Contents

National Risk Assessment: SERIOUS

RISK ASSESSMENT FOR AUSTRALIA: **Amazon Tree Boa (*Corallus hortulanus*)**

Class - Reptilia**, Order -** Squamata**, Family -** Boidae**, Genus –** *Corallus.*

SPECIES:	**Species description:**
Corallus hortulanus (Linnaeus, 1758) **Synonyms:** *Boa ambleocephala* (Donndorff, 1798) *Boa elegans* (Daudin, 1803) *Boa enhydris* (Linnaeus, 1758) *Boa enydris* (Linnaeus, 1758) *Boa hortulana* (Linnaeus, 1758) *Boa merremi* (Schneider, 1801) *Boa modesta* (Reuss, 1834) *Boa obtusiceps* (Bechstein, 1802) *Boa salmonidia* (Briceño Rossi, 1934) *Corallus cooki* (Gray, 1842) *Corallus enhydris* (Linnaeus, 1758) *Corallus enydris* (Linnaeus, 1758) *Corallus maculatus* (Gray, 1842) *Corallus obtusirostris* (Daudin, 1803) *Vipera bitis* (Laurenti, 1768) *Vipera madarensis* (Laurenti, 1768) *Xiphosoma dorsuale* (Wagler, 1824) *Xiphosoma ornatum* (Wagler, 1824) *Xiphosoma ruschenbergerii* (Cope, 1875) **Subspecies:**	Amazon tree boas exhibit an abundance of morphs and colour variations (Reptile Guide). The basic colour can be anywhere from black, brown, or grey, to any shade of red, orange, yellow, or many colours in between. Some are totally patternless, while others may be speckled, banded, or saddled with rhomboid or chevron shapes. Some reds will have yellow patterns, some yellows, red or orange patterns. The Amazon tree boa is distinguishable from other species in the *Corallus* complex by the maximum number of dorsal scale rows (usually > 50) (Henderson, 1997). Eyes can be grey, yellow, or slightly red (Reptile Direct). Adults weigh on average 1,906 grams (AnAge) with an average total length between 1.2 and 1.5 metres when fully grown (ADW; Martins, 1999). The maximum total length the Amazon tree boa can reach is 1.9–2 metres (Burnie, 2001; Henderson, 2007; Martins, 1999). Males tend to be smaller than females (Reptile Direct). They have small, claw-like remnants of vestigial hindlimbs in the cloacal region (Martins, 1999). **General information:** Distribution: The Amazon tree boa is endemic to Plurinational States of Bolivia, Brazil (Amazonas), Colombia (mainland), Ecuador (mainland), French Guiana, Guyana, Peru, Suriname and the Bolivarian Republic of Venezuela (mainland) (Guedes *et al.,* 2014; IUCN; Marques *et al.,* 2012). Habitat: Amazon tree boas are primarily arboreal (Harrington *et al*., 2018; Henderson, 2007; Martins, 1999). They are typically found below 300 metres elevation (Henderson, 1997) and can be located in diverse habitats, including primary and secondary rainforest, second growth, mixed forests, palm forests, swamp forest, savanna and grassland with stands of trees (Henderson, 2007). Diet: High diversity in diet composition. Amazon tree boas are nocturnal and diurnal (Guedes *et al.,* 2014; Henderson, 2007; Marques *et al.,* 2012; Martins, 1999) and actively hunt small mammals (including bats), birds, frogs, and lizards (da Costa Silva, 2010; da Costa Silva, 2012; Martins, 1999; Pizzatto *et al.,* 2009). Reproduction: Sexual maturity is reached at ~3 years (Mendez, 2000) and they are ovoviviparous. Mating occurs from late September to late March with births occurring in March to July (Arrivillaga *et al*., 2019; Garcia and Almeida-Santos, 2021). Gestation is between 6 to 8 months (AWD). Clutch size relates to SVL (snout-to-vent length) of females (Pizzatto & Marques, 2007).

ITIS recognises two subspecies: *C.h.enydris* and *C.h.hortulanus*; GBIF recognises two subspecies: *C.h.enydris* and *C.h.melanea*; Catalogue of Life recognises one subspecies: *C.h.melanea.* *Corallus hortulanus enydris* (Linnaeus, 1758) *Corallus hortulanus hortulanus* (Linnaeus, 1758) *Corallus hortulanus melanea* (Gray, 1849) (It should be noted that Reynolds & Henderson (2018) do not recognise any subspecies.) **Common Names:** Amazon Tree Boa Amazon Treeboa Amazonian Tree Boa Garden Tree Boa Common Tree Boa Macabrel	**Longevity:** The maximum longevity in captivity is 15 years (AnAge). Up to 20 years in captivity, over 20 years in the wild (Reptile Direct). **Conservation status:** **IUCN:** Least Concern **CITES:** Appendix II Rationale: All Boidae spp. (except the species included in Appendix I) are listed in CITES Appendix II. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival (CITES, 2007).
DATE OF ASSESSMENT: Feb 2023 (Jodi Buchecker) **EIC ENDORSEMENT:** 16/06/23 **Risk assessment model used for the assessment:**	**The risk assessment model:** Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003, 2006, 2008), reptiles and amphibians (Bomford et al 2005, Bomford 2008). Developed by Dr Mary Bomford for the Bureau of Rural Sciences (BRS), the model uses criteria that have been demonstrated to have significant correlation between a risk factor and the establishment of populations of exotic species and the pest potential of those species that do establish. For example, a risk factor for establishment is similarity in climate (temperature and rainfall) within the species' distribution overseas and Australia. For pest potential, the species' overseas pest status is a risk factor. The model is published as 'Risk assessment models for the establishment of exotic vertebrates in Australia and New Zealand' (Bomford 2008) and is available online on the PestSmart website https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/Risk_Assess_Models_2008_FINAL.pdf

Bomford 2006, Reptiles Bomford 2008, Bird and Mammal Model for Reptiles and Amphibians	**CLIMATE**: In 2021 a new version of the Climatch program used to assess similarity in climate was released by the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES): CLIMATCH v2.0. The increase in resolution in this new version (from 50 km to 20 km) required recalibration of Climate Match Scores. See Table 1. Sixteen climate parameters (variables) of temperature and rainfall are used to estimate the extent of similarity between data from meteorological stations located within the species' world distribution and stations in Australia. Worldwide, data from approximately 19000 locations are available for analysis. The number of locations used in an analysis will vary according to the size of the species' distribution and the number of meteorological stations located within that distribution. To represent the climate match visually, the map of Australia is divided into 19236 grid squares, each measured in 0.2 degrees in both longitude and latitude. CLIMATCH v2.0 calculates a match for each Australian grid by comparing data from all meteorological stations within the species' distribution (excluding any populations in Australia) and allocating a score ranging from ten for the highest level match to zero for the poorest match. Levels of climate match are used in the risk assessment for questions B1 (scores are summed to give a cumulative score), C6, and C8. Climatch v2.0 can be accessed on the ABARES website, agriculture.gov.au/abares. The direct URL is https://climatch.cp1.agriculture.gov.au/.

Reptile Model (2006):

FACTOR	**SCORE**	**DETAIL**
STAGE A: RISKS POSED BY CAPTIVE OR RELEASED ANIMALS		
A. Climate match risk score *Map the selected reptile or amphibian species' overseas range, including its entire native and exotic (excluding Australia) ranges over the past 1000 years. Use CLIMATCH v2.0 to determine the climate match between this overseas range and Australia, selecting Euclidian Match and using all 16 climate variables for the analysis.* *CMS = sum of classes 7 – 10* *CMRS = 100 x (CMS/19236).*	7.91	CMRS = 100 x (1,521/19,236) = 7.907049282595134 CMRS = 7.91
B. Exotic Elsewhere Risk score (0, 15 or 30) *Score B = A species' Exotic Elsewhere Risk Score, calculated as follows:* • *Species has established breeding self-sustaining exotic population in another country = 30* • *Species has been introduced into another country and records exist of it in the wild, but it is uncertain if a breeding self-sustaining population has established = 15*	0	*Species has not established an exotic population (including species not known to have been introduced anywhere).* No evidence the Amazon tree boas have ever established an exotic population.

• *Species has not established an exotic population (including species not known to have been introduced anywhere) = 0*		
C. Taxonomic Family Risk Score	5	*Boidae*
ESTABLISHMENT RISK RANK *A species' Establishment Risk Score = Score A + Score B + Score C.* *Establishment Risk Rank — Establishment Risk Score* *Low — ≤ 22* *Moderate — 23-60* *Serious — 61-115* *Extreme — ≥ 116*	12.91	**LOW establishment risk**

Bird and Mammal Model for Reptiles and Amphibians:

A. Degree of climate match between species overseas range and Australia (1–6) *Map the selected mammal or bird species' overseas range, including its entire native and exotic (excluding Australia) ranges over the past 1000 years.* *Use CLIMATCH v2.0, Value X = sum of classes 6 – 10, see Table 1.*	2	*Low climate match to Australia* Value X = 2,427 CMS = 2
B. Exotic population established overseas (0–4) *An established exotic population means the introduced species must have bred outside of captivity and must currently maintain a viable free-living population where the animals are not being intentionally fed or sheltered, even though they may be living in a highly disturbed environment with access to non-natural food supplies or shelter.*	0	*No exotic population ever established.* No evidence the Amazon tree boa has ever established an exotic population.
C. Overseas range size score (0–2) < 1 = 0; 1– 70 = 1; >70 = 2 *Estimate the species overseas range size* including currently and the past 1000 years; natural and introduced range in millions of square kilometres*	1	*Overseas range between 1 to 70 million square kilometres.* Overseas range size estimated at 11.5 million km^2 including current and past 1000 years, natural and introduced range.

		Overseas distribution includes the Plurinational States of Bolivia, Brazil (Amazonas), Colombia (mainland), Ecuador (mainland), French Guiana, Guyana, Peru, Suriname and the Bolivarian Republic of Venezuela (mainland).
ESTABLISHMENT RISK RANK *A species' Establishment Risk Score = Score A + Score B + Score C.* *Establishment Risk Rank — Establishment Risk Score* *Low — ≤ 4* *Moderate — 5-7* *Serious — 8-9* *Extreme — 10-12*	3	**LOW establishment risk**

ENVIRONMENT AND INVASIVES COMMITTEE THREAT CATEGORY	**SERIOUS**

World distribution map (IUCN Red List) and Climatch world distribution map (including current and past 1000 years) indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

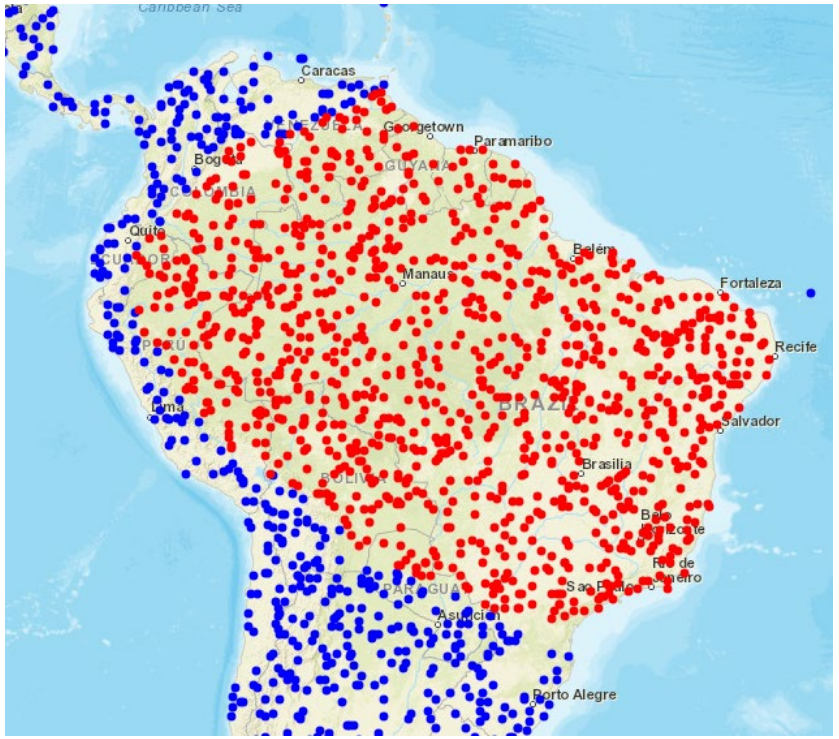
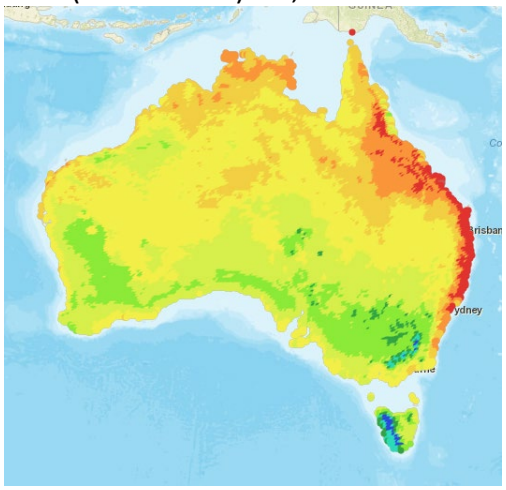


Figure 2 – World Distribution map – Climatch

Reptile model (2006): Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Corallus hortulanus*

CMS (Sum Level 7) = 1,521



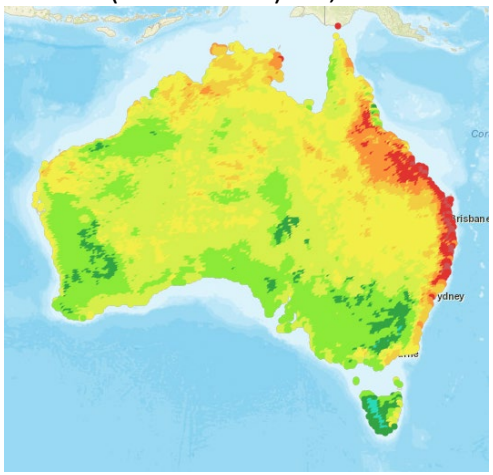
Score	Color	Count
0		28
1		57
2		158
3		2076
4		4607
5		7583
6		3206
7		1197
8		322
9		2
10		0

Species: Amazon Tree Boa (Corallus hortulanus)
Algorithm: Euclidean
1094 source features selected
19236 target features selected
Approximate selected area: 11,565,652 km^2

Bird and Mammal model: Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Corallus hortulanus*

Value X (Sum Level 6) = 2,427



Score	Color	Count
0		0
1		35
2		624
3		4160
4		6551
5		5439
6		1302
7		732
8		345
9		48
10		0

Species: Amazon Tree Boa (Corallus hortulanus)
Algorithm: Closest Standard Score
1094 source features selected
19236 target features selected
Approximate selected area: 11,565,652 km^2

Table 1: ABARES recalibration thresholds

Climate Match Score (CMS)	Climatch (50 km) Closest Standard Match Sum Level 6 (Value X)	2021 Recalibrated Climatch v2.0 (20 km) Closest Standard Match Sum Level 6 (Value X)
1 (Very low)	< 100	< 691
2 (Low)	100-599	691-4137
3 (Moderate)	600-899	4138-6209
4 (High)	900-1699	6210-11735
5 (Very high)	1700-2699	11736-18642
6 (Extreme)	≥ 2700	≥ 18643

Table 2: Assigning species to EIC Threat Categories (shaded cells relate to assignment of reptiles and amphibians to EIC Threat Categories based on an assessed establishment risk and an allocated pest risk of extreme) – adapted from Bomford 2008

Establishment Risk	Pest Risk	Public Safety Risk	EIC Threat Category	Implication for any proposed import into Australia	Implication for keeping and movement in Australia
Extreme	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Extreme	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Moderate	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Low	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Moderate	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Moderate	Highly, Moderately or Not Dangerous	**SERIOUS**	Import restricted to those collections approved for keeping SERIOUS Threat species	Limited to those collections approved for keeping particular SERIOUS Threat species
Serious	Low	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Moderate	Highly Dangerous	**SERIOUS**		
Moderate	Low	Highly Dangerous	**SERIOUS**		
Low	Extreme	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Moderate	Highly Dangerous	**SERIOUS**		
Low	Low	Highly Dangerous	**SERIOUS**		
Moderate	Moderate	Moderately or Not Dangerous	**MODERATE**	Import restricted to those collections approved for keeping MODERATE Threat species	Limited to those collections approved for keeping particular MODERATE Threat species
Moderate	Low	Moderately or Not Dangerous	**MODERATE**		
Low	Moderate	Moderately or Not Dangerous	**MODERATE**		
Low	Low	Moderately Dangerous	**MODERATE**		
Low	Low	Not Dangerous	**LOW**	Import permitted	May be limited to those collections approved for keeping particular LOW Threat species
Any Value	Any Value	Unknown	**EXTREME until proven otherwise**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Unknown	Any Value	Any Value	**EXTREME until proven otherwise**		
Any Value	Unknown	Any Value	**EXTREME until proven otherwise**		
Unassessed	Unassessed	Unassessed	**EXTREME until proven otherwise**		

Risk Assessor's details:

Risk Assessor's name:	Jodi Buchecker
Business address and contact details:	PIRSA jodi.buchecker@sa.gov.au
Date:	Feb 2023
Reviewers:	Jess Lyons, DCCEEW

Bibliography:

ADW – Animal Diversity Web ADW: Corallus hortulanus: INFORMATION (animaldiversity.org)

AnAge Amazonian tree boa (Corallus hortulanus) longevity, ageing, and life history (senescence.info)

Arrivillaga, C., Lee, A., Ebiner, S., & Moslah, S. (2019). Observations on the reproductive biology of the Amazon Treeboa, Corallus hortulanus (Squamata: Boidae) in the Manu Biosphere Reserve, Perú. Reptiles & Amphibians, 26(2), 108–110. https://doi.org/10.17161/randa.v26i2.14371

Bomford M. (2003). Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia. Bureau of Rural Sciences, Canberra.

Bomford M. (2006). Risk assessment for the establishment of exotic vertebrates in Australia: recalibration and refinement of models - A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

Bomford M. (2008). Risk assessment models for establishment of exotic vertebrates in Australia and New Zealand - A report produced for the Invasive Animals Cooperative Research Centre. Bureau of Rural Sciences, Canberra.

Bomford M., Kraus F., Braysher M., Walter L. and Brown L. (2005). Risk Assessment Model for the Import and Keeping of Exotic Reptiles and Amphibians. A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

Burnie D, Wilson DE. 2001. Animal. Dorling Kindersley. 624 pp

Calderón, M., Ortega, A., Nogueira, C., Gagliardi, G., Cisneros-Heredia, D.F., Hoogmoed, M., Schargel, W. & Rivas, G. 2016. *Corallus hortulanus*. *The IUCN Red List of Threatened Species* 2016: e.T203210A2762194. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T203210A2762194.en. Accessed on 07 February 2023.

Catalogue of Life COL | Corallus hortulana (Linnaeus, 1758) (catalogueoflife.org)

Corallus hortulana (Linnaeus, 1758) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-02-07

da Costa Silva, P., Henderson, R. W., Tavares, A. A., Araújo, S. C. M., & Guzzi, A. (2012). Observations on Foraging and New Prey Records for the Amazon Treeboa (Corallus hortulanus, Squamata: Boidae). *Reptiles & Amphibians*, *19*(3), 187-190.

da Costa Silva, P., & Henderson, R. W. (2010). Observations on habitat, activity, foraging, and diet in the Amazon treeboa, Corallus hortulanus, on Batatas Island, Parnaíba Delta, Piauí, Brazil. *Reptiles & Amphibians*, *17*(4), 218-221.

Garcia, V. C., & Almeida-Santos, S. M. d. (2022). Reproductive cycles of Neotropical boid snakes evaluated by ultrasound. Zoo Biology, 41, 74–83. https://doi.org/10.1002/zoo.21646

GBIF Corallus hortulana (Linnaeus, 1758) (gbif.org)

Guedes TB, Nogueira C, Marques OAV. (2014) Diversity, natural history, and geographic distribution of snakes in the Caatinga, Northeastern Brazil. *Zootaxa* 3863(1): 001–093. doi: 10.11646/zootaxa.3863.1.1

Harrington, Sean M; Jordyn M de Haan, Lindsey Shapiro, Sara Ruane 2018. Habits and characteristics of arboreal snakes worldwide: arboreality constrains body size but does not affect lineage diversification. Biological Journal of the Linnean Society 125 (1): 61–71

Healey, Mariah. Kenyan Sand Boa Care Sheet | ReptiFiles

Henderson, R.L. 1997. A taxonomic review of the *Corallus hortulanus* complex of Neotropical tree boas. *Caribbean Journal of Science* 33: 3-4.

Henderson, R. W. (2007). Species Profile: Amazon Treeboa (Corallus hortulanus). *Iguana*, *14*(2), 85-85.

Huntley, Mark (2012). *SandBoaMorph.com's East African Sand Boa Care Guide*. CreateSpace Publishing. 36 pp.

ITIS - Report: Corallus hortulanus

IUCN Corallus hortulanus (Garden Tree Boa) (iucnredlist.org)

Marques R, Browne-Ribeiro HC, Tinôco MS, Coelho HEA, Amorin R. (2012) *Corallus hortulanus* (Amazon Tree Boa) Geographic Distribution. *Herpetological Review* 43(3): 448.

Martins, M., M. Oliveira (1999). Natural history of snakes in forests of the Manaus region, Central Amazonia, Brazil. Herpetological Natural History, 6: 78-150.

Mendez, D. 2001. "An Introduction to Amazon Tree Boas by DM" (On-line).

Pizzatto, Lígia, and Otavio A. V. Marques "REPRODUCTIVE ECOLOGY OF BOINE SNAKES WITH EMPHASIS ON BRAZILIAN SPECIES AND A COMPARISON TO PYTHONS," South American Journal of Herpetology 2(2), 107-122, (1 August 2007). https://doi.org/10.2994/1808-9798(2007)2[107:REOBSW]2.0.CO;2

Pizzatto, L., Marques, O., & Facure, K. (2009). Food habits of Brazilian boid snakes: overview and new data, with special reference to Corallus hortulanus. *Amphibia-Reptilia*, *30*(4), 533-544.

Reptile Database Corallus hortulana | The Reptile Database (reptarium.cz)

Reptile Direct fact sheet Amazon Tree Boa Care: Size, Temperament, Habitat Setup... (reptiledirect.com)

Reptile Guide fact sheet Amazon Tree Boa Morph: Care, Habitat, and Diet Guide (reptile.guide)

Reptile Talk fact sheet Garden Tree Boa (Corallus hortulanus) - ReptileTalk NET

Reynolds, R. Graham and Robert W. Henderson 2018. Boas of the World (Superfamily Booidae): A Checklist with Systematic, Taxonomic, and Conservation Assessments. Bulletin of the Museum of Comparative Zoology Sep 2018, Vol. 162, No. 1: 1-58.

National Risk Assessment: EXTREME (*Euplectes afer and Euplectes orix*)
SERIOUS (*Euplectes axillaris and Euplectes franciscanus*)

RISK ASSESSMENT FOR AUSTRALIA: **Weaver Birds (*Euplectes* Sp.)**

Class - Aves**, Order -** Passeriformes**, Family -** Ploceidae**, Genus -** *Euplectes*.

SPECIES:	**Species description:**
Euplectes afer (Gmelin, 1789) *Euplectes axillaris* (Smith, 1838) *Euplectes franciscanus* (Isert, 1789) *Euplectes orix* (Linnaeus, 1758)	Bishops and Widowbirds are small passerine Weaver birds (as a group from 9.5 to 15 centimetres, weight between 11 to 36 grams). All four species assessed here are highly sexually dimorphic in their breeding season. The male's non-breeding plumage is similar to females and juveniles; generally streaked buff, brown, and off white (Andersson, 1994). Males in breeding season:
Synonyms: *Loxia afra* (Gmelin, 1789) *Taha afra* (Unknown) *Vidua axillaris* (Smith, 1838) *Loxia franciscana* (Isert, 1789) *Emberiza orix* (Linnaeus, 1758)	***1. Euplectes afer* (Yellow-crowned Bishop):** very short tail, black lower face, throat, breast, and belly, wide black collar on back of the neck, brilliant yellow crown, forehead, and hind crown; yellow patch on the shoulder and the rump and back are yellow (del Hoya, 2010). ***2. Euplectes axillaris* (Fan-tailed Widowbird):** medium length fan-shaped tail, body black except for buff-edged tertials, secondaries and greater coverts, cinnamon-brown on bases to primary coverts and on median coverts, forming distinctive epaulet together with red lesser coverts (del Hoya, 2010). ***3. Euplectes franciscanus* (Northern Red Bishop):** short tail, red on the backside and wraps around the chin to back of the head, throat, and breast, with a dark black crown, forehead, flank, and belly. The tail and upper wings are brown, with pale legs and a black bill (del Hoya, 2010).
Subspecies: *E. afer afer* (Gmelin, 1789) *E. afer ladoensis* (Reichenow, 1885) *E. afer strictus* (Hartlaub, 1857) *E. afer taha* (Smith, 1836)	***4. Euplectes orix* (Southern Red Bishop):** short tail, black face mask formed by forehead, forecrown, lores, cheek, chin and upper throat; rest of head down to lower throat and upper breast red; nape, rump and upper tail-coverts deep red to orange-red, mantle and back red brown; lower breast, belly and flanks black, undertail-coverts red (del Hoya, 2010).
E. axillaris axillaris (Smith, 1838) *E. axillaris bocagei* (Sharpe, 1871) *E. axillaris phoeniceus* (Heuglin, 1862) *E. axillaris quanzae* (Hartert, 1903)	**General information:** All *Euplectes* species are similar in general biology and behaviour (Craig 1980). They live in colonies that vary in size throughout the non-breeding season. Weavers roost communally, often with several different species. A single roost can hold hundreds or thousands of individuals (del Hoya 2010). Weaver bird colonies are usually found close to water bodies (Andersson, 1994). There is often some seasonal change in habitat selection, with

E. axillaris traversii (Salvadori, 1888) *E. axillaris zanzibaricus* (Shelley, 1881) *E. franciscanus franciscanus* (Isert, 1789) *E. franciscanus pusillus* (Hartert, 1901) *E. orix nigrifrons* (Bohm, 1884) *E. orix orix* (Linnaeus, 1758) *E. orix sundevalli* (Bonaparte, 1850) *E. orix turgidus* (Clancey, 1958) **Common Names:** ***Euplectes afer*:** Yellow-crowned Bishop Napoleon Bishop Napoleon Weaver Golden Bishop Black-winged Golden Bishop ***Euplectes axillaris*:** Fan-tailed Widowbird Red- shouldered Widowbird Red- shouldered Whydah ***Euplectes franciscanus*:** Northern Red Bishop Orange Bishop ***Euplectes orix*:** Grenadier Weaver Southern Red Bishop	particular sites chosen for nest-building, whereas in the non-breeding season, the birds may range through very different areas within the same broad biome (del Hoya, 2010). Habitat: **Yellow-crowned Bishop:** open grassy valleys, generally at low altitudes, breeds in very wet areas such as swamps or seasonally flooded habitats, and generally closely associated with wet areas. **Fan-tailed Widowbird:** tall grassland, often in moist or swampy areas, even reeds and papyrus. Also found in drier grassland with bushes and cultivated areas, including sugar cane fields. **Northern Red Bishop:** tall grassland, in swampy or drier bushy areas, also scrub and sugar cane. **Southern Red Bishop:** tall grassland and cultivated areas in open country, usually near water. All four species are largely granivorous, feeding on small seeds, but also eat insects, fruit and other vegetable material (Long, 1981). Fan-tailed widowbirds are also known to consume nectar (Long, 1981). As their name suggests, weavers weave their nests together. Nests are generally oval and woven by the male from thin grass strips, lined by female with fine grasses, often with seedheads attached. Nests are attached, usually less than 1m metre above ground or water, to vertical stems of grass or other vegetation. Females lay a clutch of 2-4 (average 3) eggs. All species *Euplectes* species are polygynous (Craig, 1980). In captivity hybridisation has been recorded between *E. afer* and *E.* (Colahan and Craig, 1981). Hybridisation is also recorded in captivity between *E. axillaris* and Yellow-mantled Widowbirds (*E. macrourus,* not assessed here); *E. axillaris* and Yellow Bishops (*E. capensis,* not assessed here); and *E. orix* and White-winged Widowbirds (*E. albonotatus,* not assessed here) (Colahan and Craig, 1981). **Longevity:** No record for wild birds (de Magalhaes and Costa, 2009). In captivity maximum longevity about 15 years (Species360) **Conservation status:** **IUCN:** Least Concern - these species have extremely large ranges, and hence do not approach the thresholds for Vulnerable under the range size criterion (Birdlife International, 2018). **CITES:** Not listed (UNEP-WCMC, 2015)

Red Bishop Little Bishop	
DATE OF ASSESSMENT: Mar 2023 (Jodi Buchecker) **EIC ENDORSEMENT:** 16/06/23 **Risk assessment model used for the assessment:** Bomford 2008, Mammals and Birds	**The risk assessment model:** Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003, 2006, 2008), reptiles and amphibians (Bomford et al 2005, Bomford 2008). Developed by Dr Mary Bomford for the Bureau of Rural Sciences (BRS), the model uses criteria that have been demonstrated to have significant correlation between a risk factor and the establishment of populations of exotic species and the pest potential of those species that do establish. For example, a risk factor for establishment is similarity in climate (temperature and rainfall) within the species' distribution overseas and Australia. For pest potential, the species' overseas pest status is a risk factor. The model is published as 'Risk assessment models for the establishment of exotic vertebrates in Australia and New Zealand' (Bomford 2008) and is available online on the PestSmart website https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/Risk_Assess_Models_2008_FINAL.pdf **CLIMATE**: In 2021 a new version of the Climatch program used to assess similarity in climate was released by the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES): CLIMATCH v2.0. The increase in resolution in this new version (from 50 km to 20 km) required recalibration of Climate Match Scores. See Table 1. Sixteen climate parameters (variables) of temperature and rainfall are used to estimate the extent of similarity between data from meteorological stations located within the species' world distribution and stations in Australia. Worldwide, data from approximately 19000 locations are available for analysis. The number of locations used in an analysis will vary according to the size of the species' distribution and the number of meteorological stations located within that distribution. To represent the climate match visually, the map of Australia is divided into 19236 grid squares, each measured in 0.2 degrees in both longitude and latitude. CLIMATCH v2.0 calculates a match for each Australian grid by comparing data from all meteorological stations within the species' distribution (excluding any populations in Australia) and allocating a score ranging from ten for the highest level match to zero for the poorest match. Levels of climate match are used in the risk assessment for questions B1 (scores are summed to give a cumulative score), C6, and C8. Climatch v2.0 can be accessed on the ABARES website, agriculture.gov.au/abares. The direct URL is https://climatch.cp1.agriculture.gov.au/.

Bird and Mammal Model:

FACTOR	SCORE	DETAIL
STAGE A: RISKS POSED BY CAPTIVE OR RELEASED ANIMALS		
A1. Risk to people from individual escapees (0–2) *Assess the risk that individuals of the species could harm people. (NB, this question only relates to aggressive behaviour shown by escaped or released individual animals. Question C11 addresses the risk of harm from aggressive behaviour if the species establishes a wild population).*	0	*All other animals posing a lower risk of harm to people (i.e. animals that will not make unprovoked attacks causing injury).* Small passerine birds weighing between 11-36 grams (del Hoya, 2010).

Aggressive behaviour, size, plus the possession of organs capable of inflicting harm, such as sharp teeth, claws, spines, a sharp bill, or toxin-delivering apparatus may enable individual animals to harm people. Any known history of the species attacking, injuring or killing people should also be taken into account. Assume the individual is not protecting nest or young.		
A2. Risk to public safety from individual captive animals (0–2) *Assess the risk that irresponsible use of products obtained from captive individuals of the species (such as toxins) pose a public safety risk (excluding the safety of anyone entering the animals' cage/enclosure or otherwise coming within reach of the captive animals)*	0	*Nil or low risk (highly unlikely or not possible).*
STAGE A PUBLIC SAFETY RISK SCORE **SUM A1 - A2 (0-4)**	0	**Not dangerous**
STAGE B: PROBABILITY ESCAPED OR RELEASED INDIVIDUALS WILL ESTABLISH FREE-LIVING POPULATIONS		
Model 1: FOUR-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)		
B1. Degree of climate match between species overseas range and Australia (1–6) *Map the selected mammal or bird species' overseas range, including its entire native and exotic (excluding Australia) ranges over the past 1000 years.* *Use CLIMATCH v2.0, Value X = sum of classes 6 – 10, see Table 1.*	5 4 3 5	**1. Yellow-crowned Bishop:** *Very High climate match to Australia* Value X = 7,322 = 4 + 1 = 5 (introduced populations not included in Climatch modelling due to uncertainty of actual range, therefore +1) CMS = 5 **2. Fan-tailed Widowbird:** *High climate match to Australia* Value X = 7,067 CMS = 4 **3. Northern Red Bishop:** Moderate climate match to Australia Value X = 3,585 = 2 + 1 = 3 (introduced populations not included in Climatch modelling due to uncertainty of actual range, therefore +1) CMS = 3 **4. Southern Red Bishop:** *Very High climate match to Australia*

		Value X = 13,372 CMS = 5
B2. Exotic population established overseas (0–4) *An established exotic population means the introduced species must have bred outside of captivity and must currently maintain a viable free-living population where the animals are not being intentionally fed or sheltered, even though they may be living in a highly disturbed environment with access to non-natural food supplies or shelter.*	4 0 4 4	**1. Yellow-crowned Bishop:** *Exotic population established on a larger island (> 50 000km^2) or anywhere on a continent.* Extant & Introduced (resident): Japan (Birdlife International, 2018). Extant & Introduced (breeding): Portugal; Puerto Rico (Birdlife International, 2018). Possibly Extinct & Introduced: Jamaica (Birdlife International, 2018). Introduced populations (escaped cagebirds) established in United States of America (USA) and West Indies, possibly also in parts of Iberian Peninsula (del Hoya, 2010). **2. Fan-tailed Widowbird:** *No exotic population ever established* No reports of established populations outside its natural range (del Hoyo 2010, Birdlife International 2018). **3. Northern Red Bishop:** *Exotic population established on a larger island (> 50 000km^2) or anywhere on a continent.* Extant & Introduced (breeding): Bermuda; Martinique; Puerto Rico (Birdlife International 2018). Possibly Extinct & Introduced: Virgin Islands, USA (Birdlife International 2018). Introduced (escaped cagebirds) in Southwest USA (near Los Angeles, in California (CBRC, 2015); breeding reported also in Arizona); introduced c. 1960 in West Indies, on Puerto Rico, with breeding on Martinique and Guadeloupe, and recorded on Jamaica and St Croix (Virgin Islands). Reported introduction in Japan of *E. orix* (Southern Red Bishop) more likely to be this species (del Hoya, 2010). **4. Southern Red Bishop:** *Exotic population established on a larger island (> 50 000km^2) or anywhere on a continent.* Extant & Introduced: Jamaica (Birdlife International, 2018). del Hoya (2010) reports this species formerly being present in south-eastern Australia (Adelaide, extinct by 1976).
B3. Overseas range size score (0–2) < 1 = 0; 1– 70 = 1; >70 = 2 *Estimate the species overseas range size* including currently and the past 1000 years; natural and introduced range in millions of square kilometres*	 1	*Overseas range between 1-70 million km^2* **1. Yellow-crowned Bishop:** Overseas range estimated in Climatch: 15 million km^2. Extant (resident): Angola; Benin; Botswana; Burkina Faso; Cameroon; Central African Republic; Chad; Congo; The Democratic Republic of the Congo; Côte d'Ivoire; Eritrea;

		Eswatini; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Mali; Mauritania; Mozambique; Namibia; Niger; Nigeria; Senegal; Sierra Leone; South Africa; South Sudan; Sudan; Tanzania, United Republic of; Togo; Uganda; Zambia and Zimbabwe (Birdlife International, 2018). Extant & Introduced (resident): Japan (Birdlife International, 2018). Extant & Introduced (breeding): Portugal; Puerto Rico (Birdlife International, 2018). Possibly Extinct & Introduced: Jamaica (Birdlife International, 2018). Introduced populations (escaped cagebirds) established in USA and West Indies, possibly also in parts of Iberian Peninsula (del Hoya, 2010).
	1	**2. Fan-tailed Widowbird:** Overseas range estimated in Climatch: 8.5 million km2. Birdlife International 17.6 million km^2. Extant (resident): Angola; Benin; Botswana; Burundi; Cameroon; Central African Republic; Chad; Congo; The Democratic Republic of the Congo; Eswatini; Ethiopia; Kenya; Malawi; Mali; Mozambique; Namibia; Niger; Nigeria; Rwanda; Somalia; South Africa; South Sudan; Sudan; United Republic of Tanzania; Uganda; Zambia and Zimbabwe (Birdlife International, 2018). Extant & Vagrant (non-breeding): Lesotho (Birdlife International, 2018).
	1	**3. Northern Red Bishop:** Overseas range estimated in Climatch: 7.2 million km^2. Birdlife International 11.3 million km^2. Extant (resident): Benin; Burkina Faso; Cameroon; Central African Republic; Chad; The Democratic Republic of the Congo; Côte d'Ivoire; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Liberia; Mali; Mauritania; Niger; Nigeria; Senegal; Sierra Leone; Somalia; South Sudan; Sudan; Togo and Uganda (Birdlife International 2018). Extant & Introduced (breeding): Bermuda; Martinique and Puerto Rico (Birdlife International, 2018). Possibly Extinct & Introduced: Virgin Islands, USA (Birdlife International 2018). Introduced (escaped caged birds) in Southwest USA (near Los Angeles, in California; breeding reported also in Arizona); introduced c. 1960 in West Indies, on Puerto Rico, with breeding on Martinique and Guadeloupe, and recorded on Jamaica and St Croix (Virgin Island). Reported introduction in Japan of *E. orix* (Southern Red Bishop) more likely to be this species (del Hoya, 2010).
		4. Southern Red Bishop: Overseas range estimated in Climatch: 5.2 million km^2.

	1	Extant (resident): Angola; Botswana; Burundi; The Democratic Republic of the Congo; Eswatini; Kenya; Lesotho; Malawi; Mozambique; Namibia; Rwanda; South Africa; United Republic of Tanzania; Uganda; Zambia and Zimbabwe (Birdlife International, 2018). Extant & Introduced: Jamaica (Birdlife International, 2018). Del Hoya (2010) reports this species formerly being present in south-eastern Australia (Adelaide, extinct by 1976).
B4. Taxonomic Class (0–1) *Bird = 0; mammal = 1*	0	*Bird*
B. ESTABLISHMENT RISK SCORE **SUM OF B1- B4 (1–13)**	10 5 8 10	**1. Yellow-crowned Bishop: Extreme establishment risk** **2. Fan-tailed Widowbird: Low establishment risk** **3. Northern Red Bishop: Moderate establishment risk** **4. Southern Red Bishop: Serious establishment risk**
Model 2: Seven-Factor Model For Birds And Mammals (Bomford 2008)		
B5. Diet score (0–1) *Specialist = 0; generalist = 1*	1	*Generalists with a broad diet of many food types* Members of this family are largely granivorous, feeding on small seeds, but also eat insects, fruit and other vegetable material (del Hoya, 2010).
B6. Habitat score (0–1) *Undisturbed or disturbed habitat*	1	*Can live in disturbed habitats* All four species assessed here known to live in grassland around cultivation. (del Hoyo, 2010).
B7. Migratory score (0–1) *Always migratory = 0; non-migratory = 1*	1	*Facultative migrant - Not always migratory* Birdlife International (2018) reports all four species to be non-migrants. Del Hoya et al (2010) reports that they are essentially resident species, with few moving more than 100 kilometres and that these local movements are probably related to food availability. Specifically: **1. Yellow-crowned Bishop:** In South Africa may be nomadic, possible regular seasonal movements in the Zambezi Valley. Individuals moving south at the start of the rainy season in Nigeria have stored 2-9 grams of lipid, suggesting pre-migratory fattening for flight of up to 600 kilometres. Also categorised as a migrant in Central African Republic. **2. Fan-tailed Widowbird:** Mainly resident.

		3. Northern Red Bishop: Considered resident over much of range, but regular seasonal movements apparent in some parts of range. **4. Southern Red Bishop:** Mainly resident. There are reports that they are essentially resident species, with few moving more than 100 kilometres and that these local movements are probably related to food availability.
B. ESTABLISHMENT RISK SCORE **SUM OF B1- B7 (1–16)**	13 8 11 13	**1. Yellow-crowned Bishop: Serious establishment risk** **2. Fan-tailed Widowbird: Moderate establishment risk** **3. Northern Red Bishop: Moderate establishment risk** **4. Southern Red Bishop: Serious establishment risk**
STAGE C: PROBABILITY AN ESTABLISHED SPECIES WILL BECOME A PEST		
C1. Taxonomic group (0–4)	2	*Bird in one of the taxa that are particularly prone to cause agricultural damage.* Family – Ploceidae (Sundevall, 1836).
C2. Overseas range size including current and past 1000 years, natural and introduced range (0–2) *Estimate the species overseas range size (including current and past 1000 years, natural and introduced range) in millions of square kilometres*	 1 1 1 0	*Overseas geographic range 10–30 million square kilometres.* **1. Yellow-crowned Bishop:** ~15 million *km²* (see B3). **2. Fan-tailed Widowbird:** ~17.6 million *km²*(see B3). **3. Northern Red Bishop:** ~11.3 million *km²* (see B3). **4. Southern Red Bishop:** ~5.2 million *km²*(see B3).
C3. Diet and feeding (0–3)	0	*Not a mammal*
C4. Competition with native fauna for tree hollows (0–2)	0	*Does not use tree hollows* All species assessed here build nests from grass or reeds etc.
C5. Overseas environmental pest status (0–3) *Has the species been reported to cause declines in abundance of any native species of plant or animal or cause degradation to any natural communities in any country or region of the world?*	0	*These species have never been reported as an environmental pest in any country or region.* No reports found for any of the species assessed here.
C6. Climate match to areas with susceptible native species or communities (0–5)	5	**1. Yellow-crowned Bishop:** *more than 138 grid squares within the highest two climate match classes that overlap the distribution of any susceptible native species or ecological communities = 5*

Identify any native Australian animal or plant species or communities that could be susceptible to harm by the exotic species if it were to establish a wild population here.	5 5 5	**2. Fan-tailed Widowbird:** *more than 138 grid squares within the highest two climate match classes that overlap the distribution of any susceptible native species or ecological communities = 5* **3. Northern Red Bishop:** *201 - 691 grid squares within the highest four climate match classes that overlap the distribution of any susceptible native species or ecological communities = 4 + 1 = 5* (introduced populations not included in Climatch modelling due to uncertainty of actual range, therefore +1) **4. Southern Red Bishop:** *more than 138 grid squares within the highest two climate match classes that overlap the distribution of any susceptible native species or ecological communities = 5* **Example of susceptible species:** Endangered Gouldian finch (*Erythrura gouldiae*), native to Australia, with a distribution restricted to the Top End of Western Australia, Northern Territory and Queensland. The Gouldian finch feeds exclusively on seed from a restricted range of grass species (Dostine and Franklin, 2002; Dostine et al., 2001; Tidemann, 1996) and susceptible to competition for seed (del Hoyo, 2010). In Northern Australian and southern Western Australia, species such as the Western Bristlebird (*Dasyornis longirostris* – Endangered), Double-barred Finch (*Taeniopygia bichenovii* – Least Concern), and Red-eared Firefinch (*Stagonopleura oculata* – Least Concern) are at risk from food competition with Weaver species.
C7. Overseas primary production pest status (0–3) *Has the species been reported to damage crops or other primary production in any country or region of the world?*	2	*Moderate pest of primary production in any country or region.* **1. Yellow-crowned Bishop:** Not reported as a pest but known to feed on cultivated seeds including young maize (del Hoya, 2010). **2. Fan-tailed Widowbird:** Not reported as a pest but known to feed on maize and rice (del Hoya, 2010). **3. Northern Red Bishop:** Recorded as a pest in some regions and recorded as damaging crops in Somalia. Breeds in important crops such as rice, sugar cane, millet and maize (del Hoya, 2010).

		4. Southern Red Bishop: Causes some damage to wheat, sorghum and millet crops. Considered a pest in wheat-growing areas of South Africa (del Hoya, 2010).
C8. Climate match to susceptible primary production (0–5) *Assess Potential Commodity Impact Scores for each primary production commodity listed in Table 9, based on species' attributes (diet, behaviour, ecology), excluding risk of spreading disease which is addressed in Question C9.* *0 = 0; 1-19 = 1; 20-49 = 2; 50-99 = 3; 100-149 = 4; ≥150 = 5*	4	Total Commodity Damage Score = 120 (see Table 2) These species have attributes making them capable of damaging cereal and oilseed crops.
C9. Spread disease (1–2) *Assess the risk that the species could play a role in the spread of disease or parasites to other animals*	2	*All birds (likely or unknown effect on native species and on livestock and other domestic animals).*
C10. Harm to property (0–3) *Assess the risk that the species could inflict damage on buildings, vehicles, fences, roads, equipment or ornamental gardens by chewing or burrowing or polluting with droppings or nesting material.*	0	*$0.* No reports of weaver birds causing damage to property.
C11. Harm to people (0–5) *Assess the risk that, if a wild population established, the species could cause harm to or annoy people. Aggressive behaviour, plus the possession of organs capable of inflicting harm, such as sharp teeth, tusks, claws, spines, a sharp bill, horns, antlers or toxin delivering organs may enable animals to harm people. Any known history of the species attacking, injuring or killing people should also be taken into account (see Stage A, Score A1).*	0	*Nil risk.* No reports of zoonoses found.
C. PEST RISK SCORE **SUM C 1 TO C 11 (1–37)**	16 16 16 15	**1. Yellow-crowned Bishop: Serious pest risk** **2. Fan-tailed Widowbird: Serous pest risk** **3. Northern Red Bishop: Serious pest risk** **4. Southern Red Bishop: Serious pest risk**

STAGE A. PUBLIC SAFETY RISK RANK – RISK TO PUBLIC SAFETY POSED BY CAPTIVE OR RELEASED INDIVIDUALS *0 = Not dangerous; 1 = Moderately dangerous; ≥ 2 = Highly dangerous*	0	Not dangerous
STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION **MODEL 1: FOUR-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)** *≤ 5 = low establishment risk; 6-8 = moderate establishment risk; 9-10 = serious establishment risk; ≥ 11-13 = extreme establishment risk*	10 5 8 10	**1. Yellow-crowned Bishop:** Serious establishment risk **2. Fan-tailed Widowbird:** Low establishment risk **3. Northern Red Bishop:** Moderate establishment risk **4. Southern Red Bishop:** Serious establishment risk
STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION **MODEL 2: SEVEN-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)** *≤ 6 = low establishment risk; 7-11 = moderate establishment risk; 12-13 = serious establishment risk; ≥14 = extreme establishment risk*	13 8 11 13	**1. Yellow-crowned Bishop:** Serious establishment risk **2. Fan-tailed Widowbird:** Moderate establishment risk **3. Northern Red Bishop:** Moderate establishment risk **4. Southern Red Bishop:** Serious establishment risk
STAGE C. PEST RISK RANK - RISK OF BECOMING A PEST FOLLOWING ESTABLISHMENT *< 9 = low pest risk; 9-14 = moderate pest risk; 15-19 = serious pest risk; > 19 = extreme pest risk*	16 16 16 15	**1. Yellow-crowned Bishop:** Serious pest risk **2. Fan-tailed Widowbird:** Serious pest risk **3. Northern Red Bishop:** Serious pest risk **4. Southern Red Bishop:** Serious pest risk
ENVIRONMENT AND INVASIVES COMMITTEE THREAT CATEGORY		**1. Yellow-crowned Bishop: EXTREME** **2. Fan-tailed Widowbird: SERIOUS** **3. Northern Red Bishop: SERIOUS** **4. Southern Red Bishop: EXTREME**

1a. World distribution map for Yellow-crowned Bishop (*Euplectes afer*) (IUCN Red List and del Hoya, 2010) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

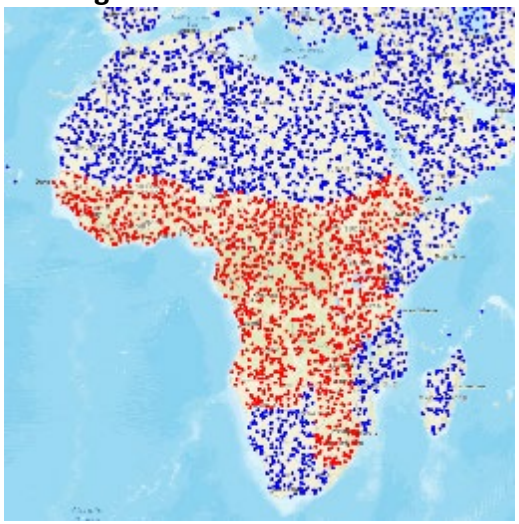


Figure 2 – World Distribution map – Climatch

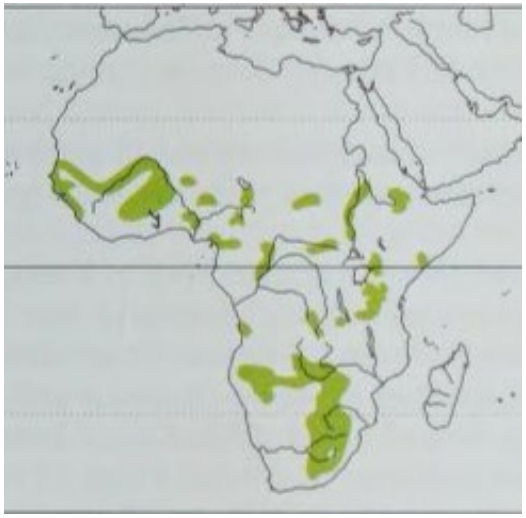
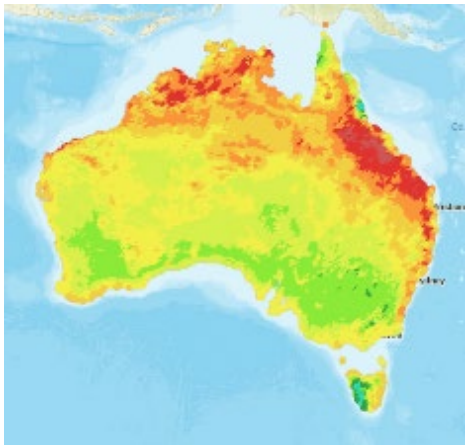


Figure 3 – Distribution Map – Africa – del Hoya (2010)

1b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Euplectes afer*

Value X = 7,322



Score	Color	Count
0		0
1		30
2		65
3		2352
4		4634
5		4833
6		3703
7		2451
8		993
9		175
10		0

Species: Yellow-crowned Bishop (Euplectes afer)
Algorithm: Closest Standard Score
1396 source features selected
19236 target features selected
Approximate selected area: 14,884,673 km^2

2a. World distribution map for Fan-tailed Widowbird (*Euplectes axillaris*) (IUCN Red List and del Hoya, 2010) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

Figure 2 – World Distribution map – Climatch

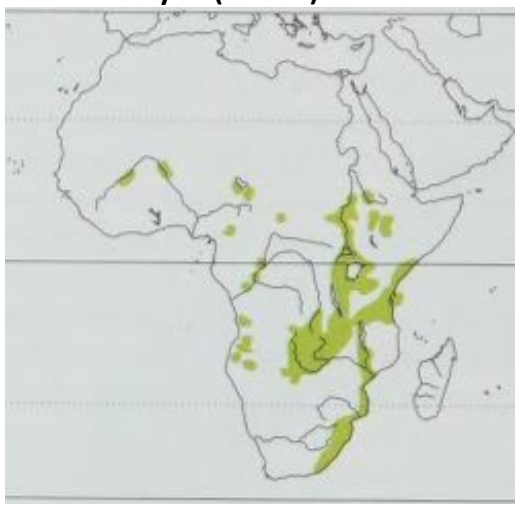
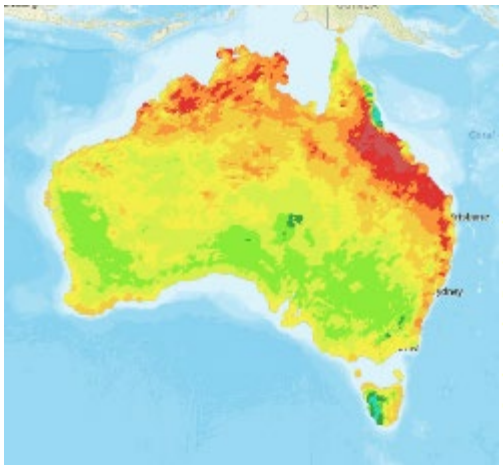


Figure 3 – Distribution Map – Africa – del Hoya (2010)

2b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Euplectes axillaris*

Value X = 7,067



Score	Color	Count
0		0
1		40
2		90
3		3058
4		4671
5		4310
6		3575
7		2269
8		950
9		273
10		0

Species: Fan-tailed Widowbird (Euplectes axillaris)
Algorithm: Closest Standard Score
766 source features selected
19236 target features selected
Approximate selected area: 8,553,723 km^2

3a. World distribution map for Northern Red Bishop (*Euplectes franciscanus*) (IUCN Red List and del Hoya, 2010) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

Figure 2 – World Distribution map – Climatch

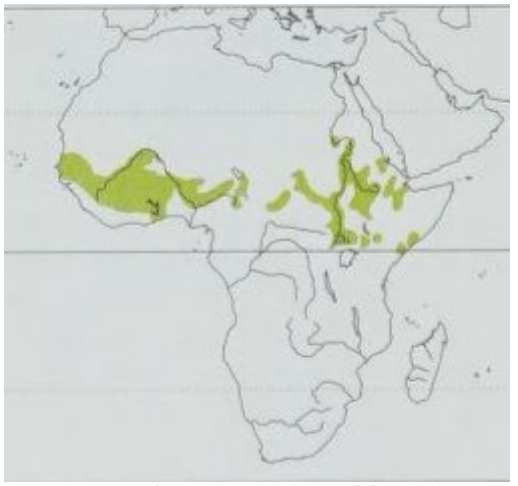
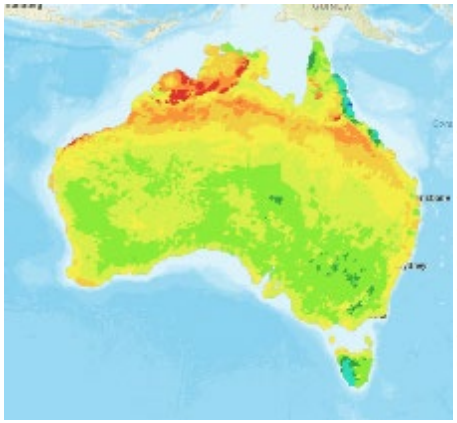


Figure 3 – Distribution Map – Africa – del Hoya (2010)

3b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Euplectes franciscanus*

Value X = 3,585



Score	Color	Count
0		2
1		99
2		197
3		5534
4		6202
5		3617
6		2319
7		1008
8		257
9		1
10		0

Species: Northern Red Bishop (Euplectes franciscanus)
Algorithm: Closest Standard Score
595 source features selected
19236 target features selected
Approximate selected area: 7,224,989 km^2

4a. World distribution map for Southern Red Bishop (*Euplectes orix*) (IUCN Red List and del Hoya, 2010) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 2 - World Distribution Map - IUCN Red List

Figure 2 – World Distribution map – Climatch – Africa

Figure 3 – World Distribution map – Climatch – Jamaica

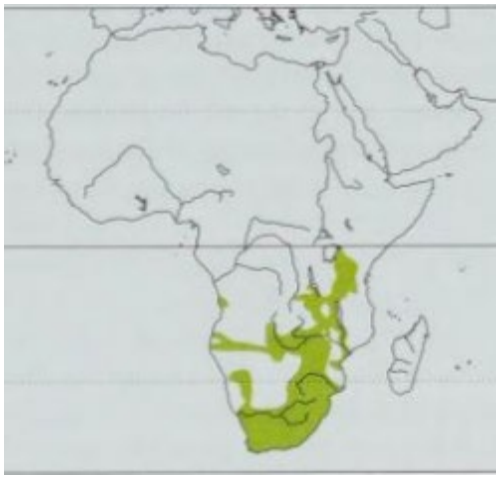
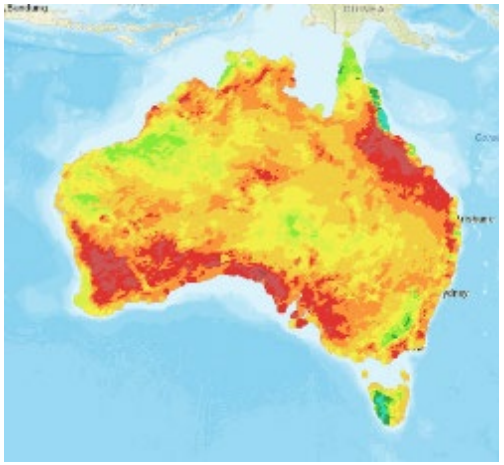


Figure 4 – Distribution Map – Africa – del Hoya (2010)

4b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Euplectes orix*

Value X = 13,372



Score	Color	Count
0		0
1		48
2		67
3		584
4		1438
5		3727
6		6562
7		4121
8		1984
9		696
10		9

Species: Southern Red Bishop (Euplectes orix)
Algorithm: Closest Standard Score
482 source features selected
19236 target features selected
Approximate selected area: 5,247,451 km^2

Table 1: ABARES recalibration thresholds

Climate Match Score (CMS)	Climatch (50 km) Closest Standard Match Sum Level 6 (Value X)	2021 Recalibrated Climatch v2.0 (20 km) Closest Standard Match Sum Level 6 (Value X)
1 (Very low)	< 100	< 691
2 (Low)	100-599	691-4137
3 (Moderate)	600-899	4138-6209
4 (High)	900-1699	6210-11735
5 (Very high)	1700-2699	11736-18642
6 (Extreme)	≥ 2700	≥ 18643

Table 2: Susceptible Australian Primary Production – Calculating Total Commodity Damage Score
The commodity value index scores in this table are derived from Australian Bureau of Statistics 1999 – 2000 data. The values will require updating if significant change has occurred in the value of the commodity (Bomford 2008).

Industry	**Commodity Value Index 1 (CVI based on best available date)**	**Potential Commodity Impact Score (PCIS 0-3)**	**Climate Match to Commodity Score (CMCS 0–5)**	**Commodity Damage Score (CDS columns 2 X 3 X 4)**
Sheep (includes wool and sheep meat)	10			
Cattle (includes dairy and beef)	10			
Timber (includes native and plantation forests)	10			
Cereal grain (includes wheat, barley sorghum etc)	10	2	5	100
Pigs	2			
Poultry and eggs	2			
Aquaculture (includes coastal mariculture)	2			
Cotton	2			
Oilseeds (includes canola, sunflower etc)	2	2	5	20
Grain legumes (includes soybeans)	2			
Sugarcane	2			
Grapes	2			
Other Fruit	2			
Vegetables	2			
Nuts	1			
Other livestock (includes goats, deer, camels, rabbits)	1			
Honey and beeswax	1			
Other horticulture (includes flowers etc)	1			
Total Commodity Damage Score (TCDS)				120

Assess Potential Commodity Impact Scores for each primary production commodity listed in Table 9, based on species' attributes (diet, behaviour, ecology), excluding risk of spreading disease which is addressed in Question C9, and pest status worldwide as:

0. *Nil (species does not have attributes to make it capable of damaging this commodity)*
1. *Low (species has attributes making it capable of damaging this or similar commodities and has had the opportunity but no reports or other evidence that it has caused damage in any country or region*
2. *Moderate–serious (reports of damage to this or similar commodities exist but damage levels have never been high in any country or region and no major control programs against the species have ever been conducted OR the species has attributes making it capable of damaging this or similar commodities but has not had the opportunity)*
3. *Extreme (damage occurs at high levels to this or similar commodities and/or major control programs have been conducted against the species in any country or region and the listed commodity would be vulnerable to the type of harm this species can cause).*

Climate Match to Commodity Score (0–5)

- *None of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes (ie classes 10, 9, 8, 7, 6, 5, 4 and 3) = 0*
- *Less than 10% of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes = 1*
- *Less than 10% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes (ie classes 10, 9, 8, 7, 6 and 5) = 2*
- *Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes AND less than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes (ie classes 10, 9 and 8) = 3*
- *Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT more than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4*
- *OR More than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT less than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4*
- *More than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes OR overseas range unknown and climate match to Australia unknown = 5.]*

Table 3: Assigning species to EIC Threat Categories (shaded cells relate to assignment of reptiles and amphibians to EIC Threat Categories based on an assessed establishment risk and an allocated pest risk of extreme) – adapted from Bomford 2008

Establishment Risk	Pest Risk	Public Safety Risk	EIC Threat Category	Implication for any proposed import into Australia	Implication for keeping and movement in Australia
Extreme	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Extreme	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Moderate	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Low	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Moderate	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Moderate	Highly, Moderately or Not Dangerous	**SERIOUS**	Import restricted to those collections approved for keeping SERIOUS Threat species	Limited to those collections approved for keeping particular SERIOUS Threat species
Serious	Low	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Moderate	Highly Dangerous	**SERIOUS**		
Moderate	Low	Highly Dangerous	**SERIOUS**		
Low	Extreme	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Moderate	Highly Dangerous	**SERIOUS**		
Low	Low	Highly Dangerous	**SERIOUS**		
Moderate	Moderate	Moderately or Not Dangerous	**MODERATE**	Import restricted to those collections approved for keeping MODERATE Threat species	Limited to those collections approved for keeping particular MODERATE Threat species
Moderate	Low	Moderately or Not Dangerous	**MODERATE**		
Low	Moderate	Moderately or Not Dangerous	**MODERATE**		
Low	Low	Moderately Dangerous	**MODERATE**		
Low	Low	Not Dangerous	**LOW**	Import permitted	May be limited to those collections approved for keeping particular LOW Threat species
Any Value	Any Value	Unknown	**EXTREME until proven otherwise**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Unknown	Any Value	Any Value	**EXTREME until proven otherwise**		
Any Value	Unknown	Any Value	**EXTREME until proven otherwise**		
Unassessed	Unassessed	Unassessed	**EXTREME until proven otherwise**		

Risk Assessor's details:

Risk Assessor's name:	Jodi Buchecker
Business address and contact details:	PIRSA jodi.buchecker@sa.gov.au
Date:	April 2023
Reviewers:	Win Kirkpatrick (WA DPIRD) Helen Hodgkins (DCCEEW)

Bibliography:

ABARES (2021) Catchment Scale Land Use of Australia – Commodities – Update December 2020, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, February, CC BY 4.0, DOI: 10.25814/jhjb-c072.

Andersson, S. and Andersson, M. (1994). Tail Ornamentation, Size Dimorphism and Wing Length in the Genus *Euplectes* (Ploceinae). The Auk 111(1):80-86.

BirdLife International. 2018. *Euplectes afer*. *The IUCN Red List of Threatened Species* 2018: e.T22719164A131990926. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22719164A131990926.en. Accessed on 13 March 2023.

BirdLife International. 2018. *Euplectes axillaris*. *The IUCN Red List of Threatened Species* 2018: e.T22719204A131992159. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22719204A131992159.en. Accessed on 13 March 2023.

BirdLife International. 2018. *Euplectes franciscanus*. *The IUCN Red List of Threatened Species* 2018: e.T22719181A131991350. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22719181A131991350.en. Accessed on 13 March 2023.

BirdLife International. 2018. *Euplectes orix*. *The IUCN Red List of Threatened Species* 2018: e.T22719186A131991711. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22719186A131991711.en. Accessed on 13 March 2023.

Bomford M. (2003). Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia. Bureau of Rural Sciences, Canberra.

Bomford M. (2006). Risk assessment for the establishment of exotic vertebrates in Australia: recalibration and refinement of models - A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

Bomford M. (2008). Risk assessment models for establishment of exotic vertebrates in Australia and New Zealand - A report produced for the Invasive Animals Cooperative Research Centre. Bureau of Rural Sciences, Canberra.

Bomford M., Kraus F., Braysher M., Walter L. and Brown L. (2005). Risk Assessment Model for the Import and Keeping of Exotic Reptiles and Amphibians. A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

CBRC's Introduced Birds Sub-Committee (2015). The California Bird Records Committee's "Watch List" of established naturalized bird species not yet accepted to the state list. http://californiabirds.org/list.html [Date accessed:14/03/2023].

Colahan, B. D., and A. J. F. K. Craig (1981). Euplectes hybrids. Ostrich 52:58-59.

Craig, A. J. F. K. (1980). Behaviour and evolution in the genus *Euplectes*. J. Ornithol. 121:144-161.

de Magalhaes JP and Costa J (2009). A database of vertebrate longevity records and their relation to other life-history traits Journal of Evolutionary Biology, 22(8):1770-1774.

del Hoyo J., Elliot A. and Christie D. (2010). Handbook of the Birds of the World - Vol. 15 - Weavers to New World Warblers. Lynx Edicions, Barcelona. Page 198-217.

Department of Agriculture (2014). Guidelines for the Import, Movement and Keeping of Non-indigenous Vertebrates in Australia. Commonwealth of Australia, Canberra. www.feral.org.au

Department of the Environment (2015). EPBC Act List of Threatened Fauna. Australian Government. http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna#birds_critically_endangered

Dickinson E. C. (2003). The Howard and Moore Complete Checklist of the Birds of the World. Princeton University Press, Princeton New Jersey.

Dostine, P. L. and Franklin, D. C. (2002). A comparison of the diet of three finch species in the Yinberrie Hills area, Northern Territory. Emu 102, 159-164.

Dostine, P. L., Johnson, G. C., Franklin, D. C., Zhang, Y. and Hempel, C. (2001). Seasonal use of savanna landscapes by the Gouldian finch, Erythrura gouldiae, in the Yinberrie Hills area, Northern Territory. Wildlife Research 28: 445-458.

GBIF *Euplectes afer* (Gmelin, 1789) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-03-13.

GBIF *Euplectes axillaris* (A.Smith, 1838) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-03-13.

GBIF *Euplectes franciscanus* (Isert, 1789) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-03-13.

GBIF *Euplectes orix* (Linnaeus, 1758) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-03-13.

ITIS ITIS - Report: Euplectes afer

ITIS ITIS - Report: Euplectes axillaris

ITIS ITIS - Report: Euplectes franciscanus

IT IS ITIS - Report: Euplectes orix

IUCN RedList Euplectes afer (Yellow-crowned Bishop) (iucnredlist.org)

IUCN RedList Euplectes axillaris (Fan-tailed Widowbird) (iucnredlist.org)

IUCN RedList Euplectes franciscanus (Northern Red Bishop) (iucnredlist.org)

IUCN RedList Euplectes orix (Southern Red Bishop) (iucnredlist.org)

Kingston R (1998). *Keeping and Breeding Finches and Seed-eaters*. Indruss Productions., New Farm, Qld.

Species360 Zoological Information Management System (ZIMS) (2023), zims.Species360.org.

UNEP-WCMC (Comps.) (2015). The Checklist of CITES Species Website. CITES Secretariat, Geneva, Switzerland. http://checklist.cites.org.

National Risk Assessment: MODERATE/SERIOUS

RISK ASSESSMENT FOR AUSTRALIA: **Whydah birds (*Vidua* sp.)**

Class - Aves**, Order -** Passeriformes**, Family -** Viduidae**, Genus -** *Vidua***.**

SPECIES: *Vidua macroura* (Pallas, 1764) *Vidua paradisaea* (Linnaeus, 1758) **Synonyms:** *Fringilla macroura* (Pallas, 1764) *Emberiza paradisaea* (Linnaeus, 1758) **Subspecies:** Monotypic **Common Names:** **Pin-tailed:** Pin-tailed Whydah Pin-tailed Widow **Paradise:** Paradise Whydah Eastern Paradise Whydah Long-tailed Paradise-whydah Long-tailed Paradise Whydah Long-tailed Paradise Widow	**Species description:** Viduids are small songbirds with a short, stubby bill. The species are similar in body size, being ~ 10-20 centimetres long, excluding the long black ornamental central tail feathers of male whydahs, and weighing 9-27 grams. All are sexually dimorphic. Outside the breeding season the males resemble the brown, streaked, sparrow-like females. Juvenile Paradise whydahs are unstreaked, uniform grey. Pin-tailed whydahs breeding male have a black crown, forehead, and face, and a white collar; mainly black underparts; the rump is white with black streaks. Paradise whydah breeding males have a black head and a golden-yellow nape; the upper parts are black, upper breast maroon-chestnut, lower breast paler chestnut, belly and vent pale buff; undertail-coverts are mostly black (del Hoyo et al., 2010). **General information:** Both the Pin-tailed whydah and the Paradise whydah are endemic to Africa. Exotic populations of Pin-tailed whydah have established in Puerto Rico, Singapore, Portugal, Japan and the United States of America. In contrast, there have been no populations established of the Paradise whydah. Viduid finches live in grassland, savannah, and open woodland, and are often found in bushed grassland around cultivation. Pin-tailed whydah's inhabit wet meadows, marshes, brushy and grassy woodlands near water, whereas Paradise whydahs are common in places far from surface water. Members of this family are almost entirely granivorous. They eat a wide variety of small grass seeds that have fallen to the ground as well as directly from grass seedheads (del Hoyo et al 2010). Forages alone or in flocks. Independent young join mixed flocks of finch species. Breeding males aggressively defend feeding areas from other birds (Birdlife International, 2012) . Pin-tailed whydahs are known to feed very occasionally on flying termites (de Hoya et al., 2010). Viduids occur in flocks at any time of the year, gathering in the evening, and they often roost in flocks both in the breeding and in the non-breeding seasons. Sometimes several species will flock and roost together at night in leafy trees. Whilst *Vidua* species differ from one another in breeding plumage and colour, and in the songs used in courtship and mate choice, they are all are brood parasites (they lay their eggs in the nests of other species).

	Longevity: No record for wild birds (de Magalhaes and Costa, 2009) but in captivity estimated to be about 15 years (Kingston, 1998). **Conservation status:** **IUCN:** Least Concern – both these species have extremely large ranges, and hence do not approach the thresholds for Vulnerable under the range size criterion (Birdlife International, 2018). **CITES:** Not listed (UNEP-WCMC, 2015)
DATE OF ASSESSMENT: Feb 2023 (Jodi Buchecker) **EIC ENDORSEMENT:** 16/06/23 **Risk assessment model used for the assessment:** Bomford 2008, Mammals and Birds	**The risk assessment model:** Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003, 2006, 2008), reptiles and amphibians (Bomford et al 2005, Bomford 2008). Developed by Dr Mary Bomford for the Bureau of Rural Sciences (BRS), the model uses criteria that have been demonstrated to have significant correlation between a risk factor and the establishment of populations of exotic species and the pest potential of those species that do establish. For example, a risk factor for establishment is similarity in climate (temperature and rainfall) within the species' distribution overseas and Australia. For pest potential, the species' overseas pest status is a risk factor. The model is published as 'Risk assessment models for the establishment of exotic vertebrates in Australia and New Zealand' (Bomford 2008) and is available online on the PestSmart website https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/Risk_Assess_Models_2008_FINAL.pdf **CLIMATE**: In 2021 a new version of the Climatch program used to assess similarity in climate was released by the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES): CLIMATCH v2.0. The increase in resolution in this new version (from 50 km to 20 km) required recalibration of Climate Match Scores. See Table 1. Sixteen climate parameters (variables) of temperature and rainfall are used to estimate the extent of similarity between data from meteorological stations located within the species' world distribution and stations in Australia. Worldwide, data from approximately 19000 locations are available for analysis. The number of locations used in an analysis will vary according to the size of the species' distribution and the number of meteorological stations located within that distribution. To represent the climate match visually, the map of Australia is divided into 19236 grid squares, each measured in 0.2 degrees in both longitude and latitude. CLIMATCH v2.0 calculates a match for each Australian grid by comparing data from all meteorological stations within the species' distribution (excluding any populations in Australia) and allocating a score ranging from ten for the highest level match to zero for the poorest match. Levels of climate match are used in the risk assessment for questions B1 (scores are summed to give a cumulative score), C6, and C8. Climatch v2.0 can be accessed on the ABARES website, agriculture.gov.au/abares. The direct URL is https://climatch.cp1.agriculture.gov.au/.

Bird and Mammal Model:

FACTOR	SCORE	DETAIL
STAGE A: RISKS POSED BY CAPTIVE OR RELEASED ANIMALS		
A1. Risk to people from individual escapees (0–2) *Assess the risk that individuals of the species could harm people. (NB, this question only relates to aggressive behaviour shown by escaped or released individual animals. Question C11 addresses the risk of harm from aggressive behaviour if the species establishes a wild population).* *Aggressive behaviour, size, plus the possession of organs capable of inflicting harm, such as sharp teeth, claws, spines, a sharp bill, or toxin-delivering apparatus may enable individual animals to harm people. Any known history of the species attacking, injuring or killing people should also be taken into account. Assume the individual is not protecting nest or young.*	0	*All other animals posing a lower risk of harm to people (i.e. animals that will not make unprovoked attacks causing injury).* Small passerine birds weighing between 9-27grams (del Hoyo et al., 2010).
A2. Risk to public safety from individual captive animals (0–2) *Assess the risk that irresponsible use of products obtained from captive individuals of the species (such as toxins) pose a public safety risk (excluding the safety of anyone entering the animals' cage/enclosure or otherwise coming within reach of the captive animals)*	0	*Nil or low risk (highly unlikely or not possible).*
STAGE A PUBLIC SAFETY RISK SCORE **SUM A1 - A2 (0-4)**	0	**Not dangerous**
STAGE B: PROBABILITY ESCAPED OR RELEASED INDIVIDUALS WILL ESTABLISH FREE-LIVING POPULATIONS		
Model 1: FOUR-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)		

B1. Degree of climate match between species overseas range and Australia (1–6) *Map the selected mammal or bird species' overseas range, including its entire native and exotic (excluding Australia) ranges over the past 1000 years.* *Use CLIMATCH v2.0, Value X = sum of classes 6 – 10, see Table 1.*	5 4	**Pin-tailed:** *Very High climate match to Australia* Value X = 14,790 CMS = 5 **Paradise:** *High climate match to Australia* Value X = 7,294 CMS = 4
B2. Exotic population established overseas (0–4) *An established exotic population means the introduced species must have bred outside of captivity and must currently maintain a viable free-living population where the animals are not being intentionally fed or sheltered, even though they may be living in a highly disturbed environment with access to non-natural food supplies or shelter.*	4 0	**Pin-tailed:** *Exotic population established on a larger island (> 50 000km^2) or anywhere on a continent.* Introduced populations outside the species natural distribution: Puerto Rico (del Hoyo et al., 2010) and Singapore (Birdlife International, 2018). Portugal – reports of birds living free but was not considered established with breeding populations (Portuguese Committee of Rarities, 2015). However, in 2019 Aves de Portugal report that Pin-tailed Whydahs are observed regularly in some regions of the country and suggest the bird may be in the process of establishing self-sustaining populations. Aves de Portugal states that the bird is not generally abundant and can be seen most frequently in the Aveiro region. California, United States of America (USA) – known to be breeding in the wild and have populations likely >100 individuals or >1000 but not yet on official state list (CBRC's Introduced Birds Sub-Committee, 2015). Japan – there are records of breedings in Tokyo and Kyoto, and occurrences in Kanagawa, Osaka, Nara, Mie, and Hyogo. In Tokyo, this species has not been observed since the 1990s. **Paradise:** *No exotic population ever established* No reports of established populations outside its natural range (Birdlife International, 2018; del Hoyo, Elliot and Christie, 2010).
B3. Overseas range size score (0–2) < 1 = 0; 1– 70 = 1; >70 = 2 *Estimate the species overseas range size* including currently and the past 1000 years; natural and introduced range in millions of square kilometres*	 1	*Overseas range between 1-70 million km^2* **Pin-tailed:** Overseas range estimated at 21 million km^2 including current and past 1,000 years, natural and introduced range. Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, The Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea,

	1	Eswatini; Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, United Republic of Tanzania, Togo, Uganda, Zambia and Zimbabwe (Birdlife International, 2018). Introduced range as above for B2. In the last 50-100 years the species has expanded its range due to the availability of dams and irrigation (del Hoyo et al., 2010). **Paradise:** Overseas range estimated at 7.2 million km^2 including current and past 1,000 years, natural and introduced range. Angola, Botswana, Cameroon, Chad, The Democratic Republic of the Congo, Eritrea, Eswatini, Ethiopia, Gambia, Guinea, Kenya, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Senegal, Somalia, South Africa, South Sudan, Sudan, United Republic of Tanzania, Uganda, Zambia, Zimbabwe and Burkina Faso (breeding) (Birdlife International, 2018).
B4. Taxonomic Class (0–1) *Bird = 0; mammal = 1*	0	*Bird*
B. Establishment Risk Score **Sum of B1- B4 (1–13)**	10 5	**Pin-tailed: Serious establishment risk** **Paradise: Low establishment risk**
Model 2: Seven-Factor Model For Birds And Mammals (Bomford 2008)		
B5. Diet score (0–1) *Specialist = 0; generalist = 1*	1	*Generalists with a broad diet of many food types.* Members of this family are almost entirely granivorous. They eat a wide variety of small grass seeds that have fallen to the ground as well as directly from grass seedheads (del Hoyo et al., 2010). Forages alone or in flocks. Independent young join mixed flocks of finch species. Breeding males aggressively defend feeding areas from other birds (Birdlife International, 2018) . Pin-tailed Whydahs are known to feed very occasionally on flying termites (de Hoya et al., 2010).
B6. Habitat score (0–1) *Undisturbed or disturbed habitat*	1	*Can live in disturbed habitats.*

		Whydah birds live in grassland, savannah, open woodland and are often found in bushed grassland around cultivation (del Hoyo et al., 2010).
B7. Migratory score (0–1) *Always migratory = 0; non-migratory = 1*	1	*Non-migratory or facultative migrant in its native range.* Viduid finches are resident. None are known to move long distances seasonally. **Pin-tailed:** Resident, seasonal migration to drier areas during the wet season, migratory or nomadic in arid areas of its range in Northwest South Africa (del Hoyo et al., 2010). **Paradise:** Not a migrant (Birdlife International, 2018).
B. ESTABLISHMENT RISK SCORE **SUM OF B1- B7 (1–16)**	13 8	**Pin-tailed: Serious establishment risk** **Paradise: Moderate establishment risk**
STAGE C: PROBABILITY AN ESTABLISHED SPECIES WILL BECOME A PEST		
C1. Taxonomic group (0–4)	0	*Other taxonomic group.* Family – Viduidae (Dickinson, 2003).
C2. Overseas range size including current and past 1000 years, natural and introduced range (0–2) *Estimate the species overseas range size (including current and past 1000 years, natural and introduced range) in millions of square kilometres*	1 0	**Pin-tailed:** *Overseas geographic range 10–30 million square kilometres.* ~21 million km^2 (see B3 for details). **Paradise:** *Overseas geographic range less than 10 million square kilometres.* ~7.2 million km^2(see B3 for details).
C3. Diet and feeding (0–3)	0	*Not a mammal.*
C4. Competition with native fauna for tree hollows (0–2)	0	*Does not use tree hollows.* Parasitic, lay in the nests of Estrildidae finches (del Hoyo et al., 2010).
C5. Overseas environmental pest status (0–3) *Has the species been reported to cause declines in abundance of any native species of plant or animal or*	0	*Never reported as an environmental pest in any country or region*. No reports found of whydah birds being an environmental pest.

cause degradation to any natural communities in any country or region of the world?		
C6. Climate match to areas with susceptible native species or communities (0–5) *Identify any native Australian animal or plant species or communities that could be susceptible to harm by the exotic species if it were to establish a wild population here.*	5	*The species have more than 138 grid squares within the highest two climate match classes that overlap the distribution of any susceptible native species or ecological communities = 5* Endangered Gouldian finch (*Erythrura gouldiae*), native to Australia, with a distribution restricted to the Top End of Western Australia, Northern Territory and Queensland. The Gouldian finch feeds exclusively on seed from a restricted range of grass species (Dostine and Franklin, 2002; Dostine et al., 2001; Tidemann, 1996) and susceptible to competition for seed (Barrett et al., 2003; Christidis and Boles, 2008; del Hoyo, Elliot and Christie, 2010). In Northern Australian and southern Western Australia, species such as the Western Bristlebird (*Dasyornis longirostris* – Endangered), Double-barred Finch (*Taeniopygia bichenovii* – Least Concern), and Red-eared Firefinch (*Stagonopleura oculata* – Least Concern) are at risk from food competition with Weaver species.
C7. Overseas primary production pest status (0–3) *Has the species been reported to damage crops or other primary production in any country or region of the world?*	1	*Minor pest of primary production in any country or region.* Although not usually considered an agricultural pest, the whydahs can sometimes be a nuisance locally. In the Fouta Djalon highlands of Guinea and Sierra Leone, they feed on smalls seeds of cultivated fonio (*Digitaria exilis*), known also as “acha” or “hungry rice”, before the harvest. This grain is the first food available to local human inhabitants after the season of rains, and people do their best to keep the birds from the crops until harvest time. Also recorded feeding on pounded maize meal in its native range (del Hoyo et al., 2010).
C8. Climate match to susceptible primary production (0–5) *Assess Potential Commodity Impact Scores for each primary production commodity listed in Table 9, based on species’ attributes (diet, behaviour, ecology), excluding risk of spreading disease which is addressed in Question C9.* *0 = 0; 1-19 = 1; 20-49 = 2; 50-99 = 3; 100-149 = 4; ≥150 = 5*	3	Total Commodity Damage Score = 60 (see Table 2) The species has attributes making it capable of damaging cereal and oilseed crops.

C9. Spread disease (1–2) *Assess the risk that the species could play a role in the spread of disease or parasites to other animals*	2	*All birds (likely or unknown effect on native species and on livestock and other domestic animals).*
C10. Harm to property (0–3) *Assess the risk that the species could inflict damage on buildings, vehicles, fences, roads, equipment or ornamental gardens by chewing or burrowing or polluting with droppings or nesting material.*	0	*$0.* No reports of damage to property.
C11. Harm to people (0–5) *Assess the risk that, if a wild population established, the species could cause harm to or annoy people. Aggressive behaviour, plus the possession of organs capable of inflicting harm, such as sharp teeth, tusks, claws, spines, a sharp bill, horns, antlers or toxin delivering organs may enable animals to harm people. Any known history of the species attacking, injuring or killing people should also be taken into account (see Stage A, Score A1).*	0	*Nil risk.* No reports of zoonoses found.
C. PEST RISK SCORE **SUM C 1 TO C 11 (1–37)**	12 11	**Pin-tailed: Moderate pest risk** **Paradise: Moderate pest risk**
STAGE A. PUBLIC SAFETY RISK RANK – RISK TO PUBLIC SAFETY POSED BY CAPTIVE OR RELEASED INDIVIDUALS *0 = Not dangerous; 1 = Moderately dangerous; ≥ 2 = Highly dangerous*	0	Not dangerous
STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION **MODEL 1: FOUR-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)** *≤ 5 = low establishment risk; 6-8 = moderate establishment risk; 9-10 = serious establishment risk; ≥ 11-13 = extreme establishment risk*	10 5	**Pin-tailed:** Serious establishment risk **Paradise:** Low establishment risk

STAGE B. ESTABLISHMENT RISK RANK – RISK OF ESTABLISHING A WILD POPULATION **MODEL 2: SEVEN-FACTOR MODEL FOR BIRDS AND MAMMALS (BOMFORD 2008)** *≤ 6 = low establishment risk; 7-11 = moderate establishment risk; 12-13 = serious establishment risk; ≥14 = extreme establishment risk*	13 8	**Pin-tailed:** Serious establishment risk **Paradise:** Moderate establishment risk
STAGE C. PEST RISK RANK - RISK OF BECOMING A PEST FOLLOWING ESTABLISHMENT *< 9 = low pest risk; 9-14 = moderate pest risk; 15-19 = serious pest risk; > 19 = extreme pest risk*	12 11	**Pin-tailed:** Moderate pest risk **Paradise:** Moderate pest risk

ENVIRONMENT AND INVASIVES COMMITTEE THREAT CATEGORY	**Pin-tailed: SERIOUS** **Paradise: MODERATE**

1a. World distribution map Pin-tailed Whydah (*Vidua macroura*) (IUCN Red List and Kirkpatrick) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

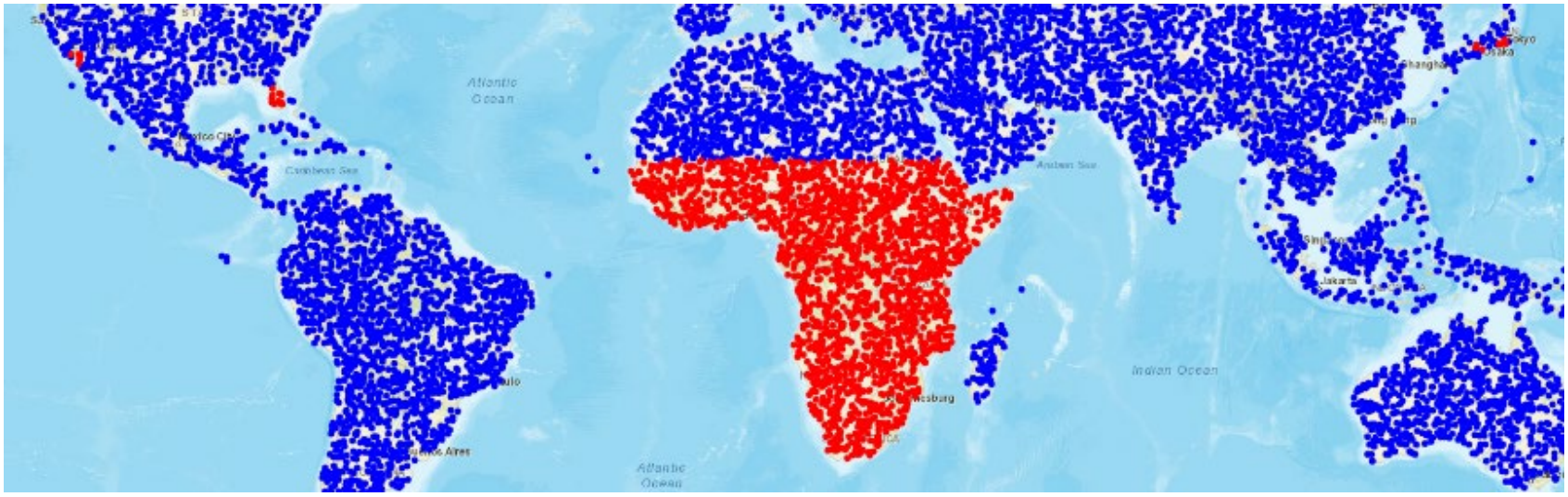


Figure 2 – World Distribution map – Climatch

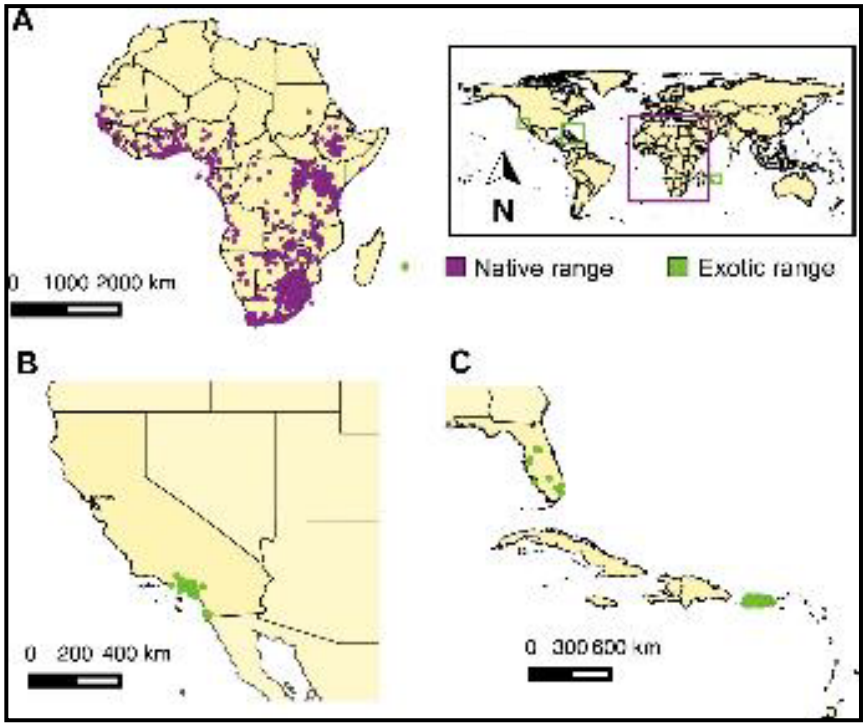
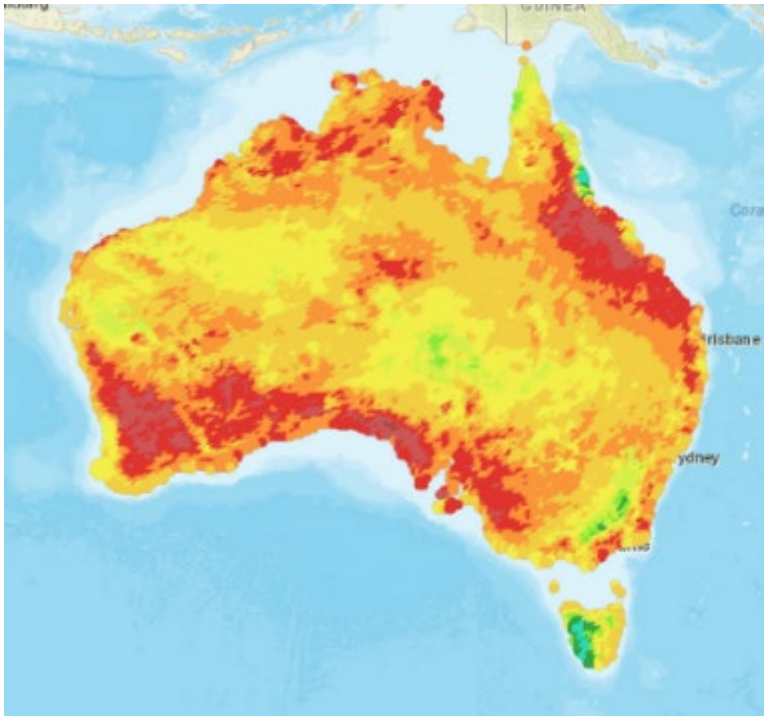


Figure 3 – Overseas distribution map (native and exotic range) – Kirkpatrick (2022)

1b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Vidua macroura*

Value X = 14,790



Score	Color	Count
0		0
1		30
2		46
3		116
4		633
5		3621
6		6827
7		4934
8		2320
9		700
10		9

Species: Pin-tailed Whydah (Vidua macroura)
Algorithm: Closest Standard Score
2052 source features selected
19236 target features selected
Approximate selected area: 20,852,615 km^2

2a. World distribution map Paradise Whydah (*Vidua paradisaea*) (IUCN Red List) and Climatch world distribution map indicating where meteorological data was sourced for the climate analysis (see B1):

Figure 1 - World Distribution Map - IUCN Red List

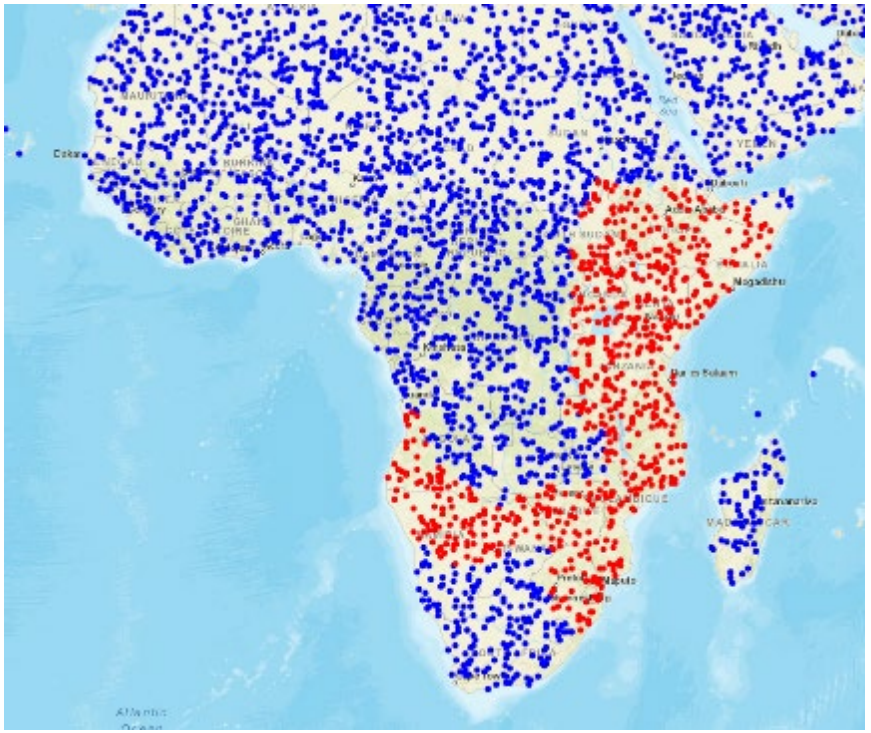
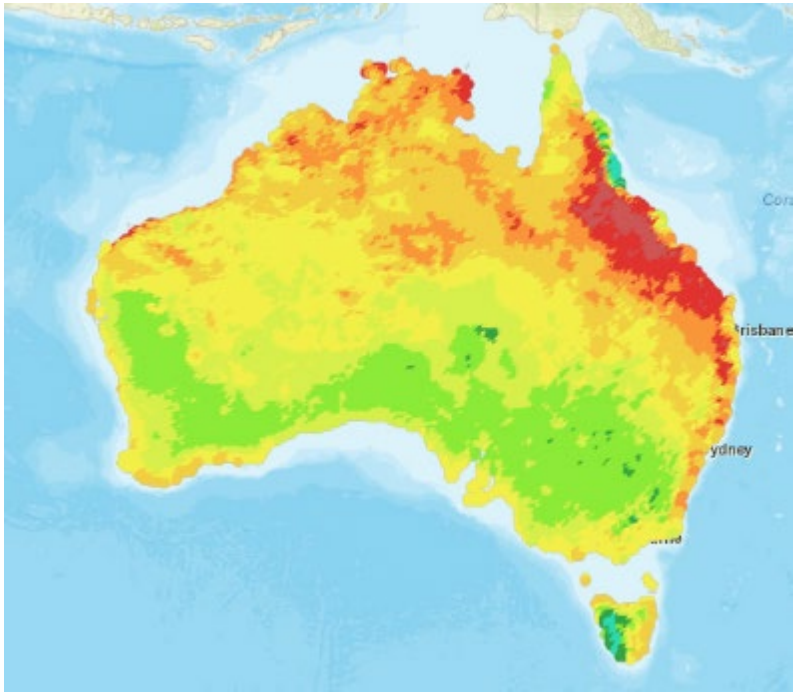


Figure 2 – World Distribution map – Climatch

2b. Climate match between world distribution of species and Australia:

Areas of Australia where the climate appears suitable for *Vidua paradisaea*

Value X = 7,294



Score	Color	Count
0		0
1		40
2		94
3		3539
4		3455
5		4814
6		4345
7		1933
8		743
9		273
10		0

Species: Paradise Whydah (Vidua paradisaea)
Algorithm: Closest Standard Score
667 source features selected
19236 target features selected
Approximate selected area: 7,263,543 km^2

Table 1: ABARES recalibration thresholds

Climate Match Score (CMS)	Climatch (50 km) Closest Standard Match Sum Level 6 (Value X)	2021 Recalibrated Climatch v2.0 (20 km) Closest Standard Match Sum Level 6 (Value X)
1 (Very low)	< 100	< 691
2 (Low)	100-599	691-4137
3 (Moderate)	600-899	4138-6209
4 (High)	900-1699	6210-11735
5 (Very high)	1700-2699	11736-18642
6 (Extreme)	≥ 2700	≥ 18643

Table 2: Susceptible Australian Primary Production – Calculating Total Commodity Damage Score

The commodity value index scores in this table are derived from Australian Bureau of Statistics 1999 – 2000 data. The values will require updating if significant change has occurred in the value of the commodity (Bomford 2008).

Industry	**Commodity Value Index 1 (CVI based on best available date)**	**Potential Commodity Impact Score (PCIS 0-3)**	**Climate Match to Commodity Score (CMCS 0–5)**	**Commodity Damage Score (CDS columns 2 X 3 X 4)**
Sheep (includes wool and sheep meat)	10			
Cattle (includes dairy and beef)	10			
Timber (includes native and plantation forests)	10			
Cereal grain (includes wheat, barley sorghum etc)	10	1	5	50
Pigs	2			
Poultry and eggs	2			
Aquaculture (includes coastal mariculture)	2			
Cotton	2			
Oilseeds (includes canola, sunflower etc)	2	1	5	10
Grain legumes (includes soybeans)	2			
Sugarcane	2			
Grapes	2			
Other Fruit	2			
Vegetables	2			
Nuts	1			
Other livestock (includes goats, deer, camels, rabbits)	1			
Honey and beeswax	1			
Other horticulture (includes flowers etc)	1			
Total Commodity Damage Score (TCDS)				60

Assess Potential Commodity Impact Scores for each primary production commodity listed in Table 9, based on species' attributes (diet, behaviour, ecology), excluding risk of spreading disease which is addressed in Question C9, and pest status worldwide as:

0. *Nil (species does not have attributes to make it capable of damaging this commodity)*
1. *Low (species has attributes making it capable of damaging this or similar commodities and has had the opportunity but no reports or other evidence that it has caused damage in any country or region*
2. *Moderate–serious (reports of damage to this or similar commodities exist but damage levels have never been high in any country or region and no major control programs against the species have ever been conducted OR the species has attributes making it capable of damaging this or similar commodities but has not had the opportunity)*
3. *Extreme (damage occurs at high levels to this or similar commodities and/or major control programs have been conducted against the species in any country or region and the listed commodity would be vulnerable to the type of harm this species can cause).*

Climate Match to Commodity Score (0–5)

- *None of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes (ie classes 10, 9, 8, 7, 6, 5, 4 and 3) = 0*
- *Less than 10% of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes = 1*
- *Less than 10% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes (ie classes 10, 9, 8, 7, 6 and 5) = 2*
- *Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes AND less than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes (ie classes 10, 9 and 8) = 3*
- *Less than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT more than 10% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4*
- *OR More than 50% of the commodity is produced in areas where the species has a climate match within the highest six climate match classes BUT less than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes = 4*
- *More than 20% of the commodity is produced in areas where the species has a climate match within the highest three climate match classes OR overseas range unknown and climate match to Australia unknown = 5.]*

Table 3: Assigning species to EIC Threat Categories (shaded cells relate to assignment of reptiles and amphibians to EIC Threat Categories based on an assessed establishment risk and an allocated pest risk of extreme) – adapted from Bomford 2008

Establishment Risk	Pest Risk	Public Safety Risk	EIC Threat Category	Implication for any proposed import into Australia	Implication for keeping and movement in Australia
Extreme	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Extreme	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Moderate	Highly, Moderately or Not Dangerous	**EXTREME**		
Extreme	Low	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Serious	Highly, Moderately or Not Dangerous	**EXTREME**		
Moderate	Extreme	Highly, Moderately or Not Dangerous	**EXTREME**		
Serious	Moderate	Highly, Moderately or Not Dangerous	**SERIOUS**	Import restricted to those collections approved for keeping SERIOUS Threat species	Limited to those collections approved for keeping particular SERIOUS Threat species
Serious	Low	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Moderate	Moderate	Highly Dangerous	**SERIOUS**		
Moderate	Low	Highly Dangerous	**SERIOUS**		
Low	Extreme	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Serious	Highly, Moderately or Not Dangerous	**SERIOUS**		
Low	Moderate	Highly Dangerous	**SERIOUS**		
Low	Low	Highly Dangerous	**SERIOUS**		
Moderate	Moderate	Moderately or Not Dangerous	**MODERATE**	Import restricted to those collections approved for keeping MODERATE Threat species	Limited to those collections approved for keeping particular MODERATE Threat species
Moderate	Low	Moderately or Not Dangerous	**MODERATE**		
Low	Moderate	Moderately or Not Dangerous	**MODERATE**		
Low	Low	Moderately Dangerous	**MODERATE**		
Low	Low	Not Dangerous	**LOW**	Import permitted	May be limited to those collections approved for keeping particular LOW Threat species
Any Value	Any Value	Unknown	**EXTREME until proven otherwise**	Prohibited, unless sufficient risk management measures exist to reduce the potential risks to an acceptable level	Limited to those collections approved for keeping particular EXTREME Threat species
Unknown	Any Value	Any Value	**EXTREME until proven otherwise**		
Any Value	Unknown	Any Value	**EXTREME until proven otherwise**		
Unassessed	Unassessed	Unassessed	**EXTREME until proven otherwise**		

Risk Assessor's details:

Risk Assessor's name:	Jodi Buchecker
Business address and contact details:	PIRSA jodi.buchecker@sa.gov.au
Date:	Feb 2023
Reviewers:	Helen Hodgkins, DCCEEW

Adapted from:	RISK ASSESSMENT for Australia Pin-tailed Whydah (*Vidua macroura*) Pallas, 1764. Win Kirkpatrick, Invasive Species, Dept of Agriculture and Food, Western Australia (2022)	**By:** Jodi Buchecker	**Date:** Feb 2023

Bibliography:

ABARES (2021) Catchment Scale Land Use of Australia – Commodities – Update December 2020, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, February, CC BY 4.0, DOI: 10.25814/jhjb-c072.

Aves de Portugal Viuvinha-bico-de-lacre (Vidua macroura) (avesdeportugal.info)

BirdLife International. 2018. *Vidua macroura*. *The IUCN Red List of Threatened Species* 2018: e.T22719988A132134939. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22719988A132134939.en. Accessed on 14 February 2023.

BirdLife International. 2018. *Vidua paradisaea*. *The IUCN Red List of Threatened Species* 2018: e.T22720012A132135621. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22720012A132135621.en. Accessed on 14 February 2023.

Bomford M. (2003). Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia. Bureau of Rural Sciences, Canberra.

Bomford M. (2006). Risk assessment for the establishment of exotic vertebrates in Australia: recalibration and refinement of models - A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

Bomford M. (2008). Risk assessment models for establishment of exotic vertebrates in Australia and New Zealand - A report produced for the Invasive Animals Cooperative Research Centre. Bureau of Rural Sciences, Canberra.

Bomford M., Kraus F., Braysher M., Walter L. and Brown L. (2005). Risk Assessment Model for the Import and Keeping of Exotic Reptiles and Amphibians. A report produced for the Department of Environment and Heritage. Bureau of Rural Sciences, Canberra.

CBRC's Introduced Birds Sub-Committee (2015). The California Bird Records Committee's "Watch List" of established naturalized bird species not yet accepted to the state list,. http://californiabirds.org/list.html [Date accessed:26/05/2015].

de Magalhaes JP and Costa J (2009). A database of vertebrate longevity records and their relation to other life-history traits Journal of Evolutionary Biology, 22(8):1770-1774.

del Hoyo J., Elliot A. and Christie D. (2010). Handbook of Birds of the World - Vol. 15 - Weavers to New World Warblers. Lynx Edicions, Barcelona. Page 198-217.

Department of Agriculture (2014). Guidelines for the Import, Movement and Keepng of Non-indigenous Vertebrates in Australia. Commonwealth of Australia, Canberra. www.feral.org.au

Department of the Environment (2015). EPBC Act List of Threatened Fauna. Australian Government. http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna#birds_critically_endangered

Dickinson E. C. (2003). The Howard and Moore Complete Checklist of the Birds of the World. Princeton University Press, Princeton New Jersey.

Dostine, P. L. and Franklin, D. C. (2002). A comparison of the diet of three finch species in the Yinberrie Hills area, Northern Territory. Emu 102, 159-164.

Dostine, P. L., Johnson, G. C., Franklin, D. C., Zhang, Y. and Hempel, C. (2001). Seasonal use of savanna landscapes by the Gouldian finch, Erythrura gouldiae, in the Yinberrie Hills area, Northern Territory. Wildlife Research 28: 445-458.

GBIF *Vidua macroura* (Pallas, 1764) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-02-14.

GBIF *Vidua paradisaea* (Linnaeus, 1758) in GBIF Secretariat (2022). GBIF Backbone Taxonomy. Checklist dataset https://doi.org/10.15468/39omei accessed via GBIF.org on 2023-02-13.

ITIS ITIS - Report: Vidua macroura

ITIS ITIS - Report: Vidua paradisaea

IUCN RedList Vidua macroura (Pin-tailed Whydah) (iucnredlist.org)

IUCN RedList Vidua paradisaea (Long-tailed Paradise-whydah) (iucnredlist.org)

Kingston R (1998). *Keeping and Breeding Finches and Seed-eaters*. Indruss Productions., New Farm, Qld.

Portuguese Committee of Rarities (2015). Systematic List of the Birds of Portugal. http://www.avesdeportugal.info/especies-cat-e.html

UNEP-WCMC (Comps.) (2015). The Checklist of CITES Species Website. CITES Secretariat, Geneva, Switzerland. http://checklist.cites.org.