NSW GOVERNMENT
Office of Environment & Heritage

Review of the NSW Threatened Species Priorities Action Statement

Cover photos: main photo: *Hygrocybe collucera* – R. and E. Kearney; other photos left to right: broad-headed snake *Hoplocephalus bungaroides* – K. Bell; Yass daisy *Ammobium craspedioides* – B. Rickwood, OEH; peppered frog *Litoria piperata* – A. Payne; brush-tailed rock-wallaby *Petrogale penicillata* – P. Thomas, OEH; gang gang cockatoo *Callocephalon fimbriatum* – A. Blyth (pixelatedempire.com)

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Glossary of terms

Conservation status – refers to the threat category that each species, population or community is assigned to in the Schedules of the *Threatened Species Conservation Act 1995* (TSC Act). Threat categories are: 'vulnerable', 'endangered', 'critically endangered' and 'presumed extinct'.

Listed species – species, populations and communities that are listed as threatened in the Schedules of the TSC Act.

Newly-listed species, populations and communities – for the purposes of this report, species, populations and communities referred to as 'newly listed' have been listed as threatened in the TSC Act since the start of the review period, that is, between 2007–2010.

PAS Recovery Database – the database used for PAS reporting and action planning during the review period.

PAS actions – actions that contribute to the recovery of a species or help abate key threats, and are listed in the PAS Recovery Database.

Review period – refers to the period of operation of the PAS that is being reviewed in this report: 2007–2010.

Photo: M. Pennay

Large-eared pied bat *Chalinobus dwyeri*.

Executive summary

This report evaluates the performance of the NSW Threatened Species Priorities Action Statement (PAS) during its first three years of operation (2007–2010). The review is informed by:

- Office of Environment and Heritage (OEH) data on the commencement of PAS actions to recover threatened species and decrease the threats they face
- feedback from surveys of staff at OEH, in local government, at Taronga Zoo and in catchment management authorities (CMAs).

Through the PAS, NSW has become one of the first jurisdictions in the world to formally document the management requirements of its threatened species, populations and communities. This represents an important first step in the very large and complex task of recovering more than 1,000 threatened species and communities listed in the *Threatened Species Conservation Act 1995*.

The ten key findings of the review are:

1. A large amount of worthwhile, on-ground activity for threatened species occurred during 2007–2010. Around 4,000 management actions were commenced by OEH (see Section 5).
2. The extent to which these activities have benefited threatened species is unclear. The PAS Recovery Database recorded actions that were commenced but did not record the progress or outcomes of actions. Many actions had no follow-up monitoring. Where monitoring did occur, results were not captured in the database. It is therefore difficult to determine the extent to which PAS actions have produced successful outcomes for species.
3. Many threatened species (30%) received little or no management. Where species did receive management, most had **some**, but not **all** actions commenced. Only 15% of threatened species, populations and communities had more than 80% of actions pertaining to them commenced.
4. The PAS listed all actions that would benefit each species, prioritising them as critical to, contributing to or desirable for the recovery of the species. Desirable actions, usually requiring less investment upfront, were often implemented over critical actions due to the availability of resources.
5. The PAS prioritised actions for each species. Each region carried out its own prioritisation of species. There was no statewide prioritisation of investment in species management.
6. Objectives and performance measures were not clearly defined for PAS actions.
7. Communities and CMAs were successfully engaged in many projects by the regional staff of OEH. However, opportunities for species-wide partnerships, crossing administrative boundaries and tenures, were not always harnessed.
8. Uptake of the PAS was lower than expected, largely due to difficulties with ongoing coordination and resourcing of the program.
9. Stakeholder surveys revealed that PAS actions were not specific enough to be useful in planning and implementing projects for the recovery of threatened species.
10. The PAS Recovery Database did not deliver on the key reporting needs of the program. Surveys revealed that the database was difficult to use and problems were not resolved due to a lack of resources. The database was not accessible to people outside OEH, limiting the scale of reporting.

The review recommends the following improvements to the PAS:

Recommendation 1. Establish six new management streams to better target the management of each threatened species.

Recommendation 2. Enhance uptake of the PAS and raise community awareness.

Recommendation 3. Make PAS actions, and their timing, more specific.

Recommendation 4. Provide a framework for local actions to contribute to statewide outcomes for species.

Recommendation 5. Target investment at the minimum set of actions that are crucial for securing a species.

Recommendation 6. Develop a sound, repeatable and transparent process for prioritising effort between species statewide.

Recommendation 7. Develop a process for monitoring and reporting on the outcomes of projects and actions for threatened species.

Recommendation 8. Develop a simple, user-friendly database to support program delivery.

Photo: OEH

Dillwynia tenuifolia.

1 About the NSW Threatened Species Priorities Action Statement (PAS)

The NSW *Threatened Species Conservation Act 1995* (TSC Act) was established to identify the plants, animals, populations and ecological communities that are threatened with extinction in NSW; and to provide for their protection. The NSW Threatened Species Priorities Action Statement (PAS) is the NSW Government's primary tool for managing the more than 1,000 threatened species, populations and communities that live in NSW. The Office of Environment and Heritage (OEH) administers the PAS, as set out in Part 5A, Section 90A, of the TSC Act. Through the PAS:

- actions for each threatened species, population and community in NSW are documented – these actions aim to promote the recovery of threatened species and manage the key threats they face
- priorities for managing threatened species are developed
- performance indicators to monitor and report on effectiveness are established
- clear timeframes for planning, implementing and reporting on PAS actions are set out.

The PAS can be viewed online at www.threatenedspecies.environment.nsw.gov.au.

Photo: J. Evans

Thirty-six actions for securing the spotted-tailed quoll are documented in the PAS. One action that was commenced during the review period was to: 'investigate the impact of fox and wild dog baiting on spotted-tailed quoll populations'.

1.1 The need for a PAS

Over 15 years have passed since the TSC Act was first introduced, and the number of threatened plants, animals and communities listed in the Act has grown to over 1,000. Before 2004, the TSC Act required a recovery plan to be prepared for every threatened species and community listed in the Act. The preparation of individual recovery plans for such a large number of species and communities proved to be impractical. For example, costs for preparing recovery plans varied greatly and were estimated to be between $5,000 and $200,000 (ANAO 2007, *The conservation and protection of national threatened species and ecological communities*, Australian National Audit Office, Department of the Environment and Water Resources, Audit Report No 31).

When the PAS was introduced, the rate of plan preparation was not keeping pace with the rate at which new species were listed. The amount of government investment in preparing the plans was disproportionately high compared with investment in recovery and threat abatement actions.

It became clear that a new program was needed to correct the imbalance between planning and implementation. That need was met with the introduction of the PAS in 2007.

Recovery plans continue to be important for guiding the recovery of high-profile, complex or critically endangered threatened species. However, around 90% of threatened species in NSW do not have a recovery plan, and are managed solely under the PAS.

1.2 What does the PAS contain?

The PAS contains a list of the actions that are important for recovering each threatened species, population and community, and for decreasing each key threat, in NSW. In 2007, when the PAS was formally approved, more than 10,000 actions were publicly exhibited. Feedback was used to improve and update the actions.

All the PAS actions are compiled in the PAS Recovery Database, which records when each action is commenced and supports OEH regional planning for recovery of threatened species. The database links to the PAS website (www.threatenedspecies.environment.nsw.gov.au) where all PAS actions can be viewed by the public. Stakeholders can use the PAS to support the development and implementation of management programs.

Each PAS action is assigned to one of 34 recovery and threat abatement strategies (e.g. habitat management, community liaison). The implementation of PAS actions under each strategy can be assessed to better understand the types of activities that are being managed.

2 Review purpose and methods

The Chief Executive of OEH is required by the TSC Act to review the PAS every three years. The purpose of this review is to evaluate the performance of the PAS during 2007–2010, and to identify proposals for improving its effectiveness.

The information used to inform this review came from:

- an analysis of data from OEH staff on action commencement – most information was taken from the PAS Recovery Database
- outcomes of workshops with OEH staff, and staff surveys to better understand issues and concerns with OEH priority action implementation, and with the effectiveness of the PAS Recovery Database
- surveys that were sent to catchment management authorities and local councils via the Local Government and Shires Associations, to capture information about the implementation of PAS actions outside OEH, and to better understand the factors influencing the take-up of the PAS.

As the PAS Recovery Database cannot currently report on the outcomes of PAS actions for threatened species, case studies from various agencies were collected to provide details of such outcomes.

Photo: B.C. Tørrissen

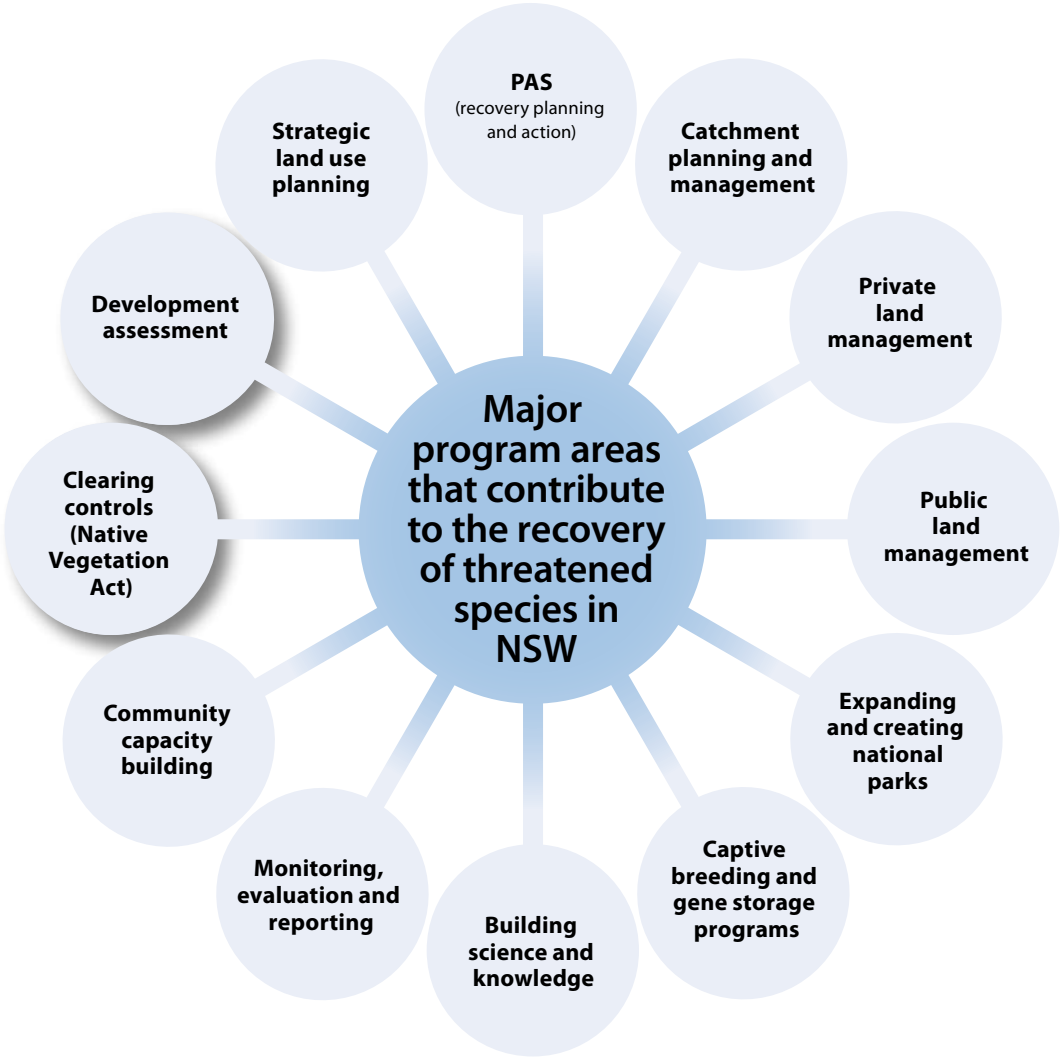
Rose-crowned fruit doves are shy, colourful rainforest pigeons that are listed as threatened in the TSC Act and are managed under the PAS.

3 Threatened species management in NSW

OEH is responsible for managing threatened species in accordance with the objectives of the TSC Act, which are to 'promote the recovery' and 'prevent the extinction' of threatened species. OEH uses a range of programs and policies to manage threatened species, often involving partnerships with other public and private land managers. The laws, programs and policies that interact to recover threatened species and communities, and abate key threats, are summarised in Figure 1 below.

The PAS is an important part of the NSW Government's strategy for recovering threatened species, populations and communities and decreasing key threats.

Figure 1 Laws, programs and policies for threatened species management in NSW



CMA = catchment management authority; MER Strategy = Monitoring, Evaluating and Reporting Strategy

More than 1,000 plants, animals and ecological communities are threatened with extinction in NSW, as listed in the Schedules of the TSC Act. Of these, 892 are species, 44 are endangered populations and 101 are ecological communities. Seventy-three species are presumed to be extinct in the wild.

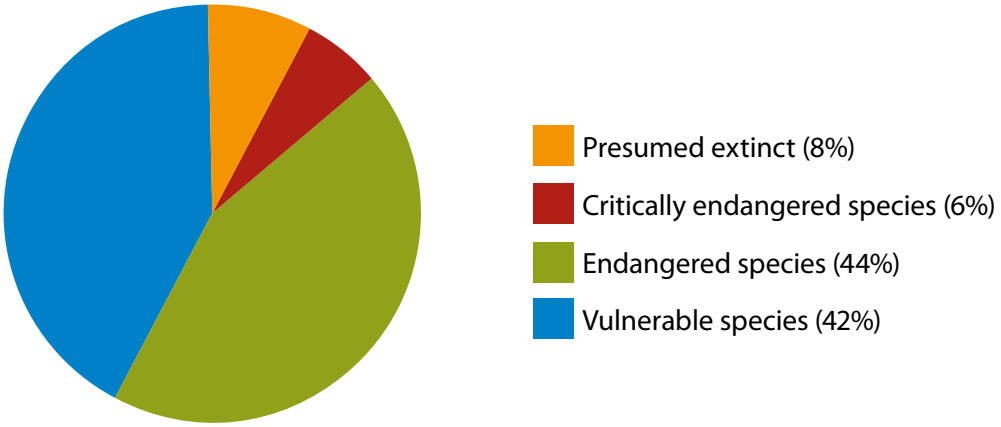
Species, endangered populations and ecological communities are listed in the TSC Act according to their vulnerability to extinction, as:

- **presumed extinct** if they have not been seen in nature during the past 50 years, despite the searching of known and likely habitats
- **critically endangered** if they face an extremely high risk of extinction in NSW in the immediate future
- **endangered** if they are likely to become extinct or are in immediate danger of extinction in the wild in NSW
- **vulnerable** if they are likely to become endangered unless threats cease.

The TSC Act also identifies 35 pressures that are 'key threatening processes' for threatened species in NSW.

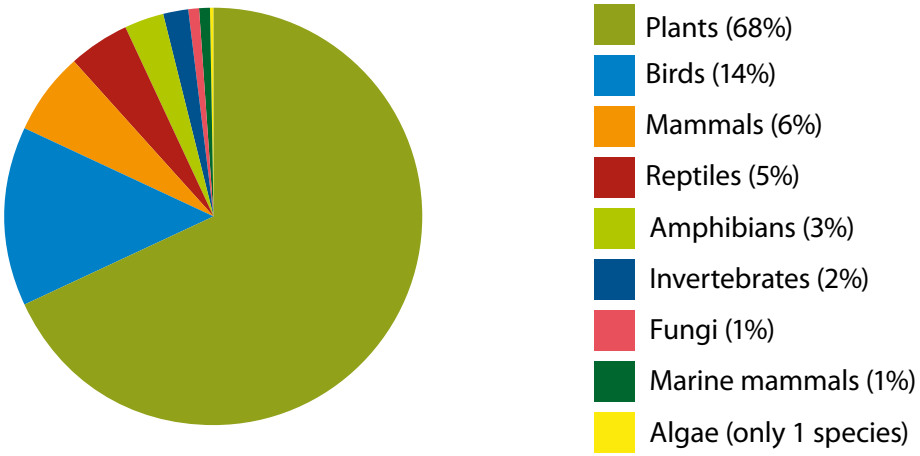
Figure 2 indicates the proportion of threatened species in NSW listed in each category according to their vulnerability to extinction.

Figure 2 The percentage of threatened species listed in each conservation status category



Around two-thirds, or 68%, of threatened species are plants. Many of these are naturally rare and are stable across their current range, but remain on the list due to their restricted distribution. The next largest group are birds, followed by mammals. Figure 3 provides more precise information.

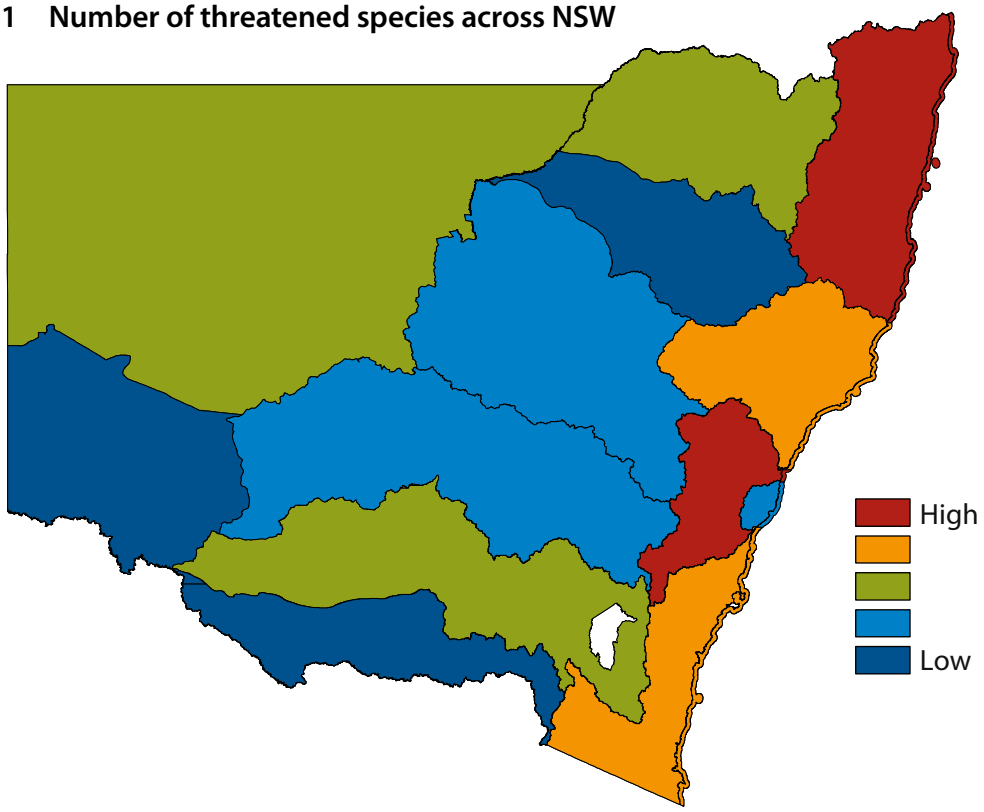
Figure 3 The percentage of threatened species from different taxonomic groups



Mammal species are the most threatened group in NSW, with 59% of all mammal species threatened with extinction compared with 28% of birds, 34% of amphibians, 18% of reptiles and 13% of plants.

Threatened species are not distributed evenly across NSW. Higher numbers can be found along coastal areas where threats are intense and there are more species (see Map 1).

Map 1 Number of threatened species across NSW



Note: 'High' in the legend indicates the presence of many threatened species. 'Low' indicates few threatened species.

Threatened species are also listed in other legislation. The *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) lists threatened species of national significance and the *Fisheries Management Act 1994* lists aquatic threatened species.

4 Implementing the PAS, 2007–2010

Through the PAS, NSW has become one of the first jurisdictions in the world to formally document the management requirements of its listed threatened species, populations and communities.

In total, over 10,000 PAS actions are in place for guiding the management of 91% of all threatened species and communities in NSW. PAS actions consist of:

- **recovery actions** for individual threatened species or groups of species
- **actions that aim to decrease a specific threat or key threatening process** affecting one or more threatened species.

Recovery actions were developed for 822 threatened species (93% of all threatened species), 35 endangered populations (81%) and 82 threatened ecological communities (84%). Actions were developed to deal with 31 key threatening processes (89%). Of the remaining 95 threatened species and communities, and 4 key threatening processes that have no PAS actions associated with them, around half are newly listed.

The PAS listed **all** actions that would bring some benefit to each species, prioritising them as critical, contributing or desirable for the recovery of the species. Desirable actions, usually requiring less investment upfront, were often implemented over critical actions due to the availability of resources. The review recommends prioritising entire projects for species rather than individual actions (see Recommendation 5 in Section 6).

During 2007–2010, OEH commenced work on 4,482 PAS actions. Actions for approximately two-thirds of NSW threatened species (692 species) were commenced. Thirty percent of species received little or no management.

The ongoing nature of many PAS actions, and limitations with the design of reporting fields in the PAS Recovery Database, have meant that this review can only report whether actions have been 'commenced', but not whether they have been completed or are ongoing.

4.1 Implementing PAS actions

The decision to carry out PAS actions was made by regional OEH staff who worked closely with local partners including catchment management authorities, local councils, non-government organisations, local businesses and community groups. Regional choices were made according to regional priorities, opportunities and resources and were influenced by the following factors:

- **conservation status** – species with a higher risk of extinction had marginally higher rates of action commencement (see Figure 4). In reality, although extinction risk strongly influenced regional priorities for action commencement, this effect was diluted because vulnerable species are more widespread than endangered or critically endangered species, and were therefore more likely to benefit from routine pest, weed and fire management programs.
- **taxonomic group** – more actions were commenced for invertebrates and amphibians than for vascular or non-vascular plants (see Figure 5).
- **action type** – habitat management actions were the most common type of action carried out, followed by research and survey actions (see Figure 6).

- **community interest and involvement** – community interests were very influential in regional decision-making for threatened species. For instance, the Northern Rivers Biodiversity Management Plan was the main vehicle for acting on the PAS in that region and was strongly influenced by community input and the involvement of local organisations, businesses and community groups. Similar plans and strategies influenced PAS implementation in other parts of NSW.
- **cost of actions and resource availability** – in most cases, some but not all actions for a species were commenced due to the availability of resources. Only 15% of species had more than 80% of their actions commenced (see Figure 7).

Figure 4 Rate of actions commenced according to conservation listing status

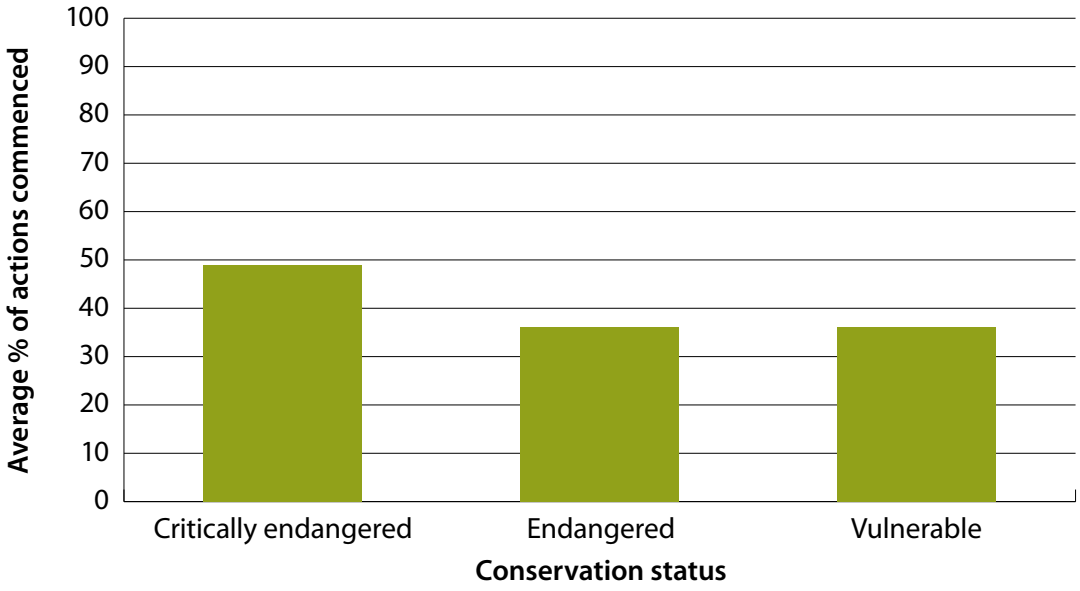


Figure 5 The average percentage of actions commenced for different threatened taxa in NSW

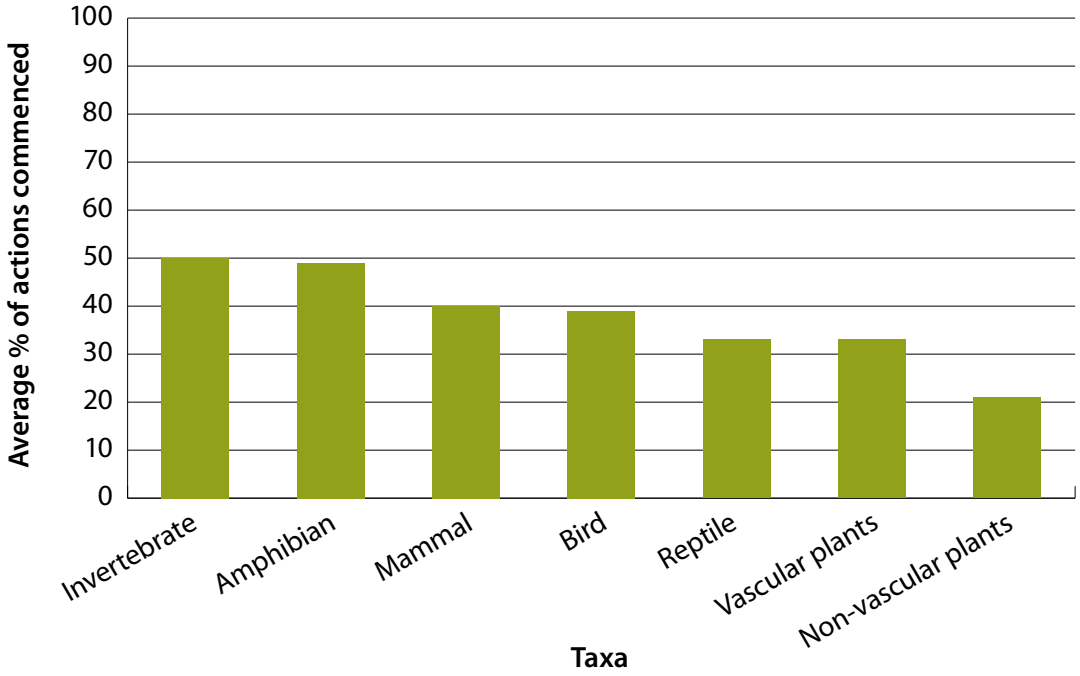


Figure 6 Percentage of actions commenced by action type

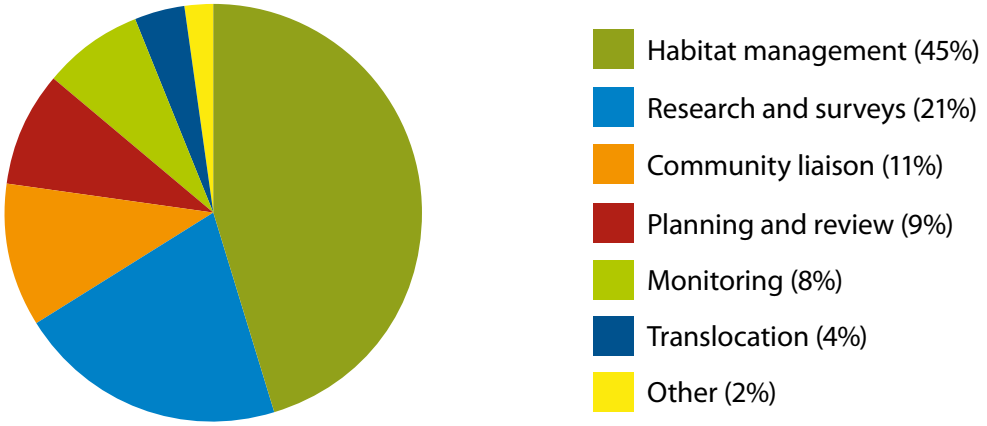
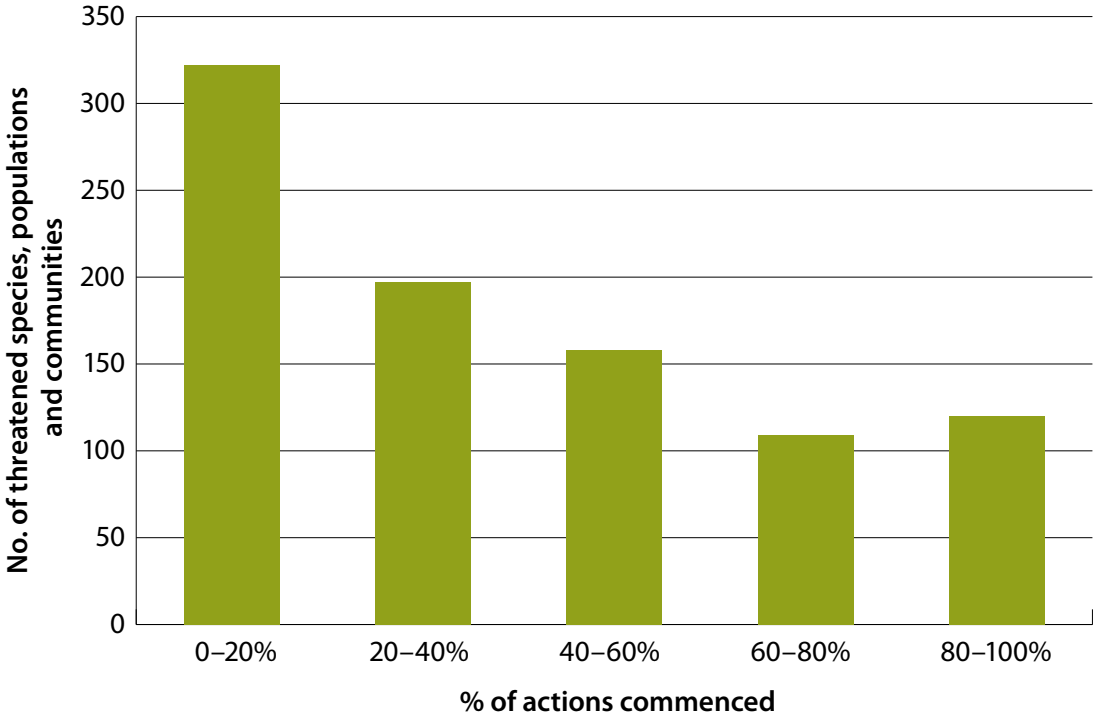


Figure 7 Percentage of actions commenced for different threatened species, populations and communities



4.2 Implementing actions for key threatening processes

PAS actions for key threatening processes were commenced at a much higher rate than actions for species. Three very successful threat abatement plans (TAPs) to control foxes, mosquito fish and bitou bush have been developed.

All PAS actions were commenced for the fox TAP during the review period (see case study).

The success of TAPs in achieving results can be attributed to factors including strong program coordination, clearly defined objectives, dedicated funding, a high level of stakeholder engagement, effective monitoring, adaptive management, and a strong and transparent process for prioritising actions.

Case study: Fox control gains large and lasting benefits for threatened species

Predation by the European fox has caused the extinction of several species in NSW, and continues to threaten others. The widespread distribution of foxes, and the scale of resources required for their control, makes complete eradication infeasible. As a result, in 2001 a threat abatement plan was developed to establish priorities for managing foxes. Fox control and monitoring have been carried out since 2001 at 89 management sites containing highly-susceptible threatened species. Threatened species that have benefited from fox control include the little tern, pied oystercatcher, brush-tailed rock-wallaby and yellow-footed rock-wallaby.

The TAP program will continue to control foxes over more than 1 million hectares, with ongoing reporting indicating large and lasting benefits for NSW threatened species.

Photo: OEH

Numbers of the yellow-footed rock-wallaby *Petrogale xanthopus* have increased as a result of fox control.

4.3 Who is implementing PAS actions?

Threatened species management in national parks and reserves

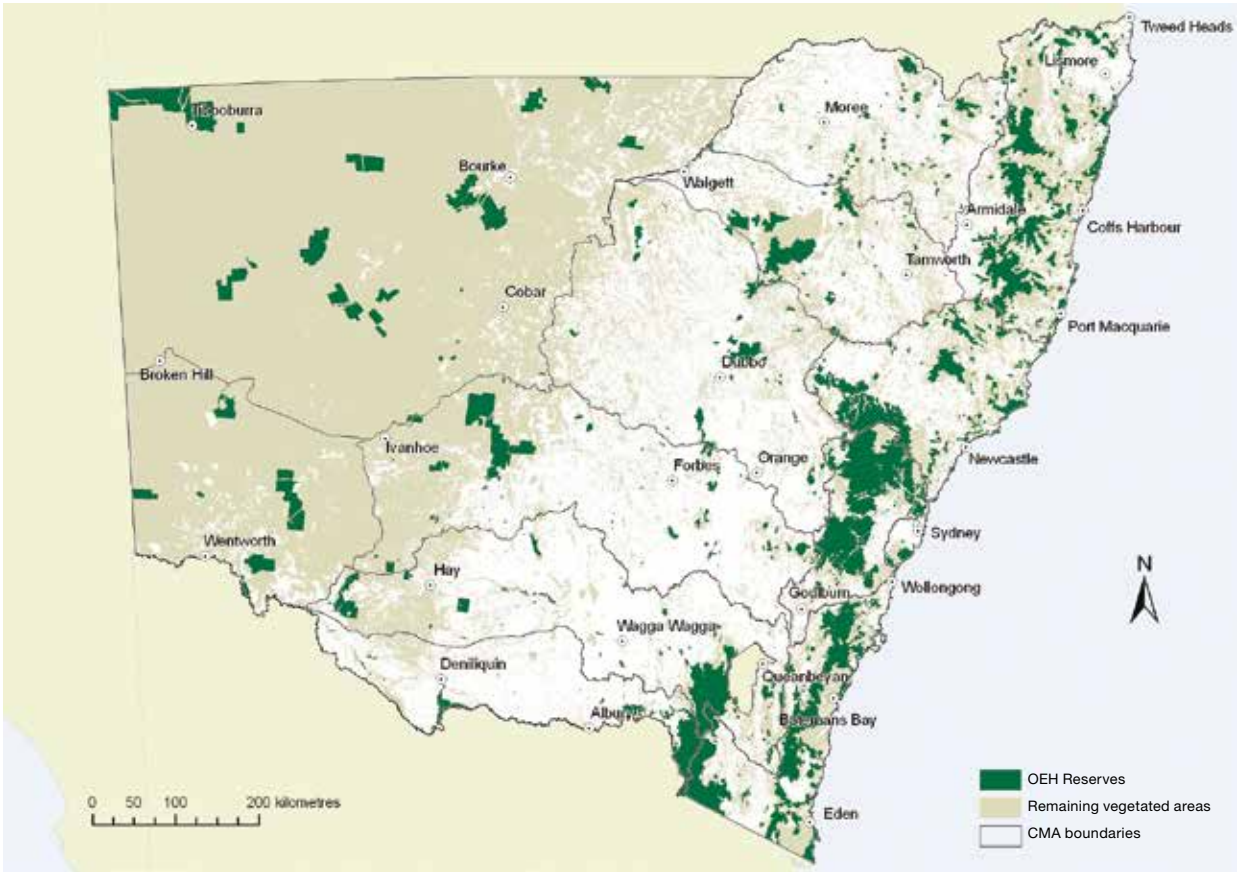
As roughly 90% of threatened species have at least some part of their distribution in NSW national parks and nature reserves, these areas play a vital role in threatened species recovery and management. Threatened species management is an important factor in directing park management actions, particularly programs relating to weed, pest and fire management.

More than half of all PAS actions were undertaken in parks and reserves. PAS actions were commenced for approximately 473 threatened species and communities in parks and reserves, including 167 animal species, 262 plant species and 42 threatened ecological communities.

OEH national parks staff were surveyed about the performance of the PAS. Around half of them thought PAS actions were too general to be useful in program planning for parks. Most respondents believed PAS actions could be improved by being more specific about location, methods and timing.

The presence of threatened species and ecological communities continues to be an important consideration when expanding existing parks or adding new parks to the NSW national parks system.

Map 2 OEH parks and reserves



Threatened species management on private and other public land

Around 10% of threatened species occur entirely outside the reserve system. OEH has worked extensively across NSW with local councils, catchment management authorities, community and environmental groups, public land managers and private landowners to prioritise, plan and implement PAS actions on public and privately-managed land outside the NSW national parks system.

During the review period, OEH regional staff used PAS actions to develop a small number of 'investment-ready' projects to be taken up and implemented by external stakeholders. The projects linked actions to specific sites, and identified opportunities for cost-sharing or partnerships with other organisations, so were considered more useful for stakeholders than the actions alone.

PAS actions were used by organisations and individuals such as local councils, catchment management authorities, community groups, non-government organisations and consultants for planning threatened species work on both public and privately-owned land. The PAS website was used to inform management plans for catchment management authorities and councils, and to support funding bids for community conservation programs.

External groups have been responsible for implementing many PAS actions. For instance, under the PAS, the Zoological Parks Board maintained captive populations of the broad-headed snake and the green and golden bell frog.

Unfortunately, information on implementation of PAS actions by organisations other than OEH was not collected in the PAS Recovery Database, so cannot be readily quantified. One outcome of the review is to recommend making it easier for external stakeholders to report on action progress so this work can be given recognition for its contribution to threatened species recovery (see Recommendation 7 in Section 6).

Photo: N. Corkish, OEH

Captive breeding of the green and golden bell frog by the Zoological Parks Board will increase the numbers and resilience of this species

The role of catchment management authorities

Catchment management authorities (CMAs) are in a good position to contribute to threatened species recovery across NSW. All 13 CMAs were contacted for the purpose of this review for information about:

- CMA implementation of PAS actions
- the usefulness of the PAS for CMA work planning.

Eight CMAs responded, reporting on the implementation of more than 600 PAS actions. Such information does not, however, reflect the effort expended by CMAs in threatened species recovery during the review period due to low levels of reporting.

Only five CMAs reported that they used the PAS to develop their threatened species work programs. CMA staff suggested that the PAS would be more useful as a planning tool if actions were more detailed and specific in terms of methods, timing and location. Staff also indicated that aligning the monitoring and reporting processes of the PAS with the monitoring and reporting standards and requirements of CMAs would enhance staff uptake of PAS programs. A user-friendly online reporting tool would be required for CMAs to contribute to reporting. This review recommends the implementation of such a tool (see Recommendation 8 in Section 6).

5 Achievements of threatened species conservation

The PAS has generated many positive outcomes for threatened species across NSW. These outcomes have been achieved through the hard work and cooperation of a range of groups and organisations including OEH, catchment management authorities, local councils, public land managers, community groups and private landholders. Some outstanding achievements are described below.

Unfortunately, the PAS did not monitor and report on outcomes for threatened species. It has therefore been difficult to assess how effective the PAS has been in achieving positive outcomes for most threatened species.

It is a key recommendation of this report that transparent processes for monitoring and reporting on outcomes be introduced (see Recommendation 7 in Section 6).

5.1 Successful habitat management programs

- **Numbers of little penguins in the Manly colony have increased** as a result of predator control, site protection and the dedication of a group of committed volunteers.
- **The largest known population of the Illawarra greenhood orchid has grown** due to cooperative action by OEH and a private landholder under a voluntary conservation agreement to control weeds, close tracks and rehabilitate habitat.
- **There are more green and golden bell frogs at several key sites** due to various organisations including the Zoological Parks Board controlling predators and restoring habitat.
- **Breeding pairs of little terns, hooded plovers, sooty oystercatchers and pied oystercatchers have increased** along the NSW coast due to a huge effort by community members and OEH to recover habitat for shorebirds.
- **One of the most extensive surveys of koalas ever conducted in Australia has been carried out** by more than 300 volunteers and OEH staff to obtain better management information for halting the decline of koalas in south-east NSW.
- **The condition of the largest remaining stand of Hunter weeping myall woodland has been improved** by weed control carried out cooperatively by the Department of Primary Industries, Singleton Council and OEH.
- **The only remaining population of Myall Creek wattle has grown** due to a liaison between land holders to install exclusion fencing and preserve habitat.
- **A key population of *Zieria obcordata* has been secured** through fencing and population augmentation through a collaborative effort between OEH, private land holders and the Australian National Herbarium.

Photo: P. Shanks

Four populations of the purple copper butterfly have been secured through weed removal and planting of the host plant, *Bursaria spinosa* subsp. *lasiophylla*.

- **The condition of 100 hectares of the endangered white box–yellow box–Blakely's red gum grassy woodland in the upper Namoi Catchment has been improved** through OEH intensively controlling Coolatai grass with funding assistance from the Australian Government.
- **Several sites have been re-colonised by the broad-headed snake** due to its habitat being restored with artificial bush rock by OEH.

5.2 Innovative breeding and reintroduction programs

- **More than 100 critically endangered spotted tree frogs have been bred in captivity and released into Kosciusko National Park where they are now breeding**. The spotted tree frog was technically extinct in NSW before this OEH program commenced.
- **Three new healthy populations of the critically endangered coastal fontainea have been established** jointly by OEH, Northern Rivers Catchment Management Authority and Ballina Council.
- **Translocation of the endangered Tumut grevillea has increased one population on private land from 6 plants to 70 plants, and has established a new population of more than 50 plants on another private site**.
- **Experimental releases of the southern Corroboree frog, one of the world's most endangered animals have prevented this species from vanishing forever from the wild**. OEH has worked in partnership with Taronga and Melbourne zoos to achieve this outcome.
- **Brush-tailed rock-wallaby populations have grown at Jenolan Caves and stablised in Warrumbungle National Park.** At Jenolan Caves, rock-wallabies are re-colonising habitat they have been absent from for decades.
- **The Royal Botanic Gardens Trust has discovered effective propagation techniques for *Persoonia pauciflora* so this species can be successfully translocated**. One population has also been protected by a voluntary conservation agreement between Cessnock City Council, the Department of Primary Industries and a dedicated local land holder.

5.3 Securing habitat through partnerships with public and private land holders

- **A very large area of vital threatened species habitat has been secured in north-east NSW, leading to improved protection for 6 endangered ecological communities (including rainforests, coastal lowlands and swamps, and woodlands), 15 threatened plants and 51 threatened animal species.** OEH has worked with Local Aboriginal Land Councils and land corporations to preserve this area, which includes 100 hectares near Nimbin, 2,700 hectares near Glen Innes and 1,027 hectares near Ballina.
- **A network of more than 1,000 land managers, government departments and researchers has been established to conserve the white box–yellow box–Blakely's red gum grassy woodland endangered ecological community in NSW.** Through the network, training, on-ground management, research and protection of the woodland community is occurring across a large area of the sheep–wheat belt.
- **One of the largest remaining remnants of eastern suburbs banksia scrub has been reserved at Malabar Headland**.
- **Forty-six hectares of vital breeding habitat for the regent honeyeater have been secured by a land covenant in the Lower Hunter Valley** between Birds Australia and the NSW Nature Conservation Trust.

6 Recommendations for the future of the PAS

The findings of this review have been used to develop a set of recommendations that will guide the redevelopment of the PAS and enable threatened species conservation to be even more effective.

Recommendation 1: Establish six new management streams to better target the management of each threatened species

Delivering effective management to each of the 892 unique threatened species (as at October 2011) listed in NSW is a complex and challenging task. As a result, each species will be allocated to one of six management streams depending on factors such as the amount of information available on the species, the species' value to the community, the species' distribution and the scale of the threats facing the species.

The management streams will guide decision-makers and the public in organising management planning for species of interest and discerning the most appropriate management actions for each species. Listing species in management streams will also clarify the way in which each species will be managed, enhancing the transparency of the program.

Note that OEH is looking at ways of improving the delivery and prioritisation of actions for endangered ecological communities and key threatening processes which are also managed under the PAS.

Photo: M. van Ewijk

OEH has increased the population of Nielson Park she-oaks *Allocasuarina portuensis* from 2 to 130 individuals, saving this species from certain extinction.

The six management streams

1. **Site-managed species (45% of NSW threatened species):** species that require active, site-based management will be managed through targeted **species projects.** These projects will list all necessary actions at all critical sites to secure each species in the wild for the next 100 years. Actions will be able to be delivered statewide or locally, and will be scoped, assessed for feasibility, fully costed and prioritised (see Recommendation 3).
2. **Iconic species (<1% of NSW threatened species):** these species will be managed considering community expectations, and community participation in species recovery will be supported and encouraged. Iconic **species projects** will take existing recovery plans into account when defining sites, actions and costs. Iconic species will not be prioritised on the basis of cost effectiveness.
3. **Data-deficient species (10% of NSW threatened species):** species for which there is insufficient information available to develop **species projects** for their recovery. Further research into their ecology and the threats facing them are needed. A **species profile** will be prepared for each species which will contain known information about the species, identify knowledge gaps to be filled, and set out research and survey priorities. Once relevant knowledge is obtained, the species can be transferred to the site-managed species management stream.
4. **Landscape-managed species (15% of NSW threatened species):** species that are typically distributed widely and are most vulnerable to the threat of habitat loss or degradation. The security of such species depends more on the total extent and condition of available habitat in NSW than on any particular management actions at any particular site. These species will largely be managed through existing programs, policies and laws such as the *Native Vegetation Act 2003,* through conservation of habitat in national parks and reserves through the *National Parks and Wildlife Act 1974*, and through catchment management authority programs that protect and improve the condition of native vegetation in NSW.
5. **'Keep watch' species' (10% of NSW threatened species):** species that require no immediate investment either because they are naturally rare with no known threats or are more abundant than previously assumed. OEH will keep a 'watching brief' on these species, and only undertake action if they begin to decline or threats increase.
6. **Partnership species (15% of NSW threatened species):** species that are migratory, vagrant, or have less than 10% of their distribution in NSW. Programs for these species are coordinated by other jurisdictions and OEH will remain an active participant.

The orange bellied parrot is an example of a partnership species. Photo: J.J. Harrison.

The gang gang cockatoo is an example of a landscape-managed species. Photo: B. Twist.

The broad headed snake is an example of a site-managed species. Photo: K. Bell.

The sooty tern is an example of a 'keep watch' species. Photo: D. Wright.

The koala is an example of an iconic species. Photo: E. Veland.

The pale imperial hairstreak is an example of a data-deficient species. Photo: B. Thompson.

Recommendation 2: Enhance uptake of the PAS and raise community awareness

Uptake of the PAS program was lower than expected during the review period due to:

- difficulties with ongoing coordination of the program
- missed opportunities for species-wide partnerships that cross administrative boundaries and tenures.

This review recommends a greater focus to be placed on engaging and coordinating the efforts of community groups, the corporate sector, private land holders, catchment management authorities, local councils, OEH and other public land managers to benefit a species across NSW. A communication plan will be developed to foster engagement with external stakeholders including the community.

This review recognises there is enormous potential for harnessing the combined efforts of a broad range of stakeholders to deliver successful outcomes for threatened species across NSW.

Photo: J. Bonsell

Much work has already been undertaken by stakeholders such as Birds Australia and the NSW Nature Conservation Trust to save the regent honeyeater. This species could be further helped through increased community awareness.

Recommendation 3: Make PAS actions, and their timing, more specific

Stakeholder surveys revealed that PAS actions were not specific enough to be useful in planning and implementing projects for the recovery of threatened species.

The review recommends developing **species projects** or **species action statements** for each species in every management stream (see Recommendation 1). The projects should clearly set out the management actions required at particular locations for each species. Actions should be fully costed, mapped, assessed for feasibility and prioritised. Although actions will be developed to apply statewide, they should be specific enough to be delivered locally by organisations and individuals. All actions will be placed on www.environment.nsw.gov.au/threatenedspecies/.

The benefits of this recommendation will be to improve transparency, enhance the capacity for external stakeholders to be engaged in threatened species work, and provide a more useful input to OEH work planning.

Recommendation 4: Provide a framework for local actions to contribute to statewide outcomes for species

A key recommendation of this review is to maximise the number of organisations that can manage and contribute to recovery actions for threatened species. These organisations need actions that are well-defined and mapped, and can be searched on and downloaded from the internet (see Recommendation 3).

Initiatives to encourage local involvement in actions to secure threatened species could include:

- corporate investors would be able to 'buy' the security of a threatened species for 50 years
- public and private land managers could search the website, join a species project and carry out specific actions to contribute to the recovery of a threatened species in their area
- catchment management authorities and councils could match local priority management sites with appropriate threatened species investment, and find potential partners and funding opportunities
- community groups could become involved by adopting a site, volunteering as part of a project, or working with other organisations. Local businesses could support community projects.
- OEH could incorporate actions into routine park management activities.

Information on the cost-effectiveness of actions (see Recommendation 6) could be used to support decision-making by any statewide or local group or individual.

Recommendation 5: Target investment at the minimum set of actions that are crucial for securing a species

The PAS listed **all** actions that would benefit a species, prioritising them as critical to, contributing to or desirable for the recovery of the species. Desirable actions, usually requiring less investment upfront, were often implemented over critical actions due to the availability of resources.

The review recommends that only actions and sites that are **essential** for securing a species should be identified in the species projects. Funding would be sought by OEH primarily for the minimum number of actions at the minimum number of sites needed to secure a species. When a species project is selected for implementation, the complete set of actions identified with it should be completed to achieve the project's objective. By following this procedure, OEH can maximise the number of threatened species that can be secured with available funding. Nevertheless, all sites and actions for a threatened species are important and other potential investors including local and Commonwealth government agencies, the private sector and non-government organisations may seek to invest in additional sites and actions.

Photo: B. Twist

Masked owl *Tyto novaehollandiae*.

Recommendation 6: Develop a sound, repeatable and transparent process for prioritising effort between species statewide

The TSC Act requires that the PAS establish priorities for threatened species management. During the review period, the PAS program prioritised actions but did not prioritise how investment should be allocated between species. Instead, species were prioritised regionally. This review recommends prioritising species statewide, using one standard approach.

Over the past 15 years, the list of threatened species and communities in NSW has grown to include over 1,000 species, populations and communities. In order to distribute resources effectively over such a large number of species, a number of factors should be considered:

- the urgency of management for a species – the greater the risk of extinction, the more urgent the need for management
- the feasibility of management – how effective actions will be in securing the species
- the cost of management – so benefits can be achieved for the greatest number of species with the limited resources available.

Information on the cost-effectiveness of management for each species should be used to support decision-making across the State.

Recommendation 7: Develop a process for monitoring and reporting on the outcomes of projects and actions for threatened species

Many worthwhile activities for threatened species were carried out during the review period (see Section 5). However, the extent to which some of these activities achieved successful outcomes is unclear. Many actions had no monitoring. Where monitoring did occur, results were not recorded in the PAS Recovery Database.

The review recommends that monitoring be included as an action in every **species project** developed under a new program (see Recommendation 1). Monitoring results should be regularly reviewed and reported on publicly, to ensure transparency. Monitoring and reporting would build on the capacity of the PAS to assess outcomes from government and non-government investment in threatened species and to demonstrate the results achieved with this investment.

Establishing measurable performance indicators for the PAS is a requirement under the TSC Act. Performance indicators should be developed that reflect:

1. the degree to which actions have been successfully implemented
2. the costs of implementation
3. the response of species to management.

Recommendation 8: Develop a simple, user-friendly database to support program delivery

During the review period, the PAS Recovery Database did not deliver on its key functions for the program. In particular, users reported that the database was difficult to use and problems were not rectified due to a lack of resources. The database was only accessible to a small number of OEH staff, limiting the scale of reporting.

This review recommends developing a new database to coordinate management of actions and track outcomes. The database should be interactive and made available to all users on the PAS website. Staff surveyed commented that the database should perform the following functions:

- display all the actions for every species
- store monitoring and reporting information on each action
- generate reports for reviewing performance
- provide a framework for coordinating management across tenures and administrative boundaries
- enable any member of the public to search for information
- link to other relevant databases
- act as a 'prospectus' for investment in threatened species recovery, by being easy to use and containing information which is easily accessible.

Photo: M. G. Jeffries

Boronia granitica.

7 Conclusion

Between 2007 and 2010, across NSW, thousands of individual actions were undertaken through the PAS that have contributed directly to the recovery of threatened species, populations and ecological communities. Actions have been made possible through the funding, collaboration and involvement of a large number of individuals, community groups, organisations, businesses and Commonwealth, State and local government agencies across NSW.

Despite all this activity, the PAS has not delivered on some of its intended functions such as supporting OEH work planning, prioritising investment and assessing program performance. A new program is being designed to deal with these limitations by bringing structure, efficiency and adaptive learning to management of the State's threatened species, populations and communities. By implementing the recommendations set out in this review, the NSW Government will deliver on its commitment to securing the future of the plants, animals and ecosystems of NSW that are threatened with extinction.

Photo: J J Harrison

Scarlet robin *Petroica boodang*.

8 Appendix: Number of threatened taxa in NSW

As listed Schedules 1, 2 and 3 of the TSC Act. This number is accurate as at April 2012.

	Species presumed extinct	Critically endangered species	Endangered species	Vulnerable species	Endangered populations
Amphibians	0	5	12	11	1
Reptiles	1	0	16	24	1
Birds	12	11	22	90	7
Mammals	25	2	16	39	10
Marine mammals	0	0	2	5	0
Invertebrates	1	1	15	0	1
Plants	33	44	333	231	24
Alga	0	0	2	0	0
Fungi	0	0	5	4	0
Ecological communities	0	8	89	4	–

Total listed species = 890 (excluding species presumed extinct).
Total listed species, populations and communities = 1,107.
Number of key threatening processes = 37.

www.environment.nsw.gov.au