NSW SCIENTIFIC COMMITTEE

Preliminary Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Preliminary Determination to support a proposal to list the White-bellied Sea-eagle *Haliaeetus leucogaster* (Gmelin 1788) as a VULNERABLE SPECIES in Part 1 of Schedule 2 of the Act. Listing of Vulnerable species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The White-bellied Sea-eagle *Haliaeetus leucogaster* (Gmelin 1788) (family Accipitridae), is a large eagle (length 75–85 cm, wingspan 180–220 cm), similar in size to the Wedge-tailed Eagle *Aquila audax* (Marchant and Higgins 1993). Adults are white with grey back, rump, wings and base of tail (Simpson and Day 2010). Sexes differ in morphology, with adult females significantly larger (Shephard *et al.* 2004). Immature birds are brown with lighter markings (Simpson and Day 2010).

2. The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin (Marchant and Higgins 1993; Shephard *et al.* 2005a, 2005b; Simpson and Day 2010). It is widespread in eastern New South Wales (NSW) and along the Darling River and there is no evidence that the NSW population differs genetically from individuals in Western Australia or Tasmania (Shephard *et al.* 2005a, 2005b). Beyond Australia, the White-bellied Sea-eagle is found from India to New Guinea (Marchant and Higgins 1993; BirdLife International 2012).

3. White-bellied Sea-eagles may be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young. They may be gregarious at food sites or roosts (Marchant and Higgins 1993). Resident pairs are territorial and occupy nesting territories of hundreds of hectares (Marchant and Higgins 1993). In Tasmania home range estimates vary between 92 km^2 and 220 km^2 (Wiersma and Richardson 2009). The diet of the White-bellied Sea-eagle consists mainly of waterbirds, freshwater turtles and fish (Debus 2008; O'Donnell and Debus 2012; Olsen *et al.* 2013). Foraging habitat consists of coastal seas, rivers, fresh and saline lakes, lagoons, reservoirs and terrestrial habitats such as grasslands (Marchant and Higgins 1993).

4. Breeding habitat for the White-bellied Sea-eagle consists of large trees, usually living or less often dead, within mature open forest, gallery forest or woodland (Marchant and Higgins 1993). Nest trees are usually emergent (Thurstans 2009), typically eucalypts (O'Donnell and Debus 2012) and often have emergent dead branches, which are used as 'guard roosts' (Dennis *et al.* 2011b; Debus *et al.* 2014). In subtropical eastern NSW White-bellied Sea-eagles nest at least 220 m from human settlements (mean 460 m, O'Donnell and Debus 2012). Spencer and Lynch (2005) report the White-bellied Sea-eagle avoids nesting near urban areas. Nests may be abandoned if disturbed (Debus *et al.* 2014; DoE 2015).

5. The White-bellied Sea-eagle is sexually mature at approximately 6 years and the mortality rate of young birds is high (Fleay 1948; Marchant and Higgins 1993; DoE 2015). Adults may live up to 30 years (Parks and Wildlife Service Tasmania 2011; DoE 2015). The White-bellied Sea-eagle breeds solitarily in pairs (Marchant and Higgins 1993). White-bellied Sea-eagles only raise one clutch per year, although a second clutch may be laid in the same nest, or in a nearby repaired nest if a nest fails early in incubation (Marchant and Higgins 1993). The breeding period extends from June to January, eggs are typically laid in June to September and young birds remain in the nest for 65–70 days (Marchant and Higgins 1993). After fledging, young birds may associate with their parents for a few years before dispersing, potentially over large distances (Marchant and Higgins 1993).

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6. The generation length of the White-bellied Sea-eagle is uncertain. Generation length has been estimated to be 15 years for the similarly sized Wedge-tailed Eagle (Garnett *et al.* 2011), which has similar demographic parameters to the White-bellied Sea-eagle (Marchant and Higgins 1993). N. Mooney (*in litt.* August 2014) suggests that the White-bellied Sea-eagle has a shorter generation length (13 years) as it has a larger average brood size usually associated with higher mortality rates and shorter lifespan than the Wedge-tailed Eagle. In this determination 13 years is used as the generation length for the White-bellied Sea-eagle.

7. The distribution of the White-bellied Sea-eagle in NSW is not restricted. The extent of occurrence for the White-bellied Sea-eagle 815,500 km^2 based on a minimum convex polygon enclosing all mapped occurrences of the species in NSW (OEH 2015), the method of assessment recommended by IUCN (2014). The area of occupancy (AOO) is estimated to be 11,572 km^2 based on 2 × 2 km grid cells, the scale recommended for assessing AOO by IUCN (2014).

8. The NSW population of the White-bellied Sea-eagle is estimated to be moderately low. Debus (2008) and Debus *et al.* (2014) estimated the population size of White-bellied Sea-eagle in NSW to be approximately 800 breeding pairs, or 1600 mature adults. Allowing for a floating population and considering uncertainty associated with the estimate, the total NSW population probably exceeds 2500 but is highly likely to be fewer than 10,000 mature individuals.

9. Declines in the White-bellied Sea-eagle have been noted in NSW (Mooney and Brothers 1986; Marchant and Higgins 1993; Dennis and Lashmar 1996; Debus *et al.* 2014), in other Australian jurisdictions (Dennis and Lashmar 1996; Clunie 2003; Steele-Collins 2008; Thurstans 2009; Dennis *et al.* 2011a, 2011b) and globally (Shephard *et al.* 2005b; BirdLife International 2012). Long-term studies on population trends of this species in NSW or population modelling are required for accurate estimation of the magnitude of decline, however, Debus *et al.* (2014) speculate a decline of at least 10% (possibly exceeding 30%) over three generations in NSW. In NSW there is evidence of declines in the White-bellied Sea-eagle population around industrial or population centres. For example, in the 1960s in Sydney, 27 nests were documented in the 40 km stretch of coastal plain between Royal National Park and the Hawkesbury River (Bowden 1996; Debus 2008). This has now been reduced to approximately three breeding pairs, with low breeding success (S. Debus *in litt.* February 2014).

   As development along the coast continues it is reasonable to infer that the pattern of decline observed in Sydney will be repeated, especially in coastal growth areas such as the Byron, Tweed, Coffs Harbour and Great Lakes local government areas (NSWPE 2014; Debus *et al.* 2014). Over time an increasing proportion of the White-bellied Sea-eagle population can be expected to be impacted by disturbance as the human population in NSW increases (Debus *et al.* 2014). The human population has been projected to increase in the 15 year period 2011–2026 in NSW by 21.1% (NSWPE 2014), and on the North Coast of NSW the human population has been predicted to double in the next 20 years (D. Brunkhorst in O'Donnell and Debus 2012) indicative of intensifying threats (clearing and disturbance) to this species within its core range. Coastal bioregions (North Coast, Sydney Basin and South-east Corner see SEWPac 2012) in NSW are well reserved with 29.6% occurring within protected areas (NPWS 2008; A Morris *in litt.* February 2015), which limits the impact of development to some extent. However, fire management and visitation may degrade the habitat values in some protected areas (Hodge and Hodge 2011; M. Schulz *in litt.* February 2015). The combination of a decline in nesting success, a decline in the number of active nests and increased mortality indicate this species is declining. A future decline in the White-bellied Sea-eagle in NSW exceeding 10% over three generations (~39 years) is therefore inferred.

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10. The White-bellied Sea-eagle population in NSW is facing multiple threats including increased mortality, decreased nesting success and reduced foraging resources. Mortality of White-bellied Sea-eagles is likely to be above historical levels (N. Mooney *in litt.* August 2014), potential causes include: non-target poisoning during vertebrate pest control (Clunie 2003); deliberate poisoning, shooting or trapping (Clunie 2003; DoE 2015); bioaccumulation of contaminants from environmental sources (Bilney and Emison 1983; Clunie 2003; Olson and Osgood 2006); entanglement from discarded fishing gear (Anon 2012; DoE 2015); collisions with wind turbines, vehicles or power lines (Smales 2006; Debus 2008; N. Mooney *in litt.* August 2014); and entanglement in fish farm nets (Debus 2008). 'Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments' is listed as a Key Threatening Process under the Act.

11. Declines in nesting success or complete nesting failure have been reported for White-bellied Sea-eagle due to disturbance of nest sites (*e.g*., Mooney and Brothers 1986; Dennis and Lashmar 1996; Clunie 2003; Dennis et al. 2011b; DoE 2015; Debus *et al.* 2014), chemical contamination (Manning *et al*. 2008; Harrington *et al*. 2013) and in one instance fire (M. Schulz *in litt.* February 2015). In coastal areas in particular, loss of habitat due to clearing of native vegetation or increasing disturbance near nest sites are likely to adversely affect this species (Debus *et al.* 2014). Nesting is more successful in native vegetation compared with modified habitats (Bilney and Emison 1983). The White-bellied Sea-eagle shows a high fidelity to successful nesting trees and is very selective about nest site location, generally preferring sites near water with low disturbance. Inferior nest sites have poor, or no success so the loss of nesting trees is a significant threat to this species (Debus *et al.* 2014). Occupation of territories by breeding pairs is reliant on the availability of suitable nest trees. Disturbance of nest sites can result in relocation to inferior nest sites further reducing nesting success (Debus *et al.* 2014; DoE 2015). Competition for breeding sites also occurs, with the larger Wedge-tailed Eagle (with occasional fatalities resulting) or Eastern Osprey *Pandion cristatus*, and is likely to intensify as breeding habitat becomes more scarce (Debus 2008; Dennis *et al.* 2011a; Hodge and Hodge 2011; N. Mooney pers com. in Debus *et al.* 2014). The core breeding habitat for the White-bellied Sea-eagle in NSW coincides with that of urban expansion, both historically and into the future (Shephard *et al.* 2005a; Debus *et al.* 2014). 'Clearing of native vegetation' is listed as a Key Threatening Process under the *Act*.

12. In coastal areas potential threats to foraging resources include: clearing, degradation or reclamation of saltmarsh, mangroves, sea grass and other riparian or shallow water vegetation resulting in loss of fish nursery habitats and food resources (Finlayson and Rea 1999; Mazumder *et al.* 2005; Saintilan and Williams 2000); contamination of prey items with industrial toxins or pesticides (Manning *et al.* 2008; Harrington *et al.* 2013); and declining fish stocks of some species (Rowling *et al.* 2010; SoE Committee 2011; Flood *et al.* 2014). In inland areas the evidence for declining foraging resources for the White-bellied Sea-eagle is unclear although likely since the European settlement of NSW. Changes to hydrology, stabilisation of water levels in major inland rivers by weirs, the construction of reservoirs and dams and the associated increase in food supply and the introduction of European Carp (*Cyprinus carpio*) and artificial fishing stock of recreational species (*e.g.* trout), have potentially been beneficial to the White-bellied Sea-eagle (Favaloro 1944; Bilney and Emison 1983; Marchant and Higgins 1993; Clunie 2003; Shephard *et al.* 2005a). In drought periods it is possible that river regulation and introduced fish may allow nesting to occur in previously unsuitable climatic conditions in inland areas (Shephard *et al.* 2005a). However, declines of 73–81% of migratory and resident shorebird numbers and declines of more than 90% of in all functional groups of waterbirds, the loss of key wetlands such as the Lowbidgee of the past 25 years (Kingsford and Thomas 2004; Nebel *et al.* 2008) and declines in freshwater fish (Faragher and Harris 1994; SoE Committee 2011) are indicative of a decline in habitat quality in inland areas (S. Debus *in litt.* February 2014). Exposure to pesticides used for agriculture (directly or indirectly through prey) is a plausible cause of decline in western NSW (M.

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Schulz *in litt.* February 2015. 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands' is listed as a Key Threatening Process under the Act.

13. Climate change, leading to sea-level rise will result in inundation of low lying coastal areas (Hughes 2003; Rogers *et al.* 2013) with unknown impacts on this species. In inland areas increased drought frequency and duration, a predicated climate change impact (Hughes 2003) may render inland areas increasingly unsuitable, compared with baseline levels, for nesting. 'Anthropogenic climate change' is listed as a Key Threatening Process under the Act.

14. White-bellied Sea-eagle *Haliaeetus leucogaster* (Gmelin 1788) is not eligible to be listed as an Endangered or Critically Endangered species.

15. White-bellied Sea-eagle *Haliaeetus leucogaster* (Gmelin 1788) is eligible to be listed as a Vulnerable species as, in the opinion of the Scientific Committee, it is facing a high risk of extinction in New South Wales in the medium-term future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

Clause 6 Reduction in population size of species
The species has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:

(c) a moderate reduction in population size,

based on either of the key indicators:

(a) an index of abundance appropriate to the taxon, or
(b) the geographic distribution, habitat quality or diversity, or genetic diversity.

Clause 8 Low numbers of mature individuals of species and other conditions
The estimated total number of mature individuals of the species is:

(c) moderately low,

and either:

(d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
    (a) an index of abundance appropriate to the taxon, or
    (b) the geographic distribution, habitat quality or diversity, or genetic diversity of the species.

Mark Eldridge
Chairperson
NSW Scientific Committee

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