringing than adults, as do the hindneck and sides of the breast. The legs and feet are a duller yellow-brown colour.

Distribution

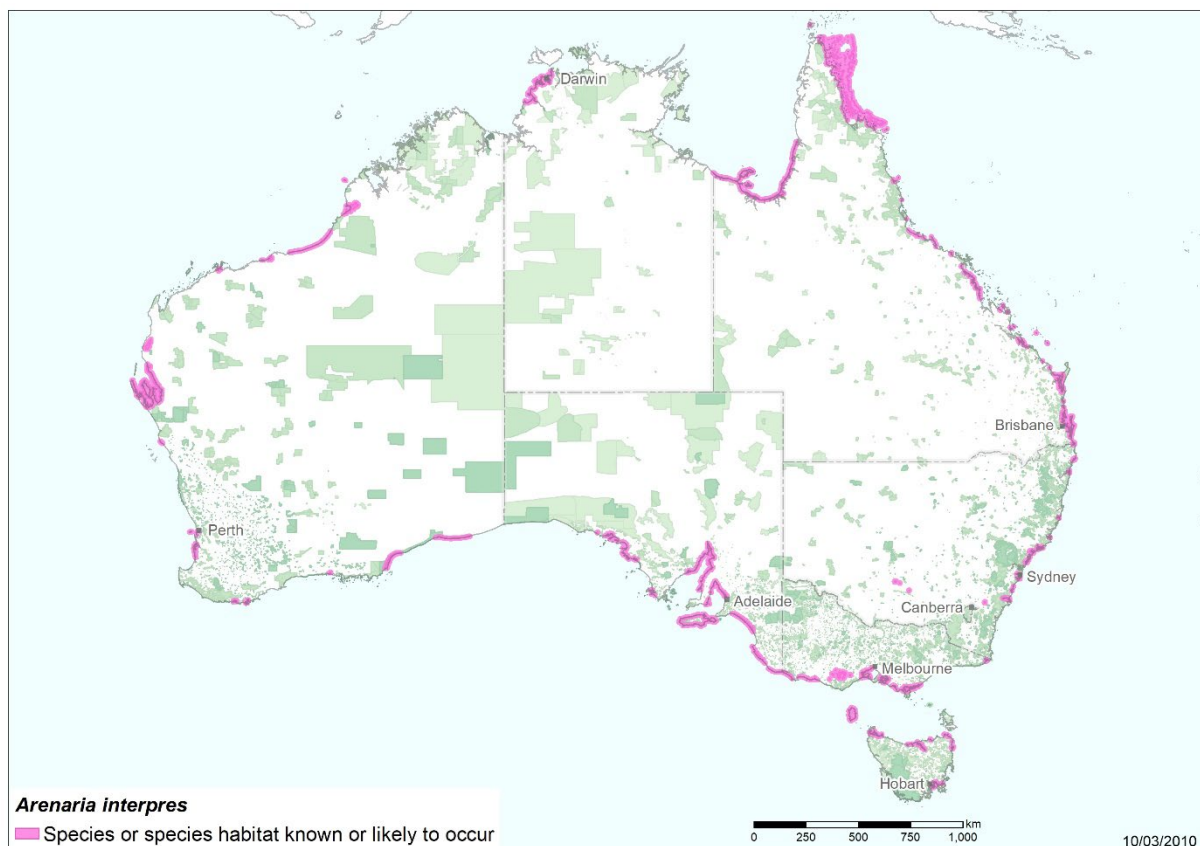
Global distribution

The ruddy turnstone breeds on the coasts of Europe, Asia, and North America, generally north of 60° latitude. Common breeding coasts include those of Norway, Denmark, the Baltic coasts of Sweden, Finland, Spitsbergen, and Estonia. The breeding grounds in west and north Alaska span from St. Lawrence Island east through the Canadian Arctic islands. The species is also known to breed in east Greenland and Iceland (Higgins & Davies 1996).

Australian distribution

During the austral summer non-breeding season, the ruddy turnstone is widespread within Australia (Bamford et al. 2008). The species is found in most coastal regions, with occasional records of inland populations (Higgins & Davies 1996). It strongly prefers rocky shores or beaches where there are large deposits of rotting seaweed. The species is also found on Lord Howe Island, Norfolk Island, Christmas Island, Cocos-Keeling Island, and Macquarie Island (Higgins & Davies 1996).

Map 1 Modelled distribution of ruddy turnstone



Source: Base map Geoscience Australia; species distribution data [Species of National Environmental Significance](#) database.

Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.

Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the habitat or geographic feature that represents to recent observed locations of the species (known to occur) or habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

Cultural and community significance

Within Australia, ruddy turnstones occur within the lands of numerous Traditional Owner groups (Clemens et al. 2021). The cultural and community significance of the species is not known. Further research into the subject area may benefit the conservation of the species by providing insights about traditional land management.

This statement of significance is not intended to be comprehensive, applicable to, or speak for, all Indigenous Australians and it is acknowledged that Indigenous groups and individuals are the custodians of this knowledge.

Relevant biology and ecology

Habitat

Foraging habitat and diet

Like most shorebird species, ruddy turnstones exhibit substantial site-specific differences in their foraging behaviour. In general, feeding takes place over the whole tidal range, however, most populations will likely spend disproportionate amounts of time foraging on the upper tidal flats (Wu & Wilcove 2020). This is a combined result of the upper zone's longer exposure time, allowing for prolonged periods of feeding (Wu & Wilcove 2020).

Ruddy turnstones are carnivorous, feeding primarily on insects, worms, crustaceans, molluscs, and spiders (Higgins & Davies 1996; Weller et al. 2019). Feeding is both diurnal and nocturnal. They have also been occasionally recorded feeding on eggs and carrion. During the non-breeding season, their main or only food source is maggots obtained from rotting seaweed and the larvae of sandhoppers obtained from the top of sandy beaches, where rotting seaweed is buried under a thin layer of sand (Clemens et al. 2021). The species forages specifically within decomposing rather than fresh kelp. Ruddy turnstones use their strong neck and bill to toss shells, kelp, and small stones, searching for maggots, larvae, and other invertebrates. They also peck at exposed objects on rock platforms as the tide recedes (Higgins & Davies 1996). The species has occasionally been recorded chasing small crabs and using their beak to probe crab holes.

Roosting habitat

Ruddy turnstones typically roost along platforms and shelves of rock, shingle, or gravel beaches, often with shallow tidal pools nearby. They can also be found roosting along sand, coral, or shell beaches, and along shoals, cays, and dry ridges of sand or coral beaches. Ruddy turnstones have occasionally been sighted roosting in estuaries, harbours, bays, and coastal lagoons among low saltmarsh, or on exposed beds of seagrass, around sewage ponds and on mudflats.

In north Australia, they are known to occur in a wide variety of habitats and may prefer wide mudflats. In southern Australia, the ruddy turnstone prefers rockier coastlines and are less numerous on large embayments with extensive mudflats. In Tasmania, the species has been sighted around rocky reefs during spring and summer, and around bays and estuaries during autumn and winter when some species remain within the Australian jurisdiction. In south-west Australia, individuals may occur on pebble-strewn shores of salt lakes near the coast.

Breeding habitat

The species breeds near the coast or up to several kilometres inland in the high Arctic. Nesting typically occurs on coastal plains, marshes, and tundra. The species shows a preference for mosaics of bare rock, clay or shingle, and vegetation near water or in areas that remain damp until late summer (Johnsgard 1981; Hayman et al. 1986; del Hoyo et al. 1996; Snow & Perrins 1998).

Reproductive Ecology

Ruddy turnstones lay their eggs from mid-May to early July. In Canada, the species lays its eggs mostly in mid-June (del Hoyo et al. 1996). Clutch sizes of two to four eggs are typical, with the incubation period lasting about 22–27 days. Both sexes care for the chicks for around 19–21 days (del Hoyo et al. 1996).

Migration

Ruddy turnstones are a migratory bird, breeding in the northern hemisphere and flying south for the boreal winter (Marchant & Higgins 1993). Like other migratory shorebird species, ruddy turnstones rely on a network of suitable habitat along their migration routes - temporarily occupying stopover sites between breeding and non-breeding grounds (Xu et al. 2019). Multiple stopover sites throughout the flyway are required for resting or refuelling during these migrations (Xu et al. 2019). Hence, connectivity among sites along the flyway is essential for the species' survival and reproduction (Xu et al. 2019). These sites are considered to be critical in terms of area and site use. The quantity and quality of stopover sites can limit population abundance and affect individual survival (Lisovski et al. 2020). A stable network of sites is crucial for maintaining stable or increasing populations of the species (Xu et al. 2019). In contrast, loss of habitat and network connectivity may negatively impact migratory bird populations (Xu et al. 2019).

There may be two migration routes to Australia. Individuals occurring in east Australia and New Zealand migrate from east Asia south across the Pacific. They return north via the east coast of Asia. The birds in the western areas of Australia likely come from populations migrating south from east Asia. These populations return north via east Asia. A few populations are known to occur in New Guinea or the Gulf of Carpentaria. They may associate with golden plovers (*Pluvialis fulva*) on migration.

Southern passage

Ruddy turnstones leave their breeding grounds in the northern hemisphere from mid-July to early September, with the minority departing in October (Higgins & Davies 1996). On the east Asian migration route, the birds travel through Korea, Japan, the Philippines, Mongolia, east China, and Hong Kong, and move through Borneo, Sumatra, and Wallacea from September.

On the trans-Pacific route, most individuals move from island to island, probably flying directly from Pribilof Island to the Hawaiian or Marshall Islands, where they arrive from early September until November. In Fiji, numbers generally increase from mid-September to late October. Ruddy turnstones arrive in the Solomon Islands after mid-September, with small numbers arriving in New Guinea. They pass through the Torres Strait and arrive in east Australia from September onwards. Only a small proportion of the population migrating across the Pacific reaches Australia.

Non-breeding season

Ruddy turnstones tend to arrive in the Northern Territory and Western Australia from August onwards. Inland records from September to November suggest some overland movement to the south coast. They arrive in South Australia and Victoria from September onwards, with most arriving between November to December. In south-east Australia, numbers tend to be stable from December until February. Large numbers of ruddy turnstones occur in north Tasmania, but few move further south. At some sites, birds are not present every year (Higgins & Davies 1996).

Northern passage

Ruddy turnstones leave sites in south of Australia from mid-March onwards. At some sites, the numbers remain high into April (Higgins & Davies 1996), with most individuals departing during the first three weeks of April. Coastal regions of South Australia experience large influxes in March and April, which is also observed in south and central New South Wales, suggesting that birds sometimes move short distances along coasts before leaving on their northward

migration. In Victoria, the birds store enough energy to fly non-stop to South-East Asia or the nearby Pacific islands. No influxes occur in northeast or north Australia. The lack of inland records in March and April suggests that some individuals fly over northern Australia.

Some adults in northwest Australia are thought to fly non-stop to the south coast of China. Small numbers of individuals leave New Guinea in January. In the Pacific, they leave Fiji near the end of April and leave the Solomon Islands by early May, possibly flying non-stop from the southwest Pacific to Japan. Ruddy turnstones have been observed passing through Malaysia mainly from March until May. They then pass through Hong Kong from late March to early June, with a peak at the end of April. Most of the population passes through Beidaihe, China, in early May, moving onto Korea and being more abundant in Japan on their north migration. They arrive in north and northeast Chukotka, Siberia, mostly during May.

Most first-year birds remain in non-breeding areas during their first breeding season (Higgins & Davies 1996), with many of these birds obtaining a significant amount of breeding plumage. Almost all individuals migrate north for the first time at two years of age.

Habitat critical to the survival

Habitat critical to the survival of the species refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species (including the maintenance of species essential to the survival of the ruddy turnstone, such as macrobenthos);
- To maintain genetic diversity and long-term evolutionary development; or
- For the re-introduction of populations or recovery of the species.

In Australia, a large network of sites is required during the non-breeding season for the species to cope with natural and human-driven environmental changes (Xu et al. 2019).

Habitat critical to the survival of ruddy turnstone includes a mosaic of feeding and roosting habitat. Roosting habitat typically occurs along platforms and shelves of rock, shingle, or gravel beaches, often with shallow tidal pools nearby. The species can also be found on sand, coral or shell beaches, as well as around shoals, cays, and dry ridges of sand or coral beaches. It has occasionally been sighted in estuaries, harbours, bays, and coastal lagoons among low saltmarsh, or on exposed beds of seagrass, around sewage ponds, and on mudflats.

In north Australia ruddy turnstones are known to occur in a wide variety of habitats and may prefer wide mudflats. In southern Australia the ruddy turnstone prefers rockier coastlines and is less numerous on large embayments with extensive mudflats. In Tasmania, it has been sighted around rocky reefs during spring and summer and moves to bays and estuaries for autumn and winter. In south-west Australia, it may occur on pebble-strewn shores of saltlakes near the coast.

Feeding habitat critical to the survival of ruddy turnstone is characterised by areas of intertidal habitat which possess large expanses of rotting seaweed. The species forages specifically within areas of decomposing, rather than fresh, kelp. They also peck at exposed objects on rock platforms as the tide recedes (Higgins & Davies 1996). Like most shorebird species, they exhibit substantial site-specific differences in their foraging distributions. 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 & Wilcove 2020). This is a combined result of the upper zone's longer exposure time, allowing for prolonged periods of feeding, and the shorebirds' preference for it (Wu & Wilcove 2020).

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

International and nationally important habitat

Under the EPBC Act, 'important habitat' is a key concept for migratory species, as identified in [EPBC Act Policy Statement 1.1 Significant Impact Guidelines - Matters of National Environmental Significance 2009](#). Defining this term for migratory shorebirds in Australia is important to ensure that habitat necessary for the ongoing survival of the 37 species is appropriately managed.

Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. The widely accepted and applied approach to identifying internationally important shorebird habitat throughout the world has been through the use of criteria adopted under the Ramsar Convention.

According to this approach, wetland habitat should be considered internationally important if it regularly supports:

- 1 percent of the individuals in a population of one species or subspecies of waterbird or
- a total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds can be defined using a similar approach to these international criteria, i.e., if it regularly supports:

- 0.1 percent of the flyway population of a single species of migratory shorebird or
- 2,000 migratory shorebirds or
- 15 migratory shorebird species.

[The National Directory of Important Migratory Shorebird Habitat](#) identifies all known feeding and roosting sites of ruddy turnstone in Australia (Weller et al. 2020). These areas are identified as internationally or nationally important in accordance with the EPBC Act Policy [Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species](#).

An Internationally Important site is determined for ruddy turnstone if it regularly supports more than 1 percent of the species' total population (1 percent flyway of the population = 300 individuals, Hanson et al 2016).

A Nationally Important site is determined for ruddy turnstone if it regularly supports more than 0.1 percent of the bird's Flyway population (0.1 per cent of the flyway population = 30 individuals, Hanson et al. 2016).

All internationally or nationally important habitat that exceeds the above thresholds is habitat critical to the survival of the species. The degradation or loss of designated important habitat will have disproportionately detrimental impacts on the species' populations and must be avoided.

Habitat critical to the survival of the species, should not be destroyed or modified. Actions that remove habitat critical to the survival would interfere with the recovery of ruddy turnstone and reduce the area of occupancy of the species. It is important to retain as much foraging and roosting habitat as possible. Actions that have indirect impacts on habitat critical to the survival should also be minimised (i.e. human disturbance or light pollution impacting habitat). Actions that compromise survival, such as the introduction of new diseases, weeds, or predators, should also be avoided.

Threats

The population decline is thought to be due to changes to the species' coastal stopover locations within the East Asian - Australasian Flyway (EAAF), particularly along the coast of the Yellow Sea. Rapid development for aquaculture, industry, and rapidly increasing human populations are the main drivers of these changes. The degradation and loss of stopover locations is being amplified by the invasion of cordgrass (*Spartina alterniflora*) and by excessive domestic, industrial and aquaculture discharges. Ruddy turnstone's habitat area is also shrinking due to a combination of restricted inflow of sediments from increasingly dammed rivers (Murray et al. 2014; Melville et al. 2016) and sea level rise.

In Australia, the biggest threat to the species is habitat loss and disturbance from visitors to beaches, bays, and estuaries, with dogs being particularly problematic (Clemens et al. 2021). Additional threats include the invasion of the cordgrass into mudflats and the increased intensity of seaweed harvesting.

Ruddy turnstones that overwinter in Australia are dependent on multiple habitat types 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). As such, 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). Threats that may impact ruddy turnstones in regions outside of the Australian jurisdiction are outlined below.

Table 1 Threats

Threats in Table 1 are noted in approximate order of highest to lowest impact, based on available evidence. Threats marked with an asterisk (*) are those that occur largely outside of Australia.

Threat	Status ^a	Evidence
Habitat loss, fragmentation, and degradation		
Habitat loss caused by residential and commercial development (In Australia and overseas*)	• Timing: current • Confidence: observed • Likelihood: almost certain • Consequence: major • Trend: increasing	<u>Australia:</u> Wetland loss and degradation 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

Threat	Status ^a	Evidence
	Extent: across part of its range	experienced most losses, especially in the southern parts of the continent (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 solar 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). <u>Overseas:</u> The increasing requirement for residential housing and urban and coastal infrastructure is causing the draining and filling of wetlands throughout the East Asian - Australasian Flyway. This is currently one of the largest causes of wetland loss (Department of the Environment 2016). The threat is particularly severe in China, where coastal wetlands have declined in both quantity and quality over the last 50 years (Zhang et al. 2012; Murray et al. 2014; Sun et al. 2015). Since 1990, almost 40 percent of naturally occurring coastal wetlands have been lost in China (Gong et al. 2010; Xia et al. 2017). The loss of stopover sites can have two consequences for migratory shorebird populations: 1) Birds may not be able to store sufficient energy reserves for the ongoing migratory flight, thus failing to arrive at their destination; and 2) birds can arrive at their destination but perform poorly because of the carry over effects of inadequate refuelling, which could reduce reproductive success (Hua et al. 2015). The current conservation status of China's coastal wetlands is inadequate to protect migratory waterbirds (Xia et al. 2017).
Habitat loss caused by industrial aquaculture (In Australia and overseas*)	- Timing: current - Confidence: observed - Likelihood: almost certain - Consequence: moderate - Trend: unknown - Extent: across part of its range	<u>Australia:</u> 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 (Ayyam et al. 2019; Ahmed & Thompson 2019; Commonwealth of Australia 2020). Direct and indirect effects of aquaculture may arise from activities including 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). <u>Overseas:</u>

Threat	Status ^a	Evidence
		Aquaculture is increasing in scale and intensity throughout the East Asian - Australasian Flyway, particularly within the Yellow Sea where China is the world's leader in aquaculture production. Around the Yellow Sea, aquaculture is practised both in artificial ponds and within intertidal and subtidal zones (Melville et al. 2016). Development of artificial aquaculture ponds results in the loss of intertidal habitats. Thus, shorebirds are forced to feed or roost in artificial environments when tidal flats are submerged (Bai et al. 2018) and are often subject to high levels of disturbance (Melville et al. 2016). Artificial wetlands typically host fewer species and fewer individuals of shorebirds compared with natural ones (Bai et al 2018). Harvesting of edible organisms within natural intertidal areas also occurs throughout the EAAF, including from areas within designated nature reserves. It is not known whether the harvesting of intertidal benthos is significantly affecting shorebirds; however, the amount harvested is, in many cases, substantial and impacts on non-target species may be severe (Melville et al. 2016).
Downstream effects of large dams*	• Timing: current • Confidence: observed • Likelihood: almost certain • Consequence: major • Trend: increasing • Extent: across part of its range	Many areas of ruddy turnstone habitat are contracting due to a combination of restricted inflow of sediments from increasingly dammed rivers (Murray et al. 2014; Melville et al. 2016), and sea level rise - with sea walls at many sites preventing suitable habitat migrating inland. Additionally, water regulation and diversion infrastructure along major tributaries has resulted in the reduction of water and sediment flows (Melville 1997; Barter et al. 1998; Barter 2002). Wetlands are particularly vulnerable to the presence of dams and river management activities as they are dependent on seasonal flooding to sustain ecosystem function (Sun et al. 2012; Junk et al. 2013). Damming reduces flooding to wetlands, causing them to shrink and become inhospitable for a range of aquatic biota, including wetland-dependent birds (Sun et al. 2012).
	•	
Seaweed harvesting	• Timing: current • Confidence: observed • Likelihood: likely • Consequence: minor • Trend: increasing • Extent: across part of its range	The demand for seaweed has continually risen over the past few decades, mostly due to its use in industrial applications such as the production of carrageenan, alginates, agar, speciality fertilisers, feed, iodine, and substances for the cosmetic, nutrition and pharmaceutical industry (Buschmann et al. 2017). Another potential

Threat	Status ^a	Evidence
		future use of both wild and cultivated seaweeds is bioenergy production (Fernand et al. 2016). Seaweed is usually harvested on an industrial scale as part of large aquaculture schemes but is also increasingly being manually harvested from washed-up material along shorelines or from accessible shallow waters (Mac Monagail et al. 2017). Proposals to harvest wrack from beaches of South Australia have been assessed as potentially threatening to shorebirds such as ruddy turnstones (PIRSA 2015). The resulting ecosystem impacts depend on the extraction method used and the scale of operations. Potential impacts include changes in primary production, habitat disruption, habitat fragmentation, and food-web alterations (Lotze et al. 2019). Due to the potential impacts of seaweed harvesting in Australia, a range of restrictions have been placed on harvesting activity to reduce impacts on nonbreeding turnstone and a few other shorebird species.
Invasive species		
Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass*	• Timing: current • Confidence: observed • Likelihood: almost certain • Consequence: moderate • Trend: increasing • Extent: across part of its range	A number of studies have revealed significant losses of saltmarsh to mangroves (McTainsh et al. 1988; Morton 1994; Duke 1995). Several factors may drive the incursion of mangroves into saltmarshes and mudflats. These include changing patterns of precipitation; altered tidal regime or sea-level; catchment modifications leading to altered sedimentation and nutrient levels; and land subsidence (Saintilan & Williams, 2001). Incursion by mangroves reduces feeding habitat availability for bar-tailed godwits and may force the subspecies away from traditional feeding sites. Invasive plant species can cause major changes in the geomorphology of coastal systems (Kennedy et al. 2017). Along the coasts of the Yellow Sea, cordgrass (<i>Spartina alterniflora</i>) 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). The species has also become established in the southern hemisphere, especially Australia and New Zealand. It generally grows seaward from the edge of marshes, facilitating the accumulation of sediment, and eventually replacing open tidal flats with dense, elevated <i>S. alterniflora</i> marshes (Kennedy et al. 2017; Jackson et al. 2021). The prolific growth of <i>S. alterniflora</i> reduces the availability of foraging and roosting habitat for shorebirds and hinders their movement through the environment (Gan et al. 2009; Jackson et al. 2021).

Threat	Status ^a	Evidence
Anthropogenic disturbance		
Disturbance at feeding and roosting sites (In Australia and overseas*)	• Timing: current • Confidence: observed • Likelihood: likely • Consequence: moderate • Trend: increasing • Extent: across part of its range	Tourist visitation to many ruddy turnstone roosting and feeding sites such as sandflats, beaches, bays, and estuaries is increasing. Human recreation, and the associated increase in development to meet tourism demands is likely to disturb shorebirds such as the ruddy turnstone. Disturbance to shorebirds is also caused by activities such as shellfish harvesting, fishing, and aquaculture (Barter et al. 2005; Davidson & Rothwell 1993), with disturbance from off-leash dogs being particularly problematic (Weston & Stankowich 2013). Anthropogenic disturbance causes shorebirds to stop feeding and fly around. This may force birds away from traditional roosting and feeding sites (Lilleyman et al. 2014) and reduce fat/energy reserves. This can affect an individual's ability to complete the northward migration back to their breeding grounds and may negatively affect survival or reproductive success. Frequent disturbances may place additional and unsustainable pressures on populations already experiencing major declines (Lilleyman et al. 2014).
Climate change		
Sea level rise (In Australia and overseas*)	• Timing: current & future • Confidence: observed • Likelihood: almost certain • Consequence: major • Trend: increasing • Extent: across the entire range	Global sea level has risen by around 17 ± 5 cm during the 20th century (IPCC 2007; Watson 2011). Current projections predict an increased rate of sea level rise over the duration of the 21st century, with the upper bound global rise ranging from 1.3-1.6m (van de Wal et al. 2022). These increases in sea level are likely to submerge more than 20 percent of coastal wetlands worldwide (Rodriguez et al. 2017). The longest continuous Australasian records show a rise in mean sea level of approximately 12 cm between 1920 and 2000 (Watson 2011). Forecasts predict a further rise of 70 cm by the end of the century (McInnes et al. 2015; Zhang et al. 2017). Coastal wetlands in Australia may be particularly vulnerable to sea level rise, where a reduction in the area of land available for feeding and roosting is likely, and nutrient and sediment flows will likely be altered. The effect of these changes on ruddy turnstone have not been quantified. Further research is required to understand how further sea level rises will affect ruddy turnstone populations.

Threat	Status ^a	Evidence
Exploitation		
Hunting*	• Timing: current • Confidence: suspected • Likelihood: almost certain • Consequence: moderate • Trend: unknown • Extent: across part of its range	Hunting is a widespread and likely unsustainable threat to migratory waterbirds in the EAAF and has been linked to the decline of many threatened species in the Flyway. There are records of hunting from 14 of the 22 countries within the Flyway - from the breeding grounds, through stopping sites, to the non-breeding grounds. It is of particular concern that records of hunting exist for 34 internationally important shorebird sites (Gallo-Cajiao et al. 2020). Countries with the most records of hunting are Russia, China, Thailand, and Myanmar (Gallo-Cajiao et al. 2020). Within Sakhalin oblast, Russia alone, 700 ruddy turnstones are harvested each year (Matsyna et al. 2020).
Fishing bycatch*	• Timing: current • Confidence: observed • Likelihood: possible • Consequence: minor • Trend: unknown • Extent: across part of its range	Competition for food with fishermen together with associated disturbance by humans and boats has continued to put pressure on waterbirds along the East Asian - Australasian Flyway (MacKinnon et al. 2012). Fishing nets set for shrimp or fish species may accidentally kill shorebirds if left on intertidal flats at low tide. Birds caught in the nets drown when the tide rises. The significance of this threat is presently not quantified and requires further investigation.
Pollution		
Chronic and acute pollution (In Australia and overseas*)	• Timing: current • Confidence: observed • Likelihood: almost certain • Consequence: minor • Trend: unknown • Extent: across part of its range	Shorebird habitats are threatened by the chronic accumulation and concentration of pollutants. Chronic pollution may arise from both local and widespread sources. Migratory shorebirds may be exposed to chronic pollution during their time in Australia and along their migration routes, although the extent and implications of this exposure remains largely unknown. In their feeding areas, shorebirds are most at risk from bioaccumulation of human-made chemicals such as organochlorines from herbicides and pesticides and industrial waste. Agricultural, residential and catchment run-off carries excess nutrients, heavy metals, sediments and other pollutants into waterways, and eventually wetlands. Wetlands and intertidal habitats are threatened by acute pollution caused by, for example, oil or chemical spillage. Acute pollution generally arises from accidents, such as chemical spills from shipping, road or industrial accidents. Generally, migratory shorebirds are not directly affected by oil spills, but important habitat may

Threat	Status ^a	Evidence
		be affected for many years through catastrophic loss of marine benthic food sources.

^aTiming—identifies the temporal nature of the threat

Confidence—identifies the nature of the evidence about the impact of the threat on the species

Likelihood—identifies the likelihood of the threat impacting on the whole population or extent of the species

Consequence—identifies the severity of the threat

Trend—identifies the extent to which it will continue to operate on the species

Extent—identifies its spatial context in terms of the range of the species

Categories for likelihood are defined as follows:

Almost certain – expected to occur every year

Likely – expected to occur at least once every five years

Possible – might occur at some time

Unlikely –known to have occurred only a few times

Unknown – currently unknown how often the threat will occur

Categories for consequences are defined as follows:

Not significant – no long-term effect on individuals or populations

Minor – individuals are adversely affected but no effect at population level

Moderate – population recovery stable or declining

Major – population decline is ongoing

Catastrophic – population trajectory close to extinction

Each threat has been described in Table 1 in terms of the extent that it is operating on the species. The risk matrix (Table 2) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; the spatial extent, and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed using available literature.

Table 2 Risk Matrix (* threat occurs mostly outside Australia)

Likelihood	Consequences				
	Not significant	Minor	Moderate	Major	Catastrophic
Almost certain		Chronic and acute pollution	Habitat loss caused by industrial aquaculture* Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass* Hunting*	Habitat loss by residential and commercial development Sea level rise Downstream effects of large dams*	
Likely		Seaweed harvesting	Disturbance at feeding and roosting sites		
Possible		Fishing bycatch*			
Unlikely					
Unknown					

Risk Matrix legend/Risk rating:

Low Risk	Moderate Risk	High Risk	Very High Risk
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Priority actions have then been developed to manage the threats, particularly where the risk was deemed to be ‘very high’ (red shading) or ‘high’ (orange shading). For those threats with an unknown or low risk (blue and green shading respectively) research and monitoring actions have been developed to understand and evaluate the impact of the threats, where appropriate.

Conservation and recovery actions

Primary conservation outcome

- Minimise further loss of habitat critical to the survival of ruddy turnstone throughout Australia (including habitat predicted to become habitat critical to survival in the future because of climate change).
- Prevent further declines in ruddy turnstone populations by working with Range States to address threats in the East Asian - Australasian Flyway.

Conservation and management priorities

Habitat loss caused by residential, commercial, and aquaculture development

- Strengthen international cooperation for ruddy turnstone conservation through the full participation and engagement of all Range States in relevant multilateral frameworks (CMS, Ramsar and the World Heritage Convention).
- Continue to identify important habitat for ruddy turnstone in Australia and improve site protection and management using international, national, and state mechanisms (i.e., new national parks, conservation reserves, Ramsar sites, biodiversity stewardship payments).
- Unify existing management plans for important shorebird areas into a guided and partially standardised document. Subsequently, develop management plans for each recognised important shorebird area which specifically considers migratory shorebirds.
- Update/modify existing site management plans to ensure they correctly take account of the species' local-scale movement patterns and incorporate all important habitat utilised during their non-breeding period.
- Ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers.
- Ensure that functional connectivity of sites is maintained throughout the species' migration network.
- Develop and implement guidelines for wetland rehabilitation and the creation of artificial wetlands to support populations of migratory shorebirds, including ruddy turnstone.
- Develop and, where necessary, implement floating roost sites that can support ruddy turnstone roosting in areas severely affected by human development.

Invasive species impacts

- Monitor the spread of cordgrass and mangroves throughout Australia and, if necessary, develop guidelines for wetland rehabilitation which explicitly outline methods to restore wetland habitat degraded by cordgrass or encroached upon by mangroves (e.g., develop methods to prevent the further spread of cordgrass and mangroves).

Climate change and severe weather impacts

- Develop and implement a climate change adaptation plan for the species.
- Quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species.
- Quantify the significance of sea level rise on ruddy turnstone feeding and roosting habitat within Australia.

Human disturbance

- Install shorebird identification signs and warning signs around areas of important habitat to help educate the public about migratory shorebirds, their roosting locations, the impacts of disturbance, and how to avoid disturbing feeding/roosting birds.

- Develop guidelines or local government regulations to reduce beach driving and off-leash dog walking in areas of important habitat for ruddy turnstone.

Hunting

- Work within CMS and the East Asian-Australasian Flyway Partnership to develop a comprehensive program of work to address the illegal hunting, take and trade of migratory waterbirds in the EAAF.
- Publish an updated field guide of shorebirds within the East Asian – Australasian Flyway and develop a series of posters showing common and protected species, and their distribution throughout the Flyway in order to improve knowledge within hunting and fishing communities about which species cannot legally be taken, injured, or traded.
- Encourage Range States of the East Asian – Australasian Flyway Partnership to actively prevent hunting in known migratory shorebird roosting and nesting sites.
- Promote the strengthening of legal mechanisms to reduce illegal hunting of migratory shorebirds and encourage stronger enforcement of these mechanisms.

Stakeholder engagement/community engagement

- Continue to engage Range States on the importance of migratory shorebird conservation through bilateral and multilateral agreements.
- Promote exchange of shorebird conservation information between governments, NGOs Traditional Owners and communities through use of networks, publications and web sites.
- Develop and implement a community education and awareness program to reduce the effects of recreational disturbance on migratory shorebirds.
- Train a greater number of volunteers, in particular Traditional Owners, to survey migratory shorebirds and improve involvement in monitoring activities.

Survey and monitoring priorities

- Continue to survey northern and inland Australia for migratory shorebird subpopulations and identify important habitats.
- Monitor the health of coastal wetlands and intertidal habitats throughout Australia.
- Consolidate monitoring databases and raw data collected by relevant stakeholders.
- Regularly monitor the level of chemical contamination within areas of important habitat for ruddy turnstone.
- Monitor the spread of cordgrass throughout Australia and, if necessary, develop guidelines for wetland rehabilitation which explicitly outline methods to restore wetland habitat degraded by cordgrass (e.g., develop methods to prevent the further spread of cordgrass).

Information and research priorities

- Develop a high resolution, spatially explicit habitat model which can be used to guide all other actions.
- Investigate the impacts of climate change on ruddy turnstone habitat and populations in Australia and the breeding grounds in the Arctic.

- Quantify the significance of sea level rise on ruddy turnstone feeding and roosting habitat within Australia.
- Investigate the significance of cumulative impacts of development on ruddy turnstone habitat and populations in Australia.
- Quantify the effects of chronic and acute pollution on ruddy turnstone population health, and where necessary implement and amend strict guidelines which restrict the use of pesticides and herbicides around areas of important habitat for migratory shorebirds.
- Investigate the impacts of hunting and shorebird prey harvesting on ruddy turnstone populations throughout the East Asian - Australasian Flyway.

Links to relevant implementation documents

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THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Threatened Species Scientific Committee finalised this assessment on 7 June 2023.

Attachment A: Listing Assessment for *Arenaria interpres*

Reason for assessment

This assessment follows evaluation by experts of the conservation status of the species in accordance with the Action Plan for Australian Birds 2020 (Garnett and Baker 2021).

Assessment of eligibility for listing

This assessment uses the criteria set out in the [EPBC Regulations](#). The thresholds used correspond with those in the [IUCN Red List criteria](#) except where noted in criterion 4, sub-criterion D2. The IUCN criteria are used by Australian jurisdictions to achieve consistent listing assessments through the Common Assessment Method (CAM).

Key assessment parameters

Table 3 includes the key assessment parameters used in the assessment of eligibility for listing against the criteria.

Table 3 Key assessment parameters

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	18,700	16,900	22,200	The estimated population of ruddy turnstone in the East Asian - Australasian Flyway was 30,000 birds in 2016 (Hansen et al. 2016). In Australia, the estimated population in 2020 (18,700 mature individuals) is based on an extrapolation of the estimate of 20,800 in Hansen et al. (2016) using data on trends from Clemens et al. (2016, 2019).
Trend	Declining			(Clemens et al. 2021; Rogers et al. 2023)
Generation time (years)	6.2	5.9	6.5	(Bird et al. 2020)
Extent of occurrence	11,600,000 km ²	11,000,000 km ²	12,200,00 km ²	In Australia, the species is widespread around coastlines and occasionally occurs inland (Weller et al. 2020).
Trend	Stable			(Clemens et al. 2021)
Area of Occupancy	9,200 km ²	9,200 km ²	14,000 km ²	Estimated and minimum AOO is based on the number of 2x2 km squares encompassing all records since 1990; the highest assumes true AOO ≥50 percent higher.

Arenaria interpres (ruddy turnstone) Conservation Advice

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
AOO is a standardised spatial measure of the risk of extinction, that represents the area of suitable habitat known, inferred or projected to be currently occupied by the taxon. It is estimated using a 2 x 2 km grid to enable comparison with the criteria thresholds. The resolution (grid size) that maximizes the correlation between AOO and extinction risk is determined more by the spatial scale of threats than by the spatial scale at which AOO is estimated or shape of the taxon's distribution. It is not a fine-scale estimate of the actual area occupied. In some cases, AOO is the smallest area essential at any stage to the survival of existing populations of a taxon (e.g. breeding sites for migratory species).				
Trend	Stable			(Clemens et al. 2021)
Number of subpopulations	1	1	1	(Clemens et al. 2021)
Trend	Stable			(Clemens et al. 2021)
Basis of assessment of subpopulation number	A single subpopulation is assumed but has never been tested genetically			
No. locations	>10			(Clemens et al. 2021)
Trend	Not calculated			(Clemens et al. 2021)
Basis of assessment of location number	The spatial nature of the threats is such that there are >10 geographically or ecologically distinct areas in Australia where a single threatening event could affect all individuals of the species present within a period of one generation.			
Fragmentation	Not severely fragmented			
Fluctuations	Not subject to extreme fluctuations in EOO, AOO, number of subpopulations, locations or mature individuals.			

Criterion 1 Population size reduction

Reduction in total numbers (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased. A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible. A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) <i>cannot be used for A3</i>] A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible. Based on any of the following (a) direct observation [except A3] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites			

Criterion 1 evidence

Eligible under Criterion 1 A2bce+3ce+4bce for listing as Vulnerable

Several studies have recorded declines of ruddy turnstone with the following change over three generations: -72 percent (Clemens et al. 2016), -28 percent (waterbird meta-analysis; Clemens et al. 2019) and -42 percent (Clemens et al. 2019). These results are 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 -2.6% annually (1993-2021) for an estimated total decline of 26% (95%CI: -53.5, 21.8) over three generations. The mean annual change in the last 10 years (2012-2021) was +2.5% (95%CI: -4.1, 9.5), suggesting the decline may have stabilised (Rogers et al. 2023). This decline is lower than many previous reports. This may indicate that the decline of this species has slowed and may even have reversed in the past decade. However, given the severe reduction in population size estimated by three earlier studies, a listing of Vulnerable is appropriate until population stabilisation can be confirmed over coming years.

The Committee considers that the species has undergone a substantial reduction in numbers over three generations, and the cause has not ceased. Therefore, the species has met the relevant elements of Criterion 1 to make it eligible for listing as Vulnerable.

Criterion 2 Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy

	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(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			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Criterion 2 evidence

Not eligible

The ruddy turnstone's EOO is estimated at 11,600,00 km² (range 11,000,000–12,200,000 km²) and its AOO is estimated at 9,200 km² (range 9,200–14,000 km²) (Clemens et al. 2021). Clemens et al. (2021) states that the species' EOO and AOO are stable. 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). Therefore, the species has not met all the requirements of this criterion.

Criterion 3 Population size and decline

	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Criterion 3 evidence

Not eligible

The number of mature ruddy turnstone is estimated to be 18,700 (range 16,900 – 22,200) mature individuals. The estimated Australian population of 18,700 mature individuals is based on an extrapolation of the estimate of 20,800 in Hansen et al. (2016) using data on trends from Clemens et al. (2016, 2019). Therefore, the species has not met all the requirements of this criterion.

Criterion 4 Number of mature individuals

	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
D. Number of mature individuals	< 50	< 250	< 1,000
D2.¹ Only applies to the Vulnerable category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time			D2. Typically: area of occupancy < 20 km ² or number of locations ≤ 5

¹ The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments may include information relevant to D2. This information will not be considered by the Committee in making its recommendation of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [common assessment method](#).

Criterion 4 evidence

Not eligible

The total number of mature individuals is estimated to be 18,700 (range 16,900 – 22,200), which is not considered low. The estimated Australian population of Ruddy Turnstone in 2020 is based on an extrapolation of the 2016 data using trends derived from Clemens et al. (2016, 2019) (Clemens et al. 2021). Therefore, the species has not met all the requirements of this criterion.

Criterion 5 Quantitative analysis

	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Criterion 5 evidence

Insufficient data to determine eligibility

Population viability analysis has not been undertaken. Therefore, there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Adequacy of survey

The survey effort has been considered adequate and there is sufficient scientific evidence to support the assessment.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 30 business days between 30 March 2023 and 15 May 2023. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process and provided to the Minister for the Environment with the Committee's advice.

Listing and Recovery Plan Recommendations

The Threatened Species Scientific Committee recommends:

- i) that the list referred to in section 178 of the EPBC Act be amended by **including** *Arenaria interpres* in the Vulnerable category.
- ii) that there not be a Recovery Plan for this species in accordance with the provisions of the EPBC Act and the Committee's conservation planning principles as follows:
 - An approved conservation advice is an effective, efficient and responsive document to guide the implementation of priority management actions, mitigate key threats and support the recovery for this species.
 - An approved conservation advice would support the species recovery by identifying priority actions, stakeholders for engagement, and the survey and research priorities to facilitate a better understanding of key threats as well as biological and ecological knowledge gaps.
 - The threats facing the entity, and the recovery actions needed can most effectively be guided via an approved conservation advice.
 - The threats facing the entity, and the recovery actions needed can most effectively be guided via an approved conservation advice.
- iii) Having regard to the above factors, a recovery plan is not required as it would not provide a significant conservation planning benefit above existing mechanisms.

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The Australian Government acting through the Department of Climate Change, Energy, the Environment and Water has exercised due care and skill in preparing and compiling the information and data in this publication.

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