NSW National Parks and Wildlife Service

Kosciuszko offset action plan – Max Mueller's burr-daisy

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This resource may contain images or names of deceased persons in photographs or historical content.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 Max Mueller's burr-daisy (*Calotis pubescens*) within Kosciuszko National Park.

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 assessments for Main Works, up to 2.6 hectares of Max Mueller's burr-daisy habitat was identified as being impacted. (Assessments for the Snowy 2.0 Exploratory Works and Transmission Connection projects did not identify any impacts to Max Mueller's burr-daisy.) At an estimated 150 individuals per hectare (see Step 1), the impact of the Snowy 2.0 project on Max Mueller's burr-daisy is estimated to be a reduction of the population by 390 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 Max Mueller's burr-daisies in Kosciuszko National Park by 468 individuals.**

As Max Mueller's burr-daisy is not a Commonwealth-listed species, this action plan has been approved only by the Deputy Secretary, NSW National Parks and Wildlife Service.

Species overview and key threatening processes

Max Mueller's burr-daisy is listed as **endangered** 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 Max Mueller's burr-daisy, including a description of the species, its habitat and distribution within Kosciuszko National Park.

Table 1 Species summary – Max Mueller's burr-daisy

Category	Summary
Description	Max Mueller's burr-daisy is a perennial herb with thick and fleshy underground stems (rhizomes). It grows to form large mats. Its leaves are very woolly when young. It has unbranched flowering stems that hold single mauve or white flower-heads, flowering in December. Max Mueller's burr-daisy fruits have 2 rows of spines that are likely to aid in dispersal.
Habitat	Max Mueller's burr-daisy grows in subalpine treeless plains in herb-rich grassland (often dominated by *Poa hookeri*).
Distribution and population	Max Mueller's burr-daisy has been recorded in 5 sites in the Snowy Mountains of New South Wales, 4 of which are in Kosciuszko National Park. The Snowy 2.0 project area contains suitable habitat for this species and the species was recorded within the Main Works environmental impact assessment survey area.

Source: Saving Our Species, *Conservation Action Plan: Max Mueller's burr-daisy (Calotis pubescens)*, 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 Max Mueller's burr-daisies within Kosciuszko National Park that will be addressed by cost-effective management actions (see Table 3).

Table 2 Key threatening processes to Max Mueller's burr-daisies in Kosciuszko National Park

Threat	Description
Weeds	Habitat degradation and competition through invasion, establishment, intensification and spread of weeds, especially ox-eye daisy, to the extent that recruitment or establishment is significantly impaired
Feral herbivores	Damage to individual plants and degradation of habitat by introduced herbivores such as deer, rabbits and horses, through grazing and trampling
Feral pigs	Damage to individual plants and degradation of habitat by feral pigs through grazing, trampling, digging and wallowing

Source: Saving Our Species, *Conservation Action Plan: Max Mueller's burr-daisy (Calotis pubescens)*, 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. 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 Max Mueller's burr-daisies and benefits that must be delivered

It is estimated that 390 Max Mueller's burr-daisies will be impacted by Snowy 2.0 Main Works. The benefit that must be delivered is the successful and sustainable establishment of an additional 468 Max Mueller's burr-daisies in Kosciuszko National Park (being 120% of the impact). This calculation is based on impacts to 2.6 hectares of Max Mueller's burr-daisy habitat from Snowy 2.0 with an estimated population density of 150 individuals per hectare.

Step 1 limitations, assumptions and notes

- The methodology outlined in this section is based on expert species knowledge from the Department of Climate Change, Energy, the Environment and Water.
- The estimate of 150 individuals per hectare in Kosciuszko National Park is based on survey data from the Saving our Species monitoring program in Nungar Plain and Kellys Plain undertaken from 2015 to 2021, and the Snowy 2.0 Main Works environmental assessments.
- Population estimates are taken from areas of known distribution in Nungar Plain and Kellys Plain. Population numbers may therefore be higher in Kosciuszko National Park as targeted surveys have not been conducted within all of the known potential habitat for this species.
- This population density figure is an extrapolation that relies on the accuracy and consistency of both monitoring and survey data.

Step 2: implementing the management actions for Max Mueller's burr-daisies to deliver the required offset

Delivering an offset of at least 468 additional Max Mueller's burr-daisies 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)
- increasing the number of Max Mueller's burr-daisies through a targeted series of offset actions such as intensive feral herbivore and weed control above and beyond core management (see actions 2 and 3 in Table 3).

Monitoring of Max Mueller's burr-daisies began in 2015 as part of the Saving our Species program. This identified 4 priority management sites in Kosciuszko National Park: Nungar Plain, Botherum Plain, Cascade Plain and Kellys Plain. To concentrate conservation efforts, this action plan proposes to use one of these sites, Nungar Plain, as the designated offset area.

Although the proposed offset area at Nungar Plain is within a Saving our Species Max Mueller's burr-daisy conservation site, actions under this plan will go above and beyond those identified under the Saving our Species program. For example, actions for Max Mueller's burr-daisy in Nungar Plain under the Saving our Species program are:

- general weed management
- feral animal management.

Ox-eye daisy poses the greatest threat to Max Mueller's burr-daisy in Kosciuszko National Park. Under the Kosciuszko Offset Project, an intensive ox-eye daisy control program has been established (see action 3 in Table 3). This control program focuses on eliminating ox-eye daisy in Nungar Plain to benefit Max Mueller's burr-daisy. This program is unique to the Kosciuszko Offset Project and would not otherwise occur as part of the Saving our Species program or through general park management actions.

The management of ox-eye daisy in Kosciuszko National Park includes the appointment of a dedicated officer for at least 5 years. While this targeted weed control program is not funded specifically from biodiversity offsets allocated to Max Mueller's burr-daisy (as it benefits multiple offset species such as clover glycine, Raleigh sedge, mauve burr-daisy, Kiandra leek orchid and *Caladenia montana*), it is still being funded under the Kosciuszko Offset Project.

While it is expected that Nungar Plain has a healthy population of Max Mueller's burr-daisy that will support the target population (objective) identified under this action plan, additional offset areas outside of Nungar Plain, not included under the Saving our Species program, will also be considered throughout the implementation of this plan.

It is expected that the removal of threats in the designated offset areas (actions 2 and 3 in Table 3) will lead to an increase in the target population numbers. However, if numbers are not increasing after threat abatement, seed collection and plantings will be considered.

The proposed offset area (Figure 1) is also identified as an offset area under the Kosciuszko Offset Project for mauve burr-daisy, clover glycine, Kiandra leek orchid, alpine she-oak skink and broad-toothed rat. Actions under this plan such as weed control may, where appropriate, be combined with similar actions for other offset species to ensure a greater benefit is achieved.

The offset area is adjacent to the Assets of Intergenerational Significance (AIS) program area for Max Mueller's burr-daisy. If actions under this plan do eventually need to occur

within the AIS site for Max Mueller's burr-daisy (for example, if the objective cannot be fully achieved in the current offset area), then Kosciuszko Offset Project actions will 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 and addressing the identified key threatening processes (Table 2).

Table 3 Management actions for Max Mueller's burr-daisies 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 confirm offset areas, estimate species density and determine threat abatement actions	–	Area shaded in red (Figure 1 – proposed offset area)	2023 to 2024	NSW National Parks and Wildlife Service (NPWS)	$0	Completed. NPWS collaborated with Saving our Species to gather information and identify a suitable habitat area in Nungar Plain. Other offset sites will be considered throughout the course of implementing this action plan.
2	Additional feral horse, rabbit, deer and pig control in the offset area identified in action 1	Feral herbivores	Offset area	2025 to 2045	Integrate into existing feral herbivore control programs	Up to $4,000 over a minimum of 20 years	Additional to core feral herbivore management. Horse removal will be consistent with the Kosciuszko National Park Wild Horse Heritage Management Plan.
3	Undertake intensive weed control, especially for ox-eye daisy, in the offset area identified in action 1	Weeds	Offset area	2025 to 2045	Integrate into existing weed control programs	Up to $4,000 over a minimum of 20 years	Additional to core weed management. Enhanced spraying for ox-eye daisy which compromises habitat and outcompetes Max Mueller's burr-daisies. Enhanced funding from other areas of the Kosciuszko Offset Project, as ox-eye daisy control will benefit multiple offset species.
4	Additional monitoring of feral animal numbers	Feral herbivores	Offset area	2025 to 2045	Integrate into existing feral animal monitoring	Up to $1,000 over a minimum of 20 years	As required, implement monitoring to measure and track feral animal densities in the designated Max Mueller's burr-daisy offset area consistent with NPWS protocols.
					Total cost	**$9,000**	

Step 2 limitations, assumptions and notes

- Seed collection and planting is not currently considered under this action plan because threat management should be adequate to allow for the natural regeneration of the species.
- Threat control strategies and actions will continue to evolve throughout the life of this action plan. The plan will be updated 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.
- The application of broadleaf herbicides used to target ox-eye daisy is likely to have a negative impact on Max Mueller's burr-daisies. Therefore, weed control in the designated offset area will be undertaken with caution.
- Fire protection and burning is not listed as an action in this plan as fire response and fire management for this species is unknown.
- 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.

Step 3: measuring and reporting on the biodiversity benefit to Max Mueller's burr-daisies

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 details relevant to monitoring.
A hierarchical approach is being taken to measure the biodiversity benefit.

i. The population density of a species is the desirable measurement attribute.
ii. If this is not feasible due to challenges such as difficulty in detecting populations due to low numbers, then other metrics (such as extrapolation of plot surveys) combined with modelling will be considered instead.
iii. If the attribute and monitoring design in (i) or (ii) 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 as part of the adaptive management approach under the Kosciuszko Offset Strategy.

Table 4 Measuring biodiversity benefits to Max Mueller's burr-daisies

Attribute to be measured	Metric	Location	Methodology	Monitoring design	Timing	Cost	Frequency of measurement
Number of Max Mueller's burr-daisies	Density (number of plants per hectare)	Designated Max Mueller's burr-daisy offset area	Site visits and individual plant counts	Establish monitoring plots/transects across designated offset area. Track changes in species density within plots/transects	During the active months (summer: December to February)	Up to $5,000 over 20 years for ongoing population monitoring to identify the extent of the offset delivered	Annually for the first 2 years, and then once every 5 years

Step 3 limitations, assumptions and notes

- Effective population monitoring will rely on the knowledge, skill and experience of the person undertaking the surveys to accurately identify the species.

Governance

Reporting

As required under Snowy 2.0 approvals, the NSW National Parks and Wildlife Service 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 population of Max Mueller's burr-daisies. The report will be provided to the Commonwealth Department of Climate Change, Energy, the Environment and Water, and published on the 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 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 Max Mueller's burr-daisies may present significant technical challenges. Together with the influence of natural variability, it is anticipated there will be a level of uncertainty in relation to both measuring and interpreting the 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 become available. At a minimum, action plans will be reviewed every 5 years.

Approvals

Date/approval	
Date prepared	January 2025
Date approved	15 January 2025
Approved by	Atticus Fleming, Deputy Secretary NSW National Parks and Wildlife Service
Date for review	January 2030

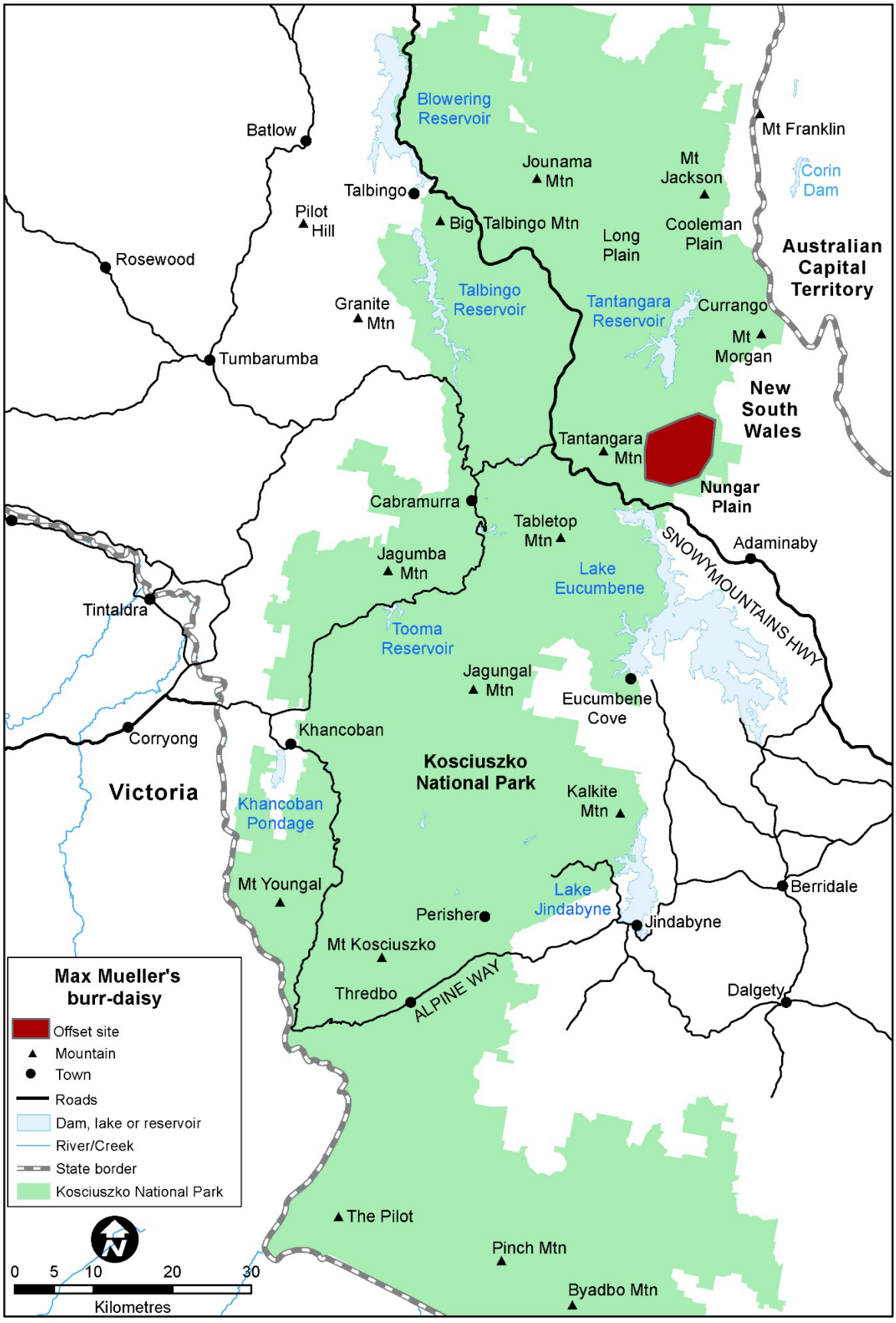

Figure 1 Proposed Max Mueller's burr-daisy offset area – Kosciuszko National Park

More information

- Assets of Intergenerational Significance