

Survey Standards: Powerful Owl, *Ninox strenua*

1 Purpose

This document outlines the standards required for surveying fauna species listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act). These standards detail acceptable survey methods and the minimum survey effort to determine the likelihood of the species' presence or absence at a site. They also detail appropriate record keeping and reporting standards.

There are two main purposes of these standards.

1. To document the information required to determine if a record is valid – i.e. determining presence only. The standards provide the information that is required to enable an assessment to be made as to whether a record can be accepted as a valid record. All records, irrespective of how they are obtained, need to adhere to these standards.
2. To document the information required for surveys that aim to determine both presence and absence – i.e. outlining the acceptable level of survey effort required to provisionally infer absence if a species is not detected during a survey. These minimum standards are required to be met by any organisation/group undertaking a presence/absence survey. They will also be useful for an organisation/group wanting to say that an area is unlikely to provide core habitat for a wide-ranging species.

Executing and reporting a survey to these standards will support the Department of Sustainability and Environment (DSE) to make an assessment of the validity of a claim to species presence or absence at a site. Subject to DSE approval, alternative survey methods may be applied where the proponent provides an evidence-based rationale for the approach and a detailed description of the survey technique(s) and where the standards are considered to exceed those set out below.

These standards should be read in conjunction with threatened species Action Statements. In the context of timber harvesting operations they should be read in conjunction with the Code of Practice for Timber Harvesting and Forest Management Plans. As further information about the species and survey techniques becomes available, these standards will be reviewed and updated.

2 Introduction

In Victoria, the Powerful Owl *Ninox strenua* is listed as threatened under the FFG Act (SAC 1994) and is classified as vulnerable (DSE 2007). An Action Statement was published in 2004 and is currently being reviewed (2011).

The Powerful Owl inhabits a wide range of forest types across Victoria and is most often found in mixed-species foothill forests (Emison *et al.* 1987, Loyn *et al.* 2001, 2002, 2004). It also occurs widely in box-ironbark forests (Soderquist *et al.* 2002) and more locally in River Red Gum (*Eucalyptus camaldulensis*) forests. It avoids extensive areas of wet forest, such as Mountain Ash (*Eucalyptus regnans*), Alpine Ash (*E. delegatensis*) or Snow Gum (*E. pauciflora*) except where they adjoin more varied forest types (Milledge *et al.* 1991, Loyn *et al.* 2001). However, in East Gippsland, it often occurs in wetter multi-species, usually multi-aged forests dominated by species such as Shining Gum (*E. nitens*),

Manna Gum (*E. viminalis*), Messmate (*E. obliqua*) where arboreal mammals are abundant. Throughout its range, the Powerful Owl generally favours dense gullies for roosting and breeding sites (Higgins 1999, Bilney 2009). It prefers older forests where large tree hollows provide nesting sites and arboreal mammal prey items are plentiful: this has been confirmed through research and modelling in Victoria (Loyn *et al.* 2001, 2002, 2004) and NSW (Kavanagh and Peake 1993, Kavanagh and Bamkin 1995, Kavanagh *et al.* 1995).

The Powerful Owl occupies a large permanent home range. Estimates of home range size have been based largely on the spacing of calling birds and appear to vary in size from 400-1,500 ha (Davey 1993), or up to 3,000 ha in drier habitats such as box-ironbark forests (Soderquist *et al.* 2002). Home range sizes may vary with density of prey items and adequate breeding hollows.

3 Requirements to demonstrate presence

Powerful Owls are distinctive birds, and cannot easily be confused with other species if they are seen well or their double hoot call is heard clearly. Trills of young birds can potentially be confused with similar trills of other owls. Inexperienced observers sometimes mistake other owls for Powerful Owls, especially when they are flushed at close range and appear large. Tawny Frogmouths (flying at night) and diurnal raptors such as Brown Goshawks (by day) are occasionally misidentified as Powerful Owls. The main criteria for accepting a record should be based on how well an observer has seen or heard the bird, and their experience and confidence in the identification. This is best gauged in conversation or by asking for written details. Signs such as feathers and owl pellets require specialist identification.

Powerful Owls have been detected using three main survey techniques namely call playback, evening and morning search at daytime roosts, and daytime searches for owls and signs of owls. Call playback involves a small degree of disturbance: hence, care should be taken to avoid excessive use of call playback at individual sites, especially in winter when birds may be subject to disturbance in the early stages of the breeding season. The latter two methods are non-intrusive and can be used throughout the year.

3.1 Acceptable records

1. Sight records – birds seen clearly by day or night, with distinctive features observed and adequate benchmarks to judge size. Records of birds seen briefly (especially at night) are only acceptable if made by experienced observers.
2. Sound records – birds heard clearly under good conditions, especially when giving their double-hoot call. Records of birds giving their bleating call or trilling call (young birds) are only acceptable when made by observers with enough experience to distinguish those calls from similar calls of Southern Boobook *Ninox novaeseelandiae* or other owls.
3. Signs of Powerful Owls such as feathers, faeces, regurgitated pellets or prey remains beneath day roosts, with expert verification that they were deposited by this species (based on photographs or collected material). Arboreal mammals typically form large proportions of the prey, and hence feature strongly in regurgitated pellets.

3.2 Non-acceptable records

Records of birds seen or heard briefly or under poor conditions are not acceptable without further verification. Records by inexperienced observers are only acceptable if the birds are seen or heard clearly and the observations are well documented (see above). Reports of signs such as feathers, faeces, regurgitated pellets or prey remains are not acceptable unless found or verified by experienced observers (see above).

3.3 Reporting standards for presence records

The following data are required to support a record of a Powerful Owl.

- name and contact details of the observer;
- details of the species present, number of individuals detected or number of observations;
- date and time of sighting;
- precise geographic location of sighting (written location and GPS coordinates);
- details of weather, wind (Beaufort scale – see appendix) and night-light (for nocturnal surveys);
- method of observation, including the sampling effort (e.g. duration of call playback and number of nights of call playback, area searched and ground traversed);
- supporting evidence such as photographs, recordings, feathers, owl pellets or road-killed specimens.
- if no material supporting evidence is available, written details of the observation need to be provided. These should include precise information about what was actually seen or heard, and what were the circumstances including duration of observation, quality of light and optical aids used (spotlight, binoculars, etc).
- details of the experience or qualifications of those who made the sighting/observation.

This is the core information required for records to be entered onto the Atlas of Victorian Wildlife (or its successor the Victorian Biodiversity Atlas). Records of all other species observed at the site should also be submitted to the Atlas of Victorian Wildlife.

4 Requirements to demonstrate presence or effective absence

While it is relatively straightforward to document if a species is present, it is more difficult to determine if a species is truly absent if it was not recorded during a survey, or if the survey was not adequate to reliably record the species if it was present. However, the concept of presence-absence has different implications for wide-ranging birds such as owls than it does for sedentary species with small home ranges. There is evidence that in extensive forests almost every part of the forest will be visited by owls at some time, so the challenge is to identify areas of forest that are of more or less importance to owls, rather than seek a non-existent dichotomy between areas where they are present or absent. In areas where they occur only infrequently, they may be considered ‘effectively absent’. Further work in known territories will be helpful in validating and quantifying this concept.

4.1 Survey effort and resulting levels of uncertainty

Using call playback, the chance of detecting Powerful Owls at a site where the species is present may be quite low (Wintle *et al.* 2005, M. Scroggie *et al.* unpubl.). If two or more

playback surveys are conducted at each site (or a subset of sites), this allows an explicit estimate of detection probabilities for the region in question.

Research has shown that Powerful Owls are likely to make some use of almost every part of the forest, at least within their preferred domain of mixed foothill forests. The chance of detecting Powerful Owls from call playback at a site “where present” has been estimated as 13% (9-18% for 95% confidence intervals), based on work in south-eastern NSW (Wintle *et al.* 2005). Similar values have been found for Victoria (16%, with 14.5 to 17.7% confidence intervals) (M. Scroggie *et al.* unpubl.). The latter figure implies that 15-19 surveys would be needed to be 95% sure that Powerful Owls were absent from a site (or 12-15 surveys to be 90% sure; Fig. 1). As random call playback surveys detect Powerful Owls at ~13% of sites (Loyn *et al.* 2001, 2002), an alternative approach is to assume that Powerful Owls are highly likely to be present at any forest site within their range, but that higher success rates would be obtained in habitats that formed core habitat for the owls, e.g. near nest sites or regular roost sites. Hence it may be reasonable to suggest that if five surveys are conducted at a site on different nights with no success, under good conditions between June and October, it is unlikely that Powerful Owls would be nesting or roosting regularly close to that site. This suggestion needs to be tested with data from known occupied sites.

4.2 Reporting standards for presence/absence surveys

The data required for the “presence only” reporting (refer section 3.3), also needs to be provided for the presence/absence surveys, with this information provided for all surveys, including those that did not detect the species. Additional data required to document presence/absence surveys is outlined below.

- date, time and location of all surveys;
- for call playback surveys, it is important to record the sequence of calls used and the times and locations of each survey, including those where no responses were obtained. The time spent spotlighting and distance traversed should be recorded.

5 Survey methods

Call playback is the most efficient method for locating owls at numerous sites. Daytime searching and dusk or dawn watches are the appropriate methods for determining the accurate locations of day roosts or nests when Powerful Owls are already known to occupy a tract of forest.

5.1 Call playback

Call playback sessions include periods of 2-5 mins of continuous 'whooooo-hooooo' calls broadcast at ~ 110% of natural volume interspersed with periods (2-5mins) of silence to listen (and watch) for a response from a Powerful Owl. Listening is continued after playback whilst a spotlighting search is conducted to search for owls that have responded by flying quietly to the playback site. If conducting simultaneous surveys for other owl species (e.g. Sooty Owl *Tyto tenebricosa*, Masked Owl *T. novaehollandiae*, and Barking Owl *N. connivens*), the playback sequence may include calls of these species punctuated with listening periods between each species (see Appendix – section 5.6). Call playback approximately doubles the chance of detecting an owl at night, compared with passive listening.

Call playback surveys are best conducted during calm, dry weather, although they can be conducted during light rain. Once an owl is detected, the playback should be discontinued to allow the owl to resume its normal activities as soon as possible. A compass bearing is taken and distance is estimated to plot the location of the owl.

Powerful Owl calls can be heard during calm, fine weather from 1-2 km away. When sampling extensive areas, it is recommended that sites should be at least 3 km apart. Care must be taken to avoid repeat counts of the same owl from two sites. However, when sampling smaller areas (such as proposed logging coupes), it may be useful to conduct several playback surveys from different parts of the area, especially when complex topography may inhibit detection of calls across ridges or gullies.

The best way to minimise the risk of failing to detect a core part of the owls' territory is to focus on spring surveys where possible, and to conduct multiple duskwatch and call playback surveys (five recommended) combined with daytime searches.

The recommended method for call playback surveys for Powerful Owl comprises the following sequence:

1. Powerful Owl — 2 mins
2. Silence (listening) — 3 mins
3. Powerful Owl — 2 mins
4. Silence — 5 mins
5. Powerful Owl — 2 mins
6. Silence — 2 mins
7. Spotlight searching — 15 mins/~200m

5.2 Dusk or dawn watch

Dusk or dawn watches should be conducted only during calm, fine weather when ambient noise levels are low. Morning dawn watch is conducted from one hour before sunrise until sunrise. On hearing the first predawn calls, a compass bearing is taken. When full daylight comes, the searcher can follow the compass bearing searching for roosting owl/s, signs or a nest.

Evening duskwatch should commence before sunset, in calm, fine weather when ambient noise is low. The duskwatch should continue until an owl is detected or until daylight has completely faded. A compass bearing to the calling owl provides a direction in which the searcher can search during the following day. Evening duskwatches are very effective for locating dependent juvenile Powerful Owls after they have fledged (September to November), when they routinely use their trilling call to solicit food from their parents. For experienced observers undertaking a duskwatch within 200 m of a nest during this period, the chance of detecting a recently fledged owl exceeds 90%.

The dusk or dawn watch technique while useful to record the presence of the species can not be used reliably to infer species absence or that the area does not represent core habitat.

5.3 Daytime searching

Searches are conducted on foot during daylight hours to locate roost or nest sites. The observer needs to look carefully for owls roosting among the foliage of densely foliated trees and tall shrubs, and also in the eucalypt canopy. The observer also needs to look for signs on the ground, such as faeces and owl pellets, which can indicate roost trees even if they are not occupied on the day in question. Powerful Owls often choose to roost in or near gullies but also frequently roost away from gullies. Hence it is important to search all parts of the slope.

Observers vary greatly in their ability to find owls and their signs during the day, and their ability may increase with experience. The amount of time taken to locate owls and their signs will vary with topography, vegetation, area to be searched and observer skill. Unskilled observers are unlikely to find owls.

This technique while useful to record the presence of the species can not be used reliably to infer species absence or that the area does not represent core habitat.

5.4 Timing considerations

All three survey approaches can be useful at any time of year. However, the height of summer (January and February) should be avoided where possible as Powerful Owls are somewhat less responsive than at other times. If planning to do multiple repeat playback surveys at a single site, it may be advisable to limit the number of surveys to no more than two or three during the autumn-winter period (May to July) when pairs are establishing territories and starting to breed. However, call playback can be highly effective at that time, and up to three surveys per site are unlikely to cause major disturbance.

Daytime searches can be most productive in spring and summer when recently fledged young roost together with or close to one of their parents. During warm weather adult or young Powerful Owls often choose to roost in shady gullies in densely foliated trees, which helps focus the search effort.

Spring (late September to early November) is an excellent time for locating sites where breeding has been successful, as young birds and their roost or nest sites can be found easily by listening for their begging calls (trills) at dusk. However, note that unsuccessful nests will not be detected by that method, and not all pairs produce young every year.

In terms of time of day, dusk watch followed if necessary by call playback in the early hours of darkness offers an efficient combination for detecting Powerful Owls close to their roost or nest site, whereas later at night they may move far from the core of their territory.

Spring surveys that include duskwatches will be very likely to detect Powerful Owls where they have bred successfully. With all other survey approaches, there is a high risk that some Powerful Owls will remain undetected. We can quantify that risk for call playback, though not for the concept that they may be more detectable in core parts of their territory.

5.5 Expertise required

Skilled observers have a greater chance of finding Powerful Owls than unskilled observers, using any of these methods. Call playback is arguably the most amenable for use by less experienced observers, but they must be sharp-eyed and sharp-eared or they will miss distant calls and glimpses of flying birds, and they must know or learn the calls of nocturnal birds and mammals. Daytime searches are much more likely to be successful when conducted by experienced and skilled observers with well-honed search image and instincts for finding these large birds, which can be remarkably inconspicuous when roosting. Observers should be known to be capable of providing objective data.

Appendix

6 Other considerations

6.1 Multi species large owl playback

Recommended multi species large owl playback sessions comprise the following sequence:

1. Powerful Owl --- 2 mins
2. Silence ---2 mins
3. Barking Owl --- 2 mins
4. Silence --- 2 mins
5. Southern Boobook --- 2 mins
6. Silence --- 2 mins
7. Sooty Owl --- 2 mins (6 territorial screams at 30 sec intervals)
8. Silence --- 2 mins
9. Sooty Owl --- 1 min (trilling)
10. Silence --- 2 mins
11. Masked Owl --- 2 mins (6 territorial screams at 30 sec intervals)
12. Silence --- 2 mins
13. Masked Owl --- 1 min (chattering)

6.2 Beaufort wind scale

0: calm (< 1 km/h); smoke rises vertically; 1: light air (1-5 km/h); wind direction shown by smoke-drift, but not by wind vanes; 2: light breeze (6-11 km/h); wind felt on face; leaves rustle; ordinary vanes moved by wind; 3: gentle breeze (12-19 km/h); leaves, twigs in constant motion; wind extends light flag; 4: moderate breeze (20-28 km/h); raises dust and loose paper; small branches are moved; 5: fresh breeze (29-38 km/h); small trees in leaf begin to sway; crested wavelets form on inland waters. Conditions > '5' are unsuitable to conduct surveys.

6.3 Comment on trigger of application of prescription

New records of Powerful Owl may trigger a change to the system of protected areas if they come from regions where targets have not been met, or if they suggest that significant improvements could be made to the existing system of protected areas (500 ha Powerful Owl Management Areas in Parks, SMZs and SPZs). Guidelines for such substitutions are included in the Action Statement. New records of nest sites or regular roost sites require establishment of 20 ha SPZs around the site.

From a management perspective, the most useful information is when nest sites or regular roost sites are located. These require special management (20 ha SMZ or SPZ) under the Action Statement. They may also be used to argue for revisions to the systems of protected areas (including Special Protection Zones in State Forest) that have been developed using records of Powerful Owls from multiple sources, combined with habitat models. Searches for young owls at dusk in spring (late September to early November) can give a high chance of locating sites where successful breeding has occurred.

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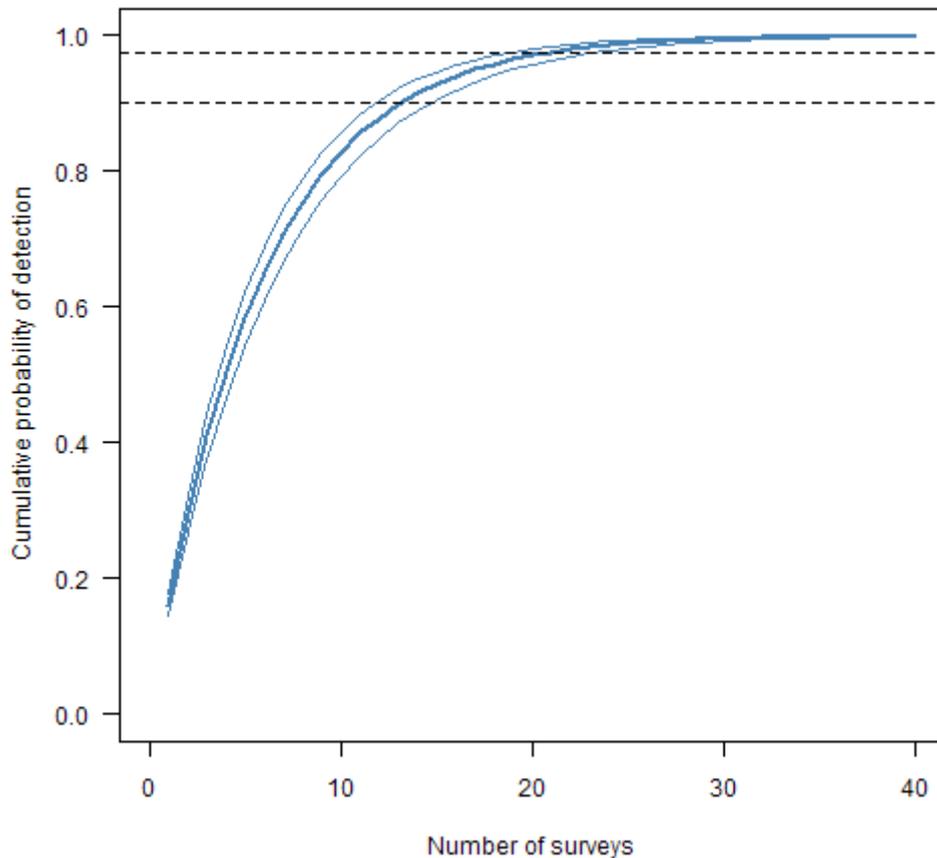


Figure 1. Cumulative detection probability using call playback for Powerful Owls at sites where the species is “present”, based on surveys in central Victoria (M. Scroggie *et al.* unpubl.). The central line shows the mean probability, and the outer lines show the 95% confidence interval. Note that these are the probabilities of detecting Powerful Owls anywhere within their large home ranges. It is expected that higher detection probabilities apply to core parts of their home range including in the vicinity of nest sites, regular roost sites and favoured foraging areas: this idea needs to be verified and quantified.