NSW GOVERNMENT

SAVING OUR SPECIES

Key threatening processes strategy

Photography

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Key threatening processes drive the extinction of species and ecological communities.

Introduction

Pests and weeds, climate change and habitat loss are some of the key threatening processes (KTPs) that impact native plants and animals in NSW.

The *Saving our Species* program (SoS) is the NSW Government's strategy for securing threatened species and ecological communities, and for managing key threatening processes.

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

An aspiration of the program is that its principles of cost-effectiveness, scientific rigour and transparency will guide investment by all (government and non-government) stakeholders across NSW.

All conservation 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 NSW for 100 years'.

This document outlines the SoS framework and approach to managing listed key threatening processes.

Key threatening processes are a focus point for SoS as they drive the extinction of species and ecological communities. In managing key threatening processes, threat abatement is fundamental to ensuring the long-term viability of threatened species and ecological communities.

Also, a threat-led approach is often more strategic and cost-effective than a species-led or community-led approach. The effective integration of the KTP strategy with other components of SoS that target species and ecological communities will be key to the success of the program.

Background, objective and legislative context

SoS formally launched in December 2013. The program will continue to develop detailed, clearly mapped conservation projects for all threatened species and ecological communities listed on Schedules 1 and 2 of the *Biodiversity Conservation Act 2016* (BC Act).

Part 4, Division 6 of the BC Act includes provisions for a biodiversity conservation program with the following objectives:

> 'to maximise the long-term security of threatened species and threatened ecological communities in nature, and
>
> to minimise the impacts of key threatening processes on biodiversity and ecological integrity.'

Division 6 also states:

'Strategies to minimise the impacts of key threatening processes may but are not required to be included in the Program.'

The objective of the SoS key threatening processes strategy is to minimise current and future impacts of key threatening processes on priority biodiversity values, including threatened species and ecological integrity. This objective aligns with the legislation.

This strategy also includes criteria for assessing the necessity of a specific strategy for any given key threatening process and where priority actions will be focused. The criteria follows the existing prioritisation strategy for species and ecological communities under SoS.

There are currently 38 key threatening processes in NSW (Table 1). These processes are eligible for listing on Schedule 4 of the Act because, in the opinion of the NSW Threatened Species Scientific Committee:

1. they adversely affect threatened species or ecological communities, or
2. they could cause species or ecological communities that are not threatened to become threatened.

Table 1 Key threatening processes currently listed on the Schedules of the *Biodiversity Conservation Act 2016*

Aggressive exclusion of birds from woodland and forest habitat by abundant noisy miners, *Manorina melanocephala*
Alteration of habitat following subsidence due to longwall mining
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
Anthropogenic climate change
Bushrock removal
Clearing of native vegetation
Competition and grazing by the feral European rabbit, *Oryctolagus cuniculus*
Competition and habitat degradation by feral goats, *Capra hircus*
Competition from feral honey bees, *Apis mellifera*
Death or injury to marine species following capture in shark control programs on ocean beaches
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments
Forest eucalypt dieback associated with over-abundant psyllids and bell miners
Herbivory and environmental degradation caused by feral deer
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
Importation of red imported fire ants, *Solenopsis invicta*
Infection by psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
Infection of native plants by *Phytophthora cinnamomi*
Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
Introduction of the large earth bumblebee, *Bombus terrestris*
Invasion and establishment of exotic vines and scramblers
Invasion and establishment of scotch broom, *Cytisus scoparius*
Invasion and establishment of the cane toad, *Bufo marinus*
Invasion of native plant communities by African olive, *Olea europaea* subsp. *cuspidata*
Invasion of native plant communities by *Chrysanthemoides monilifera*
Invasion of native plant communities by exotic perennial grasses
Invasion of the yellow crazy ant, *Anoplolepis gracilipes* into NSW
Invasion, establishment and spread of Lantana, *Lantana camara*
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Loss of hollow-bearing trees
Loss or degradation (or both) of sites used for hill-topping by butterflies
Predation and hybridisation by feral dogs, *Canis lupus familiaris*
Predation by *Gambusia holbrooki* (plague minnow or mosquito fish)
Predation by the European red fox, *Vulpes vulpes*
Predation by the feral cat, *Felis catus*
Predation by the ship rat, *Rattus rattus* on Lord Howe Island
Predation, habitat degradation, competition and disease transmission by feral pigs, *Sus scrofa*
Removal of dead wood and dead trees

Statutory management of key threatening processes

The extent, severity and impacts of key threatening processes vary significantly. Impacts on species and ecological communities at priority sites are being or will be addressed by existing SoS conservation projects.

Previously, threat abatement plans were used for the statutory management of key threatening processes. So far OEH has developed three approved threat abatement plans, targeting invasion of native plant communities by bitou bush and boneseed, predation by the red fox (*Vulpes vulpes*), and predation by the plague minnow (*Gambusia holbrooki)*. Several other strategic statewide programs or national threat abatement plans are also in place to manage other key threatening processes. Strategies developed for key threatening processes under SoS will adopt or align with these existing strategies if they have the same objectives.

The primary organisation responsible for the management of some key threatening processes (for example those managed primarily via biosecurity programs) is the Department of Primary Industries. However, the SoS key threatening processes strategy will provide guidance on priorities and tools for reporting to all NSW *Saving our Species* partners.

Saving our Species program outcomes and the KTP strategy

SoS is guided by a program logic that articulates immediate, intermediate and long-term outcomes that the program is designed to achieve, and how they relate to each other. The management of key threatening processes relates to the following outcomes:

- threats reduced or controlled at priority management sites
- improved or stabilised condition/abundance of threatened species and ecological communities in NSW
- priority threatened species and ecological communities in NSW being on track to being secure in the wild.

Even though the objective of the KTP strategy and the *Saving our Species* program logic align with each other, the objective of the KTP strategy has additional scope for activities that benefit biodiversity that is currently not threatened, which is not explicit in the SoS program logic. This is because SoS outcomes all relate to threat impacts on threatened species and ecological communities.

In practice, this means that where resources are limited, SoS investment will focus on activities that maximise outcomes identified in the SoS program logic. This includes outcomes that contribute to the security of the greatest number of threatened species and threatened ecological community values (see *Implementation and investment prioritisation*).

The exception is when the provision in the BC Act to prevent species or ecological communities from becoming threatened applies. When it is possible to prevent the establishment or contain the spread of a key threatening process in NSW, such as when a threat is not yet widespread, investment in prevention (for example, biosecurity) or containment will be considered a priority. Or if particular sites can be identified where strategic threat abatement is likely to prevent one or more species becoming threatened, investment may also be prioritised.

These types of action contribute to the outcome of maximising the number of secure species and ecological communities, given that non-threatened species and ecological communities are considered secure. Responding rapidly to new or emerging threats before significant impacts can occur is generally much more cost-effective than attempting to manage the threat once it is established across the landscape.

Objectives for managing specific key threatening processes

The objective of each key threatening process strategy relates directly to the overarching objective, which is to reduce the current and future impacts of the stated key threatening process on priority biodiversity values, including threatened species and ecological integrity, in NSW.

Objectives of specific management actions or threat abatement approaches will vary as appropriate, but will be consistent within a particular response or approach (see *Response types*).

Developing individual strategies

A *Saving our Species* strategy will be developed for each key threatening process that meets both of the following criteria.

1. The key threatening process critically impacts (that is, significantly inhibits survival, function or reproduction of) threatened species or ecological communities, or poses a future risk of critically impacting threatened species, ecological communities or priority biodiversity values in NSW.
2. Targeted actions are likely to contribute significantly to the abatement or prevention of those impacts (that is, the extent, severity or future risk of the key threatening process is sensitive to proactive management interventions).

This means that a KTP strategy will only be developed if there is likely to be a significant impact or risk reduction from targeted investment in that strategy, *independent* of other statutory obligations and regulations.

Strategies for key threatening processes that meet these criteria will be developed using an expert workshop approach broadly similar to that for site-managed species. (see the *Saving our Species Technical Report* pages 7–11 for details).

Expert panels should include OEH staff and external stakeholders with expertise and experience in managing the threat and/or species and ecological communities impacted by the threat, as well as those responsible for delivering strategic programs targeting the threat.

Response types

All proposed actions under a strategy will be categorised into one of five response types. This helps to structure strategies and target management actions. The response types are:

- research: investigating the dynamics of key threatening processes and improving management effectiveness
- prevention: preventing threatening processes that are not in NSW from entering the state
- containment: restricting threat impacts to a particular area
- strategic: developing tools and policies to help manage threats
- biodiversity asset protection: a biodiversity asset is a location with one or more threatened species or ecological communities that are a priority to protect from a key threatening process.

An individual strategy may include actions of one or more type – see Table 2. Table 2 outlines each of the five different response types. Each KTP strategy will refer to one or more of these responses based on the distribution, impacts and dynamics of the threat.

How to define critical actions

A KTP strategy should only include critical actions that are needed to meet the objective of minimising impacts on threatened species and biodiversity in NSW and that are practical and deliverable. Table 3 summarises a workflow to help identify those actions.

Once it has been established that a KTP strategy should be developed, the first consideration is whether sufficient knowledge exists to inform effective management. If not, the first priority for investment in that key threatening process should be research to better understand the threat, its impacts and appropriate management responses. If there is enough knowledge for management to proceed, but research could improve effectiveness, this should be identified as a second-order priority, as long as the proposed research is strategic and targeted to apply to management.

If the key threatening process poses a risk but is not currently impacting biodiversity in NSW, such as the red fire ant, the first and only priority response should be prevention. This type of response is likely to rely on existing biosecurity legislation and programs, if those are targeted at the particular key threatening process.

If the key threatening process is impacting biodiversity in NSW but can be geographically contained, for instance cane toads in north-eastern NSW, or it can be feasibly eradicated from a location, like rodents on Lord Howe Island, the first priority should be containment. This type of response may include actions to identify and eradicate incursions beyond a containment line.

If the key threatening process and its impacts are widespread across NSW, it should be managed by identifying and protecting biodiversity assets, in line with the widely adopted approach to invasive species management, the *NSW Biosecurity Strategy*.

Assets considered the highest priority for investment under SoS are those identified as statewide priority sites and populations for at least one species or ecological community. For any key threatening process that needs a *containment* or *biodiversity asset protection* response, a *strategic* response may also be required. A strategic response could guide on-ground activities, which may need prioritisation tools, decision-support tools or databases, or could contribute to threat abatement through other mechanisms such as communication products and behaviour-change programs.

There is no prescribed limit to the number, extent or scale of activities defined under a KTP strategy. However, it is important that only actions critical to meeting the *Saving our Species* KTP objective be included. This aligns with the broader *Saving our Species* principle of cost-effectiveness. Investment surplus to achieving the KTP objective should be allocated to critical actions for other key threatening processes, species or ecological communities, in order to meet the *Saving our Species* program's broader objective.

Recording details of actions

KTP strategies should be captured in the SoS database. Assets that are part of SoS threatened species and/or ecological communities conservation projects will be linked within the database to relevant key threatening processes. This will ensure that reporting reflects how existing projects are addressing the key threatening process.

If an existing strategy, plan or policy is the primary mechanism under a particular response type in a KTP strategy, it is important to ensure that its objectives align closely with those of SoS. This means adhering to the response type (Table 2) and the key threatening processes strategy. If the existing strategy, plan or policy is not comprehensive in addressing all critical priorities for management, additional actions or assets should be developed and identified based on the SoS strategy.

Monitoring, evaluation and reporting

There must be one or more key objectives against which to evaluate success under each response type, for all Saving our Species KTP strategies. These objectives should be SMART – specific, measurable, achievable, relevant and time-bound. Also, there must be an indicator to measure outcomes that correspond to each objective. Table 2 outlines how these indicators should be identified, monitored and evaluated for each response type.

For each key threatening process, particularly those with an on-ground component, data on threat abatement outcomes should be collected where possible in a consistent way across the state. The data can then be aggregated to evaluate whether the management methods are effective and to help improve them.

Table 2 Response types for SoS key threatening processes strategies

Response type	Definition	Objective of activities	Monitoring and evaluation
Research	Targeted research investigating the biology and dynamics of threatening processes and/or their impacts on biodiversity. Research may include developing tools that improve management effectiveness.	To reduce the uncertainty around how species and communities respond to threat impacts or the management of those impacts, in order to manage threats more effectively.	Evaluation based on whether the research has helped manage the threats more effectively and to what extent.
Prevention	Developing and enforcing relevant legislation (biosecurity for example), and implementing policies to prevent threatening processes currently not in NSW from impacting biodiversity in NSW, appropriate to the risk.	To minimise the risk of a threat occurring and impacting biodiversity anywhere in NSW.	Evaluation based on the continued prevention of the threat from impacting biodiversity in NSW.
Containment	Activities focused on restricting threat impacts to a particular location, such as within containment zones, including the eradication of identified incursions outside those zones. Also applies to eradication where feasible, such as on islands.	To prevent threatening processes from increasing their distribution in NSW and, for eradications, completely removing all occurrences and impacts of a threat from an identified location.	Evaluation based on the successful maintenance of containment zones. This could include no sustained incursions outside the containment zone, eradication of incursions outside the zone or the contained area becoming larger.
Strategic	The development of tools, policies, guidelines or communication material that help manage the threat or reduce it where it occurs. Examples include decision-support and prioritisation tools, databases, behaviour-change programs, education products and research applications.	To improve management effectiveness, efficiency, or otherwise maximise outcomes in terms of reduced impacts on threatened species and communities, broader biodiversity and ecological integrity.	Evaluation based on how widely successful the strategy has been in reducing threat impacts.
Biodiversity asset protection	Implementing direct threat abatement activities at specific locations to protect priority biodiversity assets or reduce impacts from widespread key threatening processes. Could include sites and populations identified as statewide priorities in a *Saving our Species* conservation project. Asset protection is conducted in geographic areas where containment and eradication is no longer feasible.	To directly reduce the extent or severity of threat impacts on priority biodiversity assets to improve their abundance, extent, condition or function, and, ideally, to secure the asset in the long-term.	Monitoring and evaluation of outcomes at priority sites (assets) should follow the SoS monitoring, evaluation and reporting guidelines for site-management.

Table 3 Workflow for preparing a key threatening process strategy. Each of the steps below is completed by a panel of ecological and management experts on each key threatening process.

Step	Scenario/consideration	Response/action
1	Does the KTP critically impact or threaten significant biodiversity, threatened species or ecological integrity values, **and** is the KTP likely to respond to management intervention?	Yes – proceed with development of a SoS KTP strategy
2	Is research necessary to inform a management response to the KTP?	Yes – develop **research** response (critical actions) as first-order priority
3	Research is not necessary but could significantly improve KTP management effectiveness.	Yes – develop **research** response as second-order priority
4	The KTP is not currently impacting biodiversity in NSW.	Yes – develop **prevention** response (critical actions) as first-order priority
5	The KTP is already impacting biodiversity in NSW and it is possible to contain threat impacts or eradicate the threat from a particular location.	Yes – develop **containment** response (critical actions) as first-order priority
6	The KTP is widespread in NSW with no possibility of eradication or containment, but impacts could be reduced with strategic (i.e. non site-based) actions.	Yes – develop **strategic** response (critical actions) as first-order priority
7	Important biodiversity assets can be identified that are being impacted by the KTP and where targeted management can reduce those impacts.	Yes – develop **biodiversity asset protection** response (identified priority management sites in NSW)
8	Biodiversity assets in NSW identified (either via an existing SoS species or ecological community project, or specific to the KTP strategy)	Yes – for each biodiversity asset, document: • spatial location • justification for priority • species/ecological communities impacted • action required • cost and feasibility. In addition, develop a plan to monitor and evaluate threat and target species/ecological community responses to management, consistent with the SoS monitoring, evaluation and reporting framework.
9	An existing plan, program or policy (OEH or external) has already detailed a strategy to address the KTP.	If the existing strategy aligns with SoS objectives, the KTP strategy should refer to the existing document.

Implementation and investment prioritisation

Investment prioritisation under SoS

An overarching principle of SoS is cost-effectiveness. SoS recognises that to maximise outcomes in the face of finite resources, investment must be prioritised based on benefit, likelihood of success and cost. This acknowledges the trade-off between the amount of resources that can be invested in any given species, community, location or threat, and the number of species, communities, locations and threats that can be effectively managed.

SoS applies prioritisation at two scales:

- between management streams
    - high priority: iconic, site-managed and landscape-managed species
    - medium priority: data-deficient species
    - low priority: partnership and keep-watch species
- within the site-managed stream using a project prioritisation protocol (Joseph *et al.* 2009).

Ultimately, however, SoS invests in on-ground activities in places that maximise outcomes across all program objectives. Upon completing the framework and identifying priority assets for landscape species, partnership species and threatened ecological communities, on-ground investment under SoS will be guided by a spatial prioritisation. The spatial prioritisation integrates all of the above priorities and identifies which activities implemented where in the landscape will maximise outcomes across all program objectives.

The KTP strategy follows a three-tiered approach when deciding which biodiversity assets to invest in. Tier 1 includes those with SoS conservation projects for individual species and ecological communities. Other high-priority sites and management actions worth investing in to lower impacts from key threatening processes, even though they do not involve threatened entities, could be those identified under the containment and prevention response types, or strategic assets where threat abatement is critical to prevent species becoming threatened.

Second tier assets could be those that are likely to be a statewide priority for a given species or ecological community, but which have yet to be formally identified. This could be because the relevant project has not yet been developed, and can apply to ecological communities and partnership species. This tier should become redundant once the SoS KTP strategy and associated projects have been fully developed, and existing OEH threat abatement programs have been fully aligned with the SoS framework.

Third-tier assets are those identified as priorities through a strategic statewide threat abatement program but do not align with assets identified by SoS relating to threatened species or ecological community values. Examples of statewide efforts include *Biodiversity Priorities for Widespread Weeds*, and the *NSW Fox Threat Abatement Plan*.

If there is existing data about the location and values – such as threatened species and ecological communities – at the biodiversity assets identified in KTP strategies, and data on required activities such as threat abatement associated cost, this information can be incorporated into the broader SoS prioritisation. The relative priority of these assets for investment will be determined in part by their alignment with other SoS priorities.

With respect to non-asset-based investment (such as research and strategic actions), prioritisation within and between key threatening processes, as well as between these processes and other SoS priorities, will follow similar principles. Those activities that maximise outcomes across the program will be prioritised. This will be assessed according to how widely and to what extent the activity might benefit threatened species and ecological communities, the likelihood of the activity actually delivering benefits and the implementation cost relative to those benefits.

Therefore, most SoS investment specific to key threatening processes, as opposed to threatened species conservation projects, will be for prevention, containment, research or strategic activities.

Statewide biodiversity management and the KTP strategy

Managing and protecting biodiversity in NSW requires a whole-of-government approach. A number of programs and policies administered by various agencies are responsible for and contribute to biodiversity management in NSW. Most of these programs and policies identify a focus – native vegetation, environmental water, invasive species management – and will contribute significantly to the SoS key threatening processes objective relating to non-threatened biodiversity and ecological integrity, while SoS is the key program focused on threatened entities.

Therefore, as a targeted program with a specific objective relating to the security of threatened species and ecological communities, SoS will prioritise investment of resources towards activities and locations that align with this objective.

However, SoS acknowledges the importance of actions that prevent or contain threats that may cause species to become threatened in the future. A key aim of the KTP framework and strategies is to guide and focus investment from other stakeholders in biodiversity management in NSW so that it aligns with and complements SoS investment.

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