## Blue Lake

1. Country: Australia

2. Date of compilation: 29 February 1996

3. Reference number: 5AU049

4. Name and address of compiler:
NSW National Parks and Wildlife Service
PO BOX 1967
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5. Name of wetland: Blue Lake (Kosciusko Alpine Lakes)

6. Date of designation: 17 March 1996

7. Geographical coordinates: 36°24'S 148°19'E

8. General location: Approximately 28km west of Jindabyne and 3.5km north of Charlotte Pass in the Snowy Mountains of south-eastern New South Wales, Australia.

9. Area: 320ha

10. Wetland type: Inland Wetlands 14

11. Altitude: 1,900m.a. mean s.l

12. Overview of site: Blue Lake (BL) is one of only four cirque lakes found on the mainland of Australia. These four together with another glacial lake, Hedley Tarn, make up the alpine lakes, which are the highest lakes on the mainland. BL is surrounded by alpine herb fields, heaths, fens and bogs and together with the lake it supports a variety of native plants and animals, including rare and endangered species, as well as a small number of invertebrate species which are restricted to the alpine zone.

13. Physical features: The Ramsar site includes BL, Hedley Tarn and the majority of their catchments. The Ramsar site is located on the Great Diving Range and contained within Kosciusko National Park.

BL is a cirque lake formed by glacial gouging of the granite bedrock. The lake margins are made up of moraine, talus, small pockets of alluvium deposits and granite. The bed of BL is primarily muddy with small areas of rock and sand particularly near the margins (Raine 1982). Soils in the BL area are alpine humus which are dark and friable and rich in organic matter.

Kosciusko National Park contains the only four cirque lakes on the Australian mainland. The other three lakes, Cootapatamba, Albina, and Club are shallower than BL and are held entirely by terminal moraines. These four with another glacial lake, Hedley Tarn, make up

the alpine lakes, which are the highest lakes on the Australian mainland, being at elevations between 1,890 and 2,070m (Cullen and Norris 1988).
BL receives water from Blue Lake Creek originating from Mount Twynam. Blue Lake Creek flows from BL into Hedley Tarn (an alpine lake) then into the Snowy River. The surface of BL 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. BL has a maximum depth of 28m, the maximum depth of Hedley Tarn is 5m.

The alpine lakes contain the freshest waters in Australia, with a salt level of 2.4 - 3.0 $gm^{-3}$ (Cullen and Norris 1988). The waters are clear with Secchi depths of about 6m and turbidity below 20 NTU (Cullen and Norris 1988). BL has a pH value of approximately 6 and water temperatures reach between 10 and 12°C in the summer months. Timms (1980) suggested that BL was dimictic and as such would be the only known example of this type on mainland Australia.

The climate within the catchment of BL is typically alpine. Average annual rainfall at Charlotte Pass (nearest gauging station) is 2,305mm which mainly falls as snow. Average minimum winter air temperature is - 5.1°C, with an absolute minimum recorded at - 23°C, average summer maximum is 16.8°C (Bureau of Meteorology 1993). Wind speeds of up to 160km/h and persistent at 75km/h are not uncommon. Prevailing winds are south-west to north-west.

14. Ecological features: BL does not have any macrophytes growing in the littoral area. Consequently the lake consists of entirely open water. Boulders reach the lake margin in the east and northeast and support boulder communities dominated by *Brachycome nivalis* var. *nivalis*, *Danthonia alpicola*, *Alchemilla xanthochlora*, *Blechnum pennamarina*, and *Polystichum proliferum*). Tall alpine herbfield communities surround the northeastern margin with *Celmisia* sp., *Poa* spp., *Leucochrysum albicans* subsp. *alpinum*, *Chionochloa frigida*, *Aciphylla glacialis*, *Craspedia* spp., and *Euphrasia collina* subsp. *diversicolor* being common. The remaining shores are pebbly with wet heaths and grasses abutting the shoreline (*Epacris glacialis, E. microphylla, Richea continentis, Poa costiniana, Oxylobium ellipticum*, *Podocarpus lawrencei, Kunzea muelleri, Phebalium ovatifolium*, and *Prostanthera cuneata*).

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

The remaining land within the Ramsar site consists of tall alpine herbfield and dry heath.

15. Land tenure: The Ramsar site is in a National Park of 690,000ha that is dedicated under the *National Parks and Wildlife Act 1974*.

16. Conservation measures taken: Kosciusko 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 Kosciusko National Park, and the newly formed NSW National Parks and Wildlife Service (NPWS) became the management authority for the area. The NPWS has a Plan of Management for Kosciusko National Park. Within the plan is 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, banning of fires, prohibiting camping within the catchment of BL, and restricting access to BL to 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 environmental sensitive way.

17. Conservation measures proposed: Although there is a Plan of Management for Kosciusko National Park, NSW National Parks and Wildlife Service has recognised the need to develop a plan that addresses recreation management in a more detailed manner. To initiate this process a recreation management strategy was completed in June 1993. In October, 1995 a Summit Forum was established to develop this strategy further. Members of this forum include representatives from NSW National Parks and Wildlife Service, Department of Land and Water Conservation, Snowy Mountains Hydroelectric Authority, and relevant stakeholders in Kosciusko National Park. Members of the forum are currently in the process of developing a Summit Area Management Plan, that will be progressively implemented from 1996 until the year 2000. It is likely that the walking track that leads down to BL will be modified as a result of this Plan.

18. Land use: The lands within the Ramsar site and 690,000ha surrounding the Ramsar site are permanently designated as a National Park and used as a nature conservation area. Lands beyond the National Park are Freehold and used for grazing domestic stock.

The population of the area outside the Ramsar site is approximately 3,500 and the majority live in surrounding local towns. BL is a popular tourist attraction therefore the area has a large temporary population.

19. Disturbances and threats: Prior to Kosciusko being dedicated as a National Park the area was grazed by domestic stock. This has resulted in erosion and siltation of the Kosciusko area including BL. In 1950, areas under threat from erosion were identified and works (primarily rock groynes) were put into place, and revegetation programs were undertaken, to rectify the problem. NSW National Parks have up-graded some of the works over recent years. Currently erosion and siltation are considered a minor threat to BL and it's catchment.

BL is a popular tourist attraction within Kosciusko National Park and tourists are considered a medium threat. Tourists cause two common problems, trampling of vegetation and contamination of the lake from human wastes.

20. Hydrological and biophysical values: The alpine area of Kosciusko National Park has the ability to store water within the catchment since the majority of rainfall falls as snow. Throughout the months of spring and early summer the ice and snow in the catchment melts and flows into surrounding rivers and streams.

BL 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 BL is probably the only dimictic lake on mainland Australia.

21. Social and cultural values: Kosciusko National Park has very high social and cultural value. Kosciusko National Park is the most visited National Park in NSW receiving

approximately three million visitors annually. BL is also very popular as it is one of the few areas in NSW where people can ice-climb.

Aborigines did not live permanently in the alpine area but probably visited in summer. It is also probable that groups of aborigines would have camped in the area surrounding BL to perform ceremonies and to collect Bogong Moths (*Agrotis infusa*) for food.

The first official European exploration of the region was undertaken by the Polish explorer, Paul Edmund Strezelecki, who climbed and named Mt Kosciusko (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 BL would have served as a camping ground for stockman working on the surrounding high country.

22. Noteworthy fauna: The catchment of BL supports vulnerable and rare species including the Mountain Pigmy Possum (*Burramys parvus*), and the Broad Tooth Rat (*Mastacomys fuscus*).

BL supports a number of invertebrate species including *Antipodrilus davidis, Procladius* sp., *Polypedilum* sp., *Chironomus oppositus*, *Ramrheithrus* sp., and *Glacipisium kosciusko*. Another four species have been recorded in BL and they are restricted to alpine areas and include *Metaphreatoicus australis*, *Tasmanophebia nigrescens*, *Glacidorbis hedleyi*, and *Leptoperla cacuminis* (Timms 1980, Campbell *et al.* 1986).

23. Noteworthy flora: The catchment of BL provides habitat for tall alpine herbfields, wet and dry heaths, fen, and bogs. A number of rare or threatened plants are also found within the catchment and include *Oreomyrrhis brevipes, Oschatzia cuneifolia, Abrotanella nivigena, Brachycome stolonifera, Craspedia leucantha, Erigerin setosus, Parantennaria uniceps, Colobanthus nivicola, C. pulvinatus, Carex cephalotes, Astelia psychrocharis, Agrostis meionectes, Deyeuxia affinis, Ranunculus anemoneus*, and *R. niphophilus*.

24. Scientific research and facilities: Currently there is no research being undertaken within the catchment of BL. However BL and the Kosciusko region have been the topic of much investigation. Examples of research work undertaken in the catchment of BL include: Costin (1952) undertook hydrological studies in the upper snowy catchment, Timms (1979) investigated the benthos environment of BL, Raine (1982) studied the bathymetry and thermal stratification of BL, and Bayly (1970) has reported on the zooplankton of the Kosciusko region.

There are no research facilities available at BL.
25. Conservation education: NSW National Parks and Wildlife Service runs a Discovery Ranger Program throughout Kosciusko National Park, which includes walks to BL. These programs involve guided walks and talks to community members by rangers, normally throughout school holiday periods.

BL 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 BL. Information leaflets on Kosciusko National Park and its attractions , including BL, can be obtained from the visitors centre located at Sawpit Creek.

26. Recreation and tourism: Kosciusko National Park receives approximately three million visitors a year, more or less evenly split between winter (ski season) and summer. About two-thirds of the winter visitors come for alpine skiing, in the only ski fields in New South Wales. The rest come to cross-country ski, or to enjoy other forms of snow recreation.

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

27. Management authority: New South Wales National Parks and Wildlife Service (Southern Zone and Snowy Mountains Region and District), District Manager, Sawpit Creek, Private Mail Bag, via Cooma NSW 2630, Phone: 064 56 2102, Fax: 064 56 2291

28. Jurisdiction: Territorial: Government of New South Wales
Functional: New South Wales National Parks and Wildlife Service

29. References:

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30. Reasons for inclusion: 1(a), 1(d), 2(b), 2 (d)

31. Outline of site: The outline of the site appears on the map appended.

**Appendix 1: Animal species recorded within the catchment of Blue Lake, New South Wales, Australia**

| Common Name | Scientific Name |
|---|---|
| **Birds** | |
| Pacific Black Duck | *Anas superciliosa* |
| Great Cormorant | *Phalacrocorax carbo* |
| Pied Cormorant | *Phalacrocorax varius* |
| White-throated Needletail | *Hirundapus caudaclitus* |
| White-faced Heron | *Egretta novaehollandiae* |
| Wedge-tailed Eagle | *Aquila audax* |
| Nankeen Kestrel | *Falco cenchroides* |
| Peregrine Falcon | *Falco peregrinus* |
| Black-shouldered Kite | *Elanus notatus* |
| Masked Lapwing | *Vanellus miles* |
| Flame Robin | *Petroica phoenicea* |
| Richard's Pipit | *Anthus novaeseelandiae* |
| White-browed Scrubwren | *Sericornis frontalis* |
| Pied Currawong | *Strepera graculina* |
| Australian Raven | *Corvus coronoides* |
| Little Raven | *Corvus mellori* |
| **Mammals** | |
| Fox | *Vulpes vulpes* |
| Hare | *Lepus capensis* |
| Broad Tooth Rat | *Mastacomys fuscus* |
| Bush Rat | *Rattus fuscipes* |
| Mountain Pigmy Possum | *Burramys parvus* |
| Short-beaked Echidna | *Tachyglossus aculeatus* |
| Dusky Antechinus | *Antechinus swainsonii* |
| **Reptiles** | |
| White-lipped Snake | *Drysdalia coronoides* |
| Copperhead | *Austrelaps superbus* |
| Alpine Water Skink | *Eulamprus kosciuskoi* |
| Southern Water Skink | *Eulamprus tympanum* |
| Mountain Log Skink | *Pseudemoia entrecasteauxii* |
| **Amphibians** | |
| | *Crinia signifera* |
| | *Litoria verreauxii alpina* |
| **Fish** | |
| | *Galaxios olides* |