Office of Environment & Heritage
NSW National Parks & Wildlife Service

Managing Kosciuszko National Park for the Future

Implementing the Plan of Management | Annual Report 2011-2012

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Cover photos:
Main: Winter at Wolgal Hut, Kiandra. Photo: Murray Vanderveer
Bottom left: Walkers and cyclists on the Thredbo Valley shared-use track. Photo: Stephanie Lees
Bottom centre: Clover glycine (*Glycine latrobeana*) the recently discovered rarest plant in Kosciuszko National Park. Photo: Roger Farrow
Bottom right: The Tumut based Aboriginal Discovery program. Photo: Murray Vanderveer

CONTENTS

Tables

Executive Summary

The Kosciuszko National Park Plan of Management (2006) is a highly considered and ambitious Plan, providing a framework for tackling the management challenges of the largest national park in NSW. As part of the Plan, each year a public annual report is prepared which outlines the progress being made. This report covers the period from 1st July 2011 to the 30th June 2012 and summarises the main management achievements, research and monitoring programs, the annual condition assessment of the park's values as well as a review of the Plan itself, five years after its adoption.

Part One: Major projects and achievements

A diverse range of projects and achievements were completed across the entire geographical range of Kosciuszko National Park (KNP) within the reporting period. Many of the projects outlined in the Plan have been supported by the Towards Centenary Fund; park-use fees that are specifically channelled into projects and operational areas that will benefit the park well into the future, into its Centenary year of 2044. For July 2011- June 2012 major achievements included:

Elements of the landscape

- the discovery of the park's rarest plant, the clover glycine (*Glycine latrobaena*)
- the completion of the Geodiversity Strategy, a framework for monitoring and protecting the park's significant geology, fossils, karst, soils and key landforms.

People and the landscape

- Aboriginal partnerships: endorsement of the executive committee for the Tumut, Brungle, Gundagai Area Aboriginal Community MOU and the rolling out of associated programs; the Southern Snowy Mountains Aboriginal Community MOU is also progressing as are projects pursued by that group
- the restoration and maintenance of huts and their social connections, an area which benefits hugely from the volunteer work of the Kosciuszko Huts Association.

Heritage tourism

- major restoration programs at both Yarrangobilly Caves House and the Kiandra Precinct supporting heritage tourism into the future.

Walking tracks and visitor facilities

- major capital works along the Thredbo Valley Shared Use Track with the installation of four new bridges
- maintenance of the iconic Main Range Walking Track section from Charlotte's Pass to Blue Lake
- the assisting of over 150,000 visitors via the four NPWS-managed visitor centres and the boosting of visitor convenience through the publishing of a new comprehensive *Guide to Kosciuszko National Park.*

Restoration and protection

- the greatest number of horses removed from the park since the adoption of the KNP Horse Management Strategy, including strong community support for the re-homing of horses
- execution of orange hawkweed program: treating all known sites and tracking the spread of the weed with volunteers to boost the success of the control measures

- winning the 2011 Australian Engineering Excellence Award for Environmental Engineering - a tremendous acknowledgement of the calibre of work performed by staff rehabilitating former snowy scheme sites within KNP
- the establishment of two new fire fighting teams as part of the state wide Enhanced Bushfire Mitigation Program (EBMP); these teams will increase the capacity to implement the KNP Bush Fire Management Plan and are responsible for implementing the hazard reduction burns and Asset Protection Zones in all national parks and nature reserves in the Southern Ranges Region.

Community programs

- the Tumut-based Aboriginal Discovery team receiving the Indigenous Tourism Award for Canberra and the Capital region; Pat Darlington, one of the founding creators of the Kosciuszko Education Centre receiving the Public Service Medal on Australia Day 2012 for her enhancement of public awareness of the environment
- continued growth of volunteer programs within KNP offering vital support to: the orange hawkweed program; the maintenance of cultural heritage; fauna and flora surveys; maintenance of cross country ski trails and walking track improvements.

Programs in alpine resorts

- implementation of Environmental Management Systems throughout all four alpine resorts within KNP
- completion of a habitat restoration project on the Perisher Creek with support from the Environmental Trust
- completion of a four year capital works program with major upgrades ensuring improvements to Perisher municipal services including waste management systems, sewerage treatment, roads, water supply and village signage.

Part Two: Research, monitoring and evaluation

KNP has a strong history of research and monitoring. Research, monitoring and evaluation is led by the NPWS regional Planning and Assessment Team, in many cases in collaboration with national and international research institutions and programs. This Part outlines these programs as well as the important Five Year Review of the Plan of Management itself.

Research and monitoring programs

Major research projects conducted during July 2011- June 2012 include:

- the International Mountain Invasion Research Network (MIREN) project to collect data aimed at further understanding the problem of plant invasions into mountain areas
- feral horse impact monitoring: a system developed by NPWS researchers together with CSIRO and sponsored by the Australian Alps Program; now being implemented across the Alps and state-territory borders
- monitoring of orange hawkweed control programs and investigating new controls in collaboration with Melbourne and Wollongong Universities
- the statewide Wildcount monitoring program, where infrared cameras were set across the park, providing the highest altitudinal sites for the NSW state-wide program
- the ongoing Global Research in Alpine Environments (GLORIA) program where in collaboration with Griffith University, vegetation of five summits in the park is being tracked to determine the long term effects of a changing climate
- fauna monitoring programs determining the success of management programs of threatened species or pest management programs, among them threatened frogs, mountain pygmy possums, broad-toothed rat, European red fox, European hare and spotted-tail quolls, and
- modelling of fire threats to alpine ash forests.

Annual assessment of Kosciuszko National Park's values

The condition of the values of KNP is assessed each year, both as an important measure of management effectiveness and as a tool for informing adaptive management. To do this, the condition of each value and the trend in condition is tracked in an integrated monitoring and evaluation program, making use of the results of monitoring programs, independent scientific information and State of Parks reporting.

In the 2011-12 reporting period, of the 17 values assessed nine were found to be in acceptable condition under the current management regime being: rocks and landforms; wilderness; aesthetic; Aboriginal; pastoralism; huts; mining; tourism and recreation and utilitarian functions. The other eight values have a current condition of concern and adaptive management actions are required. The values where concerns are highlighted are: karst; soils; rivers and lakes; native plants; native animals; ecosystems processes, water harvesting and scientific research. The assessment is detailed in Table 1.

The Five Year Review of the Plan of Management

The Kosciuszko National Park Plan of Management (2006) calls for a review into the success of implementation and the appropriateness and adequacy of the Plan five years after its adoption. This five year review was conducted internally by the Planning and Assessment Team with input from a wide range of staff at two staff forums and through individual interviews. The Regional Advisory Committee was involved in the review and commented on the findings. The review concluded that much had been achieved from the Plan and where there were areas of concern or a lack of action these have been included in The Five Year Action Plan to be utilised by operational planners (Table 4). Due to the comprehensive nature of the Plan, only a few gaps were identified, mostly cases where new information had come to light since it was written. The findings of the five year review will be used to assist in setting the agenda for managing Kosciuszko National Park into the future.

Introduction

Kosciuszko National Park is a special place. It contains the highest mountains on the Australian continent, unique glacial landscapes, and unusual assemblages of plants and animals, a number of which are found nowhere else. It also encompasses significant water catchments, the principal seasonally snow-covered region in Australia, and extensive tracts of forest and woodland within the most densely populated corner of the nation. Superimposed over all this is a rich layering of cultural remains, histories and meanings. Managing Kosciuszko National Park (KNP) for the future requires ensuring that these layers of values are maintained or enhanced. The guiding framework to achieve this is the *Kosciuszko National Park Plan of Management (2006),* and this annual report tracks its implementation during the period from 1st July 2011 to 30th June 2012.

This report is in two parts. Part One: Major projects and achievements provides a brief summary of standout projects completed in this financial year. Part Two: Research, monitoring and evaluation presents the annual analysis of the trend in condition of park values as well as a summary of research conducted in KNP in the reporting period. As the five year review of the Plan of Management was conducted in the reporting period, a summary of the main findings are also included in this section.

Kosciuszko National Park Plan of Management (2006)

The preparation of the Kosciuszko National Park Plan of Management (2006) was an innovative process undertaken collaboratively with many stakeholders. It brought together a variety of people and organisations with a high level of knowledge of the park's natural, cultural and socio-economic values. Specifically established to identify important issues and provide advice on management solutions were: an independent scientific committee; a community forum representing community stakeholders; an Aboriginal working group and a staff working group.

The resulting ambitious plan is a highly considered and comprehensive tool for the management of Kosciuszko National Park (KNP) with much detail and information on management challenges. In many areas it presents a cutting edge framework for managing key issues.

In 2011, the National Parks and Wildlife Service (NPWS) undertook a limited review of this document and its implementation in accordance with stipulations of the plan. This review contained an assessment of what had been achieved and proposed minor amendments of the plan to meet unforeseen management changes. This five year review adopted the internal NPWS plan of management (PoM) self-audit review methodology undertaken by local regional staff for all plans of management. The results are reviewed by the Southern Ranges Regional Advisory Committee and then audited by the state wide Conservation Audit and Compliance Committee (CACC).

A summary of the outcomes of this review is contained in Part Two of this report.

A plan of management is a statutory document under the NSW National Parks and Wildlife Act 1974 (the NPW Act) and no operation may be undertaken in the park except in accordance with the plan. The entire plan, amendments to it, and the annual implementation reports can be sourced on line at:

http://www.environment.nsw.gov.au/parkmanagement/knpmgmtplan.htm

Part One: Major projects and achievements

This Part highlights the major projects and achievements undertaken or finalised in Kosciuszko National Park (KNP) between 1st July 2011 and 30th of June 2012. Following are a range of interesting stories over different geographical areas and park management issues. This is by no means the total list of achievements for the financial year but more a summary of the highlights. Many projects listed here were made possible by the Towards Centenary Fund, an allocation from the KNP park use fees to implement important projects in the Park. This funding program has a long term aim of preparing the park for its 100th year anniversary in 2044.

1.1 Elements of the landscape

1.1.1 Geodiversity Action Plan

The KNP Geodiversity Action Plan 2012-2017 outlines the appropriate management of soils and rocks in the Park. Geodiversity is the geological equivalent to biodiversity and is largely responsible for the variety of plants, animals and other organisms that exist today. Geodiversity is also important for its cultural, aesthetic, economic, research and educational values. The action plan outlines key landforms, karst areas, rocks, minerals, fossils and soils within KNP, discussing condition and threats to condition for these features. A geodiversity monitoring program is being implemented along with actions to minimise loss or damage of values, some of which are of international significance.

Unique geodiversity features in the Park.
Photos: Left - Columnar Basalt (S. Rielly – OEH), Right – Garnet Hill (A. Baker – OEH)

1.1.2 Threatened frogs

Management of threatened frogs within KNP is an ongoing challenge with mixed results for current programs. In the reporting period the re-introduced spotted tree frog (*Litoria spenceri*) population declined by more than 90%, leaving little expectation that the population will persist. Another outbreak of the amphibian chytrid fungus, facilitated by the cool and wet la niña conditions is believed to be linked to the decline, therefore future attempts to secure

populations of the spotted tree frog in KNP will focus on establishing populations in warmer sections of stream that are less conducive to the killer fungus.

While the wild southern corroboree frog (*Pseudophyrne corroboree*) populations continue to decline, the release of captive bred eggs back to the wild is starting to produce some promising results. One release site recorded 30 breeding males in January, a survivorship beyond expectations. Unfortunately for these males, the females reach sexual maturity a year later, meaning next year will be the first chance to record breeding success. With only nine males recorded across all non-manipulated sites, these results provide hope that the complete extinction of this species in the wild can be averted.

Threatened frog programs in KNP are directed by recovery teams and have had significance input from other organisations including Taronga Zoo, Melbourne Zoo, Healesville Sanctuary, The Amphibian Research Centre and James Cook University. Funding sources include Centenary Funds, an Australian Research Centre Linkage Grant and threatened species allocation from the Office of Environment and Heritage.

The Australian Alps Program produced a vignette on the management of these animals: http://www.australianalps.environment.gov.au/publications/general/video-frog.html

A southern corroboree frog having its belly swabbed to determine whether it has been infected with the amphibian chytrid fungus. Photo: Dr David Hunter (OEH)

1.1.3 Mountain pygmy possums

Surveys during the reporting period show that populations of the mountain pygmy possum are doing very well, with 139 adults captured at the three new sites (summer of 2010-11) near Cabramurra. Further mapping of potential habitat and extrapolation from densities in the new colonies indicates there may be as many as 250 females and 100 males in the new northern KNP population. Further potential sites will be surveyed in the following season. The new northern KNP population is highly genetically differentiated from the southern, substantially adding to the overall genetic pool. The annual survey in November 2011 of the southern KNP populations that have now been monitored for 26 years showed a remarkable recovery in numbers at all of the sites. Numbers equalled or exceeded pre-drought numbers on all sites except Mt Blue Cow, which never-the-less showed a 50% recovery in population size from the very low numbers experienced from 2000-2010. Two years of cool temperatures and high rainfall have undoubtedly contributed to this recovery but the observation that numbers have exceeded previous population sizes may indicate that the concerted efforts to remove feral cats and foxes, particularly from around the resort areas and in the Whites River region, are benefitting populations. Mountain pygmy possum recovery programs, directed by the recovery team, receive funding from several sources including Centenary funds and OEH threatened species funds.

The Australian Alps Program produced a vignette on the management of these animals: http://www.australianalps.environment.gov.au/publications/newsletters/no42.html#possums

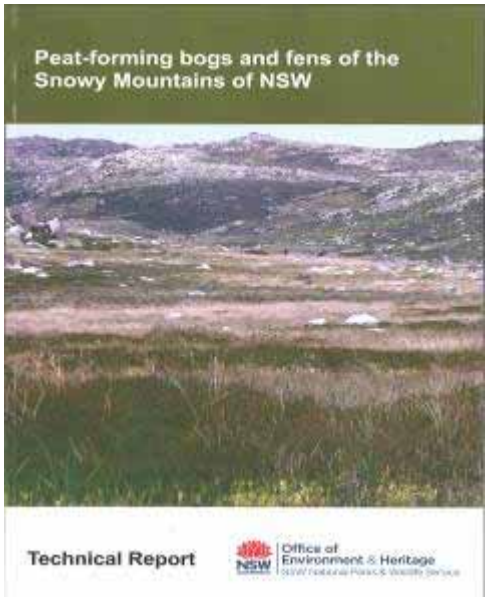
Hayley Bates, a PhD student studying mountain pygmy possum populations.

Photo: Dr Linda Broome (OEH)

1.1.4 Clover glycine - a new plant species record for KNP

Kosciuszko National Park is such a well traversed and well researched park and yet new significant discoveries are still being made. In December 2011, the clover glycine (*Glycine latrobeana*) was recorded for the first time. This is not only a new record for KNP but the plant had not been recorded in NSW since the late 19th century. Listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this record has shifted its confirmed range significantly further north. See photo on front cover.

1.1.5 Assessment of bogs and fens of the Snowy Mountains



In an important step to managing the Endangered Ecological Community of Montane Peatlands and Swamps within KNP, Professor Hope of the ANU has led an assessment of the extent of this community. The recently published report provides the first quantified

measurements of peatland extent, peat volume and peatland carbon storage for the Snowy Mountains of NSW. Bogs and fens, common in the Snowy Mountains, form up to 2.5% of the high altitude ground cover. There are at least 9120 individual peatlands in NSW and the ACT totalling 7985 ha, of which 6037 ha are in Kosciuszko National Park. Some 72% of the sites are less than 0.5 ha. The bogs and fens preserve 49 million tonnes of peat, storing 3.55 million tonnes of carbon. Most of the peatlands show damage from almost two centuries of grazing, but those at higher altitudes are recovering strongly and recolonising erosion areas. Peatlands are likely to be disadvantaged by climate change, as they are near their climatic limits and have been greatly impacted by historic grazing and landscape scale wildfires. Recovery of the peatland vegetation is underway, but will take several decades and a much longer time to replace lost peat.

1.2 People and the landscape

1.2.1 Aboriginal Community partnerships

Aboriginal partnerships continue to be a focus of KNP management. Executive committee members for the Tumut Brungle Gundagai Area Aboriginal Community MOU have signed on, and the Southern Snowy Mountains Aboriginal Community MOU is also progressing. The culture camp on the Jacob's River is waiting for a funding opportunity to be completed as the environmental assessments are now complete. The Bundian Way, a visionary large-scale

Maddy Pont and Kiralee Handy cooking with native bushfood at the inaugural Aboriginal Bush Tucker Knowledge Sustainability and Development Program. Photos: Mary Mudford (NPWS).

project to develop the traditional travel route from the coast to Mt Kosciuszko, has been supported by NPWS at various levels. This project, which aims to provide opportunities for Aboriginal communities, is led by the Eden Land Council and traditional elders groups involving local councils, State Forests, CMAs and NPWS regions along its route.

During the reporting period two community-inspired cultural gatherings were held, the first at Talbingo to work on a local Aboriginal history material in order to progress it to a publication. The second NPWS sponsored gathering was a cross-cultural exchange program at Booderee National Park and botanical gardens where Tumut- Brungle community members travelled to the coast in what proved to be an inspirational visit.

Creatively exploring bush tucker has been a focus of new NPWS led training program for local community members around Tumut. The inaugural *Aboriginal Bush Tucker Knowledge Sustainability and Development Program* included outdoor lessons with NPWS Aboriginal Discovery Rangers identifying local bush food plants, and kitchen lessons with qualified chefs and food technicians incorporating native bush flavours into modern cuisine creations.

1.2.2 Circuitt's Hut family reunion

Recognising that conserving huts is not just about fabric and building methods, but also about ensuring ongoing social connections, in April 2012, NPWS and KHA held a gathering of those people with connections to Circuitts Hut to reminisce about life in the High Country. It was an entertaining day with ghost stories, bush songs and historical tales rejuvenating connections for some and creating new ones for others.

The gathering in April at Circuitt's Hut. Photo: Megan Bowden (NPWS)

1.2.3 Building rediscovered

In a testimony to the adage "*look and you shall find*", a historical scouting trip by a KHA member discovered an unrecorded building off the Guthega road. An interesting structure, known by a few locals but not found in official records, it is most likely an old sewerage treatment works, although another theory is that it is a trout hatchery. Investigations are still underway to confirm the age and origin of the building.

The previously unrecorded mystery building, discovered off the Guthega Road. Photo: Craig Doubleday (KHA)

1.3 Heritage tourism

1.3.1 Kiandra Courthouse Precinct

Uncle Vince Bulger conducting a Smoking Ceremony at the major gathering at the Courthouse to celebrate 25 years of the Australian Alps program.
Photo: Lucy Morrell (NPWS)

The Kiandra Courthouse and surrounds continues to be a priority with investment made in the restoration and revitalisation of the precinct. With the establishment of a new café, the Courthouse was regularly open on busy weekends in 2011-12. In addition, Wolgal Hut was opened for accommodation, an exciting development where revenue raised will be directed into revitalising the Kiandra precinct. Canberra University volunteers continued to provide valuable assistance in conserving the courthouse skiing mural.

Plans have been completed for the next stage of building, incorporating improved mobility impaired access and an amalgamation of the 1890's courthouse and 1960's chalet eras of the building. Alongside this, a recent business plan and feasibility study has indicated that a three tier approach to use of the building for interpretation, accommodation and café facilities is a viable option.

Contributions by the Towards Centenary Fund, Foundation for National Parks, the NPWS volunteer program and TransGrid have been invaluable in these achievements.

Wolgal Hut was restored and opened to the public for accommodation for the first time in mid 2012.
Photo: NPWS collection

1.3.2 Yarrangobilly Caves House

The capacity of the Yarrangobilly Caves area to accommodate more overnight guests has been a major focus of the last few years. Major restoration works on the two storey section of Caves House is well under way and on target for the official opening scheduled for 2013. The fabric of the building needed attention as well as services such as power, sewerage treatment, heating and clean water. Upgrades have been necessary to meet the demands of increased capacity, and innovative new technologies have been pursued to minimise greenhouse gas emissions. The Caves House guest car park was also expanded to meet the new overnight visitor capacity of the site and a small modern solar passive building christened 'Lyrebird Cottage' has been completed for staff accommodation and overflow guests of Caves House.

Yarrangobilly Caves House verandah of the single storey section which is already open for accommodation (L). Photo: NPWS collection. A new energy efficient hot water heating system also supports the hydronic space heating installed in Caves House (R). Photo: George Bradford (NPWS)

1.3.3 Currango Homestead

The Currango Homestead, proved an ideal location for training and knowledge sharing on the subject of historic huts. In May 2012, the KHA/ NPWS partnership delivered a new course for volunteers recording newly discovered or rediscovered historic sites. KHA is developing an interactive database to capture historic information connected with huts in KNP using a uniform approach for data collection. Currango also made primetime television this year as the venue for a date for the channel 9 *Farmer Wants a Wife* program.

The Pines, a cottage available for accommodation on the edge of Currango Plain (L). Photo: Jo Caldwell (NPWS). KNP Ranger Elouise Peach with Deb Smith, Pip Brown, and Bob Salijevic from the KHA undertaking GPS training at Currango Homestead to facilitate accurate historical data collection (R). Photo: Barbara Seymour (KHA)

1.4 Huts restoration and maintenance

The co-operative maintenance and restoration of Kosciuszko Huts by the Kosciuszko Huts Association and the NPWS continues under the guidelines of the *Kosciuszko National Park Huts Conservation Strategy*. Major works were completed on Mackey's, Pedens, Wheelers, Davey's, Bradley's and the Cheese Hut and Coolamine Homestead as part of the Federal National Historic Grants Program. Many other annual work parties were undertaken by dedicated volunteers and staff.


Bradley aka O'Brian's Hut on the Khancoban to Cabramurra road. NPWS field officers rebuild the chimney in November 2011 (L). Photo: Craig Smith. A photo from 1954 from the O'Brian family collection (R).

1.4.1 Tin Mines Hut

For over 40 years, the Illawarra Alpine Club, (affiliate member group of the KHA), has been the caretaker of Cascade, Tin Mines and Teddy's Huts within the Pilot Wilderness Area. To celebrate, over the Easter long weekend, a large work party was held at the Tin Mines. Twenty-seven volunteers, young, old and in-between walked, cycled or drove in to take part in the busy four day work party. The major job for the weekend was the dismantling of the fireplace and chimney of the 'Mess hut' or 'Barn', including cleaning and storing of materials in preparation for its reconstruction next spring. Other works included relining the walls of the 'Managers' or 'Carters' hut and treatment of interior timber work with a fire retardant, renewal of the rammed earth floor, and improvement of drainage around the huts.


Refurbished interior and new rammed earth floor for the manager's hut at the Tin Mines(L). The impressive attendance at the 2012 Easter work party from the Illawarra Alpine Club at the Tin Mines (R). Photos: Rhonda Boxwell (Illawarra Alpine Club)

1.4.2 Pedens Hut

Pedens Hut on the Murrumbidgee River underwent major repair works to the footings, piers, flooring and fireplace; unearthing some interesting artefacts including an old tobacco tin with a newspaper clipping advertising a cure for baldness.

Found at Pedens Hut, a tobacco tin holding a newspaper ad for a hair and scalp specialist (L). Staff, KHA volunteers and contractor who undertook major stabilisation works on Pedens Hut (R). Photos: Megan Bowden (NPWS)

1.4.3 Mackey's Hut

During the reporting period Mackey's Hut received some vital works. Asbestos was removed; floorboards were carefully lifted to gain access to the timber piers; the hut was jacked up and levelled; the rotted timber piers were replaced with brick work; the serious lean on the chimney was addressed; and both the chimney and the fireplace were reconstructed.

Mackey's Hut after 2012 rebuild. Photo: Andrew Miller (NPWS)

1.4.4 Timber Skills Workshop

The Alps Program Timber Skills Workshop - where skills necessary for hut restoration are shared - was held at Khancoban in March 2012. Twenty participants from across the Alps came to town to learn old methods and skills for building timber huts. After a day using mauls, froes and adzes the group toured the hills looking at huts with different construction techniques in Kosciuszko National Park.

1.5 Walking tracks and visitor facilities

1.5.1 Perisher ski trails and ski facilities

The Perisher network of groomed cross country ski trails are maintained throughout winter. The high standard is achieved through good grooming management which includes banking, benching and snow farming to provide a quality surface for skiers and skaters.

Maintenance is also necessary outside of the snow season, and this year staff were supported by over 1000 volunteer work hours on track maintenance, snow pole replacement, signage installation and the erection of new snow fencing. Staff also undertook some selective rock splitting to facilitate better groomed trail networks and reduce safety concerns at particular points - a project funded by the Towards Centenary Fund.

Groomed cross-country ski trail at Perisher. Photo: Tim Greville (NPWS)

1.5.2 Thredbo Valley shared use track

Walkers and riders on the Thredbo Valley shared use track (L). Photo: NPWS collection. One of the three large bridges built over the Thredbo River along the Thredbo Valley shared use track (R). Photo: Rob Naisby (NPWS)

Works carried out on the Thredbo Valley shared use track last financial year include three suspension bridges across the Thredbo River and a further three kilometres of track. Works also covered two sponsored sections including a bridge over Bullock Yard Creek (sponsored by The Geehi Bush Walking Club) and the Mussel Wood Loop (sponsored through a grant from the Jindabyne Mountain Biking Club). Next year it is hoped that a further five kilometres of track will be completed with another three suspension bridges planned for construction over the following two years.

1.5.3 New interpretative signage

Black Perry lookout on the Snowy Mountains Highway was a focus of this year's park-wide onsite interpretation program to continually improve information on park values for park visitors. A "*Place where spirits dance*" totem was also installed at the site as part of an Australian Alps wide program instigated by the Australian Alps Traditional Owners Reference Group.

Five "*Place where spirits dance*" totems were installed in various locations across KNP as part of an Alps wide interpretative project evoking a sense of indigenous history and ongoing connection (L). New interpretation board on the Black Perry Lookout names the peaks within view (R). Photos: Matt White (NPWS)

1.5.4 New picnic shelters for the Lower Snowy

At both the Pinch and Jacob's River picnic areas, new picnic shelters have been installed to give visitors refuge from the sun on hot summer days. Soon after installation one of the Pinch picnic ground tables was stolen to be promptly replaced by park staff.

Table and picnic shelter installed at the Pinch River campground.

Photo: Luke McLachlan (NPWS)

1.5.5 Main Range walking track

Track maintenance is an ongoing commitment across the KNP each year. In the reporting period a significant amount of work was invested in the Main Range Walking Track section from Charlotte's Pass to Blue Lake. The track from Perisher to Porcupine Rocks also had a considerable amount of maintenance work carried out, all funded through Towards Centenary Funds.

View of the Main Range from the start of the Main Range Walking Trail at Charlotte's Pass. Photo: Stuart Cohen (NPWS)

1.5.6 Visitor Centre services

Visitors' centres in Jindabyne, Tumut, Khancoban Yarrangobilly are all run by NPWS staff and provide a high level of service to visitors of KNP and the region - over 150,000 people during the reporting period. In addition to this, a new comprehensive compendium for visitors to KNP was produced in December 2012 and is available to all visitors entering the park at Visitor Entry Stations. As well as this, the *Guide to Kosciuszko National Park* was produced in December 2011 as a new find-all visitor guide which includes camping and picnic areas, cave tours, walking and cycling trails, commercial tour opportunities, ski trails and snow-shoeing and heritage accommodation.

Snowy Region Visitors Centre, Jindabyne. Photo: Mark Lees (NPWS)

1.6 Restoration and protection

1.6.1 Horse management program

This year's horse trapping season has been the most successful to date with 664 horses removed from the park, bringing the approximate total, since trapping began in 2002-03, to 1855 horses by 30 June 2012.

Trapping, using steel panels together with salt and molasses as lures, is proving to be an effective technique where vehicle access is available to the trap sites. However there are large remote areas of KNP with no vehicle access and these require alternative techniques if any significant reduction is to be made on the current wild horse population which is estimated to exceed 5000 horses. The Kosciuszko National Park Horse Management Plan is due for review in 2013.

NPWS field staff move wild horses onto a horse float for removal from the park. Photo: Stuart Cohen (NPWS)

Most horses up to 20 months of age are going to homes on private properties in NSW and Victoria, which equates to about 30% of the horses removed. Although re-homing is a labour intensive process it appears to be a major factor in gaining community support for the management of the wild horse population.

Through the Australian Alps cooperative management program, in partnership with Charles Sturt University, during the year a PhD student commenced work on developing accurate techniques to estimate wild horse densities and assess their impacts on water quality across the Australian Alps in 2012. This work will complement riparian assessments undertaken by staff in KNP in 2011. Towards Centenary Funds contribute to the horse management program.

1.6.2 Orange hawkweed program

The invasive orange hawkweed (*Pilosella aurantiaca*) poses a serious threat to the biodiversity values of KNP. If spread it also has the potential adversely affects agricultural landscapes, hence its priority as a project. Efforts to manage the weed involve a large crew of volunteers searching the Jagungal wilderness area for new infestations of the weed which are then chemically treated by contractors. This year 62 volunteers walked a total of 1507km

finding 165 new infestations, taking the total number of sites to 300 (within a 8165 ha extent). The NPWS treats and monitors all sites and has been trialling spray techniques to ascertain the best form of control. The orange hawkweed program is supported by contributions from the NPWS Find it and Fix it program, Towards Centenary Funds and NPWS volunteer funds.

1.6.3 Ox-eye daisy control trials

During the past year, the first broad scale control efforts on ox-eye daisy (*Leucanthemum vulgare*) were undertaken with a helicopter aerial spraying program on Kelly's Plain and Mt Nungar. The program will continue over the next few years with a monitoring program in place to measure effectiveness.

Helicopter spray nozzle treating ox-eye daisy at Kelly's Plain (L). Photo: Tony Stubbs (NPWS). Ox-eye daisy (R). Photo: Sue Crickmore

1.6.4 Annual pig control program

Every year in KNP an aerial pig control program is run in late autumn and early winter. The program concentrates on alpine and sub-alpine areas in which pig damage poses a significant threat. This year was successful in destroying 150 pigs within the Jagungal wilderness, Kalkite area, Swamp creek, Snowy Plain, the Tooma, Hell Hole, Pretty Plain, Finns, and Burrungubugge drainage and sites along the Toolong Range and the Brassy Mountains.

1.6.5 Rehabilitation of former Snowy Sites

Winning the 2011 Australian Engineering Excellence Award for Environmental Engineering has been a tremendous acknowledgement of the high calibre of work performed by staff rehabilitating former snowy scheme sites within Kosciuszko National Park (KNP). The multidisciplinary team have again made huge achievements in the last year completing large scale projects at Bourke's Gorge and Deep Creek, tackling the challenges of high altitude area rehabilitation at Cabramurra landing strip and sites at Guthega and Smiggins and tackling severely degraded wetland sites on the windswept Kiandra grasslands. The team have a holistic approach to environmental management collecting local seed for propagating tube stock and composting their own top soil all within the park.

Gabby Wilks (NPWS), Emma Ross (Engineers Australia), Dave Darlington (NPWS) and Liz MacPhee (NPWS), accept the national Australian Engineering Excellence Award for Environmental Engineering (L). Photo: Engineers Australia.
The rehabilitation of Bourkes Gorge spoil dump #1 where 65 000 tubestock of colonising trees, shrubs and grasses were planted using 1000 cubic metres of compost and 900 bales of rice straw in the process (R). Photo: Liz MacPee (NPWS)

1.6.6 Fire management

As part of a state-wide program to increase NPWS's capacity for bushfire mitigation, the Southern Ranges Region (SRR) now has two new field teams and a fire technical officer to support their work. These teams are responsible for more than 50 Asset Protection Zones (APZs) across KNP, including many historical huts and other assets. In addition, the teams are involved in trials of newly imported specialist fire mitigation equipment such as 'The Green Dragon' from Canada, a new incendiary delivery system. They will also implement a strategic three year hazard reduction plan across the whole Southern Ranges Region and are a key means to boost the agencies capacity to implement the KNP Fire Management Plan.

NPWS Field Officers Ben Fleming and Jason Laird burning vegetation cleared as an asset protection zone around visitor facilities. Photo: NPWS collection

1.7 Community programs

1.7.1 Discovery Education programs

The Discovery program in Kosciuszko National Park is delivered from three key areas. The long established Kosciuszko Educational Centre at Sawpit Creek within KNP; the Tumut based Aboriginal Discovery holding activities within the park but also running a major program attending schools; and Yarrangobilly Caves runs sessions covering peak visitation periods. All promote the exploration and understanding of natural and cultural values of Kosciuszko National Park.

1.7.2 Aboriginal Discovery programs

Winner of the 2011 Canberra and Capital Region Tourism Awards in the category of Indigenous Tourism, the Tumut based Aboriginal Discovery Program has this year delivered programs to 9,500 people within KNP and surrounding local schools.

This year the Tumut and Brungle Aboriginal Tour Guide Training and Mentoring Program completed four years of training for 50 local Aboriginal participants. This project has created ongoing full time employment for four participants, three of these with the NPWS and the other employed by the Tumut Shire Council. A further five local Aboriginal people are now employed with the NPWS on a casual basis as part of the Discovery Programs, at Visitor Centres and in the Visitor Services Unit.

National Parks staff Shane Herrington, Talea Bulger, Mark Lees and Jack Bulger at the 2011 Canberra and Capital Region Tourism Awards. Photo: Jo Larkin, Tourism Snowy Mountains

Talea Bulger (NPWS) Aboriginal Discovery in action(L). Photo: Shelly Jones. Shane Herrington (NPWS) Aboriginal Discovery Tumut Gathering – Training & Mentor Program(R). Photo: Deb Sheldon

As part of the Tour Guide Training and Mentoring Program, the inaugural Aboriginal Bush Tucker Knowledge Sustainability and Development Program ran from February to June 2012. This program has resulted in 17 local Aboriginal high school students and community members gaining knowledge on native bush foods, including plant identification, use, health benefits and production into unique and new gourmet bush delights.

1.7.3 The Kosciuszko Education Centre

Pat Darlington, a key developer of the Kosciuszko Education Centre, has been awarded the Public Service Medal on Australia Day 2012 for outstanding public service to the enhancement of public awareness of the environment.

Pat began the program in 1989 to meet the needs of local schools and communities by providing curriculum-based programs that focused on conservation and biodiversity understanding. Staff at the Kosciuszko Education Centre now host more than 10,000 school students annually.

Pat Darlington PSM, recipient of an Australia Day 2012 Public Service Medal working with students at Kosciuszko Education Centre at Sawpit Creek. Photo: Dan Nicholls (NPWS)

1.7.4 Volunteer programs

Efforts of volunteers in Kosciuszko National Park make a huge contribution to the achievement of managing our natural and cultural heritage assets and the scale and complexity of many projects would be difficult to achieve without their help. Volunteer assistance is an area in which NPWS is keen to build further - details of how to become involved as well as a summary of current programs can be found on the NPWS volunteer website http://www.environment.nsw.gov.au/volunteers/VolunteerNationalPark.htm

Volunteer supported programs in Kosciuszko for 2011-12 include:

The 'Search and Destroy orange hawkweed' program – where 62 volunteers walked over 1507 km to find 162 new sites of orange hawkweed. This is crucial work in the program to contain this weed of national significance which received funding from NPWS Find it and Fix it and the NPWS Volunteer Grants.

Perisher cross- country ski trails maintenance – volunteers undertook 1000 hours of work along side NPWS staff maintaining cross country ski trails over the summer. Work included track maintenance, erection of snow fences, installation of directional signage and snow pole replacement.

Illawong Track upgrade and maintenance – Illawong Ski Tourers have for the second year contributed improvements on the Illawong Track over Easter long weekend.

Botanical surveys – Friends of Grasslands and other botanical enthusiasts have helped tremendously in botanical surveys, including the discovery of a new species for KNP.

Quoll surveys – volunteers assisted researchers in the annual quoll survey in the Byadbo Wilderness area.

Restoration of Kosciuszko huts has for many years been supported by the network of KHA volunteers. In 2010-11, 22 work parties were attended by approximately 118 KHA members. This is a lower figure than in past years as an unusually wet summer hindered access to a few remote huts and a number of work parties were cancelled.

Restoration and revitalisation of Kiandra – the Kiandra precinct was a hive of volunteer activities including University of Canberra students restoring the skiing mural in the old

courthouse chalet, volunteers running the Kiandra café on busy weekends and renovations and cleaning at Wolgal and Pattison's Huts.

1.8 Programs in alpine resorts

1.8.1 Perisher Creek rehabilitation

Two thousand native tube-stock plants have been planted along the Perisher Creek in an ambitious rehabilitation project to combat weeds and restore riparian vegetation. This Environmental Trust-funded project is restoring the endangered ecological bog community which is habitat for the threatened broad toothed-rat (*Mastocomys fuscus*).

The planting of 2000 native tube stock along the Perisher Creek. Photos: Mel Schroder (NPWS)

1.8.2 Community support for Guthega skink research

The community at Guthega are major supporters of the plight of the endangered Guthega skink (*Liopholis guthega*). Not only did the skink feature in the Guthega Super Sleuth event at the well patronised Back to Perisher Easter weekend, but Guthega Alpine Hotel operator, Nick Kennedy, has donated $500 for skink research on the same weekend.

1.8.3 Perisher Mountains of Music Festival

The Perisher Mountains of Music festival has doubled its visitation since it began in 2009. NPWS is a major sponsor of the June long weekend event, using it as a means to promote backcountry safety, resort environmental management systems and the protection of wildlife.

The Rhythm Hunters performed at the 2012 Mountains of Music Festival in Perisher village. Photo: Courtesy of the Mountains and Music Festival

1.8.4 Environmental management systems

As the resorts in KNP are situated in one of Australia's most sensitive environments, it's essential that negative environmental impacts are reduced. Environmental Management Systems (EMS) help achieve this, and in accordance with the KNP Plan of Management, all NSW alpine resorts have an EMS. As a tool, these systems provide a systematic approach to help understand, monitor and manage environmental impacts.

Environmental Management System (EMS) implementation audits were conducted across all four alpine resorts in 2011-12. NPWS environment officers along with resort staff jointly conducted the audits using the ISO 19011 standard and focusing on the high risk activity of hydrocarbon storage, transportation and handling. All audits concluded that: the resorts have procedures in place to minimise environmental risk and respond to pollution events; and recommendations were developed for each resort to guide further improvements. The success of the audits was due to the collaborative approach adopted by the regulators and the operators with the core objective being the continual improvement.

The annual Perisher Range Resort Environmental Management Systems (PRREMS) commitment awards were presented at the Mountains of Music festival. Guthega Ski Club received an award for water and energy efficiency, Maranatha Ski Lodge were also recognised for their efforts in the 'Sustainability Advantage' program.

The outgoing NSW Conservation Council representative on the PRREMS operational committee was presented with an 'Environmental Advocate' award for his assistance in developing and implementing the program. Details on PRREMS are online at http://www.environment.nsw.gov.au/prrems/index.htm

(L-R) Ralph Wese, President of Guthega Ski Club; Frank Zipfinger (receiving the award on behalf of Peter Prineas), President of SLOPES; Andrew Harrigan, Manager of Visitor and Business Services (NPWS); Jim Spiers, Maranatha Lodge and the Hon. John Barilaro MP, Member for Monaro. Photo: NPWS collection

To provide an environmental management overview, an *Alpine Resorts Environment Report 2011-12* was produced - a combined annual environmental report across the four resorts. The report also provides a trend in performance over the 12 month period against key performance indicators such as biodiversity, water quality, pollution prevention & incident management, air quality & CO_2 emissions, waste management, energy conservation, cultural heritage, resort amenity and sustainable recreation. More than half of the indicators showed an improved trend over the 12 months and 45% remained stable with no significant change.

1.8.5 Sustainable investment program

As part of the 2011/12 Sustainable Investment Program, V&BSS made a bid for funding to install a Heating, Ventilation & Cooling (HVAC) Building Management System (BMS) for the Jindabyne Offices as recommended in the May 2011 Level 2 Energy Audit. This bid was successful and over the last nine months V&BSS have worked with Greenkon Engineering and Doust Automation to achieve this goal. The system will, amongst other things, provide real time building temperature and humidity control and monitor the air conditioning units start up/stop and operational status. This automated system will not only improve the effectiveness of the existing HVAC system, but it's estimated that after one full year's use there will be a saving of $19000 in electricity costs p.a. along with $3000 in annual maintenance costs. Along with these financial savings, the CO2 output for the building should be reduced by approximately 97 tonnes p.a.

1.8.6 Perisher infrastructure

The construction of the Perisher Waste Transfer Station has been a key achievement over the last year, the facility being the major component in a renewed Waste Management Strategy for the Perisher Range Resorts which has introduced a waste collection service.

Over the last five years, the Perisher NPWS team has undertaken a massive infrastructure upgrade program totalling $40M. This includes:

- construction of the $3.5M Waste Transfer Station
- construction of the $2M Balance Tank for the Perisher Range sewerage system
- $2M of improvements to the Perisher Range sewerage treatment works
- approximately $10M on design and construction of concrete roads, stormwater & utilities throughout Perisher Range
- over $2m in augmentation of all three villages water supplies
- construction of a link main between Perisher and Smiggins and development of demand drought and environmental water management plans, and
- development of village signage with marquee resort entry signage as well as street and directional signage.

Perisher Valley Waste Transfer Station – July 2012. Photo: Tom Pinzone (NPWS)

Part Two: Research, monitoring and evaluation

2. Research and monitoring programs

KNP has a strong history of research and monitoring. The NPWS Southern Ranges Region - Planning and Assessment Team has specialist ecologists involved in monitoring and informing management programs. The small team is also a conduit for other research occurring in the park having cooperative programs with several institutions within Australia and internationally. Examples of current research and monitoring follow.

2.1 Mountain Invasion Research Network (MIREN) project

NPWS botanists are involved in the international Mountain Invasion Research Network (MIREN) program which aims to gain a greater understanding of the problem of plant invasions into mountain areas. Botanical surveys across altitudinal transects have increased the known KNP plants by 36 new native and 21 introduced species. The most notable find was clover glycine (*Glycine latrobeana*) at Kellys Plain, the only extant population in NSW (listed under the EPBC Act) and only the second record in NSW (the other being late 1800s at Delegate). Based on this, it is the rarest and most threatened plant species now recorded in KNP and demonstrates the importance of ongoing survey across KNP (see section 1.1). The increased number of recorded KNP species has prompted a new KNP flora list to be published in the coming year.

2.2 Horse impact monitoring

This year, a horse impact monitoring program has been rolled out across the Alps in an Australian Alps Liaison Committee sponsored program. Analysis of NSW data has been finalised and demonstrates that feral horses are having a significant impact on the Endangered Ecological Communities, alpine environments and other park values.

A report detailing the Alps-wide results is due in 2013 and horse exclosures have been established at some sites to protect specific site values and monitor change. This invaluable tool was developed by NSW NPWS researchers together with the CSIRO.

Evidence of feral horse impact at the Ingeegoodbee River, Pilot Wilderness. Photo: Geoff Robertson (NPWS)

2.3 Alpine lake research and monitoring

Records of alpine lake ice cover in KNP demonstrate an earlier break up of ice over the last 40 years. Up until the 1980's this occurred around November to December; currently it is more likely to take place September to October. This has prompted some detailed research and monitoring - of both physical and chemical properties of five KNP alpine lakes. Lake Cootapatamba, Lake Albina, Club Lake, Blue Lake and Hedley Tarn have had extensive and ongoing monitoring demonstrating among other things that these lakes are in a very good natural condition.

NPWS Alpine ecologist Dr Ken Green undertaking alpine lake monitoring. Photo: NPWS collection

2.4 Orange hawkweed research

In efforts to contain the orange hawkweed (*Pilosella aurantiaca)* - a weed of national significance that threatens KNP values and potentially the agricultural sector - the NPWS is collaborating with several research partners to answer some important questions to aid control. A 3D sonic anonometer is on loan from Melbourne University, measuring wind speed, wind direction and vertical lift to assist with modelling the seed dispersal of the weed so areas of future spread can be diligently monitored. Wollongong University is looking at other important questions that may help control such as the allelopathic tendencies of the plant, seed longevity and viability in competition with native and other weed species such as ox-eye daisy.

2.5 'Wildcount' in Kosciuszko National Park

'Wildcount' is a statewide NPWS program set up to monitor wildlife in national parks using remote infra-red cameras set up for two weeks at randomly chosen sites across the NSW national parks estate. NPWS staff implemented the program deploying 48 cameras within KNP at 12 sites. This survey captured the highest altitudinal sites for the state, the results of which are currently being analysed.

A koala recorded by the 'Wildcount' program using an infrared camera in the lower snowy area of KNP. Photo: Dr Doug Mills (NPWS)

2.6 Global Research in Alpine Environments (GLORIA)

Researchers in KNP have been collaborating with Griffith University in Queensland on the Global Observation Research Initiative in Alpine Environments (GLORIA). As part of the international project, researchers surveyed five ‘summits’ in KNP in 2004 and again in 2011. The results were analysed in the last year with some interesting findings such as an increase in shrub and herb species on these summits. Future re-surveys of the summits will confirm

whether these short-term variations in species richness, particularly increases in shrubs, are indeed signals of longer-term trends and interactions with a changing climate.

2.7 European hare research and monitoring

European hares (*Lepus europaeus*) were introduced into Australia in about 1859 but remained seemingly in low abundance in the alpine zone until the late 1970's. Since 2005, researchers have been monitoring hare numbers on the Kosciuszko Summit Road with a combination of spotlighting and the collection of hare faecal pellets. A further study to determine the impact of hare grazing on native vegetation is underway with several exclusion plots set up and a lab based analysis of the vegetative content of faecal pellet throughout the seasons. Impacts on vegetation are still being assessed, though there appears to be preferential feeding on a number of plant species, particularly the silver snow daisies throughout the year.

2.8 Broad-toothed rat populations and red fox control

The broad-toothed rat (*Mastacomys fuscus*) is a declining species of rodent that is endemic to mainly alpine and sub-alpine regions of south-eastern Australia. Fox predation on the broad-toothed rat is of particular concern because of preferential predation on this species relative to predation on the more common bush rat (*Rattus fuscipes*). In KNP, the broad-toothed rat are currently being monitored at six sites, four with fox control and two without. Monitoring has shown that recovery of populations of broad-toothed rats has been greater at sites with fox control. However, fox predation remained a common source of mortality where control is undertaken suggesting that there is potential for improvement in control programs. There are few other causes of mortality except predation by cats in and around the ski resorts.

2.9 Monitoring spotted-tailed quoll populations in dog and fox control areas

Wild dog and fox control is a key management activity within KNP. Wild dogs can cause severe damage to sheep farms adjacent to the park and foxes are a major predator of many native ground-dwelling animals. Presently, the toxin sodium monofluoroacetate (1080) is one of the control methods being used inaccessible areas where baits are distributed across forested country aerially from a helicopter. While 1080 is particularly effective in the control of wild dogs and foxes, it is also toxic to a broad range of native vertebrates given a sufficient dose. One of the species originally thought to be most at risk from 1080 poisoning is the spotted-tailed quoll (*Dasyurus maculatus*), an endangered native marsupial carnivore.

Five years ago, landscape-scale monitoring was established for quolls in areas of the southern part of KNP routinely subject to aerial baiting. The monitoring program has so far indicated that quolls are widely distributed across the southern half of the park, and persist in catchments with and without recent histories of aerial baiting. This monitoring work will continue for the foreseeable future to ensure that pest control programs do not impact negatively upon quolls.

Time-lapse image of a spotted-tail quoll depositing a scat at a latrine site.
Photo: Dr Doug Mills

2.10 Modelling fire threats to alpine ash forests

A project modelling the effects of fire in alpine ash (*Eucalyptus delegatensis*) forests was carried out during the reporting period. As the alpine ash takes 25 years to produce viable seed, these forests are especially prone to lethal fires between five and 25 years after a fire. The models present a challenge for fire management suggesting alpine ash forests in KNP are likely to decline in area from between 2 100Ha up to 21 000Ha of the existing 70 000Ha, depending on variables. (It's worth noting that these figures do not include any potential increased threat due to rising temperatures, altered rainfall patterns or other factors associated with climate change.) This is critical information for fire planning and operations over the coming decades and it will help managers to consider risk to the alpine ash communities and appropriately prioritise their protection in KNP.

3. Annual assessment of KNP values

3.1 Integrated monitoring and evaluation program

Under the Kosciuszko National Park Plan of Management (KNP PoM), all monitoring programs are collated and evaluated to better assess both the ongoing condition and the trends in condition of the Park's values (PoM Chapter 16). To achieve this, all known information from in-house monitoring to external scientific reports is used to make a condition assessment of the values and to record the trend in that assessment compared with previous years.

This year's assessment, as presented in Table 1, has also incorporated:

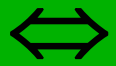
- findings from the NPWS State of the Parks (SOP) report that was undertaken for the third time across the whole state in 2010 (as reported last year, and still relevant) Further information about the State of the Parks program, including previous state-wide reporting, see http://www.environment.nsw.gov.au/sop/index.htm.
- findings relevant to values from the KNP Plan of Management Five Year Review summarised in Section 5 of this report
- the 2011-12 Regional Operations Plan (ROP) achievements (as reported in the 2012-13 ROP); these are integrated into Table 1 where relevant to KNP management issues and protection of values such as natural heritage, Aboriginal cultural heritage, historic heritage and visitor management.

Key to Table 1

	value condition: acceptable; current management regime suitable
	value condition: condition is of concern; adaptive management required
	value condition: under threat; immediate management action required
⇔	trend condition: stable under current management regimes
⇑	trend condition: improving under current management regimes
⇓	trend condition: decreasing under current management regimes

Table 1: The values of Kosciuszko National Park; an assessment of the condition and trends in condition (2011-12)

value	condition and trend	Assessment
Natural heritage		**The KNP PoM Five Year Review found:** *"Seven values are of concern and/or trending downwards, requiring increased management effort particularly rivers, catchments, soils, karst and some threatened species and components of biodiversity. Threats from the impact of increasing numbers of feral horses, deer and some weeds have increased. Drought, storms and climate change have also impacted on values during the past five years."* **Overall SOP 2010 results indicated:** *Condition*: Good (four of four areas) - Natural heritage values within KNP were generally reported by park managers in State of the Parks 2010 as being in good condition and generally intact. Recovery from the 2003 fires continues to occur, though the drought has resulted in slower recovery than expected. While impacts to natural heritage were generally noted as being stable, the inability to successfully reduce feral horse populations is reported as increasingly impacting on natural values within the Snowy River area and is therefore of concern. Managing high levels of visitation also represent some challenges within some parts of the Park such as around the Kosciuszko summit area. *Approach to management*: Mostly a constrained planned approach – insufficient resources were given as reasons for less effective management in some areas (e.g. for some threatened species, horse management, visitor impacts, fire regimes issues as well as climate change). *Effect of management*: Impacts are stable (three of four areas) or increasing (one of four areas) on natural heritage in general. Specifically pest and weed impacts are increasing in a number of areas of the park especially those related to horses, deer and most recently rabbits and weeds which will require more attention due to the wetter conditions. *Adequacy of information*: Key information is available although large gaps have been identified for some threatened species, threatening processes as well as western fall and montane areas compared to alpine areas. *Detailed assessments*: A number of more detailed SOP 2010 assessments on particular sites or issues were completed and information is incorporated into the Integrated Monitoring and Evaluation Assessment below.

value	condition and trend	Assessment
		NB – SOP2010 assessment was a qualitative assessment by park managers. More detailed information is now available on a range of issues as summarised in this table that demonstrate and quantify the increasing impact of some of the threats. This means there is some divergence from SOP2010 and this assessment of the condition of some park values.
Rocks and landforms		There has been no significant change across much of KNP, although the Byadbo Wilderness Area is increasingly showing terracing from feral horse and deer impacts which are most noticeable during periods of drought when ground vegetation cover is otherwise reduced. In certain locations there has been considerable side-slope erosion. A KNP Geodiversity Action Plan 2012-17 (2011) is complete which has identified and assessed more specific values and 22 indicative key sites to assist ongoing rapid condition monitoring every three years to inform SOP surveys. Baseline monitoring was completed in 2010. Most of these sites were considered in good condition with a limited number in moderate-poor condition (e.g. New Chum Hill and surrounding Ravine Copper Mine). A limited number of slopes on the Main Range were also noticeably impacted by erosion, however efforts to remediate these sites are proving successful and are on-going. A small number of the park's key sites or features were assessed as being in poor condition, including the caves at Cooleman and Indi karst areas which continue to be adversely impacted on by visitor activity. The strategy also identifies a range of management, interpretation and monitoring actions consistent with the POM to be implemented in coming years. Follow up monitoring of key sites is planned for 2013.
Karst		Significant karst features found in Cooleman Plain, Yarrangobilly & Ravine areas are reported to be in good condition with localised impacts declining as a result of a comprehensive and planned approach to management. Feral horse impacts on Cooleman Plain however require further control and monitoring (SOP2010). Significant feral horse impacts on karst areas of Cooleman Plain and elsewhere continue. Some management improvements to some areas of karst were undertaken. Continued increasing threats from feral horses and climate change require further management and monitoring. Climate change has the potential to impact due to drier conditions reducing inflows through karst areas, although, 2010-11 and 2011-12 were wetter years than any over the last decade. KNP Karst areas and their values were featured in *Guide to NSW Karst and Caves 2010*.

value	condition and trend	Assessment
		The KNP Geodiversity Action Plan 2012-17 (2011) considers karst values, identifies sites to be monitored and a range of actions to be implemented for Karst areas. The rapid condition assessment (2010) identified most karst areas as in Good condition with those at Cooleman and Indi karst areas in Poor condition and continue to be adversely impacted on by visitor activity. Previously the loss or damage of surface karst features such as Karren and A-tents due to feral horse activity and motor vehicles was acknowledged as a particular area of concern at Cooleman Plain and at sites near Blue Water Holes. Funding over the next 3 years has been approved from the Commonwealth Biodiversity Fund for rehabilitation of Jounama Pine Plantation within the catchment of the Yarrangobilly caves. Whilst most of the pine has been removed this project will progress replanting with native species to protect and improve this karst catchment.
Soils		Improvement to soil condition is expected since ground cover continues to improve post 2003 fires across KNP. However feral horses and deer are causing significant damage where they occur across KNP, including peat forming bogs and terracing of side-slopes in the Byadbo Wilderness Area. There are also significant impacts recorded in creek lines and wetlands from horses in the Pilot Wilderness and Long Plain areas. In 2009-2010, a preliminary Landscape Function Analysis (LFA) monitoring of 11 drainage lines, revised the condition trend was from 'improving' to 'declining' due to increasing feral horse impacts across KNP. This Drainage Function Analysis assessment was completed in 2011-2012 and due to its findings of widespread and significant impact from feral horses on peat soils, EECs and vegetation of drainage lines the condition is now assessed as of concern (orange). Of 87 sites most in KNP(83) and adjacent Namadgi NP(4), more than 50% of sites have significant degradation from feral horses and only 29 were horse free sites(Horses occur within 2-3 km of these sites). The average DFA score for horse sites was 60 versus 97 for non-horse sites(P=<0.001). Signs of deer were also found at 16 sites – all in the Pilot Wilderness excepting for a site on Botherum Plain and one on Horseshoe Fire Track. Byadbo has yet to be surveyed. Further analysis and expansion of the monitoring program through the AALC program in 2012-13 will help further understand the extent of these threats and improve targeted control methods. Heavy rains in summer 2010-11 and 2011-12 led to some landslips and further degradation of previously rehabilitated sites.

value	condition and trend	Assessment
Rivers and lakes	⇓	Within KNP some improvement in river and lake condition was expected to continue as vegetative ground cover improved across catchments since the 2003 fires and wetter conditions prevailed during 2010-11 and 2011-12. However the Drainage Function Analysis assessment was completed in 2011-2012 and it found widespread and significant impact from feral horses on soils, EEC's and vegetation of drainage lines. Given this widespread and site specific information, the condition of this value is now assessed as of concern and with a likely trend of decreasing condition as horse and deer numbers are expected to continue to increase, despite current control programs. The headwaters of the Snowy and Murray Rivers were rated as being in good to fair condition, with negative impacts generally increasing as a result of localised increases in wild horse and deer populations (SOP 2010). Climate change impacts have been documented and identified as current and ongoing threats. For example, "*At elevations above 1500m, the mean annual temperature rose by 0.74C from 1950 to 2007….Over the time since records began at Spencer Creek in 1954, the winter snow pack has thawed 16 days earlier on average at a rate of 2.8 days per decade….with 1998 being the last year in which snowpatches were recorded that had persisted into a second winter…On Blue Lake …ice break up* [occurred] *from November to December through the 20th century, but* [is] *now occurring generally in mid October and as early as September in 2006….Early icebreak up affects the lake chemistry, and exposes endemic aquatic organisms to high levels of spring UV radiation at times when , in the past they were shielded by ice."* Excerpt from Green K and WS Osborne (In Press 2012) Wildlife of the Australian Snow-Country 2nd ed. New Holland Publishers Of 58 years' data on snow cover from Spencers Creek, 2006 was 56th from the top. Since 2006 the years' snow, in terms of the integrated snow profile (which is a measure based on the weekly depth of snow and the length of the snow season) were rated 32,43,28,44 and 34 out of 58, so that only 2009 was in the top half of years. Snowy River Increased Flows **-** Compared with 2010-11, environmental flows were increased for the Snowy River to 158.36 GL (0.929 GL below target – this will be added to the 2012-13 SRIF); Murrumbidgee River, from Tantangara Dam, to 44.7GL (over-release of 2.4 GL above target) and; Goodradigbee River to 12.1GL.(0.1 GL above 2011-12 target). The releases to the remaining Snowy Montane Rivers will mostly likely be staged over the next two water years: (i) the Snowy below Island Bend (2013-14) and (ii) the upper Snowy (2014-15).

value	condition and trend	Assessment
		The AALC *Caring For Our Australian Alps Catchments* – Technical Report (2011) found that: *The Alps reliably deliver an average of 9600 Gigalitres (GL) of high quality mountain water to the Murray-Darling Basin which is about 29% of the Basins 32 800GL annual average flow. This water helps support the production of an annual $15 billion worth of agricultural product from the Murray-Darling Basin and directly contributes to a $300 million hydroelectricity industry and an Alps tourism industry worth at least $280 million.* The 2010 catchment condition assessment found of the 95 subcatchments identified in KNP, the assessment recorded 56 subcatchments in KNP as in good condition and 39 as in moderate condition with none in poor condition. It also found 24 subcatchments in declining condition, 47 with no change and 17 improving. The report also highlighted significant threats (e.g. horses, weeds, climate change) and work needed to improve catchment condition and monitoring in a number of these subcatchments. The *Caring For Our Australian Alps Catchments - Summary report for policy makers* (May 2011) published by the Commonwealth Department of Climate Change and Energy Efficiency was released late in 2011. It summarised the Technical Report and found: • water from the Alps catchments is of national economic importance; • the natural (good) condition of the catchment helps deliver high quality and reliable water yield; • climate change is impacting the natural condition of the Alps catchments; • the 2010 catchment condition assessment found the Alps catchments to be especially vulnerable to the predicted effects of climate change and there was an urgency for adequately resourced management responses to be implemented; • management interventions (priority actions) are needed to respond to severe and immediate threats, to restore and maintain natural condition and to optimise water yield, maximise water quality and maintain natural flow regimes in a climate change environment; and • whole-of-Alps large-scale adaptive management responses to climate change would significantly benefit the national economy.

value	condition and trend	Assessment
		Projects to seek federal funding for such works have been prepared. E.g. Biodiversity Fund funding was received for willow control in the upper Snowy River and revegetation of Blowering foreshores which will improve condition over time at these sites. A 2010 NPWS wetland mapping project identified over 35,000ha of wetlands across the Australian Alps bioregion of which 93% were on park. Detailed alpine bog mapping has also been completed across the park by Professor Geoff Hope of ANU and is being assessed for use in future park management. The report *Peat-Forming Bogs and Fens of the Snowy Mountains of NSW* OEH Technical Report (April 2012) concludes: *Most of the peatlands exhibit damage from the period of grazing last century but those at higher altitudes are recovering strongly and re-colonising erosion areas. The peatlands are vulnerable to hydrological changes from grazing and trampling by large mammals such as horses. They are also sensitive to climate change as they are near their climatic limits and have been greatly stressed by past disturbance and fire. Recovery of the peatland vegetation will take several decades but replacement of lost peats will be a much longer process. For this reason active management of the hydrology, surface stabilisation and reduction of disturbance are essential to restore peatlands and maintain their resilience to natural change.* Alpine lake monitoring continues with alpine lake condition still good and improving for Blue Lake and Lake Albina (with phosphorus levels declining due to reduced impacts from camping and associated activities SOP 2010). However, biodiversity in Lake Cootapatamba has declined since the arrival of the Mountain Galaxids (*Galaxias olidus*) in 2006 with the loss of *Daphnia* sp. from the lake completely and a reduction in numbers of other aquatic invertebrates. Biological water quality monitoring of the resort streams demonstrated impairment directly downstream of resorts with improvements further downstream from resorts. Sediment, treated sewage, road de-icing salts and litter are still significant inputs during the ski season. Above average rainfall and flooding events during February and March 2012 impacted on stream health. Increased stream bank erosion occurred in all waterways. (NSW Alpine Resorts Environmental Performance report 2011-12)

value	condition and trend	Assessment
		At the major catchment scale the State of Catchment Reports (2010) for the Southern Rivers and Murrumbidgee catchments (from 2008 data) identified overall hydrological condition as poor to moderate in Murrumbidgee (which has better conditions recorded in the upper catchments). In Southern Rivers, overall hydrological condition was good whilst the Snowy River rated poor, as the hydropower scheme has a significant impact on the hydrology. (The report did not take account environmental flows of recent years). Overall wetlands in the Murrumbidgee catchment are in very poor condition due to feral animals, catchment modification and lack of protection of wetlands (in the downstream areas). Wetlands in Southern Rivers catchment have very poor condition rating. Fish condition in the highlands was rated as extremely poor condition. Threats identified include emerging invasive weeds, feral horses and deer grazing. Willow control and follow up continues with impacts declining through planned and comprehensive programs especially one in collaboration with Catchment Management Authorities (CMAs) to be completed over next three years (SOP 2010). Willow control in the upper Snowy River over the next three years has been funded by the Commonwealth's Biodiversity Fund. All of the above highlights the variable condition of lakes and rivers; some of the key ongoing and increasing threats for further management actions; and the importance of KNP in protecting the better condition wetlands and rivers in these upper catchments. Overall continued regeneration in most catchments is expected although further reduction of increasing threats in declining sub-catchments is necessary as well as ongoing catchment, river and lake monitoring.

value	condition and trend	Assessment
Native plants	⇓	Mountain Invasion Research Network (www.miren.ethz.ch) (MIREN) transects have added many more species to the Kosciuszko National Park flora species list: 36 native species and 21 alien species. Also recorded and confirmed this year was *Glycine latrobeana* for Kellys Plain (see 2.1.4), ironically found amongst a significant ox-eye daisy infestation. This is quite a notable find as it is the only extant population in NSW and is listed under the EPBC Act. Based on this, it is the rarest and most threatened plant species now recorded in Kosciusko National Park and demonstrates the importance of ongoing survey across the park. Regeneration is still occurring post 2003 wild fires as demonstrated during the re-survey of the Australian Alps fire monitoring plots across three states in early 2012. The last monitoring of all these plots prior to this was in 2008. A draft report (August 2012) has been prepared discussing the AALC project from inception to the 2008 data collection. This report titled *Long term monitoring for Fire Management – 10 years on for the Australian Alps fire plots* was compiled by Margaret Kitchen (Senior Forest Ecologist, ACT Parks). This continuing regeneration post January 2003 fires is also confirmed in the nearby Brindabella National Park, Bimberi Nature Reserve and Burrinjuck Nature Reserve, NSW Michael Doherty completed a mid Ph-D presentation on this project at ANU in November 2011. The last post-fire sampling was completed for the 52 plot subsample in 2010. These same plots will be re-surveyed in November 2012. Preliminary results to date indicate that sites most closely resemble themselves and are moving back to pre-fire condition. All plants of conservation significance recorded pre-fire have re-established post-fire. Most vegetation types are recovering well, with the exception of a swamp community which has struggled to recover post-fire during drought conditions. Alpine Sphagnum Bogs and associated fens are listed as Endangered Ecological Communities (EECs) under Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (*EPBC* Act). Detailed bog mapping has been completed across the Park by Professor Geoff Hope of ANU. He found the 9120 individual peatlands in the Snowy Mountains region total 7985 ha, of which 6037 ha is in Kosciuszko National Park, 556 ha in the ACT, and 1392 ha in other reserves or on leasehold or freehold land. He also found that 6037 ha of peatlands were identified in the Park including 3656 ha of Sphagnum shrub bog with 72% being smaller than 0.5ha. A rate of 0.8 - 1.6 tonnes of Carbon/hectare/year of net carbon storage is comparable with rates found in temperate mires in other parts of the world. The report *Peat-Forming Bogs and Fens of the Snowy Mountains of NSW* OEH Technical Report (April 2012) is being assessed for use in future park management.

value	condition and trend	Assessment
		Previous bog rehabilitation monitoring shows bogs are expanding and/or continuing to improve in condition post fire. There is still no scientific consensus on the need for interventions post fire. The Drainage Function Analysis assessment has shown significant impact from feral horses on this EEC. Threats from grazing by increasing numbers of feral horses and deer have been reported in the POM Five Year Review, AALC Catchment report and SOP 2010. The new Southern Ranges Regional Pest Management Strategy has identified 14 priority pest and weed control actions to undertaken in 2012/13 to reduce threats to park values including threatened plants (eg *Calotis glandulosa, Calotis pubescens, Pterostylis oreophila, Thesium australe, Discaria nitida, Carex raleighi, Prasophyllum retroflexum, Ranunculs anemoneus*) and Montane Peatlands and Swamps EEC. Rabbits which have been low in numbers for the last decade have been identified as an increasing threat (SOP 2010) due to wetter conditions and plant growth with some control work underway. This will require more focussed management programs if good conditions continue. Further spread of orange hawkweed was identified this year through an intense, volunteer supported program. Another 165 sites were found during the 2011-12 survey season, mostly by volunteers, totalling 8.2 ha and 300 sites (up from 7.43ha over 135 sites) within the already identified 8165ha extent. This season included the discovery of two relatively large populations in and adjacent to EEC and Threatened Species. Ongoing work to eradicate this potentially invasive exotic species is planned. A report was prepared on the control effort to date and field days held to assist staff, agencies and landholder identification and coordination (OHW Program Report 2011-12). Ox-eye daisy was identified as an increasing problem, also affecting threatened flora and Alpine Bog EEC. A draft management strategy was prepared for implementation from 2012-13. Five GLORIA sites were resurveyed in January 2011 along the ridgeline leading up to Mt. Clarke. They were originally surveyed in January 2004. The five sites cover an altitudinal range of 301m from 1813 m through to 2114 m of Mt Clarke summit and cover a horizontal distance of 1600 m. Sampling in 2011 was conducted 'blind' without referring to the 2004 data. There was a change in species richness across all spatial scales, with an overall pattern of increasing richness, 80 species were recorded compared to 74 in 2004. The largest changes in species richness were at the whole summit scale where the observed changes across summits equate to an

value	condition and trend	Assessment
		increase of almost one extra species per year, taking into account species absences. The results suggest shrub migration upslope is underway, over longer time periods shrubs are expected to continue to increase in abundance at the lower summit sites, potentially causing decreases to overall species richness at those sites. Results from this re-survey do not suggest that KNP endemic species are any more or less threatened by the short-term variation in climate than the more widespread species, however, future surveys will reveal whether these species become more marginalised or continue to turnover at moderate rates across the gradient of sites at Mt Clarke. Climate change impacts have also been documented and identified as current and ongoing threats. For example, "*At elevations above 1500m, the mean annual temperature rose by 0.74C from 1950 to 2007….Over the time since records began at Spencer Creek in 1954, the winter snow pack has thawed 16 days earlier on average at a rate of 2.8 days per decade….with 1998 being the last year in which snowpatches were recorded that had persisted into a second winter. This has had an impact upon the area of short alpine herbfield a plant community that depends on low-lying snow. … Snow melt is a major cue for flowering in alpine areas, so the alpine flowering season in the Snowy Mountains has advanced in timing. Monitoring of over 60 alpine species annually shows that the length and timing of the flowering season, and therefore the period of importance to pollinating insects has advanced. The flowering of Mueller's Snow-gentian, usually a harbinger of autumn now commences in January or even December, whereas the Kosciusko Alpine Flora in 1979 recorded it as flowering rather late in the season (February-March) than most other species"*. Excerpt from Green K and WS Osborne (In Press 2012) Wildlife of the Australian Snow-Country 2nd ed. New Holland Publishers Although some progress in sampling plots, imagery availability and bog mapping occurred during 2010-11 and 2011-12, further work to map vegetation (i.e. the rest of the alpine complex), understand changes, conserve species and EECs and minimise threats is still required. E.g. current impact of horses on threatened plants in northern KNP is not known. Horse impact monitoring and the AALC projects NSW component report was completed. It considered key alpine bog EEC sites in KNP. This report demonstrates that feral horses are having a significant impact on the EEC and other park values. The project is supported by the AALC with similar work in Victoria and the final AALC report is due in 2013. Exclosures have been established at some sites to protect values and monitor change. The 2011-2012 feral horse control program removed 646 horses from the park. In terms of numbers this is the most successful trapping season to date. In northern KNP where vehicle access permits access to trap sites the program is reducing horse densities. However in remote locations with no such access horse numbers continue to

value	condition and trend	Assessment
		escalate and cause environmental damage. Co-operation with re-homing and horse interest groups continues and 220 of the trapped horses were re-homed throughout the year. Impact monitoring programs continue to be explored with the assessment of riparian zones being the most significant achievement across the Australian Alps in the past year. In co-operation with Charles Sturt University two students are undertaking studies involving horse densities and impacts across KNP and the broader Australian Alps.
Native animals		Several fauna species, such as the northern and southern corroboree frogs (*Pseudophyrne sps)*, spotted tree frog (*Litoria spenceri*), broad-toothed rat (*Mastacomys* fuscus) and the mountain pygmy possum (*Burramys parvus*), are still under threat. This is mostly by virtue of their limited overall distributions, but in the case of the frogs it is clear that populations are still in severe decline in the wild due to chytrid fungus. SOP 2010 reported - The corroboree frogs are under threat from chytrid fungus. Corroboree frog breeding and reintroductions have continued to be successful and need to continue to maintain these species. The southern corroboree frog is in critically low abundance and it is likely that it will be extinct in the wild within the next ten years if recovery efforts are unsuccessful. Significant impact on northern corroboree frog habitat and sites have been identified from feral horses and for the first time, sambar deer. Exclosures and further control of feral horses and deer are necessary to protect these species. Exclosures have been placed around key corroboree frog sites to exclude feral horses (SOP 2010). There were mixed results for Kosciuszko's threatened frogs in 2011/12. The re-established spotted tree frog (*Litoria spenceri*) population had declined by greater than 90% over the previous twelve months, leaving little chance of population persistence. This rapid decline was due to an outbreak of the amphibian chytrid fungus, which was facilitated by the cool and wet La Niña conditions that suit this pathogen. Future attempts to secure populations of the spotted tree frog in KNP will focus on establishing populations in warmer sections of stream that are less conducive to the killer fungus. While the southern corroboree frog continues to decline, the release of captive bred eggs back to the wild is starting to produce some promising results. One of the release sites had 30 males return to breed in January, which is higher survivorship than expected. Unfortunately for these males, the females take an extra year to reach maturity, so they'll have to wait another season for their chance at breeding success. With only nine males being recorded across all non-manipulated sites, these results provide hope that the complete extinction of this species in the wild can be averted.

value	condition and trend	Assessment
		Broad-toothed rat numbers have still not returned to figures before the crash in 1999, with the 2003 fires having a severe impact on their habitat and a series of early thaws reducing the ability of the populations to bounce back. Programs exist around predation in the Alpine Area (SOP 2010). A re-survey of broad-toothed rat sites after 10 years along Long Plain showed that in control sites (no horse presence) populations were unchanged. In sites with horses present all sites were compromised by two actions – grazing of the tussocks and trampling of the inter-tussock spaces. Two sites were in the bottom 1% and one in the bottom 6% and one had no evidence of the presence broad-toothed rats at all. The current impact of horses on broad-toothed rats in northern KNP is not known and work is planned for 2012-13 to ascertain this. Broad-toothed rat and mountain pygmy possums are under threat from horses, foxes, cats, ski resort development and operations and climate change. Over the last two years, mountain pygmy possums in resort areas have started to show signs of recovery after a decade of major decline. The increase in numbers may be attributed to improved weather conditions leading to increased food availability along with enhanced predator (fox and cat) control programs and habitat protection (NSW Alpine Resorts Environmental Performance Report 2011-12). A new and significant find of a large population of the mountain pygmy possums near Happy Jacks has precipitated a review the habitat requirements, distribution models and survey domain for this species. However, the possums may still require captive populations under current conditions. In ski resorts, habitat rehabilitation and reconnection is continuing to assist broad-toothed rats and mountain pygmy possum survival. The annual monitoring program for the endangered spotted-tailed quoll (*Dasyurus maculatus*) in the Byadbo Wilderness Area and adjacent Merriangah Nature Reserve indicates that the species continues to persist across a broad landscape, against a backdrop of varying wildfire history and management practices (including catchments subject to aerial 1080 baiting). The level of activity of this rare marsupial carnivore, as judged from presence of distinctive latrine sites, has remained relatively stable over the past five years. In some catchments where aerial baiting is not conducted, the emergence of feral deer has led to a noticeable decrease in frequency of quoll latrine sites. It is not known whether this decline is a behavioural response by the quolls to the deer, or whether the localised populations have in fact declined. Further monitoring is necessary to better understand whether this trend is in fact true. If so, then localised feral deer control may be necessary to reverse this trend.

value	condition and trend	Assessment
		Guthega skink (*Liopholis guthega)* numbers at the largest known population at Smiggin Holes have not returned to pre-fire conditions but the Charlotte Pass population appears healthy. New populations of the Guthega and the alpine she-oak skink (*Cyclodomorphus praealtus*) found, particularly as part of a PhD project. The project is also assessing the impacts of habitat fragmentation on alpine skink species including the Guthega and alpine she-oak skinks. Climate change impacts have been documented and identified as current and ongoing threats. For example, "*At elevations above 1500m, the mean annual temperature rose by 0.74C from 1950 to 2007….Over the time since records began at Spencer Creek in 1954, the winter snow pack has thawed 16 days earlier on average at a rate of 2.8 days per decade….with 1998 being the last year in which snowpatches were recorded that had persisted into a second winter…the altitudinal distribution of a number of species of animals increased over the past thirty years. There has been a trend of earlier arrival of migratory bird species above the winter snowline since the 1960's with 9 of 11 species of birds studied over a period of three decades in the late 20th century appeared earlier in the season. A mismatch of timing between arrival of bogong moths, the thaw and arousal of the mountain pygmy possums has led to population declines whilst endangered broad toothed rats are exposed to spring fox predation by foxes when their subnivean (below snow) grass nest are exposed earlier*." Excerpt from Green K and WS Osborne (In Press 2012) Wildlife of the Australian Snow-Country 2nd ed. New Holland Publishers The new Southern Ranges Regional Pest Management Strategy has identified priority pest and weed control actions to be undertaken in 2012/13 to reduce threats to park values including corroboree frogs, mountain pygmy possum, broad-toothed rat, Guthega skink and spotted tree frog and their habitats. SOP 2010 reported programs are in place for critically threatened taxa and these have been prioritised. In some instances, increased fire occurrence is noted as having an ongoing pressure at some threatened species sites. Where measured, the transmission of amphibian chytrid fungus does not appear to be reduced. Fox TAP and wild dog control programs are continuing to occur with these specifically having outcomes focused on threatened species protection (SOP 2010). The statewide wildcount fauna survey program has 17 remote camera survey sites in KNP surveyed between Feb – May 2012 and results are yet to be released. However, as a generalisation, broad-brush fauna biodiversity monitoring across the park have been limited, with the exception of the Alpine area (mostly wombats, kangaroos, birds, insects and introduced animals and related seasonal/climate changes). Continued work to understand changes, conserve species and minimise threats is required as documented in the

value	condition and trend	Assessment
		KNP POM Five Year Review, Southern Ranges Region Conservation Research and Monitoring Strategy (2011-2016) and SOP 2010 e.g. for smoky mouse (*Pseudomys fumeus*), booroolong frog (*Litoria booroolongensis*), spotted-tailed quoll and broad-toothed rat in northern KNP.
Wilderness		There has been no significant change to status of wilderness, however the impact of commercial tour operator and government's horse riding policy changes may require future monitoring and amendments to the KNP Plan of Management. The new Southern Ranges Regional Pest Management Strategy has identified priority pest control actions to undertaken in 2012/13 in Byadbo Wilderness and the Snowy River for pigs and willow control.
Ecosystem processes		The recent wetter conditions, compared to the past decade, mean many ecosystem processes (e.g. nutrient cycling) will continue at pace. Changes and increased threats to ecosystem processes (eg climate change, erosion etc) have been further quantified through recent studies. Climate change impacts continue to be identified through local studies such as alpine ecosystems and threatened species monitoring, the AALC *Caring For Our Australian Alps Catchments* report (May 2011) and various recent Bureau of Meteorology (BOM) and CSIRO reports, such as: The BOM Annual Australian Climate Statement 2011 identified the 10 years from 2002-2011 were Australia's equal warmest 10 year period on record. La Nina's in 2010 and 2011 brought Australia's third wettest year on record and second highest two year total. The CSIRO/BoM State of Climate 2012 report identifies: • each decade has been warmer than the previous decade since the 1950's • the Australian annual average daily maximum temperatures have increased by 0.75C since 1910 • the Australian annual average daily mean temperatures have increased by 0.9C since 1910 • the Australian annual average overnight minimum temperatures have warmed by more than 1.1C since 1910 • 2010 and 2011 were Australia's coolest years recorded since 2001 due to two consecutive La Nina events, which brought the highest two year average rainfall total on record • recent drying trends in Autumn and Winter across southern Australia continued and have been linked to circulation changes which are under active research.

value	condition and trend	Assessment
		The Annual Climate Summary for ACT (January 2012) indicated a normal year for the ACT, ie: • below average rainfall (with November the 8th wettest on record for Canberra) • close to average temperatures (maximums of 0.6 °C above average and minimums of 0.2 °C below) • the most cold nights since 1982 • the coolest minimum temperatures since 1996 • the 5th coldest December on record and coolest autumn since 1995. The variable weather conditions were described thus: *Maximum temperatures were close to average between January and May, resulting in the coolest autumn since 1995. Days warmed over subsequent months associated with low rainfall and clear conditions, with the warmest winter on record followed by the 9th warmest spring. Temperatures were particularly warm during August, September and November, all of which had days more than 2 °C above average. Temperatures cooled during the start of summer, with the 5th coldest December on record for Canberra associated with cloudy conditions and a lack of hot days.* *Minimum temperatures during 2011 were the coolest for Canberra since 1996, following an extended spell of warm nights over the last decade. Minimums were warm at the start of the year, with the 6th warmest January on record and both February and March more than 1 °C above average. Nights were very cold during the rest of Autumn, including the 4th coldest May nights on record, followed by closer to average temperatures during winter and spring and cooler conditions during December. A cold snap occurred towards the end of July, with three consecutive nights below -6 °C between the 28th and 30th, the first such period since 15-17 August 1994. The coldest night reached -8 °C on the 29th, the coldest night in Canberra since -8.5 °C was recorded on August 9 1994.* This indicates a return to more 'normal' conditions than the past decade (BOM). It remains to be seen if these will continue or if there is a return to drier condition if the La Nina pattern breaks down. Alpine climate change impacts have been documented and identified as current and ongoing threats. For example, "*At elevations above 1500m, the mean annual temperature rose by 0.74C from 1950 to 2007….Over the time since records began at Spencer Creek in 1954, the winter snow pack has thawed 16 days earlier on average at a rate of 2.8 days per decade….with 1998 being the last year in which snowpatches were recorded that had persisted into a second winter."* Excerpt from Green K and WS Osborne (In Press 2012) Wildlife of the Australian Snow-Country 2nd ed. New Holland Publishers

value	condition and trend	Assessment
		These recorded changes have resulted in changes to ecological processes that have affected fauna, flora, vegetation communities and alpine lakes detailed elsewhere in this assessment. SOP 2010 identified issues related to climate change, such as: “Insufficient knowledge/skills. Implications only just being realised. Mostly fire frequency and snow cover loss at altitude/ biodiversity change.” A survey of climate change research knowledge and needs was conducted in 2011/12 under the auspices of the AALC. This found support for continued monitoring. The authors are currently finalising the report. A number of extreme storm and heavy rainfall events caused damage across the mountains and region with many hundreds of thousands of dollars of damage to bridges and tracks. Initial repair works have been completed. No significant fire events occurred in 2010-11 or 2011-12. The Drainage Function Analysis study and exclosures to quantify feral horse impacts are assisting to identify the condition of ecosystems and their processes better. Analysis of AALC funded DFA data for NSW and Victoria are underway although due to resource restraints the program was not expanded as planned into the Byadbo area in 2011-12. This may be achieved in 2012-13.
Aesthetic		No significant change across the Main Range post fire (except for large landslips in 2010-11 that reached down to lake water level at Club lake and Lake Cootapatamba and are still visible). These are all expected to improve as regeneration proceeds. Visitor facilities to protect aesthetic values have been built and maintained across the Park (e.g. Kiandra Courthouse and Caves House restorations, lookouts and various walking trails) whilst allowing enjoyment and maintaining the aesthetic value of these areas.
Cultural heritage		The KNP POM Five Year Review and Regional Advisory Committee comments identified that historic heritage is in acceptable to good condition with significant work on many historic heritage items but more work is required on Aboriginal cultural heritage matters across the park eg *“Engagement with Aboriginal communities is well underway although more work could be achieved on identifying and managing Aboriginal cultural values in partnership with Aboriginal communities.”* And *“ Park wide research and monitoring for:…Aboriginal cultural heritage …are priorities that require more support to better inform condition assessments, threat management and protect these values.”*

value	condition and trend	Assessment
		Overall SOP 2010 results indicated: *Condition*: Good (4 of 4 areas) - KNP historic heritage is assessed by all areas as in Good condition with significant resources focussed on key heritage sites such as Huts, Yarrangobilly Caves House and Kiandra Courthouse. For Aboriginal Heritage, condition is mostly Good to Fair i.e. "Where sites are known, site preservation practices have been undertaken. Limited knowledge/info on places/sites in area generally due to the size of the area. Many sites exist in camping and picnic areas." *Approach to management*: For Aboriginal Heritage management is mostly issues based and development related, e.g. "as opposed to any comprehensive survey and/or management programs. However the area liaises closely with the Aboriginal Heritage and Conservation Officer. Interpretive signage relating to Aboriginal heritage has been installed in some locations." For historic heritage the approach has been mostly planned and sometimes constrained by resources with some conservation plans unable to be implemented due to lack of resources. *Effect of management*: For Aboriginal Heritage, impacts are mostly stable on heritage values. *Adequacy of information*: Basic information only and major gaps in Aboriginal heritage and site knowledge were identified for much of KNP. Some gaps identified in historic heritage information include Collins Hut and heritage plantings and pastoral heritage records. *Detailed assessments*: a number of more detailed SOP 2010 assessments on particular sites or issues were completed and information is incorporated into the Integrated Monitoring and Evaluation Assessment below.
Aboriginal	⇔	Aboriginal heritage across the KNP still remains difficult to quantify however a range of activities mean that community engagement and knowledge are increasing, for example: A survey was completed of the Bundian Way which is a traditional travel route from the coast through to Mt Kosciuszko. This project is in the initial stages and is supported by NPWS, Bombala and Eden Councils, Eden Land Council and traditional elders groups. The Northern KNP MOU has been signed off and these Aboriginal communities are engaging in a range of on-park activities to promote and maintain Aboriginal culture and involvement in park management. MOU development with Southern KNP Aboriginal communities is nearer to completion. The NPWS is providing ongoing local support and increased community partnerships with local Aboriginal

value	condition and trend	Assessment
		communities which is delivering increased employment opportunities, Indigenous tourism career development and the provision of unique cultural sustainability initiatives. These initiatives are assisting Aboriginal communities to reconnect with their traditional cultural practices at the same time as delivering positive reconciliation outcomes through Aboriginal Cultural education programs which are aimed at building awareness and creating appreciation of Aboriginal Culture in the general public. The Five Year Review found: *Engagement with Aboriginal Communities is well underway although more work could be achieved on identifying and managing Aboriginal cultural values in partnership with Aboriginal communities.* *Park wide research and monitoring for …Aboriginal cultural heritage;… are priorities that require more support to better inform condition assessments, threat management and protect these values.*
Pastoralism	⇔	There has been no significant change. The re-discovery of the Trout Hatchery(?) located beside Diggers Creek downstream of the Hotel Kosciusko site (now Sponars Chalet) built in the early 1900's was a significant find by local enthusiasts and demonstrates the historical multiple uses of this land.
Huts	⇑	Over the past five years significant work on the reconstruction of huts after 2003 fires was completed with implementation of Huts Conservation Strategy. Ongoing work is planned to maintain the values of these huts. SOP 2010 identified the good condition of most huts funded through the Hut Conservation Strategy 2004, Heritage Action Statement and Conservation Management Plans with Kosciusko Huts Association (KHA) involvement. "A lot of work has been done on rebuilding huts destroyed in 2003 fires and general maintenance, however there is still much to do." The Kosciuszko Huts Association continue to make a major contribution to the conservation of huts in Kosciuszko National Park not only with maintenance and restoration of the built fabric of many huts but also the compilation of historic information.
Mining	⇔	There has been no significant change. Rehabilitation of some sites continues. The KNP Geodiversity Action Plan 2012-17 (2011) considers geological and mining values and identifies a range of actions to be implemented for important mining heritage areas.

value	condition and trend	Assessment
Visitor and reserve infra-structure		The KNP PoM Five Year Review determined that good progress has been made and the majority of park resources have gone into visitor and infrastructure programs over the last five years although some key POM actions or milestones need greater resourcing and work to further protect values. For example, the Five Year Action Plan recommended a visitor impact monitoring trial on key sites to be commenced in 2012/13 and access (eg walking trail, disability, cycling and horse riding) strategies are still required to assist planning and protection of park values. Overall SOP 2010 results indicated: *Condition*: Good to Fair - while generally good, some major work and upgrades are required to sustain the increasing visitation to the park. e.g.: Main Range Track, fireplaces and minor furniture requires upgrade. *Effect of management*: Visitor impacts have been identified as stable or increasing e.g. "Visitors are impacting on cultural sites in the Lower Snowy River Corridor however in other areas visitor impacts are being effectively reduced" and "Most noticeable impacts occur at rest areas and heritage hut sites." *Extent to which visitor needs are met:* Substantially (2/ 4) or Partially (2/4) being met. For example: "Much work has been done in the Main Range area at Charlotte Pass, Rawsons Pass and the various walking tracks. However there remains an extensive amount of work to do over the next 20 plus years." There has been Improved facilities and access to sites and improved interpretation and discovery programs. *Adequacy of information*: All areas considered there was key information available with some gaps e.g. "Good information at places like Yarrangobilly and Currango where there is a management presence on site. Possible gaps in more remote areas." And "There is limited monitoring and research of visitors and visitor numbers." *Detailed assessments*: a number of more detailed SOP2010 assessments on particular sites or issues were completed and information is incorporated into the Integrated Monitoring and Evaluation Assessment below.
Tourism and recreation		Visitor tourism and recreation facilities and services continue to be improved across Kosciuszko National Park including: • three suspension bridges over the Thredbo River have now been completed on the Thredbo Valley Track along with a number of raised platforms across creeks and sensitive boggy areas. Staff have also been working with Lake Crackenback Resort who sponsored a loop section of track from the Diggings camping area to the Ski Tube and the Geehi Bush Walkers who sponsored a section of platform across Bullock Yard Creek.

value	condition and trend	Assessment
		• a significant amount of work has been completed on the Perisher cross country trail system during the volunteer working party weekends between February - May 2012. Directional signs were installed, missing poles replaced and the Valley trail and 5 and 10 km reroutes were completed. This has complemented the work done by Area staff on rock splitting and snow fence installation. Many hours were contributed by volunteers over the working party weekends. • work has continued on the Illawong Lodge track from Guthega. This included track realignment, installing bridging sections over bog areas and rehabilitation of eroded sections of the old track. This work was done with the help of Illawong Ski Tourers (IST) Volunteers over the 2012 Easter period. This was the second such work party and was again very successful. The IST Volunteers are keen to be involved in future work on the track. • refurbishment of the 1890 Kiandra Courthouse in Kosciuszko National Park continues. Contextual architectural plans plus the scope of works have been developed for the next stage of building which will enable improved mobility impaired access, amalgamation of the two major eras (courthouse and chalet) of the building (ie 1890 and 1960 fabric). A recent Business plan and feasibility study has indicated that a three tier approach to use of the building for interpretation, accommodation and café facilities will provide revenue to cover annual operational costs. Currently a contract is underway to produce a final concept plan for the building. Once the concept drawings are complete and approved full architectural design will be completed to enable tendering of the works. The drawings will be complemented with Heritage Council approvals and a landscape plan. Works to date are approximately 50% complete. • Wolgal Hut was re-opened in May 2012 as an accommodation building sleeping eight. Funds from this accommodation will be put towards the continuation of the revitalisation of Kiandra. • new accommodation at Yarrangobilly Caves House (constructed in 1917) will supplement the single story section which was opened to the public in October 2007 which has proved most popular and is exceeding occupancy and revenue estimates. Construction works commenced in February 2012 to bring the two storey section up to an accommodation standard. Works are scheduled to be completed by November 2012. Additional exterior painting and fit out will occur at the end of 2012 to enable accommodation to operate in 2013. SOP 2010 detailed assessments of assets identified: bridges in mostly good condition; buildings as in mostly fair condition with some in good or poor condition with work required; lookouts mostly good condition with regular maintenance; management trails and ski trails in good condition; parking areas and public access roads in good to fair condition with some work required; and visitor facilities and walking trails mostly good with some in fair

value	condition and trend	Assessment
		condition and requiring upgrades or maintenance. Significant work is being done using the Asset Management System to assess infrastructure condition in detail and plan maintenance and replacement programs. Engagement with a wide array of stakeholders, neighbours, organisations, businesses, recreational user groups and conservation groups is substantial and ongoing. The Australian Alps is recognised as an Australian National Landscape (with OEH as an Executive Board member of the Australian Alps National Landscape INC and the AANL tourism plan which is being implemented) and is also National Heritage Listed.
Water harvesting		Whilst 2010-11 and 2011-12 was generally a wetter than average year snow melt and soil moisture is still reduced due to drier climatic conditions over the past decade, potentially reducing long-term water inflows to the Snowy Hydro Scheme and for downstream users. Although dams and catchments are currently wet, inflows are likely to remain lower under predicted hotter, drier climate change scenarios. This is likely to be the case if the recent La Nina events weaken. The AALC *Caring For Our Australian Alps Catchments* report (May 2011) found that: *The Alps reliably deliver an average of 9600 Gigalitres (GL) of high quality mountain water to the Murray-Darling Basin which is about 29% of the Basins 32 800GL annual average flow. This water helps support the production of an annual $15 billion worth of agricultural product from the Murray-Darling Basin and directly contributes to a $300 million hydroelectricity industry and an Alps tourism industry worth at least $280 million.* The report also stated: *Present catchment condition and natural water storage capacity (e.g. in bogs and soils) in the Australian Alps national parks are less than optimal…and… Under future climate change scenarios, water yield from the Australian Alps catchments is projected to decline. Significant investment is required to halt degrading processes and restore degraded catchments and enhance natural water storage capacity, in order to maximise future water delivery to the major rivers flowing from the Australian Alps and to protect species.*

value	condition and trend	Assessment
Scientific research		The *Southern Ranges Region Nature Conservation Management, Research and Monitoring Strategy* (2011-16) identifies the significant ongoing need for research and monitoring programs in the KNP and elsewhere across SRR. Projects to improve our understanding of KNP values and maintain these are identified in the approved strategy. These numerous ongoing research and monitoring programs are then used to assist park management and inform this integrated assessment of values and threats. Information gaps identified include an up-to-date vegetation map (especially the Alpine complex, EECs), some threatened species, catchment monitoring and various park management related monitoring and research. Recent site specific surveys have demonstrated that even in KNP numerous new species (>50) and findings are likely and there is a need for an ongoing systematic program of research and monitoring. An Alps wide survey of Climate Change research, knowledge and needs was conducted under the auspices of the AALC. This found support for continued monitoring. The authors are currently finalising the report. The statewide Wildcount program has established 17 remote camera survey sites in KNP in February – May 2012 although results are yet to be released. Engagement with a wide array of researchers is ongoing including ANU, CSIRO, UNSW, UM, Griffith University and University of Queensland. The Five Year Review found less than 1% of KNP operational budget is spent on ecological programs and <7% in each of pest and weed programs (including on-ground works and R&M). Additional funding for various projects associated with management issues have been successfully sought through various sources including ARC grants, AALC, Commonwealth Biodiversity Fund and Caring for Country Funds as well as internal Find It and Fix It and HARP programs. The Australian Alps Liaison Committee Reference Groups are focussed on priority issues (e.g. catchment, fire, pests and weeds) and NPWS staff are engaged with a range of these projects including seeking Commonwealth funding to address priority management issues across the Alps.

value	condition and trend	Assessment
		NPWS technical and operational resources and projects are focussed on priority issues of understanding values and impacts of fire regimes, climate change and pest/weed control (e.g. horse impact, hawkweed control, impacts on karst and geodiversity). For example, an honours study conducted by Douglas Rowland at Wollongong University investigated various aspects of orange hawkweed (*Pilosella aurantiaca* subsp. *aurantiaca*) and ox-eye daisy (*Leucanthemum vulgare*). The study included soil seed bank, allopathic investigations and an experiment to assess competition between these two weeds and a number of native forbs. PhD studies on the four alpine skinks (alpine she-oak, Guthega, tussock and southern grass) in the Perisher Range are underway under the Glenn Sanecki Alpine Scholarship. Little is known about the ecology of the reptiles in this area and the potential impact of ski resort development and operations on their populations. Population surveys were ongoing and a comprehensive assessment of habitat was undertaken. Over the last five years, a significant number of papers, reports and books have been prepared by NPWS and other researchers on a range of topics across KNP including observed effects of climate change, biodiversity, pest and weed impacts, monitoring of spotted-tailed quolls and wild dogs as well as alpine bog vegetation mapping etc.
Utilitarian functions	⇔	Rehabilitation of Snowy Hydro Scheme sites continues. Significant change has occurred with over $14 million spent on rehabilitating former sites between 2002-2010, rehabilitating (ecological and structural stabilisation) works on over 100 sites. Snowy Hydro Ltd cloud seeding trial continues. Snowy Hydro Ltd and Transgrid are both contributing significantly to park weed control programs. The Environmental Management System is being implemented for Resorts to improve environmental sustainability and assist protection of park values. The NSW Alpine Resorts Environment Report 2010-11 was published in August 2011, documenting major achievements across the resorts in biodiversity, water conservation, pollution prevention and incident management, energy conservation, CO_2 offsets, waste management, cultural heritage and environmental stewardship. This is being followed up with annual report card reporting to be made available soon (NSW Alpine Resorts Environmental Performance Report 2011-12). An EMS framework, recognising many of the environmental and planning processes that are already applied to parks, is being prepared for NPWS and will be applied across the park. For example, Environmental Management Plans have been prepared for construction activities such as the Thredbo Valley Shared Use Track.

value	condition and trend	Assessment
		Across KNP there have also been a range of sustainability projects implemented or planned over the past five years including solar installations, Yarrangobilly hydro and other waste, energy and water saving projects. Recent examples include: • low energy lighting systems have been purchased and will be installed in the North Glory Cave when major works at Caves House have been completed. • a Cogen unit will be installed within the two storey section of Caves House. This will supply additional electricity to the Yarrangobilly complex using gas – as a by-product excess heat will be used to heat water for the hydronic system to be installed to provide heating to the building. • grey and black water reuse will occur to minimise the amount of potable water required for such functions as toilet flushing. • Transgrid are currently investigating and preparing a costs benefit analysis to install a solar array at the carpark at Jillabenan cave to feed into the internal Yarrangobilly grid to augment the current electricity supply and provide power during the summer period when water levels can are impacted by droughts.

3.2 Overall Kosciuszko National Park values condition assessment

In conclusion, of the 17 groups of significant values identified in the KNP Plan of Management (2006):

There has been some change to the overall assessed condition or threats to KNP in 2011 - 12 compared with the previous year due to more information being available and environmental conditions promoting increases in pests and weeds. There have been both positive (e.g. wetter conditions, new species finds, mountain pygmy possum population find) and negative (increased feral horse numbers, deer, rabbits, weeds including ox-eye daisy and hawkweed distribution) variations identified in known values this year but the underlying trends and threats are continuing. The recent wetter conditions will still need to continue for some years to assist soil moisture, breeding conditions and regeneration of native vegetation.

Nine values are assessed as in acceptable current condition (green) and current management regimes are suitable, with six of these assessed as having a stable trend in condition and three improving trend in condition. These are mostly related to visitor infrastructure and heritage where significant resources have been expended in the last 5 years.

Eight values are assessed as their current condition is of concern (orange) and adaptive management actions are required, with one stable, one improving and six now with a declining trend in condition i.e. Soils, Rivers and lakes, Native plants, Native animals, Ecosystem processes and Water harvesting. These values have declined in condition over the last five years and as noted in the Five Year Review require additional resources and more effective control techniques applied to the increasing threats.

Those values assessed as having a condition of concern (orange) and the trend assessed as decreasing under current management regimes (i.e. Soils, Rivers and lakes, Native plants, Native animals (especially TS), Ecosystem processes and possibly Water harvesting) are most likely to be assessed in coming years as under current threat (red) and immediate and/or improved management action is required to reverse the trend, reduce the threats and protect the value. This is already the case for some threatened species (e.g. threatened frogs still declining and Alpine Bog EEC significantly impacted) and threats (e.g. increasing feral horse and deer impacts) to these park values, where recent studies have shown that more intense effective management is still required.

Karst values are identified as having a condition of concern (orange) and stable trend due to positive management actions to protect karst areas. However, increasing threats from feral horses, visitors and climate change require further monitoring and management actions to improve their condition. Other geodiversity values have been identified and their condition will be further assessed in 2012 -13 before the 2013 SOP survey.

Significant management actions (e.g. ongoing weed control programs, hawkweed control; threatened species recovery actions for broad-toothed rat, threatened frogs; and Kosciuszko National Park Huts Strategy etc) are underway that are holding many core values from a faster decline in condition. However, in the face of various increasing/ongoing threats it will require an ongoing significant focus on more intense management response to positively effect change in the condition of those values of concern (from orange to green).

As identified in the AALC *Caring For Our Australian Alps Catchments* report (May 2011), significant ongoing investment in effective management of such core values (equal to that provided to visitor infrastructure and services) are required to improve condition and trends.

This was confirmed in the KNP POM Five Year Review (summarised in Section 5) where key issues relating to park values were identified and included:

Some major and often very costly pest and weed programs are not as effective as they should be in protecting park values and need further support (eg feral horses, deer, rabbits and various weeds such as hawkweed and ox-eye daisy)

The Park Restoration Plan should be further resourced and implemented

Engagement with Aboriginal Communities is well underway although more work could be achieved on identifying and managing Aboriginal cultural values in partnership with Aboriginal communities.

Park wide research and monitoring for: visitors and their impacts; social expectations of pest control programs; Aboriginal cultural heritage; and ecological programs (eg threatened species, some biodiversity and stream/catchment condition) are priorities that require more support to better inform condition assessments, threat management and protect these values.

Environmental quality, visitor safety and operations improved through development of parkwide EMS, environmental health plans for resorts and other visitor areas in the park and fire protection plans for leases.

The Regional Advisory Committee reviewed the KNP POM Five Year Review and its comments included:

"*The Southern Ranges Region Advisory Committee (the Committee) supports the two Recommendations in the Audit. The Committee is particularly concerned at the trend of declining core park values (native plants and animals, ecosystem processes and soils) and reduced funding provided to a range of essential management activities. The Committee is very concerned at the decreasing level of funding available for the ongoing effective control and management of pest species and believes this to be a critical matter in the decline of Park values."*

The KNP POM Five Year Review has recommended a Five Year Action Plan (subject to funding) which endeavours to address these concerns.

4. Status of PoM Actions

The Kosciuszko Action Database, a requirement of the Kosciuszko National Park Plan of Management (2006) tracks the implementation of individual actions listed in Schedule 11 of the Plan. The Database is the location where all historical information relating to the key performance indicators is stored. The reports produced through the Database inform progress on the implementation of the Plan.

Management actions identified throughout the Plan are summarised in Schedule 11. These actions are given an implementation priority in the Plan. Of the 482 actions, 101 have a High priority, 191 Medium priority, 17 Low priority and 173 as ongoing.

The following summary tables detail the implementation status of each of the Schedule 11 High, Medium and Low Priority Actions.

Table 2: Actions implementation status (%)

Implementation Status	Percentage of HIGH priority actions implemented		Percentage of MEDIUM priority actions implemented		Percentage of LOW priority actions implemented	
	2010-2011	**2011-2012**	2010-2011	**2011-2012**	2010-2011	**2011-2012**
Not Commenced	12.9%	**10.9%**	12.9%	**12.9%**	0%	**0%**
Commenced	41.6%	**42.6%**	33.5%	**33.5%**	23.5%	**17.7%**
Completed	12.9%	**14.9%**	6.8%	**6.8%**	0%	**5.9%**
Ongoing/policy	32.7%	**31.7%**	47.6%	**47.6%**	76.5%	**76.5%**

Table 3: Actions implementation status (number)

Implementation Status	Number of HIGH priority actions implemented		Number of MEDIUM priority actions implemented		Number of LOW priority actions implemented	
	2010-2011	**2011-2012**	2010-2011	**2011-2012**	2010-2011	**2011-2012**
Not Commenced	13	**11**	23	**23**	0	**0**
Commenced	42	**43**	64	**64**	4	**3**
Completed	13	**15**	13	**13**	0	**1**
Ongoing/policy	33	**32***	91	**91**	13	**13**
TOTAL	101	**101**	191	**191**	17	**17**

* Some inconsistencies occur in reporting between years. This is due to management Areas re-evaluating progress on some actions, or the amount of work required, as conditions change.

5. Five Year Review of the Plan of Management

"This plan is intended to build upon the legacy of those many individuals who have worked during the past six decades of conservation management to restore and maintain the condition of the park. To this end, the plan contains a set of policies and prescriptions aimed at improving the condition of the natural and cultural values of the park."

Kosciuszko National Park Plan of Management (2006)

5.1 Purpose of the Five Year Review

The Kosciuszko National Park (KNP) Plan of Management (PoM), adopted in June 2006, specifies that a limited review of the plan must be undertaken after five years. The plan specifies the following aims for the review:

- analyse the condition and trends in condition of the values of the park primarily based upon the monitoring results of key performance indicators (see Table 1)
- evaluate the effectiveness of management policies and actions in achieving stated objectives based upon condition assessments
- identify changes required to management policies and actions in order to improve effectiveness
- recommend required changes to monitoring programs, key performance indicators and environmental management system targets
- consider the implications of the findings of relevant new research, management strategies and techniques
- review the progress of the Service, lessees, licensees and other organisations in implementing the plan of management, and
- define operational priorities for the next five-year period.

The review was undertaken by the NPWS Southern Ranges Region Planning and Assessment Team incorporating information and data collected from:

- the Kosciuszko Action Database which tracks the implementation of the actions in the plan
- results of the integrated monitoring and evaluation program over the last four years
- State of Parks (SoP) reporting
- the outcomes of two Kosciuszko staff forums critically assessing the implementation of the PoM
- interviews with specialist park staff and managers
- the four annual KNP PoM implementation reports, and
- independent scientific reports on the values of KNP.

The KNP PoM Steering Committee, made up of senior managers of KNP, determined the review be conducted within the framework of the NPWS Plan of Management self-audit process for national parks estate used across NSW. This audit is reviewed by the Regional Advisory Committee and the state wide independent Conservation Audit and Compliance Committee (CACC). The results of the Five Year Review were submitted to the CACC for appraisal in March 2012, the findings being summarised as follows.

5.2 Outcomes of the Five Year Review

The five year review of the KNP Plan of Management overall recorded that much had been achieved in implementing a very complex and ambitious plan with many new initiatives being commenced since the plan's adoption. Significant progress was recorded in implementing policies and actions in visitor facilities areas, historic heritage, and environmental management and restoration areas. However, other significant management issues were found not commenced or required an increase in effort or changes to operations to be more effective in meeting the key principle of the plan to:

"*Maintain or improve the condition of the natural and cultural values that together make the park a special place*." (Chapter 4.2)

Important areas which have had less focus have been highlighted for the next five years of operational planning in the Five Year Action Plan (Table 4). A number of minor changes to the plan were recommended to incorporate new findings or changed policy directions.

5.2.1 Investment in park management

Over the last five years, NPWS has made a significant investment in the management of Kosciuszko National Park ($151.5M) with a major operational budget focus on infrastructure development and maintenance (38%), visitor infrastructure (18%) and visitor services (13%). A diverse range of management issues are funded by the operational budget including pests (7%), weeds (6%), fire management (6%), customer services and administration (6%), community and education programs (2%), natural heritage (1%)(ecological conservation, threatened species) and cultural heritage (1%) (historic heritage and Aboriginal heritage). Some key threatened species recovery programs such as the threatened frogs and Mountain Pygmy Possum receive the majority of funding from elsewhere in the Office of Environment and Heritage (OEH) and other external sources. Significant programs have included the $15M for the Former Snowy Sites Rehabilitation Program, $10M for the Towards Centenary Program and over $40M for the Perisher Infrastructure Program. Revenue raised over the five years was $109M from sources including Park Use Fees, leases and licences. External funds were also provided to NPWS for specific purposes such as former Snowy sites restoration, research and fire management.

5.2.2 Detailed findings of the Review

The Plan of Management for KNP is a detailed document and its review was a complex task of assessing various scales of implementation. The annual implementation reports from 2006-7 to 2010 -11 (available on the OEH website) were an important tool having documented the substantial progress towards most actions and milestone projects. Since 2008 - 09, the reports have also included a pragmatic assessment of condition and trend of park values. In general these annual reports demonstrate that:

- the condition of 17 park values is variable (see Table 1). Ten significant values are assessed as in acceptable condition such as historic heritage, aesthetic, wilderness, tourism and recreation values. Seven others are of concern and/or trending downwards, requiring increased management effort particularly rivers, catchments, soils, karst and some threatened species and components of biodiversity. Threats from the impact of increasing numbers of feral horses, deer and some weeds have increased. Drought, storms and climate change have also impacted on values during the past five years.
- a substantial amount of on-ground work has been completed or is underway across the park with significant progress in new or upgraded visitor facilities and infrastructure (e.g. Perisher resort upgrades of water supply, sewerage, roads and waste management facilities, ongoing construction of the Thredbo Valley Shared-Use Track), establishment of the Environmental Management Systems (EMS) with resort

operators and on-ground management actions reducing threats and stemming the decline of some values.

- the importance and volume of the day to day park management work is fully recognised although not easily quantified. The demands of day to day work can impede staff focus on specific projects especially complex milestone projects requiring specialist expertise or time consuming project management.
- many initiatives progressed by the plan have had funding support from the Towards Centenary Fund, a portion of park entry fees earmarked for implementing the plan with a long term vision of caring for the park for it's 100th anniversary. Specific projects supported by this project include heritage tourism, park restoration, Aboriginal heritage partnership programs, tourism promotion and visitor facilities, rebuilding of essential infrastructure in Perisher Range Resorts, improved access to the alpine resorts, rehabilitation of the Main Range, climate change research and wildlife protection. The increased funding available through the Towards Centenary Fund has enabled the department to deliver a range of projects that directly benefit those park visitors who pay park entry fees and which contribute to the protection of the key values of the park. Projects almost entirely funded by Towards Centenary Fund contributions include lookouts at Wallace Creek, Landers Falls and Black Perry; the Thredbo Valley Shared Use Track; Rawsons Pass toilet facility; reconstruction of heritage huts after the 2003 fires; construction of park visitor entry stations; the upgrade of Yarrangobilly Caves House; Kiandra Courthouse restoration and upgrade of camping facilities where camping with horses is permitted.
- a range of two year and five year milestones that have been substantially completed or completed including the development and establishment of the Kosciuszko Action Database to track the implementation of the plan, the identification of key performance indicators and integrated monitoring, evaluation and reporting programs, the KNP Restoration Plan, the KNP Huts Conservation Strategy, Main Range Human Waste Management Strategy, the KNP Geodiversity Strategy, the finalisation and implementation of the MOU with Tumut Brungle Gundagai Area Aboriginal community.
- the plan sets out a commitment to several two year and five year milestones. The majority of these have been achieved however some key milestone projects have not commenced such as park operations EMS, systematic visitor impact monitoring, park-wide recreation strategies, and development of a Visual Management System. Others have not been fully implemented such as the KNP Restoration Plan, significant animal and plant management regimes, a Visitor Data System, the KNP Communications Plan as well as many Schedule 10 research requirements.
- park zoning has successfully been applied and assists park management.
- subservient plans such as the Fire Management Strategy, Regional Pest Management Strategy, Huts Conservation Strategy, Horse Management Plan, Conservation Research and Monitoring Strategy and Visitor Management Plans are being implemented and also require review after five years of implementation.
- some actions are now being met by the development and implementation of corporate programs and tools that were not available when the plan was being developed (eg Park Management Program including the Asset Management System, various policy, guidelines and manuals, a consistent approach to annual operations planning, State Tourism Action Plan, sustainability programs and State of Parks reporting). Other actions will be met as new corporate systems are further developed and implemented across the state (eg EMS; Research, Leases and Licensing databases).

5.2.3 Recommended improvements to implementation

Improvements to implementation of the plan have been identified through assessing the status of the objectives and actions, budget analysis and consultation with staff. Whilst acknowledging significant achievements, recommended improvements include:

- improved concentration on some pest and weed programs that are effecting park values (e.g. feral horses, deer, rabbits, hawkweed and ox-eye daisy)
- better resourcing the KNP Restoration Plan for effective implementation
- concentration on implementing the agreed actions from the Communication Plan
- development of a park-wide visitor access strategy (e.g. walking, cycling, disability access) and co-ordinated implementation
- build on Aboriginal community engagement to further identify and manage Aboriginal cultural values in partnership
- expansion of park-wide research and monitoring programs to meet the requirements of the plan; areas of recreational impact monitoring, Aboriginal cultural heritage; and ecological programs (e.g. threatened species, biodiversity and catchment condition) are priorities that require more support to better inform condition assessments, threat management and protect these values, and
- further concentration on environmental quality; visitor safety and improving operations through development of park wide Environmental Management Systems, environmental health plans for resorts and other visitor areas as well as fire protection plans for leases.

A program for the next five years has been prepared to address the key issues identified in this review and advance opportunities as they arise. The proposed Five Year Action Plan (Table 4) will inform operational planning subject to annual funding and availability of staff and other resources

5.2.4 Issues not adequately captured by the Plan

Several issues that were not adequately captured by the plan were identified in the review. These are either new management issues or have gained a heightened profile in the last five years. In most cases the plan provides an adequate framework for dealing with the issues, however they should be considered to be dealt with in more detail in a major review of the plan. The issues include:

- eradication of orange hawkweed and control of oxeye daisy
- feral deer control
- new activities such as geocaching
- changes to permitted activities in wilderness areas
- increased hazard reduction commitments
- significant new species records, status listings or expanded distributions
- the KNP National Heritage Listing (2008)
- better recognition of the Kiandra heritage precinct is required in section 5.6 and 8.19
- the need surveillance for new pathogens such as myrtle rust, and
- inclusion of a number public access roads to list and maps.

Most of these issues have been directed by applying recent NPWS legislation, policy, guidelines or have been addressed to varying degrees in subservient plans and strategies

such as the regional pest management strategies, hawkweed control program, deer management strategy, priority action statements for threatened species and fire management strategy.

5.2.5 Potential amendments to the Plan

Issues identified that may require minor amendments to the Plan include:

- better recognition of the Kiandra heritage precinct is required in sections 5.6 and 8.19
- changes to permitted activities in Wilderness areas in line with recent legislation and NPWS policy (Action 8.18.1.2 and Schedule 4) (i.e. Commercial Tour Operator activities are permitted in wilderness areas until 1 October 2015 as per prescriptions for general recreational activities)
- additions to minor road network maps and section 5.4
- to avoid ambiguity, clarification is needed regarding cycling on management trails in Pilot Wilderness including Ingeegoodbee Trail and links to other named trails (8.11.1.9)
- recreational group numbers which are inconsistent with state policy - Schedule 4 table S4.2 - need to be resolved, and the
- Schedule 1 Sites of Significance (as part of the 10 year review) needs to be updated.

5.2.6 The Five Year Action Plan

The five year review of the implementation of the KNP Plan of Management assessed the status of all objectives, policies and actions and highlighted those areas where more work is needed. The following Five Year Action Plan (Table 4) of Implementation Priorities is a recommendation of projects and management actions that require attention and which has been endorsed by the KNP Steering Committee for use in operational planning over the next five years. The extent to which the actions can be implemented will be determined by resources available including funds, staffing and support.

Table 4: Five Year Action Plan - Implementation Priorities 2012-17: Kosciuszko National Park Plan of Management

High Priority – continue or expand existing programs or substantially commence new actions within two years subject to funding.

Medium Priority – substantially commence within five years (or where required complete for 10 year review) subject to funding.

Chapter 6 - Elements of the landscape **Climate, Rocks and Landforms, Karst, Soils, Rivers and Lakes, Native Plants, Native Animals**	
Continuing Actions	**New Priority Actions**
High Priority • Expand Landscape Function Analysis (LFA) and stream monitoring assessments park wide (baseline information for Sections 6.2-6) • Continue existing programs eg alpine, wetland, fire and pest impact monitoring, threatened species and Fox Threat Abatement Plan. • Continue bog protection and restoration (Objective 6.7.1) • Commence fauna and flora surveys in under-sampled parts of the park • Further work to protect and improve populations of threatened species and the habitats (Sections 6.7 and 6.8) • Significantly improve funding, expertise and resources available to key endemic species programs such as corroboree and other threatened frog species, broad-toothed rat and mountain pygmy-possum (consider others as identified in PAS2) to ensure their habitat is protected and they do not become extinct in the park **Medium Priority** • Implement actions and monitoring identified in the Geodiversity Strategy (including Karst)	**High Priority** • KNP requires vegetation mapping, initially focusing on the alpine complex and EEC mapping (Action 6.7.3.1) • Significant animal (Action 6.8.1.3) and plant (Action 6.7.1.3) management regimes – The scoping report has defined future work but is currently unfunded (milestone project) • Karst management strategy (Action 6.4.1.11 / milestone) – part of Geodiversity Strategy although further develop research and monitoring programs and management guidelines • Significant park wide improvements in the control of feral horses, deer, rabbits, cats and foxes to protect values • Provide adequate funding for survey programs on a 2-3 year rolling basis to allow spring-summer surveys periods to be better planned, staffed and resourced **Medium Priority** • Focus on impact threshold and acceptable limits to disturbance, research and monitoring on key activities and sites of high natural value in conjunction with development and application of strong site closure/rotation policies. Thresholds need to be set then used in future management decisions (Section 8.1.1, a key milestone project) • Develop an accurate way of keeping track of research – potential and current, internal and external • Review, prioritise and implement Research Schedule 10 (Section 15.0.1) for the 10 year review (n.b. – pragmatic priorities for next five years already identified throughout this table)

Chapter 7 - People and the landscape	
Continuing Actions	**New Priority Actions**
High Priority • Implementation of *Kosciuszko National Park Huts Conservation Strategy* • Focus on heritage projects and related programs at Kiandra (Actions 7.0.3.11, 7.0.3.12, 7.0.3.13). • Focus on projects and programs at Yarrangobilly (Action 7.0.3.14) • Support of the Northern KNP Aboriginal Community MOU (Tumut Brungle Gundagai Area Aboriginal Community MOU) (Action 7.0.4.13, milestone project) • Delivery of Aboriginal Discovery Program including an annual traineeship program. **Medium Priority** • Update information for AHIMS and HHIMS databases (Action 7.0.1.7)	**High Priority** • Ensure a focus on implementing Aboriginal cultural heritage actions. (e.g. actions in Sec 7.0.1 - 7.0.4) • Predictive mapping for Aboriginal and non-Aboriginal heritage to assist with action 7.0.1.8) "Develop and implement a targeted heritage survey program for the park to identify new Aboriginal and non-Aboriginal heritage landscapes, places and objects." Important for managing all heritage values • Progress the MOU with Aboriginal community for southern KNP (Action 7.0.4.13) (a key milestone project) **Medium Priority** • Thematic studies on Aboriginal cultural values (possibly through AALC program) • "Cultural landscapes and places provide opportunities for sustainable cultural tourism and recreation." – Cultural Tourism - build on successes of the north of the park (Section 7.0.5)

Chapter 8 - Recreation	
Continuing Actions	**New Priority Actions**
High Priority • Maintenance of existing and new infrastructure, considering heritage values • Implementation of *Kosciuszko National Park Huts Conservation Strategy* including toilets at priority huts • Finish Thredbo Valley Shared Use Track • Continue works at Yarrangobilly and Caves House under existing Conservation Management Plan (Action 8.19.1.1 and 4) • Continue upgrading Kosciuszko and Main Range Walking Tracks • Focus on heritage projects and related programs at Kiandra including accommodation (Section 8.19) **Medium Priority** • Need to implement Bicentennial National Trail (BNT) between Tom Groggin and Geehi (Action 8.7.1.5) • Further Lookouts	**High Priority** • Develop a park wide Recreational Access Strategy include Walking (Action 8.6.1.5 high) /Cycling (Action 8.11.1.12) / Horse riding/ Disabled (Action 8.2.1.5) (also Section 9.1) (Part of State Tourism Action Plan) • Investigate options as identified in State Tourism Action Plan for Currango, Camp Hudson (Objective 8.19.1) and walk linking Kiandra with Selwyn **Medium Priority** • Re-establishing a pragmatic Visitor Research Strategy and Visitor Data System (starting with an update of Natrec) (Section 8.1) (a key milestone project) • Focused visitor impact threshold and acceptable limits to disturbance research and monitoring on key activities and sites in conjunction with development and application of strong site closure/rotation policies (Section 8.1.1) (a key milestone project) • Prepare park wide interpretation strategy (Communications Plan Action 13.1.1.2)

Chapter 9 - Areas of exceptional natural and cultural significance **Main Range, Yarrangobilly, Cooleman Plain**	
Continuing Actions	**New Priority Actions**
High Priority • Continue works on Main Range walking track, camp sites and toilets; • Continue to develop cave monitoring and management systems (e.g Actions 9.3.1.7, 9.4.1.1) as guided by Geodiversity and Karst management strategy • Develop a visitor interpretation centre at Caves House (Action 9.3.1.21) • Increase feral horse control and better protect all karst areas (eg Action 9.4.1.2)	**High Priority** • Prepare and implement a Walking Track Management Strategy (Action 9.2.1.29) (possibly as part of a recreation access strategy) (Action 9.2.1.30) • Review and update Main Range Human Waste Management Strategy (Action 9.2.1.19) to identify next stages of work. • Re-establish a pragmatic Visitor Research Strategy and Visitor Data System (priority is Main Range and karst areas) (Section 8.1) • Focused research and monitoring of visitor impact thresholds and acceptable limits to disturbance on key activities and sites (eg Main Range and karst areas) in conjunction with development and application of strong site closure/rotation policies (Section 8.1.1 and also related Actions 9.2.1.37) **Medium Priority** • Prepare and implement an EMS for caves once corporate system in place (Action 9.3.1.8) • Charlottes Pass and Crackenback Chairlift visitor nodes site planning (Action 9.2.1.17) • Yarrangobilly Heritage Precinct Plan needs to be prepared - components are already underway (Actions 9.3.1.11 and 18, 7.0.3.10) • New walking track to natural bridge to be investigated (Action 9.3.1.18) • Park wide Human Waste Management Strategy (Section 9.1- Milestone project)

Chapter 10 - Areas of exceptional recreational significance

Alpine Resorts, Charlotte Pass, Thredbo, Selwyn, Perisher Range

Continuing Actions	New Priority Actions
High Priority • Continue to maintain and manage resorts and existing facilities according to sustainable, public safety and environmental health requirements. • Continue Resorts EMS and environmental reporting programs • Continue environmental monitoring and restoration programs	**High Priority** • Prepare Environmental Health Plans for resorts and other key destinations in the park (Action 10.2.2.2) • Liaise with RTA and Dept of Planning and Infrastructure to encourage a co-ordination of management stakeholders to develop an Integrated Access Strategy for the park (Actions 10.2.1.33) **Medium Priority** • Explore opportunities for promoting park values and messages within the alpine resort management units in co-operation with lessees (Actions 10.2.1.9/10/11/12) • Investigate alternative mechanisms for measuring carrying capacity of resorts aside from bed numbers to inform assessment at the ten year review (Actions 10.2.1.6) • Improve information management system for the administration of leases (Action 10.2.3.1)

Chapter 11 - Restoration and protection

Park Restoration, Soil Conservation, Introduced Plants, Introduced Animals

Continuing Actions	New Priority Actions
High Priority • Continue existing pest and weed control programs (subject to approved Regional Pest Management Strategy (RPMS) and PAS2) • Improve feral horse control, including applying methods agreed in the KNP Horse Management Plan in inaccessible areas such as Byadbo. (Actions 11.4.1.9-10) • Maintain FoxTAP and cat control programs. • Improve monitoring programs such as cameras and sandpad monitoring to assist with determining effectiveness of pest control programs and ensure key non target species are maintained. • Orange hawkweed eradication program • Ox-eye daisy control program • Maintain and improve existing flora monitoring programs and staff training to assist detection of new weeds (Action 11.3.3.7 and 6.7.1.7 etc)	**High Priority** • Complete and implement SRR Pest and Weed Management Strategy including adequate resourcing of programs • Review and improve effectiveness of KNP Horse Management Plan and control measures (Action 11.4.1.10) • Prioritise key actions in park wide restoration plan, fund and implement (Action 11.1.1.1) • Commence deer control program in key areas of the park then review/ expand if required. (see Southern Branch Deer Strategy and recent research) • The Landscape Function Analysis and stream monitoring techniques be applied across the park to monitor park and catchment condition and the effects of various pest species (Action 11.6.1.3) • Targeted threatened species monitoring should be expanded to threatened plants and all endangered ecological communities affected by pest or weed species or soil erosion • In light of new pathogens (eg Myrtle rust) and weeds review hygiene operational procedures and monitoring across the park to improve their implementation (Action 11.3.1.7)

Chapter 11 - Restoration and protection

Fire

Continuing Actions	New Priority Actions
High Priority • Continued fire suppression and management under the KNP Fire Management Plan and the Enhanced Bushfire Management Program will be applied to the park in coming years to protect assets, visitors and neighbours. • Research and monitoring into fire and its impacts on the park have and will continue to include: o Alpine ash and snow gum regeneration after fire o Fire flora monitoring and database (including AALC program) o Alpine bog EEC monitoring o Fire modelling studies o Other threatened and sensitive species response to fire o Fuel loadings	**High Priority** • Further work is required on monitoring the effects of increased hazard reduction burns including in SFAZ areas. (Action 11.5.6.1) • Ensure fire protection strategies are prepared by leaseholders for all lease areas (Action 11.5.1.7) • The Plan does not require critical amendments for these fire issues and the Fire Management Plan is due for review in 2013-14 (Action 11.5.1.6)

Chapter 11 – Restoration and protection

Environmental Quality

Continuing Actions	New Priority Actions
High Priority • Continue environmental sustainability efforts to improve energy efficiency, water use and waste management.	**High Priority** • Scope and implement targeted project to expand water quality monitoring programs to include all watercourse and water bodies potentially at risk from pollution (Actions 11.6.1.3-8) Include LFA monitoring of catchments **Medium Priority** • Consider results of de-icing studies and develop management recommendations (see Action 11.6.1.16) • Commence targeted monitoring of the use of groundwater in the park (Action 11.6.1.22) • EMS required for service operations once corporate system in place (Action 11.6.1.25) (a key milestone project)

Chapter 12 - Operations and authorised uses

Environmental Stewardship, service operations, RTA, Other Government Authorities, Snowy Hydro Ltd, Electricity Transmission Authorities and Telecommunication Carriers, training exercises, Memorials and Plaques

Continuing Actions	New Priority Actions
High Priority • Ensure all infrastructure within the park is captured within the NPWS GIS system (Action 12.1.1.2) (Linked to AMS) • Continue to ensure that all operations, and authorised uses of the park are consistent with the PoM, as well as corporate and park management program policy and guidelines (Objective 12.1.1) • Finalise the Snowy Management Plan with Snowy Hydro Limited (Objective 12.5.1) • Implement any directions imposed by the EPA as a result of any environmental accidents or audits	**High Priority** • Infrastructure maintenance strategy • Liaise with RTA and DoPI to encourage the development of an Integrated Access Strategy for the alpine resorts (Action 12.3.1.5) • Review Assets Registry for park and reconcile with AMS (Action 12.2.1.4) **Medium Priority** • EMS and reporting required for service operations once corporate system in place (Action 11.6.1.25, 12.2.1.3) • Review and prepare updated Schedule of Significant Features (Schedule 1) for 10 year review (Action 12.1.2.4)

Chapter 13 - Communications and cooperation

Continuing Actions	New Priority Actions
High Priority • Continue to develop internal and external communications and education networks and information flow • Improve communication between KNP Steering Committee and Area/Unit managers and staff on Plan implementation • Continue to engage the community and develop education and volunteer programs (eg Action 13.2.1.8) • Continue to support the Regional Advisory Committee • Continue to update and maintain park information and public documents on the OEH website. • Continue to support a Discovery Program that educates the public on the key values of KNP.	**High Priority** • The agreed actions from the Communication Plan should be resourced and implemented (Action 13.1.1.1) • Social research into feral animal control and communicating messages about the need to protect the park's unique value by improving control methods. **Medium Priority** • Encourage the formation of a Friends of Kosciuszko group (Action 13.2.1.7) - although the scope and role of the group may be different to that identified in the Plan • Explore opportunities for promoting park values and messages within the alpine resort management units in co-operation with lessees (13.1.1.2 pt 6; 13.1.1.4) • Adapt NPWS Statewide design guidelines for interpretation shelters for KNP purposes, especially to incorporate snowloading.

Chapter 14 - Boundaries and adjacent areas	
Continuing Actions	**New Priority Actions**
High Priority • Further purchases of inholdings / additions concentrating on those that link KNP to adjacent reserves and conservation agreements. These do not fare well in statewide selection process for limited acquisition funds due to much of the alps being well represented although still some underrepresented lower slopes and ecosystems need protection • Additional Conservation Agreements (CAs) negotiated as opportunities arise and existing CAs supported • Resolve longstanding boundary fencing agreements with neighbours without need for revocations, loss of park area or values • Additional support to K2C and S2S through Area and CPO staff • Continued support for neighbour relations and tenure blind management programs	**Medium Priority** • Need to assess all inholdings and connecting vegetated lands to assist determining priorities for any future lands on offer in light of climate change predictions • Biobanking and offset proposals – these occur sporadically as developments are proposed and lands are offered at short notice to PWG to manage rather than developers doing so. PWG policy is currently in development on this.

Chapter 15 - Research	
Continuing Actions	**New Priority Actions**
High Priority • Continue existing Conservation works, Research and Monitoring (CRM) Strategy projects to further inform park management, significant animal and plant management regimes and PAS2 • Seek further support and funding for LFA, stream monitoring, threatened species and vegetation mapping across all areas of KNP ie not just alpine areas. • Seek further involvement and partnerships with researchers and organisations on these priority research issues • Continue reporting on CRM projects through annual implementation reports, website, conferences, papers and publications.	**High Priority** • Review Schedule 10 to identify possible further priority projects that could be funded or partners sought for the next 5 year program. • Need to develop a KNP specific research program and funding sources that will allow ongoing long-term projects rather than annual funding bids. **Medium Priority** • Re-establishing a pragmatic Visitor Research Strategy and Visitor Data System • Focused research and monitoring on Impact threshold and acceptable limits to disturbance on key activities and sites (Section 8.1.1 - a key milestone project) • Preparation of issues papers to update staff on latest research • Update Scientific research and information database for Independent scientific reviews and 10 year review in 2016-17

Chapter 16 - Monitoring, evaluation and reporting	
Continuing Actions	**New Priority Actions**
High Priority • Maintain and strengthen the coordinated reporting structure through the KNP Steering Committee • Maintain the Kosciuszko Actions Database and annual implementation report. • Maintain existing reporting processes including State of Parks reporting with improved coordination via a SOP regional workshop to answer surveys questions in 2013.	**High Priority** • Improve capacity to report on pest programs. • More specific application of cost codes to directly extract costs associated with KNP rather than just to Area/Unit level. **Medium Priority** • Re-establishing a pragmatic Visitor Research Strategy and Visitor Data System. • Focused research and monitoring on impact threshold and acceptable limits to disturbance on key activities and sites (Section 8.1.1 – key milestone project) • Link plan reporting to any new corporate EMS and reporting requirements • Ensure that adequate preparation is undertaken to plan for the 10 year and Independent scientific reviews in 2016-17

NB This priority list has been compiled through the Kosciuszko PoM Five Year Review including the self-audit process and staff consultation. It is expected that day to day management will still be ongoing and require significant resources. Most new priority actions above will require additional and/or project funding to implement. Continuing reductions in funding are likely to mean that there may need to be some continuing actions stopped if new projects are required to be commenced.

6. Glossary of abbreviations

AALC – Australian Alps Liaison Committee

ANU - Australian National University

APZ - Asset Protection Zone

BMS - Building Management System

BOM - Bureau of Meteorology

CACC - Conservation Audit and Compliance Committee

CMA - Catchment Management Authority

CO2 - carbon dioxide

CPO – Community Programs Officer

CSIRO – Commonwealth Scientific and Industrial Research Organisation

EBMP - Enhanced Bushfire Mitigation Program

EEC – Endangered Ecological Community, specifically referring to listed ecological communities under the NSW Threatened Species Conservation Act 1995 or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

EMS - Environmental Management System

EPBC Act - the Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Fox TAP – Fox Threat Abatement Plan

GLORIA - Global Research in Alpine Environments

HVAC - Heating, Ventilation & Cooling

K2C – Kosciuszko to Coast, a connectivity target area associated with the Great Eastern Ranges program.

KHA - Kosciuszko Huts Association

KNP – Kosciuszko National Park

LFA - Landscape Function Analysis

MIREN - the international Mountain Invasion Research Network program

MOU - Memorandum of Understanding

NPWS – National Parks and Wildlife Service, is the Parks and Wildlife Group within the Office of Environment and Heritage (OEH)

OEH – Office of Environment and Heritage

PAS 2 – Priority Action Statement 2, the second process for prioritising threatened species recovery programs.

PoM – Plan of Management

PRREMS - Perisher Range Resort Environmental Management Systems

RPMS – Regional Pest Management Strategy

S2S – Summit to Slopes, a connectivity target area associated with the Great Eastern Ranges Project.

SRR - the Southern Ranges Region including Kosciuszko National Park

UNSW - University of New South Wales

UM - University of Melbourne

VBSS - Visitor and Business Services Section manages the unique visitor and business operations in Kosciuszko National Park within the resort areas of Thredbo, Perisher (including Blue Cow, Guthega and Smiggins Hole), Charlotte Pass and Mt Selwyn.

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