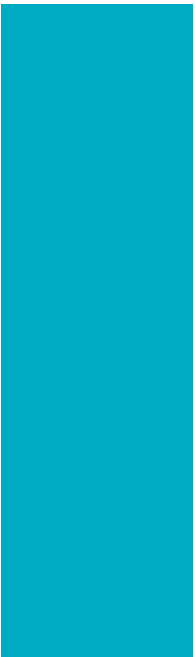
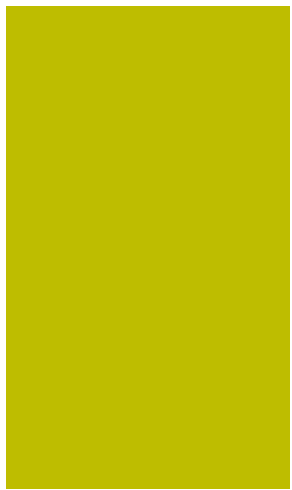


Threatened and pest animals of Greater Southern Sydney



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Note that some of the records shown on the habitat maps were not used to predict habitat because of their age, unreliable species identification or poor spatial accuracy.

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1. Introduction

Over 50 species of native animal have become extinct in Australia since 1788, and many more species are nearly extinct. Many birds, mammals, frogs and reptiles are also threatened, and often small and isolated populations are all that remain of once-common species.

Reasons for the decline of these species vary but include:

- > the loss of habitat through clearing and fragmentation of native vegetation
- > introduced species such as foxes and rabbits
- > altered fire regimes
- > introduced pathogens causing disease
- > hunting and direct exploitation.

Giant burrowing frog.

More research is needed to understand native animals and their habitats, the reasons why some species are declining, and the relationship between ecosystem health and services such as provision of clean water. This is particularly important in Sydney, a city of nearly five million people that is next to a vast natural landscape where the city's drinking water catchments are located and land has been reserved for conservation. Despite being close to Australia's greatest metropolis, the fauna from this area were relatively poorly known until recently, and the decline of many native animals in this area, the Greater Southern Sydney Region, has been of great concern.

Since the eighteenth century, foreign animals have been introduced such as rabbits, cats and foxes, which have caused the decline or extinction of many native animals. In addition, much native animal habitat has been lost to development. The Greater Southern Sydney Region was one of the first places in Australia where the landscape was rapidly transformed from native bushland and grassy open woodlands into agricultural land. The best areas to farm were fertile soils and flat, easy-to-work terrain, with good rainfall. The Cumberland Plain between Campbelltown and Camden was quickly cleared, as were the coastal plain of the Illawarra and flat land in the Burragorang Valley. Animals that depended on these environments were affected, with ground mammals such as bettongs becoming locally extinct. In the Illawarra, stands of subtropical rainforest were cleared and some species that depended on the southern outreaches of these forests disappeared, such as the wompoo fruit-dove.

Housing now covers much of the former agricultural land of western Sydney and around Wollongong. This has introduced a new range of impacts, including altered drainage patterns, weeds and domestic animals that increase pressure on remaining bushland. Coastal landscapes in particular have been dramatically altered with estuaries and wetlands filled to provide industrial land and sporting fields. Meanwhile, the rocky expanses of the Blue Mountains and Woronora Plateau remain largely unaltered because of their inaccessible terrain and infertile soils.



Photo: D. Hunter, DECC



1.1 Background

1.1.1 About the 2002–05 project

Between 2002 and 2005, the Sydney Catchment Authority and the then Department of Environment and Conservation – now Department of Environment and Climate Change (DECC) – studied the distribution of native and pest animals and their habitats in the Greater Southern Sydney Region. These organisations wished to improve their knowledge of which animals live in or visit the region and where they are located. The project's objective was to improve management of ecosystems, rare and threatened species and pest animals.

Project actions included:

- > surveying the area and recording observations of all animal species
- > choosing a subset of species for detailed examination and mapping – of the 446 native animals in the region, only 92 of the species of most conservation concern have been included in this publication (see section 1.2)
- > assessing the conservation status of each species of conservation concern (see section 1.2.2)
- > assessing how common each species of conservation concern is in the region (see sections 1.2 and 1.4.1)
- > assessing the threats faced by each species of conservation concern (see section 1.4.2)
- > assessing which habitats are the most important (see section 1.3) and the prevalence or lack of these habitats (see section 1.4.4 and the profiles in chapters 2–7)
- > creating maps of locations and habitat to accurately record the distribution of the various species (see section 1.4.5 and the profiles in chapters 2–7).

Project findings have been supplemented with more recent observations and research from 2006 and 2007, including detailed surveys of the Cumberland Plain and personal observations from experts.

Note that 'animal' in this publication refers to mammals, birds, amphibians and reptiles.

1.1.2 The study area

The area covered by this project (the study area) is the Greater Southern Sydney Region. This includes the area from the southern Blue Mountains between Kanangra-Boyd NP and Wombeyan Caves, to the coast between Bundeena and Wollongong (see map 1 overleaf). This area encompasses the rocky ranges and valleys of the southern Blue Mountains.

1.1.3 Project publications

This general overview, entitled *Threatened and pest animals of Greater Southern Sydney*, is derived from a series of technical volumes produced for the project entitled *Terrestrial vertebrate fauna of the Greater Southern Sydney Region*. It gives an assessment of animals considered to be of particular conservation concern and their habitats, and includes information on their distribution in the region, the threats facing them and ways in which people can help conserve them. This publication will interest people who wish to know more about and to help conserve native animals that are declining or under threat.

Volume one of the technical volumes is the background report and gives a detailed rationale for the project, a description of the environment and relevant technical information. The methods employed in surveying and mapping are described in detail along with a critical discussion of the animal survey techniques implemented. Based on the survey results, each major animal group in the region is reviewed and there is also a discussion of diversity and landscape-level trends. Important fauna corridors have been identified and mapped and there is a review of all species that have become extinct or have severely declined in the region.

Volume two is the technical document for the habitat mapping and conservation assessment of species of conservation concern and pests, providing additional information on the population status, threats to and management of the species, including the application of the habitat maps. This document aims to aid land managers with landscape level and site-based conservation planning and management, and includes a CD with digital layers of each habitat map, priority fauna habitats and fauna corridors. Findings may be incorporated into plans of management, regional environmental plans, catchment action plans, local environmental plans and reviews of environmental factors.

Volumes three, four and five relate specifically to the management of biodiversity in the Sydney Catchment Authority Special Areas.

These volumes can all be found on DECC's website: www.environment.nsw.gov.au, along with details of where to obtain the CD of spatial layers used in the report.

1.2 Animals studied in the project

1.2.1 Which animals were included?

Not every animal in the region was included in the conservation assessment. There are 446 animal species in the region, but many are common and not threatened, and are not therefore of conservation concern. All animals included are vertebrate species that spend some of their life on land. The project did not include seabirds, marine mammals or tidal wading birds. Species are included in this volume for one of five reasons:

1. **The species is listed under the NSW Threatened Species Conservation Act 1995 (TSC Act) – as ‘vulnerable’ or ‘endangered’.** All listed species known to occur, or known to have occurred in the past, in the region, are included.
2. **The species affects water quality in some way,** for example, the species may have contaminated water, or may have acted to increase erosion and sedimentation.
3. **The species is culturally significant to one or more local indigenous communities (the Tharawal, Gundungurra and Darug people).** The list of species in this category is not exhaustive and does not represent the extent of land animals that are important to these groups. The species in this publication are taken from reports based on community consultation (see DEC 2005a) or nominated by a community representative.
4. **The species is declining regionally.** Most native animals have declined somewhat in the region; therefore species were only included in this category if their numbers have been greatly reduced regionally or locally, or their range in the region has been greatly reduced. In particular, animals with a restricted distribution of which the study area forms a significant part, poorly known species and animals that are few in number throughout the area were included in this category.
5. **The species is a pest.** Pest species are defined here as introduced land animals that negatively affect native animals, plants or environments in the region, including all animals listed as Key Threatening Processes under the TSC Act (see section 1.4.3) or that are nominated as a pest animal under the *Rural Lands Protection Act 1998*. Not all introduced species are included, as some that are confined to urban or rural areas do not have a large impact on native animals.

Species were nominated for inclusion as species of conservation concern by wildlife experts, local naturalists, Sydney Catchment Authority catchment officers, academics and researchers, DECC staff, representatives for local indigenous communities and environmental consultants.

1.2.2 Animals of highest conservation priority

After studying the abundance, habitats and threats facing native species, DECC assessed their conservation status. Factors included in assessing the status of each species were:

1. their level of decline in the region
2. the level of threat to remaining populations
3. the total amount of habitat in the region
4. the importance of the region to the overall survival of the species
5. the amount of habitat that has already been lost.

The profiles of species in this publication are arranged according to their conservation priority.

Chapter 2 gives information on **species of highest conservation priority (11 species)**. These species are nearly locally extinct and most, such as the swift parrot and regent honeyeater, are also endangered nationally. These species must be managed at a site-by-site level, with few having more than two known populations in the region.

Chapter 3 deals with **species of high conservation priority (16 species)**. These species are rare or very rare and have declined substantially in the region. They are faced with continuing threats, mainly habitat loss or alteration. Most may be conserved by managing key habitats or key threats rather than by management at a site-by-site level. Species are also included in this category if the region makes up a critical part of their range, such as the Blue Mountains water skink.

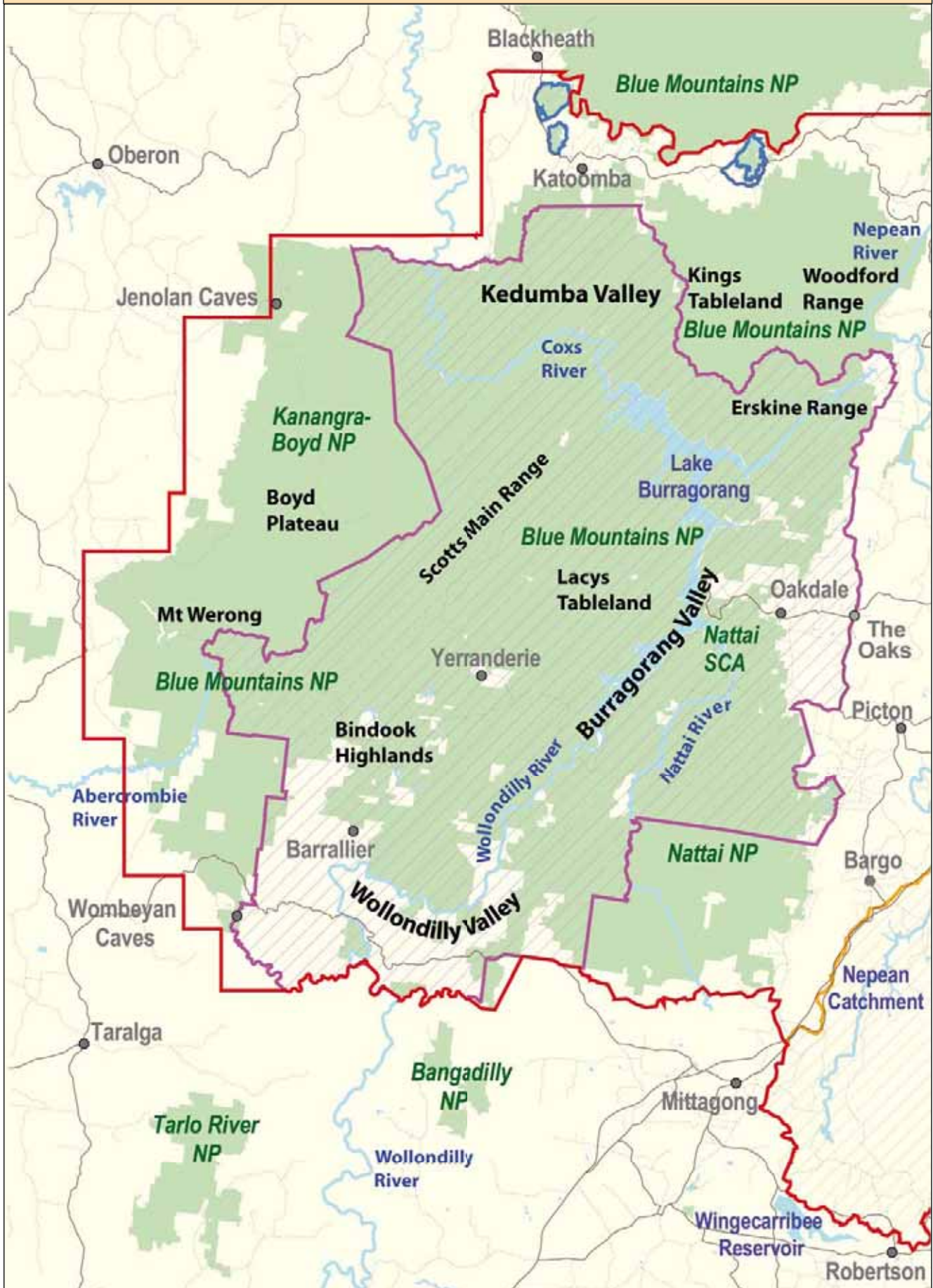
Chapter 4 provides profiles of **species of moderately high conservation priority (10 species)**. These animals are either uncommon or locally common, but have suffered significant habitat loss or threats across their range or in some areas. Species such as the brown tree creeper are included when they are secure in parts of their range, but extinct or very threatened in other parts. Rare species that are highly restricted in range, but have fewer threats facing them, such as the beautiful firetail, are also included in this category.

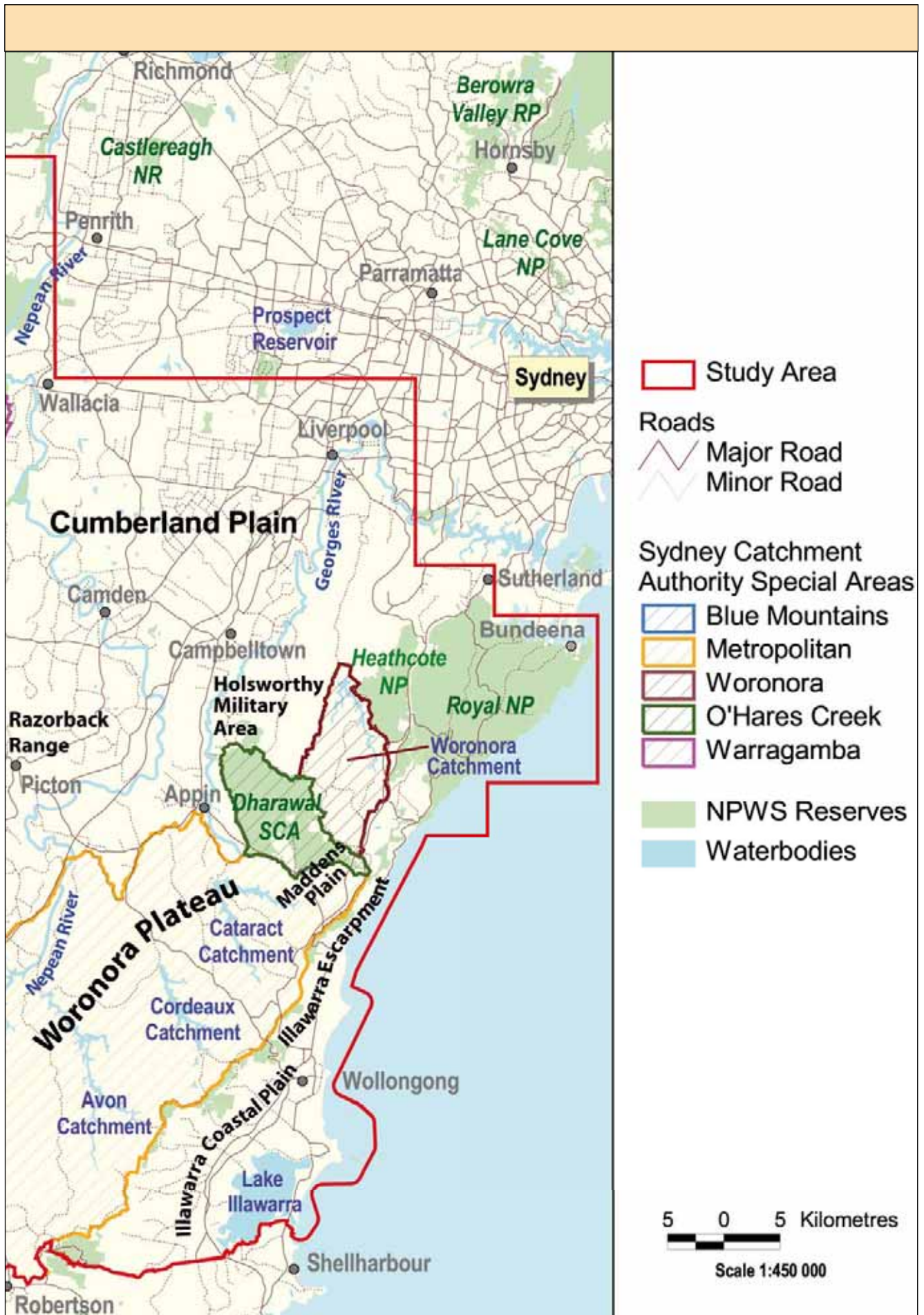
Chapter 5 gives information on **species of moderate conservation priority (10 species)**. Most of these species require few targeted management actions. They are uncommon to common in the region and generally have substantial protected habitat and few apparent threats. With many, their restricted range makes them vulnerable to future threats and habitat loss. Such species include the giant burrowing frog and eastern pygmy-possum.

Chapter 6 deals with **species of lower conservation priority (46 species)**. These species require fewer management actions for their long-term survival in the region. They are:

- > relatively common and secure in most of their range with much habitat in reserves and few threats facing them
- > locally extinct (and therefore no action in the region can now save them)
- > species for which there is negligible habitat (so the region is not important for their conservation).

Map 1. Study area





Chapter 7 provides profiles of pest species that have a major negative impact on native animals or threaten water quality or other human services.

This information can be used to:

- > target threatened species management in the region towards species of high conservation priority
- > target conservation land management in the region towards animal habitats of high conservation priority
- > target pest management in the region toward pests and areas of high priority.

This project has changed Sydney Catchment Authority's and DECC's view of the species of conservation concern in the region. While some species have been confirmed as being rare or rarer than was thought, others have been found to be relatively common and secure.

1.3 Priority animal habitats

A habitat is an environment used by animals with similar requirements regarding food and living conditions. Four priority habitats have been identified in the region. These were selected by assessing the habitat requirements of the 48 species of greatest conservation priority (see section 1.2.2) and assessing the conservation status of the habitat itself, based on its locations, extent, the impacts threatening it and its importance throughout the state or nationally.

1.3.1 Grassy box woodlands

Grassy box woodland of the Burratorang Valley floor showing the high level of clearance and disturbance typical of grassy woodlands throughout the region, even in reserves.

Grassy box woodland is the highest priority animal habitat in the region. It is key habitat for at least 18 of the 47 most threatened species, plus other species that are thought to be locally extinct. These woodlands sustain species endangered nationally such as the regent honeyeater and swift parrot, and help to conserve declining woodland birds such as the diamond firetail and speckled warbler.

This habitat type was once extensive in the region, occurring on high-fertility soils of the Cumberland Plain and Illawarra Coastal Plain and in the rain shadow valleys of the southern Blue Mountains such as the Burratorang, Nattai and Wollondilly valleys.

The largest area of semi-intact grassy box woodland is in the Burratorang Valley, which contains the most significant area in the region for conserving biodiversity. Most grassy box woodlands have been disturbed, and on the Cumberland Plain and Illawarra Coastal Plain they are heavily depleted and fragmented. In these areas, smaller isolated remnants are no longer used by animals that are sensitive to fragmentation, with this project highlighting that many animals that depend on grassy box woodland are locally extinct or have dramatically declined. For this reason, the study identified the best-quality remnants that are most likely to support viable populations of animals. For more information on the identification and mapping of priority grassy box woodland, see volume one of this series – refer to section 1.1.3.



Photo: D. Andrew

1.3.2 Upland swamps

An upland swamp on Maddens Plain.

Upland swamps are key habitat for at least 12 of the most threatened animal species including the beautiful firetail and giant burrowing frog. The region contains much of this unusual habitat compared to other parts of NSW and some species are entirely restricted to this environment, such as the Blue Mountains water skink.

Upland swamps are on the high-rainfall sandstone plateaux of the Woronora and mid to upper Blue Mountains including Narrowneck Plateau and Kings Tableland. These fragile environments are very sensitive to disturbance such as changes in hydrology and overly frequent fire. Examples of upland swamps include Maddens Plain, Stockyard Swamp and Flat Rock Swamp on the Woronora Plateau, and Corral Swamp in the Blue Mountains.



Photo: H. Jessup

1.3.3 Alluvial woodlands and forests

Riparian woodland on the Wollondilly River. In the region, most rivers like this one have altered flow regimes and are heavily affected by human activities.

Alluvial forests and woodlands are situated on the creek banks and riverflats of waterways on the coast and tablelands. This habitat occurs on deep, fertile alluvial soils that are almost all subject to clearing and other factors associated with agriculture. Many animals rely on these environments including at least seven of the most threatened species in the region such as the booroolong frog and large-footed myotis. The green and golden bell frog is also found in floodplain river systems and associated wetlands.



Photo: D. Andrew

Riverflat environments are also extremely important as animals such as the large-eared pied bat use them for foraging and moving about the landscape. Examples of key river systems in the region are the Wollondilly, Nattai, Kowmung, Cox's and Kedumba rivers in the Warragamba Special Area; the Abercrombie River in the south-west of Blue Mountains National Park; the Nepean and Georges rivers in south-western Sydney; and Macquarie Rivulet and Duck Creek on the Illawarra Coastal Plain.

1.3.4 Coastal wetlands and saltmarsh

Coastal wetland, Bellambi Lagoon.

Coastal wetlands and saltmarshes are heavily depleted in the region. Very few sites are undisturbed. Numerous threatened animals rely on these habitats, including four species of the highest conservation priority such as the black bittern and Australasian bittern. Such species were once more widespread, but are now extremely rare due to habitat loss and degradation. Some wetland species are already locally extinct, including the black-necked stork and magpie goose.



Photo: K. Madden, DECC

In the region, most coastal wetlands and saltmarshes are in Wollongong local government area with examples including Bellambi, Puckey's and Coomaditchy lagoons, Korrungulla Wetlands, Koona Point and other wetlands around Lake Illawarra. There are also some coastal wetlands in Royal NP, such as Marley Lagoon. All wetlands and saltmarsh are vulnerable to changes in hydrology, particularly sedimentation caused by upstream erosion.

For full details of methods used to assess priority fauna habitats, see volume one of this series – refer to section 1.1.3.

Subtropical influenced rainforest/wet sclerophyll forest is a further important habitat, housing at least four species of conservation concern. Overall, this is not a priority animal habitat, primarily because of the few threatened animals it sustains. However, in the Illawarra and on the Cumberland Plain it is a local conservation priority and many locally important species depend on it, such as the green catbird and southern logrunner (these species are not covered in this publication).

1.3.5 Why priority animal habitats are important

Often it is more practical to manage threatened species by conserving a landscape or habitat rather than trying to conserve each species individually, especially when there are many threatened species in an area.

Priority animal habitats support most of the region's threatened and declining animals. Given limited resources, protecting and enhancing these habitats will maximise benefits to threatened species and help maintain biodiversity in the region. Identifying these areas will help land managers develop strategies for:

- > acquiring land for conservation purposes
- > pest species control
- > weed control

- > rehabilitation and revegetation
- > fire management
- > threatened species management
- > managing Key Threatening Processes (KTPs) (see section 1.4.2).

1.4 Animal profiles

Each animal of conservation concern has its own profile in this publication, which contains the following.

1.4.1 Description

This section includes the common and scientific names of each species, a photograph, and information on habits and habitat.

It also includes an indication of the abundance of each species, as described below:

- > **common** — the species is abundant throughout most of its range and a large part of the region (e.g. short-beaked echidna)
- > **locally common** — the species is common in some areas of the region but is rare or absent elsewhere, either naturally (e.g. red-crowned toadlet) or due to threats in parts of its range (e.g. brown tree creeper)
- > **uncommon** — the species is uncommonly seen across all or part of the region either naturally (e.g. eastern pygmy possum) or due to threats (e.g. speckled warbler)
- > **rare** — the species is rarely seen across most of its range, either naturally or due to threats (e.g. spotted-tailed quoll)
- > **extremely rare** — the species is very rare and new locations are only detected once every few years or less often (e.g. squirrel glider)
- > **locally extinct** — the species once lived in the area, but has now disappeared due to threats (e.g. wompoo fruit-dove). Most species are labelled as 'presumed extinct' or 'possibly extinct' to indicate the level of uncertainty.

Each species has also been classified as either a **resident** or a **visitor**. Residents permanently live in the region. Visitors occupy suitable habitat in the region seasonally or irregularly, given the availability of food or other resources.

There is also information on whether each species is **declining**, **locally declining** (i.e. declining in parts of its range), **stable** or **increasing**. Certainty is indicated by the use of 'possibly' and 'probably'.

This section also contains an assessment of how important the study area is to the animal's survival. Categories are:

- > **core habitat** — the study area contains much important habitat for the animal which is continuously, seasonally or irregularly occupied
- > **non-core habitat** — the study area contains comparatively little habitat for the animal.

This information is followed by a brief description of where the animal lives, with an emphasis on priority habitats (see section 1.3.1). Finally, this section contains advice on the animal's listing in environmental legislation (i.e. the TSC Act and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) and whether a national or NSW recovery plan has been prepared for the animal.

1.4.2 Threats

This section gives information on the Key Threatening Processes (KTPs) and other threats that affect the animal. KTPs impact on many threatened native species, and could cause other species to become threatened. They are listed in the TSC Act, and are constantly revised and updated.

In the case of pest animals, threats they **cause** are given, rather than those they are threatened by.

Twenty KTPs operate in the study area:

1. subsidence due to longwall mining, leading to alteration of habitat
2. alteration to the natural flow regimes of rivers, streams, floodplains and wetlands
3. bush rock removal
4. clearing of native vegetation
5. competition and grazing by the feral European rabbit
6. competition and habitat degradation by feral goats
7. competition from feral honeybees
8. ecological consequences of high-frequency fires
9. predation, habitat degradation, competition and disease transmission by feral pigs
10. herbivory and environmental degradation caused by feral deer
11. human-caused climate change
12. infection by *Psittacine circoviral* (beak and feather) disease affecting parrots

Damage to important fauna habitats such as this upland swamp is one reason why feral pigs have been listed as a Key Threatening Process.

Photo: M. Schulz



13. infection of frogs by amphibian *Batrachochytrium dendrobatidis* (chytrid) fungus causing the disease chytridiomycosis
14. invasion of native plant communities by exotic perennial grasses
15. predation by feral cats
16. predation by the European red fox
17. predation by the plague minnow (*Gambusia holbrooki*)
18. removal of dead wood and dead trees.
19. invasion, establishment and spread of lantana (*Lantana camara*)
20. invasion and establishment of exotic vines and scramblers.

1.4.3 Distribution

Each profile gives details on the past and current distribution of the species, and reasons for any change in status in the region. There is information on the animal's distribution across Australia and NSW, followed by information on sightings in and around Sydney and in the study area itself. This information is followed by findings of the 2002–05 project, and of subsequent research.

This section will often list reserves in which the animal is found. 'Reserves' refers to national parks, nature reserves, state conservation areas and regional parks managed by DECC.

Throughout this publication, reference is made to records of threatened species. These records are mostly available from the Atlas of NSW Wildlife on DECC's website. Anyone may access this atlas and search for records. Records can be actual sightings or identifications from distinctive calls, nests, burrows, scats, tracks or hairs. Various government agencies, environmental consultants and conservation groups routinely have records added to the Atlas. The Atlas is at <http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp>.

1.4.4 How you can help

The next section identifies actions that members of the community can perform to help conserve the animal. These include joining 'friends of' groups, and writing to the local council to ask them to plant native rather than exotic trees. Different actions are given for each species, but many actions can benefit several species, such as planting native vegetation or building a nesting box in your garden.

1.4.5 Maps

Each profile also contains a map that displays the species' habitat and gives an overview of its distribution. The darker green colour indicates the better quality habitat, and in most instances, the greatest likelihood of finding the animal. However, the map does not indicate whether habitat is currently occupied. Species may not occupy good habitat when they have suffered dramatic declines due to disease, such as the stuttering frog, or when good habitat has become too fragmented, as in the case of the hooded robin on the Cumberland Plain.

There are two main types of map, predictive habitat maps and sightings maps:

> **Predictive habitat maps.** To date, most information on the distribution of animal species in the region has been restricted to maps that show only the location of observations. Such information presents a biased view of species distribution as it reflects only where people have looked for an animal. By contrast, predictive habitat maps such as maps 2–4 overleaf show areas where a species may be found, that is, the species has not necessarily been recorded in all highlighted locations, but the habitat is thought to be suitable for its survival. The maps have various levels of detail. Some have yellow dots showing where surveys were undertaken for the species, but it was not found. In these maps, sites where the species was found are shown as dark blue or purple squares. All other records of the species, from DECC surveys and the Atlas of NSW Wildlife, are shown as orange circles. See map 2 of the powerful owl on the next page.

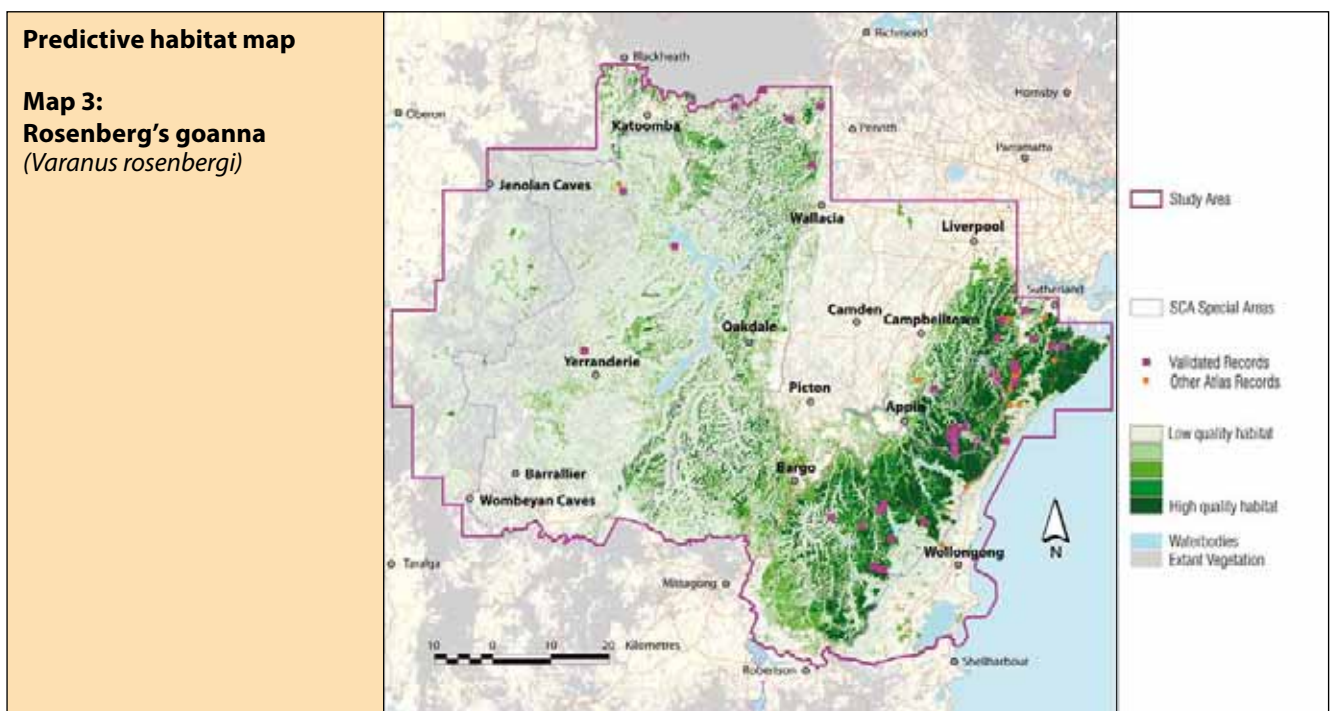
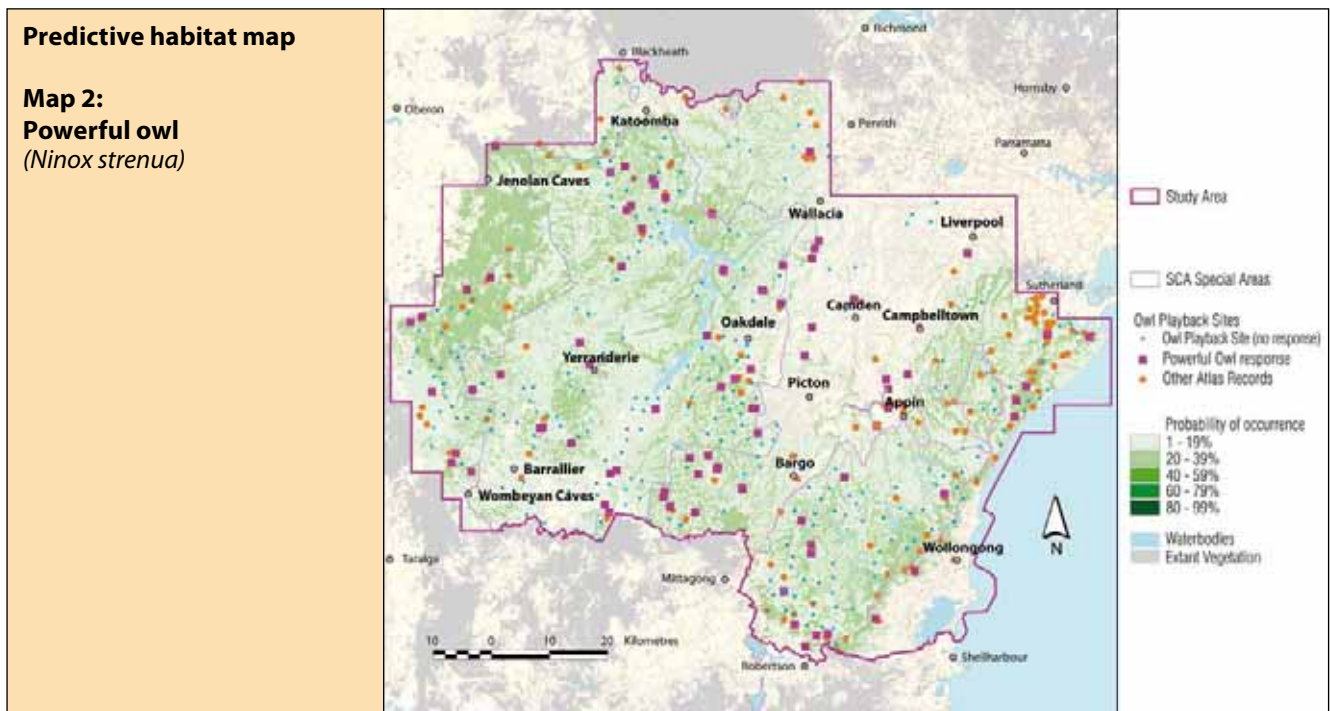
In other maps, purple squares, called 'validated records', represent sites where the species has been found and this finding has been validated by experts. Orange circles are unvalidated records from the Atlas of NSW Wildlife so are called 'other atlas records'. See map 3 of Rosenberg's goanna on the next page.

For species that have declined significantly and only occupy a small part of their former range, the maps also show post-1990 records as blue circles, and key populations are labelled. See map 4 of the brush-tailed rock-wallaby on the next page.

> **Sightings maps.** These maps show all the locations where animals have been positively identified. Sightings maps were only created when no predictive habitat map could be generated. See map 5 of the eastern bristlebird below.

Predictive habitat maps can be used to:

- > assess how much habitat is available for each species across the region and how it is distributed in reserves
- > provide an indication of a species' relative abundance
- > estimate actual population size (some maps only)
- > assess the range and key habitats of a species
- > help estimate how much habitat has already been lost
- > review the seriousness of threats that currently (and potentially) impact on a species
- > determine animal corridors and high-conservation priority landscapes
- > help undertake site-based assessments during local planning and development processes

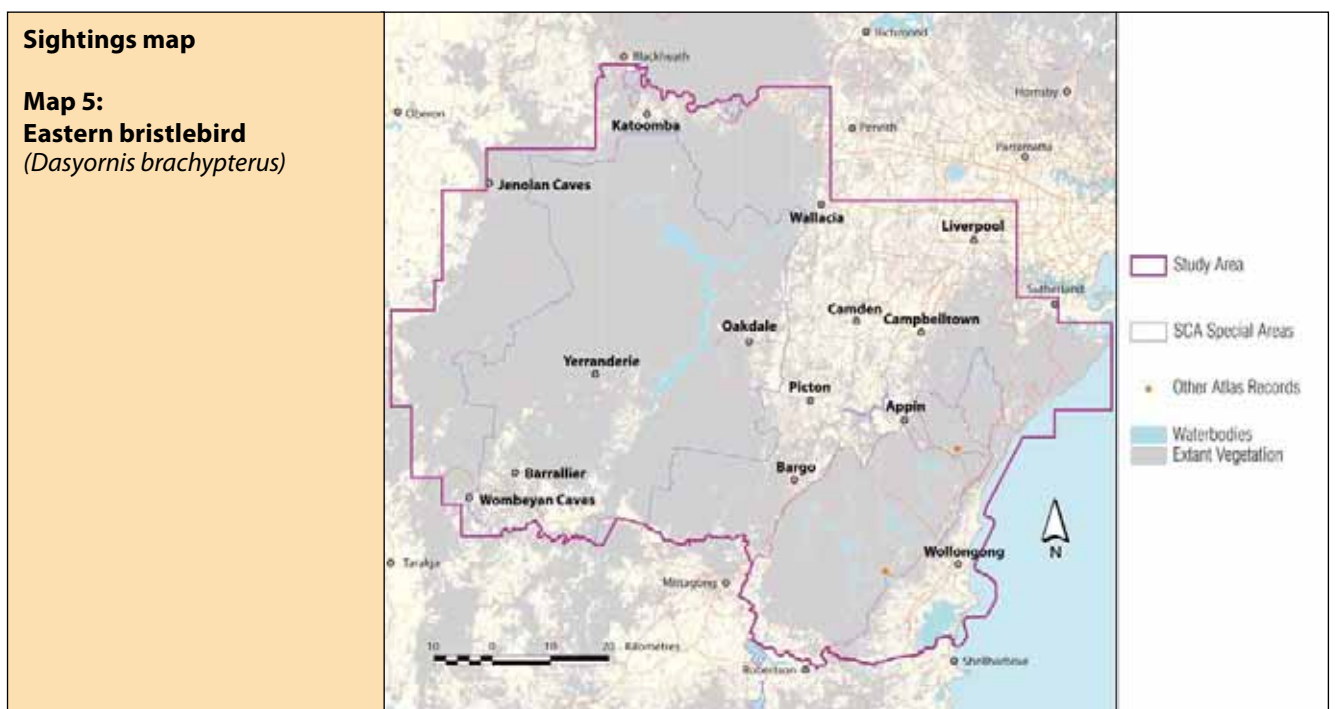
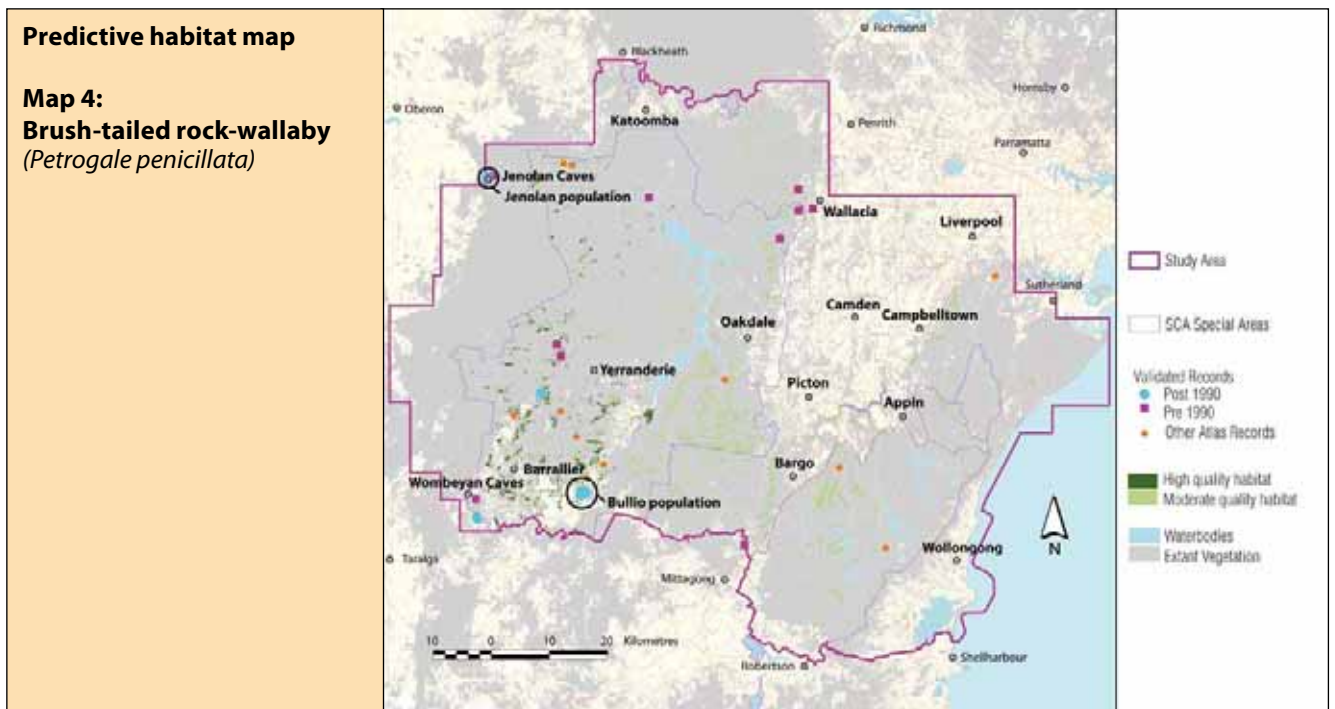


- > help in the development of reviews of environmental factors for national parks, local environmental plans for local government, catchment action plans for catchment management authorities and catchment plans of management for the Sydney Catchment Authority.

Note that the maps cannot replace field surveys and site investigations, but are useful in providing a local and regional context for them.

For specific or site-based applications, users should refer to volumes one and two for this series for more information on the maps – see section 1.1.3.

The digital layers of the habitat maps are also available on CD. These layers may be imported into a desktop geographical information system (GIS) software package, where species or sites of specific interest may be examined in detail. To obtain a CD, phone: (02) 9585 6903 or email info@environment.nsw.gov.au.



2. Animals of highest conservation priority

These animals are extremely rare in the region and must be managed at a site-by-site level. Actions for their conservation should protect and enhance habitat on, and eliminate threats from, the few sites where these animals still or may live.

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), NP = national park, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest and TSC Act = *Threatened Species Conservation Act 1995*.

2.1 Booroolong frog (*Litoria booroolongensis*)

This medium-sized frog has webbing on its hind feet which extends to the base of its first inner toe pad and a black stripe passing over its eye and ear to its shoulder. It lives mainly in rocky western-flowing creeks and their headwaters. Adults shelter under boulders or cobbles along banks, in forested areas and in open pasture. In spring, the frog lays its eggs in rock crevices in streams or isolated streamside pools. Tadpoles turn into frogs in January and February.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Non-core

Key habitat: Flowing streams with riffles (shallower, faster moving sections of a stream where rocks often break the water surface); alluvial woodlands and forests

Legislative listing: Endangered – TSC Act.
Nominated as endangered – EPBC Act.



Photo: D. Hunter

Threats

A significant threat is infection by *chytrid* fungus, which has been found where Groves Creek flows into Abercrombie River. This fungus has dramatically affected many frogs living at high altitudes.

Tadpoles are preyed on by exotic fish species including brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*) and European carp (*Cyprinus carpio*). Nearly all streams occupied by the frog contain many introduced fish. Land and water degradation, flow modification and willow invasion of riparian areas also threaten the frog.

Distribution

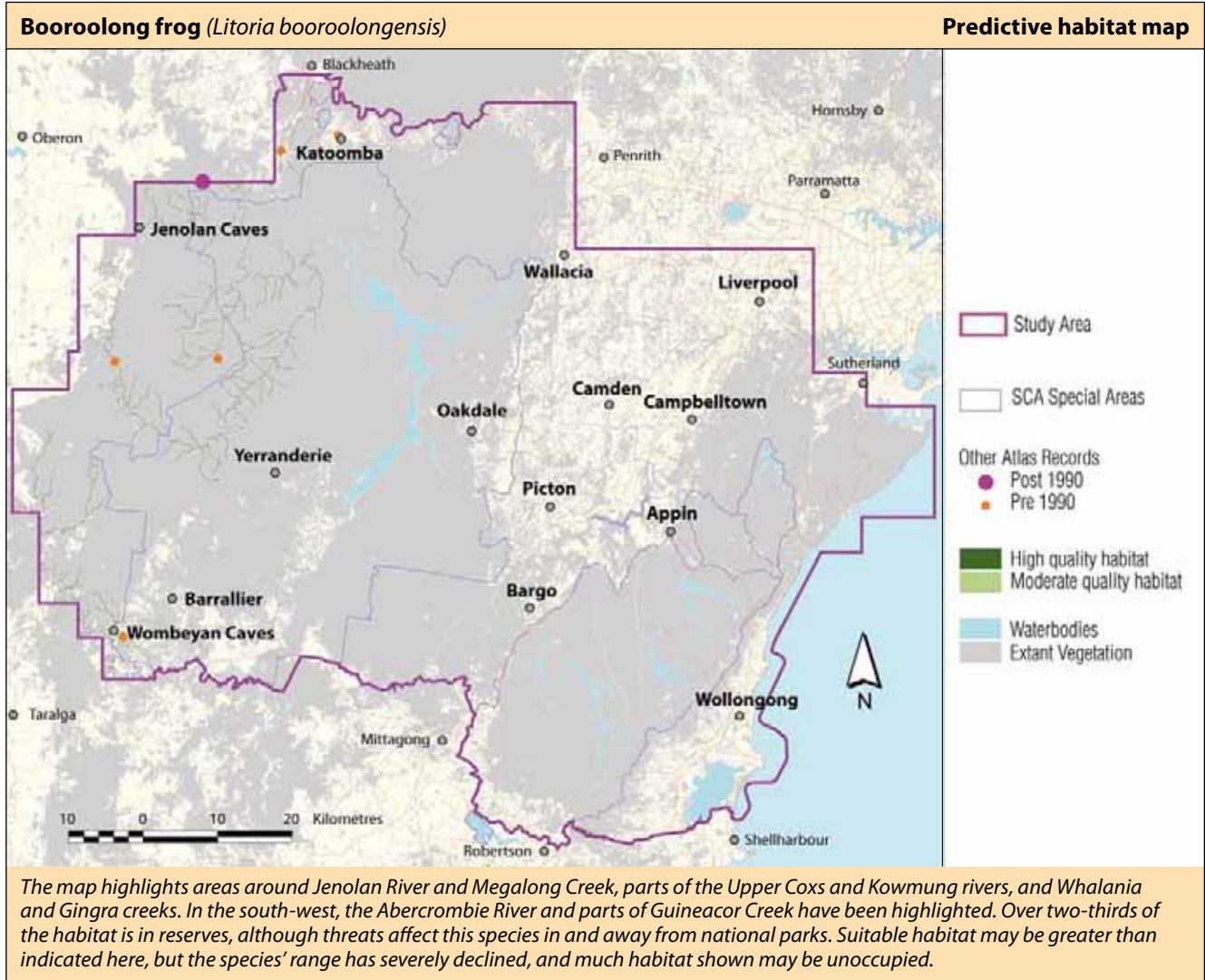
This frog used to live mainly in NSW in the New England and Central tablelands and on the south-west slopes of the Southern Tablelands, especially on the tributaries of the Murray and Murrumbidgee rivers. It also lives in Victoria.

Aside from two locations near Tamworth, the frog has not been found in the northern part of its range since 1994 so is virtually extinct in this area. Numbers have also declined across the rest of its range, with only a few recent records from the Central Tablelands. The species is not abundant in reserves, though it lives in Abercrombie River, Turon and Kosciuszko NPs and Black Andrew, Bogandyera and Ellerslie NRs. It is uncertain whether it still lives in Blue Mountains NP.

In the study area, there are six known locations. The most recent sightings are from 1998, when three frogs were detected on Beefsteak Creek and Little River, between Jenolan Caves and the Megalong Valley. There were no sightings during the 2002–05 surveys, although targeted searches were conducted in suitable habitat, particularly on and around Abercrombie River in the south-western Blue Mountains. However, as surveys were conducted during the drought, the lack of sightings does not mean the frog is locally extinct.

How you can help

- > If you have a stream or river on your property, especially if you live in the Wollondilly, Oberon, Lithgow or Blue Mountains shires, protect its water quality, remove willows and do not stock it with introduced fish.
- > Join or start a Streamwatch or Rivercare group to care for your local waterway – visit Streamwatch on www.streamwatch.org.au or Rivercare – visit www.landcareonline.com or phone: (02) 9412 1040.
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about the frog.



2.2 Brush-tailed rock-wallaby (*Petrogale penicillata*)

This medium-sized wallaby lives in loose piles of large boulders with subterranean holes and passageways; on cliffs, usually over 15 metres high with ledges covered by overhangs; or on isolated rock stacks, usually sheer and often containing fallen boulders. The wallaby shelters during the day and emerges at dusk to graze on native vegetation. It may also need to live near a permanent water supply.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Rocky outcrops and escarpments

Legislative listing: Endangered – TSC Act.
Vulnerable – EPBC Act. Revised NSW draft recovery plan (DEC various b)



Threats

Threats are predation by introduced animals such as foxes and wild dogs; competition for food and habitat with rabbits, feral goats and livestock; habitat modification through fire and vegetation clearing; disease transmission by feral carnivores (*toxoplasmosis* and *hydatosis*); and inbreeding, as the wallaby rarely migrates between colonies.

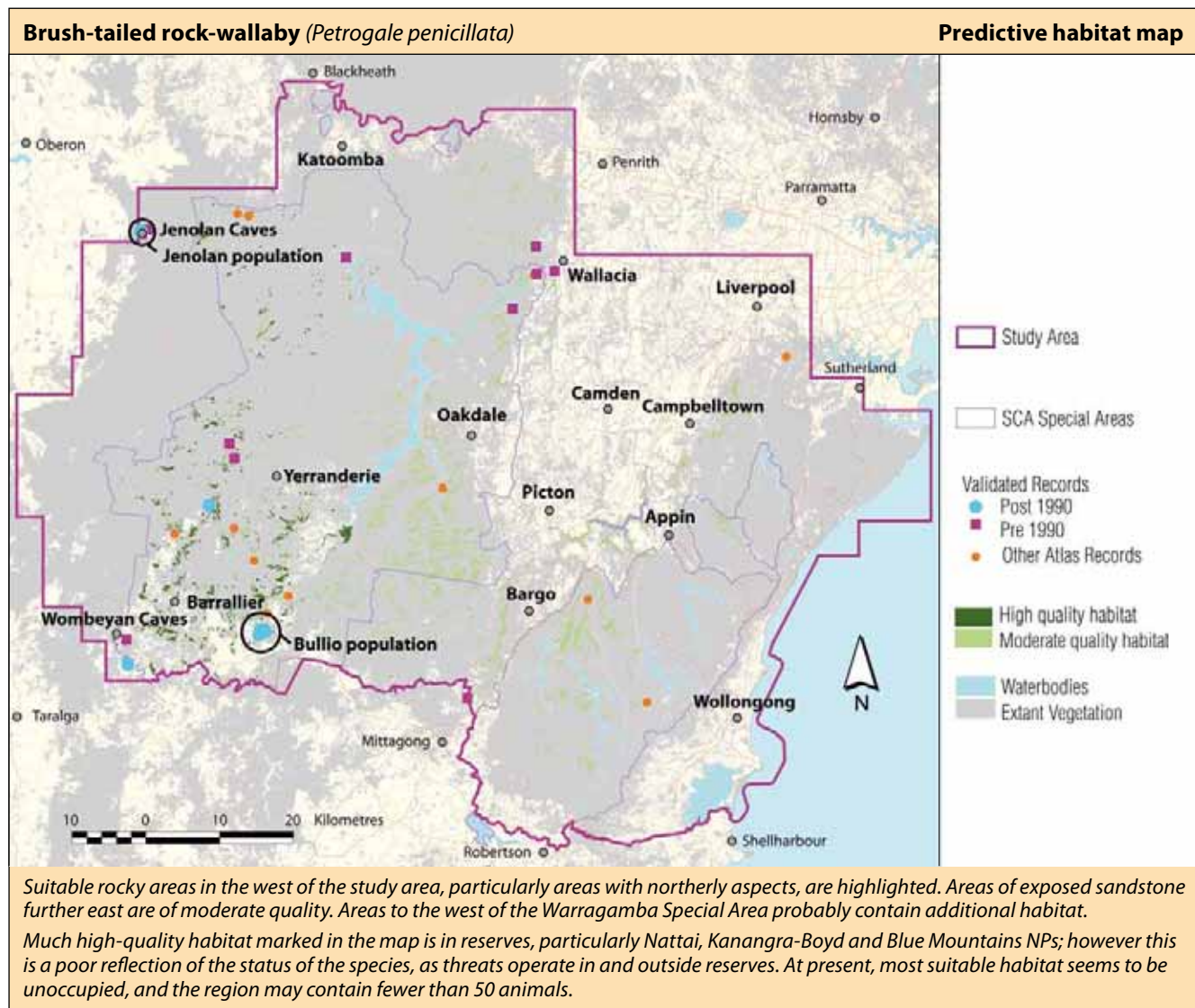
Distribution

Around Sydney, the wallaby used to live in Kangaroo Valley; the Jenolan Caves; Broke in the Hunter Valley; and Yengo, Wollemi and Morton NPs where wallabies have most recently been recorded.

In the study area, many wallabies once lived in the Wollondilly and Burragarang valleys between Wombeyan Caves and Jooriland, the Warragamba Dam wall, and the Woronora Plateau. Targeted surveys during the 2002–05 project and surveys in 2006 have not found any evidence of occupation at these sites. However, excitingly, a population of about 20 wallabies was discovered at Bullio on the edge of Nattai NP.

It is believed that much former habitat is no longer occupied as only the most inaccessible locations are protected from foxes and goats.

Many recent sightings in the western part of the study area are unreliable. More promisingly, there is a confirmed record of a scat from Bindook, and unconfirmed sightings from suitable habitat at Guineacor Creek and Tallygang Mountain in the south of the study area. There is also a captive population at Jenolan Caves, with the last known animal from Wombeyan Caves transferred to this population in 1996. These 20 or so animals have been breeding successfully, with some individuals now part of a captive-breeding program.



How you can help

- > Report any sightings of rock-wallabies to your local national parks office or email btrw@environment.nsw.gov.au. Alternatively phone DECC's Environment Line on 1300 361 967 and ask for a brochure on reporting rock-wallaby sightings. Take care not to confuse the rock-wallaby with the similar looking swamp wallaby. Both are small and dark in colour, but rock-wallabies have a distinctive pale stripe on their cheek and a thick bushy tail and are rarely seen away from cliffs and caves. Take a photo to send in, and remember to record where and when you saw the animals.
- > Join a local 'friends of the brush-tailed rock-wallaby' group such as the one at Bullio on the Wollondilly River or the one in Kangaroo Valley – visit www.rockwallaby.org.au or visit www.environment.nsw.gov.au and click on the following links: 'Parks and Wildlife' (top link), 'How you can help' (side link), 'Taking care of national parks', 'Park volunteer programs', 'Morton National Park'. Alternatively, phone: (02) 4887 7270.

2.3 Bush stone-curlew (*Burhinus grallarius*)

This large, distinctive bird is shy and secretive, so is more often heard than seen. Its distinctive, eerie, high-pitched wail is heard mostly during the night. It prefers lightly-timbered open forest or woodland, with a groundcover of short sparse grass, few or no shrubs, a litter layer and fallen timber. It roosts, nests and forages on the ground, eating insects, frogs, lizards, snakes and some vegetation and seeds.

Status/direction of change: Possibly locally extinct

Significance of study area: Non-core

Key habitat: Grassy box woodlands, wetlands and saltmarsh

Legislative listing: Endangered – TSC Act.
NSW recovery plan (DEC various b)



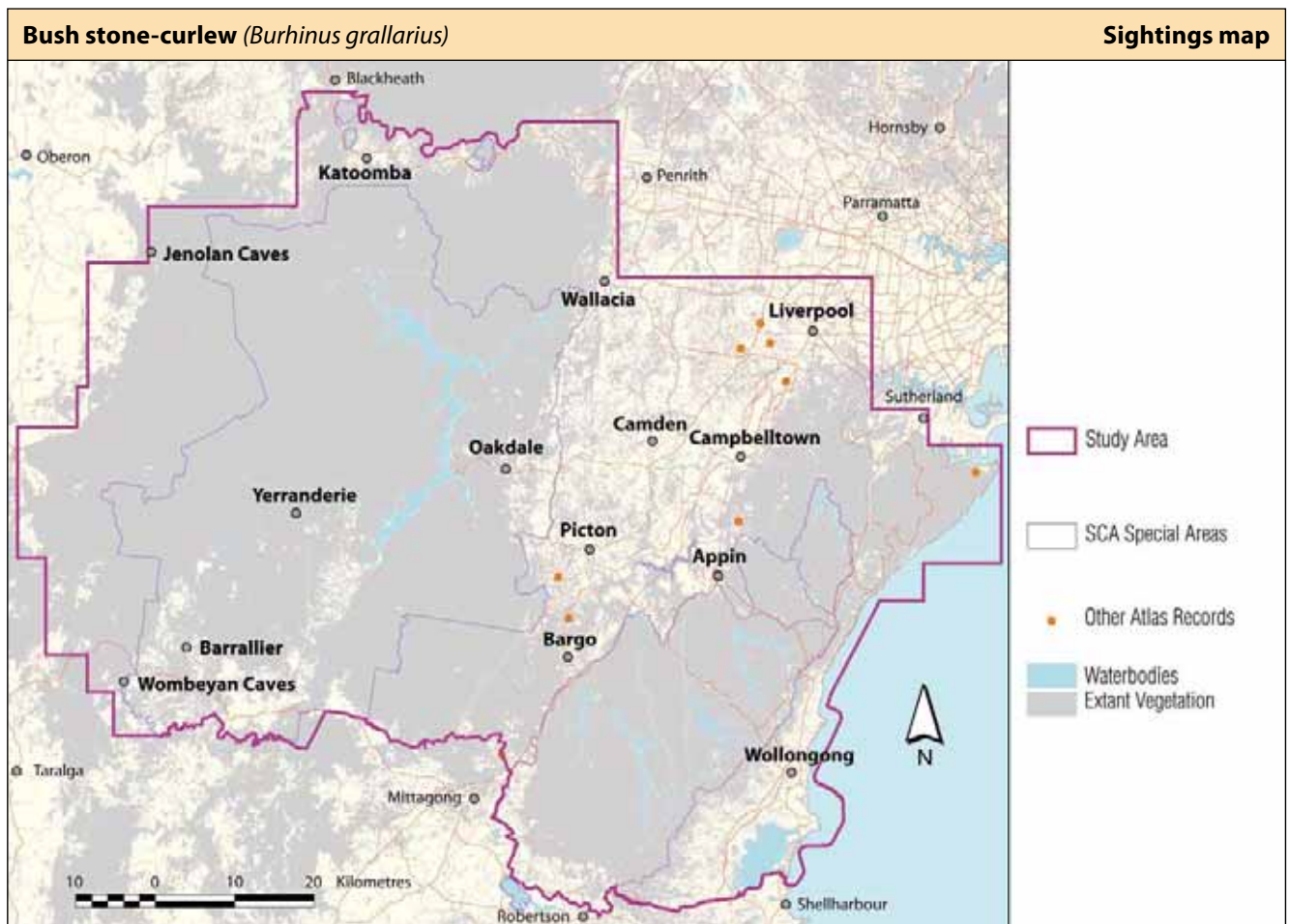
Photo: N. Lazarus

Threats

The bush stone-curlew has declined as its habitat has been cleared for farming and urban development, or been degraded by agricultural activities. Other threats include ground disturbance through removing timber from native vegetation or burning timber; illegal hunting; predation by introduced carnivores including foxes, pigs, dogs and cats; altered fire regimes, particularly frequent burning; and consumption of poisonous rabbit baits.

Distribution

The species is widespread in north and north-eastern Australia, coastal Western Australia and many coastal islands, and ranges into south-western Papua New Guinea.



This species may be extinct in the study area. It once lived in the grassy box woodlands of the Cumberland and Illawarra Coastal plains, and probably Burragorang Valley. It disappeared from the Illawarra due to the clearing of grassy woodlands, and has not been seen since 1981. Birds were detected at Couridjah and Wedderburn in the early 1990s.

Encouragingly, there is a recent unconfirmed report of a bush stone-curlew from the southern Blue Mountains. This species may therefore persist in some parts of the region, particularly on the western edge of the Cumberland Plain, but breeding is probably no longer successful due to predation by foxes.

Most recent sightings in NSW are from the north coast, the Darling Riverine Plain, the Riverina and around Sydney. A few birds still live on the Central Coast, particularly around Brisbane Water, and at least one bird lives at Careel Bay on Pittwater. The bird has recently been seen in Port Stephens, at Shoalhaven Heads and in Nowra. In and around Sydney, the bird is nearly extinct. For example, it disappeared from Cabramatta Creek in the early 1950s once the land use changed from orchards to market gardens. There are Australian Museum specimens from Colo Vale, Macquarie Fields and Thirlmere, the most recent being from Hoxton Park in 1950. A lone female still lives on Department of Defence land at Orchard Hills near Penrith, its mate apparently having been hit by a car.

How you can help

- > If you live on a property where there are (or were) bush stone-curlews you can help the birds survive by leaving woody debris on the ground, which gives them somewhere to find food and somewhere to hide during the day. Keeping grasses less than 15 cm high allows birds to easily spot predators.
- > Report all sightings to your local national parks office. For more information or to fill out a sighting form, go to www.nationalparks.nsw.gov.au/npws.nsf/Content/Bush+stone-curlew+community+survey.
- > Find a conservation project in a grassy woodland near you by contacting Conservation Volunteers Australia – visit www.conservationvolunteers.com.au/volunteer/conservation-connect.asp.

2.4 Eastern bristlebird (*Dasyornis brachypterus*)

This secretive, long-tailed bird lives in upland swamps, dense heaths and woodlands on the coast and ranges of south-eastern Australia. It is more often heard than seen, but may occasionally use a lookout perch when alarmed. It feeds mainly on insects, particularly ants. It rarely breeds and when breeding is successful, it lays two eggs but only raises one chick.

Status/direction of change: Probably locally extinct

Significance of study area: Non-core

Key habitat: Upland swamp

Legislative listing: Endangered – TSC and EPBC Acts



Photo: M. Todd

Threats

Habitat clearance has restricted the species to a few isolated populations which are threatened by severe or frequent wildfire. It is difficult for the bird to recolonise areas, increasing its vulnerability to local extinction. Highest densities are in areas that have had small patches burnt, with 30 or more years between fires. Other threats include habitat alteration by grazing and weeds; predation by foxes and cats; road mortality and land subsidence from longwall mining, which may affect the bird's habitat.

Distribution

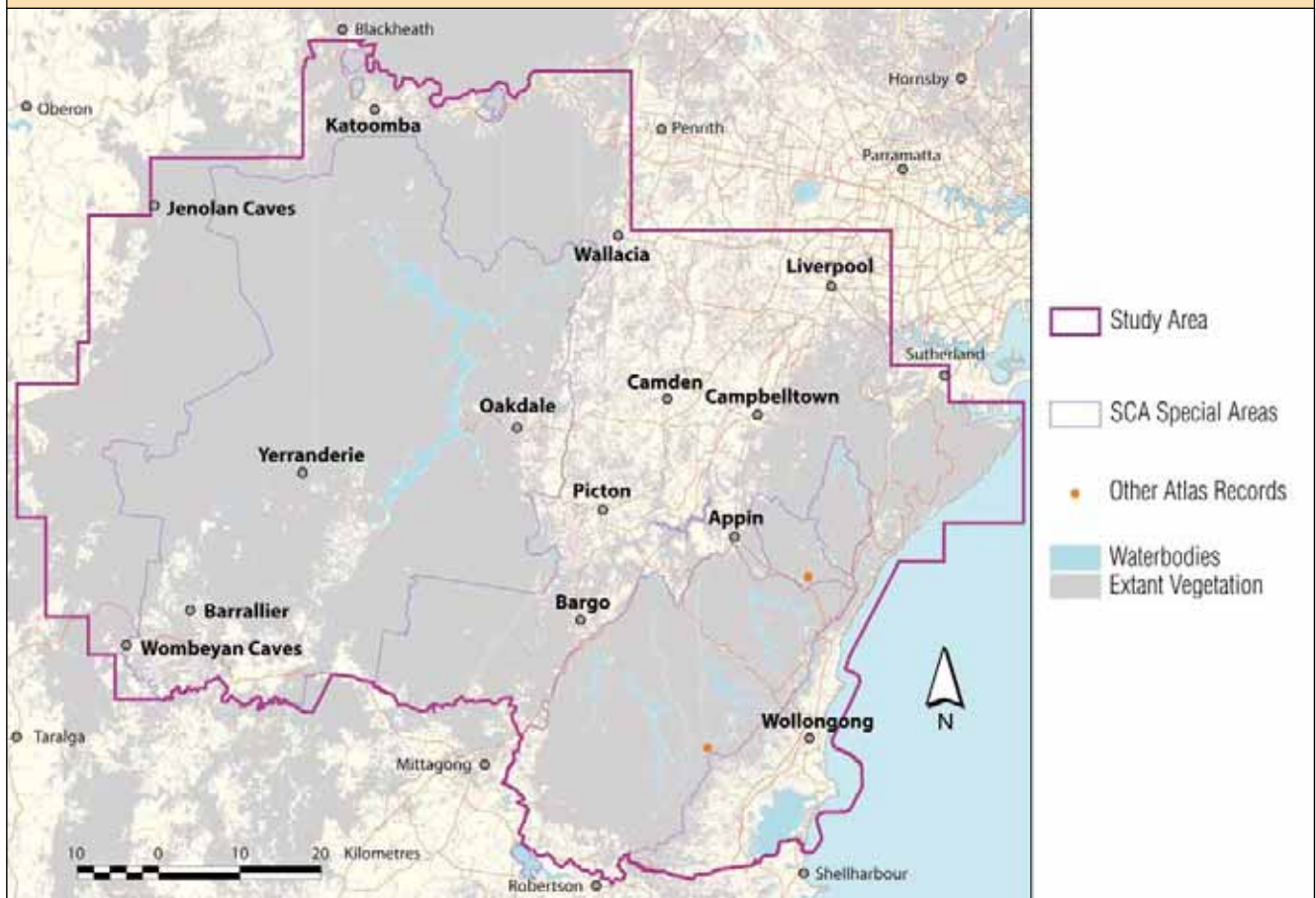
Two of the four remaining major populations of this bird are just south of the study area, in the Illawarra around Barren Grounds NR and in Jervis Bay.

In the study area, the bird used to live in the heathy swamps of the Woronora Plateau but is now thought to be locally extinct. Australian Museum records include a specimen from Maddens Plains and it was last recorded west of Mt Kembla during the 1960s. It may once have lived on the entire Woronora Plateau, in Royal NP and in the Holsworthy Military Area.

While suitable habitat still exists in the study area, extensive surveys of Royal NP and of the Woronora Plateau, and the 2002–05 surveys, have not found any evidence of the bird. These birds are poorly detected by systematic surveys when numbers are very low, so targeted call-playback surveys are required before the species can be confirmed as extinct.

How you can help

- > Join a bird-watching group such as the Bird Observers Club of Australia (www.birdobservers.org.au), Birds Australia (www.birdsaustralia.org.au) or the Cumberland Bird Observers (www.cboc.org.au) to find out more about this rare bird.



The map shows old sightings only, as the eastern bristlebird is thought to be locally extinct.

2.5 Green and golden bell frog (*Litoria aurea*)

This large, colourful frog lives in marshes and dams and alongside streams, particularly those with reeds, though some populations now live in highly disturbed areas such as disused industrial sites and landfills. Breeding males call while floating amongst vegetation between spring and autumn, particularly in January and February.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Coastal wetlands, riparian environments

Legislative listing: Endangered – TSC Act. Vulnerable – EPBC Act. Draft NSW recovery plan (DEC various b)

Threats

Hypothesised reasons for the frog's decline include the introduction of *chytrid* fungus. The frog may only be able to live in areas where the fungus has never been introduced or cannot survive due to other factors. Other threats include the disappearance of suitable breeding habitat, changes to water quality, predation by feral animals and the introduced plague minnow (*Gambusia holbrooki*) which eats the tadpoles.

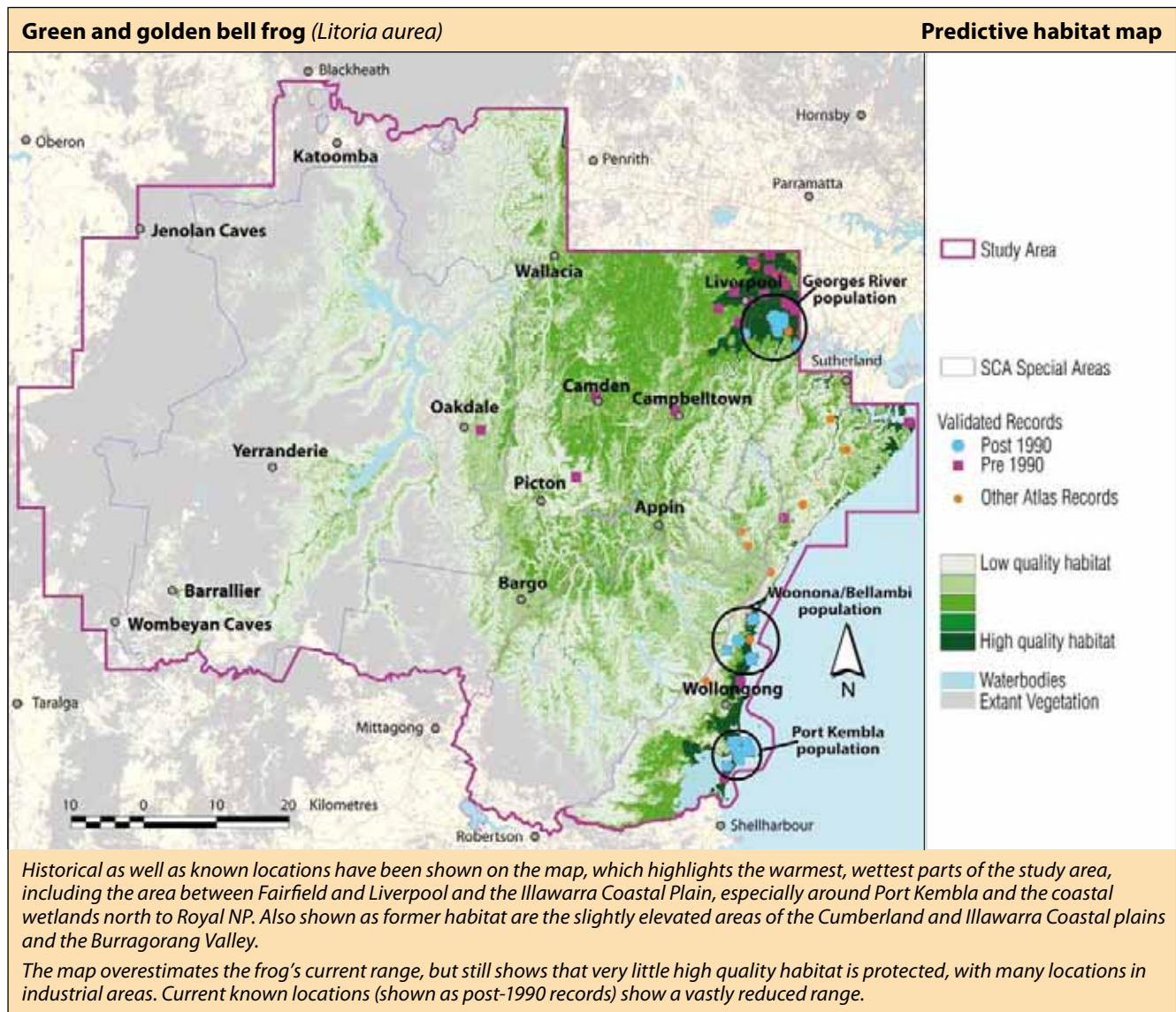
Distribution

This frog used to live on coastal and tableland areas between Brunswick Heads in northern NSW and East Gippsland in Victoria, and was common in Sydney and Wollongong. As it has declined severely in the last 30 years, it is only found in small, isolated populations, usually near the coast no more than 100 metres above sea level, with few frogs found in reserves.



Photo: N. Williams

No new locations were found during the 2002–05 survey. However, the species is known from a few sites in Wollongong (Port Kembla, Woonona and Bellambi) and around the Georges River in the Moorefield–East Hills area in south-western Sydney. There are other populations just outside the study area around Kurnell, Homebush and Rosebery. While the lack of sightings emphasises the scarcity of this frog, fieldwork was mostly undertaken during the extended drought.



How you can help

- > If you live near a bell frog colony, make a pond in your garden or remove fish from an existing pond so the frogs may use it. To learn more about frog-friendly backyards and pond construction, visit the NSW Frog and Tadpole Study Group website at www.fats.org.au.
- > If you think you have seen this frog, report it to DECC by completing a sightings form – visit www.nationalparks.nsw.gov.au/images/scientific_licence_datasheet.xls and www.nationalparks.nsw.gov.au/PDFs/WildlifeAtlas_Field_Data_Book.pdf – and emailing it to gis@environment.nsw.gov.au. If you can, take a photo or record its distinctive mating call. To listen to a recording of its call, visit www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10483.
- > Never touch a bell frog or any other frog as you can make it very sick. If you visit a wetland where there are bell frogs, sterilise your shoes, equipment and car tyres before and after visiting to ensure you do not transmit frog chytrid fungus. For more information, visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Frog+Chytrid+fungus.

2.6 Ground parrot (*Pezoporus wallicus*)

The ground parrot is slender with a long tail. Unlike most other Australian parrots, it nests in a depression scratched in the ground, usually under a clump of vegetation. It is most often located in its heathy habitat at dusk when it utters its distinctive, descending, whistling call. It eats a wide variety of seeds.

Status/direction of change: Possibly locally extinct

Significance of study area: Core

Key habitat: Upland swamp

Legislative listing: Vulnerable – TSC Act



Photo: P. Fullager

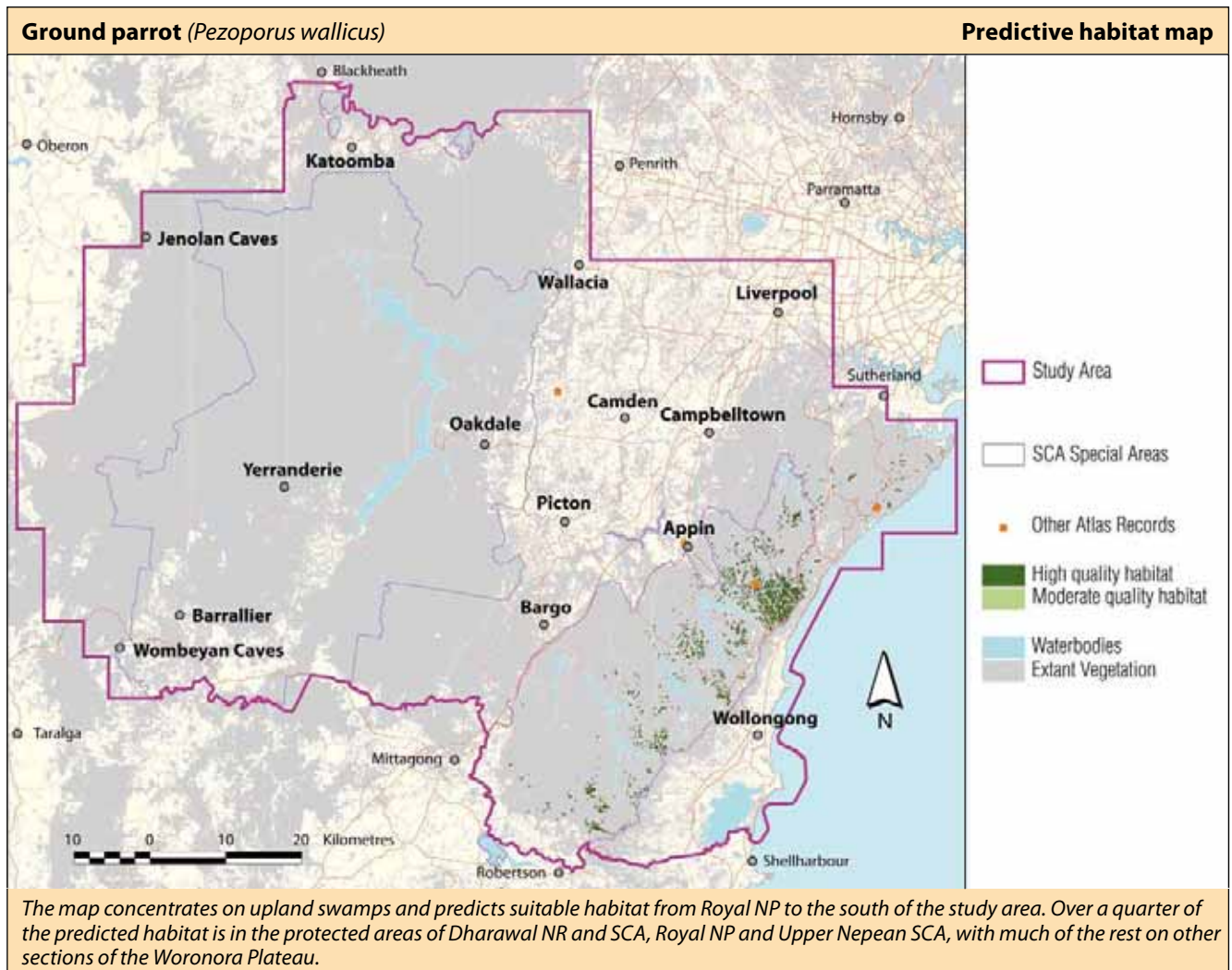
Threats

This bird's range has been reduced by habitat destruction and fragmentation through clearing for agriculture and development. This fragmentation means it is vulnerable to local extinction. Across NSW, inappropriate fire regimes are its main threat, as the parrots live in vegetation of different ages, including vegetation in recently burnt areas. Its ground-dwelling behaviour also makes it easy prey for foxes and cats.

Distribution

The *wallicus* subspecies is restricted to eastern Australia, between Fraser Island (Queensland) and south-eastern South Australia. In this range, the overall population has contracted to a number of isolated populations in coastal areas.

South of the study area, it is moderately common in suitable habitat on the Budderoo Plateau (including Barren Grounds NR), both sides of Jervis Bay (including Jervis Bay and adjoining Booderee NP) and the Tianjara Plateau in Morton NP.



No populations are currently known in the study area. The parrot once lived on the Woronora Plateau, although it probably disappeared following frequent burning after the extensive 1968 bushfires. It may still live on Maddens Plain or around Stockyard Swamp in the south. However, it has not been seen in this area for 20 years, with large-scale or overly frequent fires and pressure from introduced predators likely to be responsible for its disappearance. The bird may still also live on Curra Moors in Royal NP, although there are no recent confirmed records.

There were no sightings on the Woronora Plateau during the extensive 2002–05 surveys or targeted aural searches by other observers. However, the area's upland swamps are extensive and many locations were not surveyed. A confirmed sighting of a ground parrot at Magic Point, Maroubra in June 2006 indicates that the bird could recolonise Woronora Plateau, even if it is currently locally extinct.

How you can help

- > Join a bird-watching group – see 2.4 for details.
- > Look for the bird in the heaths of Royal and Botany Bay NPs and Malabar Headland. Report any potential sightings to DECC by completing a sightings form – see 2.5 for details.

2.7 Long-nosed potoroo (*Potorous tridactylus*)

The smallest member of the kangaroo family in NSW, with a body about 38 cm long and a tail up to 26 cm long, this potoroo lives in various habitats, especially those with a dense understorey of ferns, grasses or shrubs and sandy soil. It is generally nocturnal and feeds on fungi, insects and roots.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Upland swamp

Legislative listing: Vulnerable – TSC and EPBC Acts



Photo: K. Stepienell, DECC

Threats

The potoroo's habitat has been dramatically reduced by land clearing. Inappropriate fire regimes may affect local populations, though the species can recover rapidly, particularly in the absence of grazing or logging. Other threats are alteration to groundcover through grazing; predation by foxes, cats and dogs; and subsidence due to longwall mining, which can drain upland swamps.

Distribution

The potoroo lives in scattered locations between Gladstone, Queensland and extreme eastern South Australia, where until recently it was believed to be extinct. Other subspecies, sometimes considered separate species, live in Tasmania and Western Australia.

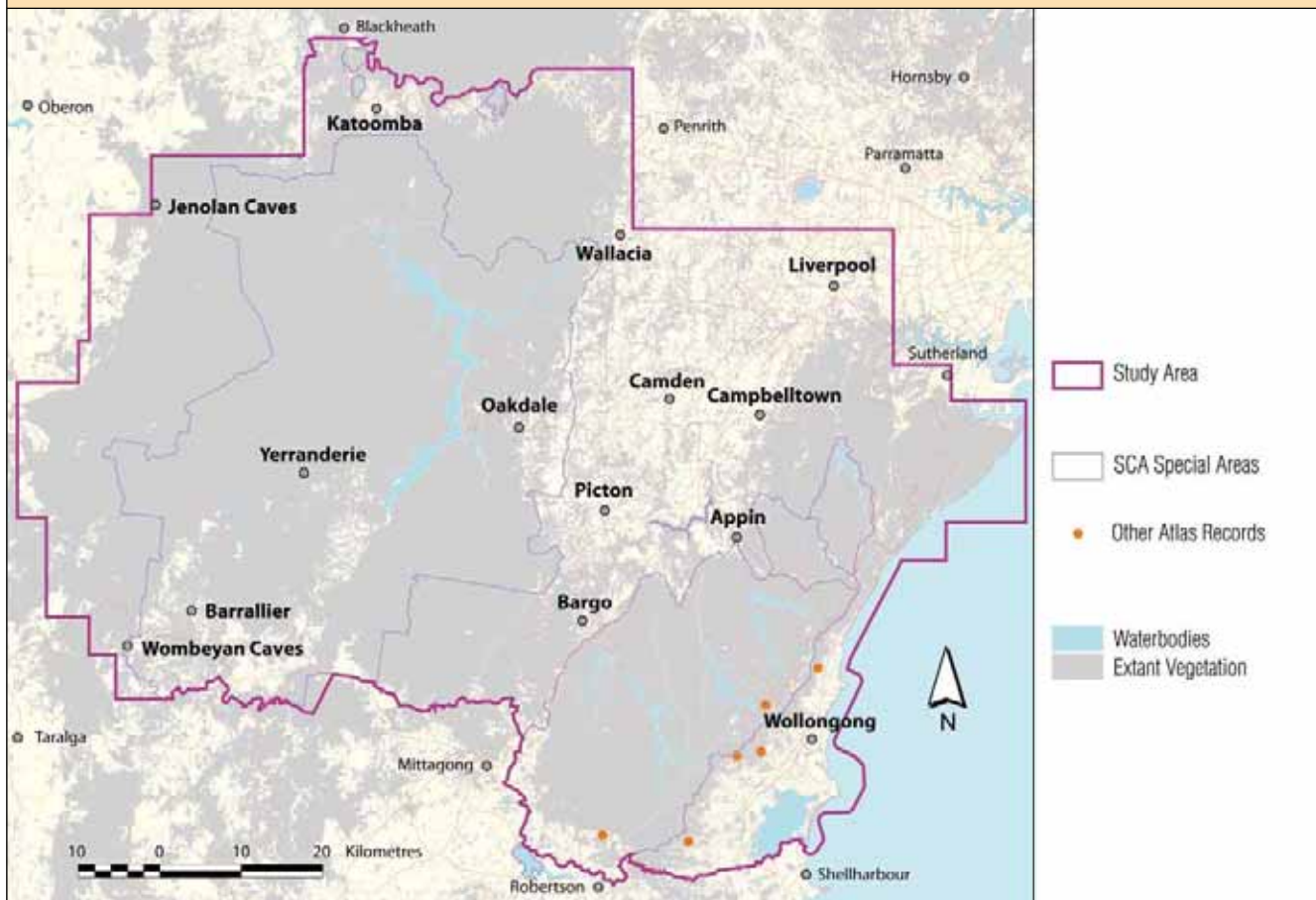
Around Sydney, the potoroo has declined greatly though it still lives on the Central Coast (around Mangrove Mountain), in upland areas south of Robertson, around Bendalong south of Jervis Bay, in Barren Grounds NR and at Red Rocks in Cambewarra Range NR near Kangaroo Valley.

In the study area, the potoroo was mostly found on the Woronora Plateau and Illawarra Escarpment and foothills. Until the late 1980s, this species was well-known in the Illawarra, though it was rare and declining. At that point, two groups from Mt Keira had disappeared, one group at Upper Cordeaux was stable, and other groups were living between Marshall Mount and Kangaloon.

During the 2002–05 surveys, no potoroos were observed. Collated results from the last eight years of all spotlighting, cage-trapping, hairtube survey and analysis of predator scats have found no trace of the species.

The only evidence that potoroos still live in the region is one sighting near Bulli on the Illawarra Escarpment in 2000, unconfirmed sightings in Dharawal SCA, and likely potoroo diggings found amongst dense saw sedge (*Gahnia* spp.) at Upper Cordeaux in September 2006. Overall, the lack of recent sightings means the potoroo may be nearly extinct in the study area.

Historical accounts of the potoroo suggest that potential habitat in the region would be on the deep soils above and below Illawarra Escarpment.



The map shows unconfirmed sightings only, as the long-nosed potoroo is thought to be nearly extinct.

How you can help

- > Join a local bushcare group or create your own, to improve habitat for the potoroo. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – www.landcareonline.com or phone: (02) 9412 1040, or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).
- > Always keep your pet dog or cat indoors at night as they may venture into bushland and kill potoroos. Never let your dog wander into native bushland.

2.8 Regent honeyeater (*Xanthomyza phrygia*)

This medium-sized honeyeater typically favours box-ironbark woodland, though it also lives in forests with river oaks (*Casuarina cunninghamiana*) and in coastal habitats with swamp mahogany (*Eucalyptus robusta*) or spotted gum (*Corymbia maculata*) trees. The bird moves in complex patterns, depending on where flowering food trees are located. It feeds mainly on nectar, and nests in eucalypts where it lays two or three eggs.

Status/direction of change: Extremely rare winter visitor/declining

Significance of study area: Core

Key habitat: Grassy box woodlands, alluvial woodlands and forests

Legislative listing: Endangered – TSC and EPBC Acts. National recovery plan (Department of the Environment and Water Resources various b)



Photo: G. Drabbb

Threats

Land clearance for agriculture has removed about three-quarters of this bird's habitat. Remaining vegetation is highly fragmented, and continues to be degraded by the removal of large trees. Habitat alteration also benefits aggressive honeyeaters such as miners (*Manorina* spp) and friarbirds (*Philemon* spp), which may displace the regent honeyeater. Only about 1500 birds are left in Australia and the population continues to decline.

Distribution

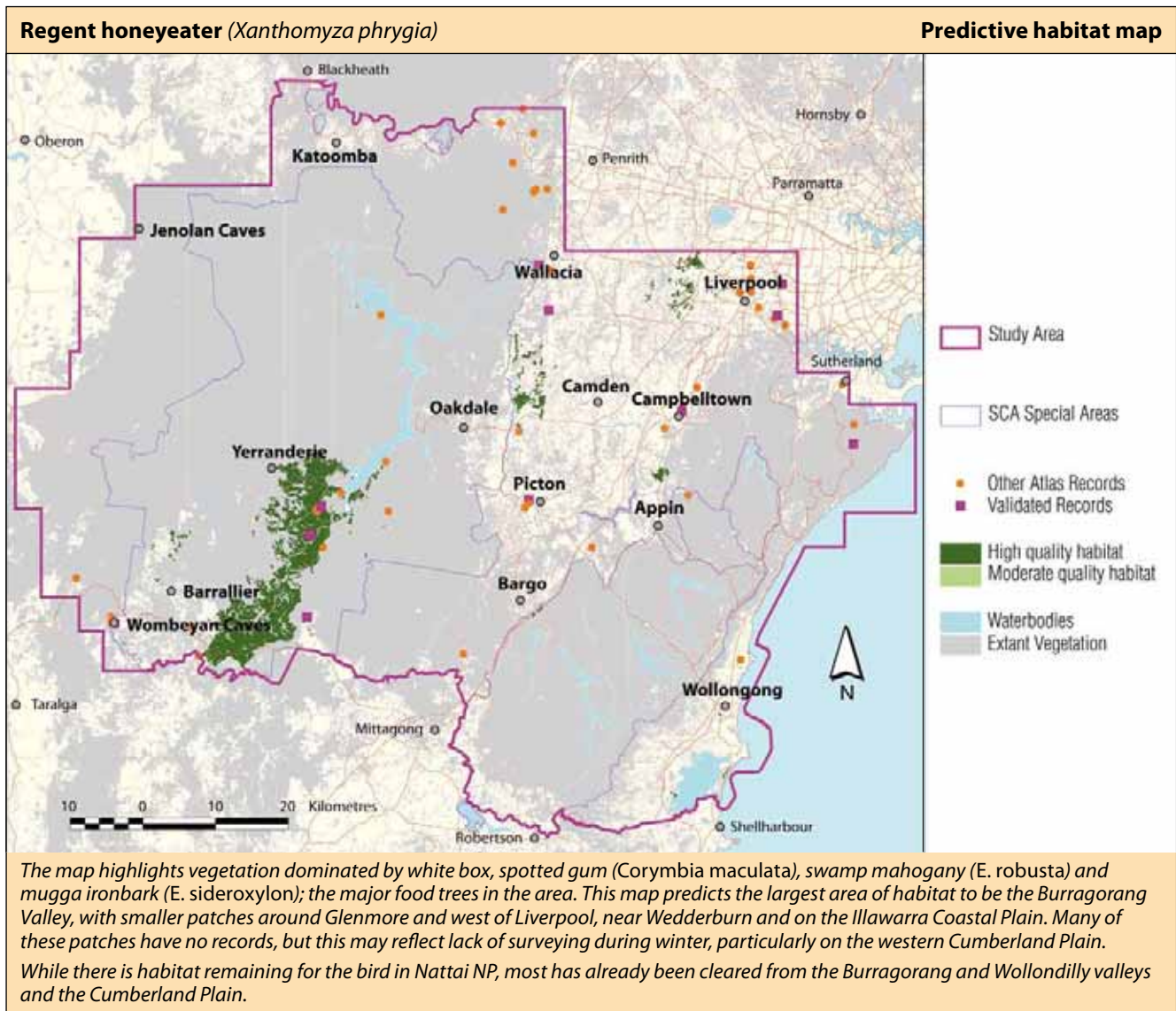
This bird is endemic to south-eastern Australia, formerly living between Rockhampton (Queensland) and Adelaide, though it is now probably extinct in South Australia, with a contraction of range in Queensland and NSW.

In NSW, most birds live around Sydney, and in the Nandewar and New England Tableland regions. Important areas in and around Sydney are the Capertee and lower Hunter valleys, the northern Cumberland Plain and the Central Coast. Birds also use areas in Goulburn River and Nattai NPs, Cockle Bay and Munghorn Gap NRs and the fringes of Wollemi NP. During the 2002–05 survey, birds were only seen in the Burragorang Valley.

This bird is highly nomadic and its major food tree, white box (*Eucalyptus albens*), flowers irregularly in the region, meaning its visits are also irregular. For example, large flocks of over 50 birds were seen in the Burragorang Valley in 1998, 2001, 2005 and 2006, but not in other years. The bird has also been seen in Wollondilly Valley (around Wombeyan Caves), in the lower Blue Mountains and on the Cumberland Plain.

How you can help

- > Join a bird-watching group to discover more about this rare bird – see 2.4 for details.
- > Volunteer to join the bi-annual national regent honeyeater and swift parrot surveys. Phone DECC's Environment Line on 1300 361 967 for more information.
- > Look for the bird in flowering gum trees in western Sydney and coastal Wollongong. Report any potential sightings to DECC by completing a sightings form – see 2.6 for details.



- > Plant food trees for the bird in your garden and encourage your local council to plant these on streets and in parks. Such trees include swamp mahogany and spotted gum south of Sydney and mugga ironbark, white box and spotted gum in Sydney's west.
- > Volunteer to regenerate western Sydney's grassy woodland or a coastal woodland like Puckey's Estate in Wollongong – see 2.7 for contact details.

2.9 Southern brown bandicoot (*Isodon obesulus*)

The southern brown bandicoot is distinguished from the more common long-nosed bandicoot by the coarse dark greyish to yellowish brown fur on its back, short rounded ears, shorter muzzle and lack of white forefeet. This nocturnal mammal lives in areas of sandy soil with low vegetation. It feeds on insects, fungi and plants that are dug from the ground with powerful foreclaws.

Status/direction of change: Unknown

Significance of study area: Unknown

Key habitat: Unknown, possibly upland swamp

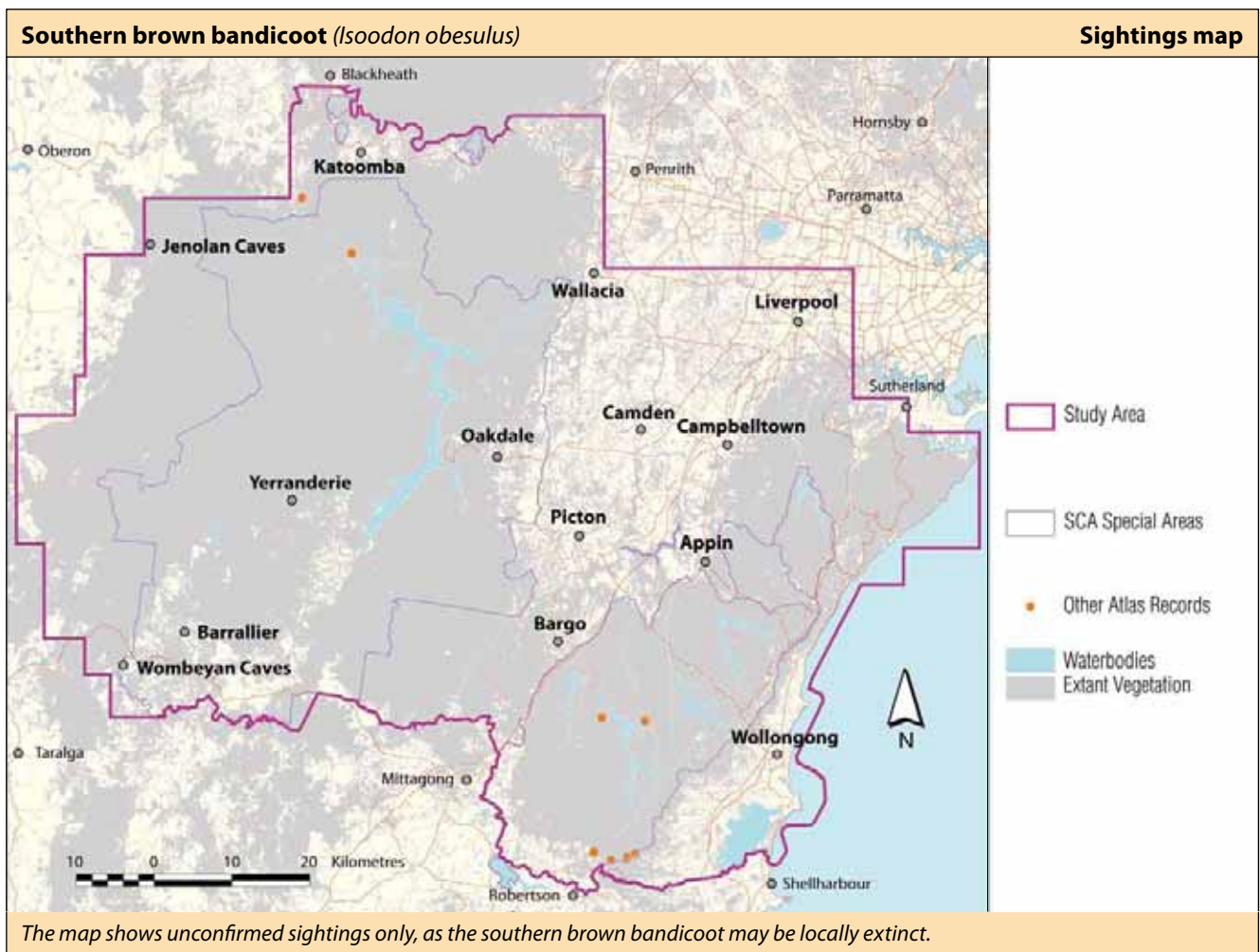
Legislative listing: Endangered – TSC and EPBC Acts. NSW recovery plan (DEC various b)



Photo: DECC

Threats

Not much is known of the bandicoot's distribution and population size, so threats are hard to determine. They include introduced predators, particularly foxes and dogs; habitat reduction through clearing and grazing; logging, though no long-term studies have been conducted; 1080 poisoning, though doses required are relatively high; and land subsidence due to longwall mining. Bandicoots in northern Sydney are killed on roads, even in national parks. Fire is a possible threat, though it may only be a problem for isolated populations or when there are many foxes in the area.



Distribution

The animal used to live between the Hawkesbury River and South Australia, though it has dramatically reduced in range and in NSW now lives only north of Sydney and south of Eden on the south coast. It lives in some reserves including Ku-ring-gai Chase and Garigal NPs in the north and Ben Boyd NP and Nadgee NR in the south.

It is uncertain whether this animal still occurs in the study area. No records were obtained from spotlighting, cage trapping, hair-tube surveys or predator scat analyses conducted during the 2002–05 surveys, or during previous DECC surveys of Wollongong and Royal NP. The only local records are from hair samples at Mt Hay, north of the study area. Unconfirmed records include a dead bandicoot collected in Avon Catchment in 1997, and further records from hair analysis in the Avon catchment.

How you can help

- > Volunteer to do bush regeneration in Garigal or Ku-ring-gai Chase NPs where the bandicoot still lives – follow the web links for www.environment.nsw.gov.au in 2.2, linking to 'Garigal National Park' or 'Ku-ring-gai Chase National Park'. Alternatively, phone Garigal NP bush regeneration group on (02) 9472 8953 or (02) 8977 7031, or Ku-ring-gai Chase NP on (02) 9472 8949.
- > Always keep your pet dog or cat inside at night as they may kill bandicoots. Never let your dog wander into native bushland.

2.10 Stuttering frog (*Mixophyes balbus*)

This frog gets its name from the soft, stuttering call males make after summer rains. It is large, but is easily camouflaged in the wet leaf litter of the forest floor. It lives by flowing streams, often in rainforest or wet sclerophyll forests, where it eats insects and small frogs. It breeds from September to April and the tadpoles take a year to turn into frogs.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Rainforests, wet sclerophyll forests, riparian environments

Legislative listing: Endangered – TSC Act. Vulnerable – EPBC Act



Photo: N. Williams

Threats

The frog is threatened by *chytrid* fungus which has been recorded in this species in northern NSW and as part of the 2002–05 surveys. Other major threats are thought to be habitat fragmentation and degradation, leading to isolated populations that are increasingly vulnerable to other threats and to local extinction; predation by introduced fish; climate change; pollution and hydrological changes.

Distribution

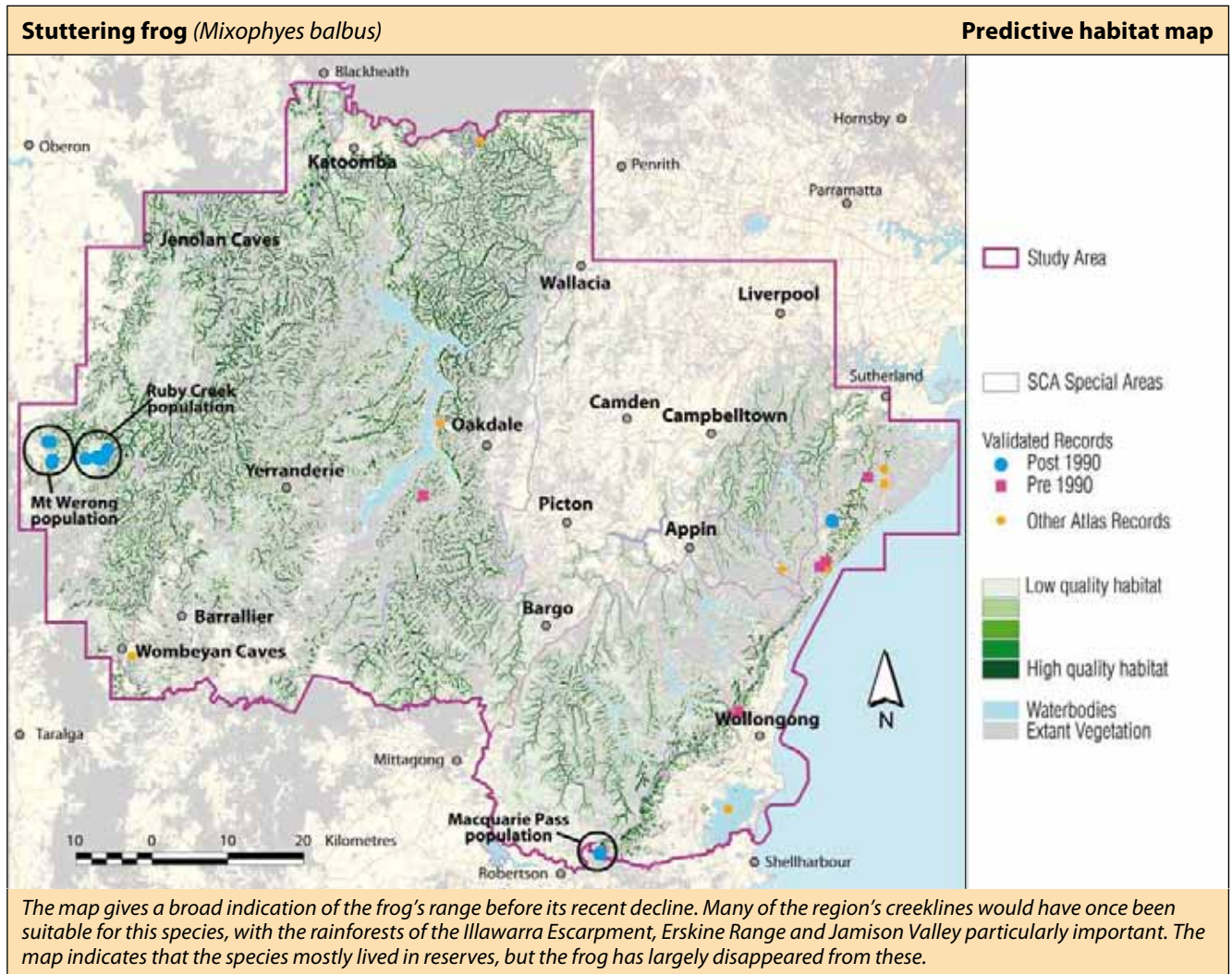
This frog was once found along the coast and ranges between northern NSW and Victoria. It has declined dramatically in the southern part of its range. In and around Sydney, it still lives in Watagan and Macquarie Pass NPs, as well as in Olney, Strickland and Awaba SFs and it has also recently been rediscovered in Wollemi NP.

It is now nearly extinct in the study area. The species was once common in the wet forests and rainforests of the Blue Mountains and Illawarra Escarpment from where there is an unconfirmed record from 2001. It still lives at Mt Werong in the Blue Mountains NP, and in Macquarie Pass NP, where tadpoles have been collected as part of a captive breeding program. There is a record from 1997 near Helensburgh. An adult was photographed in 2002 at Victoria Falls in the Blue Mountains, just north of the study area.

A population at Mt Werong along Ruby Creek was discovered in 2000. Tadpoles were detected in every large pool along a two-kilometre stretch of the creek. Three dead metamorphs were also found, and a postmortem undertaken by the Veterinary and Quarantine Centre at Taronga Zoo found *chytrid* fungus infection.

Searches of potential habitat in the study area during the 2002–05 surveys also revealed two new sites on Mt Werong Creek. This is a significant find as this creek is west-flowing whereas these frogs normally live in east-flowing streams, and because this is an unusually high altitude for this animal. Frogs were not found anywhere else in the study area, highlighting the seriousness of their decline.

Follow-up surveys in late 2006 found the frog had successfully bred in Ruby Creek but not Mt Werong Creek. Further remnant populations may still exist in the study area, though numbers are likely to be small.



How you can help

- > Report any potential sightings of the frog to DECC. Do not mistake it for a more common species such as Lesueur's tree frog (*Litoria lesueuri*). Both frogs are large and similar in colour and live on rainforest creeks, but the stuttering frog has striped legs and a blue crescent above its iris – take a photo if you can. An important recent record of this frog came from a photo taken by a bushwalker in the Blue Mountains. Complete a sightings form – see 2.5 for details.
- > Never touch a stuttering frog as you can make it very sick. See 2.5 for details of how to avoid transmitting chytrid fungus.
- > Join or start a Streamwatch or Rivercare group to care for your local rainforest stream or creek – see 2.1 for details.

2.11 Swift parrot (*Lathamus discolor*)

This medium-sized, green parrot lives in open eucalypt forest and woodland where it eats nectar and lerps (waxy coverings constructed by the nymphs of certain insects). Favoured food trees include swamp mahogany (*Eucalyptus robusta*), mugga ironbark (*E. sideroxylon*), white box (*E. albens*) and spotted gum (*Corymbia maculata*).

Status/direction of change: Extremely rare autumn and winter visitor/declining

Significance of study area: Non-core

Key habitat: Grassy box woodland, coastal swamp mahogany forest

Legislative listing: Endangered – TSC and EPBC Acts. National recovery plan (Department of the Environment and Water Resources various b)



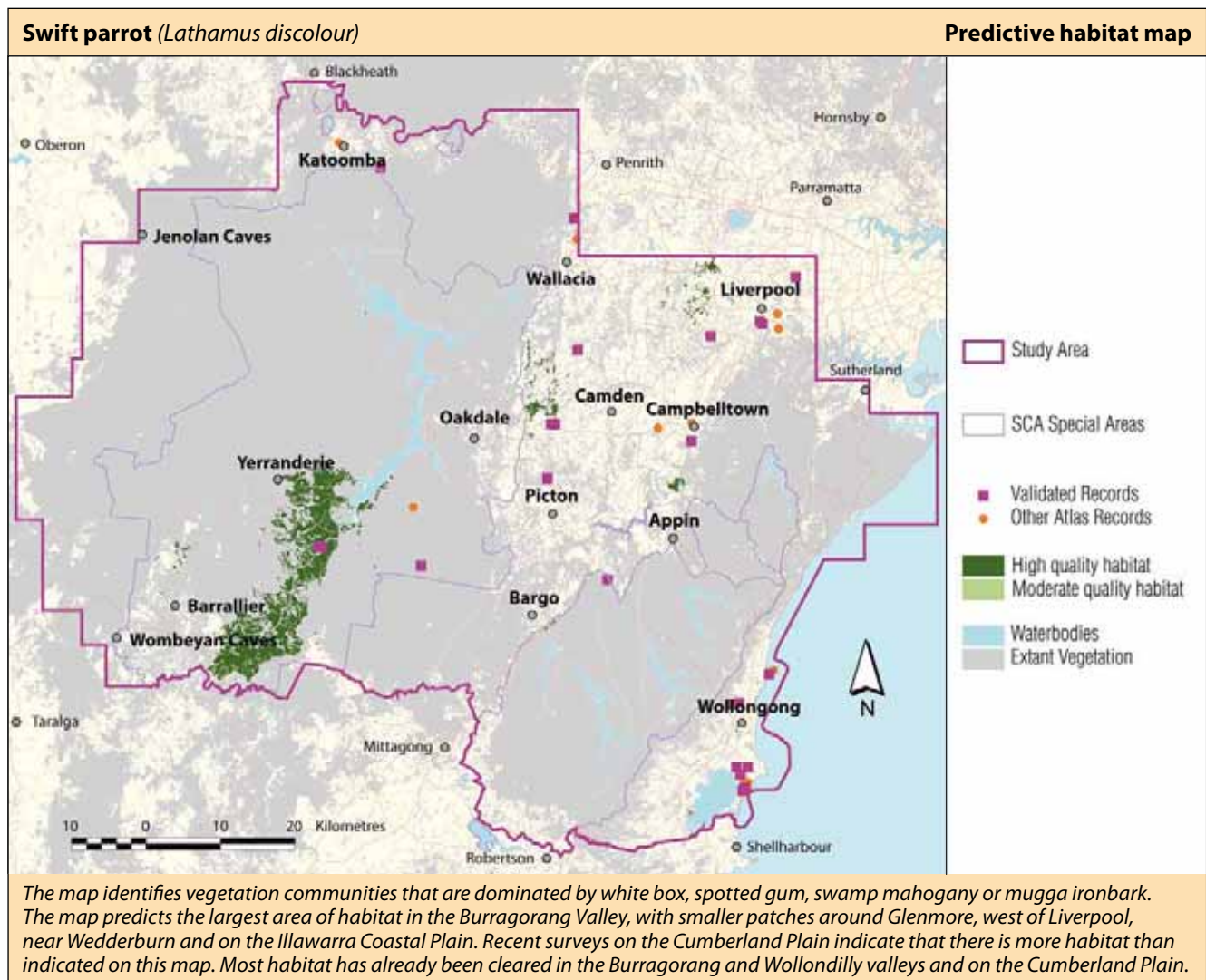
Photo: G. Dabb

Threats

During the non-breeding season, the parrot is nomadic due to the variable flowering of its food trees. Therefore, it is sensitive to clearing of areas it may rely on only once every few years. Due to its rapid flight, it is killed in collisions with windows, vehicles and fences. *Psittacine circoviral* (beak and feather) disease has been confirmed in parrots in NSW.

Distribution

Breeding only in Tasmania, the bird migrates to the mainland as far north as southern Queensland during autumn and winter, with flocks congregating at suitable food sources. It is estimated that only 2000 swift parrots are left in the wild, and populations may still be declining. Annual surveys across its range have highlighted the importance of its feeding grounds in NSW. Swamp mahogany is an important food source in the Illawarra.



In the Sydney Basin, most parrots are found on the coast, particularly the Central Coast, but they also visit the Hunter and Capertee valleys and the Cumberland Plain, and Nattai and Werakata NPs.

In the study area, the parrots mostly use habitat on the Illawarra Coastal and Cumberland plains and in Burragorang Valley. They have been recorded in the latter area since 1941 and were seen near the Jooriland Homestead in 2002 where they were feeding on lerps in red gum box woodlands. Surveys on the Cumberland Plain in 2006 recorded the parrot at Holsworthy Military Area, Razorback Range and Cuthill Road in Cobbitty, with groups of over 15 birds at the latter two sites. Although the parrot is extremely rare in the study area, its habitat there may be very important in some years.

How you can help

- > Join a bird-watching group – see 2.4 for details.
- > Report any possible sightings of this bird to DECC. Fill in a sightings form – see 2.5 for details. Take a photo if you can.
- > Volunteer to join the bi-annual national swift parrot and regent honeyeater surveys. Phone DECC's Environment Line on 1300 361 967 for more information.
- > Plant food trees for the bird in your garden and encourage your local council to plant these on streets and in parks. Such trees include swamp mahogany and spotted gum south of Sydney and mugga ironbark, grey or white box and spotted gum in Sydney's west.
- > Join the 'Friends of Tumblebee' who are working to preserve bushland in the Hunter Valley for the swift parrot – visit <http://users.tpg.com.au/users/stevez/index.html> or phone: (02) 4937 5125.

3. Animals of high conservation priority

These species are rare and have declined substantially. They are faced with continuing threats, mainly habitat loss or alteration. Most may be conserved by managing key habitats or threats in the region.

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), IUCN = International Union for the Conservation of Nature, NP = national park, NPW Act = *National Parks and Wildlife Act 1974*, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest, and TSC Act = *Threatened Species Conservation Act 1995*.

3.1 Australasian bittern (*Botaurus poiciloptilus*)

This large, secretive heron usually lives alone, in dense reeds and rushes in freshwater swamps or saltwater wetlands associated with tidal estuaries. It is identified by its distinctive booming call during the breeding season.

Status/direction of change: Rare visitor/declining

Significance of study area: Non-core

Key habitat: Coastal wetlands

Legislative listing: Vulnerable – TSC Act



Photo: T. Shimba

Threats

The main threats are habitat destruction and alteration through changed flooding regimes; the drainage, salinisation, siltation and pollution of wetlands caused by urbanisation; and cats and foxes preying on the eggs and young. Other threats include the degradation of drought refuges; clearing of riparian vegetation for agriculture; and grazing and trampling.

Distribution

The Australasian bittern is found between southern Queensland and Tasmania in eastern Australia and in south-western Western Australia, as well as in New Zealand and New Caledonia.

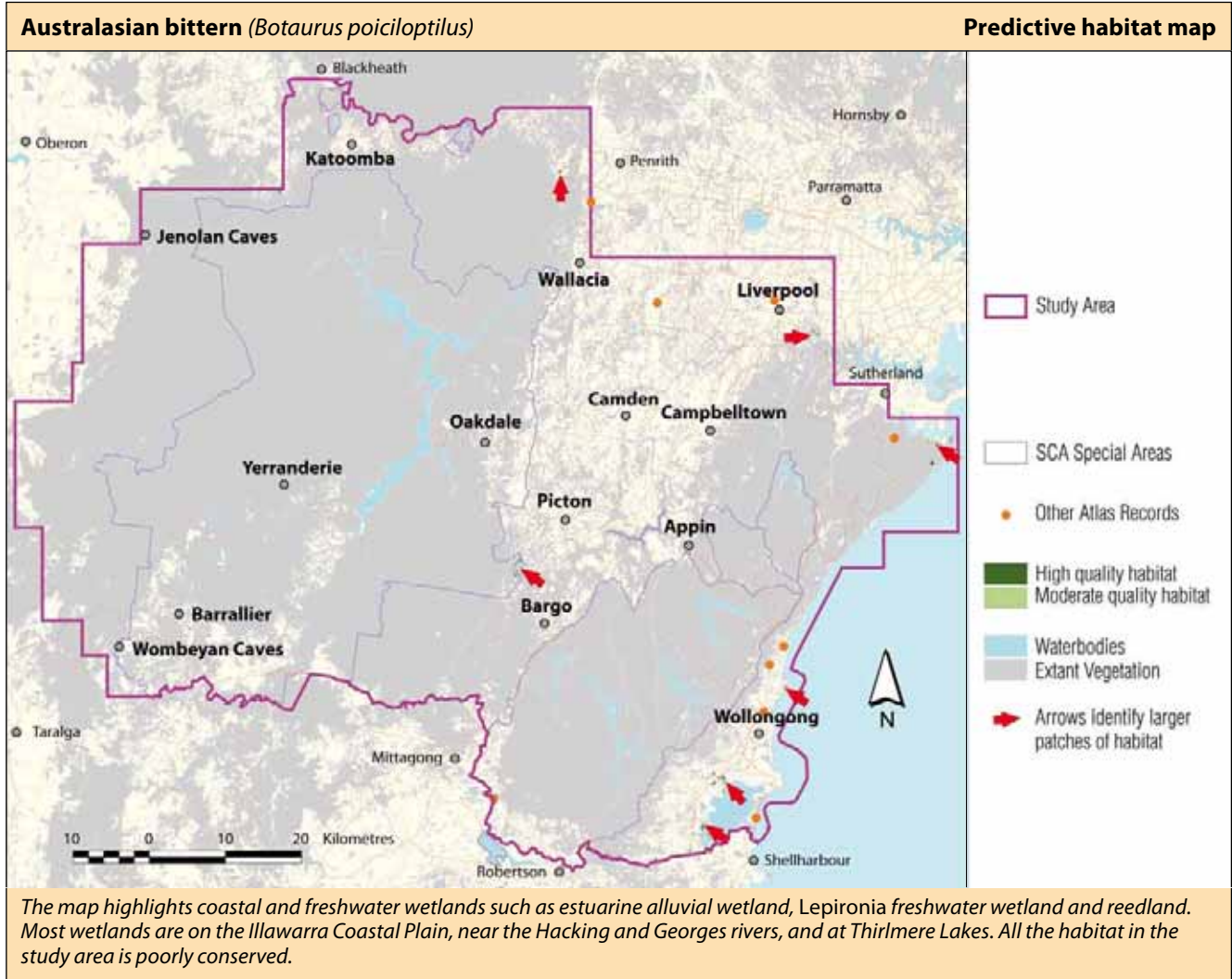
In NSW it occurs mainly in the Riverina. In and around Sydney, it lives on the coast and in reserves, including Dharug NP and Pitt Town and Kooragang NRs.

In the Illawarra, it is a rare visitor though there are more sightings during drought years. The bird has been seen in the past few years at Woonona, Sandon Point and Thirroul. Further west, it has been seen at Thirlmere Lakes and on the Cumberland Plain. Its population in the study area is probably not more than 50 and its annual population in the Illawarra is less than 20.

Outside the study area, the species is found in Towra Point NR and Cecil Hoskins NR near Moss Vale. The nearest known breeding sites are at Commonderry (near Shoalhaven Heads) and Wingecarribee Swamps.

How you can help

- > Join a bird-watching group such as the Bird Observers Club of Australia (www.birdobservers.org.au), Birds Australia (www.birdsaustralia.org.au) or the Cumberland Bird Observers (www.cboc.org.au) to find out more about this rare bird.
- > If you live near a wetland, join a 'friends of the wetland' group or start your own – phone your local council for advice. Alternatively, find a wetland conservation project near you by contacting Conservation Volunteers Australia – visit www.conservationvolunteers.com.au/volunteer/conservation-connect.asp, or Wetland Care – visit www.wetlandcare.com.au or phone: (02) 6681 6169.
- > Never let your dog wander into swamps or bogs as they may disturb sleeping or nesting birds.



3.2 Barking owl (*Ninox connivens*)

This owl has a dark brown back and a white underbody with coarse brown streaking, and a distinctive, dog-like barking call. It lives in dry, open eucalypt forests and woodlands, near rivers and swamps. It eats more insects than other large forest owls, though it also feeds on small mammals and birds during the breeding season. It nests in hollows of live trees, often on the edge of cleared country, where it lays one to three eggs.

Status/direction of change: Extremely rare resident/possibly declining

Significance of study area: Non-core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act. Draft NSW recovery plan (DEC various b)



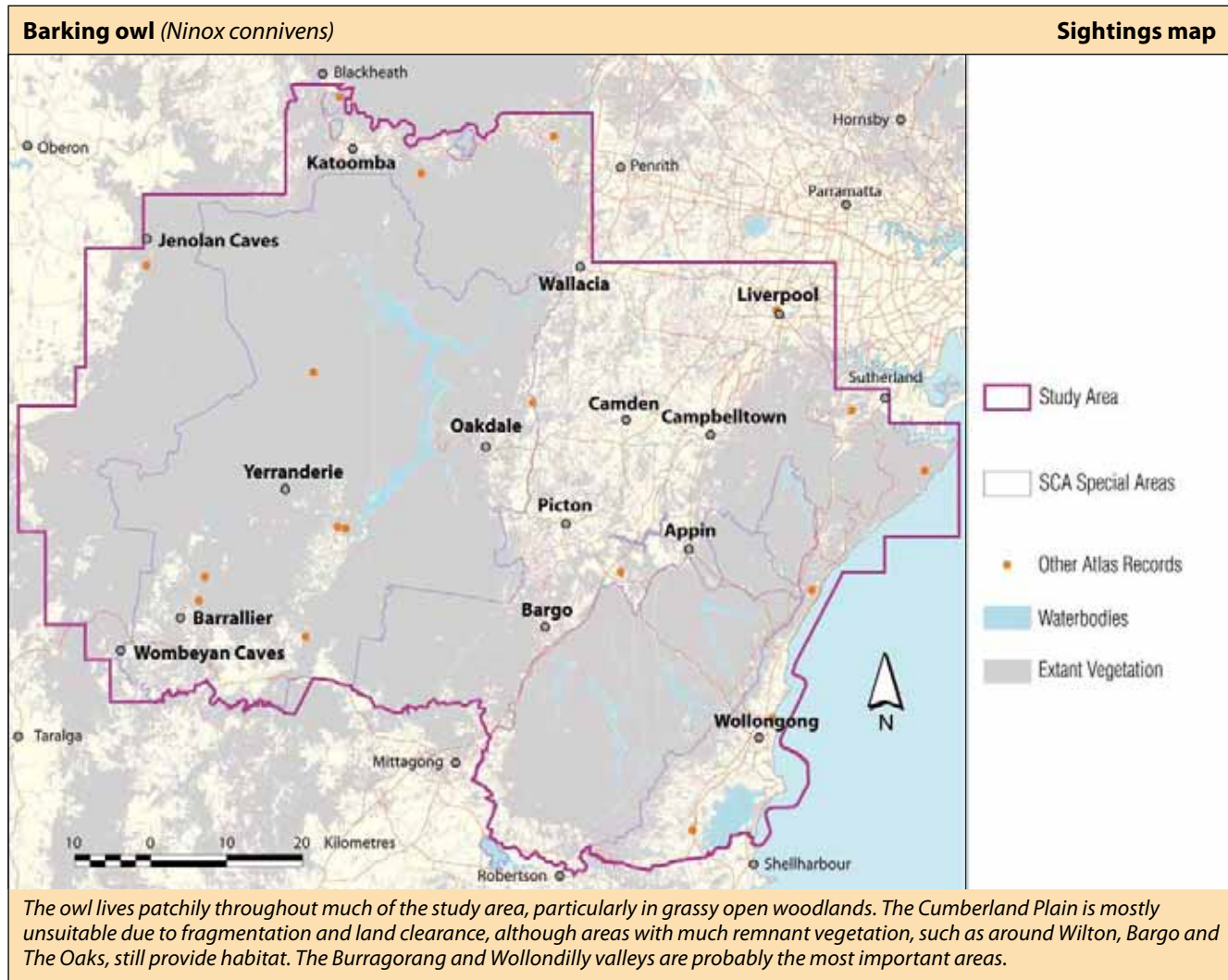
Threats

The main threat is habitat destruction, particularly due to the clearing of woodlands and forests for farming, the collection of firewood, and grazing and forestry operations that cause old-growth and over-mature trees to be cut down and reduce available nesting sites. Other threats include predation, particularly of fledglings; collisions with fences and vehicles; secondary poisoning from rodenticides; and competition from feral honeybees (*Apis mellifera*). Due to the long generation time of this species, it does not recover quickly following population declines.

Distribution

The owl lives throughout NSW, though it is rarer in the far west and at higher altitudes. In and around Sydney, important locations include the Capertee and western Hunter valleys, and grassy box woodlands on the edges of Yengo and Wollemi NPs and Manobalai NR.

In the study area, the owl has been seen in only 18 locations, with many sightings considered to be misidentifications. Call playbacks at 490 sites and 688 hours of spotlighting during 2002–05 produced only four records, from the Bindook Highlands, Scotts Main Range and near The Oaks. Surveys of the Cumberland Plain in 2006 found the owl around Razorback Range and north of the study area, near Richmond. Other sightings have been in grassy open woodlands on high-fertility soils such as in the Burragorang and Wollondilly valleys.



How you can help

- > Retain living and dead trees that have hollows on your land, including paddock trees – they provide shelter and nesting sites. Leave fallen timber on the ground as it provides habitat for prey.
- > If you hear the distinctive call of the owl, record it and send it to DECC. Also, complete a sightings form – visit www.nationalparks.nsw.gov.au/images/scientific_licence_datasheet.xls and www.nationalparks.nsw.gov.au/PDFs/WildlifeAtlas_Field_Data_Book.pdf – and email it to gis@environment.nsw.gov.au.
- > To find out more about the owl and to listen to a recording of its call, visit www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10561.
- > If you are trying to get rid of rats, use traps rather than baits to avoid poisoning owls. If rats are in the roof, find where they are getting in and block the hole with metal and chicken wire.
- > Join a local bushcare group or create your own if you live near degraded grassy woodland, to regenerate habitat for the owl, especially if you live in rural western Sydney or in the Wollondilly or Burragorang valleys. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – visit www.landcareonline.com or phone: (02) 9412 1040 – or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).

3.3 Black bittern (*Ixobrychus flavicollis*)

This medium-sized, grey–black heron has a distinctive yellow stripe on its head and neck. It is usually found alone or in pairs in thick vegetation at the edges of freshwater and estuarine wetlands, and breeds in thick leafy trees overhanging water. In the Illawarra region it is usually seen in watercourses containing swamp oak (*Casuarina glauca*) or river oak (*C. cunninghamiana*).

Status/direction of change: Rare summer visitor/ declining

Significance of study area: Non-core

Key habitat: Coastal wetlands, alluvial woodlands and forests

Legislative listing: Vulnerable – TSC Act



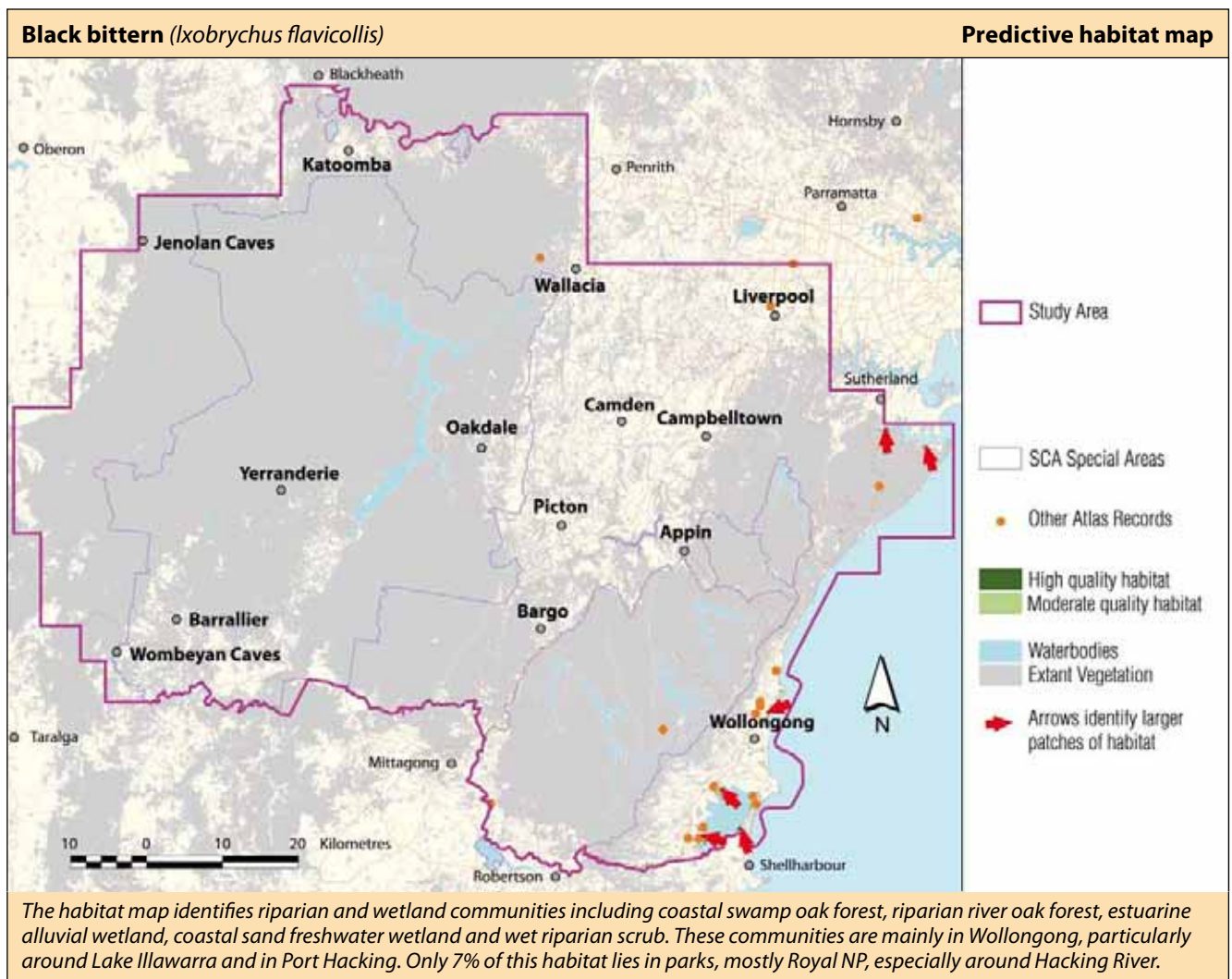
Threats

Habitat alteration is the greatest threat, including clearing of riparian vegetation for agriculture and urbanisation, and the resulting increase in salinity and sedimentation.

Distribution

In Australia, the black bittern lives on the north and east coast between the Kimberleys in Western Australia and extreme eastern Victoria. It is rare south of Sydney. There is an isolated declining population in south-western Western Australia.

In NSW, the bird lives on the coast, and occasionally west of the Great Divide. In and around Sydney, the bird is rare but lives along major rivers such as the Hawkesbury, including in Dharug and Scheyville NPs.



In the study area, less than 20 birds are estimated to live in the Illawarra. Most birds have been seen on lower Duck Creek, around Wollongong, or in various wetlands on the coastal plain. Importantly, there is a nesting record for West Dapto, confirming that the species breeds in the area. The most recent records are from Collins Creek in urban Woonona in 2005, where one bird was heard calling at night over several weeks.

Survey work in 2002–05 focused on drinking water catchments and reserves and did not target black bittern habitat. Further surveys may find this species to be more prevalent than currently recognised. Nonetheless, the map confirms that very limited suitable habitat remains, almost all of which is threatened by urbanisation and degradation.

How you can help

- > If you own land with areas of swamp oak or river oak, fence stock out and replant or encourage regeneration of bankside vegetation. This will also help improve water quality. Alternatively, write to your council to encourage them to protect the black bittern's breeding habitat.
- > If you live near a wetland, join a 'friends of the wetland' group or start your own – see 3.1 for details.
- > Stop your dog wandering into swamps or bogs where it may disturb nesting or sleeping birds.

3.4 Black-chinned honeyeater (*Melithreptus gularis gularis*)

The black-chinned honeyeater is distinguished from other honeyeaters by its larger size, bright blue or jade green eye-wattle and distinctive call. The bird is nomadic, and moves between dry eucalypt woodlands with ironbark or box species and low to moderate rainfall, where it is usually found in pairs or small groups of up to 12. It feeds on insects, nectar, lerps, flowers and leaves, usually in the upper canopy.

Status/direction of change: Rare resident/declining

Significance of study area: Non-core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act



Photo: P. McHoney

Threats

The main threats are habitat clearance and fragmentation. The bird cannot survive in vegetation remnants of less than 200 hectares, possibly due to competition from aggressive honeyeater species and increased nest predation from species such as pied currawongs (*Strepera graculina*).

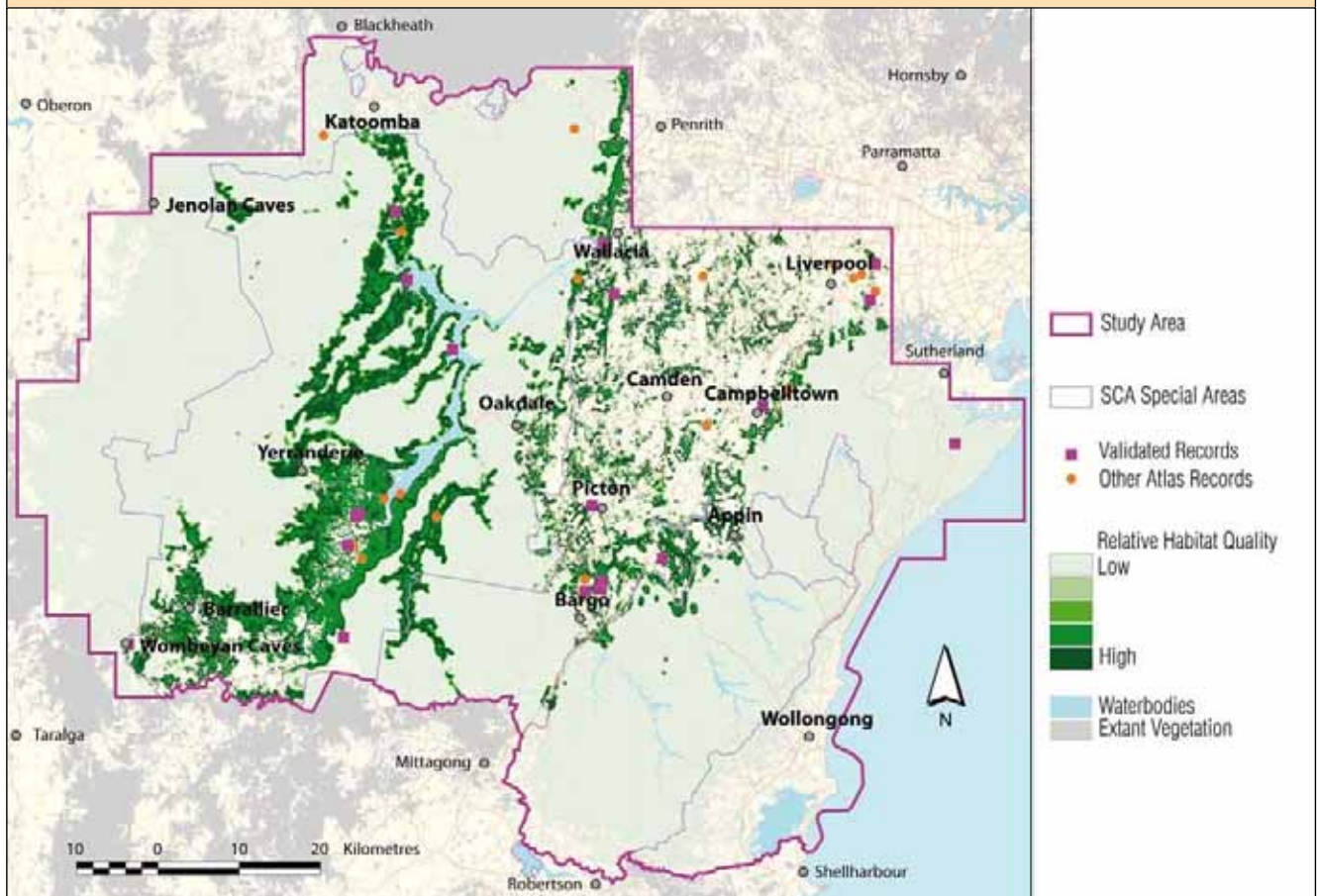
Distribution

This honeyeater is found between south-eastern Queensland and Victoria. In NSW, it lives in the Nandewar region, on the south-west slopes in the south-eastern highlands, and around Sydney. In the latter area, the bird lives in western Sydney, and the Capertee and Hunter valleys, which have fertile soils and winter-flowering trees like white box (*Eucalyptus albens*) and spotted gum (*Corymbia maculata*). These areas have been heavily cleared, degraded and fragmented. The bird has also been seen in Goulburn River and Werakata NPs, in Munghorn Gap NR, and on the fringes of Wollemi NP.

This bird is rarely seen in the study area. There are scattered records from the western Cumberland Plain and it is rare though possibly resident in the Illawarra. Other sightings have been in Burragorang Valley and Warwick Farm. During the 2002–05 surveys, it was seen in Kedumba Valley, at Butchers Creek Camp on the western shore of Lake Burragorang and at Wirrimbirra Sanctuary near Bargo. Only one record for Jooriland was made in 2002–05. However, the bird may only visit the region when there are suitable eucalypts flowering, particularly in winter. Autumn and winter surveys in 2006 have detected this species north of Bargo and on the northern edge of the Cumberland Plain near Kurrajong.

How you can help

- > Join a bird-watching group – see 3.1 for details.
- > Protect and enhance grassy woodland on your property if you own a large section of bushland. Suitable species for rehabilitation include white box (*Eucalyptus albens*) and spotted gum (*Corymbia maculata*).
- > Join a local bushcare group to regenerate bushland – see 3.2 for details.



The map predicts suitable habitat in low-lying areas, particularly high fertility woodlands and forests of the rain-shadow valleys and escarpment slopes of the southern Blue Mountains. The most important areas are Burragorang and Cocks River valleys and the Cumberland Plain. Of this habitat, much has been cleared and less than half is in reserves.

3.5 Blue Mountains water-skink (*Eulamprus leuraensis*)

This medium-sized, semi-aquatic lizard can be identified by the markings on its back, consisting of four narrow golden to white stripes on a dark brown to black background. The skink is found in high sedge and shrubby swamps that have boggy soil and plants such as button grass (*Gymnoschoenus sphaerocephalus*), blady grass (*Lepidosperma limicola*), yellow flag (*Xyris ustulata*) and weeping baekia (*Baekia linifolia*). The skink is active on warm sunny days from September to late April, when it forages in vegetation for insects including grasshoppers, flies, moths, weevils and wasps.

Status/direction of change: Extremely rare resident/ probably stable

Significance of study area: Core

Key habitat: Upland swamp

Legislative listing: Endangered – TSC and EPBC Acts. National recovery plan (Department of the Environment and Water Resources various b). NSW recovery plan (DEC various b)



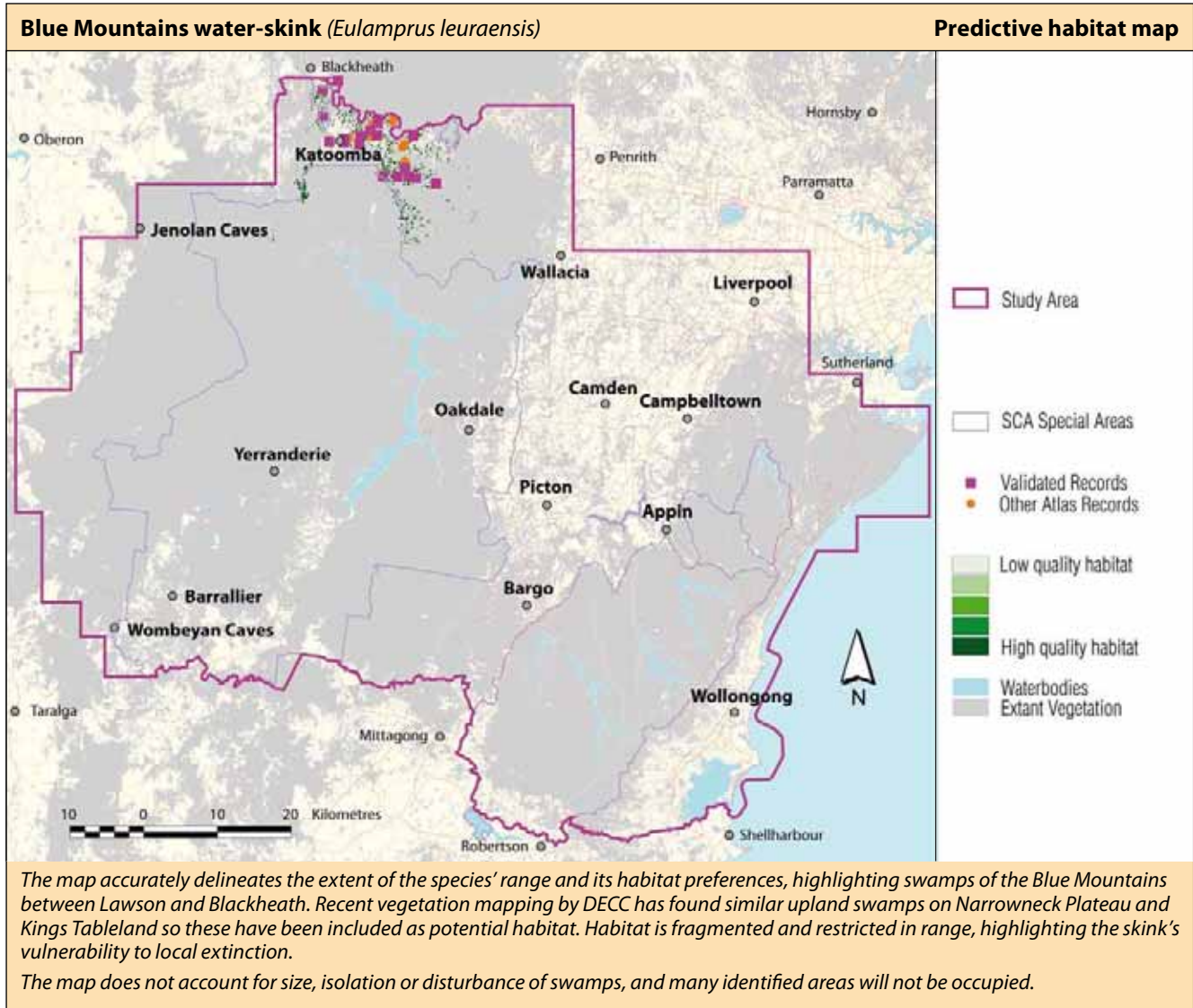
Threats

The skink is highly threatened because of the small number and isolation of its populations, its limited geographic distribution and the lack of habitat. Key threats include habitat loss; habitat degradation such as sedimentation, pollution and weed invasion of swamps from nearby urban developments; predation by cats; inappropriate fire regimes and swamp drainage from longwall mining. The impacts of these threats require more research and monitoring.

Distribution

This skink has a very restricted distribution, living in only 40 locations between the Newnes Plateau and south of Hazelbrook, most of which are in Blue Mountains NP and Newnes SF, though it also lives in crown reserves and in Blackheath and Katoomba Special Areas. Most locations are near urban settlements.

Over 50% of all known sites for the skink are in the study area. During the 2002–05 study, there were no new locations recorded despite targeted searches being conducted in suitable habitat in Katoomba, Woodford Creek and Blackheath Special Areas. Nevertheless, this species is secretive and often difficult to detect without pitfall trapping or if survey conditions are less than ideal.



How you can help

- > Join the Australian Herpetological Society (www.ahs.org.au) to find out more about this rare skink.
- > Report anybody you see collecting lizards from the wild to your local national parks office.
- > Volunteer to do bushcare work in the Blue Mountains area to improve habitat for the skink – visit www.environment.nsw.gov.au and click on the following links: 'Parks and Wildlife' (top link), 'How you can help' (side link), 'Taking care of national parks', 'Park volunteer programs', 'Blue Mountains National Park'. Alternatively, phone DECC on (02) 4787 8877.
- > If you live in the Blue Mountains, stop your cat wandering into local bushland – particularly swamps – where it may kill this rare lizard.

3.6 Broad-headed snake (*Hoplocephalus bungaroides*)

This snake is a nocturnal ambush predator, about 60 cm long, and is recognised by its distinctive black and yellow pattern. It is semi-arboreal, sheltering in winter under sandstone on rock outcrops, and in summer in tree hollows in woodland. The snake primarily feeds on Lesueur’s velvet gecko (*Oedura lesueurii*), which shelters around sandstone outcrops and less frequently under bark and in hollows of dead trees. The snake is particular about where it retreats to during the day, which may be a factor limiting its population.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Rocky outcrops in sandstone woodlands

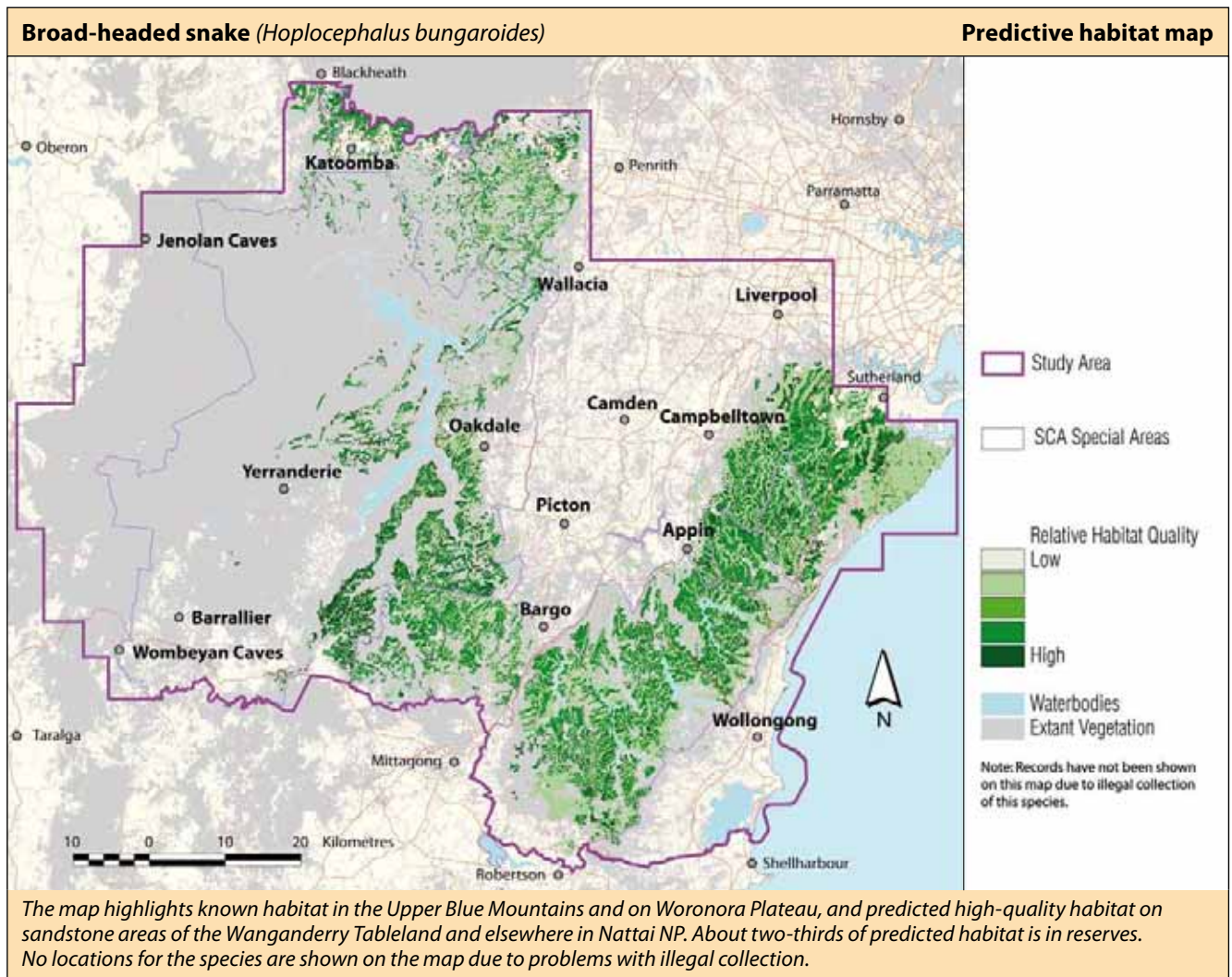
Legislative listing: Endangered – TSC Act. Vulnerable – EPBC Act



Photo: N. Williams

Threats

A key threat is the collection of bush rock for landscaping (which removes the sheltering habitat of the snake and Lesueur’s velvet gecko). This activity is generally prohibited or requires permits, but is practiced illegally. As the snake is colourful, rare and venomous, it is taken by snake-collectors. Other threats include overgrowth of rock outcrops due to fire suppression; urbanisation of sandstone ridgetops; the impacts of feral animals, especially foxes and goats, through predation and disturbance; habitat alteration through longwall mining; and removal of dead wood and dead trees. The snake may also be affected by logging operations due to its reliance on tree hollows for part of the year.



Distribution

In and around Sydney, the snake is restricted to Hawkesbury and Narrabeen sandstone environments between Wollemi NP and the Clyde River catchment, south-west of Nowra. It has disappeared from Port Jackson and Middle Harbour, and from the western edge of its distribution around Bathurst. It still lives in the upper Blue Mountains and in Wollemi and Royal NPs, extending onto the Woronora Plateau. It also lives in eastern Morton NP west of Nowra.

This is the rarest snake in the region, with only 22 new locations listed since 1990, despite targeted surveys. However, the study area is thought to contain much suitable habitat, including the upper Blue Mountains and Woronora Plateau, particularly Heathcote and Royal NPs.

During the 2002–05 study, one snake was detected at Medlow Gap in the Warragamba Special Area. This is quite far from other locations, but there is suitable habitat in this area. Another location has been found on the Woronora Plateau on a well-shaded, small rock outcrop in long unburnt woodland, where different individuals have been found for four consecutive years. This site would be considered very marginal habitat by herpetologists and snake collectors, which may have contributed to the snake's survival.

How you can help

- > Report anyone removing bush rock illegally to your local council or national parks office. To download DECC's bush rock removal factsheet, go to www.nationalparks.nsw.gov.au/PDFs/bushroc1k.pdf.
- > Report anybody you suspect of taking snakes or lizards from the wild to your local national parks office, DECC's Environment Line on 1300 361 967 or the police. All reptiles are protected in NSW and none may be taken without a permit.
- > Join the Australian Herpetological Society (www.ahs.org.au) to find out more about this rare snake.

3.7 Dingo (*Canis lupus dingo*)

A subspecies of the wolf, the dingo was introduced by humans to Australia around 5000 years ago, resulting in the extinction of the thylacine (*Thylacinus cynocephalus*) and Tasmanian devil (*Sarcophilus harrisi*) in mainland Australia. The dingo is now the native top-order predatory mammal. Dingoes are omnivorous, though they primarily eat medium to large mammals such as wallabies and kangaroos. They regulate kangaroo numbers in South Australia and probably elsewhere, and help to control feral species such as cats, pigs, goats and foxes. They live in most environments, from densely forested to cleared areas.

Status/direction of change: Uncommon resident/declining

Significance of study area: Core

Key habitat: Many

Legislative listing: See under 'Distribution'



Photo: H. Jessup

Cultural significance

The dingo is important to indigenous communities of the Blue Mountains. Many community members believe that dingoes in the Southern Blue Mountains should be conserved. Dingoes are depicted in rock art in the area. Traditionally, dingoes were highly-valued pets and hunting dogs. Aboriginal words for dingo from the region include Gundungurra – binure (old mountain dingo) and mirragang (common dingo); Darug – mirri (camp dingo) and dingo (wild dingo); and Tharawal – nurragee and mirragang (dingo).

Threats

The key threat is interbreeding with domestic dogs. While pure dingoes live in NSW, over 60% of dingoes have some dog genes and hybridisation is continuing. Other threats include hunting, poisoning and trapping to reduce the dingo's impacts on livestock.

Distribution

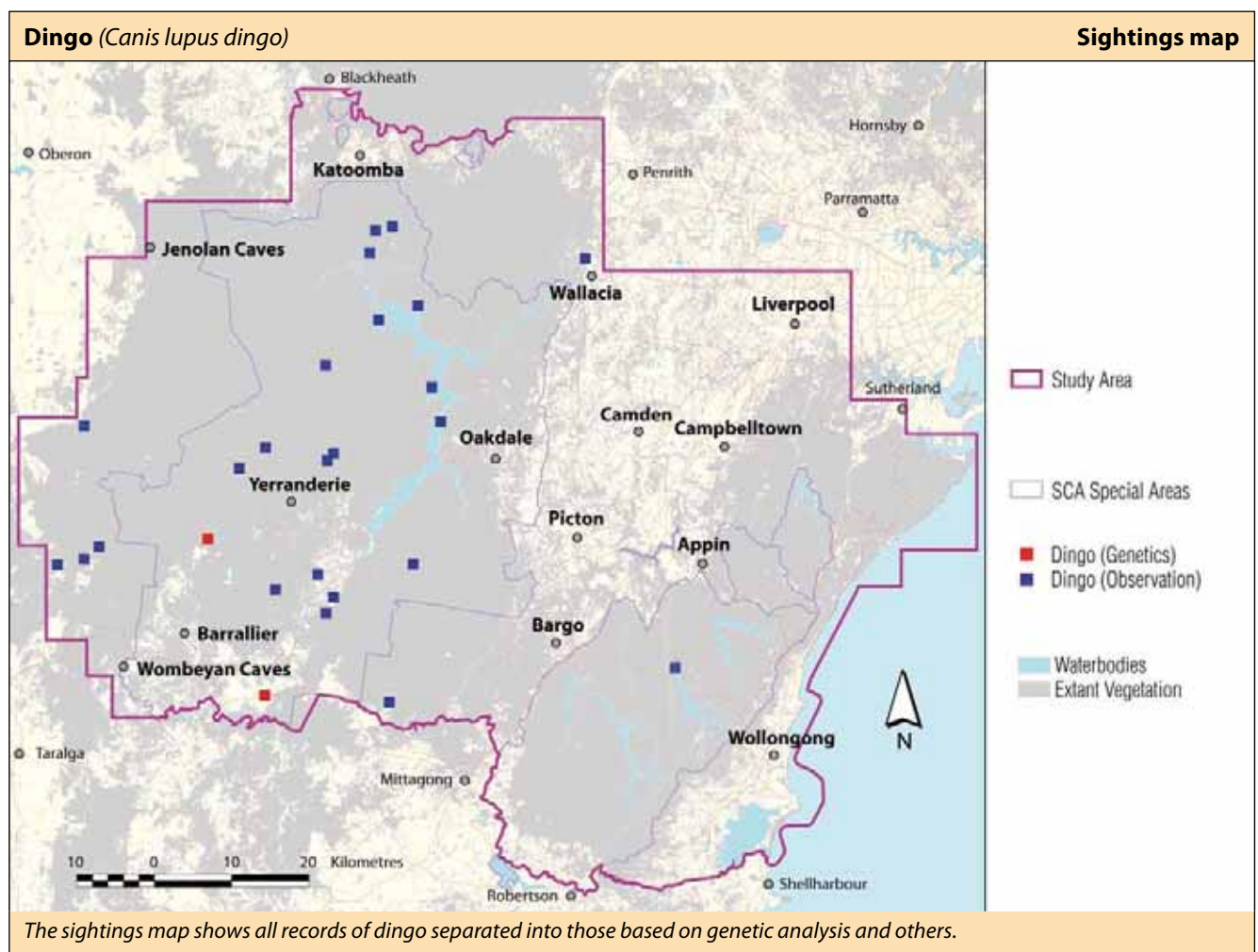
The dingo is listed on the IUCN red list of threatened species as vulnerable due to a 30% decrease in numbers (see IUCN 2005). In NSW, dingo populations from Sturt NP, the coastal ranges and some coastal parks have been nominated as endangered populations under the TSC Act. In contrast, the dingo is unprotected under the NPW Act, despite being considered a native species – a discrepancy that is yet to be resolved. Dingoes are also a declared pest species under the *Rural Lands Protection Act 1998*.

The southern Blue Mountains is a dingo conservation area, meaning control of wild dogs in this area requires a management strategy that balances the requirement to conserve dingoes with the need to manage their impacts on neighbouring agricultural lands.

Before European settlement, dingoes would have occupied much of the area in and around Sydney, both as companion animals and in the wild. They are now restricted to patches along the Great Dividing and Watagan ranges.

In the study area, dingoes or hybrids no longer live on the Illawarra Coastal Plain. There are recent sightings from the western edge of the Cumberland Plain, such as around Mulgoa and Richmond north of the study area. Until a sighting in late 2006 they were considered to be extinct on the Woronora Plateau though they were frequently found there until the 1940s. They still live in the southern Blue Mountains, including on the banks of Wollondilly, Gillan's and Sheehys creeks. While fewer than one in ten are of pure dingo ancestry, most are at least 75% dingo and fulfil an identical role as a top order predator. In another study, three dingoes were identified as pure, one 15 km from Yerranderie, one from an unrecorded location in Nattai NP (not shown on map), and one found dead on the Wombeyan Caves Rd near Bullio.

During the 2002–05 project, 26 dingoes were recorded. These were along Nattai River and near High Range in Nattai NP; below Burragorang Walls in Burragorang SCA; on Lacys Tableland, Scotts Main Range, the Kedumba Valley; and around Jerrong Road in the south-west of the study area. Records were only made if dingoes showed no physical evidence of hybridisation, or were identified by their distinctive howls. The records indicate where the most genetically intact populations live and where conservation efforts should be focused.



How you can help

- > If you own a bush property, particularly in the Burragorang or Wollondilly valleys, before you bait or shoot dingoes consider the role they have in controlling pigs, goats, foxes, rabbits and kangaroos.
- > Never feed dingos that may visit your campsite or property as they may become a pest and have to be euthanased.

3.8 Eastern freetail bat (*Mormopterus norfolkensis*)

The eastern freetail bat can be identified by its long forearms, upright ears and solid build. Its ultrasonic call is a distinctive pattern of alternating pulses. This is a poorly known species, but its preferred habitat seems to be dry eucalypt forest and woodland, though it has also been captured in rainforest and wet sclerophyll forest. It usually roosts in tree hollows, though it has been found in the roof of a hut and under the metal caps of telegraph poles.

Status/direction of change: Rare resident/probably declining

Significance of study area: Core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act



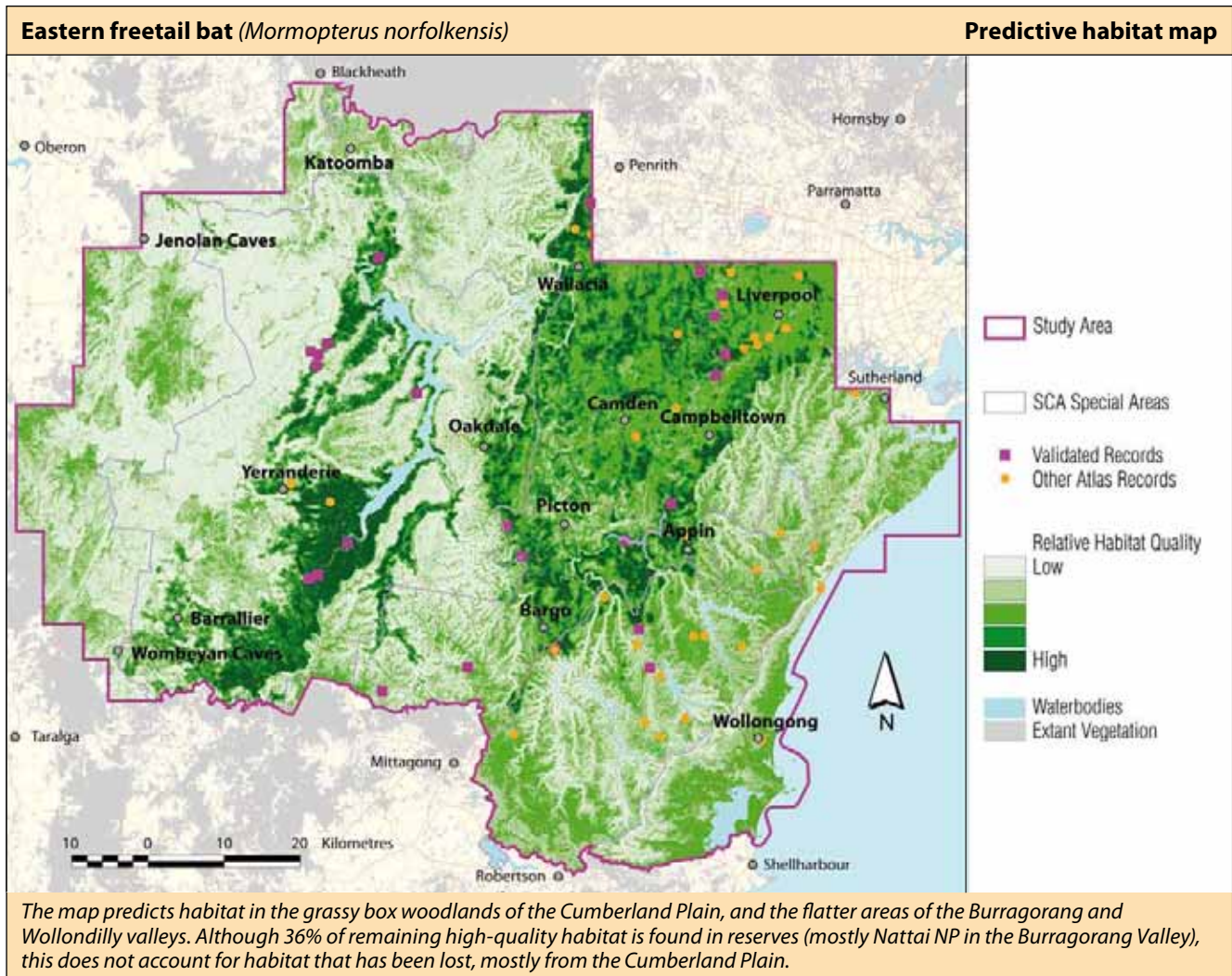
Photo: N. Williams

Threats

Threats probably include urbanisation and clearing for agriculture and logging, although the bat will forage over farmland and roost in buildings. Pesticide use in and adjacent to farms may also be a threat. Threats may be heightened because the entire known distribution of the species lies in highly populated areas which continue to face pressure from development.

Distribution

The bat lives east of the Great Dividing Range between approximately Brisbane (Queensland) and Eden (NSW). Most records in NSW are from the north coast, south-east and in and around Sydney, where the bat lives on coastal plains and in valleys of the Great Dividing Range. Many records are from the Cumberland Plain and Central Coast, and the Hunter and Kangaroo valleys. This bat has also been recorded in the Blue Mountains, Wollemi and Marramarra NPs and Western Sydney RP.



The bat occurs across much of the study area, with records concentrated in more fertile country, such as on the Cumberland Plain, and in the Wollondilly, Burragarang and Kedumba valleys. There are also scattered records from sandstone plateaux, such as the Woronora.

The 2002–05 study only recorded this species seven times (six by ultrasonic call and one trapped) in the fertile country of the Wollondilly and Burragarang valleys and on the edge of sandstone, such as on High Range near Nattai NP. Surveys in 2006 on the Cumberland Plain trapped this bat in woodland adjacent to the Nepean River in St Mary's Towers.

How you can help

- > Preserve hollow-bearing trees on your land, including standing dead trees and paddock trees, and if planting new trees, choose local native species.
- > If you live on a property where there are native trees but few hollows, you can make a nesting box for the bat. Many websites will advise you how to make these and some organisations sell them – type 'bat' 'nest' 'box' into your search engine or visit www.birdsaustralia.com.au/infosheets/nestbox.html.
- > Join the Australasian Bat Society (<http://ausbats.org.au>) to learn more about this rare bat.

3.9 Green tree frog (*Litoria caerulea*)

This bright green frog lives in many environments, often in built structures such as letter boxes and toilets, and can live in altered landscapes when there is suitable breeding habitat and shelter. It is extremely long-lived, and may survive over 20 years in captivity. Males call after heavy rain, most often between December and February, with breeding taking place in shallow, temporary water sources or in still pools and ponds.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Non-core

Key habitat: Many

Legislative listing: Protected – NPW Act



Threats

Declines in populations and threats to the species are not well understood. These frogs are susceptible to *chytrid* fungus and this is likely to be more problematic at the extremities of its range. Other threats include habitat destruction, with urbanisation reducing the amount of available shelter, breeding sites and large insect prey; predation of tadpoles by the plague minnow (*Gambusia holbrooki*); reduced water quality; road fatalities; and attacks by foxes and cats.

Distribution

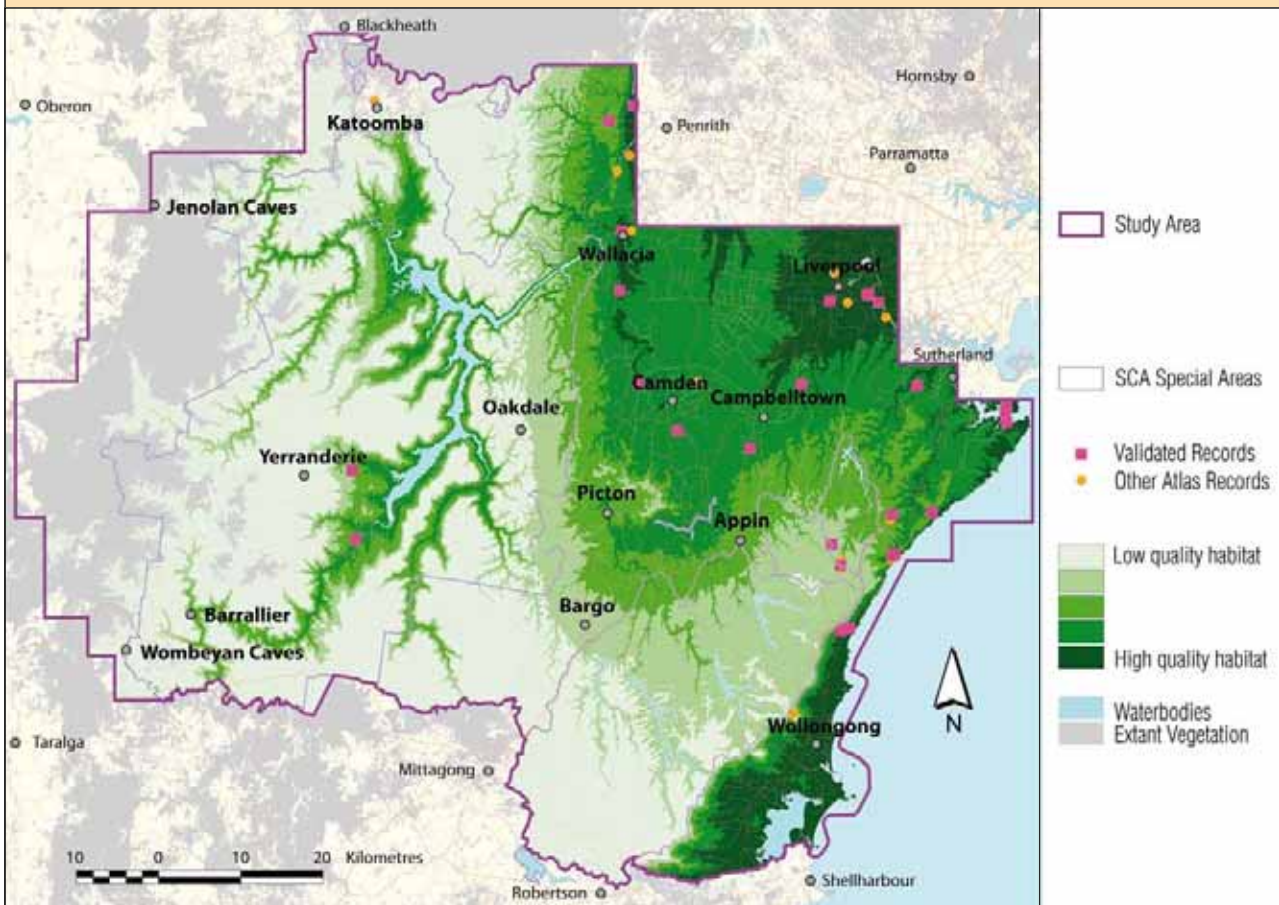
The frog can be found across the east and north of the Australian mainland and is widespread throughout the north and west of NSW. In the last 20 years, it has declined in some parts of its range.

In the study area, only 13 frogs have been recorded in 2001–06, all in the Liverpool–Campbelltown area or the Illawarra. Dead metamorphs have been repeatedly found at Caringbah, having probably succumbed to *chytrid* fungus.

The 2002–05 study found no frogs, reaffirming that they are extremely rare in the study area. While the drought throughout the survey period was not ideal for surveying frog activity, the lack of sightings and the frogs found dead in Caringbah are of considerable concern.

How you can help

- > To encourage frogs, put a pond in your yard with shallow sloping sides, and grow native plants in it. The pond should only contain fish that do not eat tadpoles such as pacific blue-eyes. Do NOT have a pond if you or your neighbours own a cat.
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about the frog and to learn about making frog-friendly backyards.
- > Report any sightings of this rare frog to DECC. Complete a sightings form – see 3.2 for details.
- > Never touch a green tree frog as you can make it very sick. For more information, visit www.nationalparks.nsw.gov.au/npws.nsf/content/Frog+Chytrid+fungus.



The map is very broad, as the lack of sightings made detailed delineation of preferred habitat impossible. It depicts the former extent of the frog's range rather than its current distribution. Highlighted areas are the Illawarra Coastal and Cumberland plains and Burrangorng Valley. This map should only be used as an indication of the potential limits of the species' distribution.

3.10 Koala (*Phascolarctos cinereus*)

Koalas live in forests and woodland, feeding on various eucalypt and other tree species. Individuals rest in dense foliage during the day and are most active after sunset. Their home range depends on the density of food trees and population size. In coastal NSW, home ranges can be between 15 and 100 hectares with individuals moving up to 20 km to search for food and habitat.

Status/direction of change: Rare resident/stable

Significance of study area: Core

Key habitat: Grassy box woodlands and other

Legislative listing: Vulnerable – TSC Act. Draft NSW recovery plan (DEC various b)

Cultural significance

The koala is important to the indigenous communities of the Blue Mountains, some believing habitat changes and over-hunting have led to population declines. Traditionally, koalas were a food source, though some groups did not hunt them. Blue Mountains communities and the Tharawal have many stories about the koala and it is often depicted in rock art. Local names include Gundungurra – colo and goola (female), burrandang (male); Tharawal – kurrilwa; Dharug – kula. Koalas are also important for the non-indigenous community, with many foundations and community groups dedicated to their conservation.



Photo: P. Madden

Threats

Threats include destruction of habitat through clearing for urban development, agriculture and mining; degradation of habitat through fire or weed invasion; mortality from dogs and motor vehicles; and infection by *chlamydia* which causes *keratoconjunctivitis* (an infection of the eyes) and infertility. In NSW, *chlamydia* mostly afflicts animals that are already stressed and is not considered a major problem.

Distribution

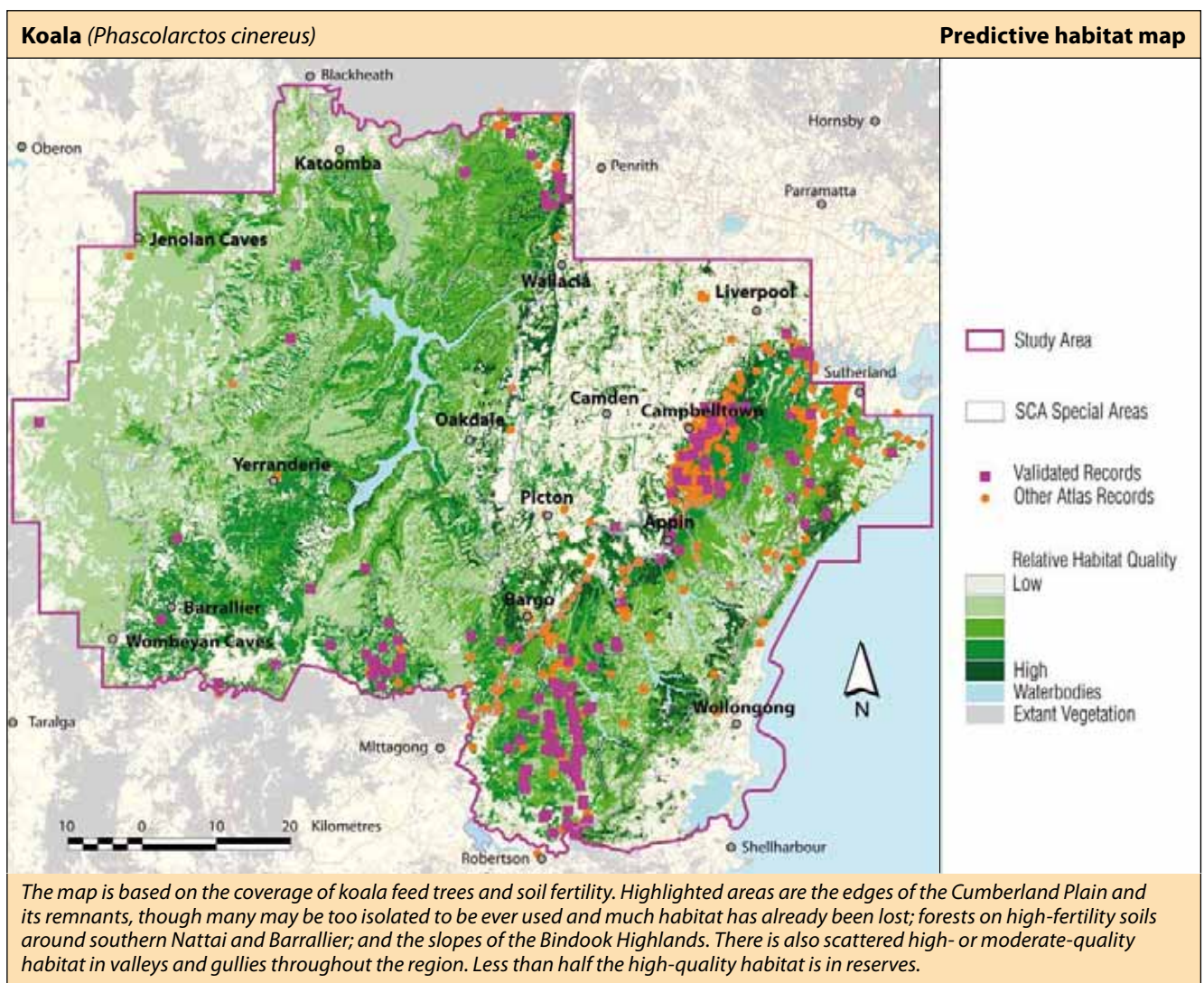
The koala is most frequently seen in eastern NSW. Records also occur further west, in parts of the Brigalow Belt and in the northern parts of the Darling Riverine Plains. However, koalas may have disappeared from 50–75% of their range in NSW, particularly in the south and west.

In and around Sydney, the koala mainly lives on the Central Coast, in the Blue Mountains and on the fringes of the Cumberland Plain. It is rarely found in reserves though it has been seen in Dharug, Wollemi and Tomaree NPs. The new Upper Nepean SCA contains most of the important breeding population in that area.

There are several populations in the study area, the two largest being near Campbelltown in the Georges River catchment, and in the Avon and Nepean catchments. The Campbelltown population has over 300 animals, with numbers slowly increasing since the 1980s. The Avon/Nepean population has also expanded. While some animals move between these populations, DNA analysis suggests they are genetically distinct.

Another two populations occur near Glenbrook and the adjoining Blue Mountains NP, and in the High Range/Mt Jellore area of southern Nattai NP. Koalas near Glenbrook are probably part of a population centred around Kurrajong, north of the study area. There are scattered records throughout the rest of the study area as young male koalas may also wander well away from these population centres.

There are reports of local population extinctions, for instance koalas were known from the tall forests at Upper Cordeaux and Helensburgh until the 1940s.



During the 2002–05 study, koalas were detected at 40 new locations, mostly in southern Nattai NP. The presence of a high-density koala population in Nattai was unknown before this project. Here, most animals were living in a fairly small area containing patches of high-fertility soil on the edges of the national park between High Range and Mt Jellore, in forest red gum (*Eucalyptus tereticornis*) trees or grey gum (*E. punctata*) trees. Sightings in the Wollondilly Valley, and at Canyonleigh, south of the study area, may be an extension of the Nattai population. In surveys conducted in 2006 on the Cumberland Plain, few records were obtained, apart from in the Holsworthy Military Area.

Koalas, including breeding females, have also been seen in the upper Nattai Valley behind Mittagong and around the villages of Hilltop, Colo Vale and Balmoral. They are also known from further west, near Bindook Mountain, Barrallier and Tallygang Mountain, though there is not a high-density population there.

How you can help

- > Report koala sightings to DECC. Complete a sighting form – see 3.2 for details. Alternatively, phone the University of Western Sydney's Koala Hotline on (02) 9962 9996.
- > Always keep your dog and cat inside at night and never let them wander into bushland.
- > If you have koalas in your area, work with your local council to protect koala habitat and corridors.
- > Join the Australian Koala Foundation (visit www.savethekoala.com) or if you have koalas in your area, start a 'friends of' group so you can work with your local council or DECC to protect them. Phone your council or DECC's Environment Line on 1300 361 967 for information.

3.11 Large-eared pied bat (*Chalinolobus dwyeri*)

This black bat is easily identified by its large ears and bands of white fur along the undersides of its body that form a V-shape. Its distinctive ultrasonic call is an alternate pattern made at a low frequency. It lives in wet and dry eucalypt forest, cypress (*Callitris*) forest and subalpine woodland, or in the box woodlands and redgum/ironbark communities of wide valleys and plains. It usually roosts in caves, though it will also use disused mine shafts; overhangs, especially sandstone outcrops; and abandoned fairy martin (*Petrochelidon ariel*) nests.

Status/direction of change: Uncommon resident/ probably declining

Significance of study area: Core

Key habitat: Grassy box woodlands, alluvial woodlands and forests, sandstone escarpments

Legislative listing: Vulnerable – TSC and EPBC Acts



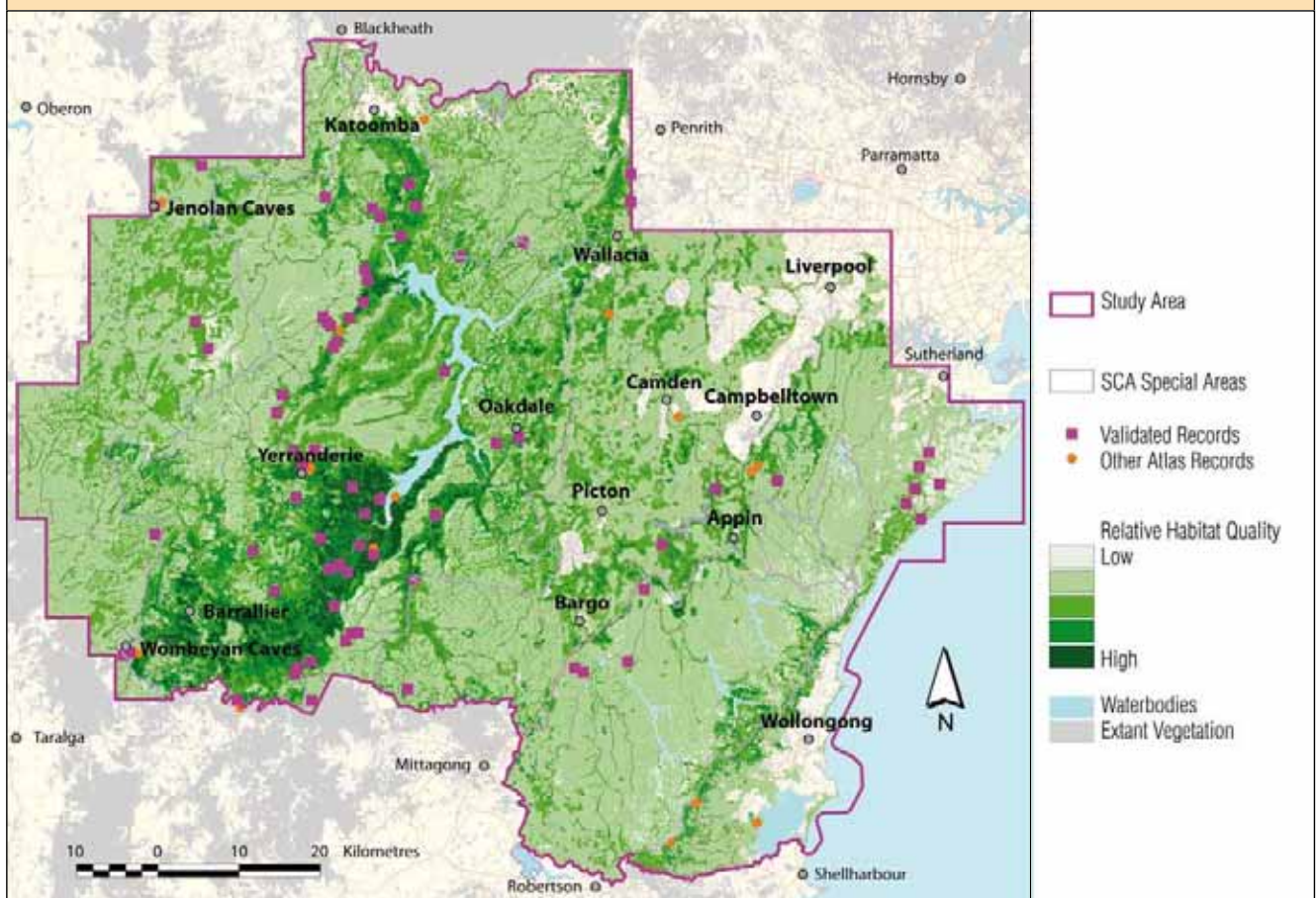
Threats

The only confirmed threat is destruction of or interference with subterranean roost sites. Mining-induced subsidence, particularly from coal mining, may destroy roosts. Other potential threats include habitat destruction for agriculture and urban development, the impacts of forestry operations, attack by feral animals and feral goats interfering with roosts. The impact of frequent fires is unknown, as is the location and types of nursery roosts used in the area and threats facing them.

Distribution

The bat has been seen on either side of the Great Dividing Range between Rockhampton (Queensland) and Bungonia (NSW). In NSW, most records are centred on the coastal ranges between Nowra and Newcastle. Elsewhere, there are small populations in the west around Mt Kaputar, the Warrumbungles and the Pilliga Scrub, and on the coastal ranges north of Grafton. The bat has been frequently encountered in and around Sydney, particularly in the Blue Mountains and Wollemi NPs, and there have also been sightings in Morton NP, which is the southernmost extent of its range.

During the 2002–05 project, the bat was recorded 46 times in 34 new places in the study area, doubling the number of its known locations. It has been recorded more regularly in the study area than elsewhere in its range. This result reaffirms the importance of the Sydney region to this bat. Surveys on the Cumberland Plain in 2006 trapped this bat in St Mary's Towers and in the Bargo area.



The map predicts good habitat in the valleys and along the rivers of the southern Blue Mountains, particularly around Jooriland and the Tonalli River in the Burragorang Valley, but also on the Nattai River and in Kedumba Valley. The remnants of the Cumberland Plain are also highlighted, though many may not be used if they are too far from suitable roosting habitat, or if they have been too isolated by clearing.

Two-thirds of the remaining high-quality habitat is in reserves, though much outside reserves has previously been lost through clearing.

Although the bat lives in sandstone caves and under overhangs, the trapping and call data show that it generally does not feed in sandstone environments. Despite extensive surveys, the bat was not seen in the sandstone woodlands and open forests of the Woronora Plateau, the Erskine or Woodford ranges, Kings Tableland or Upper Blue Mountains, but was regularly trapped on fertile valley floors in the Burragorang Valley, on coastal plains and along rivers in the east such as the Hacking. Almost all records were from forests or woodlands, although the bat was also found in thin riparian strips of vegetation on the Burragorang Valley floor in an otherwise cleared landscape. This information suggests that the bat needs sandstone overhangs for shelter and nearby rivers or grassy box woodlands for foraging. It will probably also use creekline vegetation to move around the landscape and for feeding.

How you can help

- > If you go caving or potholing, ensure you do not disturb any sites where bats are roosting.
- > Volunteer to rehabilitate habitat in national parks where the bat lives – visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Park+volunteer+programs or phone DEC's Environment Line on 1300 361 967.
- > Report any roosts of this bat to DECC. Complete a sightings form – see 3.2 for details.
- > Join the Australasian Bat Society (<http://ausbats.org.au>) to find out more about this bat.

3.12 Large-footed myotis (*Myotis adversus*)

This bat is distinguished by its disproportionately large feet, which it uses to rake insects and small fish from the surface of water. Its call can be recorded from 20 metres away but is difficult to distinguish from that of other bats. It normally roosts in caves, tree hollows, dense vegetation and artificial structures, such as bridges and mines over or near water.

Status/direction of change: Rare resident/probably declining

Significance of study area: Core

Key habitat: Alluvial woodlands and forests, rivers and riparian environments

Legislative listing: Vulnerable – TSC Act



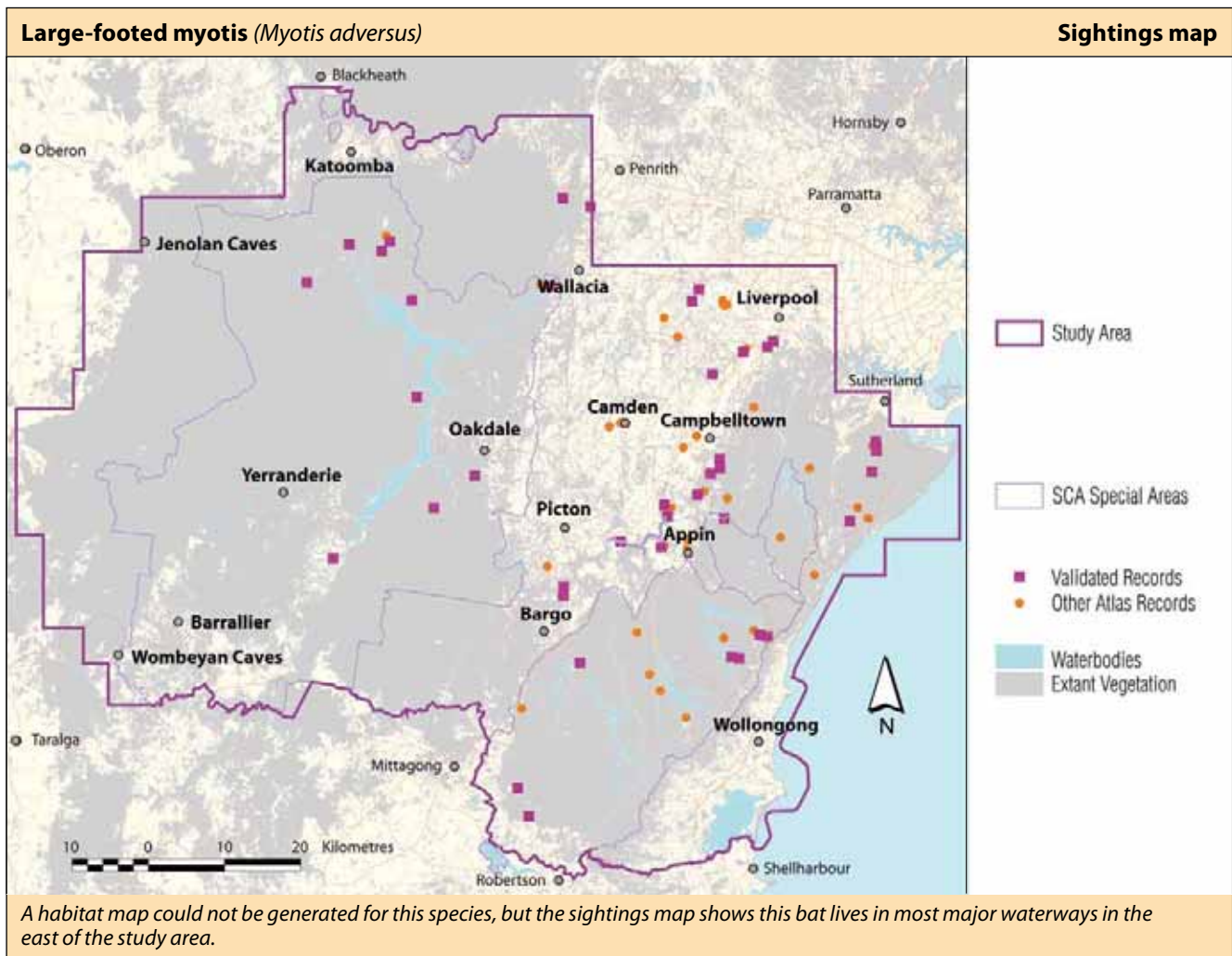
Photo: M. Schulz

Threats

The threats to this species are poorly known, but probably include changes in water quality due to sedimentation from vegetation clearing and logging, sewage and fertiliser run-off, pollution and altered flow regimes. Roosting sites may be disturbed by recreational caving or roadworks, and replacement or repair of bridges, road culverts or water supply tunnels. Land subsidence due to longwall mining may also impact on sandstone caves and waterways that provide habitat. The bat may suffer from exposure to agricultural pesticides. There is currently no information on the location and types of nursery roosts used in the area and what threats these sites may be facing.

Distribution

This bat is largely a coastal species. In and around Sydney, it lives on the coastal plains, in hinterland on the Central Coast, on the Cumberland and Illawarra Coastal plains, and in Nattai, Royal and Popran NPs.



In the study area, the bat forages along waterways in relatively disturbed environments on the Cumberland Plain. It has been regularly seen around Liverpool and Campbelltown, and along major rivers in the Blue Mountains, such as the Wollondilly, Nattai and Kedumba rivers. It has not often been recorded on the sandstone plateaux of the region, though it has been occasionally recorded along major watercourses of the Woronora Plateau.

During the 2002–05 project, 70 bats were recorded in only seven locations. New sites were in Jamison Valley on Cedar Creek, on the Coxs and Kedumba rivers, along Gillans Creek on the edge of the Cumberland Plain near Oakdale and on the Nepean River. Often many bats were trapped together, reflecting their habit of roosting, travelling and foraging in groups. The few locations at which they were encountered is of some concern, although as they are usually trapped over waterways which can be difficult to sample, they may be more abundant than the data suggests. In surveys on the Cumberland Plain in 2006, this bat was trapped in various localities along the Bargo and Nepean rivers. Future surveys may find it also occurs along tidal creeks and bays, such as around Lake Illawarra or elsewhere on the Illawarra Coastal Plain.

These bats adapt to roost disturbance better than other species. However, their habit of living in colonies, limited habitat and relative scarcity probably makes them vulnerable to decline in the region.

How you can help

- > If you go caving or potholing, ensure you do not disturb sites where bats are roosting.
- > Join or start a Streamwatch or Rivercare group to care for your local stream or creek – visit Streamwatch on www.streamwatch.org.au, or Rivercare – visit www.landcareonline.com or phone: (02) 9412 1040. Alternatively, contact your local council.
- > Preserve hollow-bearing trees on your land or on bushland sites you work on.
- > Join the Australasian Bat Society (<http://ausbats.org.au>) to find out more about this bat.
- > Phone DECC's Environment Line on 1300 361 967 if you have roosting bats in your roof eaves or shed that you want to remove.

3.13 Littlejohn's tree frog (*Litoria littlejohni*)

This poorly-known species is most easily distinguished from the closely-related Jervis Bay tree frog (*L. jervisiensis*) by its call. Although also known as the heath frog, it lives in various environments including sedgeland, wet and dry sclerophyll forests and woodlands. Males call in any month – with a review of records from NSW in 2005 suggesting a peak around February – from elevated positions beside ponds and creeks. Breeding habitat is in streams, temporary pools and dams.

Status/direction of change: Extremely rare resident/declining

Significance of study area: Core

Key habitat: Upland swamps and other environments

Legislative listing: Vulnerable – TSC and EPBC Acts



Photo: F. Lemckert
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Threats

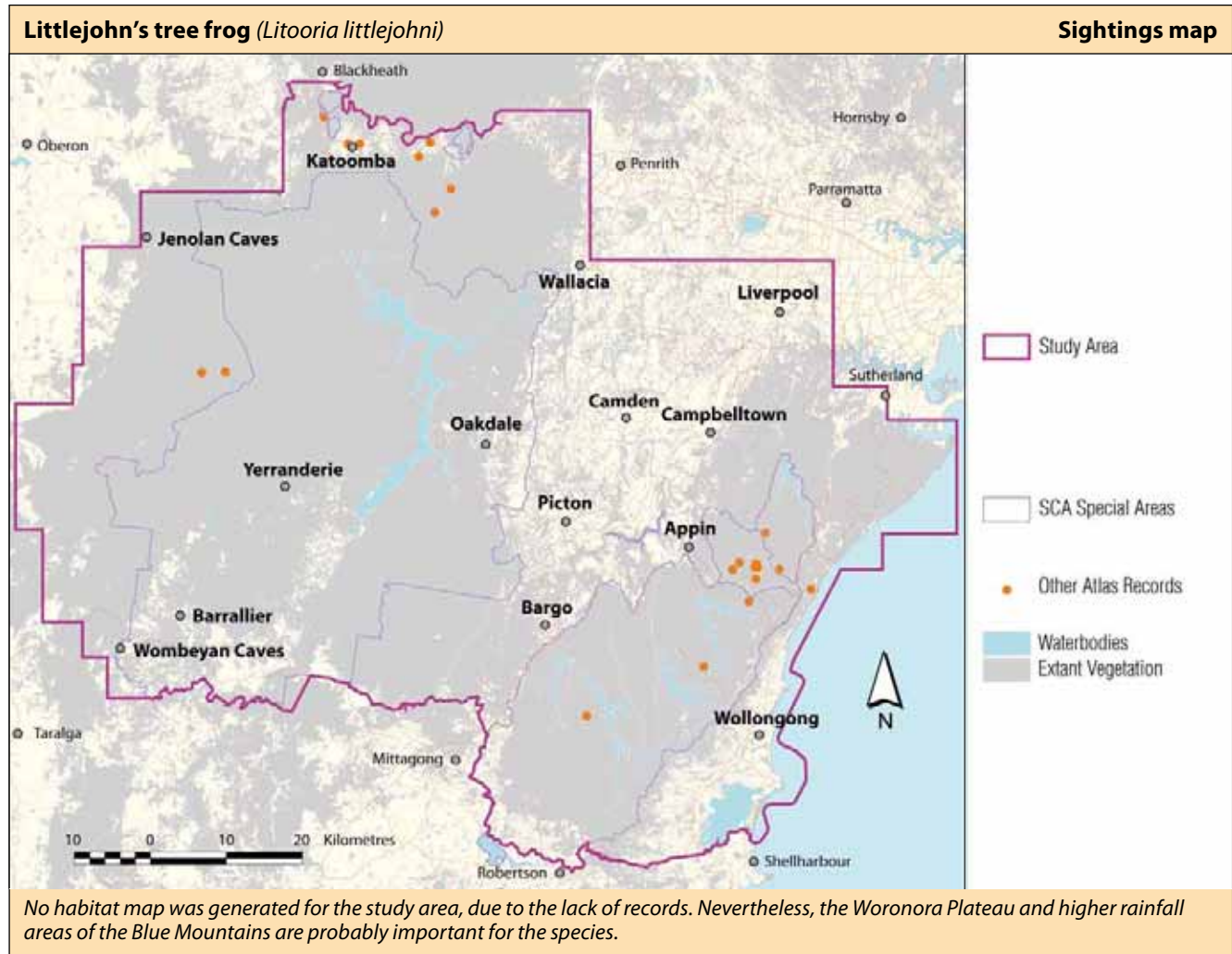
This is one of the most infrequently recorded frogs in NSW. Threats include habitat clearing (although the frog will tolerate some disturbance, it has never been found in fully cleared areas); clearing of native vegetation leading to reduced habitat; inappropriate fire practices, including pre- and post-logging burns and control burning, that disturb breeding habitat; and habitat disturbance from subsidence due to longwall mining. The frog may also be susceptible to *chytrid* fungus and predation from introduced fish. It is also prone to local extinction, as it lives in small groups from which it rarely moves.

Distribution

The frog lives along the coast from the Watagans Range west of Gosford to eastern Victoria. There are scattered records in and around Sydney, although the frog has declined significantly in this area over the past 20 years. The frog has been seen in Watagans and Blue Mountains NPs, on the Woronora Plateau and in Barren Grounds NR.

The frog is extremely rare, though may be under-recorded due to the lack of information on which to base targeted surveys. In the study area, it used to be common at Darkes Forest, and there are over 60 Australian Museum specimens for this location, but the frog is now rarely seen. During the 1999 National Parks and Wildlife Service surveys of the Wollongong LGA, frogs were only found on the Woronora Plateau.

The 2002–05 project found no new locations in the Avon, Cordeaux and Cataract catchments, and at Barren Grounds NR, despite targeted surveys. However, one record was obtained for Ingar Campground near Mt Bedford in 2004. The upland swamps here are similar to known habitat on the Woronora Plateau and at Barren Grounds NR. Encouragingly, surveys in September 2006 recorded this frog in five locations in Dharawal SCA and one in the Woronora catchment.



How you can help

- > Avoid touching frogs as you can make them very sick. Sterilise boots, equipment and car tyres between bushwalks so you do not transmit frog chytrid fungus. For more information, visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Frog+Chytrid+fungus.
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about the frog.

3.14 Masked owl (*Tyto novaehollandiae*)

This large owl is distinguished from the similar barn owl (*T. alba*) by its larger size and feet, more thickset and hunchbacked appearance and fully feathered legs. It lives in a wide range of woodland habitats which have trees with large hollows for roosting (mostly eucalypts) where it lays two to three eggs, and open areas for hunting. It feeds mostly on small, ground-dwelling mammals and occasionally on birds, sugar gliders (*Petaurus breviceps*) and insects. This owl has a home range of 800 to 1200 hectares.

Status/direction of change: Rare resident/possibly declining

Significance of study area: Core

Key habitat: Grassy box woodlands, forests and other environments

Legislative listing: Vulnerable – TSC Act. NSW recovery plan (DEC various b)

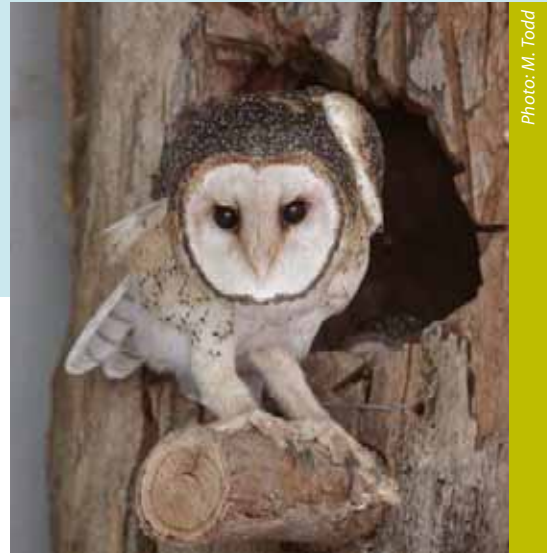
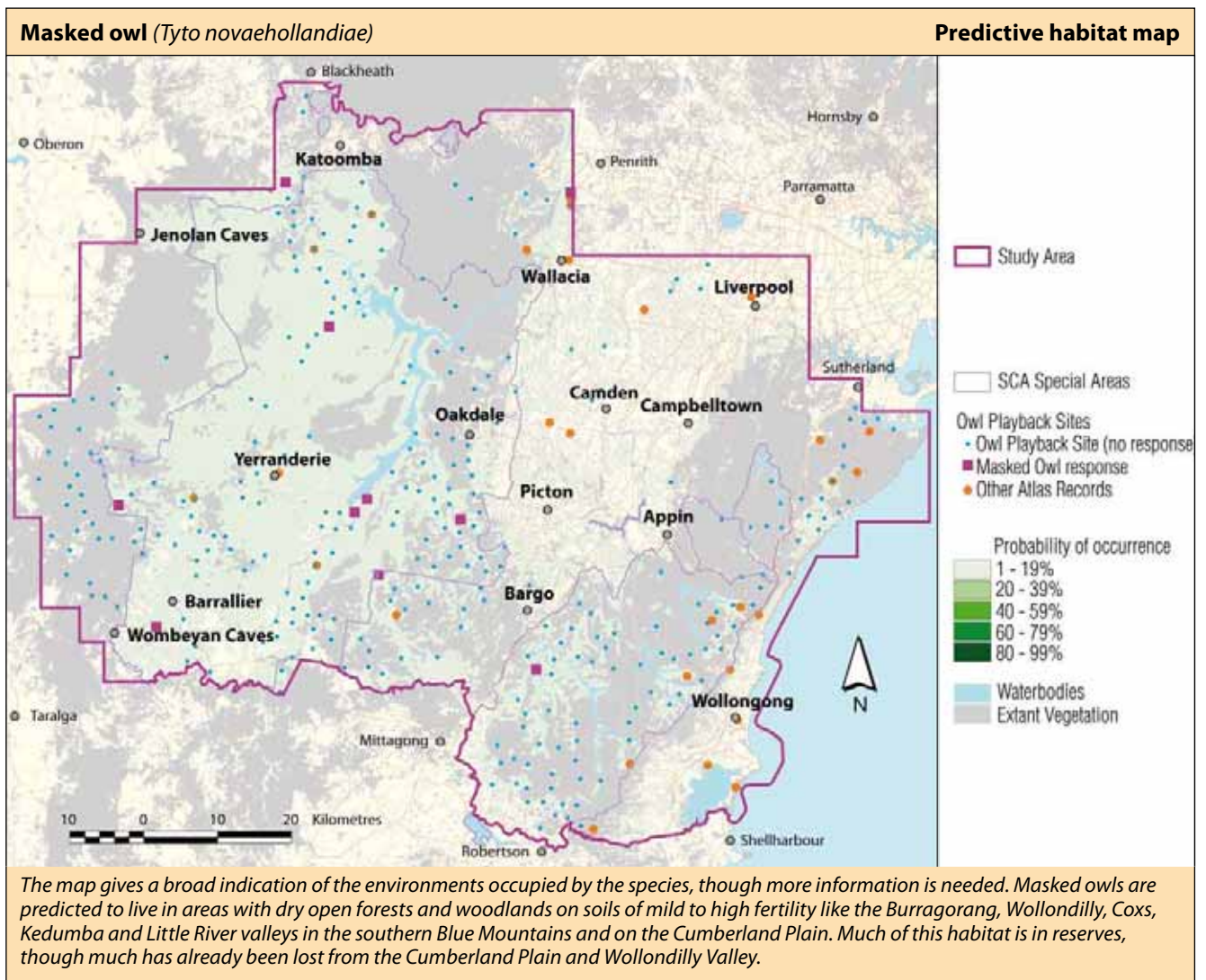


Photo: M. Todd

Threats

Clearance of native forest for agriculture, and urban development and fragmentation of habitat have decreased the abundance of these owls, as they cannot live in remnants of less than 200 hectares. Some forestry practices affect the species by removing tree hollows or reducing foraging habitat due to vigorous regrowth, though selective logging operations may be less problematic. Additional threats may include the removal of dead wood and trees, exposure to rodenticides, and invasion of weeds such as African olive (*Olea europaea*) that alter forest structure.



Distribution

In NSW, most records are from the coast. In and around Sydney, masked owls live in the open woodlands of the coastal plains between Wyong and Port Stephens – though these areas may be developed in the future. The owl can be found in reserves such as Brisbane Water and Jervis Bay NPs and in Berowra Valley RP.

This species has only irregularly been recorded in the study area. Scattered sightings include those on the Cumberland Plain, in Nattai NP, the Metropolitan Special Area and Royal NP. Three owls were recorded in unburnt, tall open forests of the Metropolitan Special Area in 2002, one year after extensive wildfires had affected most of the region during a prolonged drought. It is thought that birds may move in from further west and occasionally occupy this habitat.

During the 2002–05 project, a response was elicited at nine call-playback sites, with a further eight locations recorded incidentally, doubling the number of records known from the study area. New records were obtained for the Burratorang Valley, Scotts Main Range, Colong Caves, Wombeyan Caves Road and west of Lake Nepean. In 2006, surveys of the Cumberland Plain detected the owl on the Razorback Range near The Oaks and this area probably has more suitable habitat. In winter 2006, an individual was located in coastal blackbutt forest on Towra Point north of the study area, indicating that coastal forest remnants may be important, such as those occurring on the Illawarra Coastal Plain.

How you can help

- > Retain living and dead trees that have hollows, including paddock trees – they provide shelter and nesting sites. Leave fallen timber on the ground as it provides habitat for prey. To download DECC's dead wood and trees fact sheet, go to www.nationalparks.nsw.gov.au/PDFs/factsheet_ktp_deadwood_removal.pdf
- > If you are trying to get rid of rats, use traps rather than baits to avoid poisoning owls. To avoid using baits or traps if the rats are in the roof, find where they are getting in and block the hole with metal and chicken wire or steel wool.
- > Join a local bushcare group to regenerate bushland – see 3.2 for details.

3.15 Spotted-tailed or tiger quoll (*Dasyurus maculatus*)

This medium-sized, carnivorous marsupial has rufous to dark brown fur and white spots on its body and tail. It lives mainly on the ground, but is an agile climber and uses trees as a vantage point during hunting. It feeds on various birds, reptiles, ground- and tree-dwelling mammals and insects, and will also eat carrion and domestic poultry. Habitat requirements include suitable den sites, an abundance of food and large areas of intact vegetation. It lives in sclerophyll forest and woodlands, coastal heath and rainforest.

Status/direction of change: Rare resident/declining

Significance of study area: Core

Key habitat: Rainforests, wet sclerophyll forests and other environments

Legislative listing: Vulnerable – TSC Act. Endangered – EPBC Act



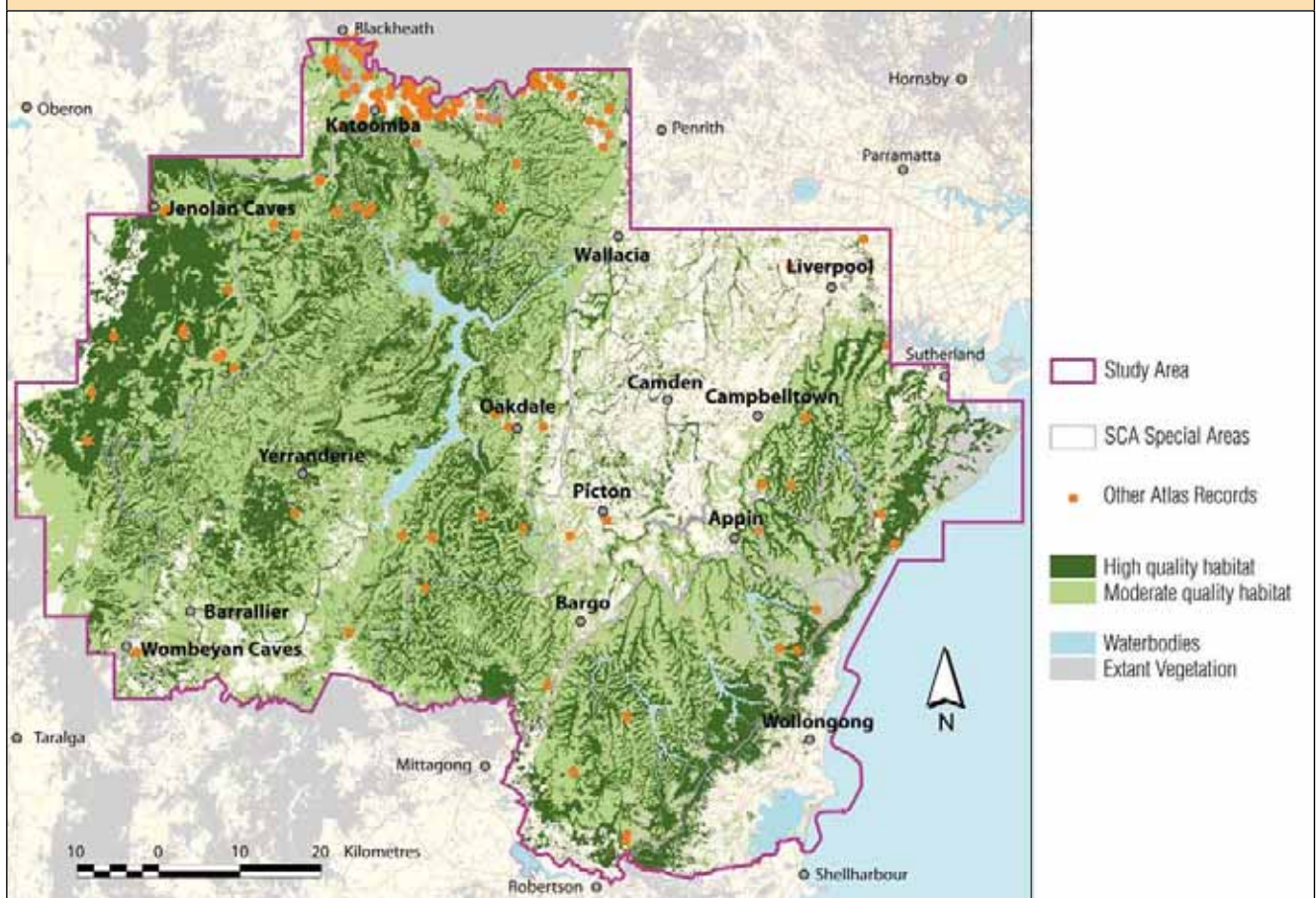
Photo: K. Stepiell, DECC

Threats

Threats include habitat loss, degradation and fragmentation; predation by and competition from introduced mammals such as pigs, cats, foxes and dogs; diseases such as *toxoplasmosis*; direct mortality at the hands of humans; and road mortality. Quolls have been heavily persecuted as killers of domestic fowl, and as a result are extinct in many parts of the country. The spotted-tailed quoll may also be threatened by aerial, ground and mound baiting using 1080 (sodium monofluoroacetate) to kill foxes, although one 2005 study showed a population on the New England Tableland was resilient to baiting programs. Inappropriate fire regimes and the removal of dead wood and trees may also affect this species.

Distribution

There are two subspecies of spotted-tailed quoll: *D. maculatus gracilis* from north Queensland and *D. m. maculatus* from south-eastern Queensland, NSW, Victoria and Tasmania. In NSW, the *maculatus* subspecies lives on both sides of the Great Dividing Range. It is mainly seen on the north coast and in the south-east, and in and around Sydney, although southern populations have declined in range by up to 50%. In the Sydney region, most animals used to be seen in the Blue Mountains between Blaxland and Blackheath, though they are rarely observed there now. They are occasionally seen between Hornsby and Newcastle and in the upper Blue Mountains, and to a lesser extent in Kangaroo Valley.



The map highlights areas of moist vegetation (usually gullies) and alluvial vegetation. This species will move very large distances and is often seen outside its preferred habitat, for instance, when it ventures onto properties to raid chicken houses. Large areas of habitat are in reserves, particularly the gullies in the Blue Mountains and Nattai NPs and on the Boyd Plateau, though threats operate across the animal's range.

Amongst the most secretive of ground mammals, this animal is difficult to trap and hard to detect in the wild. Most recent records come from tracks, scats, road kills and opportunistic sightings. During the 2002–05 study, despite a large search effort including the analysis of 600 predator scats, only one sighting was made near Bellambi Creek on the Woronora Plateau in October 2005.

In the study area in 2006, quolls were seen near Jenolan Caves, on the Boyd Plateau, south of Nattai NP, in the creeks around Mt Flora, at Holsworthy Military Area and in northern Nattai NP around Sheehys, Couridjah and Martins creeks.

In the past, the spotted-tailed quoll was quite common on the Illawarra Escarpment but declined in the 1980s and was not seen until 2006 when one animal was seen at Marshall Mount, west of Dapto. Although this report is encouraging, particularly regarding the spotted-tailed quoll's ability to repopulate areas from where it had disappeared, it is now extremely rare across the study area.

How you can help

- > DECC is encouraging people to report quolls they have seen in their area. Phone DECC's Environment Line on (02) 9995 5000 or visit www.nationalparks.nsw.gov.au/npws.nsf/content/quoll_survey.
- > If you own chickens and quolls are a problem, build a coop that has a mesh roof and floor so the quolls cannot get in. Let DECC know you have seen a spotted-tailed quoll – take a photo if you can and complete a sightings form – see 3.2 for details.
- > Join a local bushcare group or create your own if you live near degraded bushland, to rebuild habitat – see 3.2 for details.
- > If you own tracts of bushland, set aside some of your land as habitat for the quoll – there may be incentives in return. Phone DECC's Environment Line on 1300 361 967 or visit www.nationalparks.nsw.gov.au/npws.nsf/Content/conservation_partners. Alternatively, maintain a cover of native vegetation for up to 20 metres from waterways as habitat.

3.16 Squirrel glider (*Petaurus norfolcensis*)

This nocturnal animal lives in dry sclerophyll forests and woodlands, where it builds leaf-lined nests inside tree hollows. It is distinguished from the similar, more common sugar glider (*P. breviceps*) by its larger size; longer, more pointed face; longer and narrower ears and a bushier tail. The squirrel glider also does not have the sugar glider's distinctive yapping call. It has a varied diet including insects, nectar, pollen, seeds, acacia gum and sap from eucalypts. It usually lives in family groups of up to ten, consisting of one male, one or more females and their dependent young. Home ranges vary between 0.65 and 8.55 hectares, depending on habitat quality, and individuals move up to 500 metres in one night.

Status/direction of change: Extremely rare resident/
probably declining

Significance of study area: Non-core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act



Threats

Threats include the loss of hollow-bearing trees through clearing, fragmentation or logging; predation by cats and foxes; inappropriate fire regimes; and the removal of dead trees and wood. Gliders have also been caught on barbed-wire fences.

Distribution

The glider is patchily distributed along the east coast and inland slopes between north Queensland and Victoria. It lives throughout eastern NSW, but is only regularly recorded on the north coast, in the Nandewar region, and in and around Sydney. In the latter area, it lives in high-quality habitat in the dry woodlands of the Hunter Valley and on the Central Coast. Few records are from reserves, although some animals have been recorded in Wollemi and Blue Mountains NPs.

In the study area, there are only 27 records, and many of these are questionable due to the difficulty of distinguishing the squirrel glider from the sugar glider. The only museum records are from Jenolan Caves. Other records are mostly from hair from fox scats, an unreliable method of identification for this species.

During the 2002–05 study, only two new locations were recorded: two animals were seen at a site in the Bindook Highlands, and one at the south end of Scotts Main Range. This is despite 688 hours of spotlighting. Another 490 hours were spent conducting nocturnal call-playback for owls which is also an effective technique for detecting the gliders but none were seen, further highlighting the scarcity of this species in the study area.

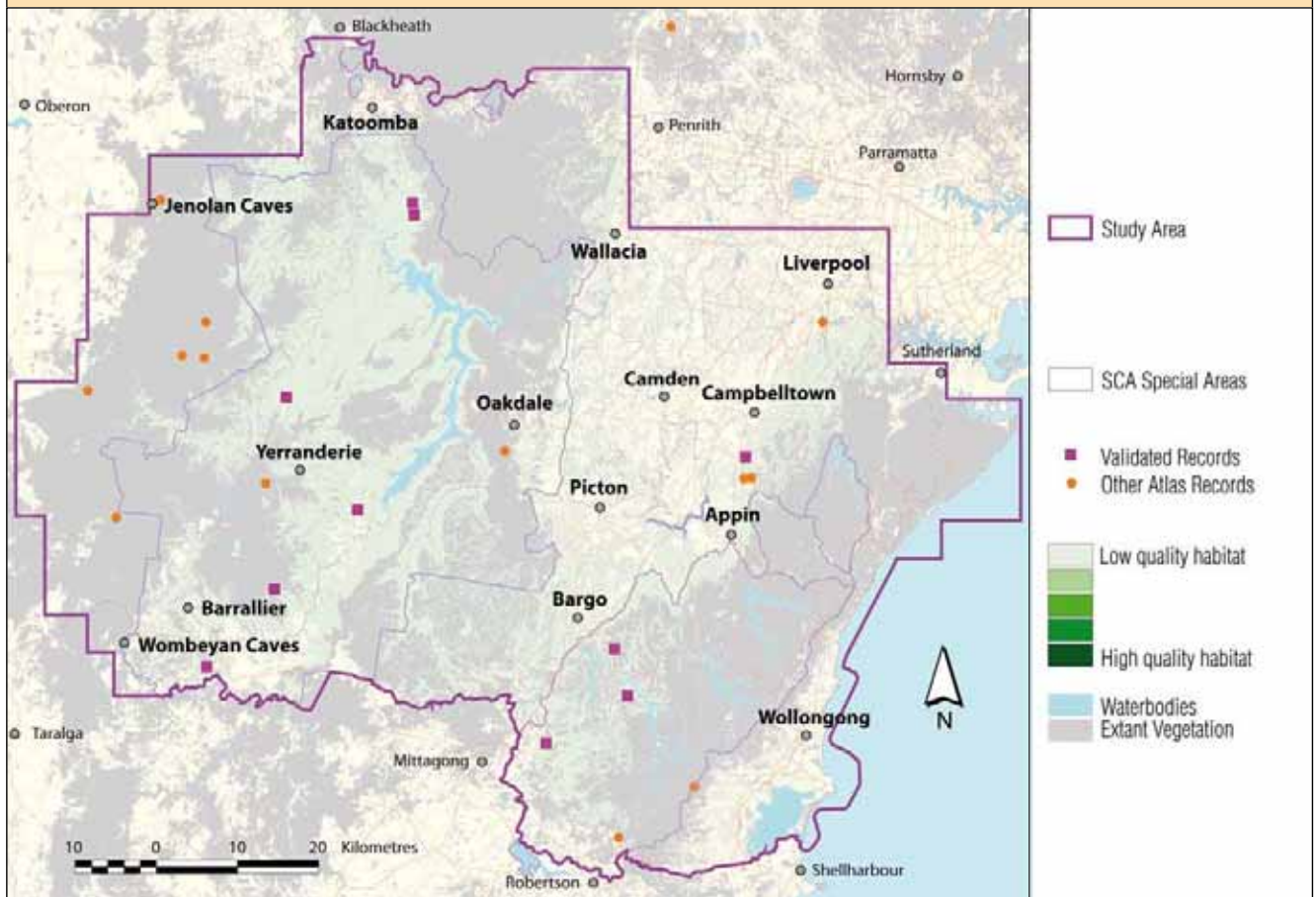
Previous surveys have been equally unsuccessful, though one glider was found at St Helens Park near Wedderburn during Georges River biodiversity surveys in 1999.

Comprehensive surveys of the Cumberland Plain in 2006 detected one glider at Holsworthy Military Area, and another in bushland near Castlereagh north of the study area. In early 2007, a family of squirrel gliders was disturbed near Kemps Creek on the Cumberland Plain. These findings confirm a remnant population remains on the Cumberland Plain.

Other reliable records are from Kedumba and Burragorang valleys and Bowman's Hill on Wollondilly River.

How you can help

- > Preserve hollow-bearing native trees on your land, including dead trees.
- > If you live near bushland in western Sydney, you could make a nesting box for the glider. Many websites will advise you how to make these and some organisations sell them – type 'glider' 'possum' 'nest' 'box' into your search engine or visit www.birdsaustralia.com.au/infosheets/nestbox.html.
- > As squirrel glider habitat overlaps with koala habitat, work with groups conducting programs to protect the koala.
- > Volunteer to regenerate a national park where the glider lives – visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Park+volunteer+programs or phone DECC's Environment Line on 1300 361 967.
- > Remove African olive from bushland on your property or on bushland you work on.
- > If squirrel gliders have been caught on your barbed wire fences, tie on streamers or other eye-catching objects to make the wire more obvious.



The map highlights dry sclerophyll woodlands and forests on marginally to moderately fertile soils. The map broadly predicts extensive tracts of habitat throughout the Nattai, Burragorang and Coxs River valleys, Scotts Main Range, the Cumberland Plain, Georges River catchment and the south-western parts of the Metropolitan Special Area. The smaller remnants of woodland on the Cumberland and Illawarra Coastal plains are probably unoccupied. About two-thirds of remaining habitat is in reserves. Much habitat has been lost to development, so the map does not reflect how precarious the situation is for this species.

4. Animals of moderately high conservation priority

These species are either uncommon or locally common but have suffered significant habitat loss or threats. Some species are secure in parts of their range but extinct or threatened in other parts, whereas other species are naturally rare and have fewer serious threats facing them.

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), NP = national park, NPW Act = *National Parks and Wildlife Act 1974*, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest, and TSC Act = *Threatened Species Conservation Act 1995*.

4.1 Beautiful firetail (*Stagonopleura bella*)

This small, dark finch has a red bill, dark mask, blue eye-ring, scarlet rump and finely-barred underparts. Often detected by its mournful drawn out 'pee-ee-ee' call, it usually lives in dense damp heaths, but will also live in eucalypt woodlands, particularly those with *Allocasuarina* species. A spring–summer breeder, it makes a bottle-shaped grass nest within six metres of the ground in a dense shrub or tree, in which it lays four or five eggs.

Status/direction of change: Uncommon resident/possibly declining

Significance of study area: Core

Key habitat: Upland swamps

Legislative listing: Protected – NPW Act



Threats

Threats include clearing of native vegetation, frequent fires that could cause local extinction and isolation, habitat invasion by exotic perennial grasses, predation by foxes and cats, and land subsidence due to longwall mining.

Distribution

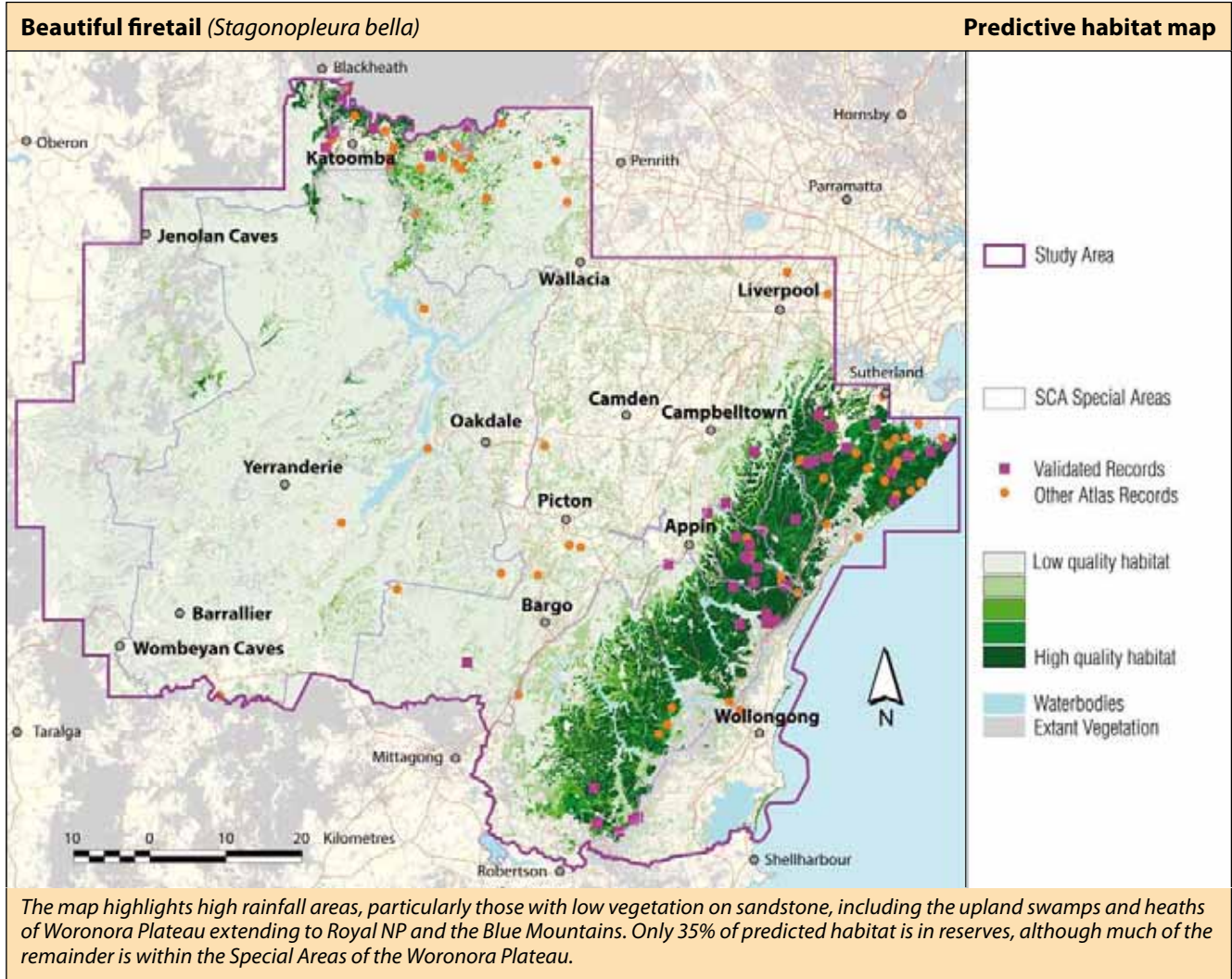
The bird reaches its northern limit around Sydney, although there are occasional sightings from Wollemi NP. Most records are from Budderoo and Morton NPs, Barren Grounds NR and reserves around Jervis Bay, with a few records in the east of the south-eastern highlands. The bird is not declining nationally, although its numbers have decreased by at least 20% in and around Sydney. Evidence suggests that population declines are operating both in and outside reserves. Populations in Heathcote NP have still not recovered five years after a severe wildfire. In contrast, DECC post-fire monitoring on Woronora Plateau noted birds carrying nesting material three years after the 2001 fires.

In the study area, this scarce bird has a restricted distribution and narrow range of habitat preferences. Records are concentrated in three main areas: the heaths and woodlands of Royal and Heathcote NPs, the upland swamps and woodlands of Woronora Plateau (particularly around Dharawal SCA and Molly Morgan Swamp) and upland swamps adjoining the Blue Mountains urban area. The populations in Royal NP are probably connected to the Woronora population.

During the 2002–05 survey, only nine new locations were found despite bird censuses at 666 sites. Eight locations were on Woronora Plateau, and one was near Rocky Waterholes Creek in Bargo SCA.

How you can help

- > Join a bird-watching group such as the Bird Observers Club of Australia (www.birdobservers.org.au), Birds Australia (www.birdsaustralia.org.au) or the Cumberland Bird Observers (www.cboc.org.au) to find out more about this bird.
- > Take part in a biodiversity survey in Royal NP to help conserve the bird – visit www.environment.nsw.gov.au and click on the following links: 'Parks and Wildlife' (top link), 'How you can help' (side link), 'Taking care of national parks', 'Park volunteer programs', 'Royal National Park'. Alternatively, phone the Royal NP volunteer coordinator on (02) 9542 0632.



4.2 Brown treecreeper (*Climacteris picumnus victoriae*)

This medium-sized bird is distinguished from other treecreepers by its slightly larger size, call and distinctive pale eyebrow stripe. It lives in eucalypt woodlands with a grassy or open shrub understorey, and abundant fallen timber or dead trees. Unlike most treecreepers, it spends about half its time on the ground eating insects, particularly ants and beetles. The bird lives in pairs or small groups in permanent territories and breeds in tree hollows.

Status/direction of change: Locally common resident/declining

Significance of study area: Core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act

Threats

Habitat clearance is a major threat. The birds cannot live in fragments smaller than 300 hectares. Once extinction occurs in a remnant, natural recolonisation is unlikely.

Other threats are competition for tree hollows from introduced species such as the common starling (*Sturnus vulgaris*) and European honeybee (*Apis mellifera*); the removal of dead wood and trees; and grazing, which reduces the diversity of ground-dwelling insects.

Distribution

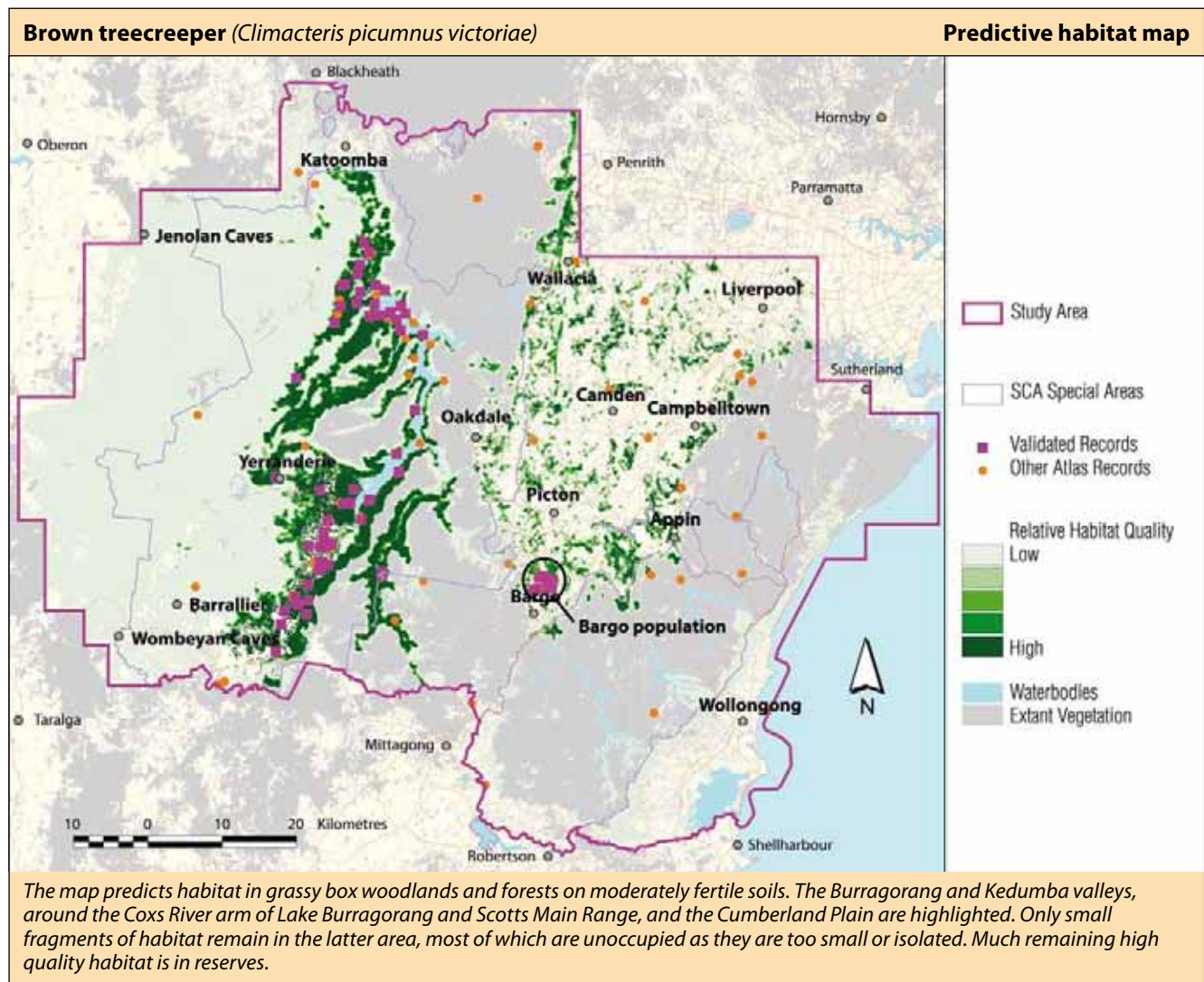
The bird lives along the coast and ranges in Victoria, NSW and south-east Queensland. The NSW population declined by at least 20% over the 15 years to 2000.



The bird is found throughout eastern NSW, though it is least common in the south, and has declined significantly on the north coast and in and around Sydney. In the south-eastern highlands, there are scattered populations living in box woodland country around Canberra.

In and around Sydney, the bird lives in open woodlands on the Central Tablelands, on open coastal plains, and in valleys such as the Hunter Valley and Cumberland Plain, though the bird has virtually disappeared from the latter area in the last 30 years.

The 2002–05 study has greatly increased knowledge of the distribution and habitat use of this species in the study area. Nearly 90 records were collected during the surveys, including from the Burragorang Valley and the shores of the Cocks River arm of Lake Burragorang, and from new locations on Scotts Main Range and in the Nattai River Valley. On the Cumberland Plain, despite surveying much suitable habitat, only an isolated population of about 14 birds was seen at the junction of Dogtrap Creek and Bargo River, just north of Bargo. This is probably the last viable population of treecreepers in western Sydney, with ongoing management required to ensure their survival.



How you can help

- > Join a bird-watching group to discover more about this bird – see 4.1 for details
- > Leave hollow-bearing trees and dead trees with hollows on your land. Leave fallen timber on the ground to encourage prey for the bird. To download DECC's fact sheet on the removal of dead wood and trees, go to www.nationalparks.nsw.gov.au/PDFs/factsheet_ktp_deadwood_removal.pdf.
- > Volunteer to do bush regeneration in the grassy woodlands of western Sydney, especially near Bargo. Phone your local council for bush regeneration groups operating in your area.
- > Remove weeds such as African olive and lantana from grassy woodland on your property, particularly if you live on the Cumberland Plain.

4.3 Diamond firetail (*Stagonopleura guttata*)

This attractive finch has a red eye-ring, beak and rump, the latter contrasting strongly with the black tail in flight. The finch lives mainly in eucalypt forests with a grassy understorey, where it eats grass seeds. It usually lives in pairs, though it sometimes forms small flocks in autumn and winter. This firetail builds bottle-shaped nests in trees or sometimes mistletoe, and produce four to six eggs.

Status/direction of change: Locally common resident/declining

Significance of study area: Core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act



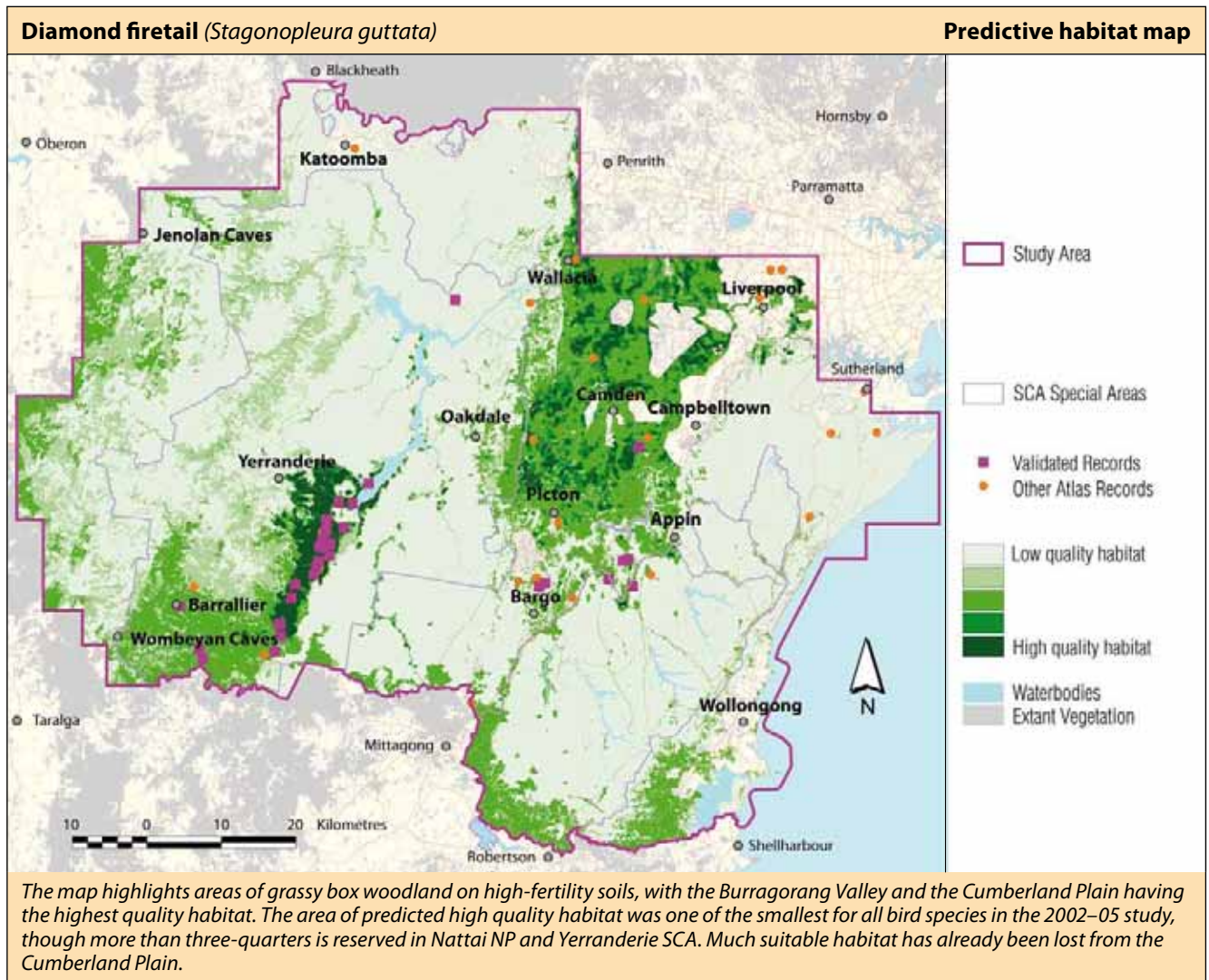
Photo: G. Dabb

Threats

These birds do not survive in remnants smaller than 200 hectares. Threats include clearing for agriculture and urban development; habitat degradation through over-grazing; the spread of exotic perennial grasses such as serrated tussock (*Nassella trichotoma*), resulting in the loss of key food plants; and competition from flock-foraging red-browed finches (*Neochmia temporalis*). Predation by foxes and cats and illegal trapping for the pet trade are other important threats, particularly on the edges of urban areas.

Distribution

The bird is endemic to south-eastern Australia, from Rockhampton (Queensland) to the Eyre Peninsula and Kangaroo Island (South Australia). It has declined throughout south-eastern Australia as much of its habitat has been heavily cleared and is poorly conserved.



It is most regularly seen in eastern NSW, less often in the west. In and around Sydney, it lives in the Capertee, Upper Hunter and Burratorang valleys, in Goulburn River and Wollemi NPs, and in Munghorn Gap and Winburndale NRs. It is sparser in the south-eastern highlands, though there are recent records east of the ACT and around Bathurst.

The diamond firetail is rare across most of the study area, having virtually disappeared from the Cumberland Plain and the Illawarra. Older museum records are scattered through areas further east, such as Helensburgh, Sutherland and Wallacia, with the last from Narellan Weir in 1931.

The report of a bird feeding on grasses around Wattamolla Road in Royal NP in 2001 emphasises the nomadic nature of this bird. Its population fluctuates depending on the amount of seeding grass. Therefore it may occasionally visit other areas of native vegetation.

The Burratorang Valley is the most important area, extending up Wollondilly Valley as far as Wollondilly River NR. During the 2002–05 project, 21 new locations were found south of Lake Burratorang. There is also a record from Erskine Range, and several sightings around Bargo. Surveys of the Cumberland Plain in 2006 confirmed that a few birds live in the south, with several sightings around Wilton and near Hanging Rock.

How you can help

- > Join a bird-watching group to discover more about this bird – see 4.1 for details.
- > Encourage native rather than exotic grasses to grow on your property. These could include kangaroo grass (*Themeda australis*) and *Microleana* species. Control weeds such as African olive and lantana.
- > Volunteer to do bush regeneration on the Cumberland Plain in western Sydney. Phone your local council for groups operating in your area or Greening Australia – visit www.greeningaustralia.org.au/getinvolved/index.html or phone (02) 9560 9144.
- > Control feral cats and foxes on your property as they prey on ground-frequenting birds such as the diamond firetail.

4.4 Eastern false pipistrelle (*Falsistrellus tasmaniensis*)

This relatively large bat is up to 70 mm long, and can be distinguished from the similar greater broad-nosed bat (*Scoteanax rueppellii*) by its two pairs of upper incisors, a gap between the incisors and the canines, and its larger ears. Its call can be confused with the call of the greater broad-nosed bat and other broad-nosed bats, though good quality calls can be separated using ultrasound analysis. The bat lives in wet areas, especially riparian or high rainfall areas with trees that are more than 20 metres tall. It may be more common at high elevations, although in Victoria it is found between sea level and 1500 metres. It usually roosts in hollows in eucalypts, occasionally in caves and old buildings. It can travel at least 12 km from its roost site while foraging, and hunts mostly within the forest canopy for moths, beetles, weevils, flies and ants.

Status/direction of change: Uncommon resident/probably declining

Significance of study area: Core

Key habitat: High productivity forests and woodlands

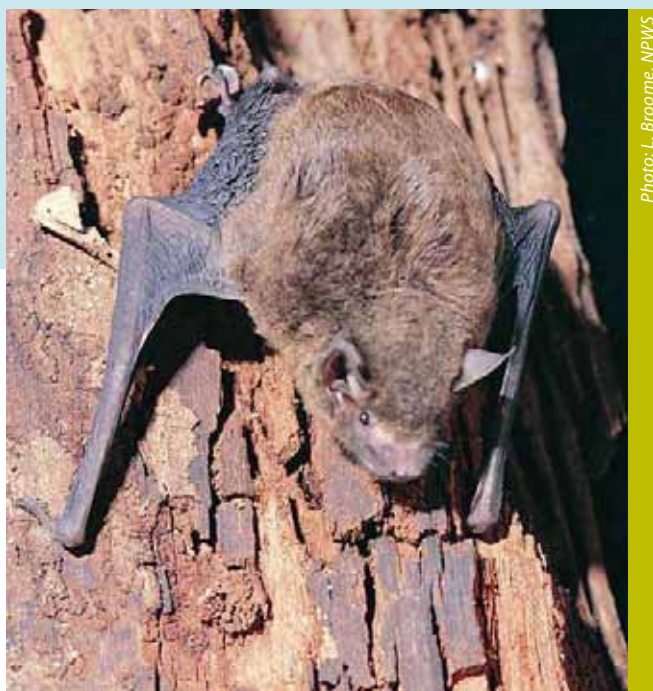
Legislative listing: Vulnerable – TSC Act

Threats

Threats to the species are poorly known, but seem to be the destruction of roosting sites through land clearing and logging; and the loss of foraging habitat due to land clearing, urban expansion and possibly the application of pesticides.

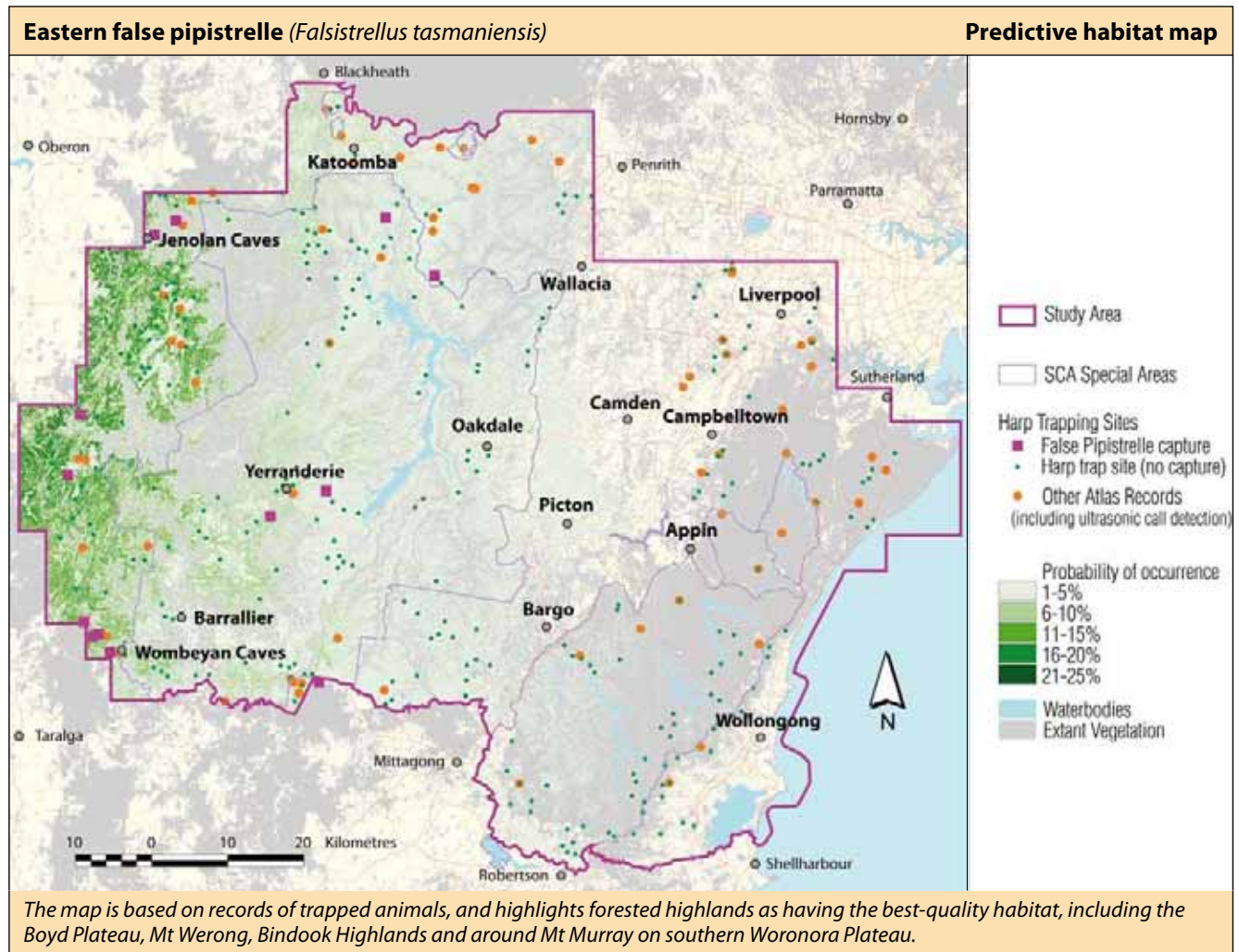
Distribution

This species is found patchily in small numbers throughout south-eastern Australia, between south-east Queensland and western Victoria, and in Tasmania. It primarily lives on the coastal plains and ranges. In and around Sydney, the bat lives on the coastal ranges of the Central Coast, including Gungahwa Creek in Wollemi NP, Mangrove Creek, and the Hunter, Kedumba and Wollondilly valleys; and in forested uplands including Mt Coricudgy, Gaspers Mountain, Chichester SF, Newnes Plateau, Boyd Plateau, Bindook Highlands, Coolah Tops and around Mt Piper power station.



In the study area, most animals trapped during surveys are from higher altitude areas in the west. There are a number of ultrasonic call recordings from the east, mostly from the edges of the Cumberland Plain, particularly where it merges into the Woronora Plateau, though this is not a reliable method of recording this bat. There are also a few records from the west-flowing Abercrombie and Turon rivers.

The 2002–05 project added 23 new sites to the study area, increasing known locations by over 50%. Many locations were on the highlands, and included Black Range near Jenolan, Mt Werong, Boyd Plateau and High Range near Nattai. The bat was also recorded and trapped at lower altitudes, such as along the Kedumba, Coxs and Wollondilly rivers. There were almost no records from sandstone woodlands and heathlands, on the Woronora Plateau or the southern Blue Mountains, despite intensive searches in these areas.



How you can help

- > Preserve hollow-bearing trees, including paddock trees, on your property. If trees on your property have few hollows you could make a nesting box. Many websites will advise you how to make these and some organisations sell them – type ‘bat’ ‘nest’ ‘box’ into your search engine or visit www.birdsaustralia.com.au/infosheets/nestbox.html.
- > Phone DECC’s Environment Line on 1300 361 967 if you have any bat colonies in your house or shed you want to remove.
- > Join the Australasian Bat Society (<http://ausbats.org.au>) to find out more about this bat.

4.5 Greater broad-nosed bat (*Scoteanax rueppellii*)

This large bat can be distinguished from the similar eastern false pipistrelle by its single pair of upper incisors and smaller ears. The bat hunts over creeks and forest clearings, and will move across clearings to reach suitable patches of habitat. It usually roosts in tree hollows, in cracks and fissures in trunks or under exfoliating bark, though on occasions it may also use old buildings. The bat's ultrasonic call is easily confused with that of the eastern false pipistrelle and other broad-nosed bat species.

Status/direction of change: Uncommon resident/
probably declining

Significance of study area: Core

Key habitat: High-productivity forests and woodlands

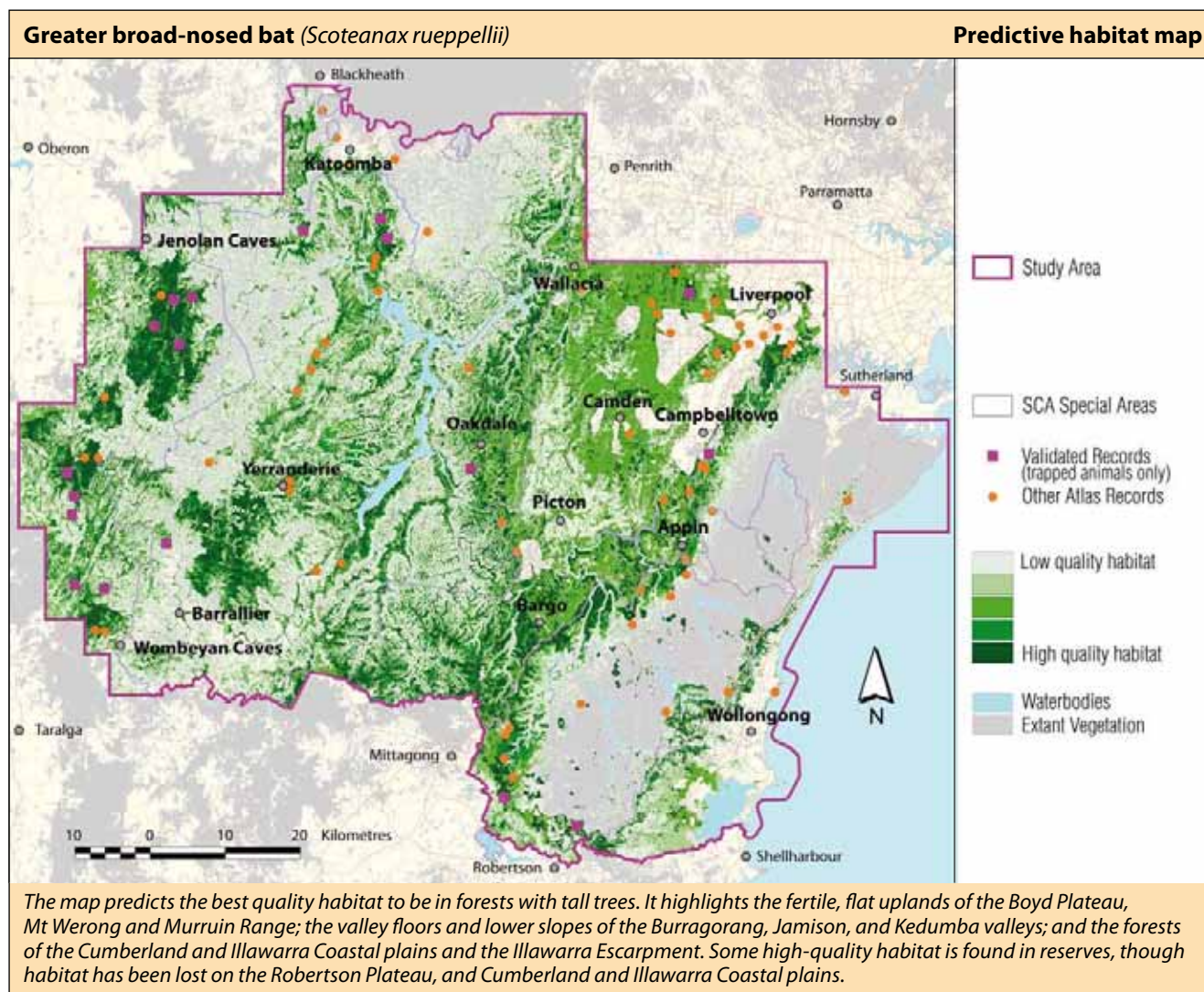
Legislative listing: Vulnerable – TSC Act



Photo: N. Williams

Threats

Threats probably include habitat clearance and fragmentation due to agriculture and urban development; logging, which may remove hollows and affect the availability of prey; disturbance to roosting and summer breeding sites; pesticides and herbicides that may affect the food supply or accumulate in the bat's tissue; changes to waterways; and in Sydney, urban expansion.



Distribution

This bat is usually found in gullies draining east from the Great Dividing Range between south-east NSW and north Queensland (Atherton Tablelands). In southern NSW it lives in low-altitude forests, while in the centre of its range it occurs at a wide range of altitudes. In NSW, most records are from the north coast, south-east and Sydney, with some records in the New England Tableland and south-eastern highlands, where it lives mainly in forested uplands.

In and around Sydney, most records are from the coastal areas of the Illawarra, Central Coast and Cumberland Plain and the large valleys of the Dividing Range, such as Kangaroo and Hunter valleys. There are few records from sandstone environments. The bat lives in some reserves, including Blue Mountains and Wollemi NPs.

In the study area, records are from forested lowlands on the Cumberland Plain and in the Blue Mountains, such as the Kedumba Valley and Gillan's Creek, or forested uplands such as Boyd Plateau and Mt Werong.

During the 2002–05 project, this species was recorded 30 times in 18 new locations. These were in the highlands of the southern Blue Mountains where few surveys had hitherto been conducted, on the Boyd Plateau and around Mt Werong (ten new locations confirmed by trapping individuals) and from forests on the eastern edge of the Cumberland Plain and near Oakdale. In 2006 a bat was trapped in isolated coastal forest at Towra Point NR, just north of the study area. This proves isolated lowland remnants in Sydney and Wollongong can be important for this bat.

How you can help

See 4.4 Eastern false pipistrelle.

4.6 Grey-headed flying fox (*Pteropus poliocephalus*)

This large fruit bat has dark grey body fur, a slightly paler grey head and a russet collar. It is the largest bat in the study area, with a wingspan of up to one metre. It is highly mobile, and numbers roosting at camps vary depending on season and food availability. The bats feed on nectar and pollen from various trees including eucalypts, melaleucas and banksias, as well as fruits. They travel up to 20 km to a food source, so are an important pollinator and disperser of native plants.

Status/direction of change: Locally common resident/declining

Significance of study area: Core

Key habitat: Rainforests, wet sclerophyll forests, other

Legislative listing: Vulnerable – TSC and EPBC Acts



Photo: M. Schulz

Threats

Main threats are destruction of habitat, especially foraging habitat, by clearing for urban development and agriculture; disturbance at roosting sites, especially of pregnant females; unregulated shooting, particularly when feeding on commercial crops; and electrocution on power lines. Additional threats include exposure to pesticides and entanglement in barbed wire fences or in nets over fruit trees in backyards.

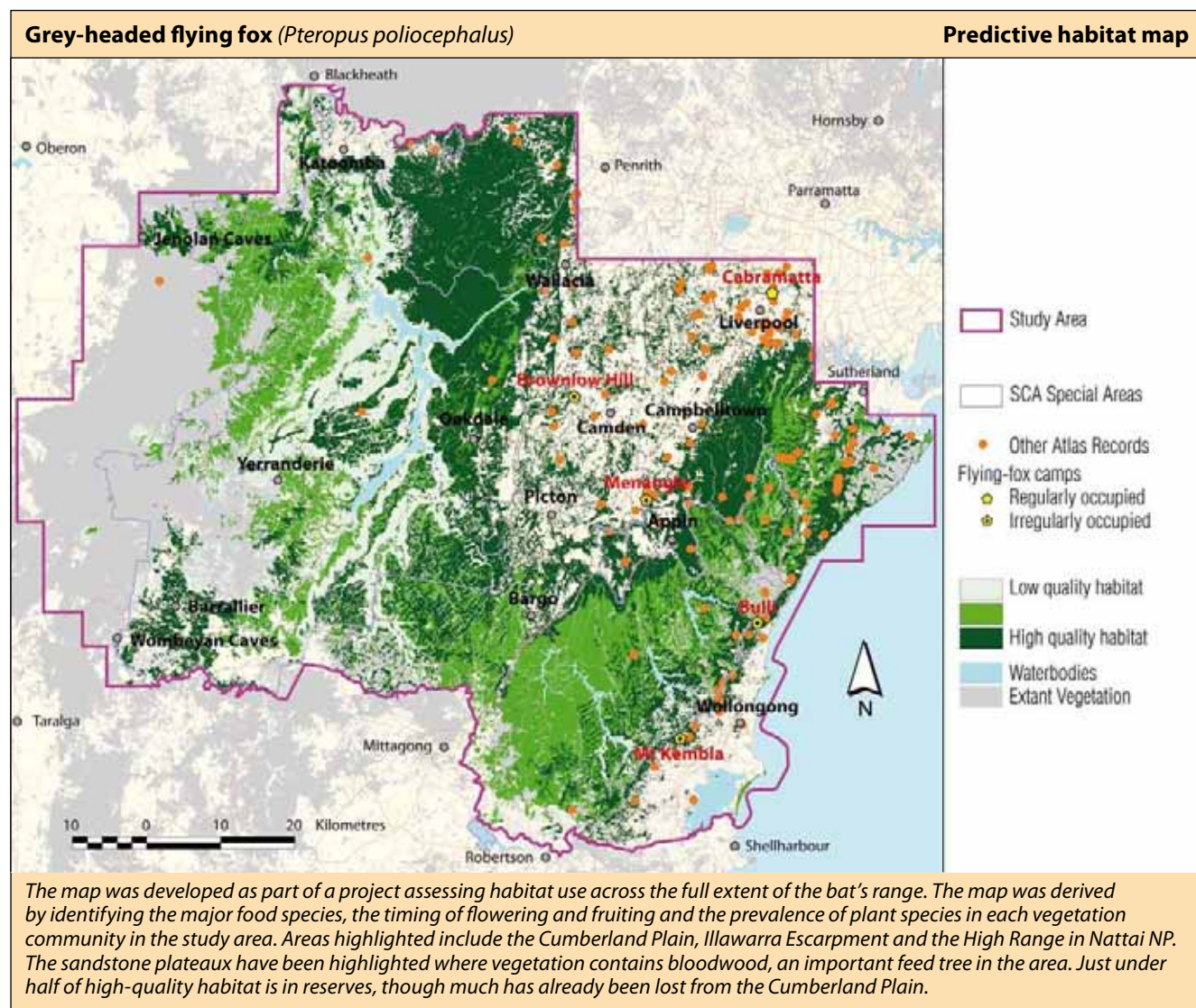
Distribution

The bat is endemic to east Australia, living between Melbourne in Victoria and Bundaberg in Queensland, though it formerly ranged as far north as Rockhampton.

In and around Sydney, the bat lives mainly on the coast and hinterland, with records from Royal, Garigal and Wyrabalong NPs and Comerong Island NR. There are about 16 camps in the region. Important camps just outside the study area include Whispering Gully near Dunmore; near Jamberoo; on Comerong Island; and at Kurnell. In the study area, there is a large, regularly used camp on Cabramatta Creek that has increased from a few animals in 1988 to over 20,000 in 2002. Temporary camps are located on the Cumberland Plain at Menangle and Brownlow Hill, in the Illawarra at Mt Kembla, and on the Illawarra Escarpment near Bulli Pass. There were more than 5000 individuals in the Menangle camp in June 2006.

Outside the camps, most sightings are from urban areas of the eastern Cumberland Plain, Illawarra Escarpment, Royal NP, parts of Woronora Plateau, and less commonly, the lower Blue Mountains. The bat is commonly seen in Wollongong, particularly in flowering blackbutt (*Eucalyptus pilularis*).

During the 2002–05 study, few records were obtained though one bat was seen feeding on a *Xanthorrhoea* (grass tree) flower spike in upland swamp on Woronora Plateau. No sightings were made in the southern Blue Mountains aside from one unconfirmed record from Burratorang SCA and one from Lacys Creek, a remote area rarely visited by people, where the bat was seen feeding on flowering mountain blue gum (*Eucalyptus deanei*). This tree species is common in moist gullies, meaning the bat may visit the southern Blue Mountains more regularly than this survey data suggests.



How you can help

- > Learn more about this Sydney bat – visit www.sydneybats.org.au or join the Australasian Bat Society – visit <http://ausbats.org.au>.
- > Join the Cabramatta Creek flying fox committee or get involved in bush regeneration around the Cabramatta Creek flying fox camp. Phone Fairfield Council on (02) 9725 0222 for more information.
- > When protecting fruit trees in your backyard, use netting pulled tight over a frame, not thin nylon netting thrown loosely over the trees. For more details about, and alternative methods for, protecting ripening fruit, visit www.sydneybats.org.au/cms/index.php?netting. If you grow fruit commercially, follow DECC guidelines for netting crops – visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Netting+of+garden+fruit+trees+guidelines+to+protect+wildlife.
- > Report any unregulated shooting of flying foxes to your local national parks office.
- > If flying foxes have been caught on your barbed wire fences, tie on streamers or other eye-catching objects to make the wire more obvious.

4.7 Hooded robin (*Melanodryus cucullata cucullata*)

This medium-sized bird lives in eucalypt woodland or acacia shrubland. The male has a black hood and upper body with a white stripe on the shoulder. The female is grey with dark brown wings. Both sexes have a white wing stripe and underparts, which with their larger size, distinguishes them from the jacky winter (*Microeca fascians*) and other female robins. They frequently perch on dead or fallen timber where they pounce on insects. They usually live in pairs, though can cooperatively breed, with two or three eggs laid in a cup-shaped nest placed in a horizontal tree fork.

Status/direction of change: Rare resident/declining

Significance of study area: Core

Key habitat: Grassy box woodlands

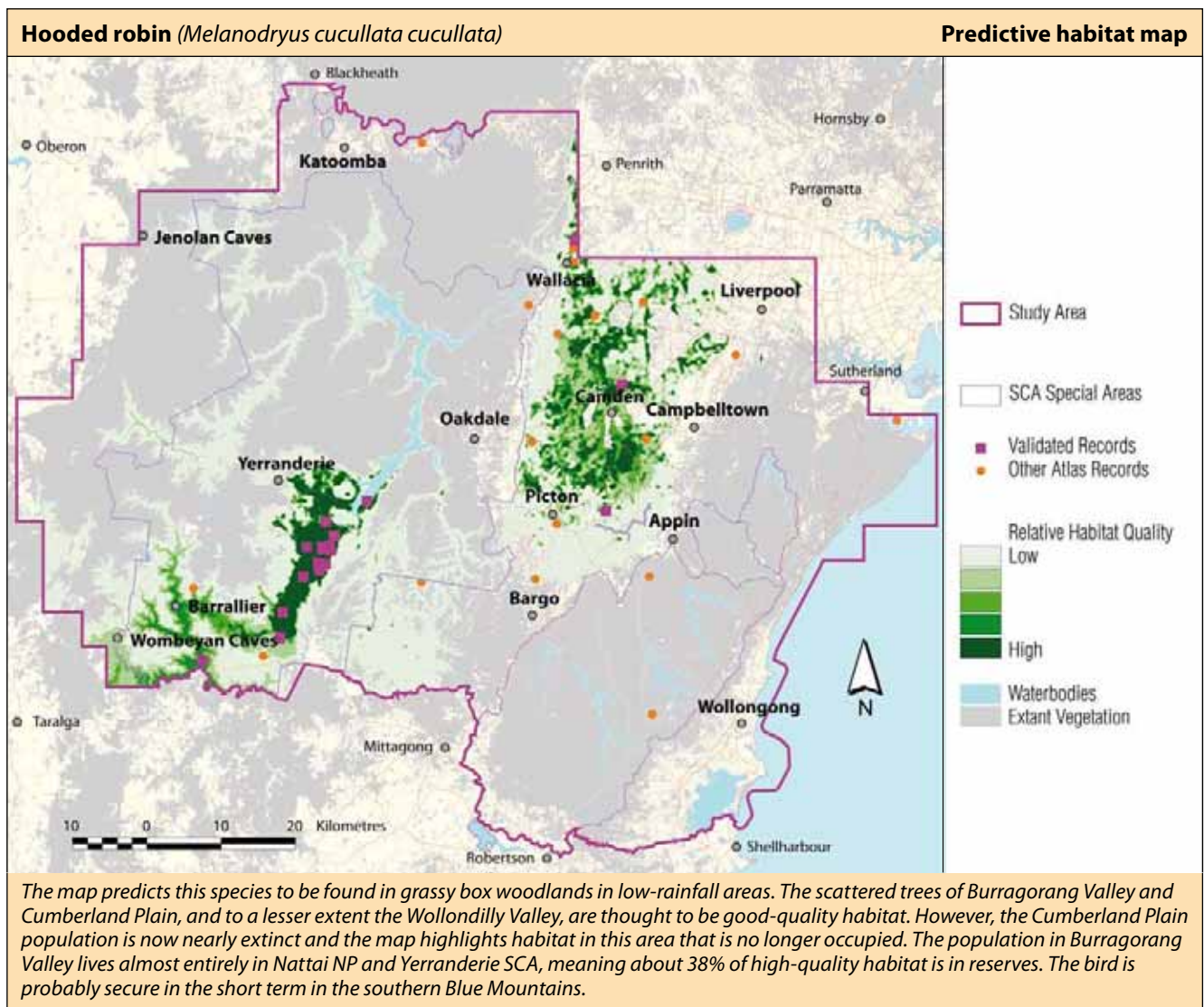
Legislative listing: Vulnerable – TSC Act



Photo: H. Follow

Threats

The robin has declined significantly in range and population in the sheep–wheat belt of central west NSW (the western slopes of the Great Dividing Range and adjacent plains) due to the degradation and fragmentation of woodland habitats. Populations do not remain even in large remnants although the reason for this is unknown. Other threats include clearance and fragmentation of other habitats; reduction of food through grazing; habitat alteration through invasion of exotic perennial grasses such as serrated tussock (*Nassella trichotoma*); and predation of eggs and young by cats and foxes.



Distribution

This bird has been seen in most parts of NSW in small numbers. In and around Sydney, it mostly lives in the Hunter, Capertee and Burratorang valleys in grassy box woodlands. DECC surveys in 2006 have added numerous records from the fringes of north-western Wollemi and Nattai NPs and Munghorn Gap NR where there are high-fertility soils.

In the study area, the bird is almost extinct on the Cumberland Plain. The most recent records are from near Cobbitty in 1998 and 2001, and from 2006 when the bird was found on Razorback Range in the south of the Cumberland Plain. The 2002–05 project confirmed that a population still lives in the southern Blue Mountains in Burratorang Valley, between Jooriland and Wollondilly River NR.

How you can help

- > Join a bird-watching group to learn more about this bird – see 4.1 for details
- > Encourage native rather than exotic grasses on your property. These could include kangaroo grass (*Themeda australis*) and *Microleana* species. Control weeds such as African olive and lantana.
- > Join a local bushcare group or create your own to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – visit www.landcareonline.com or phone (02) 9412 1040 – or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).

4.8 Restless flycatcher (*Myiagra inquieta*)

A small to medium-sized flycatcher whose white throat distinguishes it from similar species, this bird lives in open forests, woodlands and riparian vegetation and eats insects. It often perches on stumps or low branches, or hovers over the open ground while making a distinctive grinding, churring call that has led to its colloquial name of ‘scissors grinder’. Its nest of bark, grass and spider’s web is placed in a tree between 1 and 20 metres above the ground, and both sexes care for the young.

Status/direction of change: Uncommon resident/declining

Significance of study area: Core

Key habitat: Grassy box woodlands, alluvial woodlands and forests

Legislative listing: Protected – NPW Act



Photo: L. Hansch

Threats

The main threats are habitat clearance and removal of vegetation. Two studies in heavily fragmented landscapes (the Western Australian wheat belt and the Mt Lofty Ranges in South Australia) have shown that this species has declined from being common to being rarely recorded. In the latter area, degradation of remaining grassy box woodlands through weed invasion, stock grazing and changes in fire regimes are also reasons for its decline. Other threats include predation by cats and possibly the black rat.

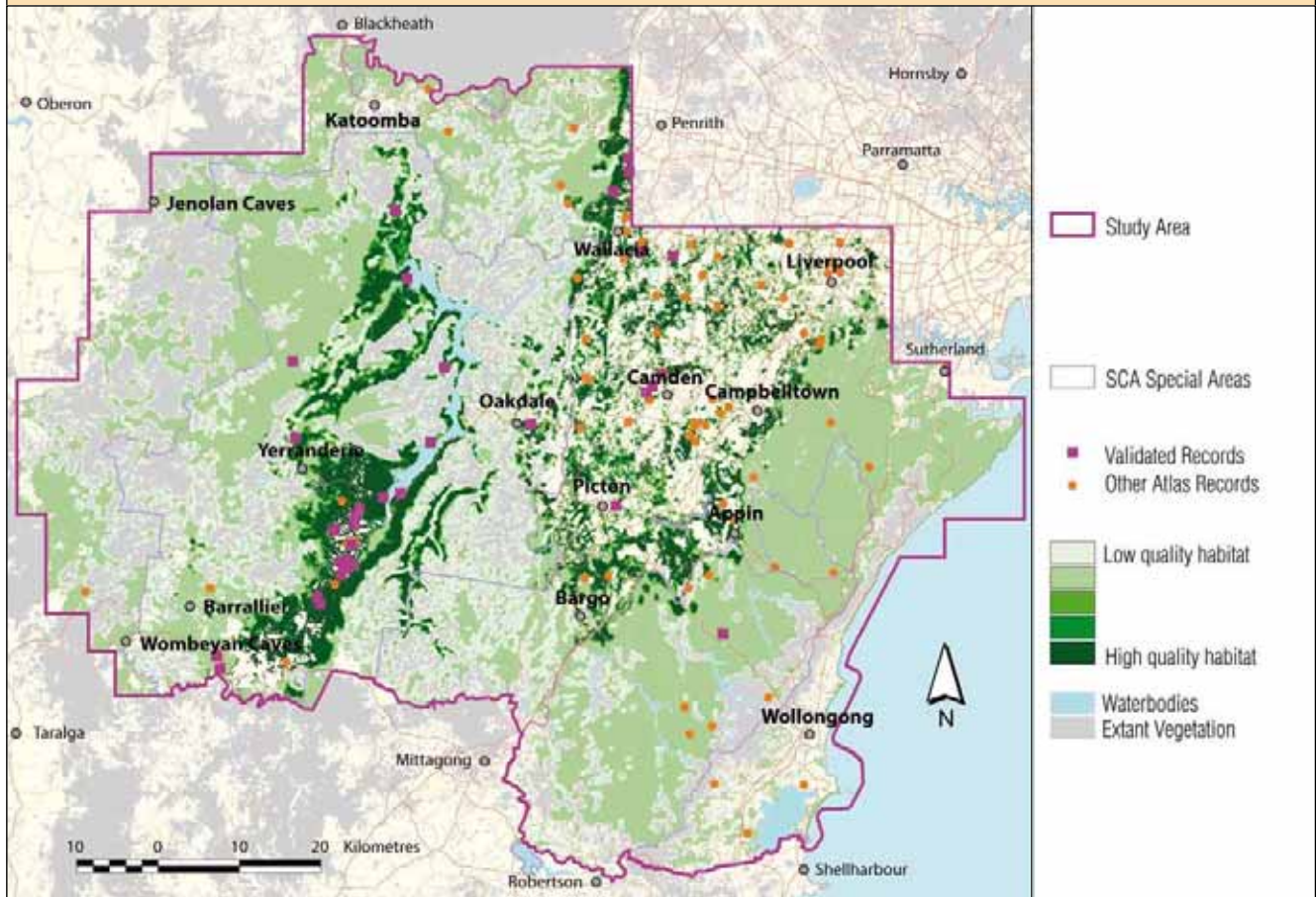
Distribution

The flycatcher is widely distributed between northern Queensland and eastern South Australia with an isolated population in south-west Western Australia.

Scattered records show that the bird is less common at higher altitudes such as in the south-eastern highlands. In and around Sydney, it is widespread, though most records come from drier habitats such as the Hunter, Capertee and Burratorang valleys and the Cumberland Plain. It was once common throughout the shale plains of western Sydney, though it has declined in this area due to habitat loss for development. The bird has disappeared from tall forest on the north shore and is rare in the Cumberland Plain woodlands. Most habitat areas have been heavily cleared and are outside reserves, though birds have been seen on the edges of sandstone reserves, such as Wollemi and Nattai NPs. This species also occurs in coastal forests, such as at Lake Illawarra and Towra Point NR, north of the study area.

In the study area, the bird is widely distributed, though it is more common in the high-fertility valleys of the southern Blue Mountains and on the Cumberland Plain. During the 2002–05 surveys, only 14 new locations were recorded. These were in Burratorang Valley, Kedumba Valley and Oakdale, and near Yerranderie. Surveys of the Cumberland Plain in 2006 detected this species more regularly, particularly in large and better-connected vegetation remnants.

Restless flycatcher (*Myiagra inquieta*) **Predictive habitat map**



The map highlights grassy box woodlands and forests on moderately fertile soils, such as the valley floor and lower slopes of the Burratorang Valley, the Cocks River arm of Lake Burratorang and the Cumberland Plain. Fragmentation and degradation of woodlands on the Cumberland Plain mean the bird may only live in large remnants. About two-thirds of high-quality habitat is in reserves, such as Nattai and Blue Mountains NPs.

The infrequency with which the bird was recorded and the amount of habitat that has already been lost reaffirm that the population is probably declining, particularly in western Sydney.

How you can help

- > Join a bird-watching group to learn more about this bird – see 4.1 for details
- > Join a local bushcare group or create your own to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley – see 4.7 for details.

4.9 Speckled warbler (*Pyrrholaemus sagittata*)

This small, ground-dwelling bird is similar in size and shape to the buff-rumped thornbill (*Acanthiza reguloides*) but can be identified by its boldly-streaked underbody, distinctive facial pattern, noticeably longer tail and distinctive call. It lives in the grassy understorey of dry sclerophyll forests and woodlands dominated by eucalypts and scattered shrubs. It eats insects and seeds and forages mostly on the ground. Pairs, and occasionally trios, live permanently in large territories of up to 12 hectares where a well-concealed domed nest is built in grass tussocks. Two to four eggs are laid, though breeding success can be low.

Status/direction of change: Uncommon resident/declining

Significance of study area: Core

Key habitat: Grassy box woodlands

Legislative listing: Vulnerable – TSC Act



Photo: G. Dabb

Threats

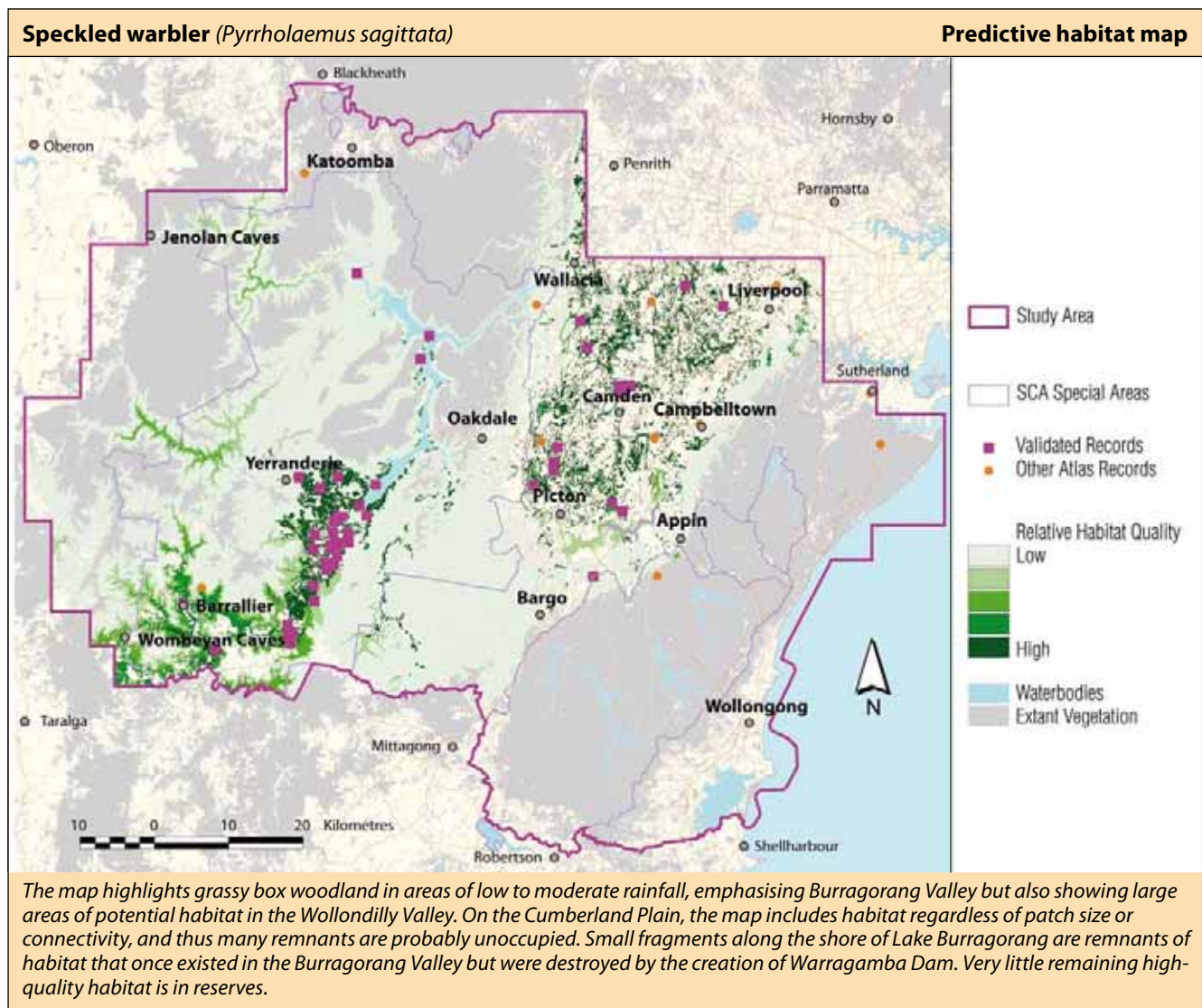
Due to agricultural land clearing, this bird has declined by at least 20% in the last 15 years. Local populations living in small, isolated patches of habitat under 100 hectares have become extinct. Other threats include invasion of habitat by exotic perennial grasses like serrated tussock (*Nassella trichotoma*); loss of habitat due to African olive (*Olea europaea*) infestation; nest predation by feral animals; the loss of groundcover through grazing by stock, kangaroos and rabbits; inappropriate fire regimes that result in decreased groundcover; and the removal of dead timber from the ground.

Distribution

The bird is endemic to south-eastern Australia, occurring between Maryborough (Queensland) and the Grampians (Victoria).

It is widespread in the east of NSW, extending as far west as the Cobar Penneplain, but is scarce or absent from the south-east coast and Australian Alps. In and around Sydney, it mostly lives in dry woodland areas, including the Burratorang, lower Hunter and Goulburn River valleys, and it is less common in the south-eastern highlands. Its preference for woodlands on high fertility soils means that it mostly lives outside reserves, though it does live in Nattai and Munghorn Gap NPs and Barton and Giralrang NRs, and on the fringes of Wollemi NP.

In the study area, the bird has declined significantly, particularly on the Cumberland Plain. In this area, it persists in some woodland remnants, such as along Cobbitty Road between Oran Park and Cobbitty, on Razorback Range, in Douglas Park and at Pheasants Nest. Small populations also still live in Scheyville NP and Orchard Hills on the northern Cumberland Plain, north of the study area. A more secure population lives in Burratorang Valley, extending up the Wollondilly River and tributaries to Wollondilly NR, and on the western shore north to Junction Point.



How you can help

- > Join a bird-watching group to learn more about this bird – see 4.1 for details.
- > Join a local bushcare group or create your own to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley – see 4.7 for details.
- > If you own tracts of grassy woodland, set aside some of your land as habitat for the bird by considering a conservation agreement or a wildlife refuge. Phone DECC's Environment Line on 1300 361 967 or visit www.nationalparks.nsw.gov.au/npws.nsf/Content/conservation_partners.

4.10 Turquoise parrot (*Neophema pulchella*)

With this small, brightly-coloured parrot, the male is brighter than the female, and has a red shoulder band. The bird lives in pairs or small family groups in eucalypt woodlands and open forests that have a grassy groundcover. It nests in tree hollows, and lays two to five eggs.

Status/direction of change: Uncommon visitor/declining

Significance of study area: Non-core

Key habitat: Grassy box woodlands, upland swamps

Legislative listing: Vulnerable – TSC Act



Photo: DECC

Threats

The main threats are clearing for agriculture, which has greatly reduced the parrot's distribution; predation by cats and foxes; loss of hollows that are used for nesting; and inappropriate burning regimes that encourage growth of shrubby rather than grassy understoreys. Fire can negatively affect breeding by destroying dead stumps, but can positively affect feeding habitats. Other threats include removal of dead wood and trees; habitat alteration through the invasion of exotic perennial grasses such as serrated tussock (*Nassella trichotoma*); loss of feeding habitat due to the invasive African olive (*Olea europaea*) and land subsidence due to longwall mining. Half the swamps used by the parrot on Woronora Plateau will be undermined in the future.

Distribution

The parrot is restricted to eastern Australia, where its range has contracted by over 50% since the 1890s.

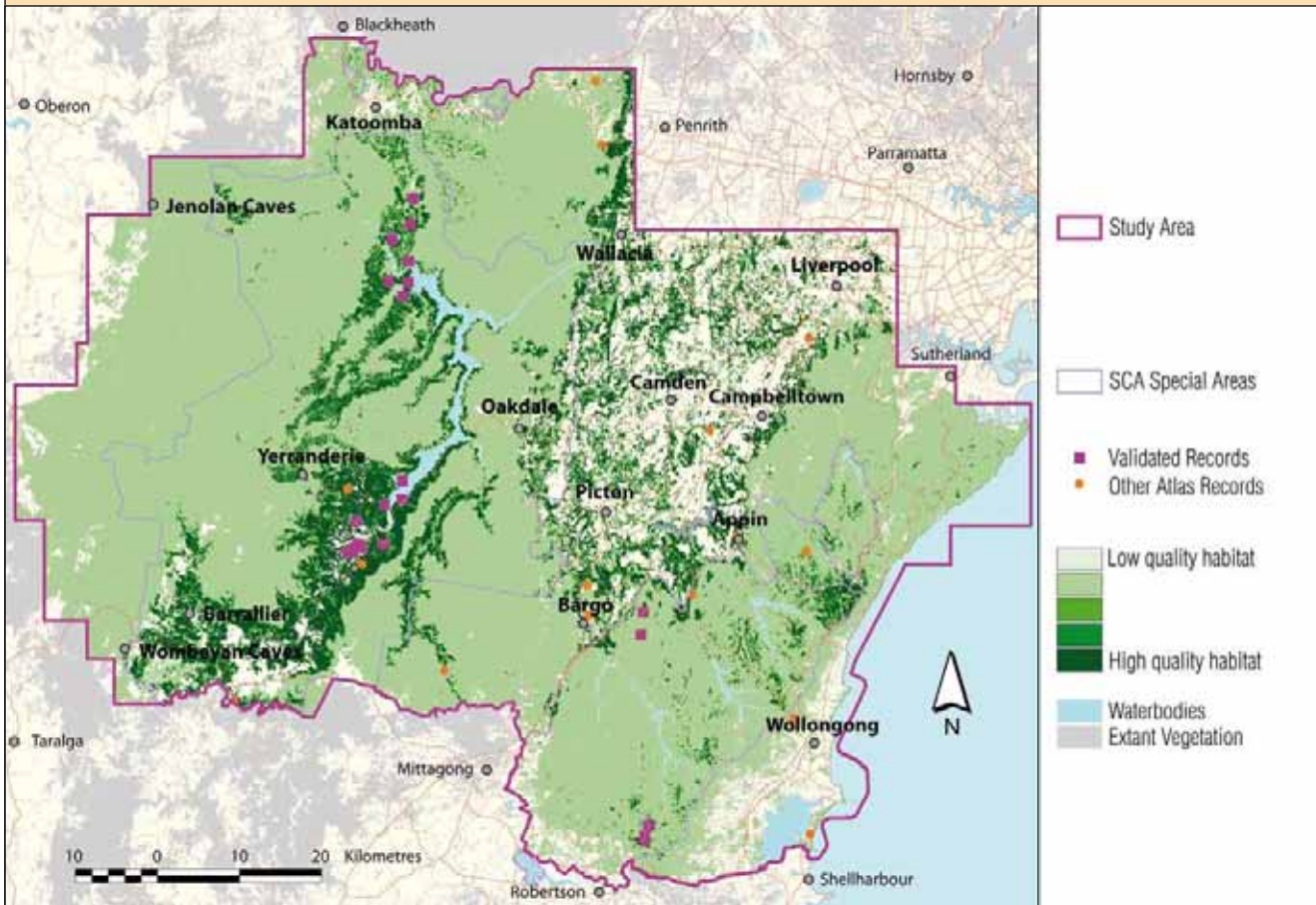
In NSW, most birds live along the western slopes in the Nandewar and Brigalow Belt South regions, on the south-west slopes, and in and around Sydney. In the latter region, the parrot is most often found in dry grassy box woodlands in the Hunter and Capertee valleys and sometimes on the Cumberland Plain. It also lives in Yengo and Goulburn River NPs, Munghorn Gap NR and Yerranderie SCA.

In the study area, there are some old records from the Cumberland Plain, but the parrot has declined severely in this area, and is extremely rare or even extinct. It was not detected during surveys in 2006 though suitable habitat still exists, particularly in the south, which may still be used occasionally.

During the 2002–05 surveys, the parrot was seen in grassy box woodlands on fertile soils in the Butchers Creek/Coxs River area, in the Burratorang Valley, and north of Avon Dam; and in upland swamps on the Woronora Plateau around Molly Morgan Crossing in southern Avon Catchment. The parrots do not live permanently on the Woronora Plateau, but visit occasionally when certain food sources are available or resources elsewhere are low. It was seen in these swamps at the height of the drought in 2002 and then again in 2006.

How you can help

- > Join a bird-watching group to learn more about this bird – see 4.1 for details.
- > Preserve hollow-bearing trees on your land and leave dead trees standing if they have hollows. Avoid removing fallen timber and shrubs such as blackthorn (*Bursaria spinosa*) as these provide important feeding and nesting sites for the bird.
- > Join a local bushcare group or create your own to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley – see 4.7 for details.
- > Encourage native rather than exotic grasses on your property. These could include kangaroo grass (*Themeda australis*) and *Microleana* species. Control weeds such as African olive and lantana.



The map highlights grassy box woodlands on high-fertility soils, and upland swamps. Areas include Burragorang, Coxs River and Kedumba valleys, the swamps of the Woronora Plateau and remnant grassy box woodlands on the Cumberland Plain. Due to the nomadic nature of this species, much suitable habitat will be unoccupied most of the time, other than in Burragorang Valley where the parrots live permanently. Much of the parrot's habitat is in reserves.

5. Animals of moderate conservation priority

These animals are uncommon to common in the region with most having ample protected habitat and few apparent threats. However, most only live in a restricted range of environments, making them vulnerable to future threats and habitat loss.

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), NP = national park, NPW Act = *National Parks and Wildlife Act 1974*, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest and TSC Act = *Threatened Species Conservation Act 1995*.

5.1 Eastern pygmy-possum (*Cercartetus nanus*)

This animal is distinguished from other small arboreal mammals by its long, strongly prehensile tail which it uses to hang from vegetation while feeding, particularly in windy conditions. It mostly lives in sclerophyll forests, woodlands and heaths, particularly favouring habitats supporting the heath-leaved banksia (*Banksia ericifolia*). Each animal has several nests throughout its territory that are usually constructed in tree hollows.

Status/direction of change: Uncommon resident/
probably stable

Significance of study area: Core

Key habitat: Sandstone woodland and heath, upland swamps

Legislative listing: Vulnerable – TSC Act



Photo: N. Williams

Threats

Threats include habitat loss and fragmentation through clearing; inappropriate fire regimes that affect understorey plants; the loss of nest sites through intensive forestry operations and firewood collection; predation by foxes and cats; and subsidence from longwall mining. In some areas, this species also lives in isolated populations, increasing the risk of local extinction.

Distribution

The possum is patchily distributed between south-east Queensland through eastern NSW to South Australia and Tasmania, though it is only found at high altitudes in northern NSW and south-eastern Queensland and is more common in the south.

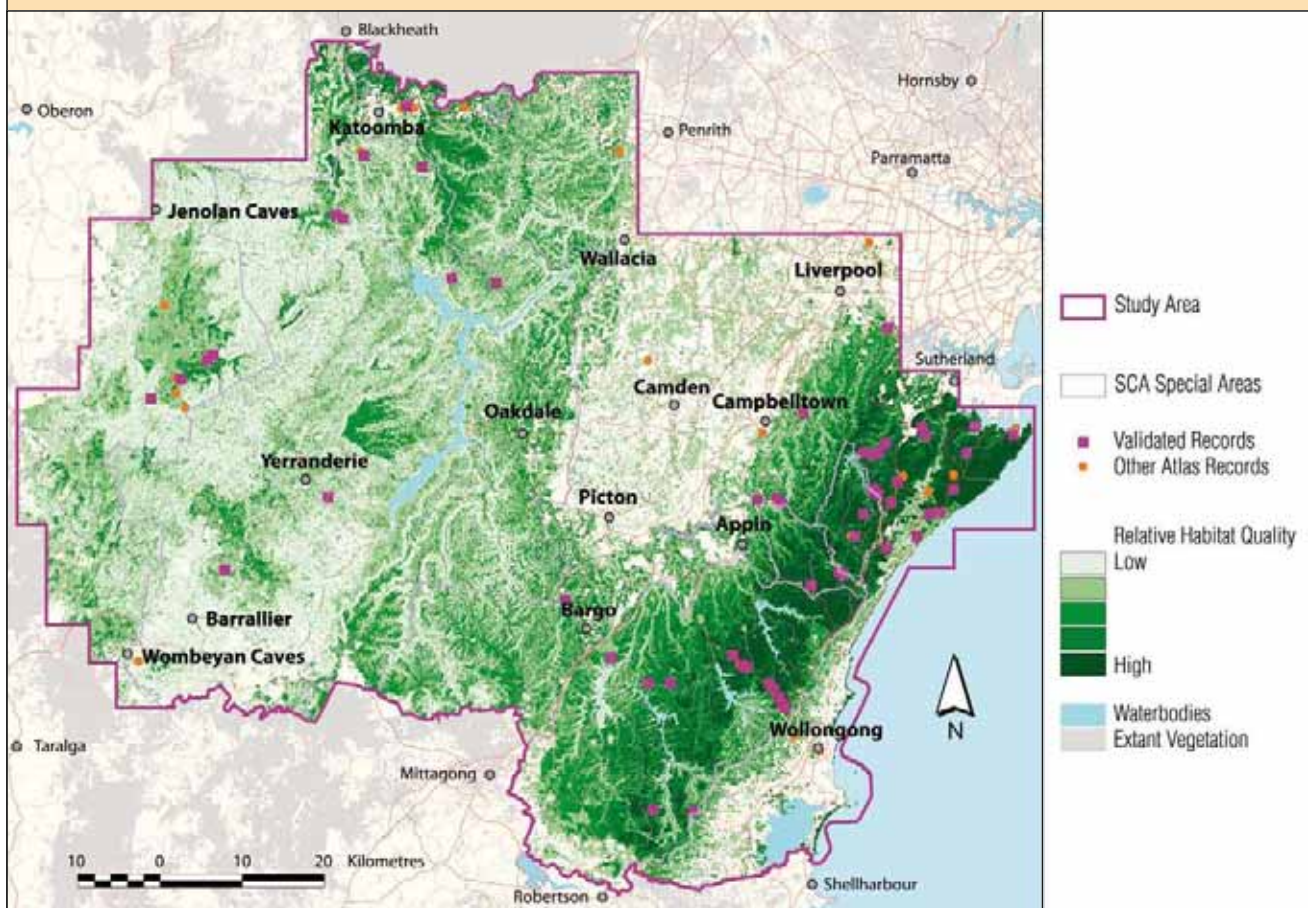
In NSW, it mostly lives near the coast, though also in woodlands with an understorey of heath on the western slopes. In and around Sydney, it mainly lives in Royal and Ku-ring-gai Chase NPs, with smaller numbers in Blue Mountains NP.

In the study area, most records are from Royal NP and Cataract and Cordeaux catchments, where for example, in 2003 22 individuals were removed from a 10-km trench that had been dug for laying a natural gas pipeline. Targeted surveys in Royal and Heathcote NPs and Garrawarra SCA have found this species to be quite common, and most often recorded in areas that have not burnt for over eight years.

During the 2002–05 project, only one individual was located, in the Metropolitan Special Area. However, this single finding does not reflect the species' true abundance as these possums are hard to detect without pitfall trapping, which was not conducted. Pitfall trapping in Dharawal SCA in 2006–07 recorded five individuals and they are probably equally abundant across most of the Woronora Plateau.

How you can help

- > Always keep your cat inside at night and if you live near bushland, consider installing a cat run to stop the cat wandering outside your property and killing pygmy-possums and other wildlife.
- > Avoid collecting firewood from bushland and if you own a property, leave dead wood and trees on the ground. Retain native hollow-bearing trees and dead trees that have hollows.
- > If you live on a property where there is bushland with few tree hollows, you could make a nesting box. Many websites will advise you how to make these and some organisations sell them – type 'pygmy' 'possum' 'nest' 'box' into your search engine or visit www.birdsaustralia.com.au/infosheets/nestbox.html.
- > If you work on a degraded bushcare site where heath-leaved banksia should grow naturally, ask your local council to cultivate these native plants in their nursery, then replant them.



The map predicts habitat in areas with much heath-leaved banksia. The main areas are the low woodlands of the Woronora Plateau, Heathcote and Royal NPs; higher rainfall areas of the Blue Mountains such as Narrowneck Plateau; the Woronora and Metropolitan Special Areas; and Holsworthy Military Area.

5.2 Flame robin (*Petroica phoenicea*)

This medium-sized robin is similar to the scarlet robin (*P. boodang*) but the male can be distinguished by its slender, more upright stance, a small white patch above the bill, dark grey upperparts and flame-red underparts. The species is migratory, breeding in the high country in spring and summer, in open areas of moist eucalypt forests and woodlands up to 1800 metres high, sometimes in recently burnt or logged wet sclerophyll forest. The robin moves to drier lowland habitats for autumn and winter, where it lives in open areas in dry sclerophyll forests and woodlands, grasslands or farmlands. It mostly forages on or near the ground, eating insects, and lives singly or in small flocks, roosting in shrubs or trees with dense foliage.

Status/direction of change: Locally common resident/declining

Significance of study area: Core

Key habitat: Highland forests and coastal lowlands

Legislative listing: Protected – NPW Act



Photo: H. Perkins

Threats

The robin's non-breeding habitat has been severely degraded, primarily due to clearing and cultivation.

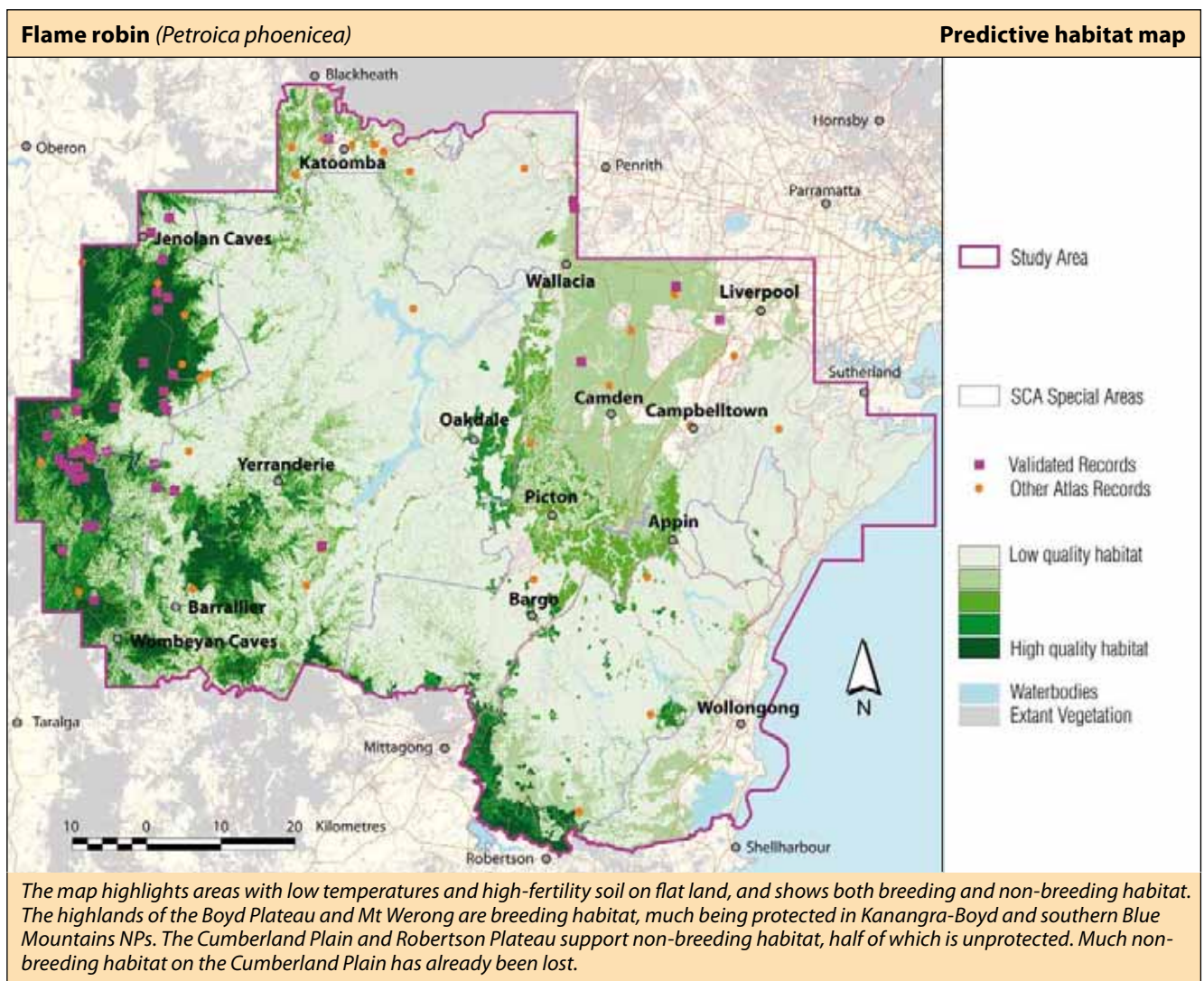
During the breeding season, the robin may be affected by grazing and woodland degradation; nest predation from pied currawongs (*Strepera graculina*); increased temperatures due to climate change; the absence of fire – the robin increases in numbers immediately after wildfire and controlled burns; and prolonged drought with its subsequent decrease in insect activity.

Distribution

The robin is endemic to south-eastern Australia and Tasmania, ranging from the northern NSW tablelands to Victoria, Tasmania and possibly south-eastern South Australia. Nationally, it has declined between 1984 and 2002. Since the 1980s, fewer robins have been seen in non-breeding habitat, particularly in South Australia and the Victorian lowlands.

In NSW, the robin lives in the south-east, from the northern tablelands to the Riverina. In the south-eastern highlands, it is mainly seen in Kosciuszko and Kanangra-Boyd NPs and Winburndale NR. In and around Sydney, it is mainly seen in Capertee Valley, around Katoomba and on the northern Cumberland Plain.

In the study area, the robin is uncommon and has significantly declined, particularly in the south of the Metropolitan Special Area where it was formerly common. On the Cumberland Plain, it is a rare autumn and winter visitor. Most sightings are at high altitudes, including the south-west Blue Mountains and Kanangra-Boyd NPs and the upper Blue Mountains urban area. During the 2002–05 surveys, 20 sightings were made at high altitudes. The few sightings at low altitudes such as in the Burratorang Valley and on the Cumberland Plain perhaps reflect the lower survey effort during winter, although an autumn–winter survey in 2006 on the Cumberland Plain failed to locate this bird.



How you can help

- > Join a bird-watching group such as the Bird Observers Club of Australia (www.birdobservers.org.au), Birds Australia (www.birdsaustralia.org.au) or the Cumberland Bird Observers (www.cboc.org.au) to find out more about this bird.
- > Volunteer to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley. Join a local bushcare group or create your own. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – visit www.landcareonline.com or phone: (02) 9412 1040 – or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).

5.3 Giant burrowing frog (*Heleioporus australiacus*)

This large, flat, globular burrowing frog is dark grey or chocolate brown with scattered large white or yellow spots over the head and sides and a pale belly. It has powerful limbs used to dig burrows in the ground and is rarely seen except after heavy or prolonged rain when it comes to the surface. The tadpole is large and black with a purple surface, and takes up to 11 months to metamorphose.

Status/direction of change: Uncommon resident/stable

Significance of study area: Core

Key habitat: Upland swamps

Legislative listing: Vulnerable – TSC and EPBC Acts



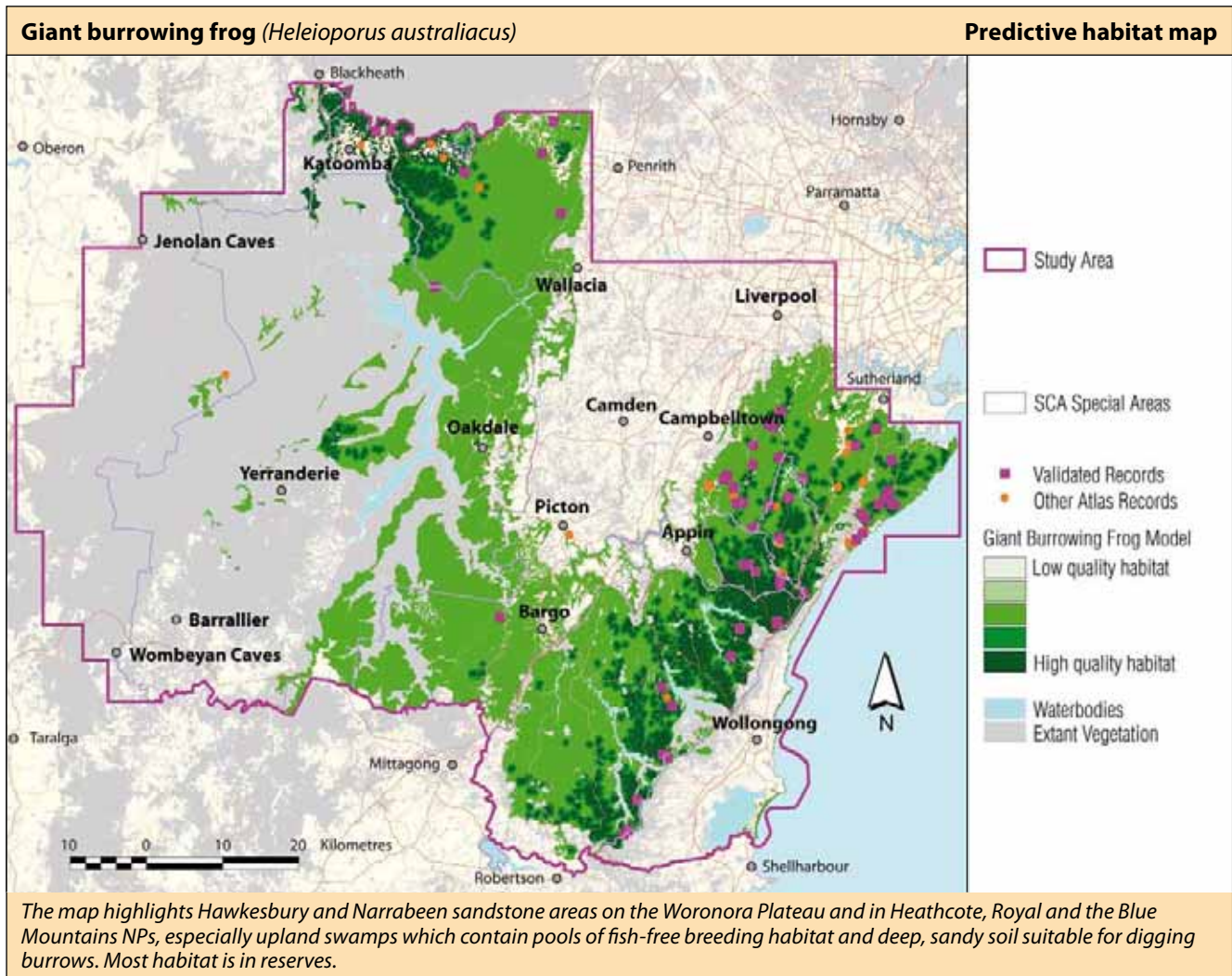
Photo: N. Williams

Threats

Main threats are the loss of habitat due to development of sandstone ridgetops for housing; habitat loss and degradation through forestry operations and agriculture; changes in water quality and flow; habitat disturbance due to road construction and maintenance; frequent fire or wildfire; disease; introduced fish that prey on eggs and tadpoles; introduced predators and climate change. Longwall mining may be a significant threat as this can crack bedrock, draining pools and creeks that are important breeding habitat.

Distribution

The species appears to have two populations, with one restricted to the Sydney Basin as far south as Jervis Bay, and the other between Narooma and eastern Victoria. This distribution may reflect two separate species, though due to limited surveys it is not known whether the two populations are linked.



In the Sydney Basin, tadpoles have been reported as being seen less frequently than in the past. The frog lives in many sandstone reserves including Royal, Ku-ring-gai Chase and Brisbane Water NPs, with fewer records in Blue Mountains and Wollemi NPs.

In the study area, there is a large amount of suitable habitat. There are many records for the Woronora Plateau, including Holsworthy Military Area, Heathcote and Royal NPs; and also for the high-rainfall areas of the Blue Mountains between Warrimoo and Blackheath. Frogs and tadpoles were found at many sites on the Woronora Plateau after the severe 2001 wildfires, indicating that many individuals survived them. The 2002–05 surveys found many new locations for this species, nearly all from the Metropolitan Special Area and Dharawal NP on the Woronora Plateau. A new location was also recorded in Bargo SCA.

The 2002–05 surveys found no evidence of the frog outside sandstone areas. Although many new locations were documented, it was possibly under-recorded as the survey was mostly conducted during drought, when this species is more difficult to detect. Nonetheless, tadpoles are highly recognisable and present for much of the year if breeding has occurred.

How you can help

- > Volunteer to regenerate bush in a national park where the frog lives (see text under 'Distribution' above). Phone DECC's Environment Line on 1300 361 967 or visit www.environment.nsw.gov.au and click on the following links: 'Parks and Wildlife' (top link), 'How you can help' (side link), 'Taking care of national parks', 'Park volunteer programs', then click on the national park of your choice.
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about the frog.
- > Always keep your cat inside at night, especially if you live near bushland where this frog lives.
- > Avoid touching frogs as you can make them very sick. Sterilise boots, equipment and car tyres between bushwalks so you do not transmit frog *chytrid* fungus. For more information, visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Frog+Chytrid+fungus.

5.4 Red-crowned toadlet (*Pseudophryne australis*)

This small, strikingly-coloured, litter-dwelling frog usually lays its eggs in a nest in moist leaf litter, relying on rain to flood the site or wash the eggs into a temporary pond where they can hatch. The frog lives in colonies of up to 30, and will breed at any time during the year to take advantage of unpredictable rainfall.

Status/direction of change: Locally common resident/probably stable

Significance of study area: Core

Key habitat: Upland swamps, sandstone woodland and heath

Legislative listing: Vulnerable – TSC Act



Photo: N. Williams

Threats

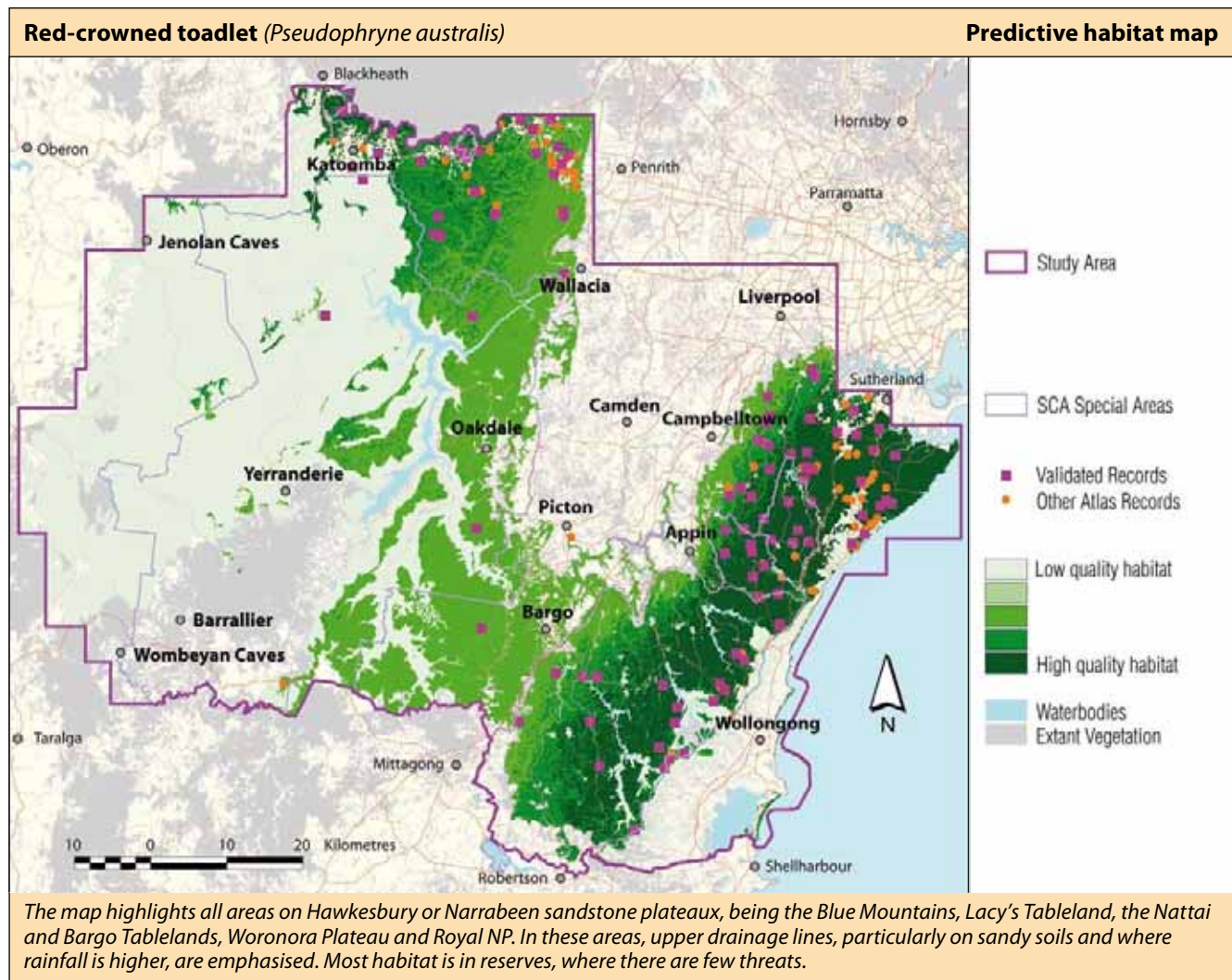
The main threats are habitat loss due to the development of ridgetop land; habitat alteration from frequent and hot fires, road and track works, bush rock removal, water pollution and longwall mining; *chytrid* fungus; and removal of dead wood and trees. Small populations are in danger of becoming locally extinct due to a high level of reproductive failure, a limited ability to disperse and overly frequent fires.

Distribution

The toadlet generally only lives on Hawkesbury and Narrabeen sandstone plateaux in the Sydney Basin. It is mostly seen in the upper Blue Mountains, in northern Sydney around the mouth of the Hawkesbury River and on the Woronora Plateau extending north to Royal NP. This species ranges from Yengo NP in the north to Barren Grounds NR in the south, and lives in Lane Cove NP. It is thought to have declined in the last 20 years, particularly in northern Sydney.

The study area contains some core areas for this species. These are the Woronora Plateau, particularly the Woronora Special Area and Heathcote and Royal NPs, and the Blue Mountains between Glenbrook and Blackheath. Frogs are still easily detected in these areas and many were found during the 2002–05 surveys, despite the drought. Interestingly, the frog was occasionally seen outside its known range and habitat preferences. For example, in the Woodford Range near Glenbrook, many frogs were found in coachwood rainforest and volcanic soil while in Nattai NP, a pair was excavated from a shallow burrow in alluvial soil at the bottom of a deep gully.

The frogs have not been found in the ridgetop environments of Nattai NP or lower rainfall areas of the Blue Mountains NP. These areas may be too steep and dry to sustain the species, or further survey work may be required under more appropriate conditions.



How you can help

- > Volunteer to regenerate bush in a national park where the frog lives such as Royal or Blue Mountains NPs – see 5.3 for details.
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about the frog.
- > Avoid touching frogs as you can make them very sick. See 5.3 for details of how to avoid transmitting *chytrid* fungus.

5.5 Rockwarbler (*Origma solitaria*)

This small, sedentary bird has a rufous rump, grey throat and black tail. It is most often seen in sclerophyll forests and woodlands where there are extensive sandstone outcrops. It builds a distinctive, oval, tapering nest made of root fibres, moss, grass stalks and bark fibres. The nest is usually suspended with spider's web from the rock ceiling inside an overhang or cave.

Status/direction of change: Common resident/ probably stable

Significance of study area: Core

Key habitat: Sandstone escarpments, other sandstone environs

Legislative listing: Protected – NPW Act



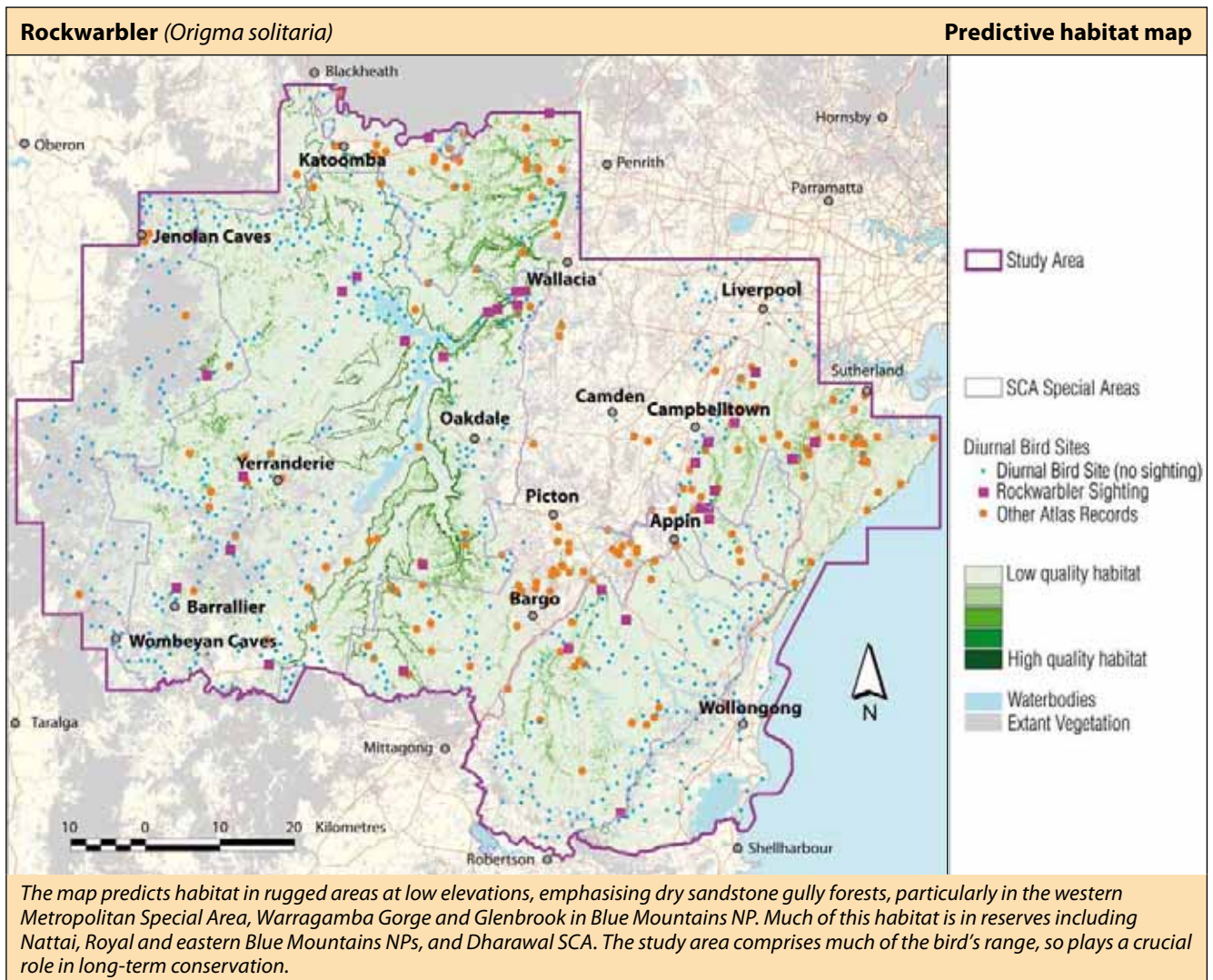
Photo: M. Todd

Threats

Threats include clearing and habitat loss due to urban development. Predation of eggs and nestlings by currawongs (*Strepera* spp.), cats and foxes may be important threats. The impacts of wildfires, disturbance of nests by humans and the long-term effect of climate change are unknown.

Distribution

The bird is endemic to central eastern NSW, and lives in gullies, gorges, rocky outcrops and cliffs. In and around Sydney, it lives in the Hawkesbury, Nepean, Wollondilly and Shoalhaven basins, with a few records from the south-eastern highlands. Many records are from sandstone environments in reserves, including Royal, Blue Mountains and Morton NPs and Munghorn Gap and Manobalai NRs. Consequently, the bird has been previously considered to be secure. However, it has declined across its range between 1984 and 2002.



In the study area, the bird lives throughout the Warragamba, O'Hares Creek and Metropolitan Special areas, as well as the Holsworthy Military Area; Wedderburn, Royal and Heathcote NPs; and the mid-Blue Mountains. It does not live in the grassy woodlands of the Cumberland or Illawarra Coastal plains and is rare in the far west, particularly in the Kanangra area of the Blue Mountains NP, and in the dry woodlands of Burragorang Valley. During the current surveys, the bird was recorded at 41 new locations, with most sightings near Warragamba Dam and southern Scotts Main Range, and in southern Nattai NP.

How you can help

- > Join a bird-watching group to find out more about this bird – see 5.2 for details.
- > Protect any sandstone outcrops and overhangs on your land.
- > When bushwalking and camping, do not light fires in sandstone overhangs as rockwarblers nest and sleep in these areas.
- > If you live near bushland, consider installing a cat run to stop your cat wandering outside your property and killing small birds and other wildlife.

5.6 Rosenberg's goanna (*Varanus rosenbergi*)

This goanna, also known as a heath monitor, is a large, powerful lizard that looks similar to the lace monitor (*V. varius*). It can be distinguished by the fine barring on its lips and tail and the spots on its legs. This goanna lives in sandstone areas, in heath and woodlands where it shelters in burrows, hollow logs and rock crevices.

Status/direction of change: Uncommon resident/locally declining

Significance of study area: Core

Key habitat: Sandstone woodlands, heaths, upland swamps

Legislative listing: Vulnerable – TSC Act



Photo: N. Corkish

Threats

Threats include habitat destruction through development of flat sandstone ridgetops; road mortality; eating 1080 baits laid down to control dogs and foxes; habitat alteration due to longwall mining, and removal of dead wood and trees; and predation by introduced predators, particularly the fox. The effects of longwall mining in upland swamps, and fire frequency and intensity, on this goanna, are not known.

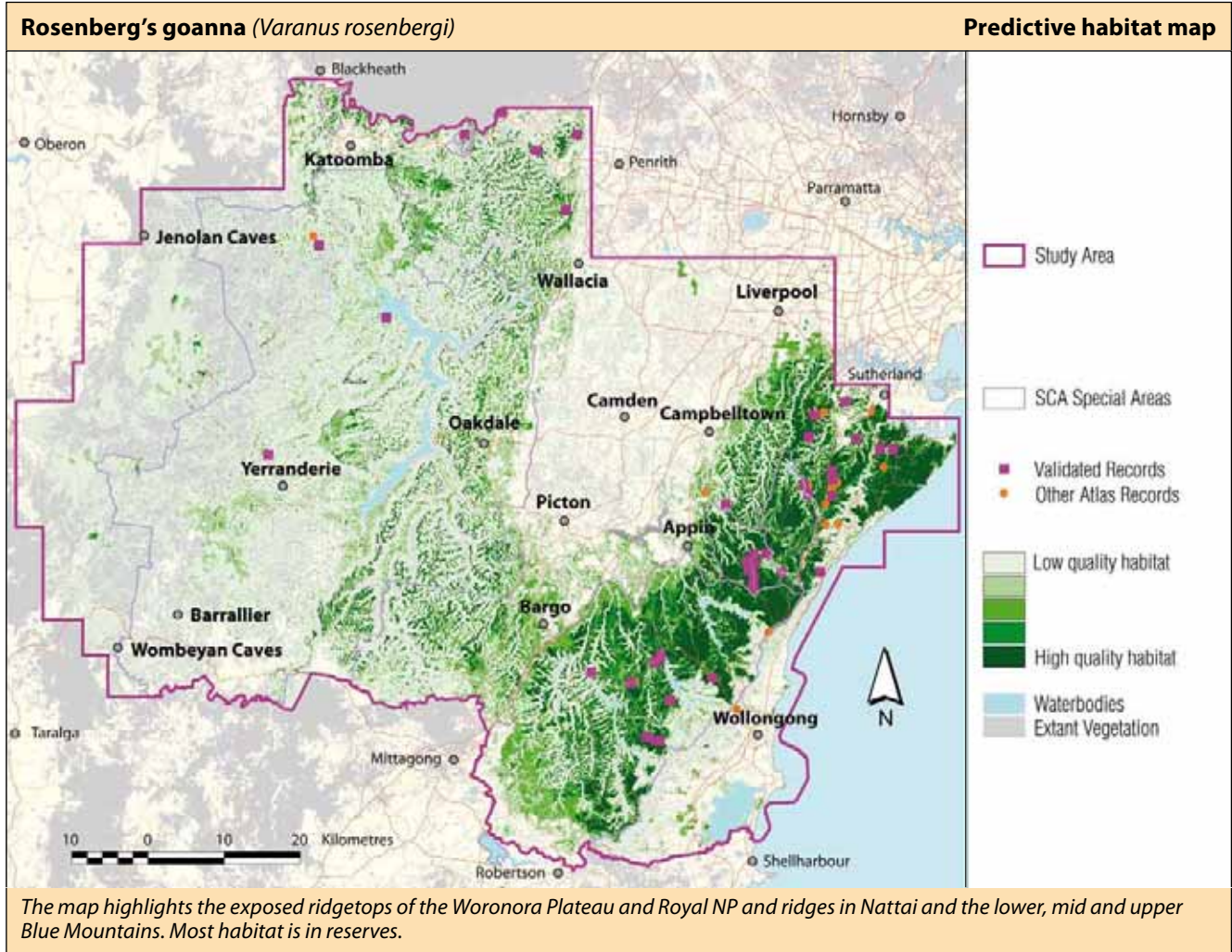
Distribution

The goanna occurs in northern Victoria, South Australia and south-western Western Australia. In NSW, there are records from the south-western slopes as far west as Bathurst and around Goulburn, and in the Canberra/Braidwood area. The goanna occurs patchily in and around Sydney and the south-eastern highlands. There is still much to be learnt about its distribution and habitat preferences.

In central eastern NSW, it was considered restricted to the Hawkesbury and Narrabeen sandstone plateaux, particularly coastal areas such as Ku-ring-gai Chase NP, the Woronora Plateau and Morton NP. However, survey work conducted by DECC over the last few years has confirmed that it also lives in Abercrombie River and Turon NPs. There have probably been population declines around the northern beaches of Sydney and the townships of the Blue Mountains, and in the agricultural areas of the south-western slopes and southern highlands. The goanna was once well known in the lower Blue Mountains and the ridgetops around Faulconbridge and Woodford, Yellowrock and around Glenbrook, including Glenbrook Creek, but has not been seen in those areas recently.

The Woronora Plateau is an important population centre, with goannas regularly seen in Dharawal SCA and around Cordeaux Dam. They are occasionally seen in the Warragamba Special Area.

During the 2002–05 project, 11 new locations were recorded on the Woronora Plateau and in the Warragamba Special Area, including the Coxs River Valley, near Butcher's Creek hut and at the south end of Scotts Main Range. In 2006–07, two goannas were killed by cars on the Princes Hwy between Royal NP and Dharawal SCA.



How you can help

- > Preserve dead and fallen trees and timber on part of your property and on bushcare sites to provide habitat for the goanna.
- > Do not let your dog or cat go into local bushland as they may attack and kill goannas.
- > Report any sightings of this goanna to DECC by completing a sightings form – visit www.nationalparks.nsw.gov.au/images/scientific_licence_datasheet.xls and www.nationalparks.nsw.gov.au/PDFs/WildlifeAtlas_Field_Data_Book.pdf – and emailing it to gis@environment.nsw.gov.au. The goanna can be distinguished from the common lace monitor by the narrow banding it has all the way down its tail and spots rather than stripes on its forearms. Take a photo if you can.
- > Slow down for any goannas crossing roads, as they are often hit by cars.

5.7 Sooty owl (*Tyto tenebricosa*)

This medium to large owl lives in tall, wet sclerophyll forests and rainforests, and has a distinctive 'falling bomb' call. It roosts and breeds in hollows in old trees, usually within 100 metres of streams, though it will also occasionally roost in caves. Pairs maintain permanent territories of between 200 and 800 hectares, depending on the availability of prey. The owl mainly eats small mammals.

Status/direction of change: Uncommon resident/ probably stable

Significance of study area: Core

Key habitat: Rainforests and wet sclerophyll forests

Legislative listing: Vulnerable – TSC Act. NSW recovery plan (DEC various b)



Photo: C. Barnes

Threats

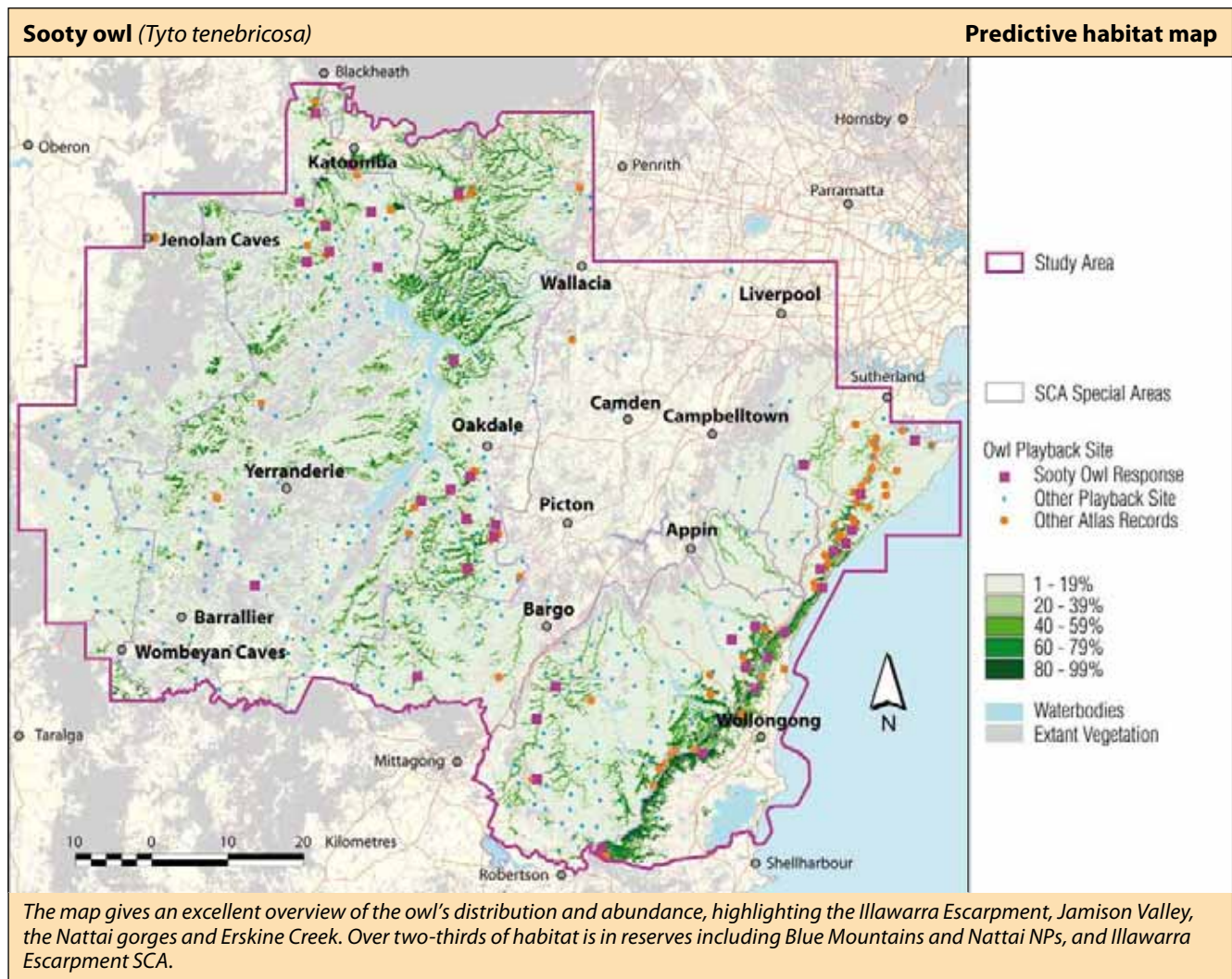
The main threats are habitat clearance for agriculture, and habitat fragmentation or degradation caused by logging, burning, dieback and urbanisation. Any practice that removes hollow-bearing trees from wet forest is problematic. The species occupies a narrow range of habitats, which makes it particularly vulnerable to climate change.

Distribution

The owl lives near the coast and coastal ranges from Queensland to central Victoria. In central eastern NSW it mainly lives on the Illawarra Escarpment and the Watagan Ranges between the Central Coast and Newcastle, with a few records in the east of the south-eastern highlands.

In the study area, the owl is regularly seen in moist gullies along and above the Illawarra Escarpment, and between Royal and Macquarie Pass NPs. It also occurs in some leafy settlements north of Wollongong, such as Stanwell Park and Austinmer. There are also records from the Kedumba Valley, Glenbrook and Jenolan Caves.

The 2002–05 project found that the owl was common in the moist forests of the Illawarra, Nattai NP and the Coxs River Valley. There were also sightings at more remote locations, such as in Bindook Highlands and at Colong Caves. Overall, this project acquired 34 additional records.



How you can help

- > Preserve native hollow-bearing trees and dead trees with hollows on your land and on bushcare sites.
- > Volunteer to regenerate bush in a national park where the owl lives, such as Royal NP – see 5.3 for details.

5.8 Southern emu-wren (*Stipiturus malachurus*)

This wren can be distinguished from similar fairy wrens (*Malurus spp.*) by its slightly smaller size, filamentous tail which is twice as long as its body, and different plumage. Males have a lavender-blue throat and eyebrows. The bird lives mainly in low, dense vegetation including coastal and high-altitude heathlands, swamps, coastal dunes, sandplains, and low mallee scrublands and woodlands. It is a feeble flier but moves nimbly through dense low cover, foraging on or near the ground for insects, occasionally also taking seeds and vegetation.

Status/direction of change: Locally common resident/probably stable

Significance of study area: Core

Key habitat: Upland swamps

Legislative listing: Protected – NPW Act

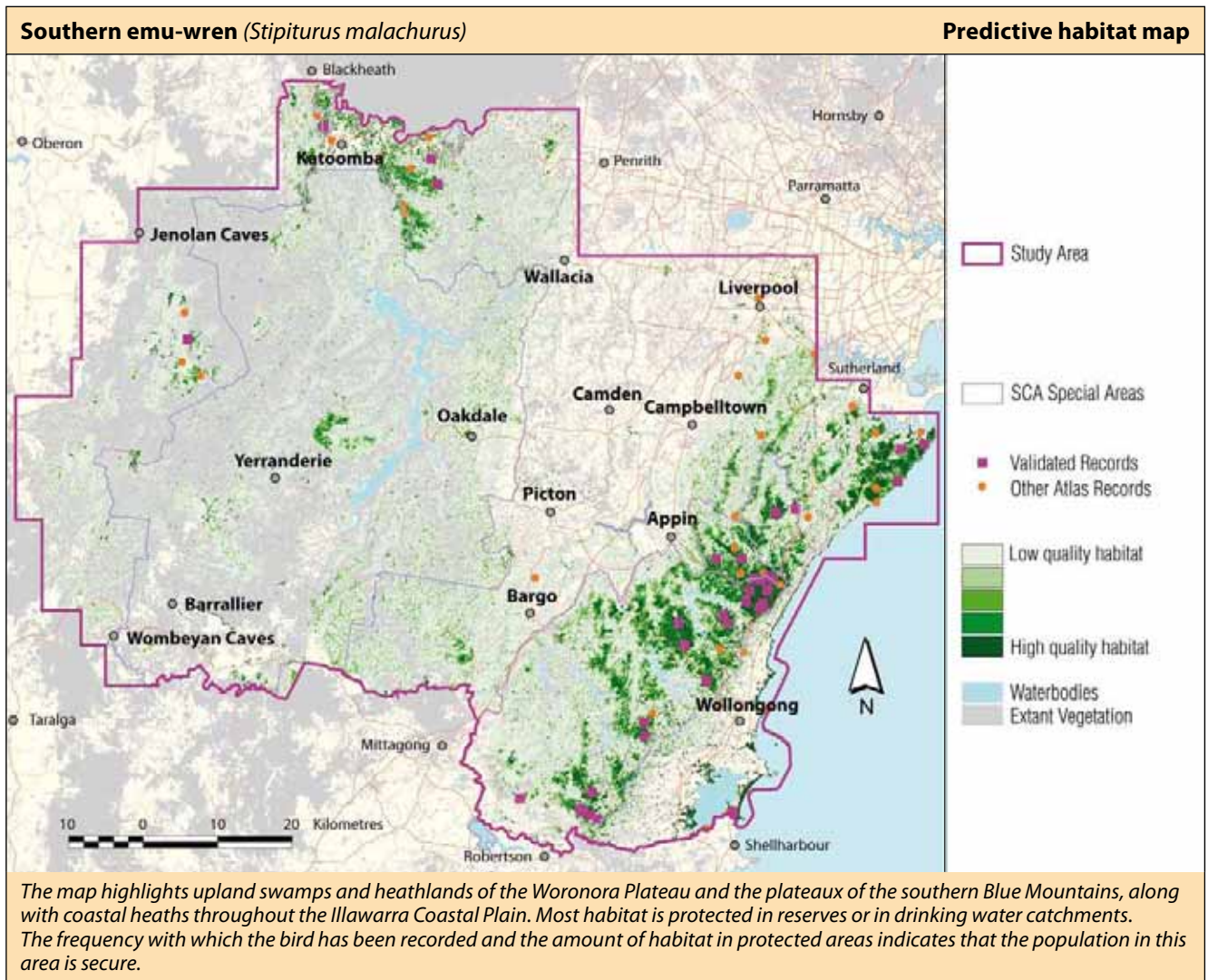


Photo: M. Todd

Threats

Main threats are clearing and draining of swamplands for agriculture and human settlement, and clearing of heathlands for the establishment of pine plantations; grazing; alteration of water quality and flow; and inappropriate fire regimes. Fragmentation and degradation of habitat have meant the bird is rapidly declining on the Fleurieu and Eyre peninsulas in South Australia. The small size and isolation of some populations leave them vulnerable to local extinction after severe fires or floods. However, in NSW widespread and intense wildfires do not seem to threaten the bird, with populations on the Woronora Plateau showing remarkable survival after the 2001 fires. Likewise, at Barren Grounds NR, there was an increase in numbers in the years immediately after fires.

Other potential threats include introduced predators such as foxes, cats and black rats (*Rattus rattus*); and draining of upland swamps from land subsidence due to longwall mining.



Distribution

The bird is endemic to coastal south-east and south-west Australia and Tasmania. In NSW, the bird lives mainly near the coast, though it can also be found on the northern and central tablelands. In the south-eastern highlands, the bird lives in the Kanangra Walls area. It is more widespread in and around Sydney, living within 15 km of the coast, though it also occurs in suitable habitat around the Blue Mountains urban area, and less frequently in Yengo NP. Important reserves include Morton, Jervis Bay and Royal NPs, Barren Grounds and Dharawal NRs and Munmorah SCA.

In the study area, the bird lives mainly in upland swamps and coastal heaths, with most sightings from the Woronora Plateau and Royal NP. Smaller populations live in swamps around the Blue Mountains urban area and in Kanangra-Boyd NP. In the Illawarra, the bird lives in low sedgeland borders coastal wetlands around Lake Illawarra. At Botany Bay NP and Towra Point NR, just north of the study area, it also occurs in heath, sedgeland and saltmarsh fringing mangroves.

The bird was commonly detected during the 2002–05 surveys, mainly on the Woronora Plateau on Maddens Plain, in Stockyard Swamp and at Molly Morgan Crossing in the Metropolitan Special Area. Surveys in 2006–07 in Dharawal SCA and NR have found this species to be relatively common in the upland swamps in that area.

How you can help

- > Join a birdwatching group to find out more about this bird – see 5.2 for details.
- > Join a local bushcare group or create your own if you live near degraded bushland – see 5.2 for details.

5.9 Square-tailed kite (*Lophoictinia isura*)

This medium-sized, long-winged raptor lives in open eucalypt forest and woodland where it hunts at canopy level, eating birds – including eggs and nestlings – and insects. Breeding pairs have a large home range of up to 100 sq km during the breeding season.

Status/direction of change: Rare visitor/unknown

Significance of study area: Non-core

Key habitat: Grassy box woodlands and other

Legislative listing: Vulnerable – TSC Act



Photo: T. Tarrant

Threats

Loss of habitat through land clearance is a major threat, though the bird may also have benefited from partial clearance. Other threats are illegal shooting, egg collection, disturbance of nest trees and inappropriate fire regimes.

Distribution

The kite is endemic to the Australian mainland, where it is most often recorded within 250 km of the coast. It migrates from southern to northern Australia after breeding, though its dispersal route is unknown.

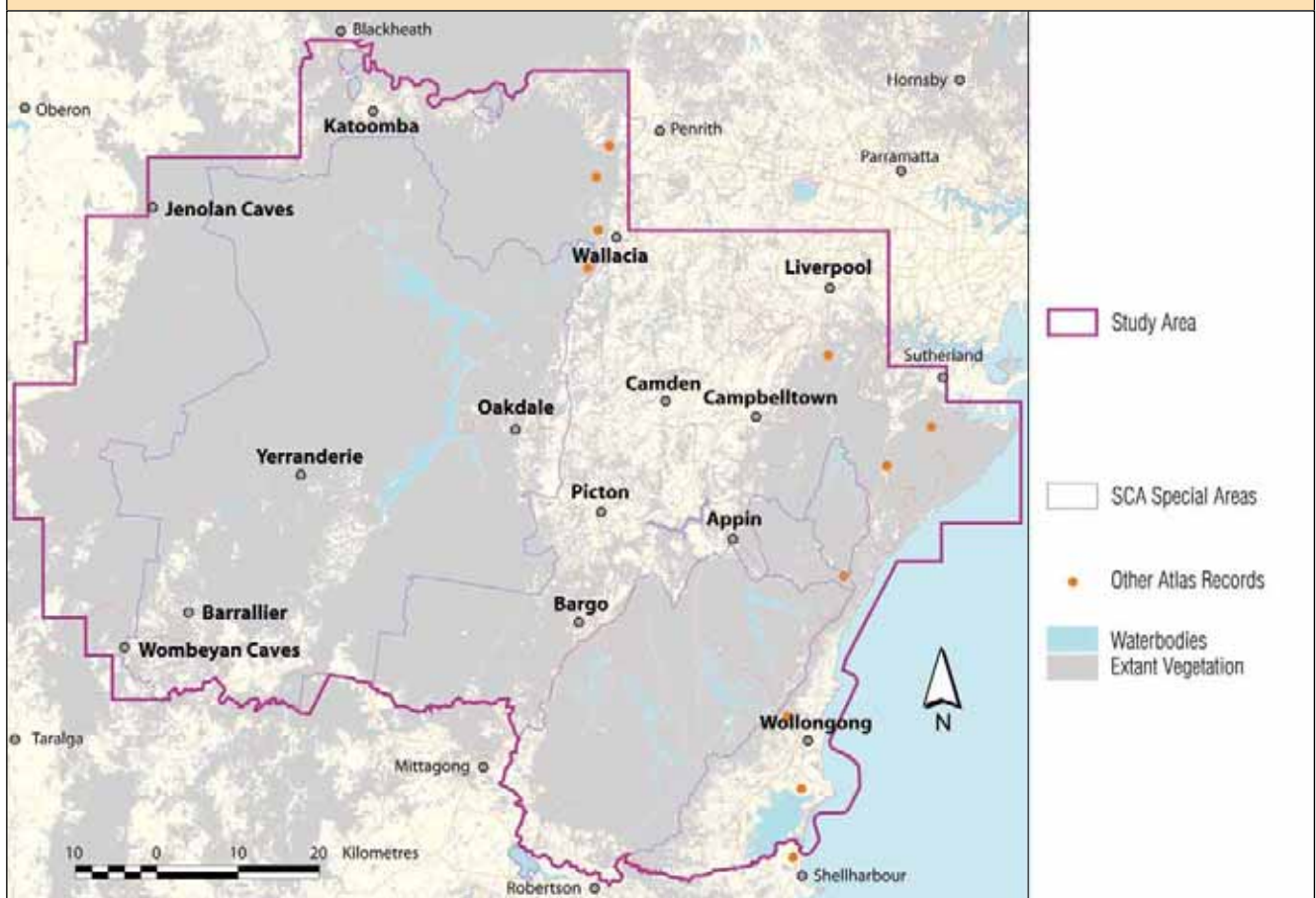
The bird is found throughout NSW, though there are only scattered records in the south-eastern highlands. Important locations in and around Sydney are the Shoalhaven/Jervis Bay area and dry woodlands on fertile soils such as Capertee Valley and along Goulburn River.

In the study area, the bird was previously thought to be a rare summer migrant. Before 2006, there were only a few records, from Maddens Plains, Waterfall and Norton's Basin. In 2006, the bird was seen on the Cumberland Plain, at Castlereagh, North Richmond and Holsworthy Military Area. All these sightings were in autumn and winter, proving that some birds are now spending winter in the region.

The kites have previously been reported to be increasing south of the study area, around Nowra, though it is difficult to separate a raise in the awareness of this species from an increase in numbers. Nonetheless, if there has been an increase, global warming may be the reason.

How you can help

- > Join a bird-watching group to learn more about this bird – see 5.2 for details.
- > Volunteer to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley – see 5.2 for details.
- > Report to your nearest national parks office anybody you see collecting eggs from or vandalising nests of birds of prey.



The map shows the dry woodlands of the Cumberland Plain as good habitat. As the bird can be difficult to identify, other birds may live in the area that have not yet been detected, particularly in limited access areas, such as Holsworthy Military Area and the Sydney water catchments.

5.10 Tawny-crowned honeyeater (*Gliciphila melanops*)

This small to medium-sized slender honeyeater has a long black bill, and a creamy-buff crown separated by a white eyebrow from a black mask. The bird lives in heathland, in coastal regions or on sandplains in semi-arid regions, and in mallee, eucalypt woodlands and street trees. The bird eats nectar, insects and spiders, and it forages in flowers, amongst the foliage of low shrubs, and occasionally on the ground.

Status/direction of change: Uncommon resident/probably stable

Significance of study area: Core

Key habitat: Upland swamps, sandstone woodland and heath

Legislative listing: Protected – NPW Act



Photo: N. Williams

Threats

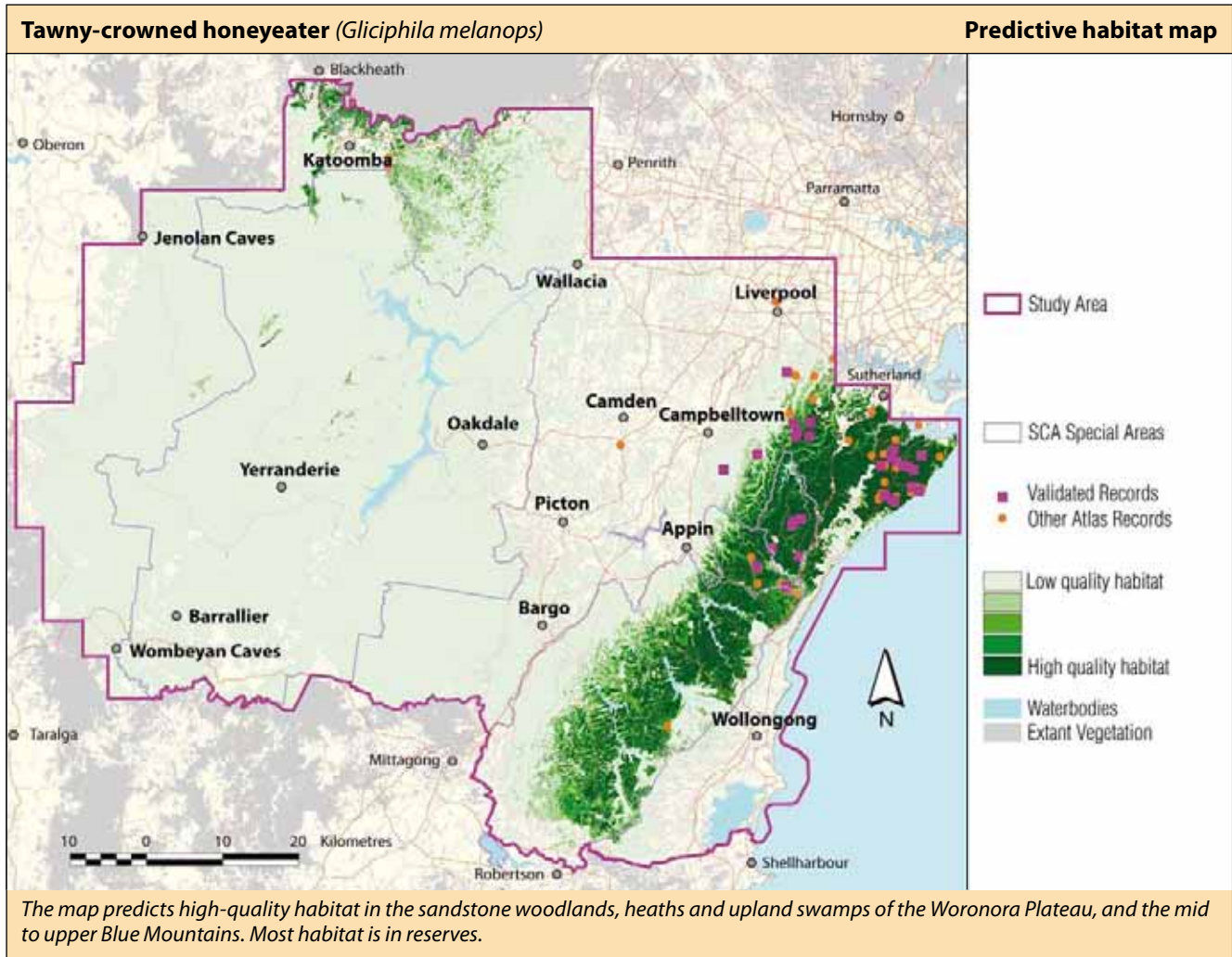
The range and abundance of the honeyeater has declined, following the clearing of native vegetation. Inappropriate fire regimes, particularly under drought conditions, may also have decreased local populations. However, the bird has reappeared in burnt areas within a year of fire, reaching peak numbers after a few years. It may also have benefited from European burning regimes in some coastal regions of Tasmania where original eucalypt forest has been replaced with dense scrub.

Potential threats include predation by introduced pests and bird nest predators, as nests are located near the ground. Habitat alteration from land subsidence due to longwall mining is another threat as the core of the bird's range is on the Woronora Plateau, half of which will be undermined in the future.

Distribution

The bird is endemic to southern Australia. In NSW it mostly lives near the coast. In and around Sydney, most records are from coastal sandstone reserves such as Munmorah and Dharawal SCAs, Brisbane Water and Royal NPs and around the shores of Jervis Bay, though there are occasional sightings in the Blue Mountains and Morton NPs. There has been a decrease in records between 1984 and 2002.

In the study area, the bird lives on the northern Woronora Plateau in Royal NP, Dharawal SCA and Holsworthy Military Area. A post-fire study of the fauna of the Woronora Plateau has shown that numbers increased significantly following the 2001 fires, but decreased within two years. During the current surveys, only seven new locations were found, all from upland swamps and woodlands on the Woronora Plateau and in Dharawal SCA.



How you can help

- > Join a bird-watching group to learn more about this bird – see 5.2 for details.
- > Volunteer to do bush regeneration in a national park where the bird lives such as Royal NP – see 5.3 for details.

6. Animals of lower conservation priority

The animals in this chapter are secure in the region with much of their habitat in reserves and few threats facing them, or locally extinct but may recolonise or be reintroduced into the region, or rarely visit but may be increasing. This chapter also includes a brief summary of locally extinct animals (where no action can save them) and those that have very little habitat in the region (so they rarely visit).

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), NP = national park, NPW Act = *National Parks and Wildlife Act 1974*, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest, and TSC Act = *Threatened Species Conservation Act 1995*.

6.1 Bibron's toadlet (*Pseudophryne bibronii*)

This small, ground-dwelling frog has a marbled underbelly and yellow to dark orange patches on the upper arms and rump. It lives in fallen timber, leaf litter, rocks and clumped vegetation. Males call from late summer through to winter from nests they build near temporary creeks, swamps and ditches. Eggs hatch after rain has flooded nest sites.

Status/direction of change: Common resident/
locally declining

Significance of study area: Core

Key habitat: Woodland and forest on higher-fertility soil

Legislative listing: Protected – NPW Act



Photo: M. Schulz

Threats

This frog is poorly understood. Potential threats include destruction of habitat from grazing, frequent burning, clearing and urbanisation; alterations to water quality or flow – the temporary water bodies or 'chain of ponds' this species lives in are often destroyed or replaced by dams; and drought, due to the frog's reproductive strategy which requires rain for successful egg survival. Unlike other toadlets, this species does not appear to be affected by *chytrid* fungus. A possible explanation is that it does not breed in streams and it is unlikely to travel great distances, making spread of the disease less likely.

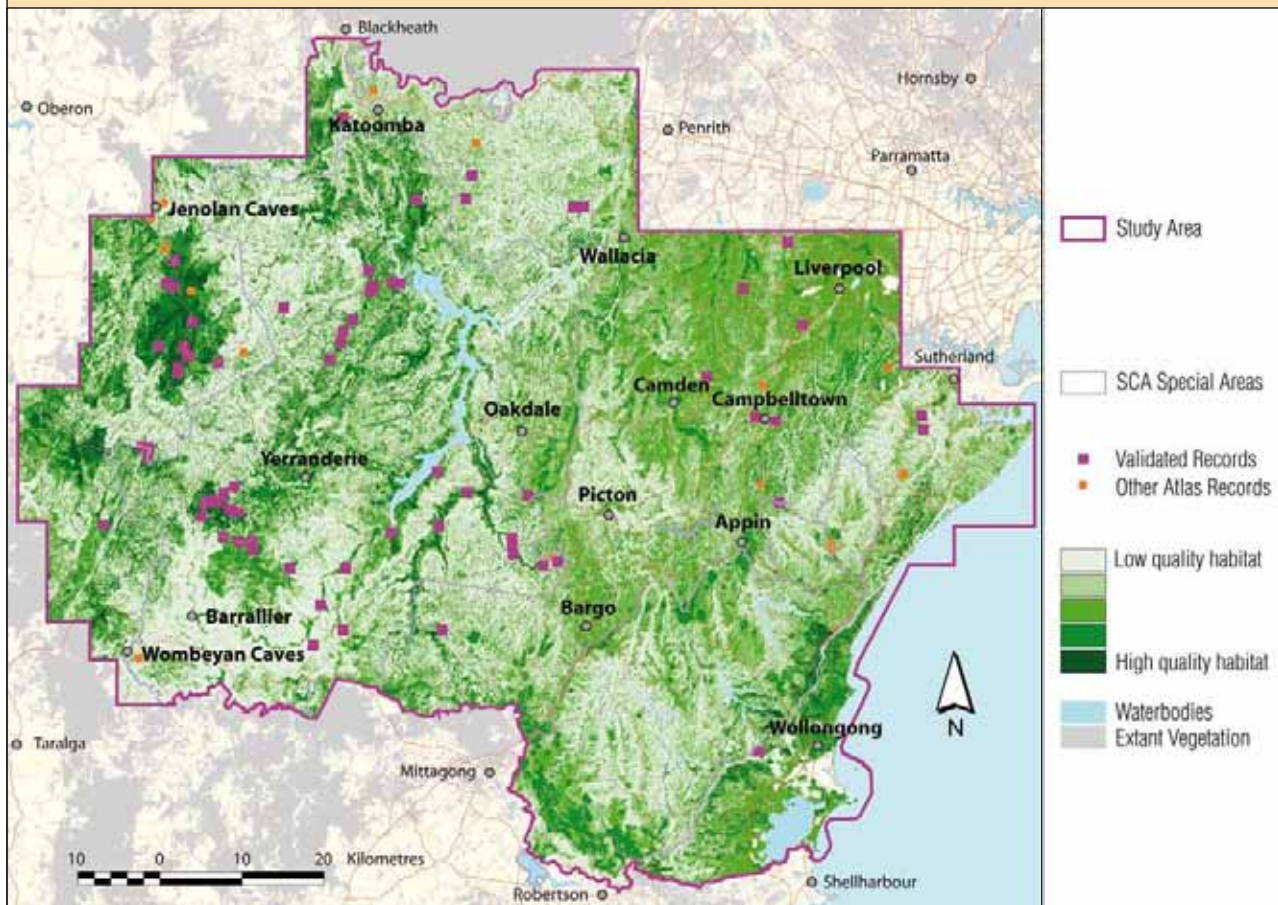
Distribution

This species is widespread throughout south-eastern Australia, and in NSW was once widespread in the Nandewar, north coast and south-east regions. It is declining in western Sydney, on the northern tablelands, and in the ACT where it is listed as a threatened species. In and around Sydney, the frog lives on the coastal plains and valley floors of the Illawarra, Sydney and Hunter; and in the highlands, particularly where there is rich soil such as in the Bindook Highlands, at Mt Coricudgy and in Tallaganda SF. The frog lives more on private land than in reserves and other protected areas, as it prefers higher-fertility soil.

The 2002–05 project found the frog on the coastal plains, in the high elevation areas of the Warragamba Special Area and in the Burratorang Valley. In the study area, the frog seems secure in the highlands, such as on the Boyd Plateau but has declined in the coastal lowlands including western Sydney and on the Illawarra Coastal Plain, possibly due to severe alterations in water quality and flow.

How you can help

- > Leave fallen timber and leaf litter in your garden or on bushland you manage (it makes good mulch).
- > Volunteer to regenerate the grassy woodlands of the Cumberland Plain or Wollondilly Valley. Join a local bushcare group or create your own. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – visit www.landcareonline.com or phone: (02) 9412 1040 – or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).
- > Join the Frog and Tadpole Study Group (www.fats.org.au) to find out more about this frog.



The map highlights the lowlands of the Illawarra Coastal Plain, Cumberland Plain and the Burrigorang, Nattai, Kedumba, Megalong and Cox's valleys; the highlands of the Boyd Plateau, Mt Werong and Bindook Highlands; and small patches of shale and fertile soil. About half this habitat is in reserves, though the Cumberland and Illawarra Coastal plains are now heavily cleared and much remaining bushland has been harvested for firewood and regularly burnt, resulting in a lack of fallen timber, mulch and litter.

6.2 Eastern bentwing-bat (*Miniopterus oceanensis*)

As its name suggests, the eastern bentwing-bat has a narrow wingtip that is folded back when the bat is at rest. This bat's call is often inseparable from those of other bats. It lives in various habitats where it usually roosts in caves, though it also uses old mines, bridges and road culverts. Females fly to maternity roosts in limestone caves in November and early December and return to other roosts in early March. Though individuals often use numerous roosts, they congregate in a few caves to breed and hibernate. This bat is a fast flyer and can travel up to 65 km in a night. It may migrate to coastal areas in winter.

Status/direction of change: Common resident/probably stable

Significance of study area: Core

Key habitat: Many

Legislative listing: Vulnerable – TSC Act

Threats

Damage and disturbance to roosting sites are the greatest threats. As few nursery caves are used, significant declines can occur if these sites are damaged. Disturbance of hibernating colonies can lead to starvation due to loss of energy reserves. Other threats are disturbance of smaller roosts by recreational caving and tourism; habitat alteration through agriculture and urban development; predation by feral cats and foxes; and exposure to agricultural pesticides.



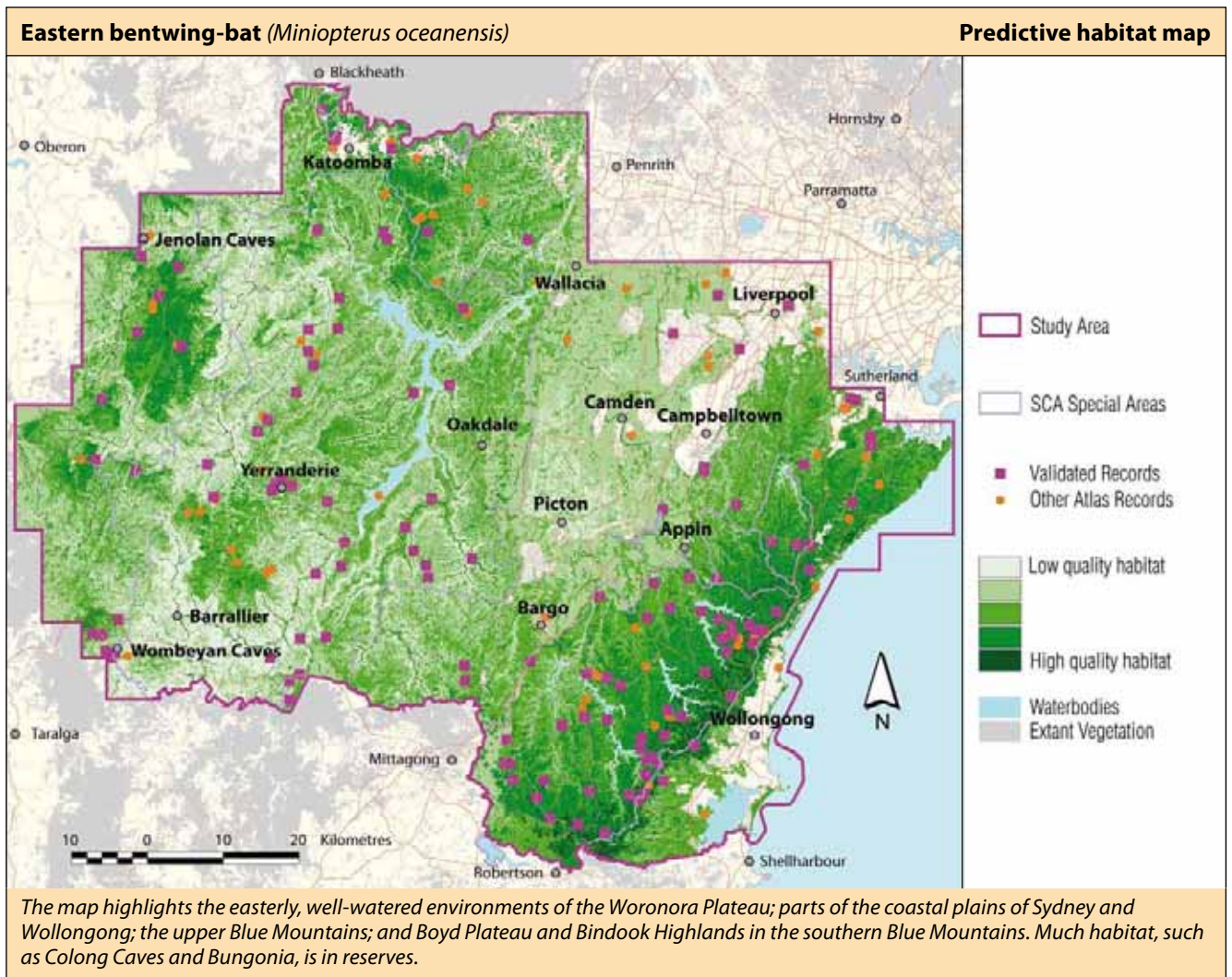
Photo: N. Williams

Distribution

This bat has a range extending from central Victoria to Cape York Peninsula, Queensland. It is widespread in and around Sydney, living in the Lower Hunter Valley and southern Blue Mountains, and on the Central Coast, Cumberland Plain and Woronora Plateau. Many records are from reserves, including Royal, Blue Mountains and Wollemi NPs.

This species has been recorded in most environments in the study area including in high-rainfall areas, along creeklines in semi-urban areas, above farm dams in cleared country, in tall grassy woodlands and dry forests, in sandstone woodland and in rainforest gullies. During the 2002–05 survey, this bat was regularly captured or recorded by ultrasonic call, with over 40 new locations discovered, mostly from the Warragamba Special Area and the southern Blue Mountains. In 2007, roost sites for the bat were discovered in disused rail tunnels in the Helensburgh–Otford area.

Colong Caves in Kanangra-Boyd NP were investigated for their suitability as maternity sites. Many bats were roosting in the caves, and although they were not being used as maternity sites, they could have been so in the past. There is a maternity roost in Bungonia. Another important communal roost is at Yerranderie in disused mine shafts.



How you can help

- > When caving or potholing, ensure you and others in your group do not disturb sites where bats may be roosting.
- > When bushwalking and camping, do not make fires in caves or overhangs where bats may be roosting.
- > Report any roosts of cave bats to your local national parks office or complete a sightings form – visit www.nationalparks.nsw.gov.au/images/scientific_licence_datasheet.xls or www.nationalparks.nsw.gov.au/PDFs/WildlifeAtlas_Field_Data_Book.pdf – and email it to gis@environment.nsw.gov.au.
- > If you live on a property where there are bats in caves, prevent weeds growing over the entrance of caves and overhangs.
- > Join the Australasian Bat Society (<http://ausbats.org.au>) to find out more about this bat.

6.3 Eastern grey kangaroo (*Macropus giganteus*)

This animal lives in small family groups amongst larger mobs, and primarily eats grasses and forbs. Habitats include sclerophyll forest, savannah woodlands, mallee and cleared pasture. Kangaroos usually rest beneath trees or shrubs during the day, grazing in open country in the late afternoon to early morning. In areas of variable rainfall, their populations can vary dramatically, depending on the availability of food and water.

Status/direction of change: Locally common resident/stable

Significance of study area: Core

Key habitat: Grassy box woodlands and clearings

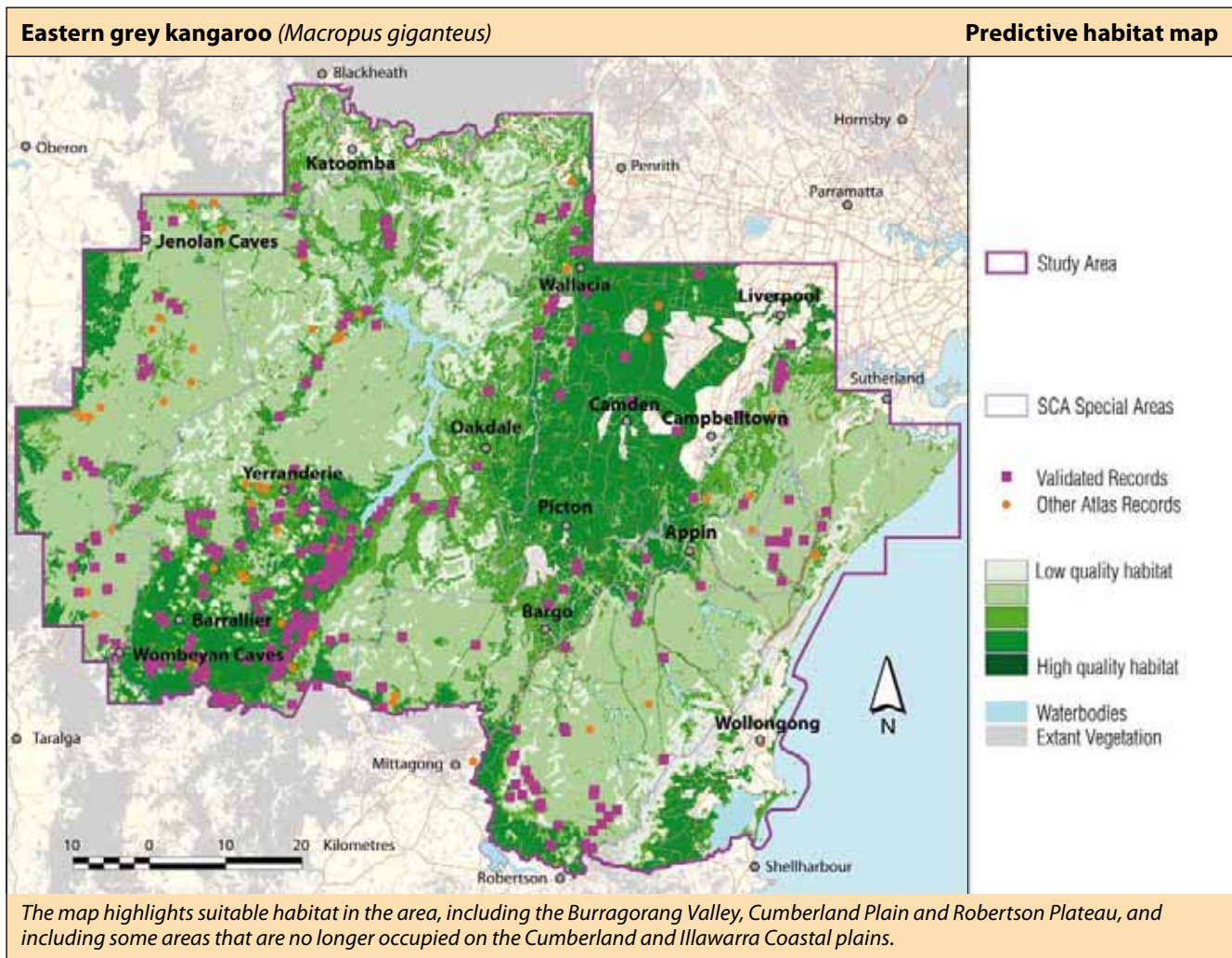
Legislative listing: Protected – NPW Act



Photo: D. Andrews

Cultural significance

Kangaroos are important to some indigenous communities in the Blue Mountains, where some members believe they are declining. They used to be an important food source, especially for people around Camden and the Burragorang Valley, and the loss of traditional hunting grounds to non-indigenous agriculture was a major disruption. Kangaroos were important for their skins (used as cloaks and waterbags), sinew (used for binding), bones (used for barbs and spear tips) and teeth (for decoration). Many rock carvings around Sydney are of kangaroos and their tracks. Local names include: Gundungurra – patagorong or patagarang; burru; Tharawal – burral, booroo; Darug – badagarang.



Threats

Before European settlement, kangaroos were limited by a lack of water, hunting and predation by the dingo, which are mostly no longer threats. Habitat changes over the last 200 years have led to an increase in kangaroo numbers, particularly in arid NSW regions, and many animals have been killed by farmers. Kangaroo culling is now strictly managed to ensure that it is ecologically sustainable.

Distribution

The eastern grey kangaroo is widespread across Australia. In some parts of its range it has declined; for example, it is listed as vulnerable in Tasmania and has suffered habitat loss due to urban development in Sydney.

The kangaroo is found regularly throughout the region, although it is rare in rugged sandstone country such as in Wollemi, Kur-ring-gai Chase and Nattai NPs. It is common in many reserves, including Kosciuszko, Kanangra-Boyd and Turon NPs, and Winburndale and Wollondilly River NRs.

In the study area, the kangaroo is most common in grassy environments on higher-fertility soils. The Burratorang and Wollondilly valleys, the Boyd Plateau, upper Abercrombie River, Scotts Main Range, Euroka Clearing in Blue Mountains NP and the southern Metropolitan Special Area all support high densities. Over 200 new locations for the kangaroo were obtained during the current surveys. Surveys of the Cumberland Plain in 2006 found kangaroos to be surprisingly common throughout many parts of western Sydney, especially near larger tracts of bushland.

Overgrazing by eastern grey kangaroos in the Burratorang Valley may be affecting the understorey and ground layer of the grassy box woodlands, and the threatened species that live in them. However, this area has always contained excellent habitat for this species and can support many kangaroos.

How you can help

- > Join a local bushcare group or create your own – see 6.1 for details.
- > Do not let your dog chase kangaroos as this can result in stress and injury or separate joeys from their mothers.

6.4 Eastern snake-necked turtle (*Chelodina longicollis*)

This turtle, also known as the long-necked tortoise, is medium-sized, having a shell measuring up to 25 cm long and an elongated neck. It prefers slow moving waterways such as swamps, billabongs, and weedy rivers and streams. In these areas, it eats planktonic crustaceans, prawns, small fish and fish carrion, and aquatic insects. It is very long-lived, only reaching sexual maturity after ten years. It has lived in captivity for over 35 years, and may even live for over 100 years.

Status/direction of change: Common resident/locally declining

Significance of study area: Core

Key habitat: Rivers and riparian environments, wetlands

Legislative listing: Protected – NPW Act



Cultural significance

The turtle is important to the Wodi Wodi of the coastal Illawarra, who harvested the eggs for food, with community members recalling collecting eggs while the turtles were laying them during thunderstorms. Skeletal remains have been found in middens throughout Sydney. Local names include: Tharawal – galangarra, barranduna.

Threats

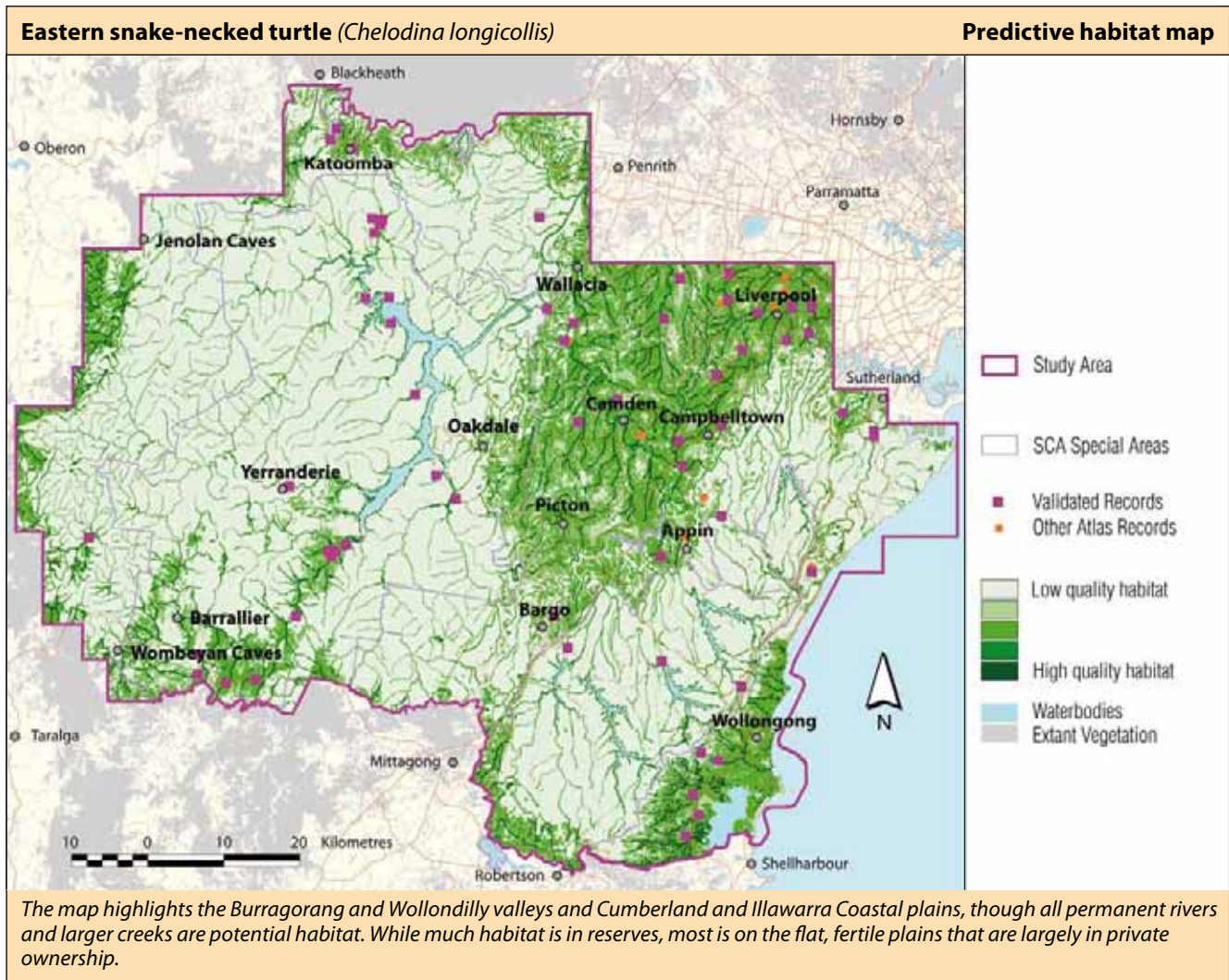
Threats include predation by introduced pests such as foxes, cats and pigs; road mortality, as the turtle is slow moving and frequently moves overland between waterbodies; competition for food and resources from introduced turtles, especially around Sydney; alterations to water quality and flow; water pollution, especially blue-green algae blooms; and being drowned in nets used in NSW inland waterways to fish for eel, carp and other freshwater species.

These turtles adapt to land clearance, grazing and environmental modification, and will often remain common in farmland if there are suitable water sources.

Distribution

The turtle lives near the coast and inland drainages of eastern Australia south of Townsville. In and around Sydney, it is most abundant on the coastal plains and western slopes, and in the valleys that divide the sandstone range. It may be less common than it once was, especially in south-western Sydney and on the Illawarra Coastal Plain where ageing populations may not be breeding. Researchers have found evidence of an emaciated population on the Hawkesbury–Nepean River, noting that no young had survived for many years, probably due to low water quality.

In the 2002–05 project, eastern snake-necked turtles were observed less frequently than expected. They are still fairly common in the Wollondilly, Kedumba and Abercrombie rivers of the southern Blue Mountains. The Illawarra Coastal and Cumberland plains were probably once core habitat, with their significant waterways, wetlands and ‘chain of ponds’. On the Illawarra Coastal Plain, the turtle still lives in less urbanised areas, particularly in West Dapto and in the Calderwood Valley. It is still also found in some waterways leading into Lake Illawarra.



How you can help

- > If you are a landowner with a stream, swamp or other waterbody on your property, protect its water quality.
- > Join or start a Streamwatch or Rivercare group to care for your local stream or creek – visit Streamwatch on www.streamwatch.org.au, or Rivercare – visit www.landcareonline.com or phone: (02) 9412 1040. Alternatively, contact your local council.
- > Watch out for turtles on roads and report any sightings of the red-eared slider, an introduced pest turtle, to your local council or DECC – for more information on this potential pest, visit www.nrw.qld.gov.au/pests/pest_animals/pdf/slider_turtle_warn.pdf.

6.5 Emu (*Dromaius novaehollandiae*)

Australia's largest bird is up to 190 cm tall and weighs up to 50 kg. It is flightless and usually seen alone, in pairs or in small groups (often a male and its offspring). The female has a loud drumming call and is slightly larger than the male, though both are similar in appearance.

Status/direction of change: Locally common resident/increasing

Significance of study area: Core

Key habitat: Grassy box woodlands, clearings

Legislative listing: Protected – NPW Act



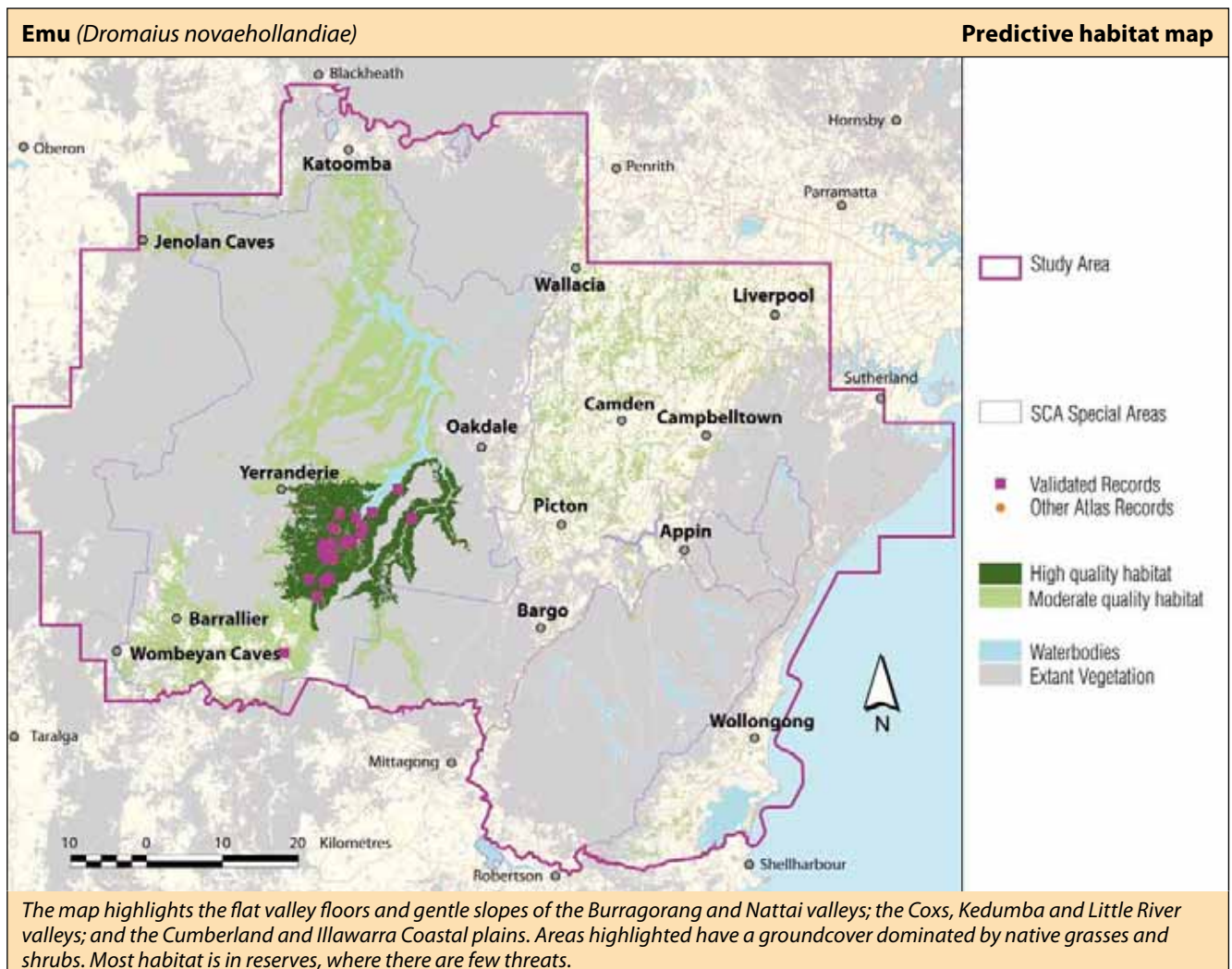
Photo: N. Williams

Cultural significance

The emu is important to the indigenous communities of the Blue Mountains, who are concerned that it has disappeared from some parts of the mountains. Emus used to be hunted for their meat and eggs, especially in Burragorang Valley and western Sydney, and were a totemic species for many groups. Their feathers were used in rituals, and they feature in rock art. Local words include Gundungurra – maraong or marayong, birriban; Tharawal – birribain, murriang; Darug – marriang. Emus are also important for non-indigenous Australians, for example, they appear on the Commonwealth coat of arms.

Threats

The emu has disappeared from part of its range due to over-hunting and poisoning. In some areas, it has also declined due to habitat destruction, and often only survives where patches of native vegetation remain. However, in other parts of its range, the emu has increased in numbers due to the provision of artificial water. The young and eggs are often eaten by pigs, dogs and foxes, and adults are killed on roads.



Distribution

The emu is found nearly everywhere in Australia, though it is rare to absent in dense tropical forests, waterless deserts and densely populated areas. In NSW, it is still common west of the Great Divide, though emus on the north coast have been listed as an endangered population. The emu may have declined nationally and has definitely declined in the last decade in the south-eastern highlands. In and around Sydney, it does not generally live in densely-populated coastal areas, with remaining populations in Goulburn River NP, Munghorn Gap NR, Burragorang Valley, at Port Stephens and around Sassafras, near Morton NP.

In the study area, the emu used to live throughout the Cumberland Plain and the grassy woodlands and plains of the southern Blue Mountains. Members of local Aboriginal communities claim that it lived in the latter area until the 1950s, and some claim that it never fully disappeared. Most emus living in Burragorang Valley are descended from individuals reintroduced in the 1980s and early 1990s. Emus recorded in Canyonleigh and Belanglo SFs are thought to be part of the Burragorang population or separate escapees. There are no recent records from the Cumberland or Illawarra Coastal plains.

During the current surveys, many emus were seen in Burragorang Valley, and an adult male with three chicks was seen in Nattai Valley. A lone individual was seen near Bullio further up Wollondilly Valley, indicating the population is more extensive than previously thought.

How you can help

- > Report sightings of emus in the Blue Mountains to help DECC assess the extent of the population, and any sightings of feral pigs, dogs and foxes in bushland. Complete a sightings form – see 6.2 for details.

6.6 Gang-gang cockatoo (*Callocephalon fimbriatum*)

This medium-sized, stocky cockatoo has dark grey feathers narrowly edged with pale grey, orange and red. Both sexes have a wispy crest that is curved forward and twisted, the male's crest and head being bright red. The birds are seasonally nomadic, living in tall mountain forests and woodlands in summer and dry, open eucalypt forests and woodlands in winter, when they may also frequent urban areas and farmlands with trees. The bird is gregarious and primarily arboreal, roosting in tall trees and foraging in the canopy in pairs or family groups for seeds, berries, fruits, nuts and insects. It breeds between October and January in hollows in large trees.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Woodlands and forests on higher-fertility soil

Legislative listing: Vulnerable – TSC Act



Photo: K. Madden

Threats

Threats are poorly known but include habitat destruction and degradation due to the loss of food trees and large old trees required for roosting and breeding. Much winter habitat has also been cleared for agricultural and urban development. There may be competition for nest hollows with other species, with nest displacement by sulphur-crested cockatoos (*Cacatua galerita*) noted in Sydney.

Psittacine circoviral (beak and feather) disease may threaten small, already-stressed populations. Climate change may alter the extent and nature of the cool temperate vegetation that the species prefers.

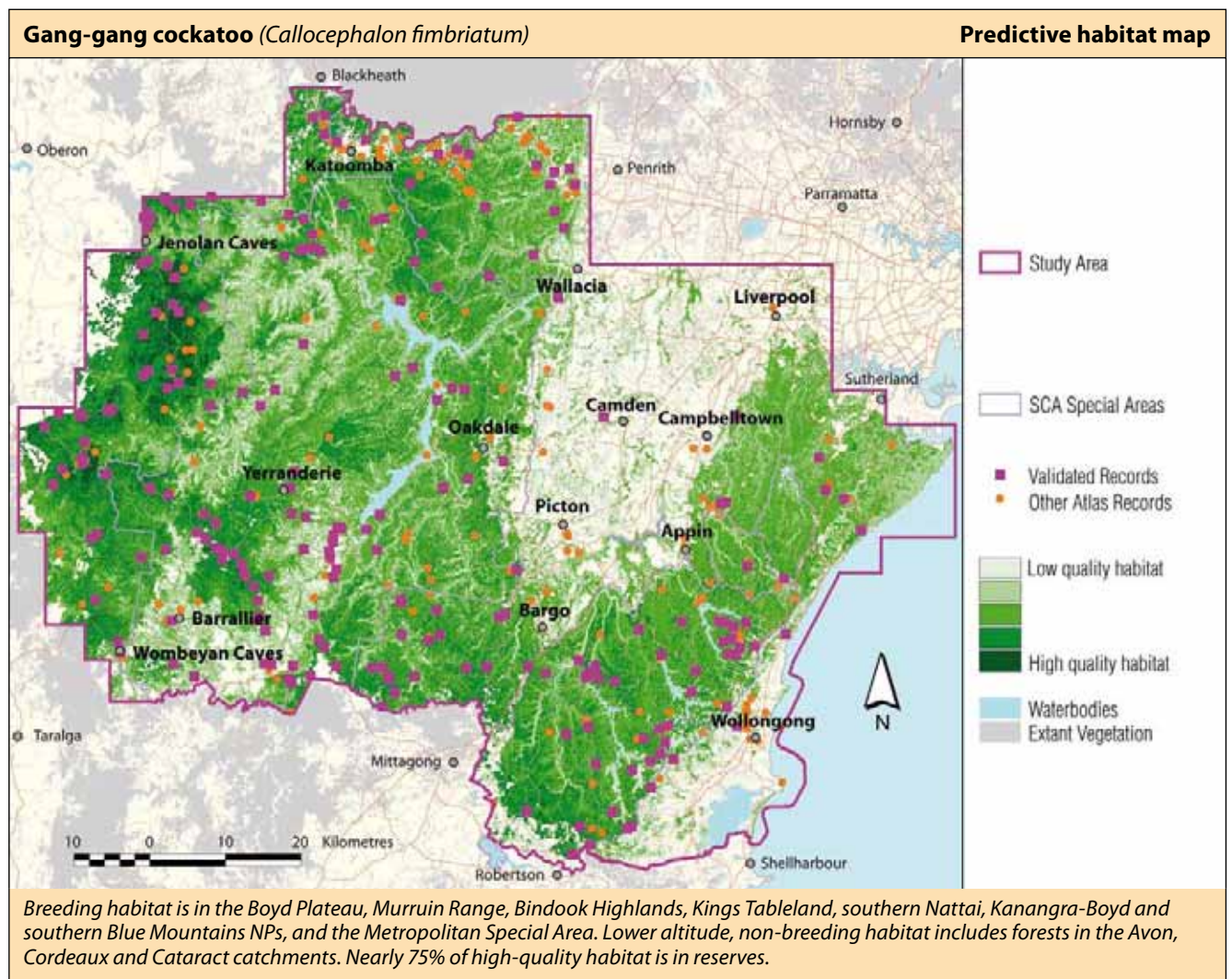
Distribution

The species is endemic to south-eastern Australia, ranging from the mid-north coast and central tablelands of NSW to far south-west Victoria and occasionally into South Australia. There has been a decline in reporting across its distribution between 1984 and 2002.

In and around Sydney, the bird is abundant south of the Hunter River with records from many national parks, though there are fewer records for Sydney and Wollongong. In the south-eastern highlands, the bird has mostly been recorded in the south, particularly around Canberra and in Kosciuszko NP.

In the study area, there are many records from the Warragamba and Metropolitan special areas and Kanangra-Boyd NP. The bird is less often seen on the Cumberland Plain and is rare in Royal NP and the Woronora Special Area, though a small flock sometimes camps around Garrawarra Farm in Royal NP. Over 170 sightings were made during the 2002–05 survey, and in 2006–07 surveys of Dharawal SCA, reaffirming that it remains common in the region.

Breeding habitat is predicted to be in high forests with taller trees, particularly those on flatter land and in shrubby environments.



How you can help

- > Grow native trees in your garden, particularly larger gum trees if you have the space.
- > Join a bird-watching group such as the Bird Observers Club of Australia (www.birdobservers.org.au), Birds Australia (www.birdsaustralia.org.au) or the Cumberland Bird Observers (www.cboc.org.au) to find out more about this cockatoo.
- > Retain native hollow-bearing trees and dead trees that have large hollows the bird can nest in.

6.7 Glossy black-cockatoo (*Calyptorhynchus lathami*)

This medium-sized black cockatoo usually lives in pairs or trios with dependent young in eucalypt woodland or forest, where it nests in tree hollows. It almost exclusively eats the fruit of she-oaks including drooping she-oak (*Allocasuarina verticillata*), forest she-oak (*A. torulosa*) and black she-oak (*A. littoralis*). Chewed cones underneath these trees indicate the bird's presence in an area.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Woodlands and forests

Legislative listing: Vulnerable – TSC Act



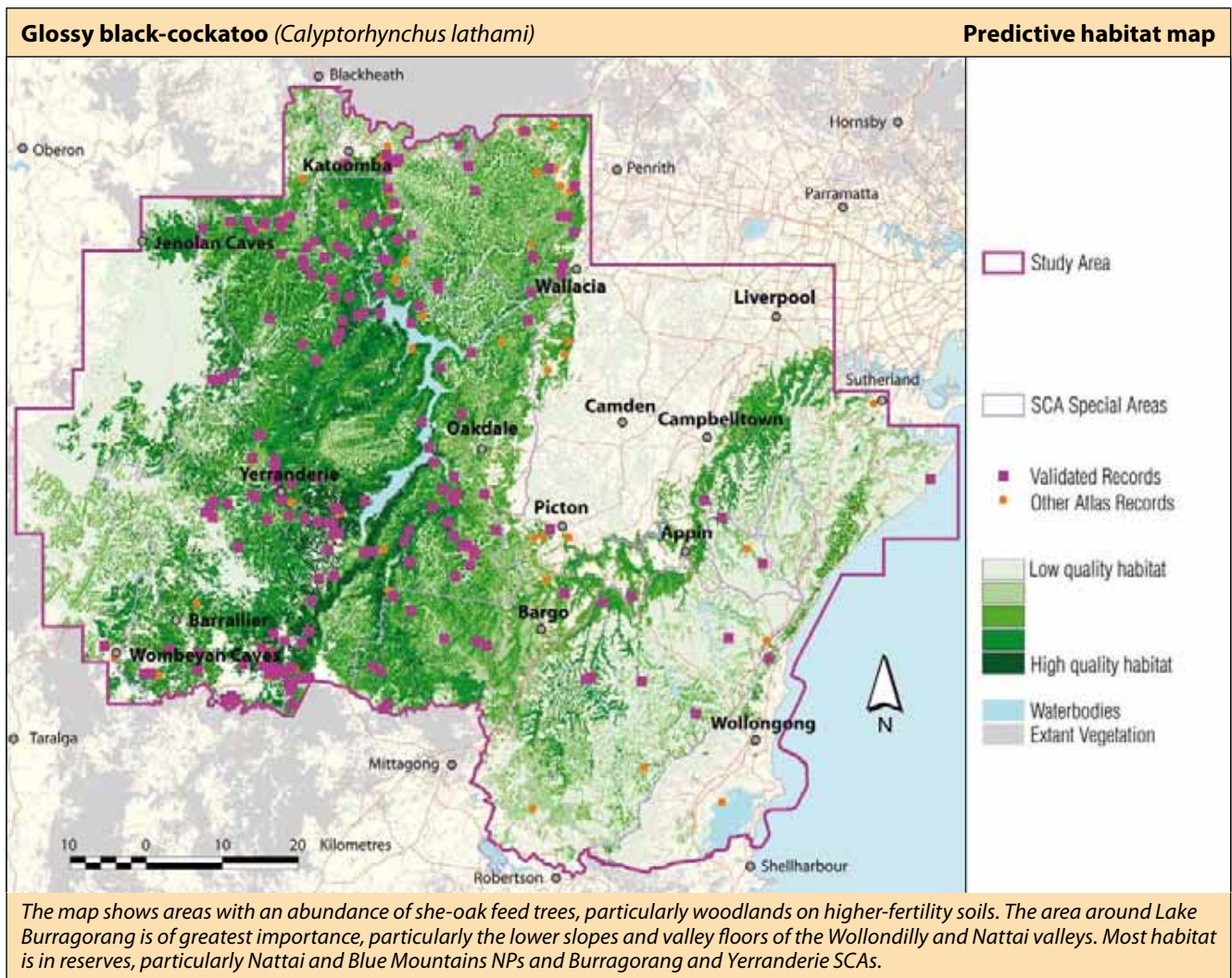
Photo: N. Williams

Threats

The major threat is habitat destruction for agriculture or residential development, and competition from open-habitat species such as galahs (*Eolophus roseicapillus*). Other threats include the fire-sensitivity of many she-oak species, affecting food supplies during and after fires; the removal of dead wood and dead trees; illegal trapping for aviaries; and infection by *psittacine circoviral* (beak and feather) disease.

Distribution

In NSW, the bird lives on the coast, coastal ranges and the western slopes, with an isolated population in the Narrandera–Lake Cargelligo area of the Riverina. There are many sightings in and around Sydney. The bird lives in many conservation reserves, including Morton, Blue Mountains, Ku-ring-gai Chase and Wollemi NPs.



In the study area, the bird is relatively common in sandstone reserves of the southern Blue Mountains, including Nattai and Blue Mountains NPs. In the far west, there are several records from the Wombeyan Caves/Tallygang Mountain area. Interestingly, since the 2001 fires, the birds have been seen more regularly on the Woronora Plateau, on the Illawarra Escarpment and at Heathcote where previously they were very rare. This increase in sightings has been reflected further south around Nowra. It is unknown whether the bird is actually increasing in this area or if large fires in the southern Blue Mountains in 2001 have forced it to move into adjacent areas. Over 150 new locations for this species were found during the 2002–05 surveys.

How you can help

- > See 6.6 Gang-gang cockatoo.
- > Preserve any she-oak species growing on your land or in bushland you help manage. If planning hazard reduction fires, avoid burning she-oaks as they must regenerate from seed and take many years to bear fruit.

6.8 Greater glider (*Petauroides volans*)

The largest gliding possum, this animal has a strongly reflective eye shine, large ears and long fluffy tail. It varies in colour between white and black, but always has white underparts. The glider lives in a hollow during the day, favouring large forest trees. At night, it eats eucalyptus leaves, and rests to help it digest food.

Status/direction of change: Locally common resident/locally declining

Significance of study area: Core

Key habitat: Woodlands and forests on high fertility soil

Legislative listing: Protected – NPW Act



Photo: R. Peime, DECC

Threats

Main threats are habitat disturbance, especially from logging that does not leave hollow-bearing trees; fire that may lead to local extinctions, such as in Royal NP, through death, loss of food and exposure to predation, particularly from powerful owls; and predation from foxes.

Distribution

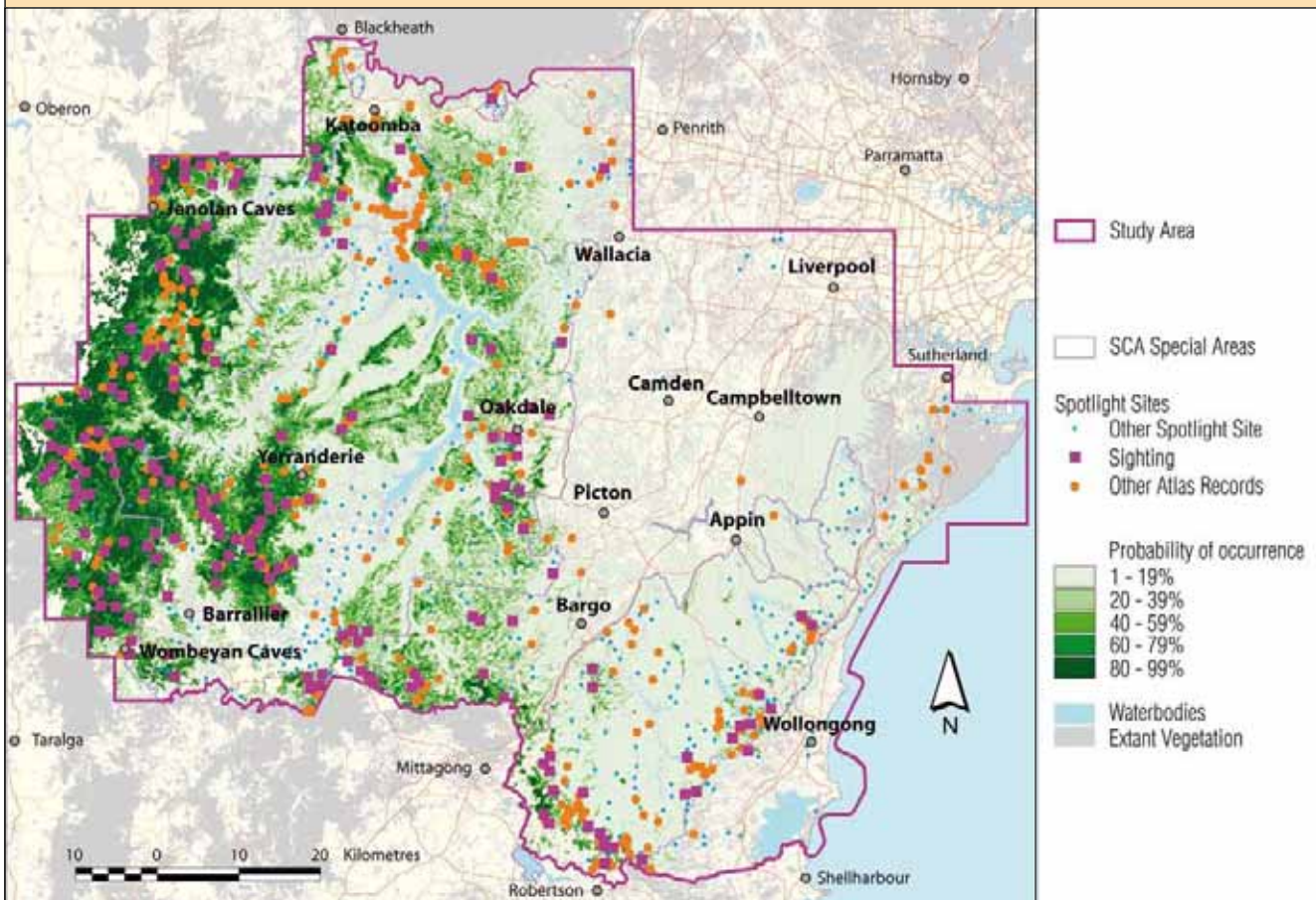
The glider is found in various eucalypt forests on and east of the Great Dividing Range between north Queensland and central Victoria. In NSW, it lives near the coast and on adjoining ranges. Some small, isolated populations live in forests further west, such as in Mt Kaputar and Coolah Tops NPs, Mt Canobolas SCA and state forests north and west of Kosciuszko NP. Other reserves with a large number of records include Brindabella, Bouddi and Meroo NPs, and Jilliby SCA, though the species is more often seen in state forests which have richer soil and taller trees.

In the study area, the glider is widespread and common in the west, living in the high-altitude tall forests of Kanangra-Boyd and Blue Mountains NPs, such as those on the Boyd Plateau, Murruin Range and Bindook Highlands. It is also found on higher-fertility soils in the Kedumba and Jenolan River valleys, at Mt Jellore in Nattai NP and throughout Burrangorang SCA. In the east, it lives in the forests near Robertson and in Cordeaux and Cataract catchments. On the Cumberland Plain it is restricted to a few localities in higher-fertility soils on the fringes, such as in the Bargo area.

There have been local extinctions in parts of the study area. Gliders used to live in Royal NP, and though a few survived the 1994 fires, they disappeared soon after. On the Illawarra Escarpment, the glider has not been recorded for many years. After a high intensity fire on the Woronora Plateau, glider numbers recovered very slowly, with numbers two years after the fire being one tenth of what they had been. Nevertheless, during the 2002–05 surveys, over 400 new locations were found, mostly in the west of the study area.

How you can help

- > Retain native hollow-bearing trees and dead trees that have hollows the glider can nest in.



The map highlights tall forests in the highlands of the west, such as the Boyd Plateau and Bindook Highlands; the deep gullies of tall, moist forests of the Blue Mountains and Nattai NPs; and Burratorang SCA. Also highlighted are smaller patches of suitable habitat in the east, particularly in Cordeaux and Cataract catchments and below the Illawarra Escarpment. Over 80% of predicted high-quality habitat is in reserves, such as Kanangra-Boyd NP.

6.9 Highlands copperhead (*Austrelaps ramsayi*)

This medium-sized snake is distinguished from the lowlands copperhead (*Austrelaps superbus*) by its prominently barred lips. It lives in cool upland areas, in moist areas of montane heath, woodland, sclerophyll forests, creek edges and marshes, and in swampy areas with thick clumps of tussock grass. It is diurnal and rests in hollow logs or beneath debris. It is highly venomous, but usually is only aggressive if provoked.

Status/direction of change: Uncommon resident/
locally declining

Significance of study area: Non-core

Key habitat: Highlands

Legislative listing: Protected – NPW Act

Threats

The snake has possibly declined over the last 20 to 30 years as it has been killed around areas of human settlement by people and vehicles, and collected for the pet trade. A decline in frog numbers due to chytrid fungus may have seen concomitant declines in snakes, as this species eats frogs. This snake may also be threatened by predation, especially by foxes, and through habitat alteration as a result of longwall mining.

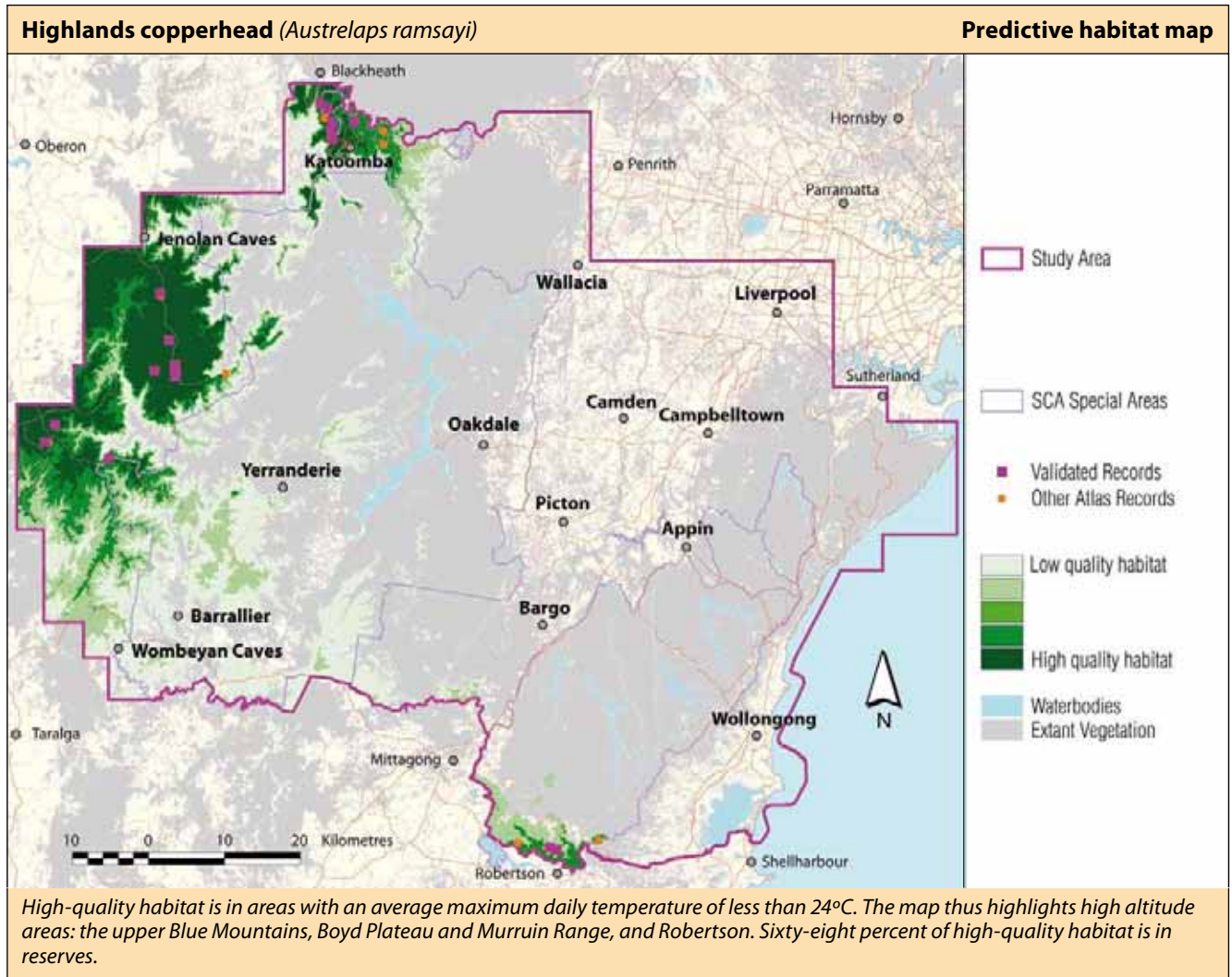


Photo: A. Dudley

Distribution

This snake lives between eastern Victoria and the New England Tableland of NSW. In and around Sydney, it only lives in the far west and south, in the upland areas of the Blue Mountains and the southern highlands. It is more common in the south-eastern highlands, particularly around Lithgow, Oberon and Orange and in the Snowy Mountains around Tumut and Cooma. It lives in various habitats including cleared land. Much of its habitat is in reserves, including the Blue Mountains, Kanangra-Boyd, Morton and Kosciuszko NPs.

The snake has been recorded in three main locations in the study area: on the Woronora Plateau; in the upper Blue Mountains between Hazelbrook and Medlow Bath; and on the Boyd Plateau and around Mount Werong. All these locations are over 600 metres above sea level. During the 2002–05 surveys, highland copperheads were regularly seen, particularly on the Boyd Plateau.



How you can help

- > Report anybody you suspect of illegally collecting or keeping snakes. In NSW, the keeping of any reptile or frog requires a permit issued by DECC. Phone DECC's Environment Line on 1300 361 967 or visit www.nationalparks.nsw.gov.au/npws.nsf/Content/Reptile+keepers+licence for more information on gaining a reptile keeper's licence.
- > Join the Australian Herpetological Society (www.ahs.org.au) to find out more about this snake.

6.10 Long-nosed bandicoot (*Perameles nasuta*)

This medium-sized nocturnal marsupial has dark greyish-brown fur on its back, a long pointed muzzle and relatively large pointed ears. It lives in rainforests, open forest and woodland. It is omnivorous, eating insects, succulent plants and fungi, and forages on the ground. During the day, the animal lives in a partly enclosed nest, usually in a shallow hole on the surface of the ground. If surprised, it will dart away giving a distinctive, snorting alarm call.

Status/direction of change: Uncommon resident/possibly declining

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



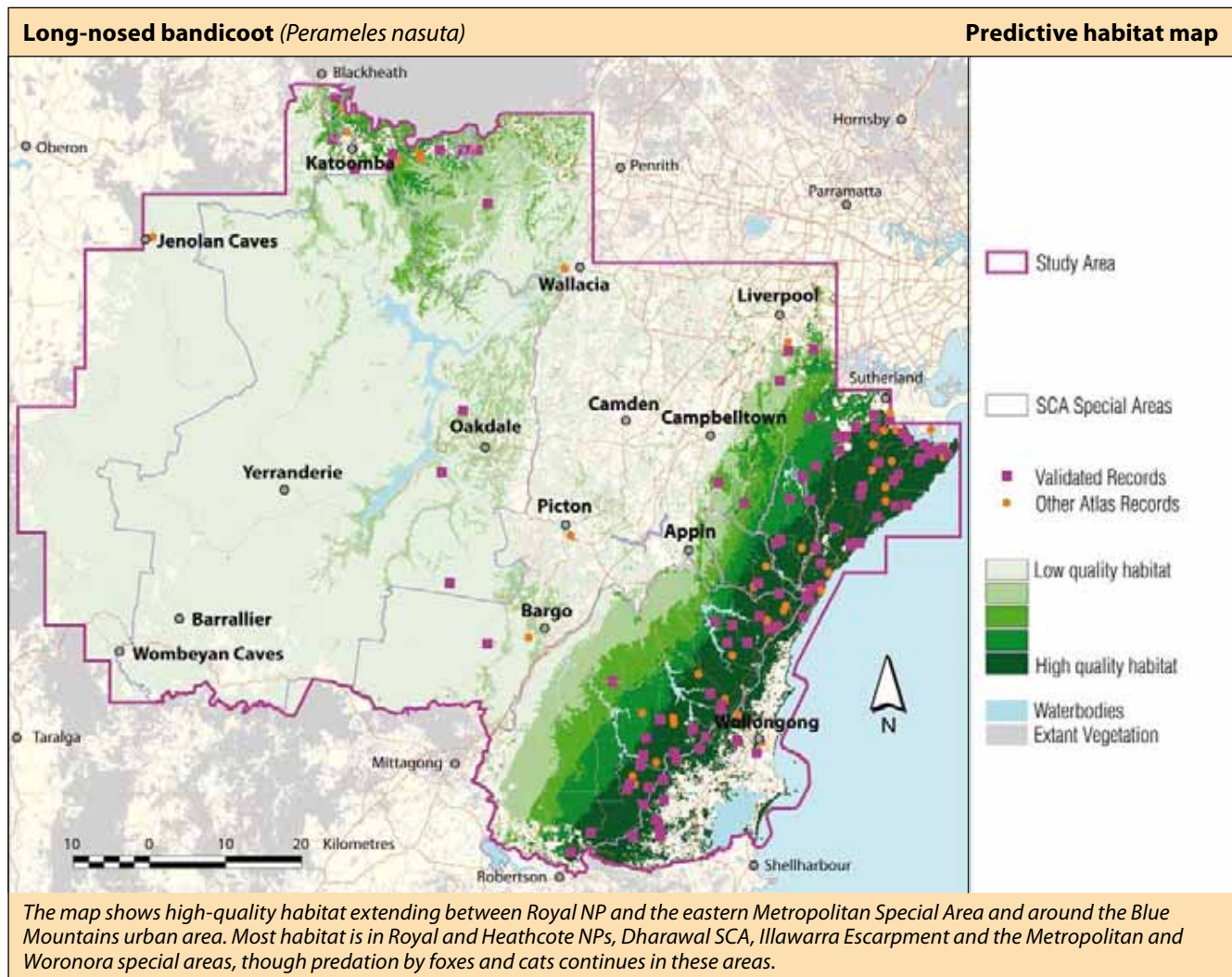
Photo: N. Williams

Threats

Threats include loss, degradation and fragmentation of habitat due to urban and agricultural development; predation by cats, foxes and dogs; and road mortality. This project has confirmed that foxes are a major predator, with one-sixth of their diet on Woronora Plateau being the bandicoot (see volume one of this series). This may be a particular problem for isolated populations or when numbers are recovering after fire.

Distribution

The bandicoot lives along the east coast of Australia from Cape York in northern Queensland to the Otway Ranges in Victoria. The animal used to live west of the Great Dividing Range in the late 19th and early 20th centuries, but today rarely occurs. It has declined in developed areas along the coast, particularly in Sydney and the Blue Mountains, and on the Illawarra Coastal Plain.



In and around Sydney, the animal mostly lives on the coastal plains. Smaller numbers live along the Dividing Range, including on the Hunter Range, in the southern highlands and in the Blue Mountains. The animal can survive well in semi-urban environments, such as in Manly, Avalon on the northern beaches of Sydney, and Austinmer and other suburbs of Wollongong. It also lives in a number of reserves, such as Royal, Heathcote, Ku-ring-gai Chase, Garigal, Watagans and Blue Mountains NPs.

In the study area, most records are from traces left by the animals in the form of diggings, hair or remains from predator scats. Live animals are most commonly seen in the east in Royal NP, on the eastern Woronora Plateau and on the Illawarra Escarpment, with fewer animals seen or heard in the Blue Mountains urban area and Nattai SCA. An isolated population occurs in Coniston Woodland in urban Wollongong.

Records from the 2002–05 survey comprised diggings from Burragarang SCA and the Woronora Plateau, and remains in fox scats in the Metropolitan Special Area. An analysis of fox scats in the Warragamba Special Area did not find any evidence of the species and no diggings were found.

How you can help

- > Always keep your pet dog or cat inside at night as they may kill bandicoots. Never let your dog wander into native bushland. If you live near bushland, consider installing a cat run to stop your cat hunting outside your property and killing bandicoots and other wildlife.
- > Volunteer to regenerate bushland where the bandicoot lives as it is often found near houses. Join a local bushcare group or create your own – see 6.1 for details.
- > When removing dense growths of weeds such as lantana or blackberry from your property or bushcare site, be aware that bandicoots may be relying on this cover to protect them from cats and foxes. Removing these weeds in stages and replacing them with equally dense natives is a good strategy.
- > Report any sightings of feral cats or foxes on bushland to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 6.2 for details.

6.11 Mainland tiger snake (*Notechis scutatus*)

This large, highly variably patterned snake sometimes has the banding suggested by its common name. Though found in many areas, it is most common in wetland and riparian habitats as its main food is frogs. It is usually diurnal but will be active at night during mild or hot weather. It is highly venomous, but is usually only aggressive if provoked.

Status/direction of change: Uncommon resident/locally declining

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



Photo: D. O'Connor

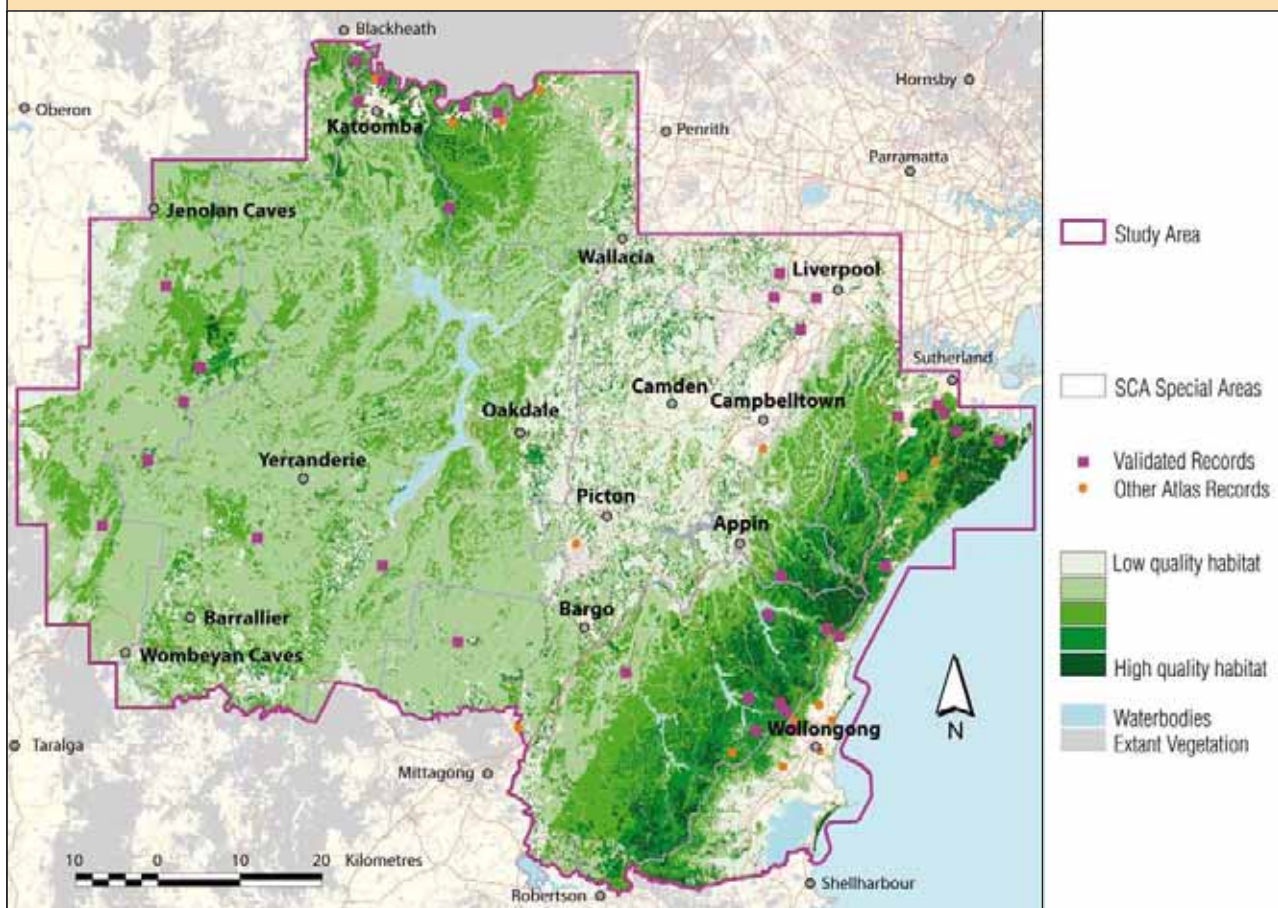
Threats

The tiger snake is one of the main causes of snakebite fatalities in south-eastern Australia, which has often led to its persecution by humans. Numbers may have declined as the number of frogs has declined. Other threats are the draining or degradation of wetlands and swamps from activities such as longwall mining, and urban and farm development; frequent fires; predation by foxes and the increased use of bushland tracks by trailbikes.

Distribution

The snake lives between the highlands of south-eastern Queensland and the Murray River area of South Australia. In NSW, population declines have been noted in Sydney, especially at Botany swamps and in the Rockdale wetlands. In and around Sydney, the snake lives mainly along the coast between Wollongong and Wyong; and in the upper Blue Mountains, southern highlands and the Hunter. It is found in many reserves, including Royal, Blue Mountains, Nattai, Kanangra-Boyd, Wollemi and Morton NPs and Barren Grounds NR.

In the study area, the snake is most common at moderate to high elevations, being frequently seen in the Kanangra area of the Blue Mountains, on the Wanganderry and Nattai tablelands and around Lake Cordeaux and Lake Cataract. It has also been occasionally seen in Royal NP and in south-western Sydney between Liverpool and Campbelltown. During the 2002–05 project, it was most frequently seen in the upland swamps of the Woronora Plateau, and in tall forests with high levels of groundcover such as in the Blue Mountains.



The map predicts habitat in areas with high annual rainfall and levels of canopy cover, and in upland swamps. The high-rainfall Woronora Plateau and parts of Wollongong and the upper mountains are highlighted, and within these, areas of forest or upland swamp. Vegetation remnants of the Cumberland and Illawarra Coastal plains are also predicted as habitat, though this snake was more common in these areas before clearing and fragmentation. The species is well protected in reserves.

How you can help

- > Report anybody you suspect of illegally collecting or keeping snakes. In NSW, the keeping of any reptile or frog requires a permit issued by DECC – see 6.9 for details.
- > Join the Australian Herpetological Society (www.ahs.org.au) to find out more about this snake.
- > If you live near a wetland, join a 'friends of the wetland' group or start your own – call DECC's Environment Line on (02) 9995 5000 for advice or your local council. Alternatively, find a conservation project near you by contacting Conservation Volunteers Australia – visit www.conservationvolunteers.com.au/volunteer/conservation-connect.asp – or Wetland Care – visit www.wetlandcare.com.au or phone: (02) 6681 6169.

6.12 Olive whistler (*Pachycephala olivacea*)

The male olive whistler has a greyish back, a scalloped whitish throat and buffish underparts, while the female is generally less colourful. The bird is usually found in the understorey and is most often detected by its distinctive call. It lives in forests, including rainforests and woodlands, particularly those with dense shrubbery such as areas dominated by tea-trees (*Leptospermum spp.*). It partially migrates to lower altitudes during winter.

Status/direction of change: Extremely rare visitor/unknown

Significance of study area: Non-core

Key habitat: Rainforests, wet sclerophyll forests, other

Legislative listing: Vulnerable – TSC Act



Photo: T. Shimba

Threats

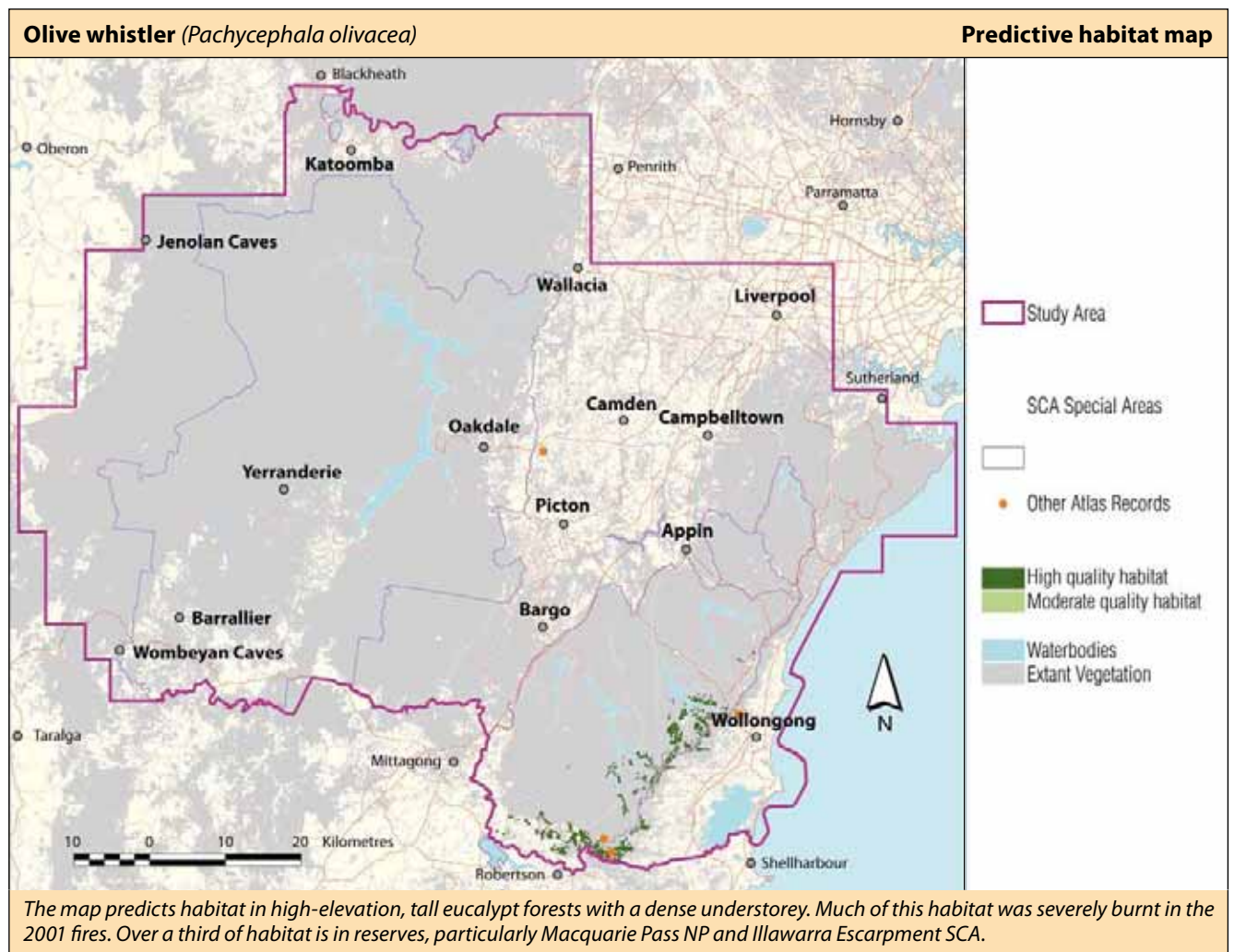
Threats are poorly known, but probably include habitat clearance, particularly of vegetated gullies; and predation of nests by cats and black rats. Fire may be problematic. For example, this species disappeared after a control burn in Victoria and in the first year after fire on sites in Tasmania. It is unknown how much time is needed for habitat to regenerate sufficiently to be reoccupied.

Distribution

This subspecies lives in eastern Victoria and southern NSW, as far north as Wollongong, while four other subspecies live elsewhere in eastern Australia.

Most records for this subspecies in NSW are in the Australian Alps and the south-east. In and around Sydney and the south-eastern highlands, the bird is only patchily distributed in reserves such as Gourock NP, Kosciuszko NP and Barren Grounds NR.

Almost all records in the study area are confined to the Illawarra, where the bird is a rare visitor. It is seen occasionally in the moist forests on the Woronora Plateau, near Robertson; in Macquarie Pass NP; and around Mt Keira. Recently, a nesting pair was found near Macquarie Hill so breeding must occasionally occur in this area. During the 2002–05 surveys and surveys conducted in the region in 2006–07, no birds were detected.



How you can help

- > Join a bird-watching group to find out more about this bird – see 6.6 for details.
- > Join a local bushcare group or create your own – see 6.1 for details.
- > If you live near bushland, consider installing a cat run to stop your cat wandering outside your property and killing small birds and other wildlife.

6.13 Painted button-quail (*Turnix varia*)

This relatively large button-quail lives in dry open forests, grassy woodlands, heath and shrubland, and open to dense mallee scrub. It prefers areas with fallen timber, thick leaf litter and grass tussocks on stony ridges, slopes and hillsides. It feeds in pairs between dusk and dawn, searching through leaf litter for seeds, fruits, leaves and insects. In foraging, the birds spin on alternate legs, leaving distinctive circular depressions in the leaf litter.

Status/direction of change: Uncommon resident/probably stable

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



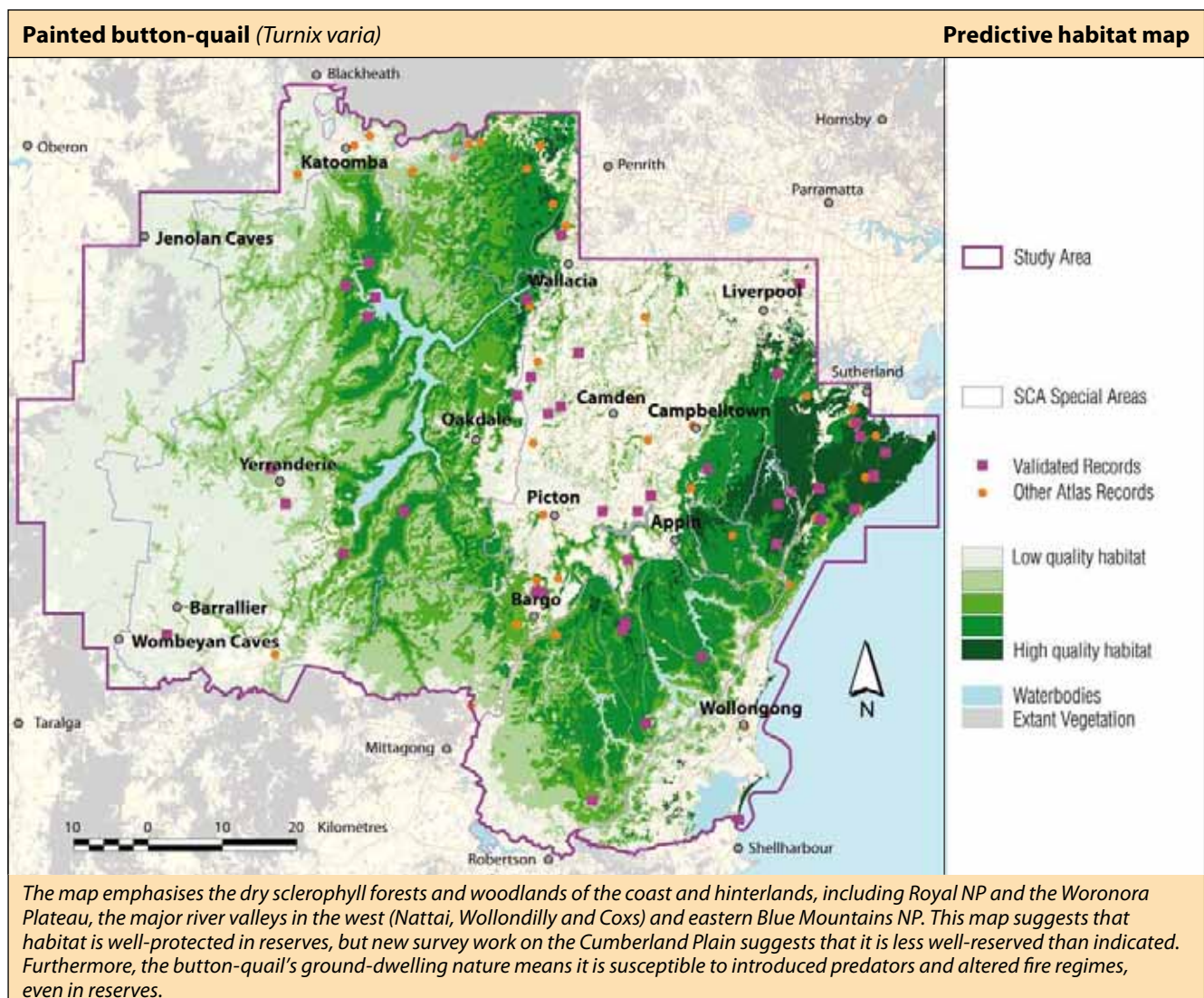
Photo: M. Todd

Cultural significance

Quail of all varieties are important to the indigenous communities of the Blue Mountains, mainly because they are an important traditional food source. Some members of these communities believe that quail numbers have been much reduced by the introduction of cats and foxes. Traditionally, quail feathers were used in bird traps and decoys around the Hawkesbury–Nepean River. Traps were laid in small tunnels in earth mounds with sticks used to block one end. Local words include: Tharawal – buruwal; Gundungurra – goonanadan; Darug – maunlai.

Threats

Threats include encroaching urban development causing habitat loss and degradation, shooting, predation by introduced pests, road mortality and grazing. A separate subspecies found only on the Houtman Abrolhos islands in Western Australia is threatened by fire and possibly by the house mouse (*Mus musculus*), either through competition for food or predation of eggs.



Distribution

This button-quail lives in east and south-east Australia, in south-west West Australia, in northern Tasmania and on some coastal islands. In parts of its distribution, including NSW (particularly around Sydney), Tasmania, Western Australia and south-eastern South Australia, it is thought to have declined.

In NSW, there are records from the eastern half of the state, with concentrations in and around Sydney, on the north coast, and on the western slopes of the Great Divide. In and around Sydney, it is widespread, but less common in areas of Hawkesbury sandstone. In the south-eastern highlands, it is more scattered with records around Bathurst and around Canberra. It is not commonly recorded in reserves.

In the study area, it lives in low numbers on the Woronora Plateau, on the Cumberland Plain and in Burratorang Valley. During the 2002–05 survey, it was recorded at seven new locations including the Metropolitan Special Area, Warragamba Trig and Butchers Creek in the Warragamba Special Area. Surveys of the Cumberland Plain in 2006 have detected this species much more regularly, with sightings from the Razorback Range, Nepean and Bargo. This data indicates that the bird is more prevalent in areas with higher-fertility soils which produce more grass and seed.

How you can help

> See 6.12 Olive whistler.

6.14 Pink robin (*Petroica rodinogaster*)

This small robin lives in gullies in rainforests and moist eucalypt forests. The male is sooty black above and on the upper throat, with a rose-pink breast, while the female is olive-brown with a rich tan wing mark. Both sexes can be distinguished from the similar rose robin (*P. rosea*), by their shorter tail that has no white on the outer feathers. The robin eats insects, usually near the ground. It disperses in winter to drier forests and woodlands, including gardens; and may also move to lower elevations.

Status/direction of change: Extremely rare visitor/unknown

Significance of study area: Non-core

Key habitat: Moist forests and gullies, other habitats

Legislative listing: Vulnerable – TSC Act



Threats

The main threats are timber harvesting, particularly where the understorey is disturbed, and tree dieback, particularly in myrtle beech (*Nothofagus cunninghamii*) forest. Other threats include land clearance, prescribed and uncontrolled burning, predation by cats and climate change.

Distribution

This robin breeds in eastern Victoria and south-eastern NSW, with birds spreading as far as Sydney and Adelaide during the non-breeding season.

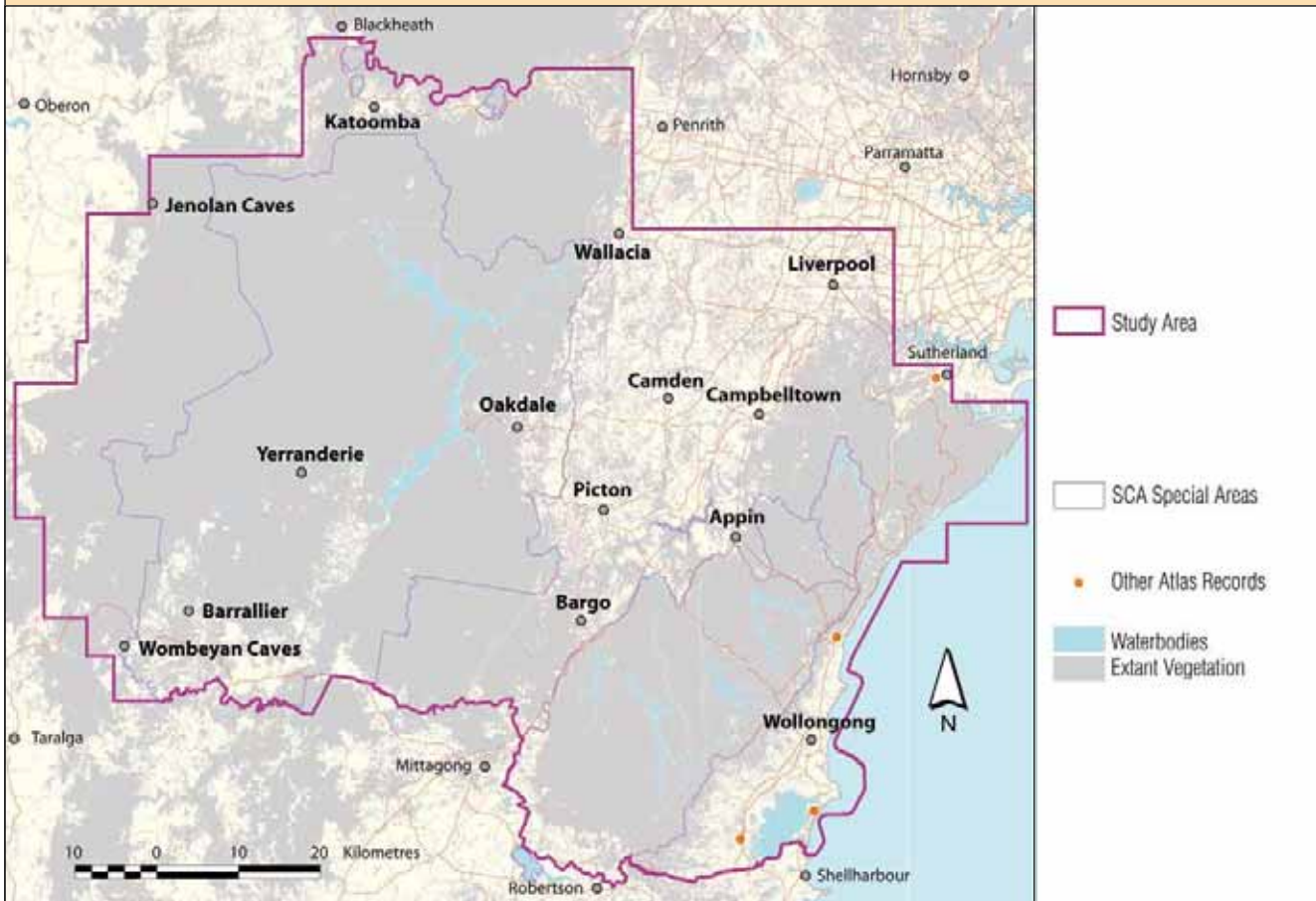
There are scattered records from the south-east corner of NSW, most from Kosciuszko NP. There have only been a few sightings in and around Sydney.

In the study area, the robin is an extremely rare visitor with lone birds recorded mostly in the Illawarra. Individuals are seen in forested areas and occasionally gardens every few years, particularly during winter. The most recent record is of a non-breeding robin that was recorded just south of the study area at Barren Ground NR.

This species has possibly been under-recorded by systematic surveys as these rarely take place during winter, and it is easily overlooked when in non-breeding plumage and not calling.

How you can help

> See 6.12 Olive whistler.



The map shows that the pink robin has mostly been recorded visiting the Illawarra coastal plain.

6.15 Platypus (*Ornithorhynchus anatinus*)

One of only three egg-laying mammals in the world and the only venomous mammal, the platypus is long-lived with a slow reproductive rate. It feeds on aquatic invertebrates, such as crayfish, and possibly fish and amphibians, and lives in an oval burrow in the riverbank that usually opens just above water level. It can live in nearly all aquatic environments, though in NSW it is more common in east-flowing rivers and the upper or middle reaches of west-flowing rivers.

Status/direction of change: Uncommon resident/
locally declining

Significance of study area: Core

Key habitat: Rivers and riparian environments

Legislative listing: Protected – NPW Act

Threats

The platypus can live in creeks on land that has been cleared for agricultural or urban development. However, the species is vulnerable to local extinction when populations become isolated from one another due to stream bank erosion or dam construction. Riverbank damage, declines in water quality, siltation and insensitive fishing techniques are also threats.

Distribution

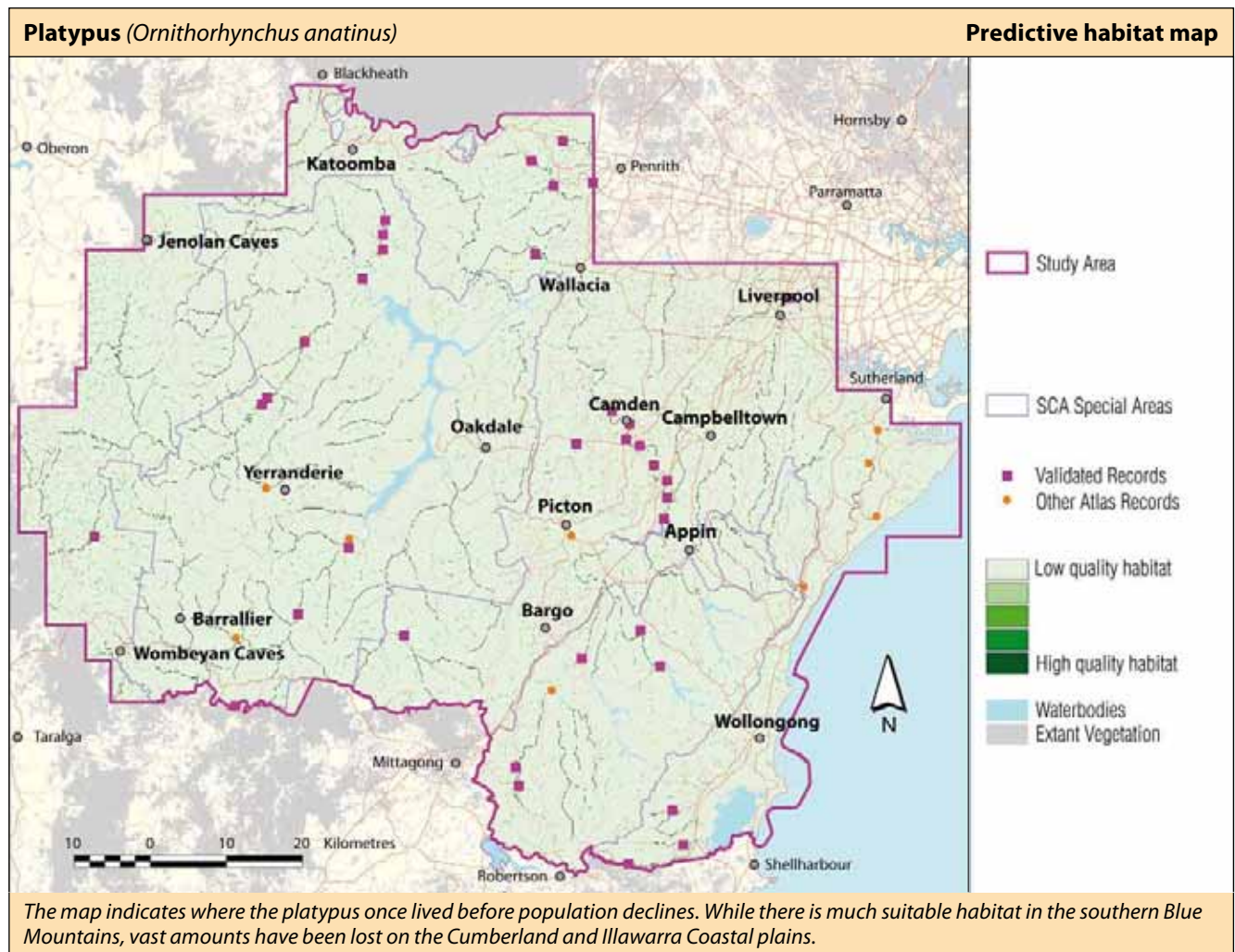
The platypus lives between north Queensland and the mouth of the Murray River, and in Tasmania, though it is extinct in South Australia except for an introduced population on Kangaroo Island. Platypuses are still common throughout much of their range.



Photo: K. Steynell, DECC

The animal is widespread in eastern NSW, with occasional records further west from the Murray and Murrumbidgee rivers. There are records throughout the south-eastern highlands, with recent records from the Shoalhaven, Eucumbene and Goobarragandra rivers. The platypus has declined significantly in and around Sydney, especially in the Nepean River and in streams flowing through Wollongong and Sydney, although it can still be seen on the Central Coast just north of Gosford, and in the southern highlands.

In the study area, the animal has been seen in the Blue Mountains (including the Wollondilly, Nattai, Kowmung, Kedumba, Coxs and Abercrombie rivers), the southern highlands (in the upper Nepean and Cordeaux rivers), the Hacking River in southern Sydney, and on the Cumberland Plain along the Nepean River. The animal is still seen on the coastal plain of Wollongong. During this survey, it was seen throughout the southern Blue Mountains, usually in pools of slow-moving water on large rivers. Surveys of the Cumberland Plain in 2006 only found this species in the Upper Nepean River near Bargo. Although this species is secretive and under-recorded during systematic surveys, it appears secure in the reserves of the Blue Mountains.



How you can help

- > If you have a river on your property, protect its water quality and grow native species along its banks, and avoid bank erosion from the trampling of livestock.
- > Join or start a Streamwatch or Rivercare group to care for your local stream or creek – see 6.4 for details.
- > If you have seen a platypus in your local area, complete a sightings form – see 6.2 for details. Make sure you have accurate details of where and when you saw it.

6.16 Powerful owl (*Ninox strenua*)

The largest owl in Australia, this bird is recognised by its relatively small, round head and long tail. It is dark brown above with prominent off-white barring, and paler underneath with dark markings. It lives in various forest habitats, usually breeding and roosting in rainforest or wet sclerophyll forest where it nests in large hollows in tall eucalypts, and normally lays two eggs. It hunts in open forests, eating primarily arboreal mammals such as common ringtail possums (*Pseudocheirus peregrinus*) and greater gliders (*Petauroides volans*). The owl usually maintains a territory of between 300 and 1500 hectares, the size depending on habitat quality and prey density.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Many

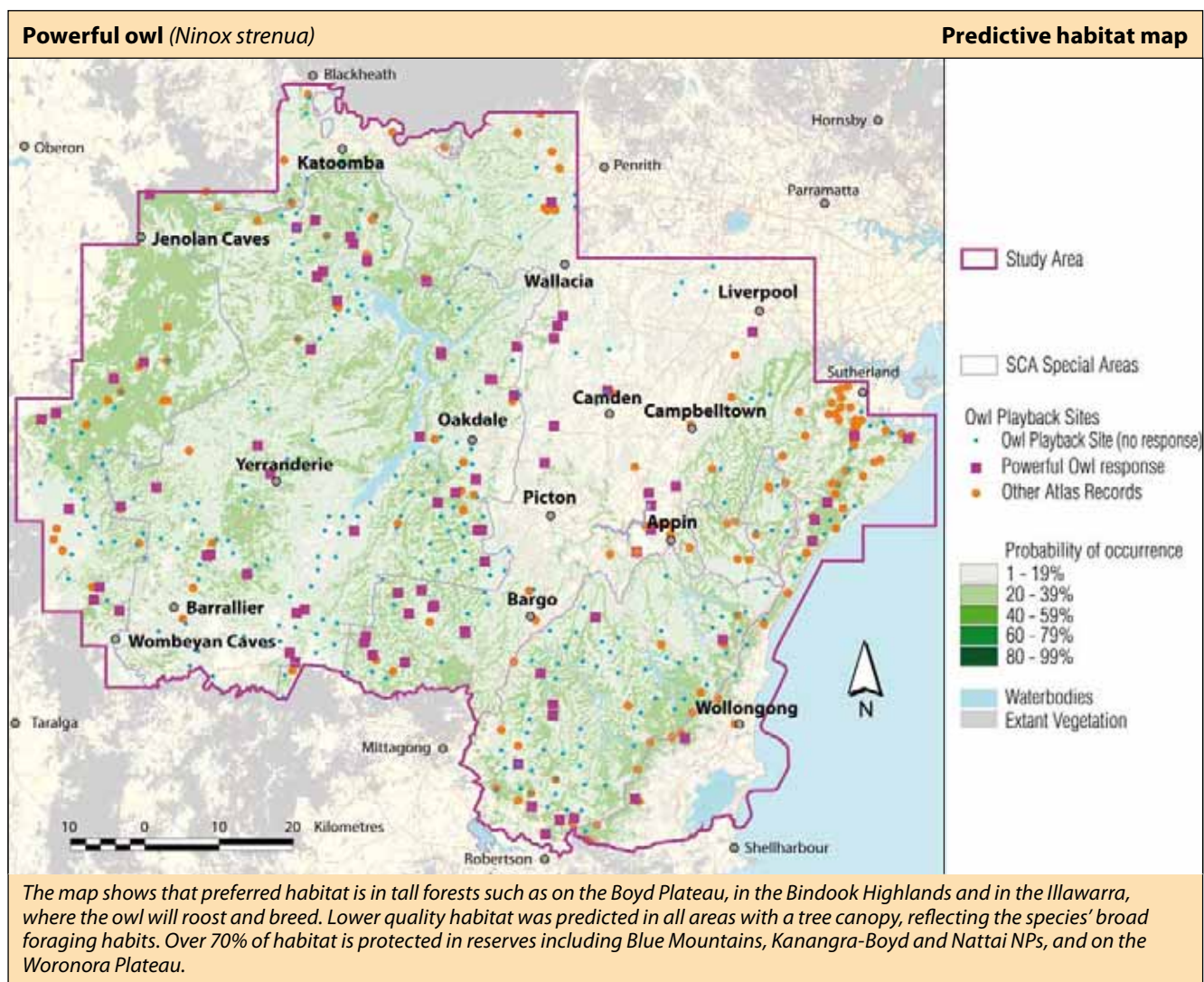
Legislative listing: Vulnerable – TSC Act. NSW recovery plan (DEC various b)



Photo: N. Williams

Threats

Land clearance for agriculture has reduced the habitat area of the owl, particularly the availability of roost sites. However, this species will live in disturbed areas such as in selectively logged forests if there is available prey and sufficient nesting and roosting sites. Other threats include predation of fledglings by foxes and poisoning from rodenticides.



Distribution

This owl lives in Queensland, NSW and Victoria and is found in the suburban areas of Brisbane, Sydney and Melbourne. In NSW, the owl lives mainly on the coast but has occasionally been seen further west, particularly in the south-eastern highlands. In and around Sydney, it can be seen from the rural–urban fringes of Sydney to west of the Dividing Range on the Central Tablelands. The owl lives in most reserves in the area, though there are fewer owls in northern Yengo and Wollemi NPs.

In the study area, the owl is widespread and common, occurring particularly in tall forests. The 2002–05 survey achieved a high response rate to call-playback surveys, with an overall detection rate of 24%. Areas with many owls were the Illawarra Escarpment, Nattai NP, Scotts Main Range, the Coxs River Valley and Murruin Creek in Blue Mountains NP. Overall, 71 new locations were found, showing that more powerful owls live in and around Sydney than previously thought. Surveys of the Cumberland Plain in 2006 have found the owl to be relatively common in the forests around Nepean River and Razorback Range and even in isolated remnant bushland around Cobbitty.

How you can help

- > If you are trying to get rid of rats, use traps rather than baits to avoid poisoning owls. To avoid using baits or traps if the rats are in the roof, find where they are getting in and block the hole with steel wool or metal and chicken wire.
- > Preserve all hollow bearing trees on your land or on bushcare sites you work on.

6.17 Red-browed treecreeper (*Climacteris erythroptus*)

This small bird is darker and more streaked than the similar white-throated treecreeper (*Cormobates leucophaeus*), which also has a different call. It lives in sclerophyll forests, preferring areas with smooth-barked eucalypts where it forages for insects, rarely coming to the ground. Both males and females help care for the young.

Status/direction of change: Common resident/
probably stable

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



Photo: M. Todd

Threats

Threats are poorly known, but probably include habitat destruction and fragmentation, lack of hollows due to competition with introduced species, land clearance and removal of trees for firewood, introduced honeybees, and the increase in temperature due to climate change. The bird's ability to recolonise areas that have been disturbed is unknown, though this is a significant threat with other treecreepers.

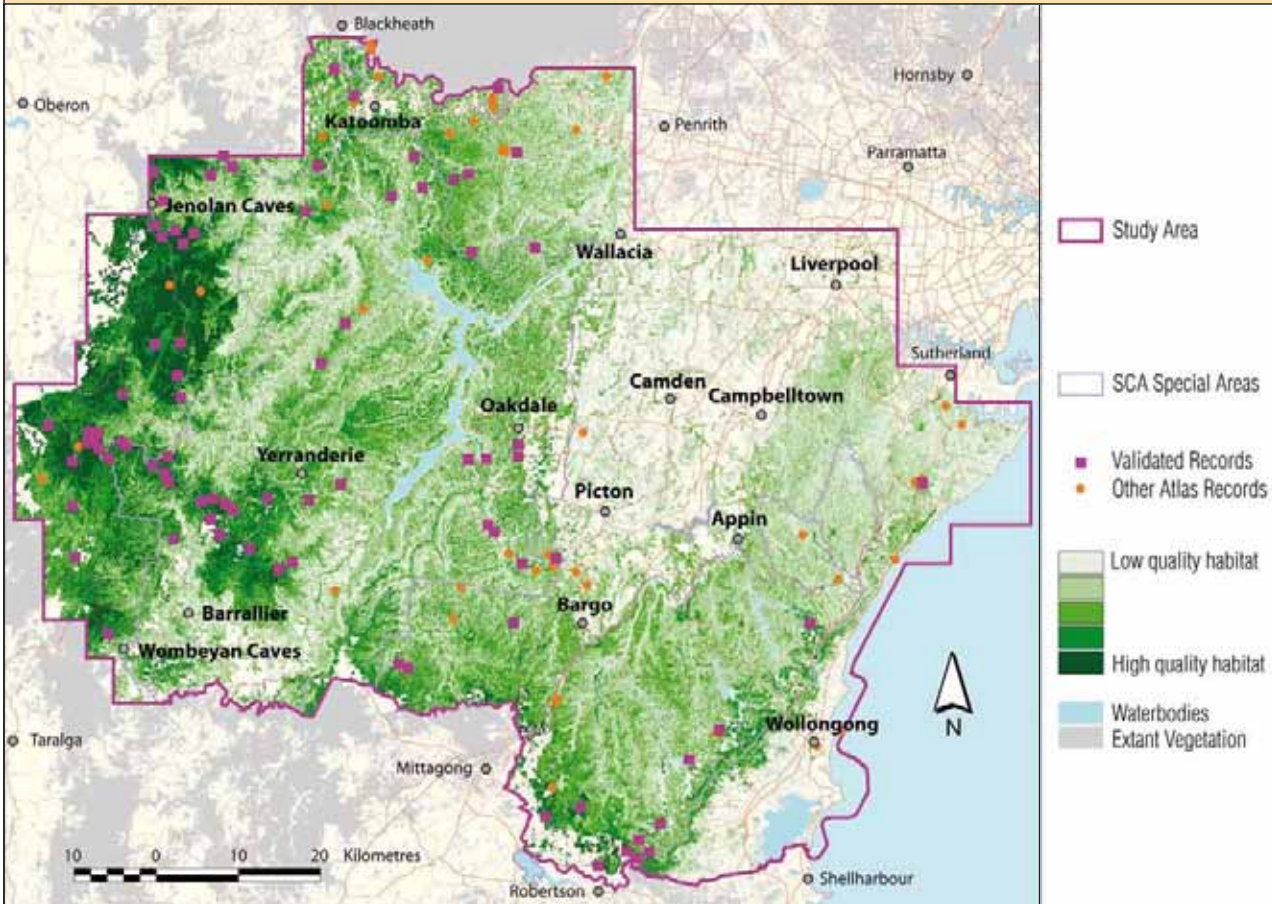
Distribution

The bird is endemic to south-eastern Australia between the Conondale Range (Queensland) and central Victoria. Declines have been noted across the bird's range. It is widely distributed through eastern NSW, with scattered records west of the Great Dividing Range and an isolated population in Coolah Tops NP. There are records throughout the south-eastern highlands and in and around Sydney, though the bird is rare in dry woodlands or grasslands such as the Hunter Valley, Cumberland Plain and around Goulburn. It lives in reserves including Barren Grounds and Munghorn Gap NRs, and Blue Mountains, Kosciuszko and Watagans NPs.

In the study area, the bird lives in moist forest areas including the Illawarra, Blue Gum Creek in Nattai NP, the Boyd Plateau in Kanangra-Boyd NP and parts of Blue Mountains NP, particularly the south-west and Bindook Highlands. During the 2002–05 surveys, 55 new locations were collected. Even so, only a few birds live in some areas such as in Royal NP.

How you can help

- > Retain native hollow-bearing trees and dead trees that have hollows.
- > Join a bird-watching group to learn more about this bird – see 6.6 for details.



The map highlights areas with tall forests, cool temperatures and flat land, including the Boyd Plateau, Bindook Highlands and the Illawarra. Over 75% of high-quality habitat is in reserves including Kanangra-Boyd, Blue Mountains and Nattai NPs, and little of this has been cleared.

6.18 Rose-crowned fruit-dove (*Ptilinopus regina*)

This small, colourful pigeon is similar in size to the superb fruit-dove (*P. superbus*). It lives in tropical and subtropical rainforests, especially those with dense vines, and in eucalypt forests and mangroves. It eats fruit in the canopy, in small groups.

Status/direction of change: Extremely rare visitor/declining

Significance of study area: Non-core

Key habitat: Rainforests and wet sclerophyll forests (subtropical influences)

Legislative listing: Vulnerable – TSC Act

Threats

Habitat clearance probably restricts the population size, though birds will fly to isolated patches with one or two fruiting trees. Other threats are disturbance from people, increased nest predation by species such as pied currawongs (*Strepera graculina*) and corvids (*Corvus* spp.), logging, inappropriate fire regimes and urbanisation, with birds often injured or killed by flying into windows.



Photo: T. Tarrant

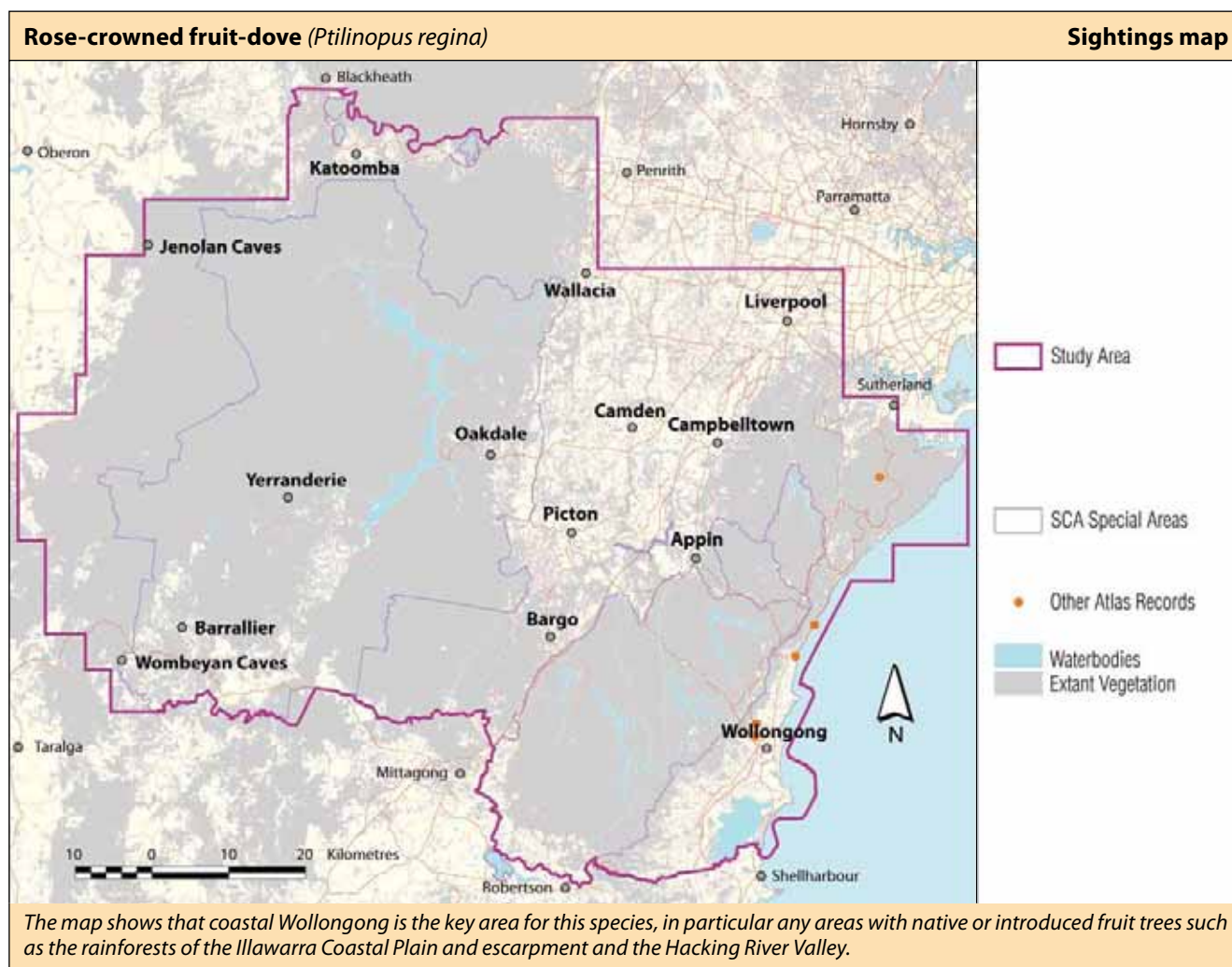
Distribution

The bird breeds between the Torres Strait and central NSW, with birds flying as far south as Tasmania.

In NSW, most records are from the north coast in coastal and highland areas, including in national parks.

The bird occasionally visits the Sydney area in winter and spring with many records from gardens.

This dove has declined in the study area (see volume one of this series). It occasionally visits the Illawarra, usually between May and October, where it can be seen in rainforests and other areas with fruiting trees including gardens. It has been seen on Lady Carrington Drive in Royal NP; and three birds have been found dead in the northern suburbs of Wollongong. Adults and juveniles have been detected south of the study area at Bass Point and Broughton Vale. The species was not recorded during the 2002–05 survey or in surveys conducted since.



How you can help

- > Join a bird-watching group to learn more about this bird – see 6.6 for details.
- > Report any sightings of this rare visitor or birds that have flown into windows to your local national parks office or complete a sightings form – see 6.2 for details.
- > If you live in the Illawarra, plant native fruit trees in your garden such as figs (*Ficus* spp.) and lilly pillis (*Syzygium* and *Acmena* spp.)
- > Volunteer to participate in regenerating lowland rainforest on the Illawarra Coastal Plain. Contact Bushcare – visit www.landcareonline.com or phone: (02) 9412 1040 – or Wollongong or Shellharbour councils.

6.19 Satin bowerbird (*Ptilonorhynchus violaceus*)

This large, plump bird is famous for its mating ritual. The male, who has a glossy blue-black plumage, greenish-white legs and a short tail, makes an intricate bower of sticks decorated with bright blue or yellow objects. Besides this, he performs an elaborate dance to attract females. The females are olive grey-green on the upper parts, with rufous brown wings and tail and a brown scaly pattern on the throat and breast. The bird is omnivorous, eating plant and animal matter. It will also eat the fruit of introduced plant species, such as the African olive (*Olea europaea*) and privet (*Ligustrum* spp.) and may help spread these weeds.

Status/direction of change: Common resident/possibly increasing

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



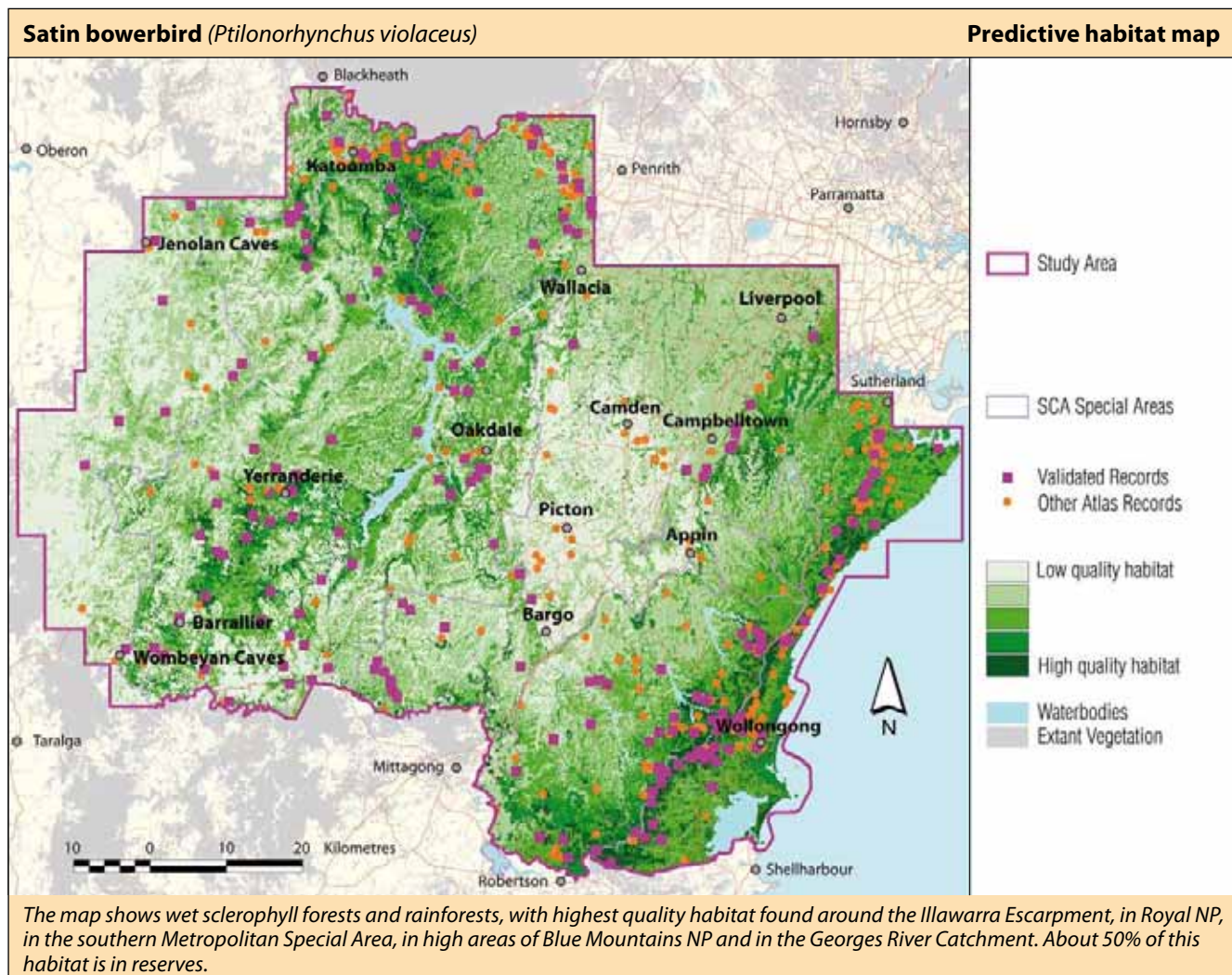
Photo: K. Madden, DECC

Cultural significance

The satin bowerbird is a totemic species for the Wodi Wodi of the Illawarra and other Tharawal communities of the south coast. It features in Dreamtime stories, including one that tells of the drastic repercussions a man suffered when he broke laws regarding killing and eating the bird. Tharawal words for the bird include bumbiang.

Threats

As large flocks may damage fruit crops in winter and spring, fruit growers can persecute them. Males can be strangled by the blue rings from the caps of milk bottles while they are collecting them for their bower.



Distribution

This species ranges from south-east Queensland through coastal NSW to the Strzelecki Ranges in Victoria. It has increased between 1984 and 2002 and is widespread across the coastal third of NSW, being common even in urban areas, with bowers seen in bushland parks and backyards.

The bird is common in the south-eastern highlands and in and around Sydney, though fewer sightings occur in dry areas, and at high altitudes in the southern highlands such as at Bathurst and Oberon. It lives in many reserves including Brindabella, Blue Mountains and Conjola NPs, and Jilliby SCA.

It is common in the study area, especially on the Illawarra Escarpment, in the Blue Mountains urban area and in Royal NP, especially along Lady Carrington Drive. The 2002–05 surveys found 140 new locations, generally in moist forests such as the sandstone gullies of the Metropolitan Special Area, around Jellore Creek in Nattai NP, in Burragarang SCA and on the Bindook Highlands. Surveys in 2006 on the Cumberland Plain found this species to be widespread and common, particularly in areas infested with African olive, such as the Razorback Range and around The Oaks.

How you can help

- > Join a bird-watching group – see 6.6 for details.
- > Plant native fruit trees on land you own or manage such as figs (*Ficus* spp.) or lilly pillis (*Syzygium* or *Acmena* spp.).
- > If you live near bushland, consider installing a cat run to stop your cat wandering outside your property and killing small birds and other wildlife.
- > Hide blue objects that the male may steal for his bower. The blue rings from the lids of milk containers are particularly dangerous as they can get caught around the bird's neck.

6.20 Short-beaked echidna (*Tachyglossus aculeatus*)

This monotreme (egg-laying mammal) is covered in long spines and has a long, tubular snout. Its front feet have flattened claws so it can dig in forest litter, burrow, and tear open rotting logs and termite mounds. The echidna uses its 18-cm-long sticky tongue to collect ants and termites which it then eats together with soil and nest material. In arid regions, it avoids temperature extremes by sheltering in caves or crevices during the day, while in more temperate regions it shelters under thick bushes, hollow logs, rock overhangs or piles of debris, or in a burrow, emerging to feed at dawn and dusk.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



Photo: N. Williams

Cultural significance

The echidna is an important traditional food animal for the Wodi Wodi, the coastal Illawarra tribe of the Tharawal. During an archaeological survey of the Woronora Plateau, echidnas were commonly depicted in rock shelters. Their spines were also used on skins and ornaments. Tharawal words include gununggwir and dhuradhural.

The echidna is also well-known in the non-indigenous community and is on the five-cent coin. The echidna was also a mascot for the 2000 Olympic Games in Sydney.

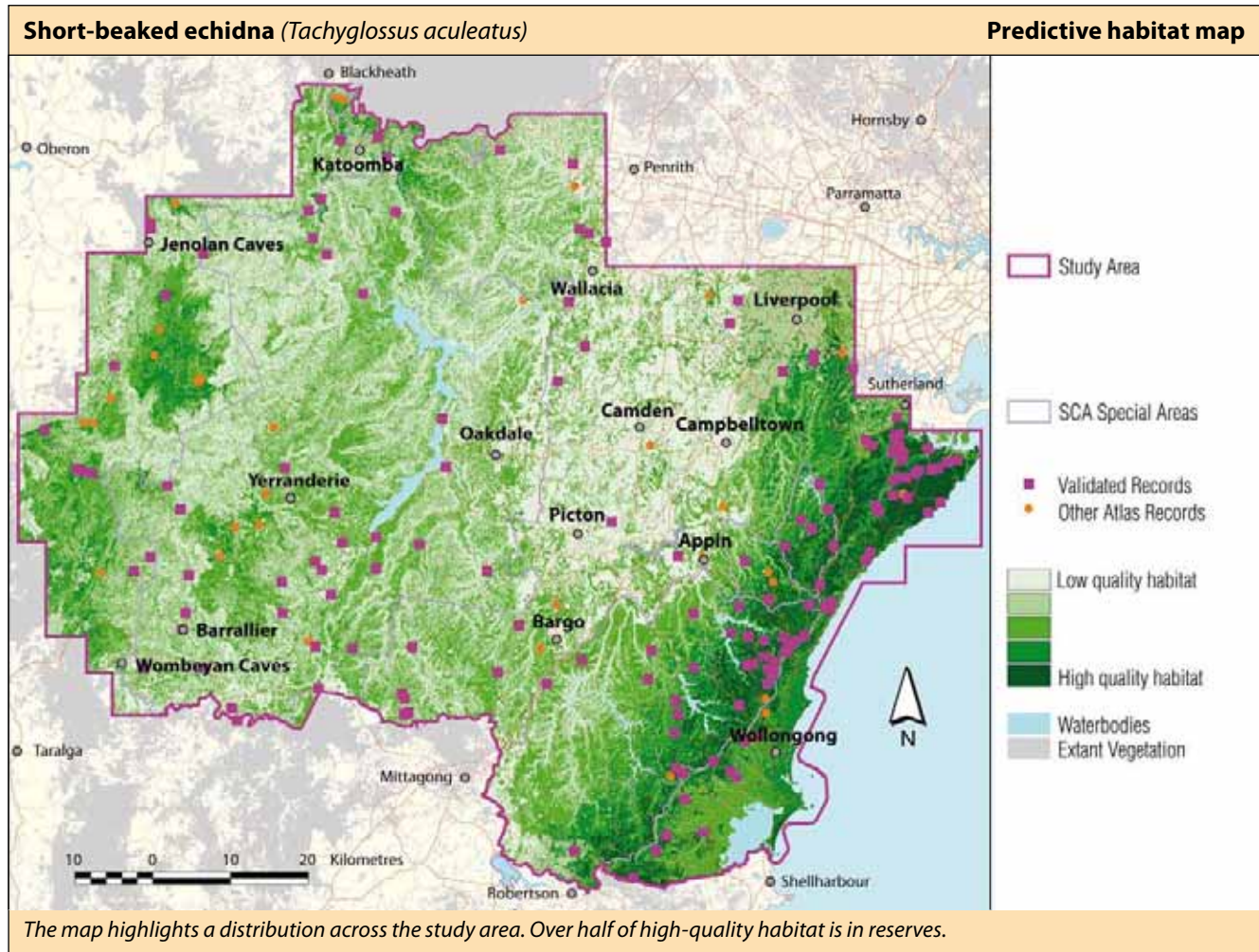
Threats

Threats include predation by dingoes, which occasionally eat adults; goannas, which may take juveniles; foxes; wild dogs and cats. Echidnas are also killed on roads, especially in the Royal NP and on the F6 freeway on the Woronora Plateau, and have declined on the Wollongong Coastal Plain and in western Sydney where clearing and urbanisation have destroyed habitat. The echidna may also be affected by invasive grasses, pesticides, overgrazing, the collection of fallen timber for firewood, increased fire frequency and other factors that affect its food supply and shelter sites.

Distribution

The species is distributed all over Australia, from regions that are covered in snow in winter to the central deserts. It lives in and around Sydney, though records are sparse in Wollemi, Yengo and northern Blue Mountains NPs. Echidnas are still frequently seen on the outskirts of Sydney, particularly near bushland in the northern suburbs.

Echidnas are common in the study area. They were seen in all 2002–05 survey areas or identified from their diggings in termite mounds or ant nests, from their distinctive cylindrical scats, or from dog and dingo scats. Surveys of the Cumberland Plain in 2006 found that they live in most large, intact vegetation remnants.



How you can help

- > Leave fallen timber on the ground as habitat and retain native trees and grasses on your property and on bushcare sites.
- > Do not let your dog wander into native bushland where it may kill echidnas and other native animals.
- > Echidnas follow one another and often cross the road at the same point year after year. If there is a place in your area where echidnas are regularly killed by cars, encourage your local council to erect signs warning drivers.

6.21 Spotted quail-thrush (*Cinlosoma punctatum*)

This medium-sized, sedentary ground-dwelling bird has an olive-brown back with bold black streaks, a grey breast, black streaks and spots on its sides, and flesh-coloured legs. It lives in dry, open sclerophyll forests and woodlands, usually on stony ridges and slopes with a sparse understorey and grassy groundcover. It turns over litter in search of insects, and also eats seeds, fruit and vegetation. It breeds on the ground, with its nest under or against a rock, fallen log or tussock.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Many

Legislative listing: Protected – NPW Act



Photo: G. Etherington

Threats

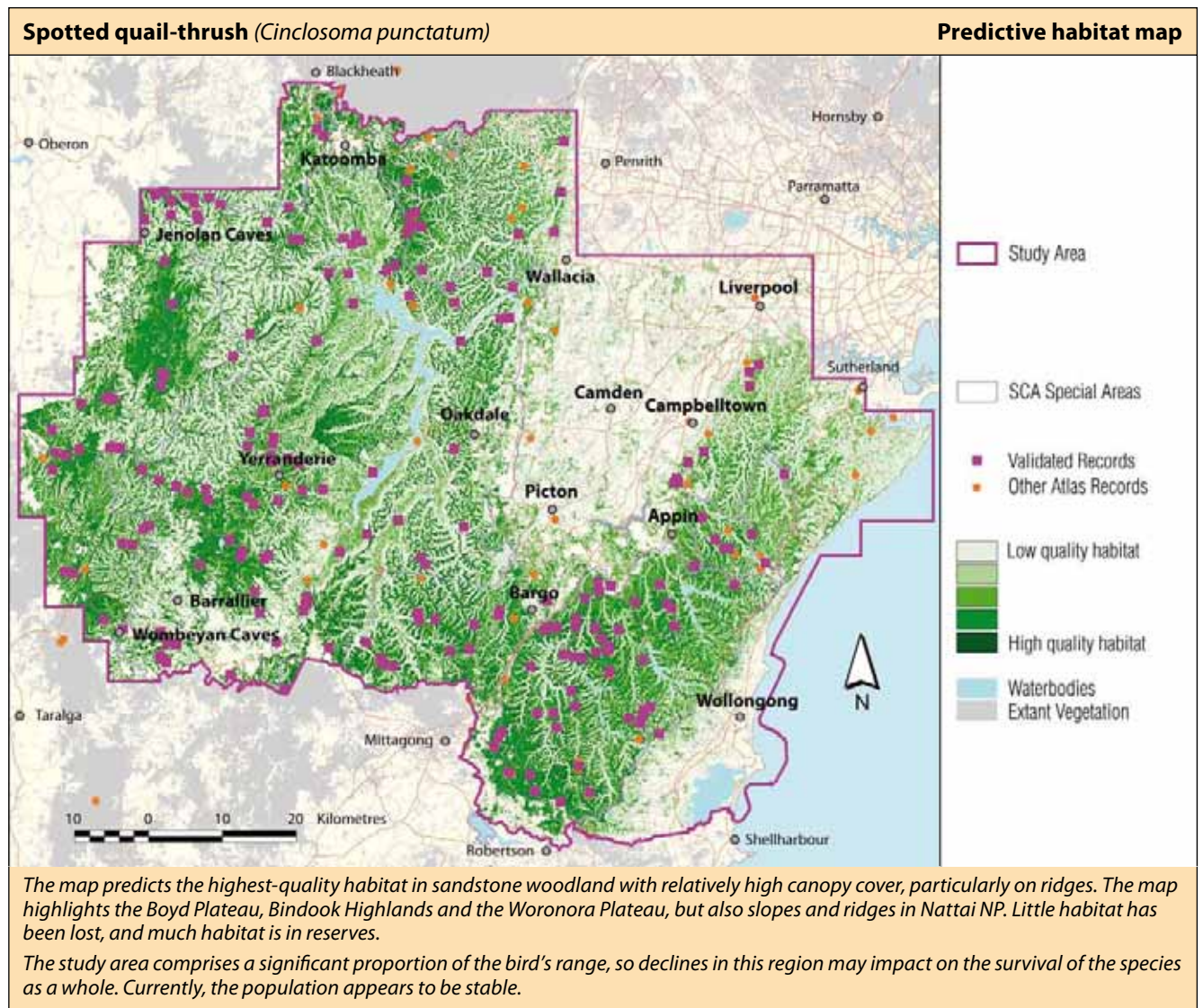
Threats include habitat clearance and fragmentation; habitat degradation due to urban development; predation by cats, dogs and foxes; the alteration of habitat by invasive weeds; the removal of dead timber and frequent fires.

Distribution

The bird lives in south-eastern Australia from Rockhampton in Queensland to eastern Tasmania and south-east South Australia. Populations have declined in some areas, most notably in the Mt Lofty Ranges near Adelaide where the bird was once common but is now locally extinct.

In NSW, it lives on the coast and ranges. It is common in the sandstone reserves in and around Sydney, and is rare in or absent from the Hunter and Capertee valleys, and the Cumberland and Illawarra Coastal plains. In the south-eastern highlands, records are more scattered. It does not live in open or extensively cleared landscapes.

In the study area, it is often seen in sandstone areas. During the 2002–05 surveys, there were over 140 records from Dharawal SCA, the Metropolitan Special Area, Nattai NP and most of Blue Mountains NP. This species is rare on the edges of the Cumberland Plain, with records in 2006 from box–ironbark woodland in Holsworthy Military Area and sandstone transition forest west of Mulgoa.



How you can help

- > Retain all fallen timber, and native trees and grasses, on bushcare sites and in bushland on your property, as feeding, resting and nesting habitat for the bird.
- > Join a bird-watching group to find out more about the bird – see 6.6 for details.
- > If you live near bushland, consider installing a cat run to stop your cat wandering outside your property and killing small birds and other wildlife.

6.22 Superb fruit-dove (*Ptilinopus superbus*)

This small, colourful rainforest pigeon lives in the canopy of its dense rainforest habitat, where, apart from its call, it can be hard to detect. It eats rainforest fruits but will also eat the berries of introduced plants like lantana (*Lantana camara*) and privet (*Ligustrum spp.*), and may help spread these weeds.

Status/direction of change: Extremely rare visitor/declining

Significance of study area: Non-core

Key habitat: Rainforests and wet sclerophyll forests (subtropical influences)

Legislative listing: Vulnerable – TSC Act

Threats

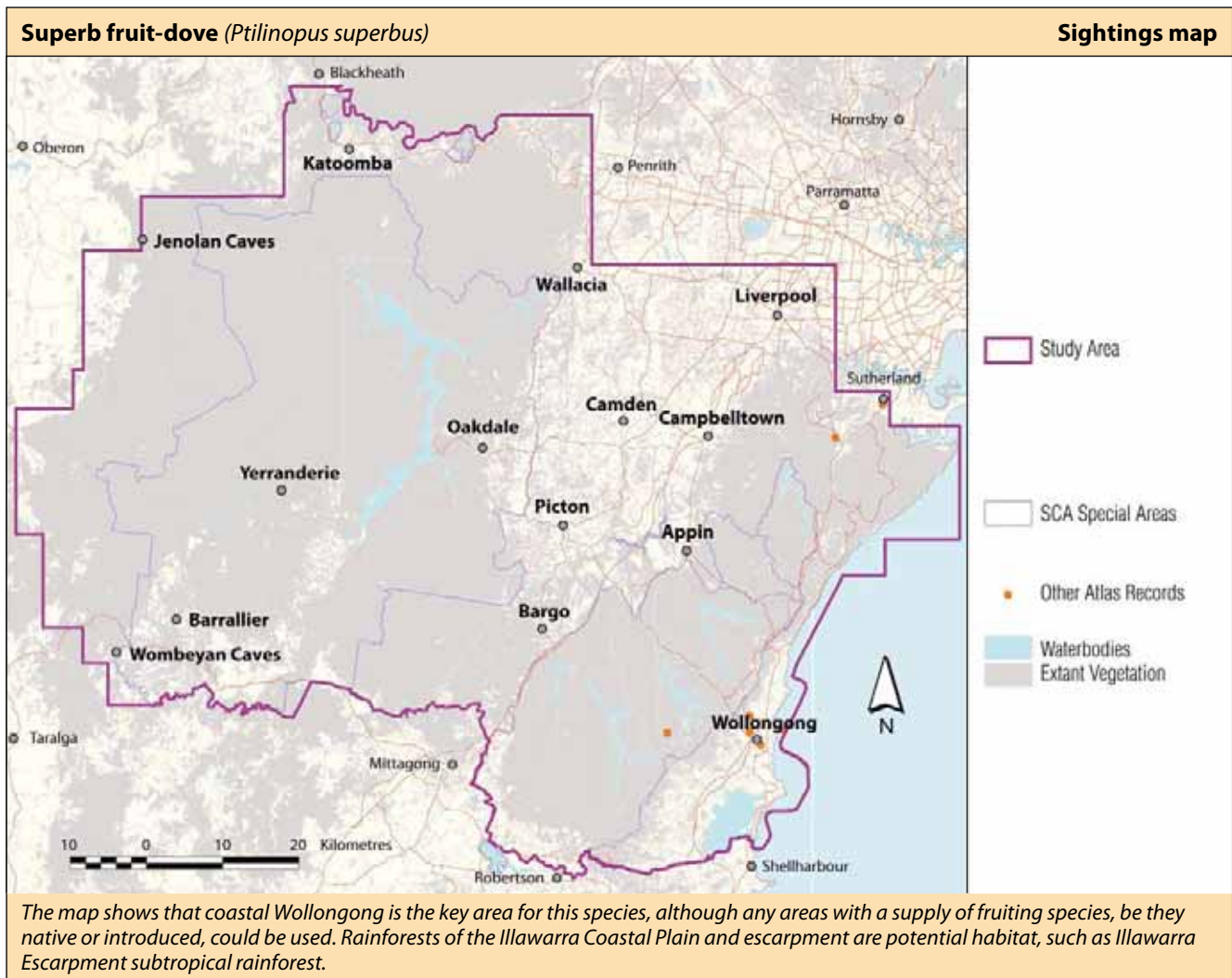
Clearance of rainforest, particularly in lowland areas, may limit the number of birds visiting NSW in the non-breeding season. As birds migrate at night, collisions with objects such as lighthouses and windows are common. Two records from Wollongong LGA and many records from Sydney are of birds that have flown into windows.

Distribution

The bird is found on the east coast of Australia, with records from as far south as Tasmania, though it is less common south of Townsville in Queensland which is its southern limit of breeding. It also lives in eastern Indonesia, through New Guinea to the Solomon Islands.

The NSW population may be as low as 100 birds, possibly migrants from the north. Most sightings are on the far north coast or in urban areas on the coast between Newcastle and southern Sydney, although occasionally birds have been seen as far south as Narooma.

In the study area, the bird is very rarely recorded, with only six records from the Wollongong area, one from Engadine in April 1995, and a male from Wattle Forest in Royal NP in 2002. There are occasional sightings in the Illawarra south of the study area, the most recent being at Jamberoo Mountain in February 2003.



How you can help

- > Report any sightings of this rare visitor or birds that have flown into windows to DECC by completing a sightings form – see 6.2 for details.
- > If you live in the Sutherland Shire or the Illawarra, plant native fruit trees in your garden such as figs (*Ficus* spp.) and lilly pillis (*Syzygium* and *Acmena* spp.)
- > Volunteer to participate in regenerating lowland rainforest on the Illawarra Coastal Plain – see 6.18 for details.

6.23 Superb lyrebird (*Menura novaehollandiae*)

This large, distinctive, mostly ground-dwelling bird has long legs, an amazing vocal repertoire and a spectacular tail. In late summer and autumn, males rake up soil to make display mounds on which they sing and dance. The bird can mimic other species, and even copies mechanical noises like chainsaws. The bird lives in moist forests, where it turns over litter, soil and rotting logs in search of insects.

Status/direction of change: Common resident/stable

Significance of study area: Core

Key habitat: Rainforests, wet sclerophyll forests

Legislative listing: Protected – NPW Act



Cultural significance

The bird is a symbol of peace and conciliation for the Tharawal people and is in many legends and Dreamtime stories in south-eastern Australia. One story from the Illawarra and Shoalhaven tells of a singing competition between the lyrebird and all the other birds, which the kookaburra won, leaving the lyrebird to retreat to dark gullies under mosses and ferns. Local names include Tharawal – calboonya; Gundungurra – jakular. The lyrebird is also significant for non-indigenous Australians, featuring on the ten-cent piece, and is widely recognised as an iconic species of the Australian bush.

Threats

Main threats are clearing of native forest for agriculture or its conversion to pine plantations, weed invasion and predation by cats, foxes and dogs. Other threats include frequent fire that affects foraging habitat, interference with nests in overhangs close to urban areas and road mortality.

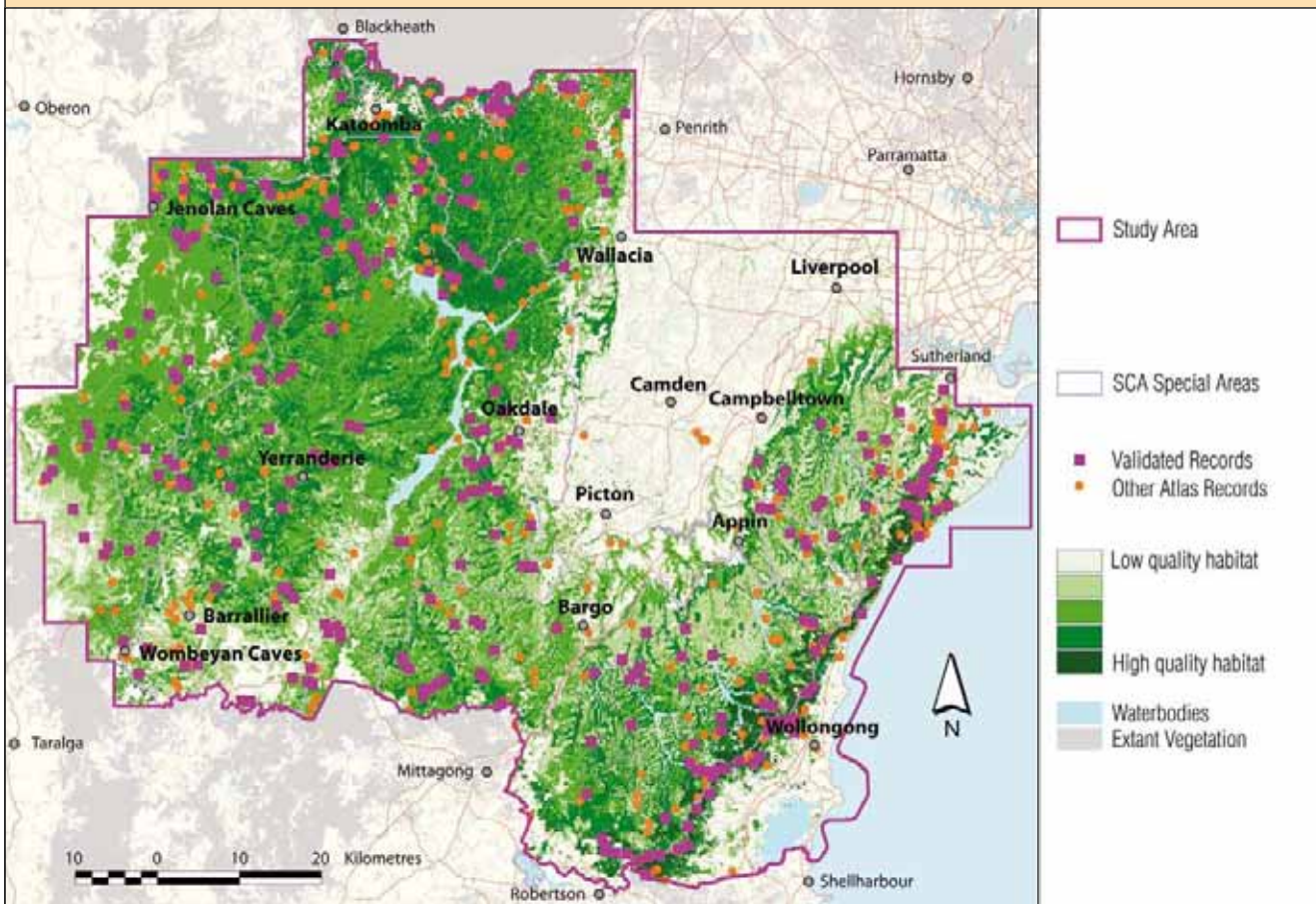
Distribution

The bird ranges from east of Melbourne along the coast and ranges to Stanthorpe in south-east Queensland. Populations have decreased in many areas, particularly in south-east Queensland, south and eastern Victoria and northern Sydney. The bird is still widespread and common in NSW, with fewer records on the eastern tablelands. In and around Sydney, it is common. In the south-eastern highlands, it lives in wet eastern areas, and is common around Kosciuszko NP. The bird also lives in many other NSW reserves.

In the study area, the bird is common except in dry open areas like the Cumberland and Illawarra Coastal plains and Burratorang Valley. The moist forests of the Illawarra Escarpment and the Hacking Valley in Royal NP have many sightings. During the 2002–05 surveys, over 300 records were collected, with the bird's loud distinctive call often being recorded. Systematic surveys of the Cumberland Plain in 2006 found the bird in sandstone transition forest along the Nepean and Bargo rivers in south-west Sydney and at Monkey Creek near The Oaks. These areas are large patches of remnant vegetation connected to the Woronora Plateau or southern Blue Mountains. Surveys in 2006–07 of Dharawal SCA and wet forests around Helensburgh found the lyrebird to be similarly common.

How you can help

- > If you live near bushland, consider installing a cat run to stop your cat wandering outside your property and killing birds and other wildlife.
- > Join a bird-watching group to learn more about this bird – see 6.6 for details.
- > Leave fallen timber and leaf litter on the ground as foraging habitat for the bird, in bushland on your property or on bushcare sites.
- > Do not let your dog or cat wander into native bushland where it may kill lyrebirds and other wildlife.
- > Protect rocky overhangs on your bushcare site or property, as lyrebirds build nests in such habitats.



The map predicts the best habitat to be tall forests and rainforests, particularly on the Illawarra Escarpment between the Hacking River Valley in Royal NP and Macquarie Pass NP and in the moist gullies of the southern Blue Mountains, such as the Jamison and Kedumba valleys below Katoomba. This map shows that the bird will also be found outside wet gullies, occasionally even on dry ridgetops. Much habitat is in reserves.

6.24 Tree-base litter-skink (*Lygisaurus foliorum*)

This very small, delicate skink is mostly brown with dark flecks on its back and white spots on its sides and limbs. It lives in fallen debris, eating mainly insects and spiders. Little is known about its breeding habits, but it is thought to lay only two eggs at a time.

Status/direction of change: Uncommon resident/
locally declining

Significance of study area: Non-core

Key habitat: Grassy box woodlands

Legislative listing: Protected – NPW Act



Threats

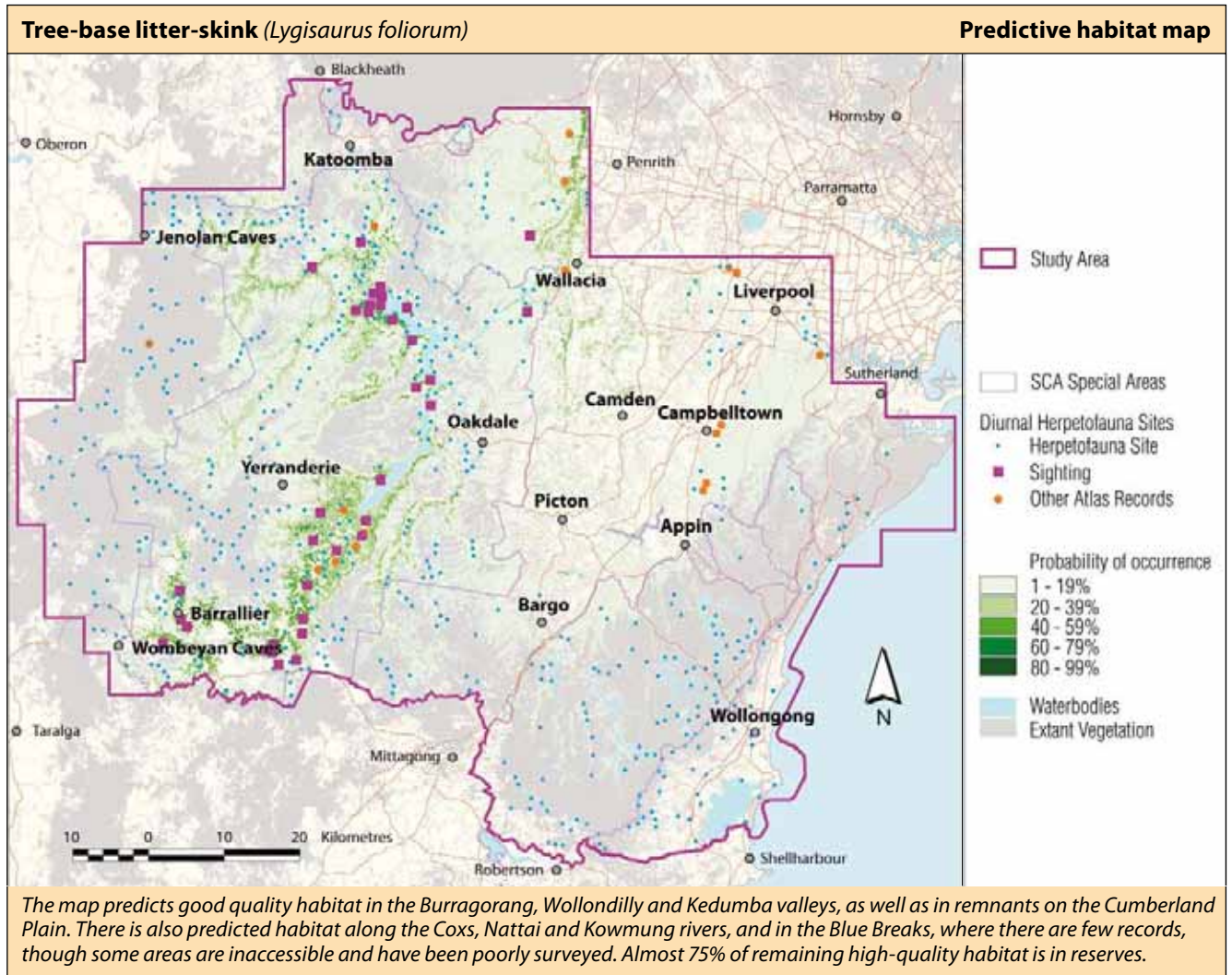
This species is poorly understood, but is probably threatened at a local level by habitat destruction and alteration for agriculture and urban expansion, frequent burning and habitat simplification due to grazing.

Distribution

This skink lives in the open woodlands of the coast and ranges of NSW and Queensland from south of Townsville to Sydney. It is patchily distributed in and around Sydney, occurring on the Cumberland Plain, in the Burragorang Valley, on the fringes and in valleys of Wollemi and Yengo NPs, and in the Hunter Valley.

In the study area, the skink lives mainly in the Burragorang Valley and on the Cumberland Plain in western Sydney, where it is rare as its former habitat is now largely fragmented and disturbed. It can still be found around Wedderburn and Fairfield. Surveys in 2006 have found this species around Castlereagh and in Shane's Park north of the study area. The skink may live in other patches of intact grassy box woodland in western Sydney.

The 2002–05 project has extended the known range of the skink south to Wollondilly Valley around Bullio and into the south-eastern highlands. Surveys have also found that in the Burragorang and Wollondilly valleys, the skink is quite common in the white box, ironbark and forest red gum woodlands of the valley floor; even in isolated patches of vegetation. As similar habitats exist south and west of this area, the known range of this species may continue to expand if it is found through future survey work on the western slopes and in the southern highlands. Despite the loss of habitat on the Cumberland Plain, the species seems secure in the study area as large populations exist within the reserves of the southern Blue Mountains.



How you can help

- > Join a local bushcare group or create your own to regenerate the grassy woodlands of the Cumberland Plain – see 6.1 for details.
- > Retain fallen timber and leaf litter and native grasses and herbs on your property or bushcare site, particularly on the Cumberland Plain.

6.25 Varied sittella (*Daphoenositta chrysoptera*)

This small tree-dwelling bird has a compact body, short tail, broad rounded wings and a long, slender upturned bill. Plumage varies around Australia, though the adults are always greyish above and white below, with black upper wings and a black tail with a prominent white tip. The bird lives in open eucalypt woodland and forest, mallee, and coastal scrub, including some scrubby parks and gardens. It is more common where there are trees with rough, fibrous or scaly bark, in which it will forage in groups down trunks and along large branches for insects.

Status/direction of change: Common resident/locally declining

Significance of study area: Core

Key habitat: Many

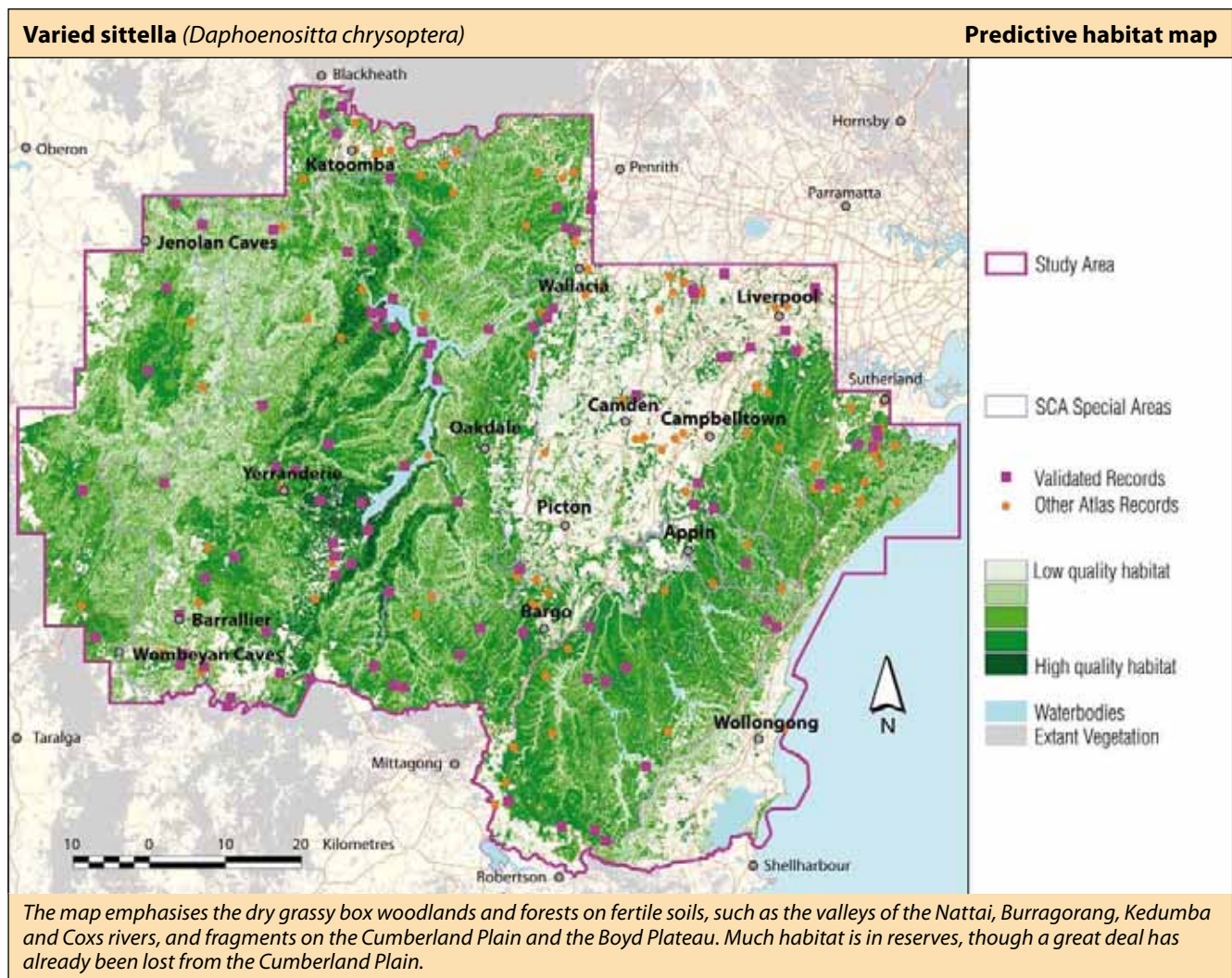
Legislative listing: Protected – NPW Act



Photo: G. Dabbb

Threats

Clearing of open woodlands has reduced the bird's numbers in some parts and it is declining in the sheep-wheat belt (the western slopes of the Great Dividing Range and adjacent plains) due to widespread clearing for agriculture. Other threats are removal of timber, eucalypts or shrubs; and inappropriate fire regimes. The exposed position of the nest, long incubation period of the eggs and long time spent in the nest when young may result in low nesting success.



Distribution

The bird lives throughout Australia except parts of north-west Western Australia and north-east South Australia. In NSW it lives everywhere except in the extreme north-west. There has been a 20% decline in the frequency of reporting between 1984 and 2002 in and around Sydney and in the south-eastern highlands. The bird is still widely distributed in the Sydney area, although it does not live in rugged sandstone environments such as the Erskine Range, Morton and Wollemi NPs, rainforests, or cleared or naturally open areas such as around Oberon and Cooma and below the Illawarra Escarpment.

In the study area, over 60 new locations were recorded during the 2002–05 surveys. Surveys of the Cumberland Plain in 2006 have detected the bird, most often on the shale–sandstone forests that fringe the plain.

How you can help

- > Join a bird-watching group to find out more about this bird – see 6.6 for details.
- > Join a local bushcare group or create your own if you live near degraded bushland – see 6.1 for details.

6.26 White-winged chough (*Corcorax melanorhamphos*)

This large black bird has white wing patches, usually only visible in flight, red eyes and a long curved bill. It lives in small groups of five to ten, though can occur in flocks of up to 100. It has two main calls, one being a series of mournful whistles and the other a harsh grating 'hass'. The bird has a large feeding territory (up to 1000 hectares), feeds mainly on the ground, and eats insects and some seeds. It is a communal breeder and builds a large mud nest in which it lays three to five eggs.

Status/direction of change: Locally common resident/locally declining

Significance of study area: Core

Key habitat: Woodland and forest on higher-fertility soil

Legislative listing: Protected – NPW Act



Threats

Threats are poorly known, but are probably reduction of habitat through land clearing for agriculture and urbanisation; habitat fragmentation, especially as the bird is a communal breeder; and poisoning from baits used for feral animal control. Other threats may include overgrazing of grassy woodlands, the spread of introduced grasses altering the ground layer, removal of dead timber, and predation by cats and foxes.

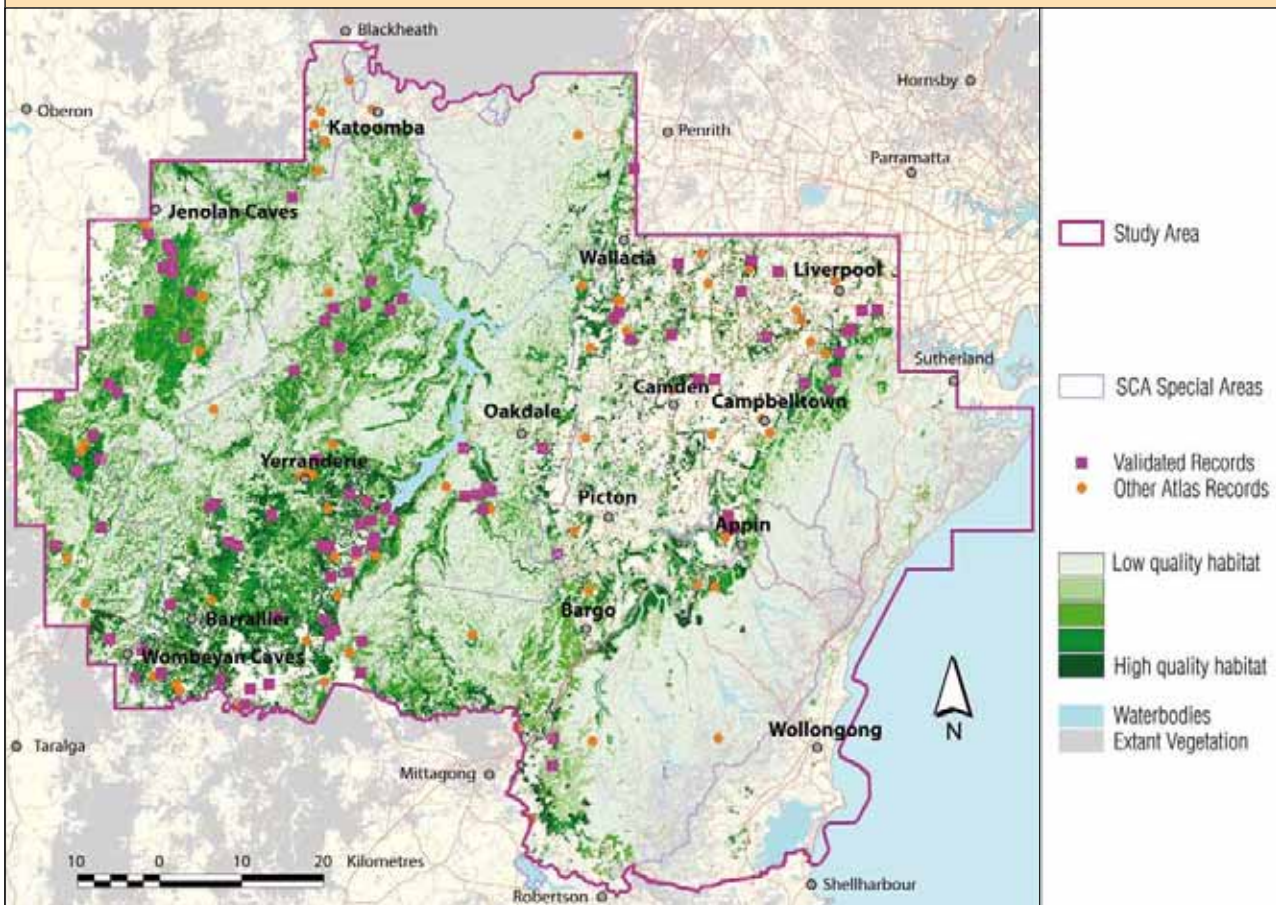
Distribution

The bird is endemic to south-eastern Australia although it has declined throughout its range between 1984 and 2002. It lives throughout much of NSW and is common on the outskirts of Sydney and in the south-eastern highlands, though it does not live in Sydney's eastern suburbs or on the Illawarra Coastal Plain. It is rare in sandstone reserves such as Wollemi NP though it lives in Goulburn River, Scheyville and Tarlo River NPs and Black Andrew and Winburndale NRs.

In the study area, it has declined on the Cumberland Plain. It is common further west, living mainly on the Boyd Plateau and in Burragorang and Wollondilly valleys. It is less common in the east, though scattered populations occur on the Cumberland Plain, particularly around Holsworthy Military Area and in the Bargo–Wilton area. The 2002–05 surveys found the bird was common in the rain-shadow valleys of the southern Blue Mountains where 61 new locations were recorded.

How you can help

- > See 6.25 – Varied sittella.
- > Do not let your dog wander into native bushland where it may kill choughs and other wildlife.
- > If you live near bushland, consider installing a cat run to stop the cat hunting outside your property and killing choughs and other wildlife.
- > Retain fallen timber, native grasses and herbs in bushland on your property or on bushcare sites as feeding habitat for the chough.



The map highlights grassy box woodland in low rainfall areas on fertile soils, including western Kanangra-Boyd NP, Tallygang Mountain, the Burragorang Valley, Scotts Main Range and the Cumberland Plain. Much habitat is in reserves, particularly Kanangra-Boyd, Blue Mountains and Nattai NPs. On private land on the Cumberland Plain and around Tallygang Mountain, much habitat has been lost.

6.27 Wompoo fruit-dove (*Ptilinopus magnificus*)

This large, colourful rainforest pigeon is found in tall subtropical or tropical rainforests. It feeds on fruits, vines and palms, usually in the dense canopy where it is often detected by its distinctive call.

Status/direction of change: Locally extinct

Significance of study area: Non-core

Key habitat: Rainforests and wet sclerophyll forests (subtropical influence)

Legislative listing: Vulnerable – TSC Act

Threats

The population in the Illawarra has been reduced by hunting for food and sport, and to prevent damage to fruit crops; museum collecting; and habitat destruction. Removal of lowland rainforest, which the bird uses in the non-breeding season, limits its population size in northern NSW. Elsewhere, its rainforest habitat has been greatly reduced by clearing, logging and inappropriate fire regimes.

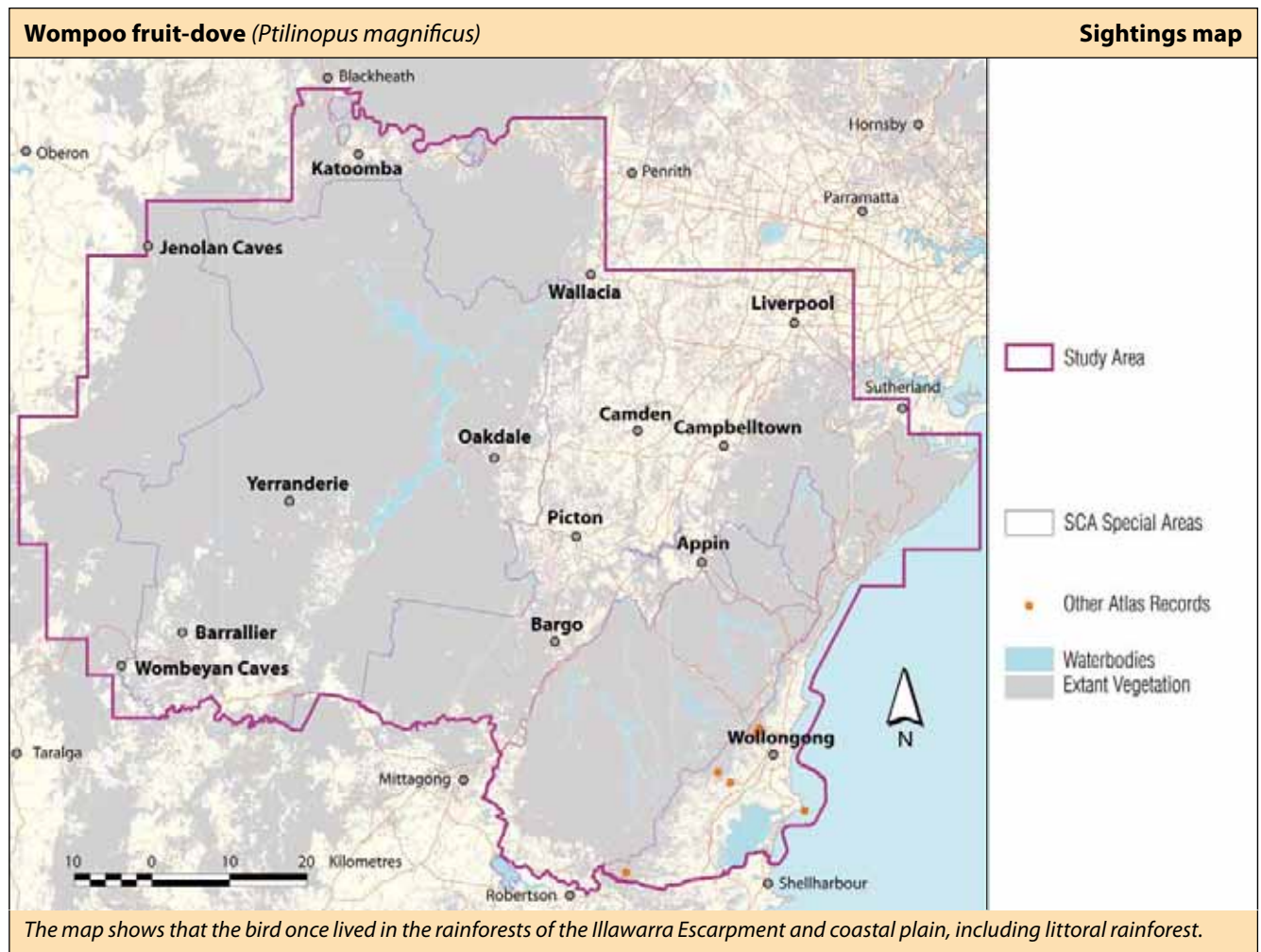
Distribution

A number of subspecies live along the eastern coast of Australia and New Guinea, with the largest race (*magnificus*) in NSW, where the bird mainly lives on the north coast with occasional sightings in and around Sydney, at Collaroy, Newcastle and most recently Berkeley Vale on the Central Coast.



Photo: DECC

The bird is now probably extinct in the study area, though it was once common in the rainforests of the Illawarra Escarpment and coastal plain, south to Cambewarra Mountain. It was moderately common in the 1840s, with the most recent record being from Mt Keira in 1920. As the bird is a sedentary species, it will be difficult for it to re-establish naturally in Wollongong from the nearest resident population in Barrington Tops.



How you can help

- > Join a bird-watching group to find more about this former resident of the Illawarra – see 6.6 for details.
- > Report any potential sightings of this bird to your local national parks office or complete a sightings form – see 6.2 for details.

6.28 Yellow-bellied glider (*Petaurus australis*)

This nocturnal, tree-dwelling marsupial needs mature hollow-bearing trees in which to hide during the day. It has dark grey fur above and whitish-yellow to orange fur underneath, with large bare ears. It is heard more often than seen, emitting a distinctive throaty shriek when it is threatened. It eats eucalypt nectar, sap, manna and insects found under shedding bark. Its extraction of sap from eucalypt bark leaves distinctive, deep V-notched incisions in the trunks of selected trees in its territory.

Status/direction of change: Locally common resident/stable

Significance of study area: Core

Key habitat: Wet sclerophyll and open forests

Legislative listing: Vulnerable – TSC Act. NSW recovery plan (DEC various b)



Photo: J. Winter, DECC

Threats

Threats are loss of hollow-bearing trees through clearing, fragmentation and timber extraction; habitat loss from logging; predation by cats and foxes; and high-intensity fire that reduces food resources and populations.

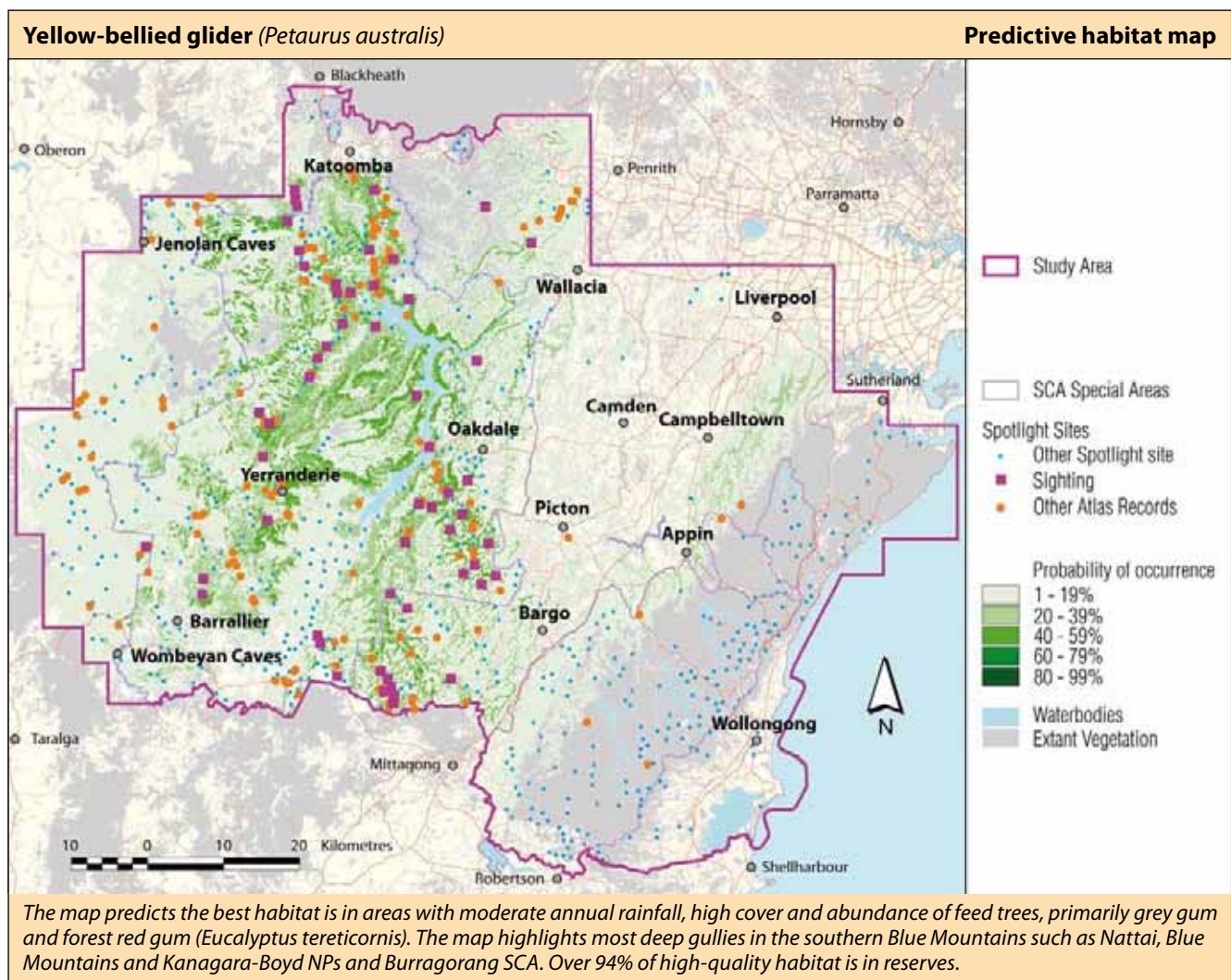
Distribution

The glider lives in the tall, open sclerophyll forests of eastern Australia. In and around Sydney, its population strongholds are the tall, moist forests of the Central Coast and Watagan Ranges. It lives in the southern Blue Mountains and in Maragle, Bago and Buccleuch state forests.

The glider was thought to be an ecological specialist with poor recovery potential, and was thought to be sparse in the study area, as there are few well-timbered forests for it to live in.

New information collected as part of the 2002–05 project shows that the glider is widespread and common in the study area. Surveys recorded 161 new locations, 80% of these being in the southern Blue Mountains, particularly Nattai NP, the moist gullies of Blue Gum Creek and the forests around Mt Jellore, Scotts Main Range and the Coxs and Kedumba valleys. These areas have many gliders, even following the severe wildfires of 2001. For example, a group of at least five was recorded in Blue Gum Creek in Nattai NP one year after it had been subjected to an extreme fire.

The western edge of the Woronora Plateau has suitable feed trees such as grey gum (*Eucalyptus punctata*), and there is an anecdotal report of old incisions in a grey gum. However, the 2002–05 survey failed to confirm the presence of this animal on the plateau and it may have declined in this area. Surveys of the Cumberland Plain in 2006 found gliders around Mulgoa and north of the study area at Cattai and Wilberforce, but not in the east, for example along Nepean River, though further investigations need to be undertaken.



How you can help

- > Retain hollow bearing trees on your land or on bushland sites.

6.29 Other animals of lower conservation priority

The following threatened species are listed under the TSC Act (with the exception of the red-necked pademelon, a regionally significant species), and are either extinct in the study area or the area contains only peripheral habitat.

Black-necked stork or Jabiru (*Ephippiorhynchus asiaticus*) Peripheral habitat

This bird is an extremely rare visitor. It was more plentiful in the past but most habitat has been lost. Three sightings have been made in Wollongong, the last in 1977. Another three unconfirmed records are from the Cumberland Plain. A single female was seen on the Georges River, north of the study area, in May 2005.

Black-tailed godwit (*Limosa limosa*) Peripheral habitat

This bird is a rare summer visitor to freshwater and saltwater habitats. It was seen at Tom Thumbs Lagoon in 1955, around Lake Illawarra and on the mouth of the Hacking River, and recently in December 2006 at Tallawarra Power Ash Ponds in Wollongong.

Blue-billed duck (*Oxyura australis*) Peripheral habitat

This small diving duck usually lives in deep freshwater wetlands. It is an extremely rare visitor and there are only two records; a bird at Cobbitty in 1980 north of the survey area and one at Wollongong Botanic Gardens in 1996. It has been occasionally seen nearby at Killalea Lagoon and Cecil Hoskins NR.

Brush-tailed bettong (*Bettongia penicillata*) Locally extinct

This species is extinct in most of mainland Australia. There are three old records from Balmoral, near Bargo, in the southern highlands, the last being from 1906. The reasons for its decline include clearing of habitat for agriculture, competition with grazing animals and predation by cats and foxes.

Brush-tailed phascogale (*Phascogale tapoatafa*) Locally extinct

There is one record of this animal – an undated Australian Museum record from Camden Park. It is unlikely that this marsupial still lives in the region. It has probably been lost due to habitat clearance and predation by cats and foxes.

Eastern quoll (*Dasyurus viverrinus*) Locally extinct

This animal is generally considered extinct on mainland Australia. The species declined in the early twentieth century, possibly from disease, and only managed to recover in Tasmania. There are undated Australian Museum records from Campbelltown, Colo Vale and Woodford. The only other sightings are from the Illawarra where it was common in the 1920s. The last record was at Robertson in 1970, with another unconfirmed animal killed nearby by a landholder in 1980.

Freckled duck (*Stictonetta naevosa*) Peripheral habitat

Normally a bird of inland waters, this duck is an extremely rare visitor, primarily during droughts. It has been seen around Wollongong, and the CSIRO has specimens from Avon Dam collected in April 1979. The most recent records are from Lake Fitzpatrick in Mt Annan Botanic Gardens in February 2003 and from Lake Illawarra, at Warrawong and Koona Bay in May 2003.

Giant barred frog (*Mixophyes iteratus*) Locally extinct?

This frog is chiefly a north coast species in NSW with an isolated population in the Watagan Ranges (west of Gosford). It is uncertain whether this frog ever lived in the study area or whether it has become locally extinct.

There are only two Australian Museum records, from Warrimoo in 1968 on a creek flowing into the Nepean River north of the study area.

Little bentwing-bat (*Miniopterus australis*) Peripheral habitat?

In early 2007 a roost of little bentwing-bats was found in a disused rail tunnel near Otford in the south of the study area. This species is now confirmed for the study area though it is probably highly localised in occurrence. Further study will help to assess the importance of the study area to this species. A museum specimen also exists from Wombeyan Caves, although this is possibly a mislabelled eastern bentwing-bat, as this bat would normally be found in wet forests near the coast.

Magpie goose (*Anseranas semipalmata*) Locally extinct

This goose was recorded in the early years of European settlement in Sydney and the Illawarra Coastal Plain. There is one record from 2003 from Macquarie Fields. It probably declined due to the loss of wetlands and overhunting by Europeans.

Osprey (*Pandion haliaetus*) Peripheral habitat?

This fish-eating raptor of coastal and, less commonly, inland waterways is an extremely rare visitor to Lower Nepean and Hacking rivers and around Lake Illawarra. The most recent records are from near the Nepean River at Glenleigh in 2003 and a bird sighted in August 2005 on the Georges River at Oatley. Additionally, this species was nesting on the Narrabeen Lakes, north of the study area, in 2005. In 2007, a single osprey has been regularly seen at Maianbar on Port Hacking and appears to live in the area.

Osprey



Photo: G. Robertson

Painted honeyeater (*Grantiella picta*) Locally extinct?

The bird once uncommonly visited shale areas with plentiful mistletoe. Individuals may have lived on the southern part of the Cumberland Plain, but the last record was at Castlereagh in 1960. It probably declined due to habitat loss.

Painted snipe (*Rostratula benghalensis australis*) Peripheral habitat?

This bird is an extremely rare visitor to wetlands with a dense vegetative cover and muddy flats. There is an undated specimen from Campbelltown in the Australian Museum. There are two more records from the early 1970s and an undated record from 'near Badgerys Creek' and Woolooware Bay, north of the study area. The bird's nocturnal and secretive habits may mean it is under-recorded.

Parma wallaby (*Macropus parma*) Locally extinct

Described as common until the mid-1920s around Coalcliff, Helensburgh and Royal NP, by the 1960s there were only scattered records. Two groups were seen in Cataract Catchment in 1969. It has not been recorded since that time and now appears to be locally extinct.

Red-necked pademelon (*Thylogale thetis*) Locally extinct

This pademelon has become locally extinct in the last 20 years. It was once abundant and widespread, preferring areas with dense undergrowth along and behind the Illawarra Escarpment. It firstly disappeared from the Illawarra Coastal Plain and around Wedderburn, possibly due to predation from foxes and cats. Fires in 1965 caused the extinction of other groups on the Woronora Plateau and on the escarpment around Bulli Pass. In the late 1980s, there was a small population north of Bald Hill and in several places along the escarpment and around Avon and Nepean lakes.

Rufous bettong (*Aepyprymnus rufescens*) Locally extinct

This species, like many other medium-sized mammals, experienced a rapid decline after European colonisation, probably due to habitat loss and predation by cats and foxes. The only record is an undated Australian Museum specimen from Campbelltown.

Tasmanian bettong (*Bettongia gaimardi*) Locally extinct

This bettong is presumed to be extinct on the Australian mainland, with a different subspecies (*cuniculus*) that is restricted to Tasmania considered threatened. The only records are undated Australian Museum specimens from Campbelltown and bones collected from Wombeyan Caves that are in the Australian National Wildlife Collection. The species probably declined due to habitat loss, predation by cats and foxes and competition with rabbits.

7. Pest animals

Unlike the other chapters, this chapter contains profiles of animals that threaten native animals by preying on them or competing with them for food, habitat and other resources. The aim is therefore to reduce the negative impacts of these animals on native species, water quality or human activities.

In this chapter, EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), IUCN = International Union for the Conservation of Nature, NP = national park, NPW Act = *National Parks and Wildlife Act 1974*, NR = nature reserve, RP = regional park, SCA = state conservation area, SF = state forest and TSC Act = *Threatened Species Conservation Act 1995*.

7.1 Common myna (*Acridotheres tristis*)

This bird is native to India and was introduced to Australia in the 1860s to control insect pests on farmland. Since the 1960s, it has become common in towns and cities, and in open grassy box woodlands with hollow-bearing trees. It nests in hollows, cliffs, buildings, other structures or thick tangles of vegetation, raising two broods of one to six chicks per year. The birds will roost communally in thick, exotic vegetation such as Canary Island date palms (*Phoenix canariensis*), Mediterranean cyprus (*Cupressus sempervirens*) or ivy (*Hedera* spp.). It will eat almost anything, including insects, fruits and vegetables, chicks, eggs, lizards and food scraps. It is aggressive, and often bullies its own and other species for food, nesting sites or territories.

Status/direction of change: Common resident/increasing

Key habitat: Urban, rural and open grassy woodlands

Legislative listing: Unprotected– NPW Act. One of 100 world's worst invaders (IUCN 2005).



Photo: G. Dabbb

Impacts

The most frequently reported bird in Sydney, this bird is formally recognised as a conservation problem only in the ACT. It evicts native birds and their eggs or chicks from their nests, including parrots, laughing kookaburras (*Dacelo novaeguineae*) and dollarbirds (*Eurystomus orientalis*). It will also outcompete mammals that depend on tree hollows, such as sugar gliders (*Petaurus breviceps*), white-striped freetail-bats (*Tadarida australis*) and common brushtail possums (*Trichosurus vulpecula*). In rural areas, it competes for food and habitat with threatened species such as the superb parrot (*Polytelis swainsonii*) and brown treecreeper (*Climacteris picumnus*).

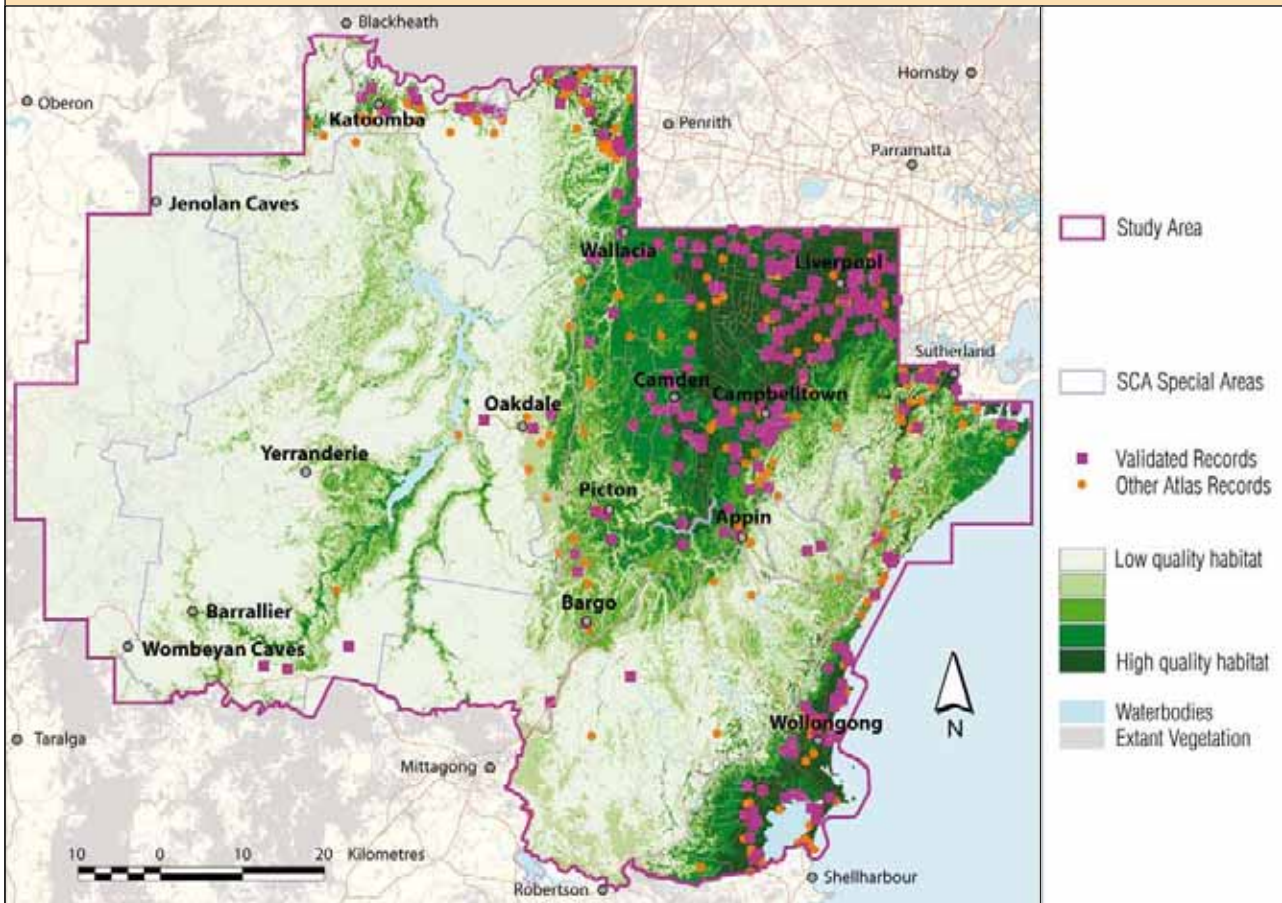
Distribution

Nationwide, sightings have increased between 1984 and 2002. In NSW, many more birds have been seen on the north coast and in Nandewar in the last ten years. In and around Sydney, the bird lives mainly in urban areas, in small urban reserves such as Sydney Harbour and Werakata NPs and Western Sydney RP, and on the edges of large reserves.

In the study area, the bird lives on the coast and Cumberland Plain, in the towns of the Blue Mountains and in cleared areas such as along Wombeyan Caves Road, at Avon Dam and at Darkes Forest. The birds have spread further away from urban areas over the last ten years. However, most intact native vegetation, particularly vegetation on sandstone, is not suitable habitat.

How you can help

- > Replace thick, exotic trees in your garden such as Canary Island date palms, Mediterranean cyprus or ivy with eucalypts or other native species, and encourage your council to plant native rather than exotic trees on streets and in parks.
- > Plant native flowering bushes such as bottlebrushes and grevilleas to encourage native birds such as honeyeaters and lorikeets that chase away mynas. However, as these native birds also chase away little insect-eating birds such as fairy wrens (*Malurus* spp.), plant a mix of low spiky bushes to ensure wrens have a place to hide.
- > Check that mynas are not taking over nest boxes in your garden. If they are nesting in your roof eaves or shed, destroy their nests to stop them laying eggs and reproducing.
- > Do not encourage these birds by leaving food such as dog biscuits around.



The map predicts habitat in cleared, flat, warm areas on the Cumberland and Illawarra Coastal plains, in the Blue Mountains urban area and in the Burragorang Valley, though some of this habitat is unoccupied as the bird has not yet discovered those areas. Less than 10% of habitat is in reserves so the bird is not a great threat to protected areas, except the Burragorang Valley, which mynas may colonise in the future, where many threatened species live.

7.2 Common starling (*Sturnus vulgaris*)

This medium-sized European native was released in south-eastern Australia between 1850 and 1880. It spread rapidly and by 1926 was established throughout much of NSW. It is common in urban areas, on cleared agricultural lands and in native open woodland, reedbeds and riparian vegetation. It nests in hollows in trees, buildings, fence posts or cliffs where it raises up to three clutches of three to six chicks a year. It is omnivorous, eating insects, seeds and fruit. It will roost communally, usually choosing thick, exotic vegetation such as Canary Island date palms (*Phoenix canariensis*) which may provide better heat conservation than open-canopied trees.

Status/direction of change: Common resident/increasing

Key habitat: Urban, rural and open grassy woodlands

Legislative listing: Unprotected – NPW Act. One of 100 world's worst invaders (IUCN 2005).



Photo: G. Dabb

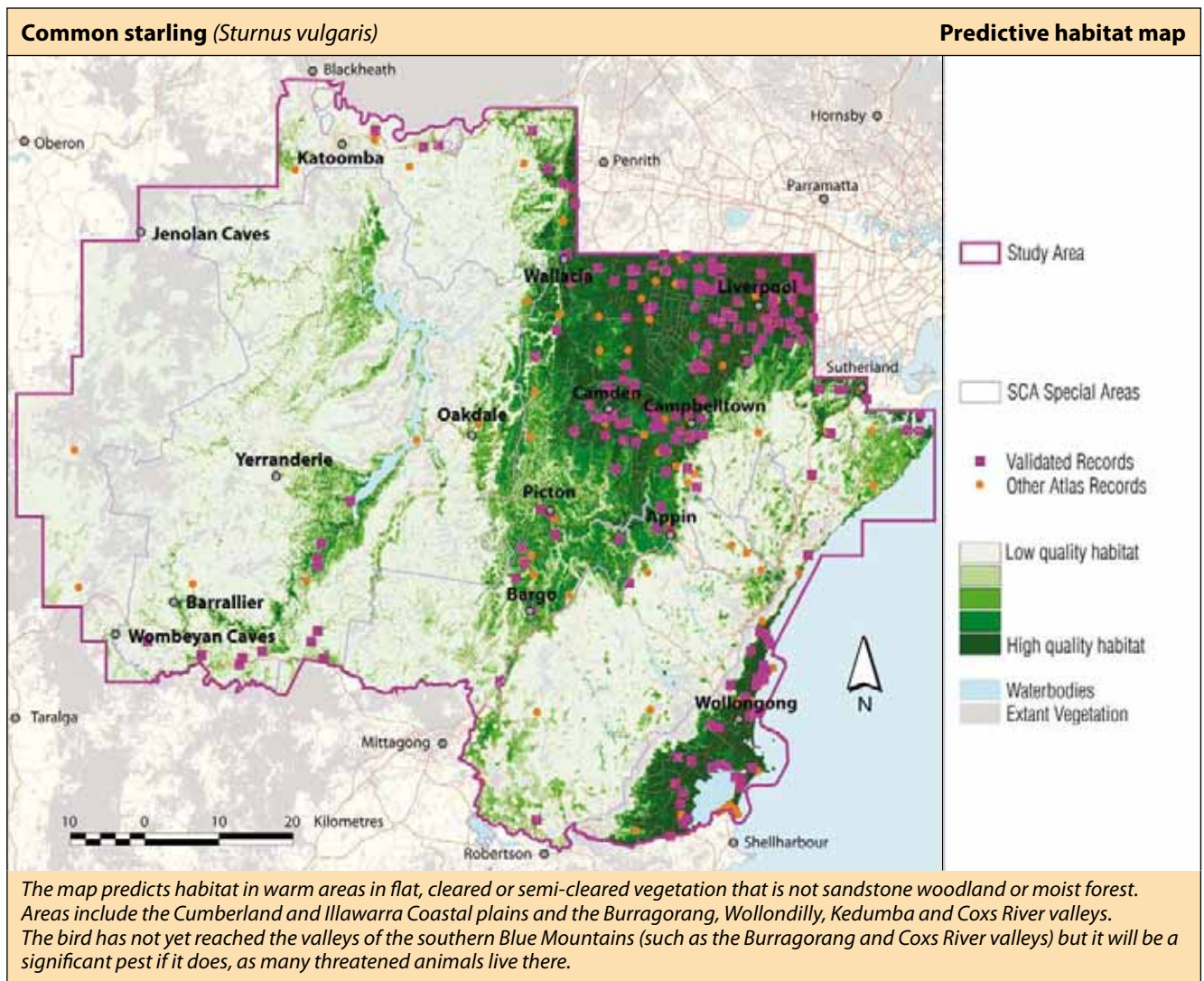
Impacts

Starlings are a pest of the grain and fruit industry, particularly grape growing. This bird has not been formally listed as a conservation problem in Australia. Its main impacts are competition for hollows with other birds, including rare and declining species such as the superb parrot (*Polytelis swainsonii*) and brown treecreeper (*Climacteris picumnus picumnus*); and contamination of nesting sites. Starlings coat their nest cavities with a deep lining that quickly becomes contaminated with parasites, so hollows become unsuitable for other species. They also compete for food resources with some native species, and help spread invasive weeds.

Distribution

This is the most widely distributed of all introduced birds in NSW. Nationally, between 1984 and 2002 this species showed no change in frequency or distribution, though regional increases were noted in and around Sydney. It mostly lives in urban and rural areas but is sometimes seen in metropolitan national parks such as Lane Cove, Sydney Harbour and Werakata NPs and Western Sydney RP, and on the edges of large reserves near agricultural areas.

In the study area, the birds live in cleared and modified areas on the Illawarra Coastal and Cumberland plains, along Wombeyan Caves Road, in the southern parts of Warragamba Special Area, in the Burragorang Valley and around Yerrinbool. During the 2002–05 surveys, this species was not found in undisturbed sandstone vegetation.



How you can help

- > Replace thick, exotic trees in your garden such as Canary Island date palms with eucalypts or other native species, and encourage your council to plant native rather than exotic trees on streets and in parks.
- > Plant native flowering bushes such as bottlebrushes and grevilleas to encourage native birds such as honeyeaters and lorikeets that chase away mynas. However, as these native birds also chase away little insect-eating birds such as fairy wrens (*Malurus* spp.), plant a mix of low spiky bushes to ensure wrens have a place to hide.
- > If starlings make a nest in your roof eaves or shed, destroy it so they cannot lay eggs and reproduce.

7.3 Eurasian blackbird (*Turdus merula*)

This medium-sized bird is black with a yellow–orange beak and eyering (male) or dark brown with a streaked throat and yellow-brown bill (female). It is a native of Europe and India and was introduced to Australia in the 1860s and 1870s. The Sydney population came from an aviary release in the 1940s. It lives in gardens, parks and orchards, and in moist native forests, particularly where dense weeds provide cover. It builds a cup-shaped nest in which it lays three to five eggs. It eats insects, seeds, fruits and berries on the ground or in low shrubs.

Status/direction of change: Uncommon resident/increasing

Key habitat: Many

Legislative listing: Unprotected – NPW Act



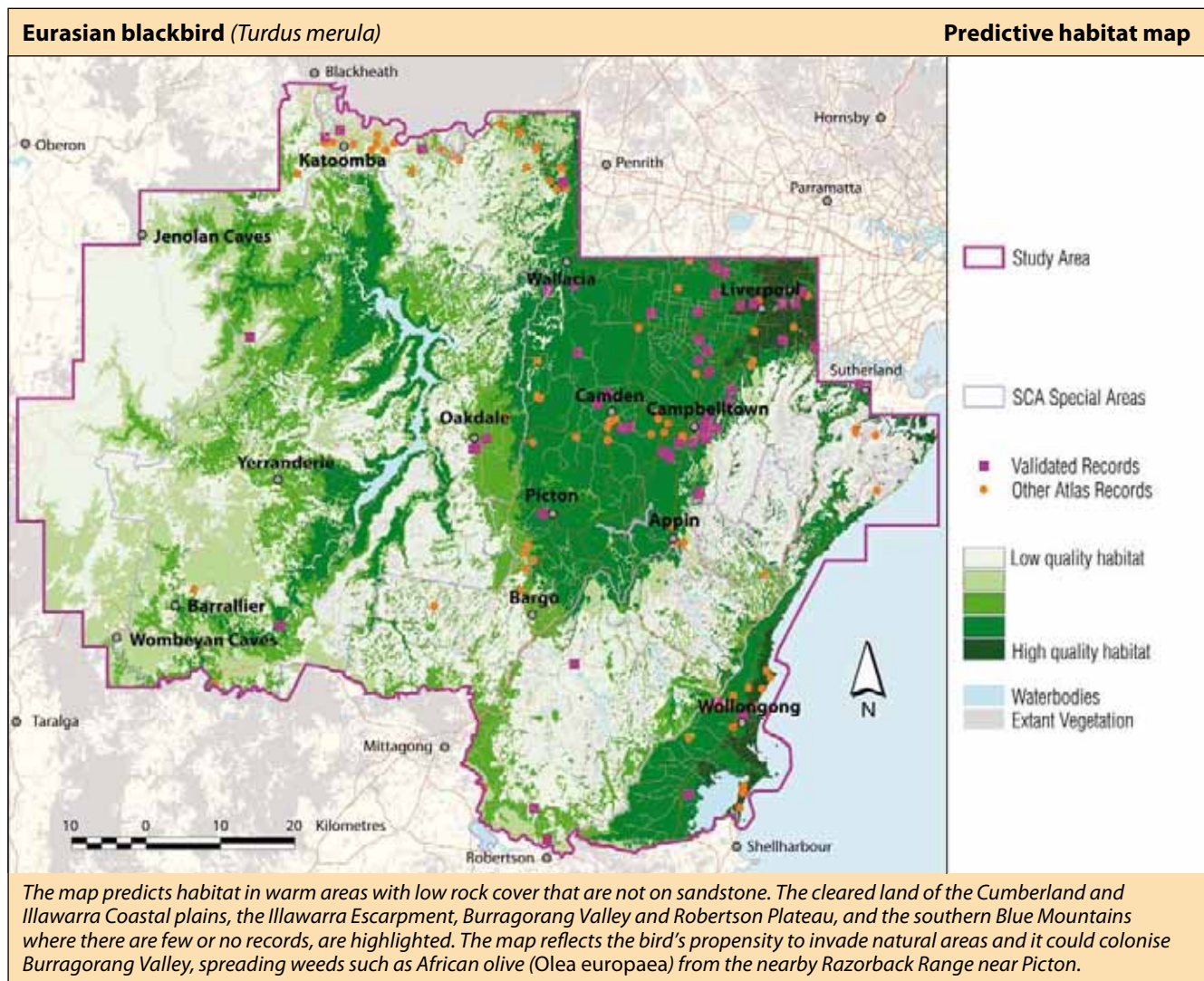
Photo: G. Dabbs

Impacts

These birds can live in undisturbed areas of native vegetation, so may compete with native birds such as bassian thrush (*Zoothra lunulata*), breed with them as may have occurred with the Norfolk Island island thrush (*Turdus poliocephalus poliocephalus*) or prey on native insects. They help spread weeds such as blackberry, bitou bush and boneseed.

Distribution

There has been an increase in sightings between 1984 and 2002 across the bird’s range. In NSW, the bird is widespread except in the far north-west, but is concentrated in the south-east and along the Murray River. Its northern limit is around Armidale and Bourke, but it may be expanding northward. It is common in and around Sydney, with numerous records in Sydney, fewer records in the south and occasional records on the Central Coast and further north.



It lives mainly in urban areas and in metropolitan reserves such as Lane Cove, Sydney Harbour and Scyeville NPs and Robertson NR, and on the edges of large reserves.

In the study area, sightings are mainly from the Cumberland Plain, in the Blue Mountains townships and on the Illawarra Coastal Plain where it seems to be increasing. It also lives in urban and agricultural areas around Oakdale, along the Tourist Road near Robertson, and Woodford Creek in the Blue Mountains, and in the Burragorang Valley. Increasingly, blackbirds are being sighted far away from clearing and infrastructure.

How you can help

- > Remove fruiting weeds from your garden and your property, especially African olive, and replace them with native plants.
- > Join a bushcare group or create your own to help remove African olive from bushland on the Cumberland Plain or lantana from the Illawarra Escarpment. Contact your local council, Conservation Volunteers Australia (www.conservationvolunteers.com.au/volunteer/conservation-connect.asp), Bushcare – visit www.landcareonline.com or phone: (02) 9412 1040 – or Greening Australia (visit www.greeningaustralia.org.au/getinvolved/index.html or phone: (02) 9560 9144).

7.4 Fallow deer (*Dama dama*)

This deer is native to the Middle East and Europe. It is smaller than other introduced deer, weighing 36–97 kg, and is generally spotted. Many fallow deer populations were established from escapees from deer farms, which became popular in the 1970s and 1980s.

Status/direction of change: Locally common resident/increasing

Key habitat: Many

Legislative listing: Key Threatening Process — TSC Act

Impacts

Impacts include overgrazing, trampling, ring-barking, weed dispersal, erosion acceleration, concentration of nutrients in soil and water quality degradation. The deer can also cause serious traffic accidents, damage residential gardens and fences, damage pasture and crops, attract illegal hunting, and carry diseases and parasites that may be transmitted to humans and impact on agriculture.

Distribution

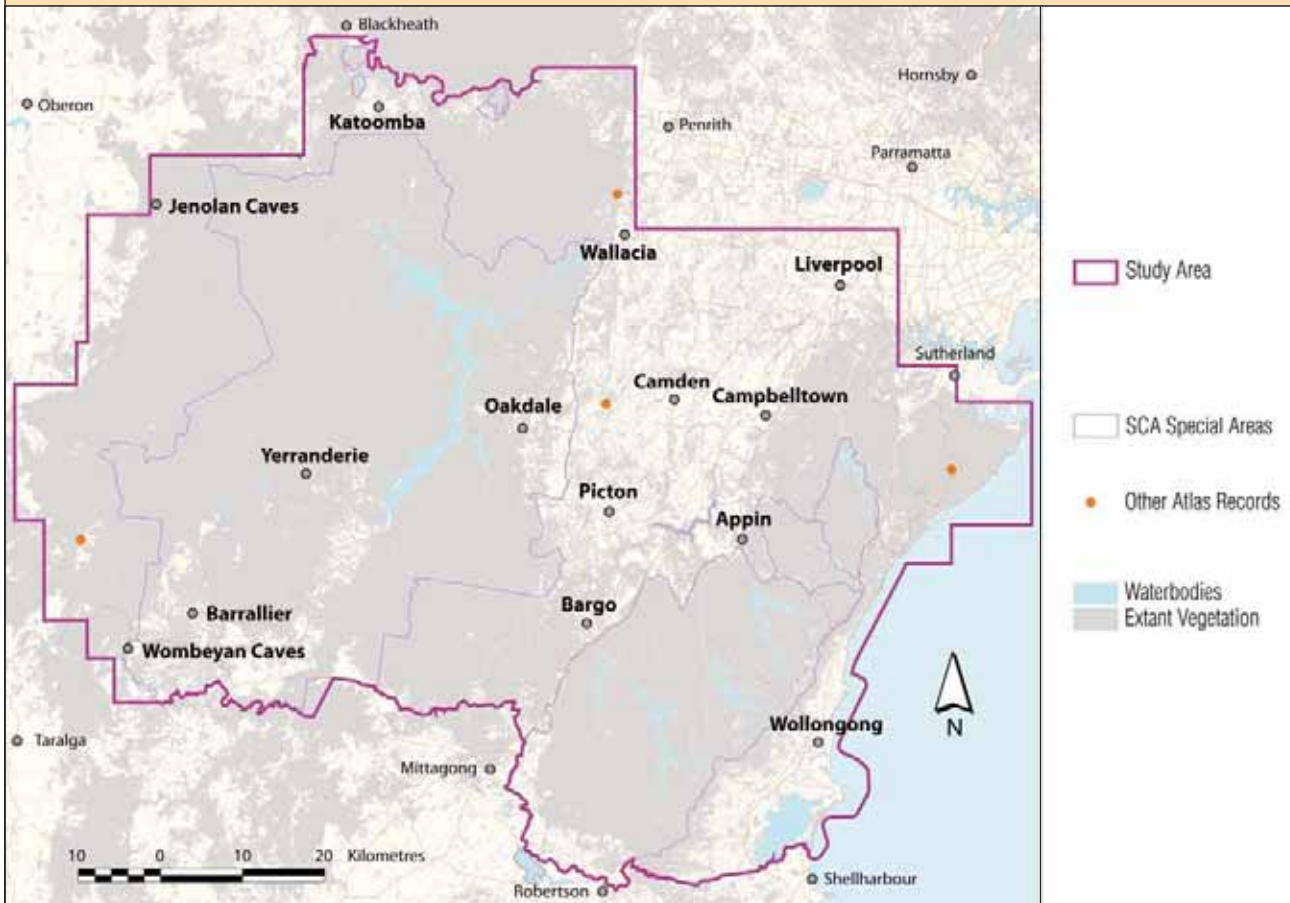
This was the first species of deer to become naturalised in Australia, with populations now established in all states except Western Australia. In NSW, its distribution is patchy and not well understood, as populations have been established from multiple escapes and releases and it is still expanding its range.

In the study area, the deer is found in western Sydney, particularly around Greendale in Bents Basin and Gulguer NRs, where it is expanding and damaging vegetation and market gardens. A working group is developing control methods. Recent surveys of the Cumberland Plain found the deer north of The Oaks on Razorback Range, and it also lives in the Upper Nepean catchment, in the north-western corner of Kanangra-Boyd NP and north of Batsch Camp off the Oberon–Colong Stock Route. A small group has been seen near Mt Ousley Rd in Wollongong.

The 2002–05 surveys recorded the deer off Venns Fire Trail in south-western Blue Mountains NP. It is well-established in the Bindook Highlands and could colonise all forests in the southern Blue Mountains. Many recently established deer populations are quickly growing. In the future, deer are likely to be a major pest in the region.

How you can help

- > Let your local council or DECC know if you see fallow deer in your neighbourhood or in bushland. Knowing where these pests are helps land managers. Complete a sightings form – visit www.nationalparks.nsw.gov.au/images/scientific_licence_datasheet.xls and www.nationalparks.nsw.gov.au/PDFs/WildlifeAtlas_Field_Data_Book.pdf – and email it to gis@environment.nsw.gov.au.



The map shows locations where populations are known to exist. Nonetheless, the deer are highly secretive, and are likely to be more widespread than indicated.

7.5 Feral cat (*Felis catus*)

This medium-sized carnivore was first domesticated in the eastern Mediterranean about 3000 years ago. Its origin in Australia is unknown, although it was deliberately introduced into the wild during the nineteenth century to control rabbits, rats and mice and is now found everywhere except in some wet rainforests. Cats can survive with limited access to water, obtaining moisture from their prey. They prefer live prey, and will eat small mammals, birds, reptiles, frogs, fish and insects. They can kill vertebrates up to 2 kg in weight but prefer smaller species weighing less than 220 grams.

Status/direction of change: Uncommon resident/
probably stable

Key habitat: Many

Legislative listing: Key Threatening Process
– TSC and EPBC Acts. National threat abatement
plan (Department of the Environment and Water
Resources various c). One of world's 100 worst invaders
(IUCN 2005)



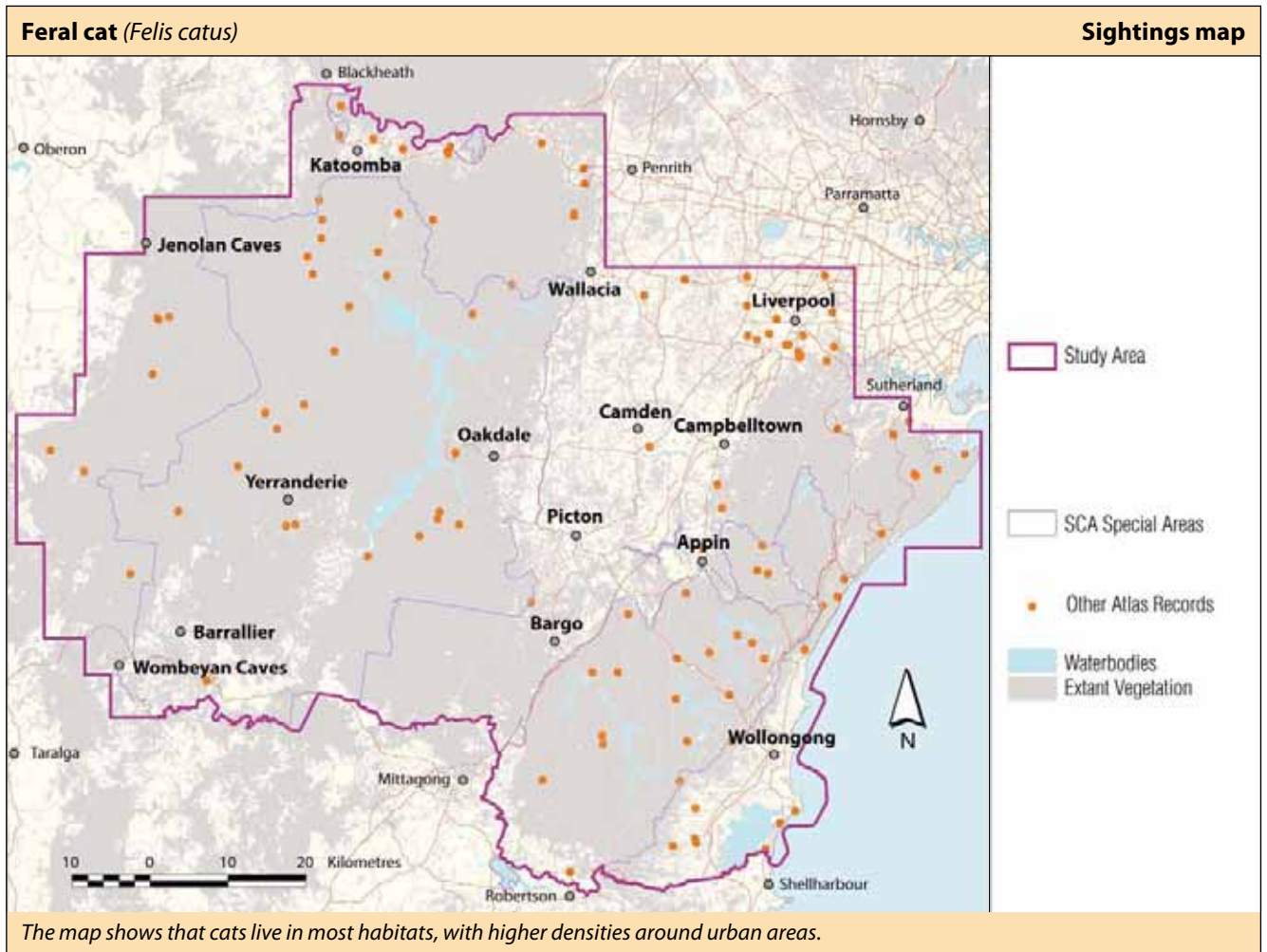
Impacts

Predation by cats has been implicated in the extinction of many mammals and birds on islands, and in NSW of 13 mammal and four bird species. Impacts on native animals are severe in modified, fragmented areas where numbers of rabbits and mice fluctuate. The impact of domestic, stray and dumped cats on native wildlife in urban bushland and adjacent reserves is poorly understood.

Distribution

Feral cats live throughout NSW. In and around Sydney, most live within 50 km of the coast and north of Shoalhaven River, while they are more thinly scattered in the south-eastern highlands. Small numbers live in large reserves such as Wollemi and Kosciuszko NPs.

Cats have been seen throughout the study area, though in many places they are highly secretive and rarely recorded. There are few records in the far south-western suburbs of Sydney between Leppington and Picton, probably due to the lack of surveys in these areas. There are records from settled and remote areas, including metropolitan areas and Warragamba. Current surveys recorded 18 sightings from areas such as the Lizard Creek crossing in Cataract catchment, near Bowmans Hut in Wollondilly River NR, Colong Caves and Narroneck Plateau in the upper Blue Mountains. A report of a cat from Lacys Tableland in the southern Blue Mountains shows this species can live in remote, undisturbed country. Cats may have already affected the region's fauna, with ground-frequenting birds and numerous small to medium-sized mammals missing from the region.



How you can help

- > Report any sightings of feral cats on bushland to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.
- > Report anybody dumping cats or kittens to the RSPCA on (02) 9770 7555 as this is a cruelty issue as well as impacting on biodiversity. If you see anyone dumping cats in a national park, contact your local national parks office.

7.6 Feral dog (*Canis lupus familiaris*)

Domesticated European dogs were introduced into Australia with British settlement. Their wild descendants commonly live in areas that have been cleared for agriculture. They eat medium to large mammals, such as kangaroos, wallabies, livestock, rabbits and feral pigs, reptiles, birds, insects and carrion.

Status/direction of change: Common resident/increasing

Key habitat: Many

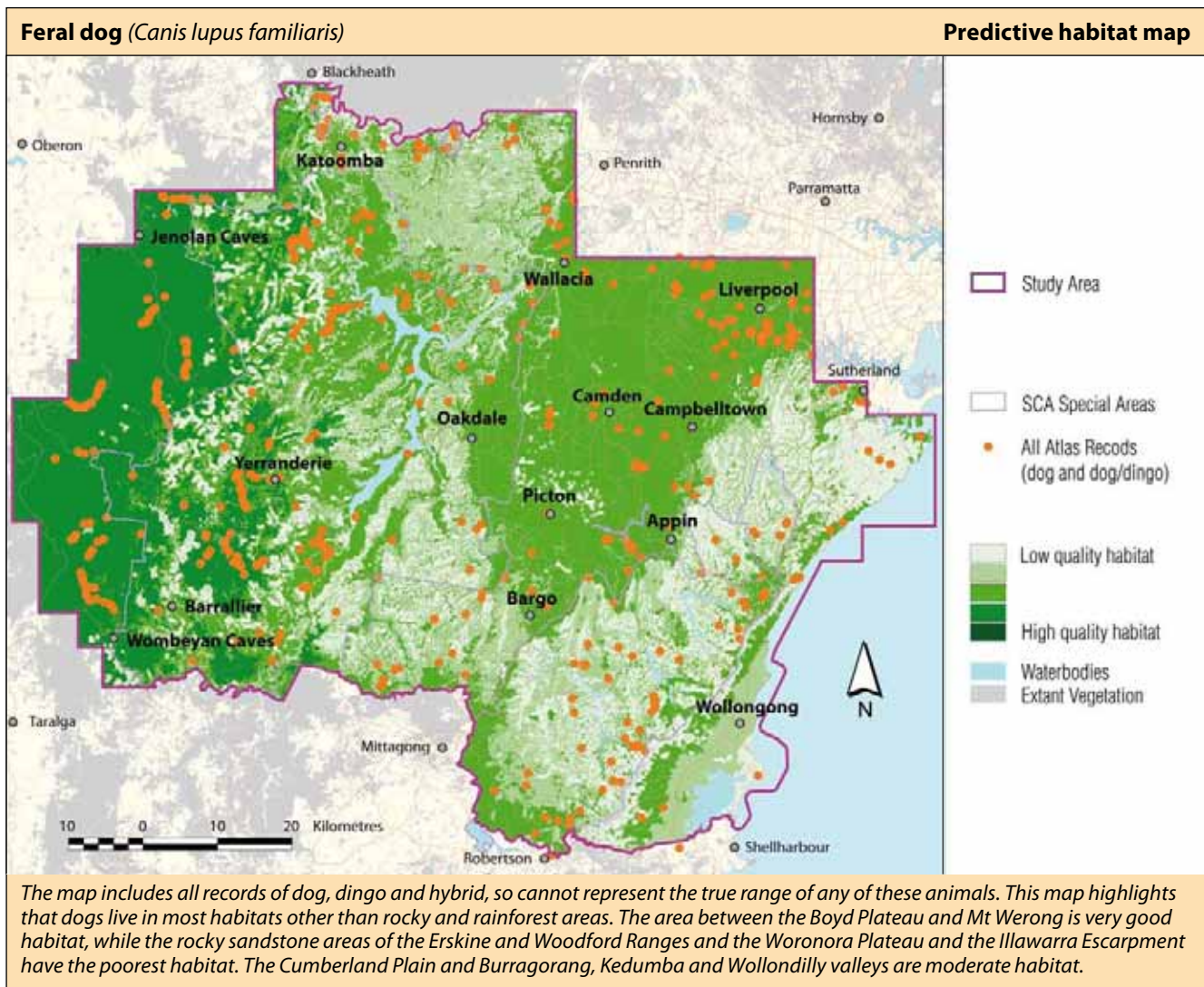
Legislative listing: Unprotected– NPW Act. Pest animal subject to pest control order – *Rural Lands Protection Act 1998*



Photo: G. Steenbeeke

Impacts

Feral dogs threaten the existence of dingoes by interbreeding with them. Feral dogs do not impact on other native fauna as much as foxes and cats since dingoes have been top-order carnivores for about 5000 years. Most species that survived the arrival of the dingo should be able to co-exist with feral dogs. There are exceptions when other threats are also present such as habitat loss, disease, altered fire regimes and predation by foxes. Feral dogs affect isolated populations of threatened species, such as brush-tailed rock wallabies, koalas (*Phascolarctos cinereus*), long-nosed potoroos (*Potorous tridactylus*) and sooty oystercatchers (*Haematopus fuliginosus*). They also eat livestock, and carry diseases such as *cryptosporidium* and *hydatids* that may be transmissible to humans.



Distribution

Feral dogs live throughout the Great Dividing Range and in some coastal areas. They and their hybrids are expanding into remote areas once occupied only by dingoes.

In the study area, dogs live mainly on the Cumberland Plain and on agricultural land, such as the Upper Wollondilly Valley and Oberon. In the southern Blue Mountains, sightings decrease with distance from human habitation as dingo sightings increase. Feral dogs are secretive, though they are commonly detected via scats and tracks. During this project, there were 127 records, 93 being from scats. Only 13 animals were detected that were clearly feral dogs, these being on the edges of the Cumberland Plain and in the far west near human settlement. On the Woronora Plateau, dogs were only detected from scats, with grooming hairs confirming their identity.

The southern Blue Mountains is a dingo-conservation area, so control of wild dogs there requires a management strategy. Currently, the Rural Lands Protection Board, the Sydney Catchment Authority and DECC undertake feral dog control programs throughout the region, particularly on the edges of reserves.

How you can help

- > Report anybody dumping dogs or puppies to the RSPCA on (02) 9770 7555. This is a cruelty issue as well as impacting on biodiversity. If you see anyone dumping dogs in a national park, contact your local national parks office.
- > Report any sightings of feral dogs on bushland to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.

7.7 Feral goat (*Capra hircus*)

This medium-sized herbivore was introduced to Australia by the First Fleet in 1788, due to its ability to thrive on tough grazing land, reproduce rapidly and provide meat, milk and fibres. Feral goats are descendants of goats that have escaped, were abandoned or were deliberately released. They eat trees and shrubs, grass, fruit, bark, roots and dead plant material. Goats are preyed on by dingos and feral dogs, but thrive when these predators are absent.

Status/direction of change: Locally common resident/ probably increasing

Key habitat: Steep, rocky environments

Legislative listing: Key Threatening Process – TSC and EPBC Acts. National threat abatement plan (Department of the Environment and Water Resources various c). One of 100 world's worst invaders (IUCN 2005).



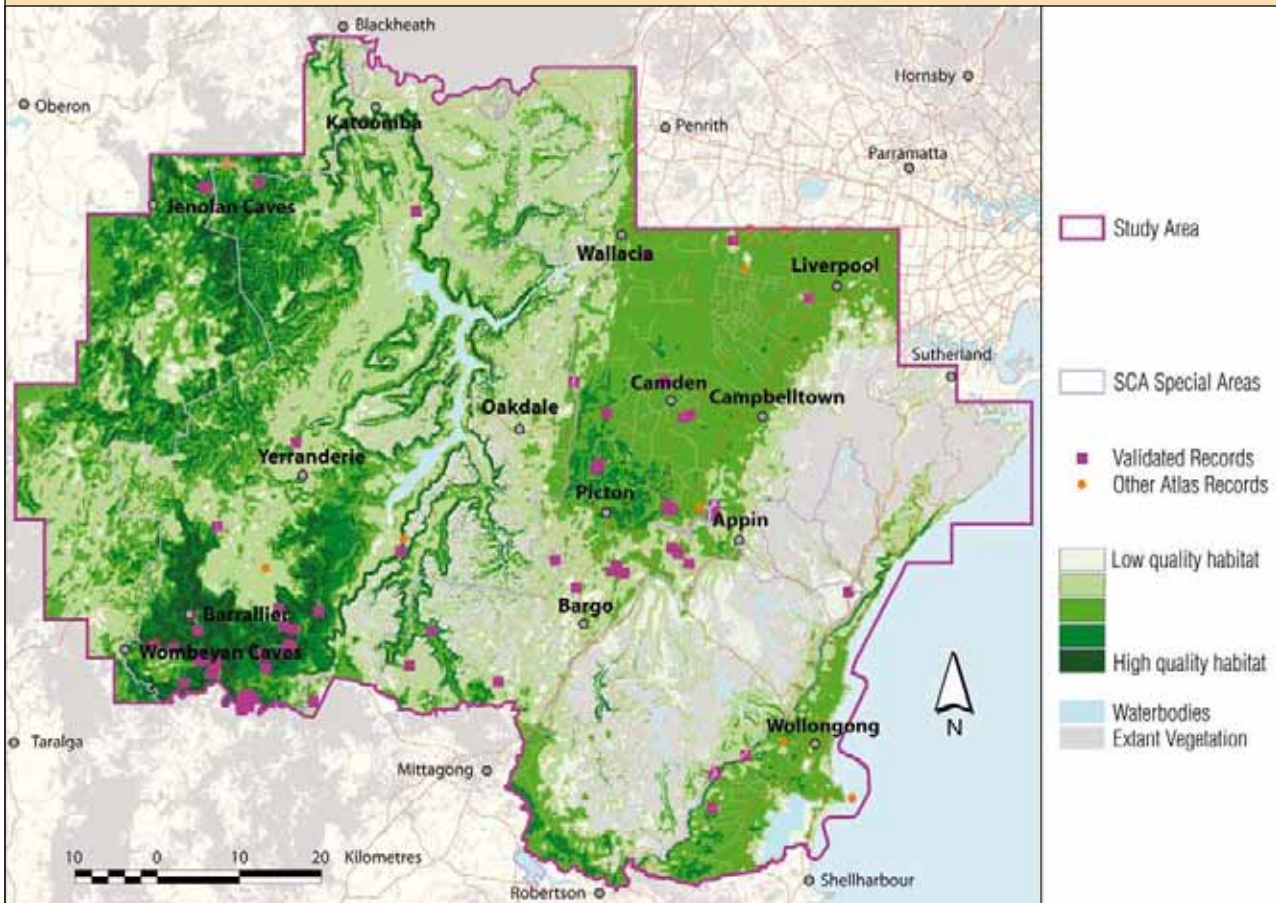
Impacts

Feral goats harm native habitat by affecting soil structure, overgrazing, trampling, producing droppings and introducing weeds. Goats contribute to soil erosion and prevent trees and shrubs from regenerating. They compete with native animals for food, water and shelter, especially the endangered brush-tailed rock-wallaby. They spread disease to livestock and can destroy Aboriginal heritage sites.

Distribution

Feral goats live everywhere, but are most common in the rocky or hilly arid areas of western NSW, South Australia, Western Australia and Queensland. They are common in western NSW, and throughout the tablelands, but are rare in the Australian Alps and south-east. They live patchily around Sydney, most living in the south-eastern highlands, including Abercrombie River and Tarlo River NPs, and Bungonia SCA, and in the far north such as in eastern Goulburn River NP and Munghorn Gap NR.

In the study area, they live in rocky and steep areas. They are common in the Wollondilly Valley around Tallygang Mountain, Scabby Flat, and Wollondilly River and Joadja NRs, especially around Wollondilly River NR. Fewer live in the Jenolan and Nattai River valleys, and on the Illawarra Escarpment. On the Cumberland Plain, surveys in 2006 found that they were quite common along the gorges of the Nepean, Bargo and Cataract rivers. They do not live in sandstone areas except when there are more fertile soils nearby.



The map predicts habitat where there are higher-fertility soils, particularly in rugged country. This map shows all areas that would be occupied in the absence of control programs and feral dogs and dingoes. When these predators are present in high numbers, the goats are found only on rocky escarpments. Habitat areas include the Wollondilly Valley and Tallygang Mountain.

How you can help

- > Report sightings of feral goats in reserves to DECC. Knowing where these pests are helps land managers. Complete a sighting form – see 7.4 for details.

7.8 Feral pig (*Sus scrofa*)

Feral pigs are descendants of domestic pigs that were introduced by English settlers in the nineteenth century. They escaped from domestic stock or were released for recreational hunting. As pigs need shade and water, they prefer moist habitats such as riparian areas, swamps, wet sclerophyll forests and forested gullies. They eat grasses, bulbs, tubers, roots, seeds, fruit, mushrooms, carrion, birds, reptiles, frogs, small mammals and soil invertebrates.

Status/direction of change: Locally common resident/increasing

Key habitat: Swamps; bogs; wet and dry sclerophyll forests; riparian areas

Legislative listing: Key Threatening Process – TSC and EPBC Acts. National threat abatement plan (Department of the Environment and Water Resources various c). Pest animal subject to pest control order – *Rural Lands Protection Act 1998*. One of 100 world's worst invaders (IUCN 2005).



Photo: DECC

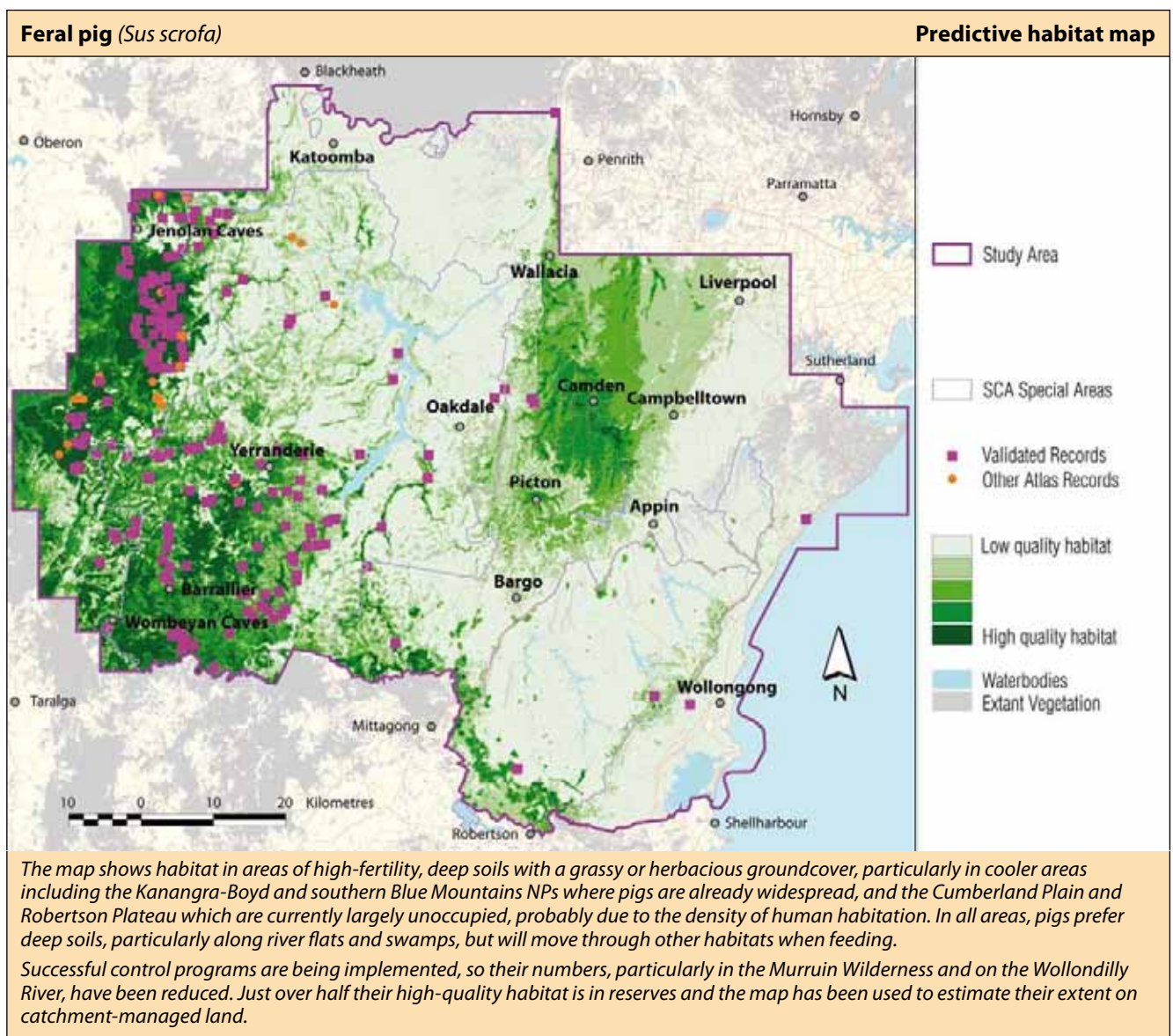
Impacts

Feral pigs compete with and prey on various native animals. They can cause local extinction of species such as rare orchids. They alter habitat by wallowing, rooting and foraging; destroying plants and reducing their regeneration; altering soil structure; spreading weeds; creating drainage channels in swamps; reducing water quality and spreading disease such as root-rot fungus (*Phytophthora cinnamomi*). They carry pathogens that may be transmitted to humans including *leptospirosis*, which has been found in feral pigs in Sydney.

Distribution

Feral pigs are found across Australia, mainly in eastern NSW, the ACT and Queensland and through northern Australia to the Kimberley Region. Around Sydney, most live in and west of Goulburn River NP, between Tumut and Bega, in the study area and in reserves such as Kosciuszko NP and Tinderry NR. As they are poorly recorded outside reserves, the extent of their distribution is not accurately known.

Feral pigs live throughout the western third of the study area, particularly in Coxs and Kowmung valleys, on Boyd Plateau, Mt Werong and Bindook Highlands, south-west of Lake Burragorang and round Wollondilly River NR. Damage caused by feral pigs is common in all these areas. They are rare on the Woronora Plateau, aside from around Pheasants Nest. Surveys in 2006 on the Cumberland Plain found them on the Razorback Range near Picton, on Monkey Creek north of The Oaks and on the Nepean River west of Appin.



How you can help

- > Report all sightings of feral pigs to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.

7.9 Fox (*Vulpes vulpes*)

This animal is native to Europe, Asia and North America, and was introduced in Victoria for sport hunting in the 1870s. It eats vertebrates and invertebrates, including crayfish, carrion and plants such as berries.

Status/direction of change: Common resident/ probably stable

Key habitat: Many

Legislative listing: Key Threatening Process – TSC and EPBC Acts. National threat abatement plan (Department of the Environment and Water Resources various c). NSW threat abatement plan (DEC various c).



Photo: N. Williams

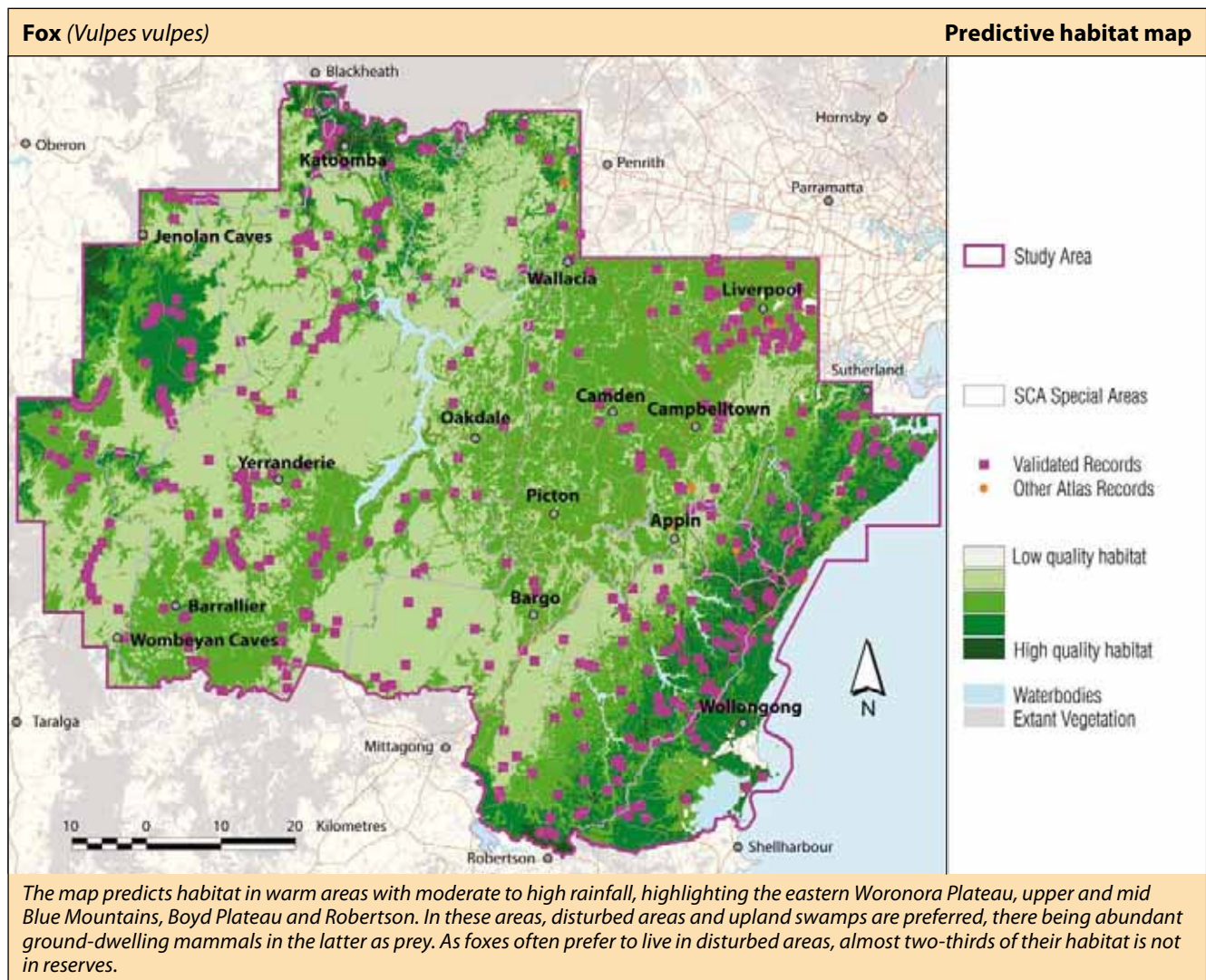
Impacts

Foxes prey on or compete with many native species, particularly small and medium-sized mammals, ground-frequenting birds, small reptiles and freshwater turtles. As pests in an agricultural landscape, foxes prey on lambs and domestic fowl. They regulate the populations of some prey species, including the eastern grey kangaroo (*Macropus giganteus*).

Distribution

Foxes live throughout the southern two-thirds of mainland Australia and have recently been introduced to Tasmania. They are common throughout eastern NSW, including in and around Sydney. Even though they are under-recorded outside reserves, there are few areas without sightings.

In the study area, foxes are found everywhere though they are less abundant in closed forests such as rainforests. They are more common in the east, particularly on the Woronora Plateau and Cumberland Plain from which many ground-nesting birds and medium-sized mammals have disappeared in the last 20 years, including the bush stone-curlew (*Burhinus grallarius*), ground parrot (*Pezoporus wallicus*), eastern bristlebird (*Dasyornis brachypterus*), parma



wallaby (*Macropus parma*), red-necked pademelon (*Thylogale thetis*), southern brown bandicoot (*Isodon obesulus*) and long-nosed potoroo (*Potorous tridactylus*). In addition, populations of the spotted-tailed quoll (*Dasyurus maculatus*) and brush-tailed rock-wallaby (*Petrogale penicillata*) have been much reduced. Whilst fire and habitat loss have contributed to these local extinctions and declines, the fox has also played a part, and it will continue to impact on these species. During the current surveys, foxes were common in almost all areas visited. One exception was Lacys Tableland, where a lack of roads and a group of dingoes may have been contributing factors. Over 150 new locations of fox were found in 2002–05, many from scats.

How you can help

- > If there are populations of any of the threatened native animals listed under 'Distribution' in your local area, join a 'friends of' group or start your own to initiate actions to protect these species – phone DECC's Environment Line on 1300 361 967 for advice.
- > Report any sightings of foxes on bushland to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.

7.10 Rabbit (*Orytolagus cuniculus*)

Rabbits come from Spain and were introduced into south-eastern Australia from England in 1858. They live in native and modified grasslands, woodlands, forests, and agricultural and urban areas, and on heaths. They are scarce when there are clays soils which are not suitable for digging warrens, and need water in arid areas though elsewhere they obtain water from their food. Rabbits eat grasses, herbs, roots and seeds, and in times of drought will eat the bark and roots of shrubs.

Status/direction of change: Common resident/ probably stable

Key habitat: Rural areas, grasslands and open grassy woodlands

Legislative listing: Key Threatening Process – TSC and EPBC Acts. National threat abatement plan (Department of the Environment and Water Resources various c). Pest animal subject to pest control order – *Rural Lands Protection Act 1998*. One of 100 world's worst invaders (IUCN 2005).



Impacts

Rabbits cause land degradation and soil erosion by altering the structure and composition of vegetation, removing plants above and below ground, preventing plant regeneration, ring-barking trees and shrubs and digging burrows. They compete for food and shelter with native species such as the brush-tailed rock-wallaby, and have contributed to the extinction of some small mammals. They are a major food source for cats and foxes in many areas. Sharp declines in rabbit numbers, such as due to disease, can cause these introduced predators to eat native animals.

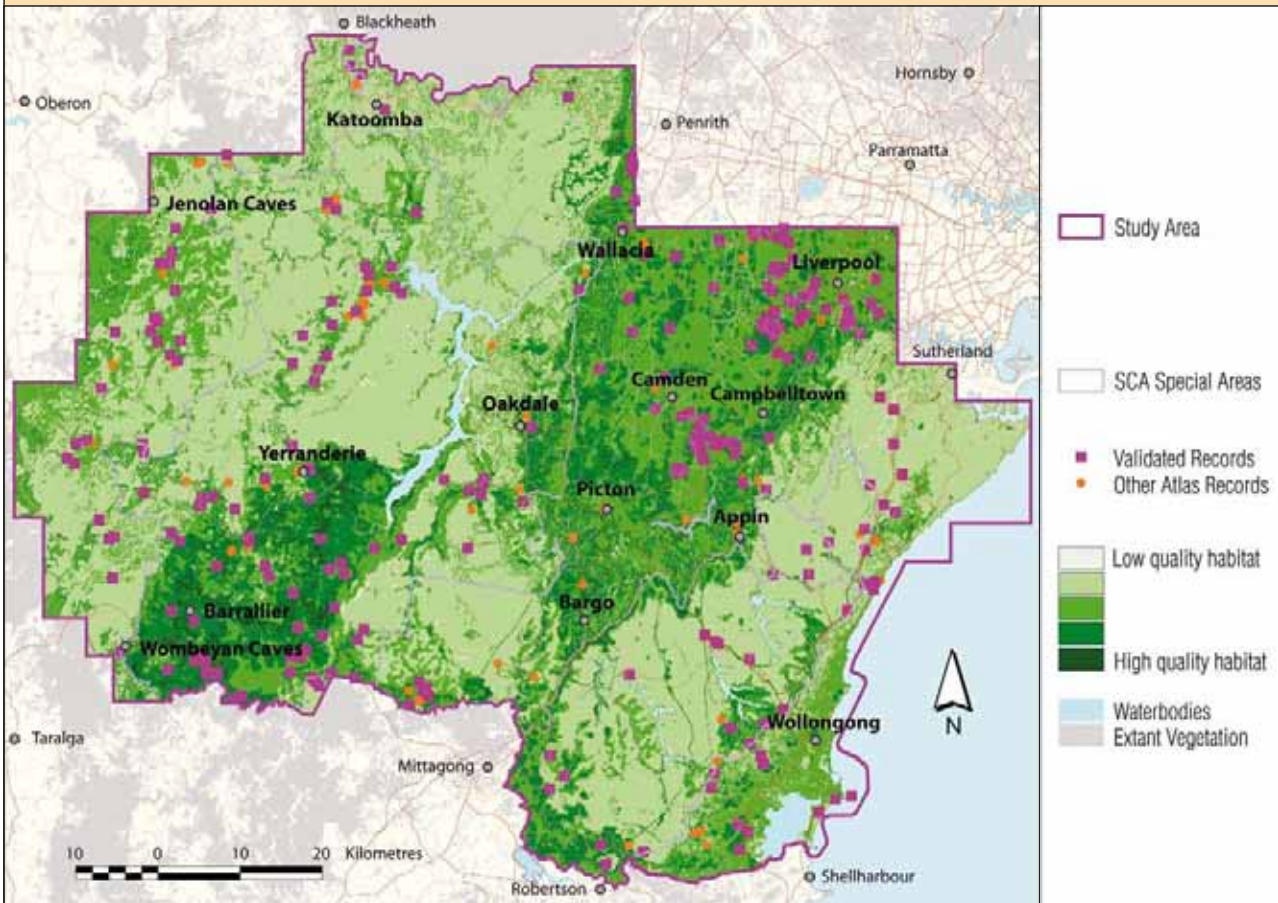
Distribution

Rabbits have spread throughout mainland Australia except the northernmost areas. They live throughout NSW, with more on the coast and western slopes. In and around Sydney, many live on the Cumberland Plain and Central Coast and in the Hunter Valley, and fewer live in large sandstone reserves such as Wollemi and Morton NPs.

In the study area, rabbits mainly live in areas of higher fertility and deep soils, such as on the Cumberland and Illawarra Coastal plains and in the Burragorang and Wollondilly valleys, and at high altitudes such as on the Boyd Plateau, Bindook Highlands and Scotts Main Range. Current surveys found they were scarce on the sandstone plateaux of Nattai NP, in the Woodford and Erskine ranges, and on the Woronora Plateau where they only live on disturbed land in the far south and around Darkes Forest. Most of the 137 sightings in 2002–05 were in the south and west, on cleared land around Nattai NP (Mt Jellore, Sheehys Creek), at Colong Caves and in the Coxs River Valley. More than half these sightings were animals seen opportunistically or during spotlight surveys, with most remaining records being scats or diggings, or hairs in predator scats.

How you can help

- > Report any sightings of rabbits in bushland to DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.
- > Report anybody dumping rabbits to the RSPCA on (02) 9770 7555. This is a cruelty issue as well as impacting on biodiversity. If you see anyone dumping rabbits in a national park, contact your local national parks office.



The map predicts high-quality habitat in areas with deep, fertile soils, and grassy box woodlands or forests, particularly on disturbed land such as on the Cumberland and Illawarra Coastal plains, on Robertson Plateau, in Burratorang and Wollondilly valleys and west of Kanangra-Boyd NP. The map shows there is only a minor threat from rabbits in low-fertility sandstone areas, particularly those with no disturbed land.

7.11 Red deer (*Cervus elephus*)

This deer is native to Eurasia, North Africa and North America and is the largest deer in Australia. It became established soon after European settlement when wild populations grew from escapees from deer farms, especially in the 1970s and 1980s. It has a light-coloured rump and long pointed ears. It has not spread as widely as some other deer, despite adapting to a wide range of environments.

Status/direction of change: Locally common resident/increasing

Key habitat: Many

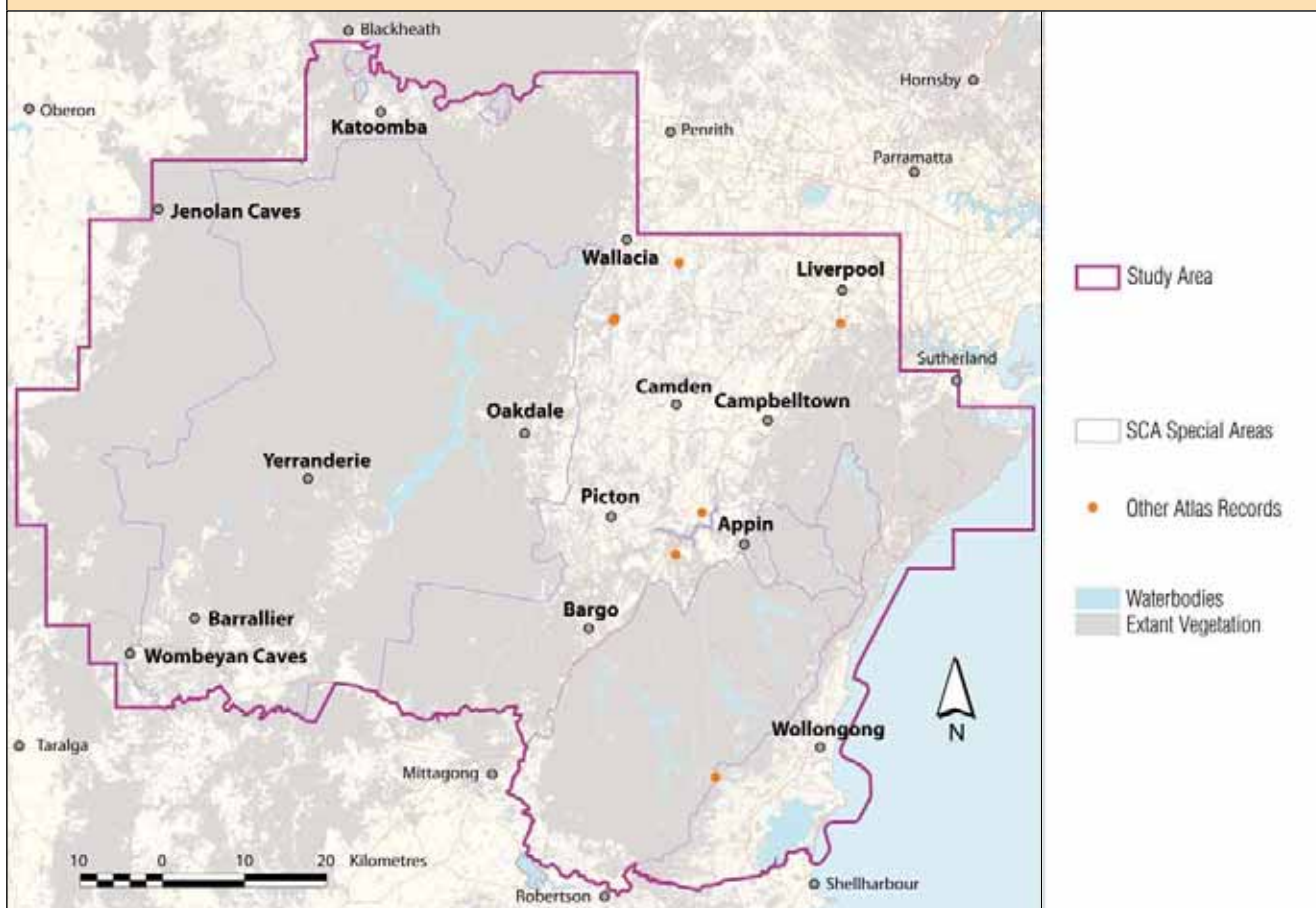
Legislative listing: Key Threatening Process – TSC Act

Impacts

Impacts include overgrazing, trampling, ring-barking, weed dispersal, erosion acceleration, concentration of nutrients in soil and water quality degradation. Deer can cause serious traffic accidents, damage residential gardens and fences, attract illegal hunting, carry diseases and parasites that may be transmitted to humans and impact on agriculture.

Distribution

In NSW, the red deer's distribution is patchy and poorly understood. No populations have reached their full extent. Several populations live in the study area, mostly on the Cumberland Plain where surveys in 2006 found them at St Mary's Towers near the Cataract River between Douglas Park and Wilton, and in Bents Basin around Greendale. A deer working group is acting to control the latter herd.



The map shows all records, and locations where the deer are known to live. Nonetheless, they are highly secretive, and are probably more widespread than indicated. Many recently-established deer populations are quickly growing. In the future, red deer are likely to be a major pest in the region.

How you can help

- > Report any sightings of deer to your local council or DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.

7.12 Red-whiskered bulbul (*Pycnonotus jocosus*)

This medium-sized brown bird has a white throat and cheek patches, small red 'whisker' mark, pink undertail and a distinctive black head and crest. It is a native of south-east Asia between India and Hong Kong, and was introduced to Sydney in 1880, probably for aesthetic reasons. In Australia, the bird lives in gardens, parks and wastelands, and only occasionally enters native vegetation. It eats insects and berries and builds an untidy cup nest in thick cover, raising two to three broods of three to five chicks per year.

Status/direction of change: Common resident/probably increasing

Key habitat: Many

Legislative listing: Unprotected – NPW Act

Impacts

Impacts are poorly known. There may be some competition with native species for resources, but the main impact is probably that the bird helps spread weeds with soft, fleshy fruits such as African olive, privet, bitou bush, blackberry and lantana.

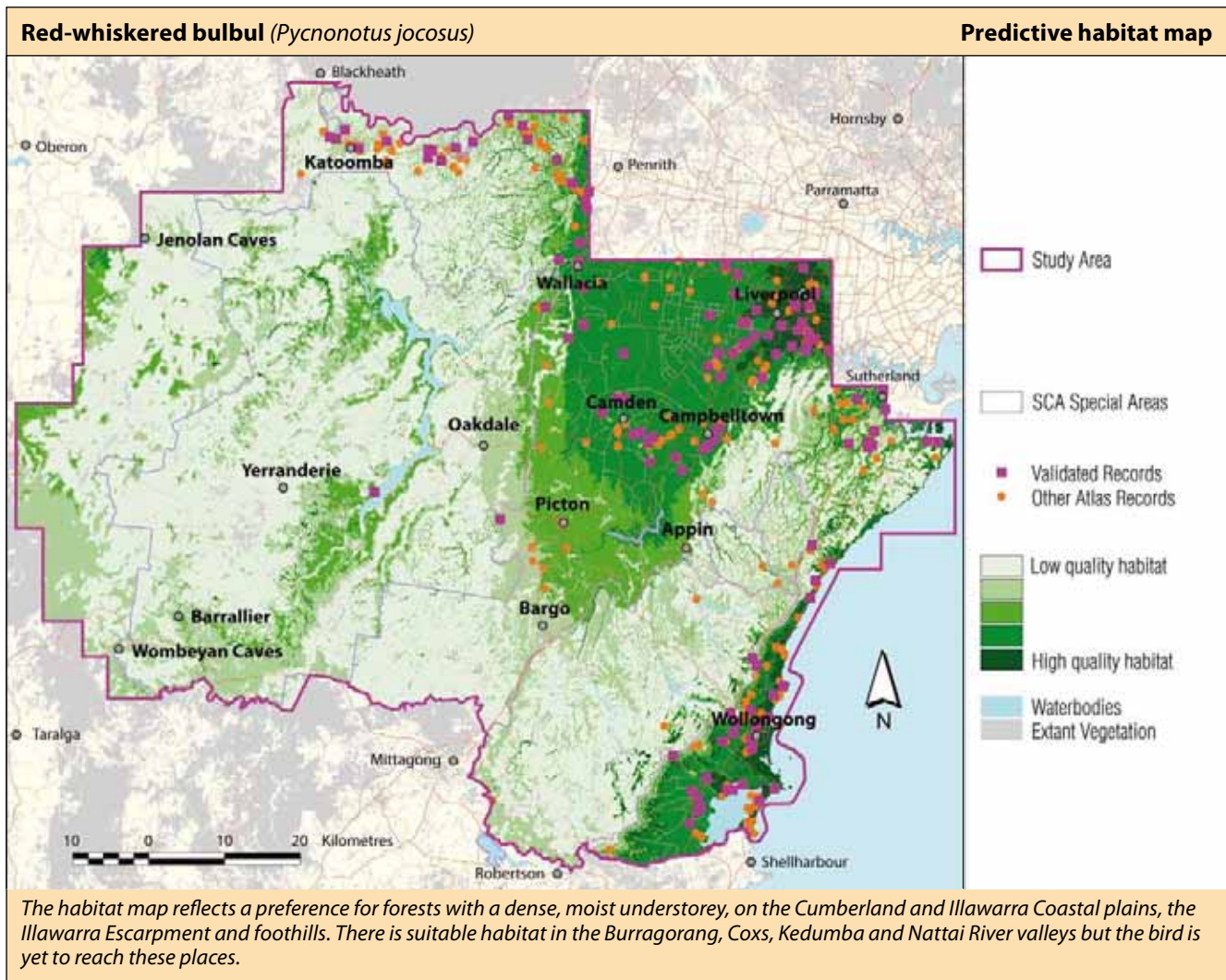


Photo: P. van der Woude

Distribution

The bird mainly lives in Sydney, Wollongong and Newcastle with an isolated colony at Coffs Harbour. There are occasional sightings in Melbourne and Adelaide. Its distribution may be slowly expanding, with records between Belmont (Newcastle) in the north, Culburra in the south and Katoomba in the west. It is common on the Cumberland and Illawarra Coastal plains and Central Coast, and in the Blue Mountains urban area. It is mainly seen outside reserves, though it is common in smaller, urban parks such as Scheyville and Lane Cove NPs, Illawarra Escarpment SCA and Western Sydney RP, and on the edges of larger reserves that abut urban or agricultural areas.

In the study area, it was first recorded in Wollongong in 1948 and Camden in 1956, having spread from Sydney. It is largely restricted to areas of human habitation, particularly the Cumberland Plain, the Blue Mountains townships and the Illawarra Coastal Plain.. There are also scattered records from Woodford Creek Special Area, the semi-cleared areas in the east of Warragamba Special Area and near the Bellambi Creek Crossing of the Princes Highway in Metropolitan Special Area. This species is unlikely to enter pristine areas, though it is unknown whether this is due to a lack of resources or competition from native species. There is only one record for the Burragorang Valley. In the future, the bird could help spread weeds such as African olive to the Burragorang and Wollondilly valleys from the Razorback Range near Picton.



How you can help

- > Join a local bushcare group or create your own if you live near degraded bushland – see 7.3 for details.
- > Remove fruiting exotic plants such as African olive and lantana from your property and replace them with native species.

7.13 Rusa deer (*Cervus timorensis*)

This deer is a native of Indonesian deciduous forests and grasslands. The NSW population is descended from Javan deer that escaped into Royal NP in 1907. Rusa deer are grazers, but will eat the buds, shoots and leaves of trees and shrubs including reproductive parts of plants, and strip bark from woody plants. They are mostly nocturnal, sheltering by day in forest or woodland. They can reproduce at any time of year.

Status/direction of change: Locally common resident/increasing

Key habitat: Many

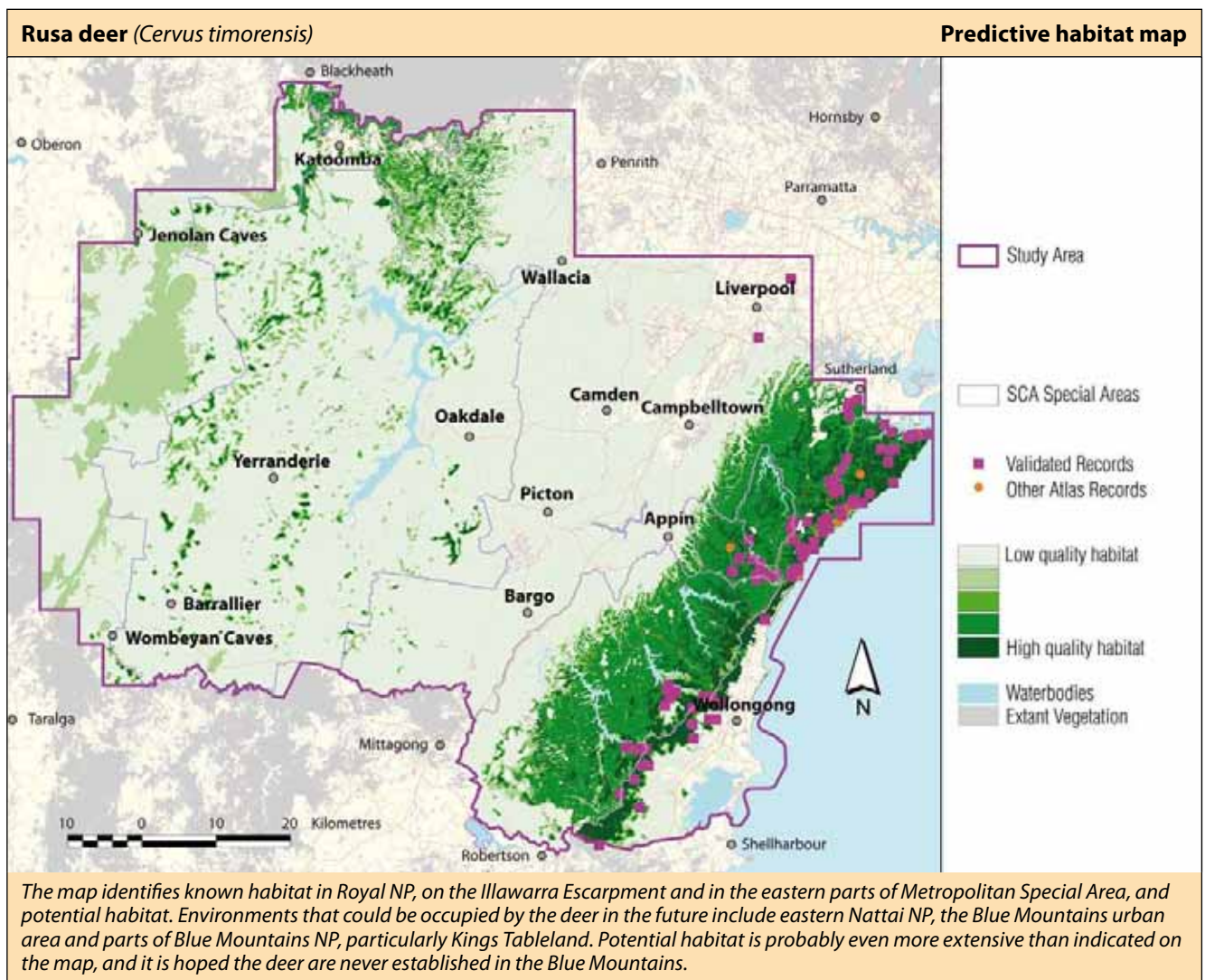
Legislative listing: Key Threatening Process – TSC Act



Photo: K. Gillett

Impacts

Impacts include overgrazing, trampling, ring-barking, weed dispersal and soil erosion. In Royal NP, they have altered the structure, composition and abundance of various plants. Grazing is threatening an endangered population of black cypress pine (*Callitris endlecheri*) on the Woronora Plateau. Deer also affect the water quality in creeks and rivers through erosion and faecal contamination and will impact on Aboriginal heritage sites by sheltering in caves. They may compete with native animals for food, particularly during drought or after fire. They have caused serious traffic accidents on the F6 south of Sydney, and may transmit disease to humans, which is of particular concern in the water catchment areas.



Distribution

The largest population in NSW (5000 to 7000 animals) is in southern Sydney and along the Illawarra Escarpment. From the original escapees in Royal NP, this herd now extends along the coast from Sutherland to Ulladulla, living particularly in rainforests and moist eucalypt forests.

In the study area, deer live in Royal NP, where a working group has developed a plan to control them, and in wet forests of the escarpment and foothills in Wollongong, particularly around Otford, Figtree and Unanderra. The 2002–05 surveys recorded them above the escarpment, around the clearings at Darkes Forest, in the Metropolitan Special Area and in undisturbed tall moist forest near Flying Fox Gully in the Avon catchment. The deer are common on cleared areas around Upper Cordeaux and in the north, suggesting that populations have not yet reached their capacity further south. In recent years, drought, fire and population expansion have caused them to move into new areas and marginal environments, causing further damage. Recently, they have been seen at Bowmans Hill on the Wollondilly River and in Nattai NP. The 2006 survey of the Cumberland Plain found them on the Nepean River, at St Mary Towers and Wilton, at Holsworthy Military Area, and at Mirambeena Regional Park near Bankstown. Surveys in 2006–07 found many of them in Dharawal SCA and NR, around Bundeena, Otford and Helenburgh.

How you can help

- > Report any sightings of deer to your local council or DECC. Knowing where these pests are helps land managers. Complete a sightings form – see 7.4 for details.

7.14 Spotted turtle-dove (*Streptopelia chinensis*)

This large grey-brown dove has a long, strongly graduated tail and black half-collar spotted with white. It is a native of south-east Asia between China and India and was probably introduced to Australia in the 1860s and 1870s for aesthetic reasons. It lives in parks and gardens and around homesteads, and is rarely found in native vegetation, though it is sometimes seen in coastal scrub and mangroves, particularly in areas with nearby disturbed land. It builds an untidy platform of sticks on a limb of native or introduced trees and shrubs, usually in dense foliage, in which it lays two eggs. The dove feeds on the ground, usually on seeds, though in urban areas it will also feed on waste and handouts.

Status/direction of change: Common resident/ probably increasing

Key habitat: Urban and rural areas

Legislative listing: Unprotected – NPW Act



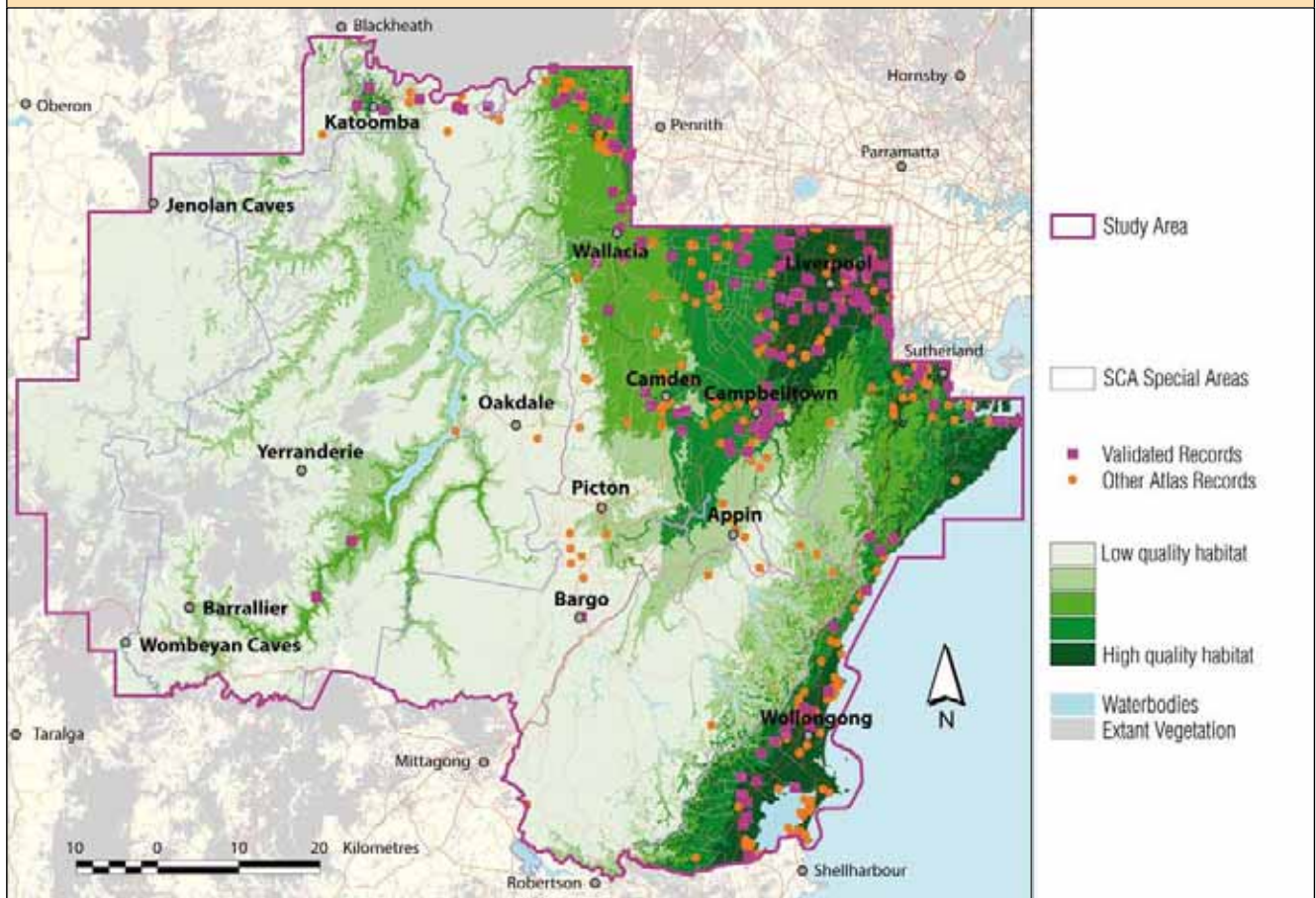
Impacts

The dove may compete for food and habitat with native pigeons, such as the bar-shouldered dove (*Geopelia humeralis*). It will eat germinating seedlings and chicken feed, and may spread the stickfast flea (*Echidnophaga galinaceae*), a chicken parasite.

Distribution

By 1960, the dove was common in most coastal settled areas in NSW, but was rare west of the Great Dividing Range. It has been recorded with increasing frequency between 1984 and 2002. It is common in the east Sydney Basin, while there are only occasional records in drier areas such as the upper Hunter Valley and Mudgee. In the south-eastern highlands, it lives in Canberra and Bathurst. It is mainly seen outside reserves, though it is common in smaller, urban parks such as Lane Cove and Garigal NPs, Cockle Bay and Newington NRs and Western Sydney RP, and on the edges of larger reserves that abut urban or agricultural areas.

In the study area, it mainly lives along the Illawarra Coastal and Cumberland plains and in the towns of the Blue Mountains. There are scattered records throughout reserves, though these are mainly in cleared or disturbed environments, such as the Burratorang Valley. During the 2002–05 surveys, this species was never found in large tracts of intact bushland.



The habitat map highlights cleared flat land, particularly on the Cumberland and Illawarra Coastal plains, with smaller areas in the Blue Mountains urban area and the disturbed areas of the Burratorang Valley. Many areas such as the Burratorang and Nattai River valleys are currently unoccupied. This work confirms that little suitable habitat for the dove exists in reserves, with the Burratorang and Wollondilly valleys notable exceptions.

How you can help

- > Plant native rather than introduced trees and shrubs in your garden.
- > Do not encourage these birds by leaving food around, such as dog biscuits.

7.15 Wild horse (*Equus caballus*)

Horses arrived in Australia with the First Fleet in 1788. Many escaped or were released to join established groups or form new herds. They spread across much of Australia, excluding most deserts and intensively managed areas. Regional feral populations differ depending on the founding population, geographic isolation, natural selection and human culling. The herd in the Warragamba Special Area may have originated from pit ponies released after coal mining operations ceased.

Feral horses live where pasture and drinking water are relatively abundant, in herds of up to more than 100. They eat grasses, perennial herbs, roots, bark, buds and fruit, and generally live for less than 20 years. Feral horse populations can increase by up to 20 to 25% per year under suitable seasonal conditions.

Status/direction of change: Locally uncommon resident/increasing

Key habitat: Grassland and grassy woodlands

Legislative listing: Unprotected – NPW Act



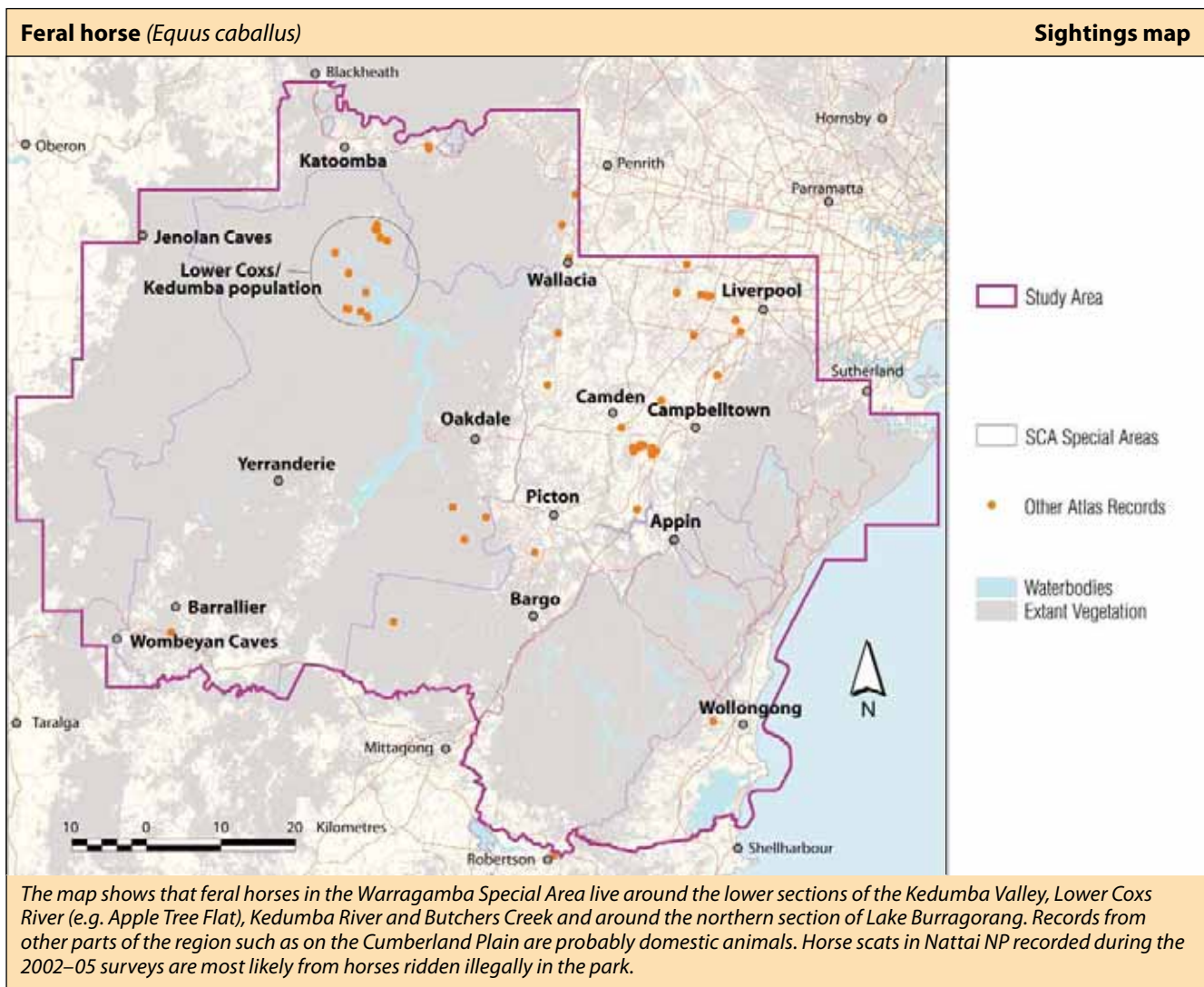
Photo: M. Schulz

Impacts

Through grazing and trampling, feral horses can substantially alter the type of plants that grow in an area. Under dry conditions, horses also compete with native fauna for food and water. Other impacts include the death of mature trees by chewing and stripping bark, track formation, disturbance of soil and removal of vegetation resulting in erosion on steep slopes and heavily used areas, stream bank damage, wetland damage through trampling, soil compaction along heavily used trails, increased nutrient loads in water (through faeces), and the fouling of waterholes through wallowing or individuals becoming bogged. They are also possibly hosts of pathogens such as *Giardia* and *Cryptosporidium*, and help spread weeds. In agricultural areas, they compete with livestock for pasture, damage fencing, disperse weeds and disrupt domestic horses.

Distribution

The largest population in NSW of 3000 or more animals lives in Kosciuszko NP. Another population of 12 lives in south-eastern NSW in Wadbilliga NP. In the study area, 30–50 feral horses live in the Warragamba Special Area. In 2004, DECC established a steering committee which has prepared a management plan to control feral horses in this area.



How you can help

- > Report any sightings of feral horses in reserves to DECC. Complete a sightings form – see 7.4 for details.

Appendix: Vagrants

Below, all species are given that are listed as threatened species under NSW or Commonwealth legislation but in the study area are vagrants, that is, they only occur in the area very rarely and by accident. Despite their legislative listing, at present there are no conservation actions required for these species in the study area:

- > barred cuckoo-shrike (*Coracina lineata*)
- > comb-crested jacana (*Irediparra gallinacea*)
- > grey-crowned babbler (*Pomatostomus temporalis*)
- > grey falcon (*Falco hypoleucos*)
- > striated fieldwren (*Calamanthus fuliginosus*)
- > yellow-bellied sheath-tail-bat (*Saccolaimus flaviventris*).

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