



**FLORA & FAUNA  
GUARANTEE**

## FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

### FINAL RECOMMENDATION ON A NOMINATION FOR DE-LISTING

*Aythya australis* – Hardhead

DOCID107-417469679-742

**Date of receipt of nomination:** 4 February 2022

**Date of preliminary recommendation:** 10 August 2023

**Date of final recommendation decision:** 6 March 2024

**Validity:** The nomination is for a valid item.

**Prescribed Information:** The prescribed information was provided:

**Name of the Nominator** is adequately provided.

**Name of the Item** is adequately provided.

The nominated taxon is accepted by the Scientific Advisory Committee (SAC) as a valid taxon because it has been formally described and is accepted as a valid taxon by Museums Victoria.

#### **Current conservation status**

The taxon nominated for de-listing is currently listed as Vulnerable in Victoria on the *Flora and Fauna Guarantee Act 1988* (FFG Act) Threatened List under Primary Criterion 5.1 – Subcriterion 5.1.3(b)(ii) (IUCN criterion C2a(ii)) (State Government of Victoria 2021).

#### **Nomination for de-listing under the FFG Act**

The nomination to remove the Hardhead from the FFG Act Threatened List was made under Section 16A(2)(a) of Division 3 of the FFG Act:

A person may make a nomination to the Committee to be considered under this Division that a taxon of flora or fauna that is specified in the Threatened List is no longer eligible to be specified in the Threatened List.

It is contended in the nomination that the taxon does not meet the small population size and decline thresholds as required by criterion C2a(ii) under which it was listed.

#### **Eligibility for listing as a taxon under the Flora and Fauna Guarantee Act 1988**

The SAC has assessed the eligibility of the taxon to be removed from the Threatened List based on its extinction risk within Victoria in accordance with Section 16C(4)(c) of the FFG Act and the criteria for determining eligibility for listing prescribed in the Flora and Fauna Guarantee Regulations 2020 (FFG Regulations). In its application of the relevant eligibility criteria, the SAC has, as required by the nationally adopted Common Assessment Method, had regard to the *IUCN Red List Categories and Criteria (Version 3.1)* (IUCN 2012) and the *Guidelines for Using the IUCN Red List Categories and Criteria (version 15.1)* (IUCN Standards and Petitions Committee 2022).

#### **Species information**

##### **Description, life history, generation length**

The Hardhead is a medium-sized, dark-brown bird with white feathers under the tail. The male has a white eye. In flight, the Hardhead has a large white band across the belly, the underwing is translucent white, and the upper wing has a white strip

on the trailing edge. The Hardhead is very swift in flight with rapid, short wing beats. The wings are narrow and pointed and set well back on the body. On the water, the Hardhead is a dark coloured duck, floating very low and sometimes the white undertail is visible (Game Management Authority 2023). Hardheads dive for their food, leaping forward and diving smoothly under the water. They eat aquatic plants and animals, particularly mussels and freshwater shellfish (Marchant & Higgins 1990). Hardheads breed in low, thick vegetation, in or near the water, along rivers and channels and around billabongs and dams, more generally in coastal wetlands. The nest is a trampled platform of reeds, sticks and vegetation, with some down lining. The nest is built by the female and is often added to with what she can reach from the nest. She incubates the eggs alone (BirdLife Australia 2023).

The generation length of the Hardhead is estimated to be six to eight years, based on BirdLife International data from congeners on other continents. BirdLife International (2023) gives an estimated generation length of 7.7 years.

### **Distribution**

The Hardhead is endemic to Australia, though it is occasionally seen in New Guinea and other islands. The Hardhead is widely distributed throughout Australia; however, the stronghold of the species during the non-breeding season is in the deeper, permanent freshwater swamps and lagoons of the Murray-Darling Basin and south-east South Australia (Emison et al. 1987). The species has been quite common at times on the freshwater lakes at the mouth of the Murray River and in the swamps of the east coast (Frith 1977). In Victoria, Hardhead have been observed to be most abundant on larger wetlands (> 6 ha) and sewage ponds and in the southern bioregion of the state. They have been less abundant on dams and smaller water bodies, and in the east, west and north of the state (Ramsey & Fanson 2021).

### **Habitat**

Hardhead are found in freshwater swamps and wetlands, showing a very strong preference for extensive areas of deep water, especially if these carry abundant cover in the form of emergent vegetation. They are rarely seen on land and tend to roost on low branches and stumps near the water. They prefer deep, fresh open water and densely vegetated wetlands on the coast for breeding. In the inland, its favourite haunts are in the permanent cumbungi swamps and lignum creeks. Hardheads occur occasionally in sheltered estuaries (BirdLife Australia 2023, Frith 1977).

### **Threats**

Availability of wetland habitat is a major driver of waterbird abundance, breeding and diversity. Reductions in habitat area and persistence due to climate change, river regulation and water extraction have resulted in ongoing long-term habitat declines, particularly in the Murray Darling basin. Purchases and timed releases of environmental water to support breeding or habitat retention have offset some, but not all of the ongoing impacts of regulation (Porter et al. 2023).

Drainage of deep-water coastal swamps (the main breeding habitat) has posed a threat to the Hardhead population in Victoria (Frith 1977). Loss of these wetland types and the increased use of water for irrigation, with the associated decrease in the frequency of natural flooding regimes, has reduced the number of wetlands available on the coast which act as drought refuges. Breeding habitat has also been reduced by diversion of water for irrigation and flood mitigation (Marchant & Higgins 1990).

Hardhead have been a popular game bird over the last decade, with an estimated 0 to 30,222 birds harvested per year (mean 7,083) between 2009 and 2021 (Moloney & Flesch 2022). The impact of this level of harvest on long-term population viability has not been quantified but is thought to be less than the impact of permanent habitat loss, with the exception being in dry years when Hardhead congregate in smaller areas of suitable habitat (John Porter pers. comm. 13 Feb 2024). Harvesting at the higher of these rates could pose a significant threat to the Hardhead population in the future if coupled with the predicted ongoing threats related to wetland habitat reduction.

### **Decision by the Scientific Advisory Committee**

The eligibility of the nominated taxon to be maintained on or removed from the Threatened List must be determined in accordance with the eligibility criteria prescribed for the purposes of Division 2 of Part 3 of the FFG Act.

The relevant eligibility criteria are prescribed in Schedule 1 of the FFG Regulations, which provides that a taxon is at risk of extinction in a particular category of threat if a primary criterion is met and is therefore eligible to be specified in the Threatened List.

As required under the Intergovernmental Memorandum of Understanding - Agreement on a Common Assessment Method for Listing of Threatened Species (to which Victoria is a signatory), eligibility has also been assessed in accordance with the *IUCN Red List Categories and Criteria* and the *Guidelines for Using the IUCN Red List Categories and Criteria* (IUCN 2012, IUCN Standards and Petitions Committee 2022).

The IUCN guidelines (IUCN Standards and Petitions Committee 2022) allow for the removal of a species from the Threatened List (de-listing) when new or corrected information arises since the first or previous assessment. Evidence demonstrates that the taxon does not meet the criterion under which it was listed as Vulnerable in Victoria under the FFG Act (C2a(ii)).

For details of the IUCN criteria see Appendix 1.

### **Criterion A – Population size reduction**

#### **Not eligible**

##### **Evidence:**

Two independent data sets indicate no evidence of population decline over the past three generations, for either eastern Australia or just in Victoria. First, the Eastern Australian Waterbird Aerial Survey has been conducted annually over the last several decades along standardised survey bands 30 km wide that cover parts of Victoria, NSW, QLD, NT and SA (Porter et al. 2023). Data and analyses from these surveys prepared for the SAC for the Hardhead (Porter et al. unpublished), indicate that while the number of ducks counted in these surveys fluctuates from year to year, there is no statistical support for any temporal trend – upwards or downwards – over three generations (approx. 21 years) in eastern Australia, or just in Victoria. Therefore, a population reduction of either  $\geq 50\%$  (criterion A1) or  $\geq 30\%$  (criterion A2) over three generations at either spatial scale has not been demonstrated. This is consistent with analyses from a different monitoring program at a much smaller spatial scale, focused on the wetlands of the Western Treatment Plant (WTP) near Geelong in Victoria. Rogers et al. (2023) also report wide fluctuation in the number of Hardhead at the WTP (one of the main waterbird habitats in Victoria) but there is no statistical support for any temporal trend – upwards or downwards – over three generations.

### **Criterion B – Geographic range (Extent of Occurrence and Area of Occupancy)**

#### **Not eligible**

##### **Evidence:**

The Extent of Occurrence across the Hardhead's range is estimated to be 220,000 km<sup>2</sup> and the Area of Occupancy is estimated to be 8,800 km<sup>2</sup>, both of which exceed the thresholds for criterion B (<20,000 km<sup>2</sup> and <2,000 km<sup>2</sup> respectively) (State Government of Victoria 2021).

### **Criterion C – Small population size and decline**

#### **Not eligible**

##### **Evidence:**

While the annual abundance of mature Hardhead counted in surveys in Victoria fluctuates, estimates of the total Victorian population (Tables 1 and 2) and count data from a stratified random sample of Victorian wetlands (Table 3) do not support the conclusion that the Victorian Hardhead population meets the threshold for criterion C (<10,000 mature individuals). Tables 1 & 2 below give summary descriptive statistics for two different modelling approaches, both of which seek to estimate the total number of Hardhead in Victoria in each listed year (Abundance estimate) from counts of individuals in sampled wetlands. While the statistical uncertainty around the abundance estimates is higher than for other waterbird species in the surveys (Ramsey & Fanson 2021, 2022), this uncertainty is built into the Lower and Upper 90% confidence intervals, and these metrics are the most appropriate for assessing whether the total number of Hardhead is lower than 10,000 in any given year (Dave Ramsey, pers. comm. 23 Feb 2024). For example, the model-based abundance estimate for 2021 was 28,300 with 90% confidence intervals of 15,800 to 51,900. In other words, there is 90% confidence the total number of Hardheads in Victoria during the survey period was between 15,800 and 51,900 birds. Another way of expressing this is there is 90% confidence that the total number of birds exceeded 10,000, because the lower confidence interval exceeds that threshold. Taking all the available estimates (five abundance estimates with associated confidence intervals over four years and two modelling approaches), the lower confidence interval exceeds 10,000 birds in four of five cases. Further, the wide fluctuations in the number of birds in Victoria is understood to be in response to changing environmental conditions, that cause birds to move

northwards to the Murray Darling basin when breeding conditions are favourable (Rogers et al. 2023) or when habitat in Victoria contracts during dry periods. The balance of evidence indicates that Hardhead does not meet Criterion C based on population size, nor is there evidence of a decline in the Hardhead population size (see Criterion A above) (BirdLife International 2017, Porter et al. 2023, Rogers et al. 2023).

**Table 1: Model-based estimates of total abundance of Hardhead in Victoria (Ramsey & Fanson 2021, 2022).** Counts for Hardhead were too few for robust analysis in 2022.

Survey year	Abundance estimate	Standard error	Coefficient of variation	Lower 90% confidence interval	Upper 90% confidence interval
2023*	-	-	-	-	-
2022	-	-	-	-	-
2021	28,300	10,000	0.35	15,800	51,900
2020	54,400	11,900	0.22	33,500	80,100

\* Model-based estimates from the 2023 survey (Ramsey & Fanson unpublished) were not available at the time of writing.

**Table 2: Design-based estimates of total abundance of Hardhead in Victoria (Ramsey & Fanson 2021, 2022, unpublished).** Counts for Hardhead were too few for robust analysis in 2022.

Survey year	Abundance estimate	Standard error	Coefficient of variation	Lower 90% confidence interval	Upper 90% confidence interval
2023	156,100	51,400	0.33	83,300	292,600
2022	-	-	-	-	-
2021	13,300	4,000	0.30	8,200	21,500
2020	55,300	28,200	0.51	21,600	141,900

**Table 3: Total count of Hardhead observed at selected Victorian wetlands (Purdey & Menkhorst 2015, Menkhorst & Purdey 2016, Menkhorst et al. 2017, 2018, 2019)**

Survey year	Total count
2019	16,870
2018	24,473
2017	19,296
2016	2,059
2015	2,479
2014	16,347

#### Criterion D – Very small or restricted population

##### Not eligible

##### Evidence:

The estimated number of mature Hardhead in Victoria far exceeds the criterion D threshold of <1,000.

In accordance with the IUCN Guidelines for application of criteria at regional and national levels (IUCN 2012), conspecific populations outside Victoria may affect the risk of extinction. The Hardhead population in Victoria may experience a ‘rescue effect’ from interstate populations (none of which are considered threatened under relevant state legislation), and immigration will likely decrease the extinction risk within Victoria. Therefore, even if the Hardhead did meet the criteria for listing as Vulnerable in Victoria, the Guidelines would require the result to be downgraded where exchange occurs between the regional and global population. This adjustment would move the result from Vulnerable to Near Threatened, thereby making the Hardhead ineligible for listing.

## Criterion E – Quantitative analysis

### Insufficient data to determine eligibility.

There is no population viability analysis available to provide evidence for this criterion.

### Documentation

The published and unpublished information provided to and sourced by the SAC has been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

### Advertisement for public comment

In accordance with the requirements of Section 16D of the FFG Act, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:

Victorian Government Gazette on 22 December 2023

DELWP website

DELWP social media

Public submissions closed on 21 January 2024.

### Additional Information considered by the Scientific Advisory Committee

Following publication of the preliminary recommendation, the SAC received four submissions. In formulating its final recommendation on this item, the SAC considered the submissions, sourced additional data and expert advice and was not made aware of any compelling evidence to warrant a change to the preliminary recommendation that the nominated taxon is not eligible for listing.

### Final Recommendation of the Scientific Advisory Committee

As outlined above, the taxon nominated for de-listing does not satisfy at least one criterion of the set of criteria prepared and maintained under Division 2 of Part 3 of the FFG Act and stated in Schedule 1 of the FFG Regulations.

The SAC concludes that on the evidence available, the nominated taxon is not eligible for listing.

The Scientific Advisory Committee therefore supports the nomination for de-listing and makes a final recommendation that the Hardhead be removed from the *Flora and Fauna Guarantee Act 1988* Threatened List.

### Endorsement by the Convenor of the Scientific Advisory Committee

Date



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Dr. Michelle T. Casanova  
Convenor

6 March 2024

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**Appendix 1:** IUCN Red List Categories and Criteria

**SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).<sup>1</sup>**

<b>A. Population size reduction.</b> Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	<b>Critically Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
<b>A1</b>	≥ 90%	≥ 70%	≥ 50%
<b>A2, A3 &amp; A4</b>	≥ 80%	≥ 50%	≥ 30%
<b>A1</b> Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.	} based on any of the following:	<ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.</li> </ul>	
<b>A2</b> Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be reversible.			
<b>A3</b> Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3].			
<b>A4</b> 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.			
<b>B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)</b>			
	<b>Critically Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
<b>B1.</b> Extent of occurrence (EOO)	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
<b>B2.</b> Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
<b>AND at least 2 of the following 3 conditions:</b>			
<b>(a)</b> Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
<b>(b)</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			
<b>(c)</b> Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			
<b>C. Small population size and decline</b>			
	<b>Critically Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
<b>Number of mature individuals</b>	< 250	< 2,500	< 10,000
<b>AND at least one of C1 or C2</b>			
<b>C1.</b> An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
<b>C2.</b> An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
<b>(a)</b> (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
<b>(b)</b> Extreme fluctuations in the number of mature individuals			
<b>D. Very small or restricted population</b>			
	<b>Critically Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
<b>D.</b> Number of mature individuals	< 50	< 250	<b>D1.</b> < 1,000
<b>D2.</b> Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	<b>D2.</b> typically: AOO < 20 km <sup>2</sup> or number of locations ≤ 5
<b>E. Quantitative Analysis</b>			
	<b>Critically Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
<b>Indicating the probability of extinction in the wild to be:</b>	≥ 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

<sup>1</sup> Use of this summary sheet requires full understanding of the IUCN Red List Categories and Criteria and Guidelines for Using the IUCN Red List Categories and Criteria. Please refer to both documents for explanations of terms and concepts used here.