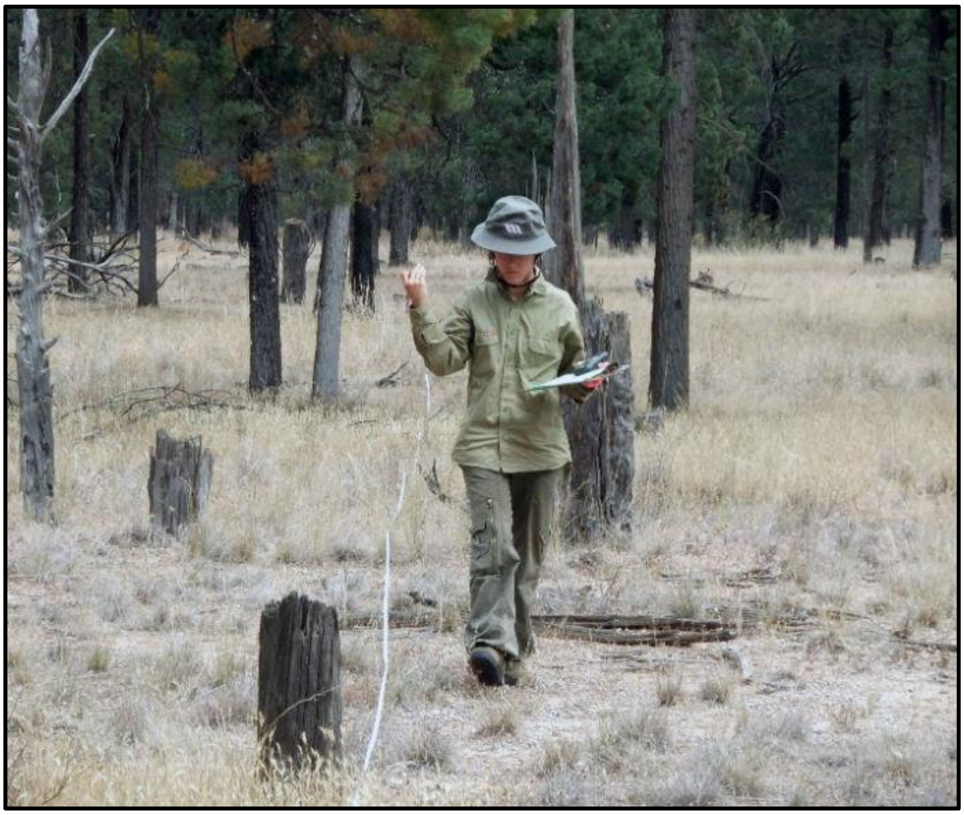
Field survey methods

Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species.



1. Follow the guidelines

Use the best practice survey methods in these guidelines to conduct your field survey.

You can deviate from these guidelines as long as you provide a referenced, scientifically valid reason for this.

Surveyor experience

You should have extensive experience conducting field surveys and be able to identify threatened species and their habitats within the study area. You should also be able to identify similar species that may be confused with a threatened species.

Familiarise yourself with herbarium or museum specimens of any unfamiliar threatened species before you conduct the survey.

Guidelines for specific species

Very little is known about the habitat needs or behaviour of many threatened species, making it difficult to determine adequate levels of survey effort.

Species' habitat needs may also vary across NSW, so seek local information and use your professional judgement. Back this up with sound reasoning and scientific information, where appropriate.

Specific survey methods and the effort recommended for each threatened species will be added to these guidelines as they become available.

2. Preliminary assessment

Conduct a preliminary assessment before the field assessment.

Step 1 - Define the study area

The study area is generally larger than the development site as it includes adjacent areas that may be directly or indirectly affected by the proposal. For instance, it may include adjacent parcels of land containing suitable habitat for threatened species.

It is therefore important to recognise that you may need to investigate these parcels along with the development site.

Define the study area before determining the list of threatened species potentially affected. This is to ensure that you include species less obviously affected.

The study area must be:

- clearly defined
- marked on a map showing the development site boundary and any additional areas facing indirect impact
- included in the final report.

Your preliminary assessment must also consider potential impacts (direct or indirect) of the proposed development on the study area.

Direct impacts include:

- poisoning or removing the organism
- removing habitat.

Indirect impacts occur when project-related activities affect species other than by direct loss.

Examples include:

- sediment, pollutant or nutrient run-off into adjacent vegetation
- habitat fragmentation or isolation
- soil erosion
- altered hydrology regimes
- exposure to heat or predators, or loss of shade
- inhibition of nitrogen fixation
- weed invasion
- fertiliser drift
- increased human activity within or directly adjacent to sensitive habitat.

Step 2 – Obtain licences

You need a licence under section 132C of the *National Parks and Wildlife Act 1974* to undertake an activity for scientific, educational or conservation purposes likely to result in one or more of the following:

- harm to any protected fauna, or to an animal that is a threatened species or is part of an endangered population or an endangered ecological community
- harm to any protected native plant, or any plant that is a threatened species or is part of an endangered population or an endangered ecological community. You will need a

licence if you plan to collect specimens for identification purposes, pick cuttings or whole plants, or collect seed

- damage to critical habitat
- damage to a habitat of a threatened species, an endangered population or an endangered ecological community.

You must submit a report of the work carried out under the licence, including any results, to the Office of Environment and Heritage (OEH) within two months of the expiry of the licence.

Animal care

Be aware of the requirements relating to animal care and ethics when conducting wildlife surveys.

Handling and capturing animals is regulated by the *NSW Animal Research Act 1985* and the *NSW Animal Research Regulation 1995*, which are administered by the NSW Department of Primary Industries.

The Act requires that every person undertaking animal research must hold an Animal Research Authority. Under the Act, animal research includes the use of animals in field surveys.

All surveys must be carried out in accordance with the NSW Department of Primary Industry's guidelines for wildlife surveys.

Step 3 – Stratify the site

Stratify the study area by dividing it into relatively homogenous units, often referred to as 'environmental sampling units' or 'stratification units'.

Stratified sampling provides a logical, objective and efficient method of undertaking surveys and ensures that the full range of potential habitats and vegetation types are sampled systematically.

You can perform initial stratification using recent aerial photography or satellite imagery, but stratification should be confirmed during the preliminary site visit.

Stratify the study site by Office of Environment and Heritage Biometric vegetation type. If the site supports only one vegetation type, or a very large area of one vegetation type, further stratify the site by vegetation condition or disturbance history.

Record stratification units on a survey map.

Step 4 – Visit the site

Conduct a preliminary site visit to refine the initial stratification units, determine the OEH Biometric vegetation types, assess the vegetation condition and conduct a habitat assessment.

Take a description of the Biometric vegetation types for the relevant catchment management authority into the field during the preliminary site visit.

3. Habitat assessment

Habitat assessment is recommended, where possible, as a surrogate for intensive surveys. Threatened species are assumed present if their habitat requirements are met.

Conduct a comprehensive habitat assessment across the whole site, identifying key habitat features for both flora and fauna.

You should be familiar with the habitat requirements of each threatened species identified as possibly occurring in the study area.

This information can be found in recovery plans, threatened species profiles and supporting scientific literature.

A thorough habitat assessment is also needed with species impact statements.

Section 110 of the Threatened Species Conservation Act 1995 requires a species impact statement to include a full description of the type, location, size and condition of the habitat (including critical habitat) of all threatened species and populations assumed to be present on the site.

The habitat assessment should include information about:

- landscape features in the study area (e.g. river banks, rocky outcrops, dry slopes, wetlands, undulating terrain)
- any other features that could provide habitat such as hollow-bearing trees, dead wood and dead trees, or culverts
- the Biometric vegetation types.

Record all areas of native and introduced vegetation, as even weeds can potentially provide habitat for threatened species.

As part of the habitat assessment, look for:

- hollow-bearing trees, including dead stags
- bush rock and rocky outcrops
- natural burrows
- large trees with basal cavities
- logs
- wetlands, streams, rivers, dams and other water bodies
- nests and roosts
- wombat burrows
- dens used by yellow-bellied gliders, squirrel gliders and brush-tailed phascogales
- sap feed trees for the yellow-bellied glider and squirrel glider
- distinctive scats (e.g. those of the spotted-tailed quoll or koala)
- latrine and den sites of the spotted-tailed quoll
- *Allocasuarina* spp.
- flying-fox camps
- Microchiropteran bat tree roosts
- Microchiropteran bat subterranean roosts (caves, culverts, tunnels and disused mine shafts)
- swift parrot and regent honeyeater feed or nest trees
- winter-flowering eucalypts

- permanent soaks and seepages in potential habitat for *Philoria* spp.
- areas that can act as corridors for plant or animal species.

Also consider the connectivity value of the site. If it forms an important corridor in the area, the development is likely to have an effect on threatened species in the region.

A map of the study area detailing key habitat features, including the Biometric vegetation types, must be included in the report.

4. List threatened species

OEH recommends using the BioBanking Credit Calculator to obtain a list of threatened species possibly on the site.

Although only consultants accredited to use the credit calculator can submit a BioBanking Statement under the BioBanking Scheme, anyone can download and use the calculator.

Once you have downloaded it, select the 'development sites' button and complete steps 1 to 4 to obtain a list of threatened species potentially occurring on the site. Steps 5 and 6 are not necessary for generating a threatened species list.

Make sure you select both the 'Print list of threatened species requiring field survey or checking for known populations' AND the 'Print list of threatened species predicted on site' buttons in step 4.

The credit calculator produces the list of those species requiring species credits separate to the list of species requiring ecosystem credits under the BioBanking Scheme.

For Environmental Planning and Assessment Act assessments, all species potentially occurring on site (i.e. both lists) need to be considered during the field survey.

If you don't want to use the BioBanking Credit Calculator to compile a list of threatened species, you must justify how this list was determined.

Other resources you could use include:

- BioNet
- Threatened species profile database**.**

Consultants should note it is important to obtain a full report by contacting the OEH Wildlife Data Unit.

Full reports contain more detailed information about individual sightings than is available from the above website.

OEH can only provide information for the records it has custody of. Consultants should also seek information held by other organisations such as CSIRO, Australian Museum, Department of Primary Industries and local councils.

Any 'final determination' to list a species, population or ecological community as 'critically endangered' or 'endangered' made after lodgement of a development application or activity proposal must be included in the consideration of impacts and the application of the assessment of significance.

Vulnerable species listed after lodgement are not subject to impact assessment as long as the application is determined within 12 months of lodgement.

5. Determining biometric vegetation types

Classification of native vegetation in NSW follows the system described by Professor David Keith in *Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT*.

This divides native vegetation into 17 broad vegetation formations, which in turn are divided into vegetation classes. These classes are divided further into vegetation types, referred to here as 'biometric vegetation types'.

OEH has developed a NSW Vegetation Types Database for use with the biometric tool, which is designed to assist in assessing biodiversity values when preparing property vegetation plans under the Native Vegetation Act 2003.

OEH has provided a spreadsheet containing a definition of these vegetation types on a catchment management area basis.

Each vegetation type is defined on the basis of the following attributes:

- dominant canopy species
- main associated species
- landscape position
- characteristic mid-storey species
- characteristic groundcover species
- other diagnostic features.

Identify all vegetation types in the study area, match to an OEH biometric vegetation type, map them and include them in the final report.

Some vegetation types will not fit neatly into any of the OEH biometric vegetation types listed for a catchment management authority area (e.g. where the vegetation lies in an ecotone between two types).

In these cases, use professional judgement to decide the appropriate vegetation type to use.

Establishing plots

OEH suggests less experienced consultants or those unfamiliar with the geographical region of the proposed development site use a number of plots to help determine biometric vegetation types.

Plots should be established randomly within an area of homogenous vegetation.

Place plots randomly by:

- marking points randomly on the site map in each area of homogenous vegetation, then establishing plots at these points, or
- pacing a pre-determined but random distance into the area of homogenous vegetation and establishing a plot at this point, then repeating the process until the desired number of plots is established.

Use your professional judgement when placing plots and for increasing the number of plots as needed. The table below provides the minimum number of plots required for determining the biometric vegetation types, although you can add more plots if required.

Record all species in each plot. Use full scientific names. Identify plants to the species or subspecies level where possible.

If you are unsure of any species, send them to an expert for identification. The Botanic Gardens Trust offers a plant identification and botanical information service.

Record the stratum in which each species belongs (i.e. canopy, mid-storey, groundcover), noting that some species may be present in more than one stratum. Note the landscape position and main associated species.

Match this information to the Biometric vegetation types.

Table 1: Minimum number of plots required per stratification unit

Area of stratification unit (hectares)	Minimum number of plots
0-4	1 plot per 2 hectares (or part thereof)
5-20	3 plots
21-50	4 plots
51-100	5 plots
101-250	6 plots
251-1000	7 plots
> 1000	8 plots

Vegetation condition

Once you have determined vegetation types, assess each type's vegetation condition.

Vegetation condition will either be 'low' or 'not low' for the purpose of the BioBanking Credit Calculator.

Other features of conservation significance

Also note OEH Biometric vegetation types as a conservation concern if they are listed as:

- 'over-cleared' (i.e. more than 70% cleared) and
- not in low condition

6. Survey methods and effort

Surveys for impact assessments do not need to be for a set length of time, nor do they need to be consistent between sites. This is because surveys are to determine the presence of a threatened species, not to compare sites or monitor them.

Spend enough time at each site to thoroughly survey the area of suitable habitat. Justify the level of effort, and include information on the size of the area and the amount of time spent searching.

This section provides general information on survey methods and effort that are relevant for all threatened species.

Specific survey methods and the effort recommended for each threatened species will be added to these guidelines as they become available.

False absences and imperfect detection

While the presence of a target species can often be confirmed at a site relatively easily, it is generally impossible to confirm a species is absent.

This is because it is rare that a species has a 100% chance of being detected on a single visit, i.e. it has a probability detection of 1. Therefore, non-detection does not necessarily mean the species is absent.

Several factors influence detectability, including:

- the species in question - fauna with large home ranges are especially likely to go undetected in an area, as at any given time they may be in another part of their range
- climatic conditions (e.g. temperature, rainfall)
- experience of the surveyor/s
- the survey method used.

An observed absence may be due to an observer failing to detect a species that lives at the site, e.g. a bird that was elsewhere in its home range at the time of the survey or that failed to call during a point count.

False absences have serious consequences for habitat modelling and monitoring studies, as well as impact assessments.

For impact assessments, false absences may result in inadequate conservation measures and an increased risk of local extinction.

What’s the probability?

Many ways of minimising false absences rely on knowing the probability of detecting a species in a specific area, repeating the number of surveys or increasing the time spent searching.

For a statistical breakdown, see references. In particular search to determine the optimum number of site visits required to estimate occupancy.

The approach taken to reduce the likelihood of false absences varies between fauna and flora.

Increasing the number of visits to a site should increase the probability of detecting target fauna. However, increasing the time spent searching per survey is more likely to detect target flora.

7. Vital information to report

Your final report must include details of the field survey, including:

- a list of all threatened species possibly occurring on or using the development site and details of how this list was obtained if the BioBanking Credit Calculator was not used
- details of how these threatened species or their habitat will be affected by the proposal
- a list of all species detected in the study area, whether threatened, not threatened or invasive
- a detailed map or maps including the location of the development site, the study area, the biometric vegetation types, stratification units (if different to the vegetation types) and the location of all surveys undertaken
- details of the habitat assessment
- details of the survey methods used, including number of traps and transects, and the number of repetitions. You will need to justify if and why this differs from the recommendations in these guidelines
- weather conditions at the time of surveys
- names and experience of all personnel involved in the field surveys
- any other information outlined elsewhere in these guidelines.

8. References

Field SA, Tyre AJ and Possingham HP 2005, 'Optimizing allocation of monitoring effort under economic and observational constraints', *Journal of Wildlife Management* 69, pp 473-482.

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