NSW National Parks and Wildlife Service

Kosciuszko offset action plan – southern myotis

Kosciuszko Offset Project

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Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

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Objective

This plan sets out management actions that, when implemented and measured, will deliver biodiversity gains for the southern myotis (*Myotis macropus*) within Kosciuszko National Park. The southern myotis is also known as a fishing bat.

The Kosciuszko Offset Strategy 2023 sets out a framework for the development of offset action plans. It is based on a clear objective – to deliver a biodiversity gain in the park equivalent to 120% of the biodiversity loss identified in the Snowy 2.0 environmental assessments.

In the Snowy 2.0 environmental assessment for Main Works, up to 4 hectares of southern myotis habitat was identified as being impacted. (Assessments for the Snowy 2.0 Exploratory Works and Transmission Connection projects did not identify any impacts to the southern myotis.) At an estimated 6 individuals per hectare (see Step 1), the impact of the Snowy 2.0 project on the southern myotis is estimated to be a reduction of the population by 24 individuals.

To deliver the 120% biodiversity gain identified under the Kosciuszko Offset Strategy, the objective of this action plan is to **increase the population of southern myotis in Kosciuszko National Park by 29 individuals**.

As the southern myotis is not a Commonwealth-listed species, this action plan has been approved only by the acting Deputy Secretary, NSW National Parks and Wildlife Service.

Species overview and key threatening processes

The southern myotis is listed as **vulnerable** under the NSW *Biodiversity Conservation Act 2016*. It is not a listed species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Table 1 provides a species summary for the southern myotis, including a description of the species, its habitat, its preferred food sources and its distribution within Kosciuszko National Park.

Table 1 Species summary – southern myotis

Category	Summary
Description	The southern myotis is a species of small bat. It has disproportionately large feet, being more than 8 mm long, with widely spaced toes that are distinctly hairy with long, curved claws. It has dark grey to reddish brown fur above and is paler below. It weighs up to 15 grams and has a wingspan of about 28 cm.
Habitat	The species generally roost in groups of 10 to 15 individuals. Roosts are located close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.
Diet	The species forages over streams and pools catching insects and small fish by raking its feet across the water surface.
Distribution and population	The southern myotis is found in the coastal band from the north-west of Australia, across northern Australia and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. In NSW females have one young each year, usually in November or December.

Source: Saving Our Species and personal communication NSW Department of Climate Change, Energy, the Environment and Water, Biodiversity Conservation Division

Table 2 provides a list of key threatening processes to the southern myotis within Kosciuszko National Park that will be addressed via cost-effective management actions (see Table 3).

Table 2 Key threatening processes to southern myotis in Kosciuszko National Park

Threat	Description
Disturbance	Loss or disturbance of roosting sites. Clearing adjacent to foraging areas. Reduction in stream water quality affecting food resources.

Source: Saving Our Species and personal communication NSW Department of Climate Change, Energy, the Environment and Water, Biodiversity Conservation Division

Kosciuszko Offset Strategy: metrics-based approach

The Kosciuszko Offset Strategy requires expenditure of Snowy 2.0 offset funds to deliver biodiversity gains for Kosciuszko National Park equivalent to 120% of the loss for threatened species, threatened ecological communities, and ecosystems impacted by the Snowy 2.0 project. The benchmark of 120% has been set because this is considered achievable over the life of this action plan and it can be demonstrated as a biodiversity gain.

In setting an objective to exceed the statutory requirements, the strategy recognised the difficulties in measuring biodiversity gains and the inherent fluctuations in biodiversity over time. This benchmark provides a margin that will increase confidence that the minimum statutory requirements are being met. The strategy takes a metrics-based approach that will be applied to the delivery of biodiversity offsets by the NSW National Parks and Wildlife Service (NPWS). This will be achieved by following a 3-step process:

Step 1: quantifying the impacts and benefit that must be delivered

Step 2: implementing actions to deliver the required offset

Step 3: measuring and reporting on the biodiversity benefit.

Step 1: quantifying the impacts on the southern myotis and benefits that must be delivered

It is estimated that 24 southern myotis will be impacted by Snowy 2.0 Main Works. The benefit that must be delivered is the successful and sustainable establishment of an additional 29 southern myotis in Kosciuszko National Park (being 120% of the impact). This calculation is based on impacts to 4 hectares of southern myotis habitat from Snowy 2.0 with an estimated population density of 6 individuals per hectare.

Step 1 limitations, assumptions and notes

- The methodology in the dot-points below is based on expert departmental species knowledge.
- It is possible that southern myotis were not specifically recorded by Snowy 2.0 ecologists during the Main Works assessments. The call of the southern myotis is similar to that of other bats and can be confused when the call quality is poor. Southern myotis were only recorded as a possible identification at each of the sites assessed by Snowy 2.0.
- There is no research, literature or sufficient site-specific data that enables an accurate estimate of a possible southern myotis population in Kosciuszko National Park.
- Hollow-bearing trees were identified and recorded during the Snowy 2.0 Main Works assessments when assessing the vegetation types preferred by southern myotis. The assessment data indicates that hollow density is low within these vegetation types, and when competition by other hollow-dependent species is considered this further reduces roost availability for populations of southern myotis. This action plan has therefore used an estimate of one suitable colony roost per hectare in determining the offset objective

- Research published in 2009 conducted by Melbourne University in Yan Yean National Park, Victoria, suggests colony sizes average 6 bats per roost. In the absence of southern myotis population data for Kosciuszko National Park, the estimate of 6 bats per hectare is used in this action plan.
- Upon completion of actions 1 and 2 (which include monitoring actions – see Table 3), and as further studies and information on the southern myotis populations and densities in Kosciuszko National Park become available over the life of the action plan, the benefit that must be delivered will be refined and adjusted accordingly.

Step 2: implementing the management actions for southern myotis to deliver the required offset

Delivering an offset of at least 29 additional southern myotis in Kosciuszko National Park will involve the following management interventions:

- identifying an area (or areas) of suitable habitat for delivery of the offset (see action 1 in Table 3)
- measuring the current density (or other suitable metric such as occupancy) of southern myotis at that location and identifying the target density and thus the required area across which the offset actions are to be delivered (see action 2 in Table 3)
- conduct surveys to confirm the presence of southern myotis (see action 3 in Table 3)
- increasing the density (or other suitable metric) of southern myotis at that location through the installation of bat boxes (artificial habitats) (see action 4 in Table 3).

During the environmental assessments for Snowy 2.0 Main Works, targeted acoustic surveys detected bat calls at 3 locations in the Talbingo area near the Yarrangobilly River in northern Kosciuszko National Park. These calls were precautionarily registered as southern myotis.

Southern myotis alter their calls when feeding and drinking in what is known as a feeding buzz. Pulses admitted during this phase resemble the calls of other similar bats in the same family but different genus, making it difficult to identify the exact species.

As a result, there is no research, literature or sufficient site-specific data collected that enables an accurate estimate of southern myotis populations in Kosciuszko National Park. Additionally, with the low number of suitable hollows recorded during the Snowy 2.0 assessments, low roost availability adds to the challenge of supporting a population of southern myotis in the park.

This action plan relies on estimated colony sizes from roost research conducted in 2009 in Yan Yean National Park in Victoria by Melbourne University, which suggested an average of 6 bats per roost. This figure has been cautiously used to estimate a population size of 6 bats per hectare, applying an estimated likelihood of just one suitable colony roost per hectare.

Actions under this plan focus on the installation and monitoring of artificial roost structures in suitably identified foraging and breeding habitat (Figure 1) and any additional sites determined by NPWS or species experts during initial habitat inspections (see action 1 in Table 3). Once sites have been deemed suitable habitat, auditory surveys using bat detectors will be conducted to determine the flight path of the southern myotis and to provide a directional indication for the establishment of appropriate mist net locations to confirm the presence of southern myotis (see action 3 in Table 3).

If a roost is located, stag watching (monitoring and counting bats as they exit the roost) and scat surveys will be undertaken with an expert and/or suitably trained and qualified NPWS staff to determine the presence of southern myotis.

Once species presence has been determined, population density figures may be re-evaluated to ensure the delivery of the offset exceeds the impact. Currently, the biggest threat to the species is availability of suitable roosting sites within 200 m of foraging habitat. To address this threat and to reach the 120% biodiversity gain, artificial habitat will be installed in the park (see action 4 in Table 3) and monitored.

The proposed offset area in Figure 1 includes burnt and unburnt sites following the 2019–20 bushfires, and some sites are now also identified under the Assets of Intergenerational Significance (AIS) program. Actions under this action plan may, where appropriate, occur within AIS sites where offset funds are used to benefit the species, and actions go above and beyond those identified under the AIS program.

Table 3 lists the actions needed to deliver the required biodiversity gains. These include identifying suitable habitat areas, determining species presence in those areas, and addressing the identified key threatening processes (Table 2).

Table 3 Management actions for southern myotis to deliver the required offset in Kosciuszko National Park

Action number	Action	Threat addressed	Location	When	Who	Total cost (preliminary estimates)	Comment
1	Conduct site visits to identified foraging and breeding habitat (Figure 1) to identify sites for auditory surveys	–	Area shaded in red (Figure 1)	2023 to 2025	NPWS	$4,000	Completed. Southern myotis never roost more than 200 m from foraging and breeding habitat, so suitable locations for artificial habitats should be able to be determined through targeted site inspections in areas circled in Figure 1 and any additional sites identified by NPWS. Exact points to be site assessed can only be determined during field visits to the area by species experts.
2	Undertake a desktop assessment to determine the designated offset area and locations for auditory surveys	–		2023 to 2025	NPWS	$0	Completed. The desktop assessment is required to ensure that offset polygons encompass target areas for auditory surveys, mist netting and stag watching.
3	Conduct auditory surveys using bat detectors and, if required, scat surveys, use of thermal cameras, mist netting and stag watching to confirm presence of southern myotis	–	Designated southern myotis offset areas	2024 to 2027	NPWS	$5,000	Underway. Identify presence of southern myotis and determine the required type and number of artificial habitats needed at each site to deliver the required offset.
4	Purchase and install artificial habitats at southern myotis offset areas identified in actions 2 and 3	Disturbance	Designated southern myotis offset areas	2025 to 2027	NPWS	$50,000	It is expected that artificial habitats will support above and beyond the required offset objective for this species. When the populations have reached a sustainable level, a staged removal of the artificial

Action number	Action	Threat addressed	Location	When	Who	Total cost (preliminary estimates)	Comment
							structures is intended. Stag watching or artificial habitat watching will form a critical part of ensuring the required offset is delivered. Direct counts may be made by counting as individuals exit the structure and/or by using a stethoscope camera inside the structure. This action is listed in the monitoring section of this action plan (see Table 4).
					Total cost	**$59,000**	

Step 2 limitations, assumptions and notes

- Very little monitoring of southern myotis in Kosciuszko National Park has occurred to date, limiting current understanding of the species in the park. The Snowy 2.0 Main Works environmental assessments were the first significant monitoring of the species in Kosciuszko National Park.
- If southern myotis are confirmed as being present in the park, there is no certainty that they will utilise constructed bat boxes (artificial habitats). If artificial habitats are unsuccessful as roost sites, this action plan will be re-evaluated with the potential for habitat rehabilitation – including possible tree plantings to take place at locations to be determined – in actions 1 and 2 in Table 3.
- This action plan will be updated accordingly as new information, knowledge and management techniques become available.
- Costs identified above will be revised, as required, taking into account the relative cost-effectiveness of different measures.
- Actions under this plan will not apply to sites directly impacted by Snowy 2.0 construction activities. Snowy Hydro Limited is required under planning approvals to undertake habitat rehabilitation at these sites. Reintroducing southern myotis into Snowy 2.0 project sites is outside the scope and timeframe of this project and action plan.

Step 3: measuring and reporting on the biodiversity benefits to southern myotis

The Kosciuszko Offset Strategy states that each action plan must describe how the required biodiversity benefit (offset) will be measured. This involves setting out the attributes to be measured and the methodology, timing and other relevant details relevant to monitoring. A hierarchical approach is being taken to measuring the biodiversity benefit.

1. The population density of a species is the desirable measurement attribute.
2. If this is not feasible due to challenges such as difficulty in capturing and detecting populations due to low numbers, then other metrics (such as occupancy) combined with modelling will be considered instead.
3. If the attribute and monitoring design in (1) or (2) above is not working, then the attribute being measured will be revisited and another metric considered.

Any changes to metrics over time will be updated in the action plan and reported on as part of the adaptive management approach under the Kosciuszko Offset Strategy.

Table 4 Measuring biodiversity benefits to southern myotis

Attribute to be measured	Metric	Location	Methodology	Monitoring design	Timing	Cost	Frequency of measurement
Population	Density (number of individuals within a colony)	Designated southern myotis offset areas	Auditory surveys (bat detectors), scat surveys, mist netting, stag watching (exit counts)	Surveys, netting and stag watching to occur during the breeding season in spring and summer (November to March). Monitoring to also determine if roosts are maternity roosts	During the active months (spring to autumn)	Up to $14,500 over a minimum of 20 years for ongoing population monitoring to identify the extent of the offset delivered	One week every year for the first 3 years, then one week every 5 years after that

Step 3 limitations, assumptions and notes

- The Snowy 2.0 Main Works assessments only used auditory surveys to determine species presence. This action plan proposes to use 4 different survey methodologies as species identification is recognised as difficult and unreliable using auditory surveys alone.
- This action plan and the survey methodologies will be reviewed and updated if population density figures are unable to be determined using the 4 proposed methodologies.

Governance

Reporting

As required under Snowy 2.0 approvals, NPWS must monitor, evaluate and publicly report on progress of the implementation program and the effectiveness of the specific projects and actions. They will prepare an annual report on the Snowy 2.0 biodiversity offset program for Kosciuszko National Park and its implementation, including progress with achieving the required increase in the number of southern myotis. The report will be provided to the Commonwealth Department of Climate Change, Energy, the Environment and Water, and published on the environment.nsw.gov.au website within 3 months of the end of each financial year.

The annual report will:

- detail the expenditure from the biodiversity offset fund on agreed actions under the Kosciuszko offset action plans
- outline any interest earned and reinvested into the offset program
- provide details about the conservation actions carried out for each approved threatened species, threatened ecological community and threatened ecosystem action plan such as:
    - the type of conservation action implemented – for example, feral animal control, habitat restoration
    - the geographic extent and location of the conservation actions
    - the proportion of the proposed conservation actions achieved and the proportion yet to be achieved
    - an analysis and summary of monitoring data
    - future conservation actions, with key timeframes including intended completion
- include details on progress towards each action plan objective
- document where adaptive management principles have been applied to each action plan to improve their effectiveness.

Adaptive management

Quantifying and measuring the biodiversity benefit for southern myotis may present significant technical challenges. Together with the influence of natural variability, it is anticipated there will be a level of uncertainty to both measuring and interpreting biodiversity benefits relevant to the species. This uncertainty will be addressed by applying an adaptive approach, including reviewing and updating density numbers, monitoring, methodologies and strategies as new information, data or technology becomes available. At a minimum, action plans will be reviewed every 5 years.

Approvals

Date/approval	
Date prepared	February 2025
Date approved – NSW National Parks and Wildlife Service	April 2025
Approved by	Naomi Stephens, Acting Deputy Secretary National Parks and Wildlife Service
Date for review	February 2030

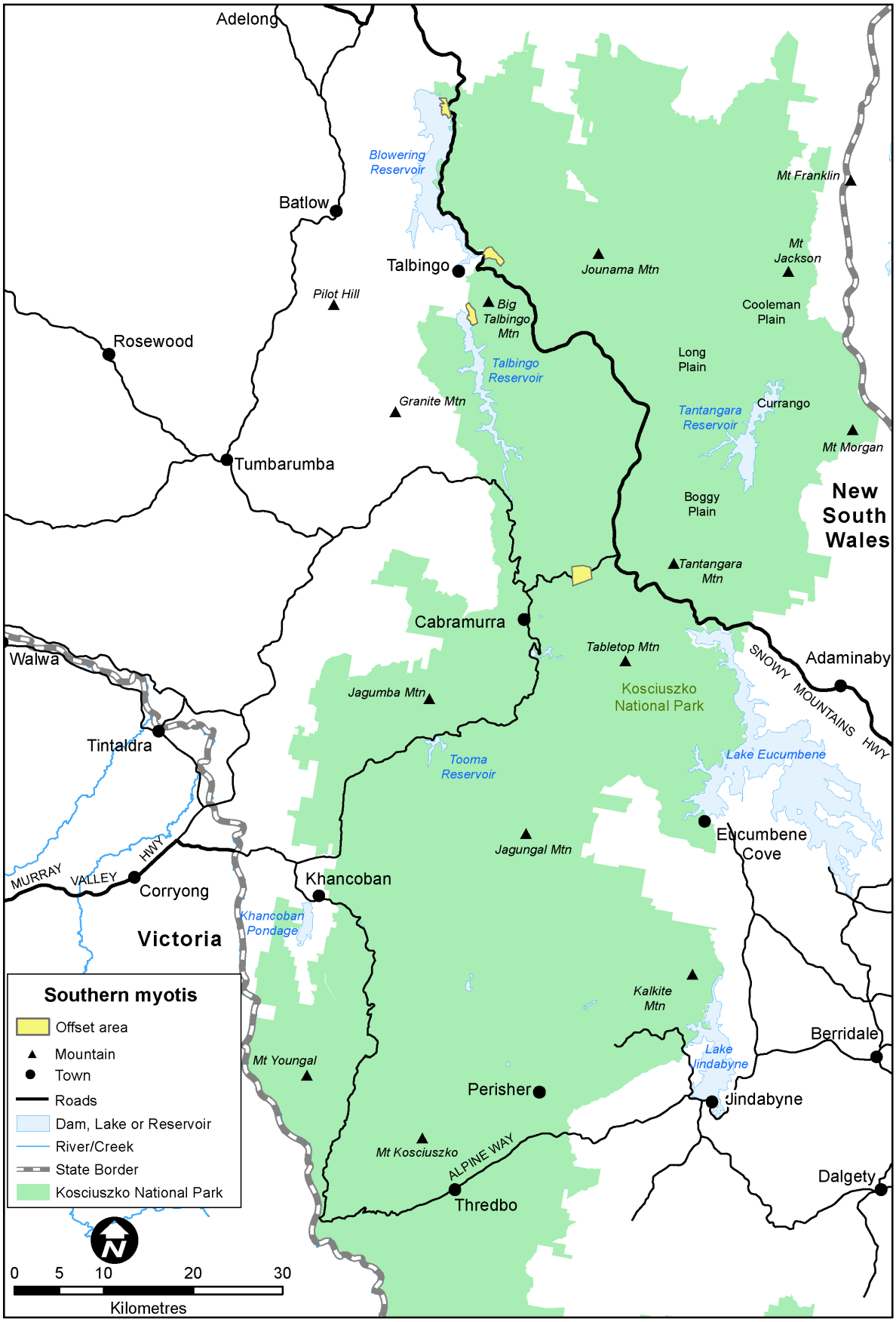

Figure 1 Proposed southern myotis offset areas – Kosciuszko National Park

More information

- Assets of Intergenerational Significance