



2010 NOMINATION – *Falco subniger*

Section 1 - Legal Status, Distribution, Biological, Ecological

Conservation Theme

<p>1. The conservation themes for the assessment period commencing 1 October 2010 (for which nominations close 25 March 2010) are ‘heathlands and mallee woodlands’, and ‘terrestrial, estuarine and near–shore environments of Australia’s coast’.</p> <p><i>How does this nomination relate to the conservation themes?</i></p>	<p>The species’ breeding habitat or nest sites potentially include mallee woodlands near open country</p>
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Taxonomy

<p>2. What are the currently accepted scientific and common name/s for the species (please include Indigenous names, where known)? <i>Note any other scientific names that have been used recently. Note the species authority and the Order and Family to which the species belongs (Family name alone is sufficient for plants, however, both Order and Family name are required for insects).</i></p>	<p>Black Falcon- <i>Falco subniger</i></p> <p>Yes</p> <p>Australian endemic species in a global genus and family</p>
<p>3. Is this species conventionally accepted? If not, explain why. Is there any controversy about the taxonomy?</p>	
<p>4. If the species is NOT conventionally accepted, please provide: <i>(i) a taxonomic description of the species in a form suitable for publication in conventional scientific literature; OR</i> <i>(ii) evidence that a scientific institution has a specimen of the species and a written statement signed by a person who has relevant taxonomic expertise (has worked, or is a published author, on the class of species nominated), that the person thinks the species is a new species.</i></p>	
<p>5. Is this species taxonomically distinct (Taxonomic distinctiveness – a measure of how unique a species is relative to other species)?</p>	

Legal Status

<p>6. What is the species’ current conservation status under Australian and State/Territory Government legislation?</p>	<p>Vulnerable under the Victorian Advisory List; under review for possible listing as Vulnerable in NSW (NSW Scientific Committee)</p>
<p>7. Does the species have specific protection (e.g. listed on an annex or appendix) under other legislation or intergovernmental arrangements, e.g. Convention on International Trade in Endangered Fauna and Flora (CITES), Convention on Migratory Species (CMS).</p>	<p>No, other than CITES II</p>

Description

<p>8. Give a brief description of the species' appearance, including size and/or weight, and sex and age variation if appropriate; social structure and dispersion (e.g. solitary/clumped/flocks).</p>	<p>The Black Falcon is a large (45-55 cm), very dark falcon with pale grey cere (enclosing the nostrils), eye-rings (around dark eyes) and feet. It is uniformly dark brown to sooty black, with a pale throat and indistinct black streak below the eyes; some individuals have faint, narrow barring under the wings and tail. The dark form of the Brown Falcon <i>Falco berigora</i> is sometimes mistaken for the Black Falcon; it is similarly uniformly dark brown with pale grey cere, eye-rings and feet (dull yellow in old males), but has a double cheek-mark, long legs, bicoloured, barred underwings, and slow flight. The Black Falcon occurs solitarily, in pairs, or in family groups of parents and offspring. Individuals may congregate at food sources (e.g. fires which expose prey, irruptions of quail or button-quail, and locust plagues).</p>
<p>9. Give a brief description of the species' ecological role (for example, is it a 'keystone' or 'foundation' species, does it play a role in processes such as seed dispersal or pollination).</p>	<p>High-order predator of birds</p>

Australian Distribution

<p>10. Describe the species' current and past distribution in Australia and, if available, attach a map.</p>	<p>Thinly distributed over most of the Australian mainland except the eastern humid coastal and escarpment forests. Little or no change in distribution at the continental scale. Map available in , e.g., Barrett et al. (2003).</p>
<p>11. What is the extent of occurrence (in km²) for the species (described in Attachment A); explain how it was calculated and datasets used.</p>	<p>Potentially ~70% of mainland Australia or ~5 million km², based on distribution of records for the species in the two national bird atlases.</p>
<p>a. What is the current extent of occurrence?</p>	<p>A above</p>
<p>b. What data are there to indicate past declines in extent of occurrence (if available, include data that indicates the percentage decline over the past 10 years or 3 generations whichever is longer)?</p>	<p>No evidence for past declines in EEO</p>
<p>c. What data are there to indicate future changes in extent of occurrence (if available, include data that indicates the percentage decline over 10 years or 3 generations whichever is longer (up to a maximum of 100 years in the future) where the time period is a continuous period that may include a component of the past)?</p>	<p>None</p>
<p>12. What is the area of occupancy (in km²) for the species (described in Attachment A); explain how calculated and datasets that are used.</p>	<p>Unknown, but given the generally low densities of this species possibly 10% of EEO or ~500 000 km².</p>
<p>a. What is the current area of occupancy?</p>	<p>Unknown with any precision.</p>
<p>b. What data are there to indicate past declines in area of occupancy (if available, include data that indicates the percentage decline over the past 10 years or 3 generations whichever is longer)?</p>	<p>Could be inferred from decline in index of abundance (see Q. 27).</p>
<p>c. What data are there to indicate future changes in area of occupancy (if available, include data that indicates the percentage decline over 10 years or 3 generations whichever is longer (up to a maximum of 100 years in the future) where the time period is a continuous period that may include a component of the past)?</p>	<p>Future changes in AOO can be inferred from the fact that a 30-50% decline in index of abundance occurred over only two generations in the eastern sheep-wheat belt and Murray-Darling Basin, where natural ecosystems are under severe threat.</p>
<p>13. How many natural locations do you</p>	<p>Difficult to define a 'location' for this highly mobile, nomadic or</p>

<p>consider the species occurs in and why? Where are these located? The term 'location' defines a geographically or ecologically distinct area.</p>	<p>migratory (within Australia) species that can appear over any open habitats across the country. If one equates 'locations' with IBRA bioregions, then it potentially occurs in at least 50 of the 80 bioregions.</p>
<p>14. Give locations of other populations: captive/propagated populations; populations recently re-introduced to the wild; and sites for proposed population re-introductions. Note if these sites have been identified in recovery plans.</p>	<p>Not applicable</p>
<p>15. Is the species' distribution severely fragmented? What is the cause of this fragmentation? Describe any biological, geographic, human-induced or other barriers causing this species' populations to be fragmented. Severely fragmented refers to the situation in which increased extinction risk to the taxon results from most individuals being found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonisation.</p>	<p>No</p>
<p>16. Departmental Use Only:</p>	

Global Distribution

<p>17. Describe the species' global distribution.</p>	<p>Endemic to mainland Australia.</p>
<p>18. Give an overview of the global population's size, trends, threats and security of the species outside Australia.</p>	<p>Not applicable: the Australian population is the global population.</p>
<p>19. Explain the relationship between the Australian population and the global population, including:</p>	<p>N/A</p>
<p>a. What percentage of the global population occurs in Australia;</p>	<p>100%</p>
<p>b. Is the Australian population distinct, geographically separate or does part or all of the population move in/out of Australia's jurisdiction (give an overview; details in Movements section);</p>	
<p>c. Do global threats affect the Australian population?</p>	

Surveys and Monitoring

<p>20. Has the species been reasonably well surveyed? Provide an overview of surveys to date and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size.</p>	<p>The only comprehensive surveys have been the national bird atlases in 1977-81 and 1998-2001 (Blakers et al. 1984; Barrett et al. 2003), and the two national Bird of Prey Watch schemes in 1986-1990 and 1996-2000 (Baker-Gabb & Steele 1999; Steele & Baker-Gabb 2009). There is a high likelihood that its current known distribution is its actual distribution, although records may be inflated by misidentified dark Brown Falcons.</p>
<p>21. For species nominated as extinct or extinct in the wild, please provide details of the most recent known collection, or authenticated sighting of the species and whether additional populations are likely to exist.</p>	
<p>22. Is there an ongoing monitoring programme? If so, please describe the extent and length of the programme.</p>	<p>No</p>

Life Cycle and Population

<p>23. What is the species' total population size in terms of number of mature individuals? How were population estimates derived and are they reliable? Are there other useful measures of population size and what are they? In the absence of figures, terms such as common, abundant, scarce can be of value.</p>	<p>Not precisely known for this species. As an approximation, the global population was estimated as in the low tens of thousands to below 100 000 birds (Ferguson-Lees & Christie 2001). However, this estimate was made in the 1990s (pre-calicivirus reduction of rabbit prey) and may require revision downwards, given that the national reporting rate has declined by 38% since the 1980s (██████ pers. comm.). The national population may be about 30 000 birds. It is a scarce species.</p>
<p>24. Does the species occur in a number of smaller populations? How many? For each population give the locality, numbers and trends in numbers and tenure of land (include extinct populations). Can these be considered to be subpopulations and why? Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange.</p>	<p>No</p>
<p>25. Provide details on ages of the following:</p>	
<p>a. sexual maturity;</p>	<p>Unlikely to breed in the wild before 3-4 years, by analogy with the better known Peregrine Falcon.</p>
<p>b. life expectancy;</p>	<p>Little known: up to 12 years in the wild, 20 years in captivity (Marchant and Higgins 1993).</p>
<p>c. natural mortality.</p>	<p>Virtually unknown; probably starvation, predation of eggs/chicks, occasional predation by larger raptors.</p>
<p>26. Reproduction</p>	
<p>For plants: When does the species flower and set fruit? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, cleared ground) in order to reproduce?</p>	
<p>For animals: provide overview of breeding system and of breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process?</p>	<p>The Black Falcon breeds in solitary, dispersed pairs. It uses an old stick nest, typically built by a crow or raven or sometimes another raptor species, in the top of an emergent live (or sometimes dead) tree in woodland, often riparian. The clutch of usually three or four eggs is laid between winter and late spring. The incubation period is 5 weeks, the nestling period 6-7 weeks, and the post-fledging dependence period lasts at least 3 weeks. Few data on success/productivity; single clutch/brood per year. Breeding in the arid zone may be influenced by rainfall and prey abundance. (Source: Marchant and Higgins 1993)</p>
<p>27. What is the population trend for the entire species?</p>	<p>Suspected decline. Barrett et al. (2002) flagged the Black Falcon as among those grassland bird species showing a 30-50% national decline in the preceding 20 years, with declines greatest in south-eastern Australia.</p>
<p>a. What data are there to indicate past decline in size (if available, include data on rate of decline over past 10 years or 3 generations whichever is longer)?</p>	<p>The species' index of abundance declined nationally by 38% over two generations (20 years), $P = 0.00$ (i.e. statistically significant) (██████ pers. comm.). The decline was greatest (30-50%) in south-eastern Australia (Barrett et al. 2002), i.e. the eastern sheep-wheat belt and Murray-Darling Basin.</p>
<p>b. What data are there to indicate future changes in size (if available, include data which will indicate the percentage of decline over 10 years or 3 generations whichever is longer (up to a maximum of 100 years in the future) where the time period is a</p>	<p>The change in reporting rate over two generations would extrapolate to -51% over three generations if the decline is real and continuing.</p>

<i>continuous period that may include a component of the past)?</i>	
28. Does the species undergo <i>extreme natural fluctuations</i> in population numbers, extent of occurrence or area of occupancy? To what extent and why? Extreme fluctuations can be said to occur in a number of taxa when population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e. a tenfold increase or decrease).	There is no evidence of extreme fluctuations in the global population; however, this species can be irruptive according to seasonal conditions and prey abundance (Marchant & Higgins 1993).
29. What is the <i>generation length</i> and how it is calculated? Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies under threat, the more natural, i.e. pre-disturbance, generation length should be used.	Estimated as 10 years for the similar Grey Falcon (Garnett & Crowley 2000), presumably on the basis of age at first breeding + half the average adult lifespan (and possibly based on the similar, better-known Peregrine Falcon).
30. Identify <i>important populations</i> necessary for the species' long-term survival and recovery? This may include: key breeding populations, those near the edge of the species' range or those needed to maintain genetic diversity.	Important populations appear to include the south-west Qld Channel Country, the Lake Eyre Basin, the Murray-Darling Basin and the South Australian plains (e.g. Barrett et al. 2003).
31. Describe any <i>cross-breeding</i> with other species in the wild, indicating how frequently and where this occurs.	Nil
32. Departmental Use only:	

Populations In Reserve

33. Which <i>populations</i> are <i>in reserve systems</i>? Which of these are actively managed for this species? Give details.	Populations are likely to occur in most substantial reserve of flat, open habitats in the arid and semi-arid zones, particularly those with riparian habitats. No reserves are specifically managed for this species.
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Habitat

34. Describe the <i>species' habitat</i> (e.g. aspect, topography, substrate, climate, forest type, associated species, sympatric species). If the species uses different habitats for different activities (e.g. breeding, feeding, roosting, dispersing, basking), then describe each habitat.	The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded (eucalypt-dominated) watercourses; it also uses agricultural land with scattered remnant trees. The Falcon is often associated with streams or wetlands, visiting them in search of prey. It uses standing dead trees as lookout posts. Specific aspects of habitat floristics or quality are probably more relevant to prey densities than to structural habitat selection by the falcon. For instance, in agricultural landscapes the falcon nests in healthy, bird-rich riparian woodland remnants (Debus et al. 2005).
35. Does the species use <i>refuge habitat</i>, e.g. in times of fire, drought or flood? Describe this habitat.	The species is likely to use drought refuges, such as open habitats in humid zones.
36. Is the <i>extent or quality</i> of the species' habitat <i>in decline</i>? If the species uses different habitats, specify which of these are in decline.	The main threats to the Black Falcon are suspected to be clearing of habitat in the semi-arid zone, and degradation of habitat in the arid and semi-arid zones by overgrazing, with likely effects on the Falcon's foraging habitat, nest sites and food supply. Over 80% of temperate woodlands in Australia have been cleared, and the process is continuing (Olsen et al. 2005; Johnson et al. 2007), and native grasslands in NSW are being cultivated (Baker-Gabb 1998). The main effect of clearing, and degradation of riparian woodlands, may be the loss of nest trees from key Falcon breeding areas. Loss of breeding populations of Black Falcons, after destruction of their riparian nest trees, has been documented in South Australia (Olsen

	<p>1994). Altered flow regimes in the Murray-Darling Basin (a key region for the Falcon in NSW) may also cause significant loss of riparian or floodplain nest trees, given the scale of such changes (cf. Kingsford & Thomas 2004; Kingsford & Porter 2009). Some inland bioregions (Brigalow Belt South, NSW Southwestern Slopes, Darling Riverine Plains, Riverina) are 40-84% cleared and moderately to highly stressed (landscape stress factor 2-5, mostly 3-5, out of 6: Morgan 2000; Barrett et al. 2007). Even little-cleared bioregions farther west are moderately stressed (Mulga Lands, Murray-Darling Depression, Broken Hill Complex stress rating 4; Cobar Peneplain, Channel Country, Simpson-Strzelecki Dunefields stress rating 3: Morgan 2000; Barrett et al. 2007). Raptor species diversity and abundance in savannas and steppes in other countries are adversely affected by livestock overgrazing, wood cutting and expansion of cultivation (Sorley & Andersen 1994; Herremans & Herremans-Tonnoeyr 2000; Sanchez-Zapata et al. 2003; Thiollay 2006), and similar processes are operating in Australia (e.g. Baker-Gabb 1998; Olsen et al. 2005).</p>
<p>37. <i>Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?</i></p>	<p>Its habitat includes Brigalow, Buloke and the various listed box/gum grassy woodlands and natural grasslands, and it is associated with many listed threatened terrestrial mammals and birds of the arid and semi-arid zones.</p>

Feeding

<p>38. <i>Summarize the species' food items or sources and timing/seasonality.</i></p>	<p>The Black Falcon feeds mostly on birds, especially flocking, ground-feeding granivores (pigeons, doves and parrots); also some small mammals, large insects and occasionally carrion (e.g. road kill) (Marchant & Higgins 1993; Debus et al. 2005). Rabbits were formerly a high proportion of the Falcon's diet by biomass, but following the spread of rabbit calicivirus disease, and consequent decline in rabbit numbers by 65-85% in the arid and semi-arid zones, the falcon is likely to be increasingly dependent on native prey, especially birds (Marchant & Higgins 1993; Falkenberg et al. 2000; Sharp et al. 2002; Debus et al. 2005).</p>
<p>39. <i>Briefly describe the species' feeding behaviours, including those that may make the species vulnerable to a threatening process.</i></p>	<p>The Falcon takes some introduced Common Starlings in agricultural areas, which may be a vector for pesticides, and feral Rock Doves, which are a vector for disease (trichomoniasis, which infects raptors via their prey) and possibly for pesticides. Most of its former native mammalian prey species in inland NSW are extinct ('critical weight range' terrestrial mammals of rabbit size or smaller, e.g. large rodents: Van Dyck & Strahan 2008). Key avian prey species (terrestrial grassland birds, e.g. quail, button-quail, pipits, larks and songlarks) require ground cover, often of native grasses, and are sensitive to livestock grazing pressure (Marchant & Higgins 1993), or are hollow-dependent (e.g. parrots).</p>

Movement Patterns (fauna species only)

<p>40. <i>Describe any relevant daily and seasonal pattern of movement for the species, or other irregular patterns of movement, including relevant arrival/departure dates if migratory.</i></p>	<p>The Black Falcon is a highly mobile and dispersive, migratory or irruptive species, with wintering in northern Australia and dispersal towards the coast during droughts (Marchant & Higgins 1993).</p>
<p>41. <i>Give details of the species' home ranges/territories.</i></p>	<p>Breeding pairs of Black Falcons defend their nesting territories against other predators and competitors, and use breeding territories in successive years. The Black Falcon's home range is undetermined, but likely to be larger than for the Peregrine Falcon in the temperate zone (i.e. more than 100 km²). Nesting densities are variously one pair per 15 km² (four pairs in 60 km², with 4-5 km between nests) in arid-zone floodplain woodland in good seasons, and one pair in 134 km² in average to dry years in the sheep-wheat belt (Marchant & Higgins 1993).</p>

Survey Guidelines

<p>42. Give details of the distinctiveness and detectability of the species.</p>	<p>The species is distinctive and readily detectable to raptor experts, but laypeople often misidentify dark Brown Falcons as Black Falcons.</p>
<p>43. Describe methods for detecting species including when to conduct surveys (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort; and limitations and expert acceptance; recommended methods; survey-effort guide.</p>	<p>Daytime road transects through open or lightly wooded habitats during dry weather are effective for detecting the species (Baker-Gabb & Steele 1999). Daytime walking or slow driving along inland wooded watercourse in late winter/spring is an effective way to find active nests (Falkenberg et al. 2000).</p>

Section 2 - Threats and Threat Abatement

Threats

<p>44. Identify past, current and future threats, to the species indicating whether they are actual or potential. For <u>each threat</u>, describe:</p>	<p>Apart from habitat degradation (see Q. 36), other threats or potential threats to the Black Falcon include human disturbance to nest sites (including possible robbery of eggs or chicks), pesticides, and collisions with powerlines. However, this falcon's eggshell thickness was not affected by DDT, and DDT has since been banned, but the effect of other pesticides (including locust sprays, which are even used in National Parks) is unknown. Mammal-eaters like the Black Falcon were less susceptible to pesticides than bird-eaters are (Olsen et al. 1993), but in the NSW agricultural zone, following the decline of rabbits, the Falcon now eats many birds (Debus et al. 2005). Urban Peregrine Falcons die from organophosphate poisoning campaigns against feral pigeons (Hurley 2009); Black Falcons take feral pigeons, some from within rural cities where pigeons are also destroyed as pests (Debus et al. 2005; ██████████ personal observation). Windfarms may cause occasional collision mortalities of falcons. Modelling of the currently small data set for the White-bellied Sea-Eagle suggests that the few deaths nationwide (less than 5 per year) will have no significant population effect at the current scale of windfarm development (Smales 2005; no data or modelling for any falcons). This mortality factor may increase substantially in the future, with the expansion of windfarms. Furthermore, observed casualties of Tasmanian eagles at windfarms (at least 12 in two years) have been much greater than the modelled predictions (Mooney 2009).</p>
<p>a. how and where it impacts on this species;</p>	<p>See above</p>
<p>b. what its effect has been so far (indicate whether it is known or suspected; present supporting information/research; does it only affect certain populations);</p>	<p>These threats are suspected rather than known, but are inferred to be operative in south-eastern Australia (Murray-Darling Basin, sheep-wheat belt) where the falcon's decline is greatest (Barrett et al. 2002).</p>
<p>c. what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations);</p>	<p>These threats, especially habitat degradation, are suspected to intensify in the Murray-Darling Basin and eastern sheep-wheat belt in the future, particularly with climate change.</p>
<p>d. what is the relative importance or magnitude of the threat to the species.</p>	<p>Threats to breeding habitat and nest sites are suspected to be moderate to severe for Black Falcon breeding populations (especially during drought), threats to the Falcon's prey base are suspected to be low or moderate, and other threats are suspected to be low.</p>
<p>45. If not included above, identify catastrophic threats, i.e. threats with a low predictability that are likely to severely affect the species. Identify the threat, explain its likely impact and indicate the likelihood of it occurring (e.g. a drought/cyclone in the area every 100 years).</p>	
<p>46. Identify and explain any additional biological characteristics particular to the species that are threatening to its</p>	<p>None known</p>

survival (e.g. low genetic diversity)?	
47. Identify and explain any quantitative measures or models that address the probability of the species' extinction in the wild over a particular timeframe.	Nil
48. Is there other information that relates to the survival of this species that you would like to address?	<p>The susceptibility of large falcons to population declines related to pesticides, loss of breeding habitat or nest sites, and human disturbance to nest sites, suggests the need for a precautionary approach.</p> <p>The Atlas 1/Atals 2 national comparison suggests that the species meets EPBC criterion 1, suspected to have undergone and likely to undergo in the future a substantial reduction in numbers, and IUCN criterion A2b, with A2c (decline in habitat quality) also likely to apply.</p>

Threat Abatement and Recovery

49. Give an overview of how broad-scale threats are being abated/could be abated and other recovery actions underway/ proposed. Identify who is undertaking these activities and how successful the activities have been to date.	None specifically applicable to this species are officially current or proposed, although Olsen (1998) proposed targeted research in South Australia, and Olsen et al. (2000) proposed survey, monitoring, life-history studies, and limiting-factor research. Nest sites subject to development pressures, e.g. to clear habitat (other than routine agricultural management) could usefully be subject to the EPBC Act referral process. General ecosystem rehabilitation, e.g. by Landcare and CMAs, will be of benefit in the long term.
50. For species nominated as extinct in the wild, provide details of the locations in which the species occurs in captivity and the level of human intervention required to sustain the species.	

Mitigation Approach

51. Describe any mitigation measures or approaches that have been developed specifically for the species at identified locations. Identify who is undertaking these activities and how successful the activities have been to date.	None known. Nest-site protection, with buffer/exclusion zones, in concert with conservation of foraging habitat and prey, would be a useful approach.
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52. Departmental use only:	
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Major Studies

53. Identify major studies on the species that might relate to its taxonomy or management.	Few studies; Debus et al. (2005) is the only recent one.
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Management Documentation

54. Identify key management documentation available for the species, e.g. recovery plans, conservation plans, threat abatement plans.	Olsen et al. (2000), Australasian raptor conservation assessment and management plan.
55. Departmental use only:	

Section 3 – References and Reviewers

Notes:

- The opinion of appropriate scientific experts may be cited (with their approval) in support of a nomination. If this is done the names of the experts, their qualifications and full contact details must also be provided in the reference list below.
- Please provide copies of key documentation/references used in the nomination

56. Reference list

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- Barrett G, Silcocks A, Barry S, Cunningham R, Poulter R (2003) 'The new atlas of Australian birds'. (RAOU: Melbourne)
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- Australia's bioregions and subregions.' (Environment Australia: Canberra)
- Mooney N (2009) Tasmanian Area Rep's report 2005-2008. *Boobook* **27**, 6-8.
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- Olsen J (1994) 'Some time with eagles and falcons'. (Behavioural Ecology Research Group, University of Canberra: Canberra)
- Olsen P (1995) 'Australian birds of prey'. (NSW University Press: Sydney)
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