

Information Sheet on Ramsar Wetlands (RIS)

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

20 November 2008

3. Country:

Australia

4. Name of the Ramsar site:

Blue Lake

5. Designation of new Ramsar site or update of existing site:**This RIS is for** (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:**a) Site boundary and area**

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
ii) the boundary has been extended ; or
iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
ii) the area has been extended ; or
iii) the area has been reduced**

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

Since the listing of Blue Lake Ramsar site in 1996, further information has become available indicating several international important species and/ or ecological communities are found within the site, this information directly relates to Ramsar criterion 2.

7. Map of site:**a) A map of the site, with clearly delineated boundaries, is included as:**

14. Justification for the application of each Criterion listed in 13 above:

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Blue Lake is one of only four cirque lakes (wetland type O) found on the mainland of Australia. The site contains a rare example of a near-natural alpine wetland within the South-East Coast Drainage Division (Snowy River Catchment [II-22]) and Australian Alps biogeographic region. Blue Lake and Hedley Tarn are found within Kosciuszko National Park, which has been protected for its conservation values for over 50 years. Blue Lake and Hedley Tarn are surrounded by alpine herb fields, heaths, fens and bogs (wetland type U). The impact on Blue Lake and Hedley Tarn prior and after its protection have been minimal, consequently Blue Lake and Hedley Tarn remains in a near natural state. Moreover, Blue Lake is possibly the only dimictic lake on mainland Australia.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

The Blue Lake Ramsar site supports threatened species and a threatened ecological community on an international, national and NSW state scale. In particular, it may support the mountain pygmy possum (*Burrhamys parvus*) which is listed as endangered under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act), and is listed as critically endangered on the IUCN Red List, the broad toothed rat (*Mastacomys fuscus*) which is listed as vulnerable under the *Threatened Species Conservation Act 1995* (TSC Act) and listed as near threatened on the IUCN Red List, the alpine tree frog (*Litoria verreauxii*) which is listed as being of least concern on the IUCN Red List - but having a declining population trend, and endangered under the TSC Act and the anemone buttercup (*Ranunculus anemoneus*) which is listed as vulnerable under the TSC Act and EPBC Act.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/ or animal species important for maintaining the biological diversity of a particular biogeographic region.

The Blue Lake Ramsar site supports populations of plant and animal species important for maintaining the biological diversity of the South East Coast Drainage Division (Snowy River Catchment (II-22)) and the Australian Alps biogeographic region. In addition to supporting the threatened species listed in Criterion 2 above, the site also supports the rock or branched caraway (*Oreomyrrhis brevipes*), wedge oschatzia (*Oschatzia cuneifolia*), snow wort (*Abrotanella nivibena*), Gwenda's daisy (*Brachycome stolonifera*), *Craspedia leucantha*, dwarf fleabane (*Erigeron setosus*), snowpatch daisy (*Parantennaria uniceps*), snowpatch cushion-plant (*Colobanthus nivicola*), feldmark cushion-plant (*Colobanthus pulvinatus*), wire-head sedge (*Carex cephalotes*), Kosciuszko pineapple-grass (*Astelia psychoracharis*), *Agrostis meionectes*, *Deyeuxia affinis*, anemone buttercup (*Ranunculus anemoneus*) and snow buttercup (*Ranunculus nipbophilus*). This has been acknowledged through the inclusion of Kosciuszko National Park as a biosphere reserve in the UNESCO Man and the Biosphere programme (MAB).

15. Biogeography

a) Biogeographic region: South East Coast Drainage Division (II-22 Snowy River Catchment); Australian Alps biogeographic region

b) Biogeographic regionalisation scheme: Australian Water Resources Council – Australia's Drainage Divisions and Basins (AWRC 1975). IBRA (Interim Biogeographic Regionalisation of Australia) classification (Thackway and Cresswell 1995).

16. Physical features of the site:

Kosciuszko National Park contains the only four cirque lakes on the Australian mainland. The other

three lakes, Cootapatamba, Albina and Club are shallower than Blue Lake and are held entirely by terminal moraines. These four lakes, along with Hedley Tarn (formed by the partial damming of Blue Lake Creek by a terminal moraine), make up the alpine glacial lakes, which are the highest lakes on the Australian mainland, being at elevations between 1890 metres and 2070 metres (Cullen and Norris 1989).

The margins of Blue Lake are made up of moraine, talus, small pockets of alluvium deposits and granite. The bed of Blue Lake is primarily muddy with small areas of rock and sand, particularly near the margins (Raine 1982). Soils in the Blue Lake and Hedley Tarn area are alpine humus, which are dark and friable and rich in organic matter. The associated peat soils of fen and bog communities are significant within the Blue Lake Ramsar site as they have the ability to retain large volumes of water which influences the occurrence of surrounding vegetation.

Blue Lake receives water from Blue Lake Creek originating in upper Blue Lake catchment below Mount Twynam. Blue Lake Creek flows from Blue Lake into Hedley Tarn and then into the Snowy River. The surface of Blue Lake is frozen for approximately four months of the year, it overflows in spring with the snow thaw, and during the remainder of the year the lake level remains stable. Blue Lake has a maximum depth of 28 metres. Hedley Tarn has a maximum depth of five metres.

The Blue Lake Ramsar site is in a near-natural state, made evident by the high quality of the water within. The alpine lakes contain the freshest waters in Australia, with a salt level of 2.4 – 3.0 grams per cubic metre (Cullen and Norris 1989). The waters are clear with Secchi depths of about six metres and turbidity below 20 NTU (Cullen and Norris 1989). Blue Lake has a pH value of approximately six and water temperatures reach between 10 and 12 degrees Celsius in the summer months. Timms (1980) suggested that Blue Lake was dimictic and as such would be the only known example of this type on mainland Australia.

Three streams contribute water, primarily surface run-off, to Blue Lake. The amount of inflow to Blue Lake depends on snowfall and the surrounding air temperature. The outflow from Blue Lake is the Blue Lake Creek which feeds Hedley Tarn. Blue Lake Creek is a tributary to the Snowy River which enters the ocean at Mario, Victoria. Comprehensive data on inflows and outflows for the Blue Lake Ramsar site is lacking. Permanent ice covers the Blue Lake and surrounding waterways during winter. Stream flow from Blue Lake to Hedley Tarn is extremely low during winter and typically increases in November.

The climate within the catchment of Blue Lake and Hedley Tarn is typically alpine. Average annual precipitation at Charlotte Pass (nearest gauging station) is 2243 millimetres, which mainly falls as snow. Average minimum winter air temperature is –6.8 degrees Celsius, with an absolute minimum recorded at –23 degrees Celsius. Average summer maximum is 17.2 degrees Celsius (Bureau of Meteorology 2006). Wind speeds of up to 160 kilometres per hour and persistent of 75 kilometres per hour are not uncommon. Prevailing winds are south-west to north-west.

17. Physical features of the catchment area:

The Ramsar site includes the entire catchment area of the Ramsar site.

Development of the regions geological features can be divided into four periods occurring over 470 million years and beginning with the formation of bedrock following sedimentation in the deep marine environment and prolonged erosion. A period of uplift and continued erosion followed with a subsequent period of climactic change that resulted in formation of glacial features. Blue Lake was formed during this period and is the only cirque lake to be formed by glacial gouging of the granite bedrock. It is thought that the deepest part of Blue Lake was formed by the convergence of two glaciers resulting in Blue Lake containing two basins with depths of 26 metres and 28 metres. Following the glacial period, the final period is of relative stability.

Remnants of the sedimentary rocks from the earliest period still remain in the area in the form of slates, quartzites and schists.

Since Blue Lake is relatively deep, it acts as a sink for sediment from the catchment. Post-glacial sediments seven metres deep have been observed in cores from several locations (Raine 1982). Overgrazing in the late 19th century has resulted in some degradation of the area including eroded soils and entrenched flow lines.

18. Hydrological values:

The alpine area of Kosciuszko National Park has the ability to store water within the catchment since the majority of precipitation falls as snow. The volume of stream flow is dependent on snowfall within the catchment. Throughout the months of spring and early summer the ice and snow in the catchment melts and flows into surrounding rivers and streams. Of the three streams feeding Blue Lake, the north-western stream is the largest contributing approximately half of the water entering Blue Lake (Raine 1974). It is possible that the two smaller streams contributing a combined total of 25 percent of the water entering Blue Lake become permanently frozen during winter.

It is likely that ground water contributes only a minimal amount to the Blue Lake due to the elevation of the lake, the impermeability of the granite matrix and the location of the site in the Snowy River catchment.

Blue Lake and Hedley Tarn together with the four other alpine lakes are the freshest water bodies on mainland Australia and serve as baselines for monitoring impacts on their own and other aquatic ecosystems (Good 1992). The alpine lakes are the only natural wetlands on the Australian mainland with an ice sheet over the lake surface throughout winter, and Blue Lake is possibly the only dimictic lake on mainland Australia.

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19. Wetland Types

a) Presence:

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •
Vt • W • Xi • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) Dominance:

Inland wetland Va dominates the Blue Lake Ramsar site (approximately 300 ha)

Inland wetland U is present in the Blue Lake Ramsar site (approximately 10 ha)

Inland wetland O consists of Blue Lake (14.4 hectare) and Hedley Tarn (one hectare)

Inland wetland M consists of Blue Lake Creek and the three streams feeding the Blue Lake

Wetland type N – some or all of the streams may become frozen during winter months

20. General ecological features:

Blue Lake does not have any macrophytes growing in the littoral zone. Consequently the lake consists of entirely open water. Boulders reach the lake margin in the east and north-east and support boulder communities dominated by snowy daisy (*Brachycome nivalis* var. *nivalis*), *Danthonia alpicola*, lady's mantle (*Alchemilla xanthochlora*), alpine water-fern (*Blechnum pennamarina*) and mother shield-fern (*Polystichum proliferum*)

Tall alpine herb field communities surround the northeastern margin with *Celmisia* sp., *Poa* spp., alpine hoary sunray (*Leuhobrysum albicans* subsp. *alpinum*), *Chionochloa frigida*, snow aciphyll (*Aciphylla glacialis*), *Craspedia* spp. and *Euphrasia collina* subsp. *diversicolor* being common. The remaining shores are pebbly with

wet heaths and grasses abutting the shoreline (*Epoacris glacialis*, *E. microphylla*, *Richea continentis*, *Poa costiniana*, *Oxylobium ellipticum*, *Podocarpus lawrencei*, *Kunzea muelleri*, *Phebalium ovatifolium* and *Protanthera cuneata*).

The margins of Hedley Tarn consist of heath, fens (*Carex ganichaudiana*, *C. hypandra* and *Danthonia nudiflora*) and bogs (*Sphagnum cristatum*, *Carex ganichaudiana*, *Epacris paludosa*, *Richea continentis* and *Astelia* spp.).

The vegetation communities surrounding Blue Lake increase the amount of silt and sediment trapped, increasing the amount of available nutrients to the wetland community. The vegetation also contributes important carbon into the wetland system which is critical for the carbon balance within the system upon which a lot of the fauna depend. They also help contribute to the water quality by filtering excess nutrients out of the water.

The remaining land within the Ramsar site consists of tall alpine herbfield, short alpine herbfield, snow patch felmark, bogs and fens and heath.

Ecosystem services provided by these species and habitats include supporting threatened species, supporting food webs and trophic relay, providing nature observation and research opportunities and supporting cultural heritage linkage.

21. Noteworthy flora:

The catchment of Blue Lake provides habitat for tall alpine herbfields dominated by *Poa* and *Celmisia* species and *Brachycome* and *Austodanthonia* species, feldmark dominated by *Colobathis* species, short alpine herbfields dominated by *Plantago* and *Neopaxia*, tall heaths dominated by *Epacris glacialis* and fen and bogs. A significant number of endemic and rare species, that are restricted to alpine and sub-alpine environments are found within the catchment and include the rare rock or branched caraway (*Oreomyrrhis brevipes*), wedge oschatzia (*Oschatzia cuneifolia*), rare snow wort (*Abrotanella nivibena*), Gwenda's daisy (*Brachycome stolonifera*), *Craspedia leucantha*, dwarf fleabane (*Erigeron setosus*), rare snowpatch daisy (*Parantennaria uniceps*), snowpatch cushion-plant (*Colobanthus nivicola*), feldmark cushion-plant (*Colobanthus pulvinatus*), rare wire-head sedge (*Carex cephalotes*), Kosciuszko pineapple-grass (*Astelia psychoracharis*), *Agrostis meionectes*, rare *Deyeuxia affinis*, anemone buttercup (*Ranunculus anemoneus*) and snow buttercup (*Ranunculus nipophilus*). The anemone buttercup, *Ranunculus anemoneus*, listed as vulnerable under the EPBC Act and in the TSC Act is found in the Blue Lake Ramsar site. The catchment also supports the ecological community of montane peatlands and swamps listed as endangered under the TSC Act.

There have been 48 species of introduced plants recorded within the Kosciuszko alpine area. Introduced plants are the result of previous land management practices and are the focus of weed control programmes.

22. Noteworthy fauna:

The Blue Lake catchment may also support internationally significant migratory birds, including the Japanese/Latham's Snipe (*Gallinago hardwickii*).

Noteworthy invertebrates that inhabit Blue Lake include the freshwater cockle (*Glacipisium Kosciuszko*) which has only recently been identified (1943), and is restricted to the Snowy Mountains. The isopod, *Metaphreatoicus australis* and the mayfly (*Tasmanopplebia nigrescens*) have restricted distributions, and are found only in the highlands of south-eastern Australia. The gastropod (*Glacidorbis hedleyi*) is also restricted to the highlands of south-eastern Australian and is also endemic to alpine lakes.

Introduced fauna species that have been recorded within the Ramsar site are the fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), cat (*Felis catus*) and hare (*Lepus capensis*). They are considered to be threats to the sites natural, cultural and recreational values.

The Blue Lake Ramsar site also supports one species of fish, the native Mountain galaxias (*Galaxias olidus*) and two species of amphibians, the eastern common froglet (*Crinia signifera*) and the endemic high altitude alpine tree frog (*Litoria verreauxii alpine*). There are also five common species of reptiles, Copperhead (*Austrelaps superbus*), white-lipped snake (*Drysdalia coronoides*), alpine water skink (*Eulamprus kosciuszkoii*), southern water skink (*Eulamprus tympanum*) and mountain log skink (*Pseudemoia entrecasteauxii*).

23. Social and cultural values:

Kosciuszko National Park has very high social and cultural value. Kosciuszko National Park is the most visited National Park in NSW receiving approximately three million visitors annually. Blue Lake is of particular interest for education and communication since it is a unique and rare example of an alpine lake and is the only cirque lake exhibiting a dimictic thermal regime. It is frequently visited by school and university groups for educational purposes. It is an important site for investigating the impacts of climate change in Australia. Blue Lake is also very popular as it is one of the few areas in NSW where people can ice climb.

Indigenous people did not live permanently in the alpine area but evidence indicates that they have exploited food resources in the region for at least the past 100 years. For example, we know that groups of Indigenous people collected and cooked bogong moths (*Agrotis infusa*) from the Australian Alps. It is reasonable to assume that they would have camped in the area surrounding Blue Lake during these activities.

The first official European exploration of the region was undertaken by the Polish explorer, Paul Edmund Strzelecki, who climbed and named Mt Kosciuszko (the highest mountain in Australia) in 1840. However it is very likely that stockmen in search of pastures were there before him. Before the park was dedicated the majority of the area was used for grazing domestic stock. In 1974 all agricultural practices were prohibited within the park which ended 150 years of grazing in this area of NSW. It is very likely that Blue Lake would have served as a camping ground for stockmen working on the surrounding high country.

24. Land tenure/ownership:

The Ramsar site and the surrounding area is within a National Park of 690 000 hectares that is dedicated under the *National Parks and Wildlife Act 1974*.

25. Current land (including water) use:

a) Within the Ramsar site:

The lands within the Ramsar site are permanently designated as a National Park and used as a nature conservation area.

b) In the surrounding area:

The 690 000 hectares surrounding the Ramsar site is also designated as a national park and used for conservation. Lands beyond the National Park are Freehold and used for grazing domestic stock. The population of the area outside the Ramsar site is approximately 3500 and the majority live in surrounding local towns. Blue Lake is a popular tourist attraction therefore the area has a large temporary population.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) Within the Ramsar site:

Since alpine ecosystems are largely influenced by low temperature conditions they are considered to be particularly sensitive to climate change and they have been identified as one of the most vulnerable ecosystems in Australia. The Intergovernmental Panel on Climate Change predict temperature increases of 0.7 degrees Celsius to 2.5 degrees Celsius by 2050 (Houghton et al. 2001) and according to best-case scenarios developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), a temperature increase of 0.6 degrees Celsius by 2050 would result in a 27 percent reduction in the area that receives 30 days of snow per year in the Australian Alps (Hennessey et al. 2003).

The potential effects that this would have on the ecological character of the Blue Lake Ramsar site include alterations to catchment hydrology and geomorphic processes; possible extinction of flora and fauna whose climatic ranges are limited to alpine and sub-alpine regions; uphill migration of biota from lower altitudes; expansion in the distribution of some plant communities; reduction in the size of species composition of some plant communities; change in the composition and abundance of fauna; increase in the diversity, abundance and distribution of weed species; uphill extension in the range of feral animals; and increase in wildfire incidents. This has significant implications for the ecological character of the Blue Lake Ramsar site and has been identified as a major threat.

Cloud seeding trials began within Kosciuszko National Park in 2004 and occur over the Blue Lake Ramsar site. Silver iodide cloud nuclei are added to clouds from 12 pairs of ground-based generators to increase rainfall within the Snowy River catchment. While silver iodide is broadly regarded as insoluble, the ecological impacts of the addition of silver iodide on the water quality of the near-natural Blue Lake Ramsar site are unknown. Furthermore, changes in precipitation may impact the highly sensitive alpine flora and fauna.

Blue Lake and Hedley Tarn are popular tourist attractions within Kosciuszko National Park and tourist visitation has increased significantly since the 1970s and 1980s. Recreation and tourism are considered a major threat to the Blue Lake Ramsar site and impacts include increased litter, compaction of soil, erosion, vegetation trampling, faecal contamination, disturbance of wildlife, noise pollution, reduction of visual amenity, introduction of alien plants and increased feral animal activity.

Bushfires are a natural and periodic event within the Australian landscape. Drought increases the amount of dry fuel available, making conditions favourable for bushfires. The Australian Alps experienced the largest bushfire event in over 60 years in the summer of 2003 and the fire did progress into the Blue Lake Ramsar site. The burnt area is recovering and impacts within the Ramsar site include loss of vegetation, increased run-off and erosion, increased sedimentation, and the addition of ash and burnt material to waters.

Prior to Kosciuszko being dedicated as a National Park the area was grazed by domestic stock. This has resulted in erosion and siltation of the Kosciuszko area including Blue Lake and Hedley Tarn. In 1950, areas under threat from erosion were identified and works (primarily rock groyne) were put into place, and revegetation programs were undertaken, to rectify the problem. NSW Department of Environment and Climate Change and Water have up-graded some of the works over recent years, however erosion and associated sedimentation within fen and bog areas and Blue Lake remain a threatening process. Currently erosion and siltation are considered a minor threat to Blue Lake and its catchment.

b) In the surrounding area:

Climate change, cloud seeding, recreation and tourism, bushfires and erosion and sedimentation are all threatening processes occurring within the Blue Lake Ramsar site and the surrounding areas.

27. Conservation measures taken:

a) The Blue Lake Ramsar site lies within Kosciuszko National Park, which was designated in 1977 as a biosphere reserve within the UNESCO Man and the Biosphere Program. Kosciuszko National Park is also managed to conserve biological diversity according to Australia's obligations as a signatory to the International Convention on Biological Diversity (CBD). Other international agreements which are significant for the Blue Lake Ramsar site include the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australian Migratory Bird Agreement (CAMBA) and Republic of Korea-Australian Migratory Bird Agreement (ROKAMBA). The Australian Alps, which includes Kosciuszko National Park and the Blue Lake Ramsar site, is internationally significant.

At a national level, Australia's obligations concerning international agreements, including the Convention

on Wetlands of International Importance (Ramsar Convention) are provided for within the EPBC Act. The Ramsar site is within the Australian Alps, which is listed on the National Heritage List.

Other NSW legislation which affords protection and/or conservation to the Blue Lake Ramsar site includes the *National Parks and Wildlife Act 1974*, *Threatened Species Conservation Act 1995*, *Environmental Planning and Assessment Act 1979* and *Environmental Planning and Assessment Act Amendment (Ski Resort Area) Act 2001*. Other NSW legislation which may direct management within Kosciuszko National Park and influence management and conservation within the Blue Lake Ramsar site include the *Snowy Hydro Corporatisation Act 1997*, *Snowy Mountains Cloud Seeding Trial Act 2004*, *Protection of the Environment Operations Act 1997*, *Aboriginal Land Rights Act 1983*, *Rural Fires Act 1997*, *Noxious Weeds Act 1993*, *Rural Lands Protection Act 1988*, *Heritage Act 1977*, and *Public Health Act 1991*.

b) The IUCN (1994) protected areas category which apply to the site:

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an official management plan exist, is it being implemented:

A management plan for the Blue Lake Ramsar site has not been developed, however the Ramsar site lies entirely within Kosciuszko National Park. A plan of Management for Kosciuszko National Park has been developed and implemented in 2006 (DEC 2006). This plan of management replaces previous plans implemented in 1988 and 1974. This plan recommends specific management actions for the Blue Lake/Hedley Tarn catchment, some actions were included as a response to the Ramsar nomination.

d) Other current management practices:

Kosciuszko State Park was gazetted in 1944 and was formerly used for grazing domestic stock. All agricultural practices were phased out soon after the park was gazetted. In 1967 the park's name was changed to Kosciuszko National Park, and the newly formed NSW National Parks and Wildlife Service (NPWS) became the management authority for the area (in 1997 the spelling of Kosciuszko was changed to Kosciuszko). The NPWS has a Plan of Management for Kosciuszko National Park. Within the plan are a number of conservation and management initiatives to preserve and enhance the area for nature conservation. Initiatives include the control of introduced plants and animals, the encouragement of 'leave no trace' principles, banning of fires above the tree line, prohibiting camping within the catchment of Blue Lake and Hedley Tarn, and restricting access to Blue Lake by foot and skis. Visitors are also encouraged to stay on the tracks provided to decrease the risk of trampling of sensitive vegetation, and to dispose of human wastes in an environmentally sensitive way.

28. Conservation measures proposed but not yet implemented:

A number of strategies and management plans are being prepared for Kosciuszko National Park which are relevant to the conservation of the Blue Lake Ramsar site. In particular, a Human Waste Management Strategy (HWMS) is being prepared for the Main Range Management Unit, the Main Range Walking Track Environmental Management Plan is undergoing finalisation before implementation, a visitor registration system is to be considered and a Blue Lake ice climbing and abseiling impact assessment is to be undertaken.

29. Current scientific research and facilities:

The NSW DECCW is undertaking research within the Blue Lake Ramsar site which includes analyses and monitoring of algae, ice break-up and thermal regime, water chemistry, nutrient quality, pH, water temperatures and studies of the impacts of increased UV radiation on alpine biota. Monitoring of changes in alpine air temperatures, snowfall, snow depth and rainfall is undertaken by the CSIRO and Snowy Hydro Ltd. Research into soil characteristics and processes critical to the sustainability of alpine grasslands is being undertaken at the Australian National University and studies of snowpatch vegetation communities and recovery from fire is being undertaken at Griffith University.

In the past Blue Lake, Hedley Tarn and the Kosciusko region have been the topic of much investigation. Examples of research work undertaken in the catchment of Blue Lake include: Costin (1952) undertook hydrological studies in the upper snowy catchment, Timms (1980) investigated the benthos environment of Blue Lake, Raine (1982) and Burgess et al. (1988) studied the bathymetry and thermal stratification of Blue Lake, Bayly (1970) has reported on the zooplankton of the Kosciusko region, Powling (1970) has reported on the phytoplankton of the Kosciuszko region, Raine (1974) carried out actuopalynology studies, water chemistry was investigated by Williams et al. (1970) and Balmaks (1984) and most recently Hancock et al. (2000) examined littoral invertebrate communities of the Kosciuszko region lakes and Stanley and De Deckker (2002) examined the history of climate change in southeastern Australia by radiocarbon dating a core from Blue Lake.

There are no research facilities available at Blue Lake and there is no intention to establish any.

30. Current communications, education, participation and awareness (CEPA) activities related to or benefiting the site:

There are no information or visitor facilities within the Ramsar site as it is in a remote area, however the DECCW Snowy Region Visitor Centre in Jindabyne provides information, maps, and details about the site. The Main Range Track is a walking track that has a section within Ramsar site and attracts many visitors in the warmer months. The cirque wall at Blue Lake is the best known rock climbing destination in the park and the only place on mainland Australia regularly used for ice climbing. The site is also popular for ski touring.

NSW National Parks and Wildlife Service runs a Discovery Ranger Program throughout Kosciuszko National Park, which includes walks to Blue Lake. These programs involve guided walks and talks to community members by rangers, normally throughout school holiday periods.

Blue Lake is utilised for educational visits by nearby schools, universities and camping organisations. Interpretative signs are located at the top of the track that leads down to Blue Lake.

31. Current recreation and tourism:

Summer visitation to the alpine region of Kosciuszko National Park is increasing dramatically. In 1978 the number of summer alpine visitors was estimated to be 20 000 while later surveys in 1985 and 1999-2000 estimated the number of summer alpine visitors to be 36 000 and 102 500 respectively.

About two-thirds of the winter visitors come for alpine skiing, as it is the only ski field in New South Wales with alpine skiing. The rest come to cross country ski, or to enjoy other forms of snow recreation.

Blue Lake and its immediate surroundings make it an ideal location for many recreational activities including bushwalking, ice climbing, ski touring, and rock climbing. During 1994, Blue Lake had approximately 15 000 visitors. Camping is no longer permitted in the catchment of Blue Lake, however, the fringes of its catchment are still frequently used as camping grounds. Consequently, Blue Lake remains a popular alpine tourist attraction. Illegal camping within the catchment is controlled, however it does occur.

32. Jurisdiction:

Territorial: Government of New South Wales

Functional: New South Wales Department of Environment, Climate Change and Water

33. Management authority:

New South Wales Department of Environment, Climate Change and Water (Southern Zone and Snowy Mountains Region and District)

District Manager

PO Box 2228

Jindabyne, NSW, 2627

34. Bibliographical references:

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Appendix I:

Below is the map for Blue Lake Ramsar site, clearly showing the Ramsar site boundary.

