Haliaeetus leucogaster

White-bellied sea-eagle

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Photo: Ross Monash 2022

Scientific name: ***Haliaeetus leucogaster*** Gmelin, 1788

Common name: White-bellied sea-eagle

Group: Vertebrate animal, class bird, family Accipitridae

Status: *Threatened Species Protection Act 1995*: **vulnerable**

Environment Protection and Biodiversity Conservation Act 1999: **Marine**

IUCN Red List: **Least Concern**

Distribution: Biogeographic origin: **Not endemic to Tasmania**

Tasmanian NRM Regions: **North, South, Cradle Coast**

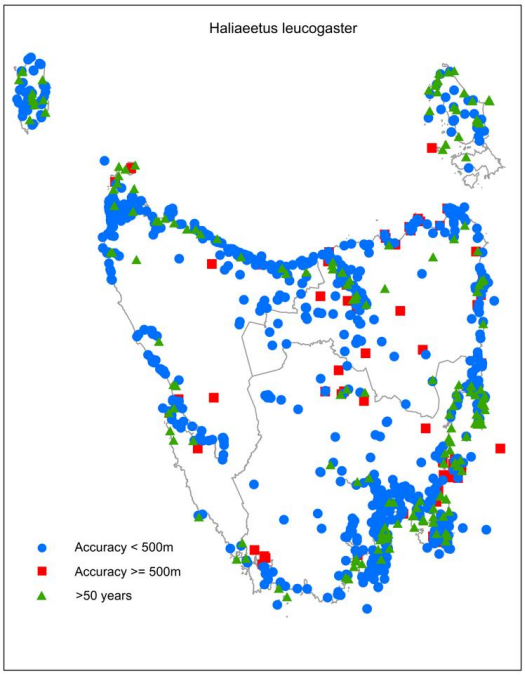

Figure 1. The distribution of *Haliaeetus leucogaster* sightings, showing NRM regions (from Natural Values Atlas as at 21 June 2022)

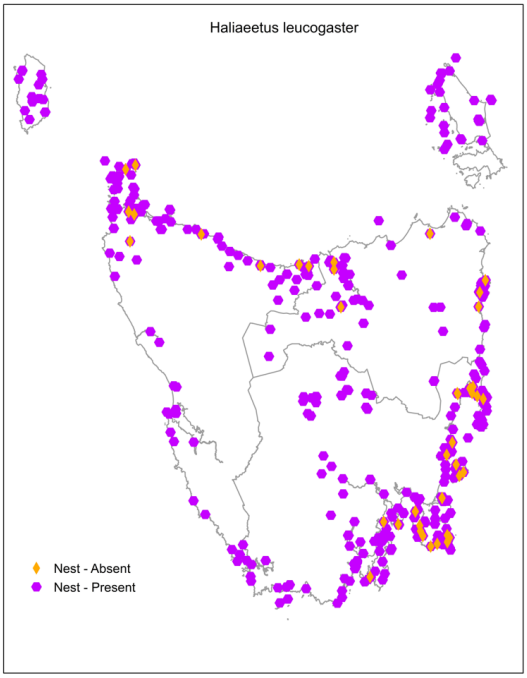

Figure 2. The distribution of *Haliaeetus leucogaster* nest records, showing NRM regions (from Natural Values Atlas as at 21 June 2022)

SUMMARY: The white-bellied sea-eagle (WBSE) *Haliaeetus leucogaster* is a large raptor, predominantly white with grey-black upper and underwing flight feathers. Juvenile birds are largely brown all-over. The species occurs widely from western India to southern China, across south-east Asia, New Guinea, and around the entire Australian coastline. In Tasmania, WBSEs occur around the coast and along inland rivers and lakes. WBSEs may be seen roosting on prominent trees, soaring in the sky, or circling low and diving to snatch food from the surface of the water. WBSEs feed on fish, birds, mammals and reptiles, either live caught or carrion. The number of WBSEs in Tasmania is estimated at between 800–850 adults with approximately 280 breeding territories. The principal threats include loss of suitable nesting habitat, breeding disturbance, premature mortality from collision, entanglement, electrocution and poisoning. Ongoing management of the WBSE is aimed at maintaining a sustainable population through implementing effective protection and threat mitigation actions.

IDENTIFICATION AND ECOLOGY

The white-bellied sea-eagle *Haliaeetus leucogaster* (WBSE) is a large raptor with long, broad wings and a short fan-shaped tail. Birds measure 75–85 cm in length and have a wingspan of 180–220 cm. Females generally weigh between 2.8–4.2 kg, and are larger than the males, which weigh between 2.5–3.7kg. Adults are predominantly white and grey. The head, breast, belly, and the feathering on the legs, are white. The back and upper surfaces of the wings are grey, the wings have black tips. The undersides of the wings are greyish black around the distal edges, with a smaller area of white along the leading edge. The tail is dark grey at the base with a white tip, and the legs and feet are cream-coloured (Marchant and Higgins 1993).

Juvenile WBSEs are predominantly dark brown on the upper parts, except for the creamy colouring on the head, and creamy markings over the rest of the upper parts. The underside of the body is a similar colour to the upper parts but becomes paler with age. The underside of the wing is patterned with a mixture of orange-buff, white, dark brown and dark grey. There is a gradual transition from the juvenile to the adult plumage. This transition is completed in a series of moults over 4–5years (Marchant and Higgins 1993).

WBSEs are opportunistic carnivores, feeding on carrion or live caught prey such as fish, birds, reptiles, and small mammals. (Debus 2008). Hunting is by high soaring or still-hunting from a perch, attacking in a shallow glide or dive to snatch prey from the water surface or ground (Debus 1998, 2008). Pairs often hunt together and are known to harass other bird species, either stealing prey or forcing the other bird to regurgitate its food which they then consume (Clunie 1994).

WBSEs are found around the coast and inland waterways where they can be seen soaring on upswept wings. WBSEs are monogamous and pair for life, but if one bird dies the surviving bird will re-pair (Clunie 1994). The birds are generally sedentary once a territory has been established, and juvenile birds can disperse widely to find a territory. These non-territorial individuals play a critical role in replacing any lost breeding adults due to mortality (Clunie 1994).

Nests can be substantial structures over 1.5 metres across and up to 2 metres deep composed of structured piles of sticks lined with leaves, grasses and seaweeds (Clunie 1994, Debus 1998). On mainland Tasmania and its large surrounding islands, their nests can be in trees and larger shrubs where trees may be absent. On islands without significant ground predators, nests may be on the ground or on rock-stacks. WBSE and Tasmanian wedge-tailed eagle *Aquila audax fleayi* (TWTE) nests can be hard to distinguish, as their breeding ranges can overlap in Tasmania, and nest usurping or rival nest occupation has been observed (Mooney and Holdsworth 1991). This means a nest built by a WBSE might be used in

some years by TWTEs and vice versa. This can also mean WBSEs are breeding in very atypical places (NVA records).

Lifespan can exceed 20 years in the wild and WBSEs are able to breed once they have acquired their adult plumage, generally at about five years of age (Debus 1998). The species breeding season in Tasmania generally spans the period June to January, inclusive, with one or two whitish-yellow eggs laid, usually from June to October. Young typically leave their natal territory at around 4 to 5 five months of age (Debus 2008).

DISTRIBUTION AND HABITAT

The WBSE is found outside Australia from western India to southern China, south-east Asia and New Guinea (Marchant and Higgins 1993). The species occurs around the entire mainland Australian coastline (Shephard et al. 2005a).

In Tasmania, WBSEs occur around the coast, and inland along larger rivers, lakes and dams. The species is commonly recorded on most of Tasmania's nearshore islands including on King, Flinders, Maria, and Bruny Islands and many Bass Strait islands (NVA 2022). It is thought there is some limited movement of individuals between Tasmania and the mainland as there is no evidence for genetic differentiation between the Tasmanian and Australian mainland populations (Shephard et al. 2005a).

In Tasmania, most nest sites occur within 5 km of the coast or large estuaries; however, breeding pairs have been observed farther inland on large rivers, lakes and dams (TSS 2006, NVA 2022). Nests are constructed in tall live or dead trees in mature forests or more rarely on sea cliffs and rock stacks where predators are absent. Birds will also nest in low coastal scrub where cliffs or tall trees are not available (Marchant and Higgins 1993). Birds hunt both over land and water; large estuaries and convoluted coastlines are the favoured sites for both nesting and foraging (TSS 2006). Areas of land that contain no nesting sites, but available prey are also important foraging habitat for immature and other non-territorial WBSEs (TSS 2006).

Confusing species: Juvenile or immature WBSEs can be confused with TWTEs, or in some circumstances swamp harriers *Circus approximans*, especially when perched. However, immature, or juvenile WBSEs can be distinguished from the TWTE by their shorter, very pale tail, a pale half-moon at base of flight feathers, and unfeathered and heavily scaled tarsi or lower leg (TWTE tarsi are feathered).

POPULATION PARAMETERS

The Tasmanian WBSE is considered a 'single' relatively stable population, although there is little published information on changes in numbers over time.

The number of adult birds in Tasmania has previously been estimated based on the number of known nests correlated with WBSE territory/home range analyses. In 2003, this analysis attributed 230 nest records to WBSE, representing approximately 140 territories, equating to approximately 280 breeding birds. Including the number of juvenile and immature birds both equal the number of breeding adults, the total population size was estimated to be approximately 840 individuals (DPIPWE 2003). Eagle nest records have doubled since that time suggesting that previous population estimates were biased by survey effort resulting in an underestimation.

Changes in timing of ground-based and aerial survey techniques employed in association with forest practices activities restrict the ability to confirm the eagle species utilising a new, or existing nest, unless a bird is present during the activity search. Such nests are attributed to 'eagle sp.' on the Natural Values Database until confirmation of the species is determined. In such instances the 'eagle sp.' is usually attributed to the TWTE, consequently inflating the number or nests assigned to the TWTE and reducing those of the WBSE.

Population trend estimates: Scientifically rigorous and robust baseline data is lacking, making it difficult to determine population trends and inform future management. Knowledge gaps exist in base-line population trends and reliable population estimate methodologies for this species.

Thurstans (2009a) surveyed a sample of 80 WBSE nests listed in the NRE Tas Tasmanian Raptor Nest Database. Twenty-two nests were found to have disappeared, 11 through natural attrition, seven due to human activities, and four to unknown causes. In a precursor to this study, WBSE nests on the Tasman and Forestier Peninsulas were surveyed for 10 consecutive years from 1993 to 2003 by Tom Terry, providing an indication of nest productivity over that period (Thurstans 2003). Since 2012, WBSE nests around the Three Capes Walk track including a control sample have been monitored to both guide construction activities and measure impacts of construction and use. The citizen science program *Where?, Where?, Wedgie!* Project commenced in 2019 and conducts annual state-wide surveys which collect important WBSE record data.

Survey techniques: A range of survey techniques are used to capture information about the WBSE, dependent on the aspect of the bird's ecology being examined, including:

- standardized point and transect counts,
- nest surveys, and
- nest productivity assessments.

The WBSE is active all year-round and can be readily detected and observed flying and soaring high in the sky or perched strategically in a tree or capturing prey from the surface of the water. Standardised observational counts are the main technique used to record field sightings. Sighting survey designs include standardised observational point counts and more structured monitoring designed transect counts.

Searching for new eagle nests is generally undertaken by ground survey or by aerial searches and occurs strictly outside the breeding season from February to the end of June.

Surveying known nests to assess nest condition and breeding activity, provides important information on the past and potential future use of nests and on population abundance. Nest productivity checks are only undertaken by highly experienced specialists. The Forest Practices Authority (FPA) undertakes aerial inspections of a subset of active nests to evaluate chick mortality and fledging survival rates.

Ground and aerial surveys for new nests should only be conducted by appropriately skilled practitioners and undertaken outside the eagle breeding season. It is recommended that specialists proposing to undertake ground-based surveys complete the Forest Practices Authority (FPA) eagle training course to ensure industry best practice survey techniques are adopted and implemented. The use of UAVs to assess nest condition should only occur between April and June and with strict adherence to the Guidelines developed by Sustainable Timber Tasmania, FPA and the Department of Natural Resources and Environment Tasmania (NRE Tas).

Nest activity assessments, either aerial or ground-based, for the purpose of determining whether a nest is active is considered a highly disturbing activity and should only be undertaken by appropriately qualified and experienced persons, in consultation with the regulators. Surveys are normally conducted between mid-October and the end of December and require a different approach and skill set to that of new nest searches. Ground based nest activity checks are discouraged, while aerial activity checks require highly technical skills to ensure minimal disturbance to breeding eagles. Aerial searches require highly specialised skills, search experience and planning beyond the FPA course and come with significant resource and operational challenges.

For further information on threatened raptor habitat and nest survey techniques please refer to the FPAs website to obtain the *Fauna Technical Note No.1: Eagle nest searching, activity and nest management guidelines.*

Population Viability Analyses (PVA): Undertaking a state-wide population viability analysis (PVA) will be important in evaluating

the population effects of different threats and management options, and to support informed and adaptive decision making, prioritisation of recovery actions, and allocation of resources. To be effective, a PVA must be based on local, contemporary data (including population parameters such as current population size, sex ratio, age structure, fecundity ('birth' rate), mortality (death rate), and carrying capacity) and be undertaken in collaboration with relevant stakeholders. A stratified state-wide PVA would prove valuable in evaluating the magnitude of different threats and inform management decisions, including the prioritisation of recovery actions and the allocation of resources. It will take some time before this data is available to enable suitably accurate predictions.

Publicly available information: NRE Tas has established and maintains a register and data layer of all recorded nest sites (the Tasmanian Raptor Nest Database). This information is available via the Natural Values Atlas (NVA). New nest and existing nest condition and activity assessment observations for WBSE should be reported to the Department to continue to build knowledge of WBSE ecology and habitat requirements.

Nesting habitat models have also been developed (e.g. Brown and Mooney 1997) and continual refinement occurs through NRE Tas (Bill Brown pers. comm. 2020). The FPA data is accessible as layers on LISTmap and the NVA. The FPA has developed a variety of eagle technical notes which can be accessed from the FPA's website.

Future focus: There is a need to coordinate and centralise data relevant to eagle conservation, making it accessible to stakeholders in real time, to inform effective conservation management of the species. Improved nest records and associated mapping processes will be critical in ongoing management of the species.

RESERVATION STATUS

As of June 2023, 177 (35%) WBSE nests were recorded on formal reserved land (including National Park and Conservation Areas) and 44 (9%) nests were recorded in informal reserves including on Permanent Timber Production Zone Land and Future Potential Production Forest Land. A further 35 (7%) recorded nests were protected by conservation covenants on private land (NRE Tas 2023).

CONSERVATION STATUS

The WBSE is listed as Specially Protected under the Nature Conservation (Wildlife) Regulations 2021 under the *Nature Conservation Act 2002*. The species was listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995* in 2003 under criterion D1: total population estimated to be less than 1,000 mature individuals. It is also listed as a Marine species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Please note that this assessment was conducted under the previous version of the *Guidelines for Listing under the Threatened Species Protection Act 1995*, which has since been superseded by a newer version endorsed by the Scientific Advisory Committee (Threatened Species) in March 2023.

KEY THREATENING PROCESSES AND MANAGEMENT CHALLENGES

One of the key challenges to the effective management of the WBSE is an absence of robust information on the species' ecology and its past, present and future role in Tasmania's ecological systems. Such data would support the quantification of success of management actions, the detection of emerging threats, improve our understanding of responses to existing threats, and help inform prioritisation of recovery actions.

Multiple, interrelated key threats on WBSE populations have been postulated, including:

- habitat loss (vegetation clearance),
- breeding and nest disturbance,
- collision and electrocution,

- persecution and poisoning, and
- the direct, indirect and cumulative effects of climate change.

These threats present multifaceted and complex management challenges relating to:

- the derivation of population and trend estimates,
- habitat protection and threat mitigation,
- research, monitoring and reporting,
- strategic coordination and stakeholder partnerships, and
- community awareness and engagement.

A species' management plan was developed under Tasmanian threatened species legislation in 2006. The Threatened Tasmanian Eagles Recovery Plan: 2006–2010 was formally reviewed in 2021 and a recommendation to update the plan was approved by the Tasmanian Minister.

HABITAT LOSS

Loss of nesting habitat resulting from the clearing of native vegetation for coastal development and agriculture is an ongoing threat to WBSE populations. This can lead to reduced breeding opportunities and disturbance to breeding attempts causing nest abandonment and reduced breeding success.

A lack of long-term strategic landscape-scale management of vegetation clearing including the associated regulatory frameworks and policies to appropriately protect habitat are contributing to this overall threat.

Habitat management: The *Forest Practices Act 1985* (and associated Forest Practices Code), has incorporated provisions for eagle nest protection, including the capacity to informally reserve areas containing identified WBSE nests (≥10 ha). Standard forest management practices also prescribe a 500 m (or 1 km line of sight) management zone around known nests, with the goal of limiting disturbance to adult birds and nestlings during the breeding season. However, the level of legislative protection afforded to WBSE nests within planning schemes across local government agencies is inconsistent and not supported by similar robust decision support tools. An integrated approach across commonwealth, state and local government legislative and regulatory frameworks could support improved conservation outcomes for threatened species (including WBSEs) and their habitat, and improve the ability to assess, evaluate and address cumulative impacts across different scales.

Offsets are another planning mechanism used to account for impacts on threatened raptors. Until recently, offsets aimed at eagle conservation were primarily in the form of protecting nests on private land through the establishment of perpetual conservation covenants. More recently, formal financial contribution offsets have been required by commonwealth and state regulators as a mitigation measure for wind farm developments in Tasmania in situations where impacts are unavoidable and predicted to result in net loss of habitat. These financial contributions have focused on supporting strategic priority research and conservation activities administered via NRM bodies through a dedicated offset fund.

Breeding and nest disturbance: Disturbance of breeding birds is an ongoing threat which can lead to reduced breeding success. Long-lived species with low annual breeding effort (k-selected species) such as the WBSE rely on low adult mortality rates to maintain populations (Newton 1979). Disturbance can be triggered by either visual or aural cues, including activities as innocuous as people bushwalking or photography enthusiasts in the vicinity of a nest. Other activities such motor biking, firewood cutting, helicopters, forestry, and other development operational activities have been found to lead to far more serious disturbance impacts (Mooney & Holdsworth 1991). Inappropriate inspection or monitoring activities of nest trees, using either aerial or ground-based methods, can also initiate nest abandonment and reduced breeding success. While individual responses vary, disturbance

occurring even many hundreds of meters away can cause breeding birds to temporarily abandon eggs or chicks leaving them at risk to exposure, starvation or predation, or even desert the nest site for years (Mooney & Holdsworth 1991).

Unmanned aerial vehicles (UAVs) or drones are a relatively new technology widely used recreationally, and that provide the capability to visually inspect eagle nests from above while eliminating the need for manned aircraft. However, the use of drones near eagle nests during the breeding season poses a significant risk to breeding disturbance and nest abandonment. There is also a risk that a WBSE may perceive the drone as another bird or threat and attack the drone potentially injuring the bird as well as destroying the drone.

The FPA have developed fauna survey guidelines including raptor nest survey techniques *Fauna Technical Note No.1: Eagle nest searching, activity and nest management guidelines* to address and mitigate breeding and nest disturbance impacts. The FPA also provides industry training courses specific to TWTE and WBSE surveying techniques and protocols.

Sustainable Timber Tasmania, FPA and NRE Tas have collaboratively developed guidelines for the appropriate use and operation of UAVs around eagle nest locations.

Enthusiast birdwatchers and photographers may also pose a potential disturbance risk to nesting TWTE and WBSE. To address this gap, NRM South have developed *Ethical Nature Photography in Tasmania Guidelines* to address some of the potential risk behaviours (see NRM South website).

Future focus: Develop contemporary species management plans incorporating comprehensive survey, data collection and management protocols, and tailored management advice and mitigation guidelines. There is an emerging need to review and amend existing drone operational guidelines in Tasmania that has specific regard for WBSE and other raptors. Regulation guidelines, operating procedures and Fly Neighbourly Advice for the use of aircraft and drones in the vicinity of WBSE nests also needs to be reviewed and standardised in collaboration with those agencies responsible for such activities.

ENTANGLEMENT AND DROWNING

The vicinity of commercial fish farms to nests has been found to influence the foraging behaviour of male WBSEs (Wiersma and Richardson 2009). As a result, fish farms may have the effect of increasing the energy expenditure of male WBSEs during the breeding season. Increased territorial conflict around nests near fish farms may also have consequences for nest attentiveness and breeding productivity (Wiersma and Richardson 2009). Other known threats from fish farms include entanglement in wildlife exclusion netting, pen entrapment and drowning and oiling in fish mortality pits (Weirsma and Richardson 2009).

There is a need to develop industry specific strategies and mitigation measures to address the risk and impacts fish farms and fishing tackle is having on WBSEs.

COLLISION AND ELECTROCUTION

Collision is an ongoing threat that can cause injury and or death with some bird's requiring euthanising due to the extent of their injuries. Incidences of collisions include power lines, wind turbines, and aircraft.

Power poles with poorly insulated conductors are an ongoing threat to, and cause of death of WBSEs (most electrocutions end in death or crippling). Electrocutions can also occur when an eagle collides with a power line carrying into a second line resulting in electrocution.

Various threat mitigation actions have been investigated, trialled and or implemented largely by industry. These include TasNetworks development of a Threatened Bird Strategy and annual mitigation works program including installation of flappers and safe perching platforms to prevent electrocution, and the

trialling of automated monitoring and turbine shutdown systems at some wind farms.

Future focus: A continuous program of monitoring and systematic surveys of the overhead powerline network and associated infrastructure is considered critical to capture the most comprehensive data associated with WBSE collision and electrocution records and inform adaptive mitigation management actions.

PERSECUTION AND POISONING

Poisoning is an ongoing threat to, and cause of death of WBSEs. Anticoagulant rodenticides (especially second generation) are widely used to poison rodents in domestic and commercial contexts. Eagles may ingest anticoagulants via animals that have eaten the baits (secondary poisoning) or via animals that themselves have fed on poisoned rodents/rabbits (tertiary poisoning). Even if a non-fatal dose of poison is ingested, it may predispose an individual bird to accident and injuries, exacerbate existing injuries, or increase the risk of mortality. The same applies to lead poisoning from ingested shot or bullet fragments; the presence of elevated lead levels in nestlings is of particular concern (Pay 2019).

Future focus: Landcare conducted a series of public presentations in 2021/22 on anti-coagulant rodenticides in Tasmania, summarising key information on their website. BirdLife Australia currently has a national program covering the same issues, brought to the fore by recent mouse plagues and consequent overuse of rodenticides.

Education programs administered through land care and NRM programs seek to raise awareness of the risk of these poisons to raptors and other scavenging carnivores and how to reduce the risks through appropriate use.

CUMULATIVE IMPACTS AND CLIMATE CHANGE

Cumulative effects on WBSEs (at territory, regional, or statewide scale) may be significant, but are currently not well understood nor considered in development assessment processes. Other than industries that specifically monitor for direct impacts, such as forestry, TasNetworks and the wind farm industry, there is no regular monitoring and only anecdotal reporting of eagle mortalities and injuries.

Regulation of disturbance through planning schemes does not include a mechanism to consider the impacts of changes to or intensification of use, subdivisions and future development, which may result in significant and permanent disturbance. Moreover, understanding the impacts of a changing climate will be critical in managing both the TWTE and WBSE species into the future. Identified threats may include impacts on breeding season and breeding success, modification/loss of nesting habitat due to dieback and transitioning ecosystems, changes in wildfire frequency, and severe weather events (Pay *et al.* 2021a, Pay *et al.* 2021b, Mooney *et al.* 2021).

Wildfires and inappropriate fire regimes may also provide an ongoing threat to WBSE due to the potential for the loss and damage of nest trees, and to the surrounding vegetation. Planned burns during the species breeding season may also have an impact on breeding success if the appropriate avoidance and mitigation measures are not implemented.

While the effects of wildfire are difficult to manage, pre-burn planning and assessments for TWTE nest management are undertaken; however, greater consideration of nest proximity is required at the landscape scale and between seasons to reduce the threat of cumulative impacts on individual nests.

STRATEGIC COORDINATION, STAKEHOLDER PARTNERSHIP AND COMMUNITY ENGAGEMENT

NRE Tas coordinates the Threatened Tasmanian Eagles Conservation Management Reference Group (ECMRG) which includes membership from industry, NRM bodies, government and eagle experts to share information about conservation management

challenges, issues and research and inform recovery planning.

Community awareness programs have proven critical in raising awareness about the conservation challenges associated with the TWTE and WBSE. An annual 'Expedition Class' school education program, a range of community awareness and engagement events and other activities have been run since 2018 as part of promotion for the *Where? Where? Wedgie!* citizen science program, together with regular social media. The overall Nature Trackers citizen science program website brings together links on reporting, threat management and conservation science for the public.

The Raptor Refuge hotline was established for reporting injured or deceased raptors. Raptor rehabilitation continues to have high public and media profile.

Future focus: Provide information and support to relevant NRM committees, Landcare, local councils, government agencies, the local community and development proponents on the locality, significance and management of known nests and potential habitat. The NRE Tas Private Land Conservation Program extension and stewardship services provides covenant landowners with information and advice about how to best manage WBSEs.

A coordinated community education and engagement program on eagle conservation management is required, with a focus on methods to minimise disturbance in buffer areas around known nests, and other relevant aspects such as the threat from poisoning. Such a program could be extended to local councils, veterinarians, landholders and the broader community. Publicly available tools and data sets also need to be maintained (including the Tasmanian Raptor Nest database on the NVA, and information on the NRE Tas Threatened Species Link, NRE Tas website, FPA Technical Notes and website). Non-government bodies (e.g., BirdLife Tasmania, BirdLife Australia Raptor Group) should be better integrated into formal conservation efforts.

RESEARCH

In recent years the Bookend Trust trialled the *Where? Where? Wedgie!* citizen science program to monitor all Tasmanian raptor populations, and a refined version of the method has been repeated annually since 2019. If these surveys continue over the required three generation lengths, this approach is expected to provide high quality information on population trends.

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www.nre.tas.gov.au/threatenedspecieslists
www.threatenedspecieslink.tas.gov.au/

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Permit: A permit is required under the Tasmanian *Threatened Species Protection Act 1995* to "take" (which includes kill, injure, catch, damage, destroy and collect), keep, trade in or process any specimen of a listed species.