NSW GOVERNMENT

SAVING OUR SPECIES

Framework for keep watch species

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Photography
Cover photo: bordered guinea flower (*Hibbertia marginata*), Lachlan Copeland
Pages 2-3: elegant greenhood (*Pterostylis elegans*), Lachlan Copeland
Pages 4-5: chef's cap correa (*Correa baeuerlenii*), Jackie Miles
Page 6: tall velvet sea-berry (*Haloragis exalata subsp. velutina*), Lachlan Copeland
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Page 11 (top): Evans grevillea (*Grevillea evansiana*), Barry Collier
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Introduction

Keep watch management stream

The keep watch management stream is part of the NSW Government's *Saving our Species* (SoS) program. The SoS program allocates species to the keep watch management stream if strong quantitative evidence shows the species populations are secure without targeted investment in management.

The objective for the keep watch management stream is to **maintain the security (<5% extinction risk over the next 100 years) of keep watch species at priority sites in New South Wales**.

Strategies for keep watch species include monitoring actions only to ensure populations remain stable or improve and to identify potential new and/or emerging threats to the security of the species.

To be eligible for the keep watch management stream, a species must meet all four of the eligibility criteria:

1. The population is stable or increasing.
2. The population is not too small.
3. Distribution is not significantly restricted, fragmented or unstable.
4. An adequate proportion of the species population occurs within secure conservation land tenure where critical threats are abated or managed.

Eligibility criteria 1, 2 and 3 are based directly on IUCN Red List criteria and guidelines and require the species to meet thresholds for the category:

- Vulnerable to extinction (as per IUCN listing), or
- a lower risk of extinction that would make a species ineligible for threatened species listing under the *Biodiversity Conservation Act 2016* (BC Act).

Criteria for listing species are published in the Biodiversity Conservation Regulation 2017, Part 4. Assessment against the criteria allows for time lags between effective management and a positive effect on the species' population.

Eligibility criterion 4 is based on protection and critical threat abatement, and the security of those arrangements. (Note: this criterion is indirectly based on IUCN Red List criterion A as threat impacts may lead to population decline.)

Keep watch species populations should be monitored using best practice techniques and at intervals based on the species ecology and life history traits to ensure the species is secure without active management.

Species that continue to be secure will be nominated for review by the NSW Threatened Species Scientific Committee (the Scientific Committee) for delisting.

Those that do not meet the objective due to changed circumstances or new and/or emerging threats will be reassigned to an active SoS management stream such as site-managed or landscape-managed where they will be prioritised for on-ground management.

Saving our Species program

The SoS program is the NSW Government's innovative approach to managing threatened plants and animals. The program sets a clear framework for prioritising resources for managing entities listed as threatened under the BC Act.

The aim of the program is to develop targeted strategies for managing threatened species, threatened ecological communities and key threatening processes using the best available information.

SoS uses principles of cost-effectiveness, scientific rigour, transparency and accountability to guide investment by government and non-government stakeholders.

All strategies developed under SoS are unified by the overarching objective of the program: **'to maximise the number of threatened species that are secure in the wild in New South Wales for 100 years'.**

SoS overarching objective

To maximise the number of threatened species that are secure in the wild in NSW for 100 years

↓

Key SoS program objective

To optimise investment in the management of threatened species and communities through the identification of priorities

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Keep watch species objective

To maintain the security (<5% extinction risk over the next 100 years) of keep watch species at priority sites in NSW

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Performance indicators

- Stable or increasing keep watch species population in NSW
- Number of keep watch species proposed for delisting
- Number of keep watch species reassigned into active management stream

Figure 1. Keep watch species objective and performance indicators within the context of the SoS program.

Legislative framework

The BC Act requires that SoS (delivering the Biodiversity Conservation Program) has a framework to guide priorities for implementing species and ecological community strategies. This document represents the framework for keep watch species. Under Part 4 Division 6 of the BC Act, the program must develop a strategy for each threatened species within two years of being listed. The aim of each strategy is to achieve the objectives of the program in relation to that species.

Keep watch species stream approach

Some of the species listed as threatened under the BC Act at its commencement in August 2017 have already been assessed against the keep watch criteria and assigned to the keep watch management stream.

Allocation of species to the keep watch stream

Other threatened species may be allocated to the keep watch management stream using the following process (and see Figure 2).

Step 1 Species actively managed in a non-keep watch management stream

Species listed as threatened under the Biodiversity Conservation Act

Some species listed as threatened under the BC Act at its commencement (August 2017) have been already assigned to an active management stream and have been subject to the strategies developed for them. When threats have been managed adequately in active management streams and population stability or improvement is observed through monitoring, the species can be assessed against the keep watch eligibility criteria.

New species listed as threatened under the Biodiversity Conservation Act

Species are listed as threatened by the Scientific Committee. The SoS Species Technical Group (STG), a technical advisory body under the governance of the SoS program, allocates each species to a SoS management stream where active management actions are required to meet the program objective (i.e. not the keep watch management stream). A species strategy is developed, identifying critical threats and actions to reduce those threats at priority management sites. The strategy includes monitoring objectives and targets for the species population and threats. Species are actively managed, according to the strategy, to meet those targets. When threats have been managed adequately and population stability or improvement is observed through monitoring, the species can be assessed against the keep watch eligibility criteria.

Step 2 Species nominated for assessment against the keep watch eligibility criteria

The species project coordinator managing the species strategy nominates the species for assessment against the keep watch eligibility criteria when enough quantitative evidence has been collected through monitoring. For most species being considered for keep watch, this is likely to result from years of threat abatement and population survey and management within other SoS management streams or conservation programs.

Evidence must be provided against all four of the following criteria to be eligible for keep watch:

1. Population is stable or increasing
    a. Population trajectory data adhering to the *Saving our Species monitoring, evaluation and reporting: Guidelines for conservation projects* (OEH 2018) are available and show evidence of stable or increasing populations across an adequate and representative proportion of the species range, and
    b. In the case of past population reduction which was observed, estimated, inferred, or suspected, where the causes of the reduction are clearly reversible **and** understood **and** have ceased, the population has not reduced by 70% or more over a timeframe appropriate for the taxon.
2. Population is not too small
    a. the species is present at three or more locations, **and**
    b. area of occupancy is 20 km^2 or greater, **and**
    c. the species has greater than 1000 individuals in the total population.
3. Distribution is not significantly restricted, fragmented or unstable

    If the species geographic range is less than 5000 km^2 extent of occurrence or 500 km^2 area of occupancy, the species must not have both of the following:
    a. a severely fragmented distribution, **and**
    b. extreme fluctuations in any of extent of occurrence, area of occupancy, number of locations or subpopulations or number of individuals.
4. An adequate and representative proportion of the species range is within secure conservation land tenure within which the species critical threats are abated or being adequately managed
5. An adequate and representative proportion of the species range comprises secure conservation land tenure (including protected areas and land covenanted in perpetuity) **and either:**
    a. the species' critical threats are abated because the species is in a secure conservation land tenure, **and/or**
    b. evidence shows that critical threats are being, and will continue to be, adequately managed within these sites.

Further context and information on the rationale underlying the criteria are available in *Eligibility criteria for the Saving our Species (SoS) keep watch management stream.*

The STG assess each nomination for the keep watch management stream against the eligibility criteria. If the keep watch eligibility criteria are met, the species is assigned to the keep watch management stream and subject to a program designed to monitor the continuing security of the species. If the criteria are not met, the species remains in its current active SoS management stream.

Step 3 Species assigned to the keep watch management stream

Species assigned to the keep watch management stream are monitored in accordance with best practice techniques for their taxa and at intervals appropriate for their ecology and life history traits. Monitoring will continue until evidence suggests either:

- the species are ready to be proposed for delisting (in the case of continued improvement) and data is available to send to the Scientific Committee, or
- the species should be reassigned to an active management stream (in the case of new and/or emerging threats or observed population declines).

A monitoring program is designed for each keep watch species and prioritised according to the monitoring prioritisation framework for the keep watch management stream. Some keep watch species may exhibit similar traits and/or occur in similar regions, which may allow more than one species to be monitored during each monitoring event.

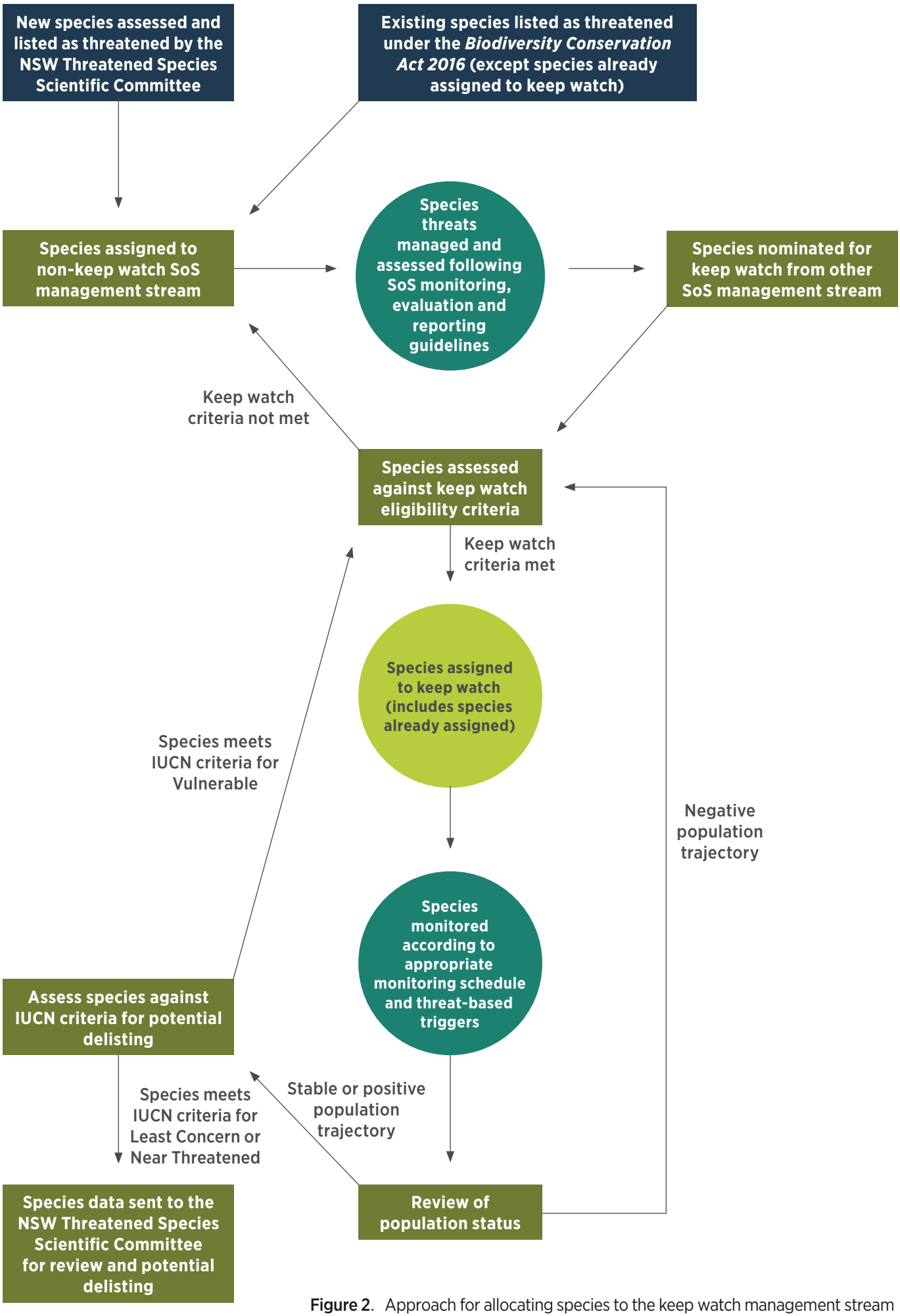

Figure 2. Approach for allocating species to the keep watch management stream and outcomes of monitoring (adapted from Gallagher et al 2018)

Monitoring. prioritisation and investment

The SoS program aims to invest conservation resources where they are likely to deliver the greatest benefit, so the program prioritises keep watch species for on-ground monitoring where populations are most at risk of future population declines if conditions change. The monitoring prioritisation framework governs monitoring in the keep watch management stream.

1. The monitoring prioritisation framework prioritises species for monitoring based on indicators of inherent vulnerability (for range size the indicator is area of occupancy (AOO) and for population size the indicator is the number of individuals) and the status of known population information (number and reliability of population information sources). Species with highly restricted ranges are considered vulnerable to extinction via stochastic (unpredicted or random) events (see 'Stochastic threat-triggered monitoring'), and small populations are considered potentially vulnerable to intrinsic population issues such as inbreeding depression and genetic drift. Remaining species are ranked according to their vulnerability, with the most vulnerable ranked highest. The smaller the range and population size the greater the vulnerability.
2. The framework classifies species into monitoring priority groups and subgroups based on the indicators of inherent vulnerability (Table 1). The priority subgroups form the first level of prioritisation while the priority within each subgroup is based on the reliability and number of data sources.

Table 1. Monitoring priority groups for keep watch species.

Monitoring priority groups	Subgroups
Priority group 1 AOO class 1 (<20 km^2)	**Group 1a** Population class 1 (<1,000 individuals) Population class 2 (1,000–1,999 individuals) **Group 1b** Population class 3 (2,000–4,999 individuals) Population class 4 (5,000–10,000 individuals) Population class 5 (>10,000 individuals)
Priority group 2 Population class 1 (<1,000 individuals)	**Group 2a** AOO class 2 (20–50 km^2) **Group 2b** AOO class 3 (50–100 km^2) AOO class 4 (100–200 km^2) AOO class 5 (>200 km^2)
Priority group 3 Population class 2 (1,000-1,999 individuals)	**Group 3a** AOO class 2 (20–50 km^2) **Group 3b** AOO class 3 (50–100 km^2) AOO class 4 (100–200 km^2) AOO class 5 (>200 km^2)
Priority group 4 Population class 3 (2,000-4,999 individuals) Population class 4 (5,000-10,000 individuals) Population class 5 (>10,000 individuals)	**Group 4a** AOO class 2 (20–50 km^2) **Group 4b** AOO class 3 (50–100 km^2) **Group 4c** AOO class 4 (100–200 km^2) **Group 4d** AOO class 5 (>200 km^2)

Monitoring schedule

Best practice approaches for deciding how often a species should be monitored are based on analyses of the likelihood that monitoring will detect any change that is present (the statistical power) and the capacity for monitoring (and sampling technique) to detect significant changes in the population. The monitoring schedule for keep watch species is based on these analyses where they are available. When they are not available, keep watch animal species are monitored as often as recommended by existing best practice techniques and species-specific assessment of population status. Monitoring frequency of keep watch plant species is informed by their functional groups. These groups are based on four life-history traits, which show the potential for populations to change over time and their resilience to environmental change (Table 2).

Table 2. Plant life-history traits used to inform monitoring frequency.

Trait	Indicative of...	Implications for monitoring frequency
Longevity	Rate of population turnover	Species with short lifespans typically have a higher rate of turnover and thus greater potential for demographic fluctuation over time. These species will require more frequent monitoring to capture long term population trends and to understand the degree of variability. Conversely, long-lived species that focus resources toward persistence tend to fluctuate less over time and can be monitored less frequently (Adler et al., 2014; Legge et al., 2018 Chapter 3).
Reproductive age	Potential for recruitment and potential rates of recruitment	Species with late reproductive age (long juvenile period) have a lower potential for recruitment. These populations demonstrate lower rates of change over time, so they need less frequent monitoring (Adler et al. 2014)
Seed bank formation	Capacity to tolerate environmental stochasticity	The capacity to form a persistent seed bank confers the species with a degree of resilience to disturbance through the storage of reproductive potential. Species with persistent seed banks can be less vulnerable to extinction, so they need less frequent monitoring than those species that do not (Roberts, 1981; Baskin & Baskin, 1998; Adams et al., 2005).
Capable of vegetative reproduction	Capacity for persistence through less favourable conditions	Considered a low-risk regenerative strategy compared to sexual reproduction, because unlike seedlings, the offspring receives resources directly from the parent plant (Grime 2001). Vegetative reproduction can also increase the density of populations and increase the chance of persistence (García & Zamora 2003; Henle et al. 2004), so they need less frequent monitoring than species that only reproduce sexually.

Each keep watch plant species is assigned to one of ten functional groups (based on their taxa type, e.g. herbs, shrubs, trees, etc., and life-history) and monitored every one, three or five years (Table 3). Functional groups with a high capacity for variation (e.g. short-lived species, and species with short juvenile periods) should be monitored more frequently than those functional groups that do not. Similarly, functional groups with limited resilience to environmental changes, stochasticity, and disturbance (e.g. species not capable of forming persistent seed banks or reproducing vegetatively) should be monitored more frequently than those functional groups that display greater potential resilience through the formation of persistent seed banks and/or reproducing vegetatively in addition to sexually. Plants considered exceptional to these groupings will be monitored according to best practice and expert advice.

Table 3. Plant functional groups for monitoring, and their associated monitoring frequencies, based on life history traits and taxa.

Monitoring functional group	Monitoring frequency (every 1, 3 or 5 years)
Short-lived shrubs and herbs	Annually
Species with no observed sexual reproduction	Annually
Long-lived herbs, ferns and cycads with long juvenile stage, no known vegetative reproduction and transient seed bank	Annually
Perennial shrubs with persistent seed banks	Every 3 years
Early maturing, long-lived orchids with transient seed bank	Every 3 years
Long-lived herbs capable of vegetative reproduction and persistent seed bank	Every 3 years
Woody climbers and shrubs with short to moderate juvenile stage and transient seed bank	Every 3 years
Long-lived non-woody plants capable of vegetative reproduction but with transient seed bank	Every 3 years
Trees with moderate to long juvenile stage (>5 years)	Every 5 years
Perennial shrubs capable of vegetative reproduction and with persistent seed bank	Every 5 years

Stochastic threat-triggered monitoring

Stochastic threats may significantly increase the risk of extinction of keep watch species populations. Stochastic threat events are those which can threaten species populations within short timeframes (e.g. <1 year). When a stochastic threat event occurs, they trigger exceptional monitoring activities for potentially affected species. Prioritisation of monitoring across affected species would still be guided by the prioritisation framework (i.e. affected species are prioritised according to inherent vulnerability).

Six stochastic threat events are relevant to the current suite of species in the keep watch management stream:

- extreme heat and heatwaves
- extreme rainfall
- storms
- coastal flooding
- fire
- chytrid fungus.

Note that other stochastic threats may be identified for new species assigned to keep watch that have not been included here, e.g. other diseases or environmental threats.

The steps taken to implement stochastic threat-based triggered monitoring are as follows:

- Identify and define each stochastic threat and their potential impacts.
- Identify vulnerable keep watch species and functional groups for each stochastic threat.
- Establish channels to communicate observed events to relevant Department of Planning, Industry and Environment personnel.
- Determine the impact and spatial extent of the event, and identify species that may live in the location of the event.
- Prioritise potentially affected species for monitoring.

Monitoring, evaluation and reporting for the *Saving our Species* program

The monitoring program designed for each keep watch species should include a monitoring, evaluation and reporting (MER) plan. The MER plan should measure trends in species abundance (or a validated surrogate) at priority sites representative of the species distribution according to the monitoring schedule in Table 3 . The sampling technique used for each species should be robust enough to detect changes in populations. The objective of the MER plan for each keep watch species is to determine if the species abundance (or validated surrogate) is stable or increasing.

Each MER plan will be refined over time based on the information collected during monitoring.

All keep watch species MER plans will be consistent with the framework for undertaking monitoring for site-based conservation projects as provided in *Saving our Species monitoring, evaluation and reporting: Guidelines for conservation projects* (OEH 2018).

Glossary

Abated is when a critical threat has been removed entirely (e.g. in the case of reserves offering protection from land clearing, or a pest species being excluded from a defined area such as an island) or evidence shows the impact of the threat has been reduced to a level that no longer threatens the security of the threatened species in question. In relation to evidence of abatement, see the definition for 'adequately managed'.

Adequate and representative proportion of the species range is that considered necessary to be of secure conservation tenure and threat-free for the species to meet the SoS objective of <5% extinction risk over the next 100 years. Globally accepted conservation targets range from 30-100% of the species original (i.e. pre-European) range depending on the species (Fahrig 2003, Groves 2003). The protected areas should encompass the full range of abiotic conditions, ecosystems and communities across the species range (Akçakaya et al 2018). The chosen target should be guided by expert knowledge, IUCN principles and acceptable thresholds, and SoS guidelines. For example, for site-managed species, the minimum number of management sites to secure the species has been identified by experts and the MER framework assumes that a stable/ increasing population trend at all management sites equates to the species being on track to be secure for 100 years (OEH 2013 section 2.2, 2018).

Adequately managed is when managed critical threats have some evidence to show that the management actions employed are either: 1. reducing the severity or extent of the threat; and/or 2. having a positive impact on the threatened species in question. This evidence is generated as part of the project evaluation and reporting framework embedded within the SoS MER guidelines (OEH 2018).

Area of occupancy (AOO) is a measure of a species range defined as representing 'the area of suitable habitat occupied by the taxon'. In the calculation of AOO, known, inferred, or projected sites of present occurrence are scaled to 2 x 2 km grid cells and so it is a conservative measure of distribution. AOO is inversely related to extinction risk, with species with small AOO at higher risk of extinction via stochastic threat events. Refer to IUCN (2017, section 4.10) for further information and assistance calculating AOO.

Extent of occurrence (EOO) is a measure of species range defined as 'the area contained with the shortest contiguous imaginary boundary which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy' (IUCN 2017). EOO represents the extent or outer boundaries of the species' known distribution and is most commonly employed when estimating the spatial extent of threatening factors across the known distribution. Refer to IUCN (2017 section 4.9) for further information and assistance calculating EOO.

Genetic drift is a mechanism of evolution in which allele frequencies of a population change over generations due to chance (sampling error). Genetic drift occurs in all populations of non-infinite size, but its effects are strongest in small populations.

Inbreeding depression is the reduced biological fitness in a given population as a result of inbreeding, or breeding of related individuals. Population biological fitness refers to an organism's

ability to survive and perpetuate its genetic material. Inbreeding depression is often the result of a population bottleneck.

Population trajectory data includes survey data (or where necessary the use of surrogates or proxies for cryptic species) of the population or, where a population is abundant or highly dispersed, representative sites (e.g. landscape managed species). The data should show the trajectory of the population, requiring two or more surveys conducted within a timeframe appropriate to the species generation time and ecology so as to capture meaningful change (i.e. change across multiple generations and not random fluctuations). Ideally, population trajectory data is provided for all management sites considered necessary to secure the species (site-managed species), or all important and priority locations/populations (relevant to landscape-managed species and defined as sites/habitat which have been identified that capture a significant population or habitat, for which investment in landscape rehabilitation or threat abatement will be invested, OEH 2015). In cases where robust population data is not available for **all** required management sites/important locations, experts can estimate population trajectories for sites/populations without data.

Secure conservation land tenure includes all SoS management sites (i.e. a spatially defined area which encompasses one or more locations where a particular threatened species is known to occur and where any given threat to that species is managed in a consistent way, OEH 2013), the NSW protected area network and all private lands secured in perpetuity via a conservation covenant or similar binding agreement.

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