

PLAN OF MANAGEMENT 2001

Ginini Flats Wetlands Ramsar Site



Department of Urban Services
Conservation Series No. 18

GININI FLATS WETLANDS RAMSAR SITE

Plan of Management

May 2001



environment ACT
PART OF THE ACT GOVERNMENT AND THE DEPARTMENT OF URBAN SERVICES



ACKNOWLEDGEMENTS

A preliminary draft of this Plan of Management was prepared for Environment ACT by Dr Bob Banens, Mr Allen Fox and Dr Laslo Nagy of the Atech Group with advice from Mr Roger Good and Ms Jane Gough.

Comments and contributions on the drafts were provided by staff from Environment ACT, the Nature Conservation and Namadgi Sub-committee of the Environment Advisory Committee, the Flora and Fauna Committee and various ACT community groups and individuals.

The development of this management plan was funded through the National Wetlands Program of Environment Australia.

NOTES

This plan of management has been prepared to fulfill the principle obligation of Contracting Parties to the Ramsar Convention. This obligation is to develop management plans for all Ramsar sites in their territory. Also, this Plan constitutes a component of the management plan for Namadgi National Park. The implementation of the management actions stated in this Plan of Management will be undertaken as part of the management of the Namadgi National Park.

ISSN 1036-0441

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Published by Publishing Services for Environment ACT (BDM 0778)

120 A4, 05/01 (01/0882)

Environment ACT Home Page: <http://www.act.gov.au/environ>

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ABSTRACT

This Plan of Management for the Ginini Flats Wetlands Ramsar Site has been prepared to meet the 'wise use' obligations of the Convention on Wetlands (Ramsar, Iran, 1971). These conditions establish an obligation for the management agency to prepare and implement a plan for Wetlands of International Importance listed under the Convention. This plan, when read in association with the Namadgi National Park Plan of Management and the Environment ACT, Action Plan No.6—Corroboree Frog, provides the basis for management of the Ginini Flats Wetlands.

The Ginini wetlands are an important site within Namadgi National Park and a significant area in terms of a representative upland *Sphagnum* peat wetland (Department of Territories, 1986). The area has been listed as a Wetland of International Importance under the Convention on Wetlands.

The site provides habitat for an international migratory bird listed under the Japan-Australia and China-Australia Migratory Bird Agreements (JAMBA/CAMBA) and for the vulnerable Corroboree Frog (*Pseudophryne pengilleyi*). This plan takes account of the recommendations of Action Plan No.6 (Corroboree Frog), under Section 21 of the ACT Nature Conservation ACT 1980.

The Ginini Flats Wetlands occur within Namadgi National Park and the 1986 Plan of Management for the Park provides some generic guidelines for management of the Ginini area with respect to fire, feral animals, exotic plants, recreation and community involvement.

The Ginini Flats Wetlands Plan of Management details specific management programs and actions to be implemented over the seven year life of the plan. A full review of the success of the planned and implemented management actions in meeting the stated objectives, will be made at the end of the seven year period.

During the life of the Plan, annual reviews of individual management programs will be made to ensure that management actions are not implemented in ways that compromise the conservation of individual components of the wetland ecosystems. Modification of programs will be made as necessary following each annual review process.

VISION

The vision for the management of the Ginini Flats Wetlands Ramsar Site is:

The Ginini Flats Wetlands as an ecologically significant and sustainable natural system providing habitat for an international migratory bird, the vulnerable northern Corroboree Frog and other native flora and fauna representative of the sub-alpine *Sphagnum* wetland.

The overall objectives to achieve this vision are to:

- Conserve and protect the biodiversity of native flora and fauna of the woodland and aquatic ecosystems and habitats of the wetlands and its catchment.
- Provide appropriate community environmental education and research opportunities.
- Provide for low impact recreational opportunities appropriate to the conservation and protection of the wetlands and its catchment.
- Conserve the Aboriginal and European cultural features of significance within the wetlands and its catchment.

1. INTRODUCTION

1.1 Scope of the Plan

This Plan provides a background and description of the natural and cultural resources of the Ginini Flats with particular reference to the Ginini Flats Wetlands Ramsar Site (*Sub-alpine Bog Complex Ramsar Site*), and details management actions considered necessary to ensure the maintenance and conservation of these values. The Wetlands and its catchment have been designed as the area to be managed by this Plan (**Figure 1**).

The Plan provides a structured approach and a timeframe for the implementation of each of the management actions, over the proposed seven year life of the Plan. While the actions to be implemented are defined, the plan must be considered as dynamic and flexible such that it can be modified following any review, or as a response to community demands and management needs.

The Plan includes guidance for the management authority (Environment ACT) and the community for the conservation of the natural and cultural heritage values.

The community organisations and individuals that provided input and comment during the development of the Plan are listed at **Appendix 1**.

1.2 The Ramsar Convention

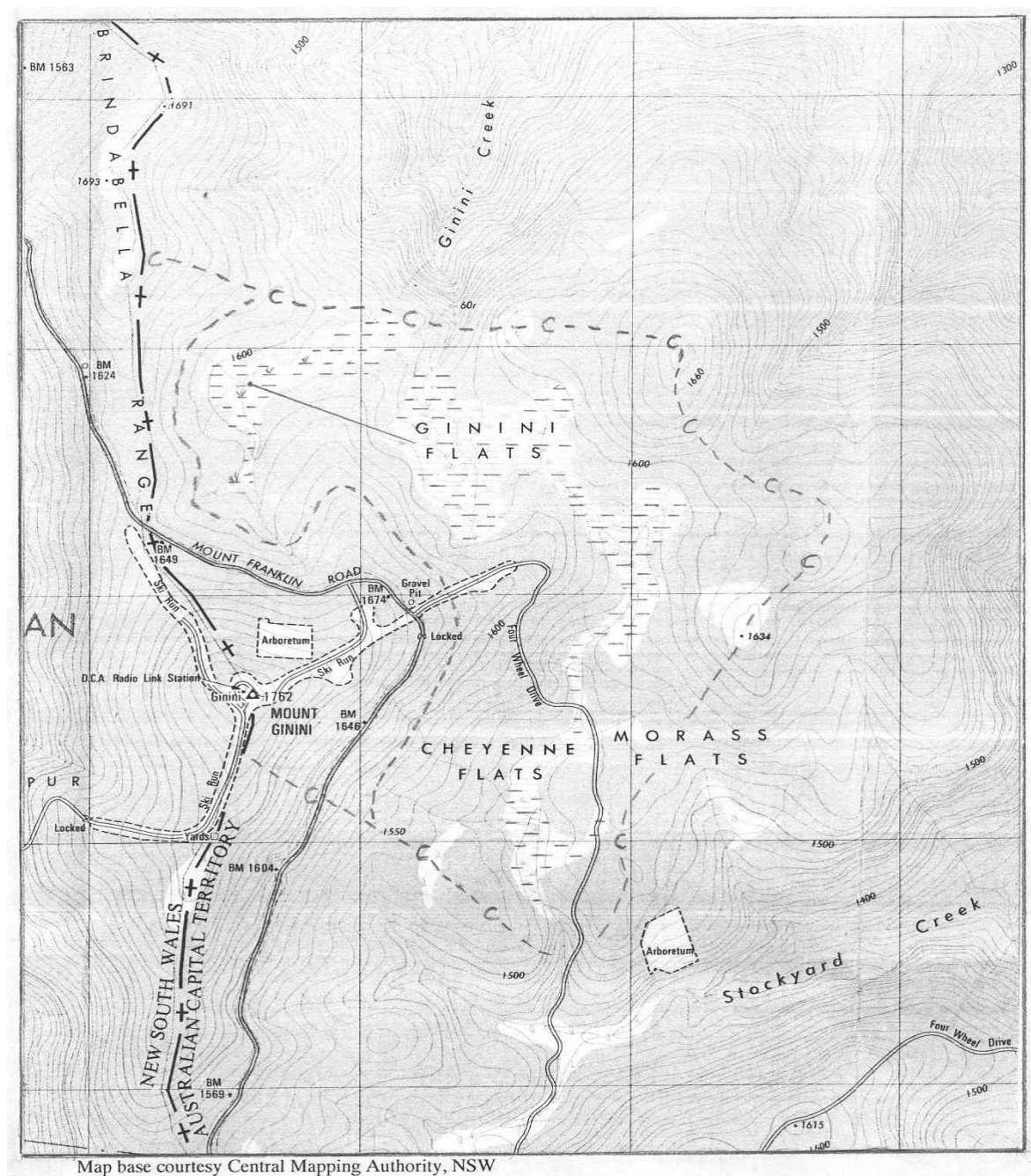
The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is ‘the conservation and wise use of wetlands by national action and international co-operation as a means to achieving sustainable development throughout the world’. Over 110 nations, including Australia, have joined the Convention as Contracting Parties and more than 1,000 wetlands around the world have been designated for inclusion in the Ramsar List of Wetlands of International Importance.

The Convention on Wetlands was the first of the intergovernmental treaties dedicated to the conservation and ‘wise use’ of a particular ecosystem—wetlands. The original emphasis of the Convention was on the ‘wise use’ of wetlands as habitat for waterbirds, but has been broadened in scope to cover all aspects of wetlands conservation in recognition of wetland values with respect to both biodiversity and economic well-being (Ramsar Convention Bureau, 1997). The main objectives of the Convention are to halt the worldwide loss of wetlands and to conserve those that remain. It is particularly significant because the notion of ‘wise use’ enshrined in the treaty has become synonymous with ‘sustainable use’ (Comino, 1997).

There are four main obligations on contracting parties arising from the terms of the Convention. These are:

1. nominate at least one or more suitable sites to be included on the List of Significant Wetlands of International Importance and ensure they are managed so as to maintain their ‘ecological character’;

Figure 1: Ginini Flats Wetlands Ramsar Site



2. formulate and implement national landuse planning which includes wetland conservation and as far as possible promote the wise use of all wetlands;
3. establish a national system of wetland reserves, facilitating the exchange of data and publications on wetlands research and training wardens in wetland management; and
4. commit to aligning national policies with coordinated international action.

At the 4th Conference of the Contracting Parties to the Convention on Wetlands (Montreux, Switzerland) in 1990, resolutions on wise land use called on all Contracting Parties to develop management plans for each listed Ramsar site. It also outlined Guidelines on Management Planning for Ramsar and other wetlands.

The resolution calls on Contracting Parties to:

- *Develop management plans for each listed wetland applying the management guidelines, including in particular plans which relate to sites on the Montreux Record.*
- *Establish appropriate legal and administrative structures for the application of management plans.*
- *Provide funds for implementation of the plans and the training of personnel.*

The Wetlands Unit of Environment Australia is the administrative authority for the Ramsar Convention in Australia. Under the Australian Constitution, however, primary responsibility for land and resource-use lies with the State and Territory Governments. Accordingly, in Australia, the Convention on Wetlands is implemented primarily under individual State and Territory legislation. Coordination is achieved through a network of officers representing State, Territory and Commonwealth nature conservation agencies constituted under the auspices of the Australian and New Zealand Environment and Conservation Council (ANZECC), known as the Wetlands and Migratory Shorebirds Taskforce.

Environment Australia released the *Wetlands Policy of the Commonwealth Government of Australia* in 1997. The purpose of the Policy is to promote the conservation, repair and wise use of wetlands. One of the Strategies of the Policy is to develop management plans for Ramsar listed wetlands in partnership with State/Territory governments. Funding has been provided through the National Wetlands Program of Environment Australia to assist with the development of this management plan.

Australia was the first country to become a Contracting Party to the Convention and has over 50 properties designated to the List. The Ginini Flats Wetlands were designated on 11th March 1996.

1.3 The Purpose of this Management Plan

The principal obligation of Contracting Parties to the Ramsar Convention is to develop management plans for all Ramsar sites in their territory and to ensure their implementation. This Plan fulfills the first part of the obligation by providing guidelines for management. The second part of the obligation will be undertaken through management of the site by

Environment ACT. The Plan covers the catchment to the wetlands as a number of influencing or impacting management issues occur outside the designated boundary of the site.

Implementation of this Plan of Management will:

- ensure the maintenance of the integrity of the Ginini wetlands by minimisation of human impacts;
- support appropriate research into the dynamics of the ecosystem which will underpin management decisions;
- provide appropriate protection from damaging wildfire, impacts of feral animals, weed species and the potential impact of human recreation and use; and
- provide relevant information by way of public education programs regarding the values of the wetlands, and the significance and obligations set by the Ramsar Convention for the managers of listed wetlands of international importance.

1.4 Statutory and Management Responsibilities

Any management plan or management program for the Ginini Flats Wetlands Ramsar site must be consistent with relevant government legislation.

Nationally, the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) contains provisions relating to protection and management of Ramsar Wetlands and listed threatened and migratory species. The Act:

- recognises that Ramsar Wetlands of International Importance (and listed threatened and migratory species) are matters of National Environmental Significance;
- introduces an environmental assessment and approval regime for actions that are likely to have a significant impact on Ramsar wetlands (and listed threatened and migratory species); and
- provide for improved management of Ramsar wetlands.

Any action which has, or is likely to have, a significant impact on the ecological character of the Ginini Flats Wetlands Ramsar Site and/or a listed threatened species, should be referred to the Commonwealth Minister for the Environment and Heritage to determine whether the action is subject to the EPBC Act. Details on the Act and its provisions can be obtained from Environment Australia (www.environment.gov.au/epbc).

In the ACT, the National Capital Plan (1990) sets the highest level of planning direction and states that the mountainous areas are to be maintained as an important visual background to the National Capital, be managed for its nature conservation values and the Cotter catchment is to be protected as the main supply of water for Canberra (Section 8.7.2).

The *Nature Conservation Act 1980* provides the main legislative backing for the ACT Government's management of reserved lands, covering the protection and conservation of native plants and animals. In so doing, the Act confers powers on the Conservator to control activities on reserved land. This is accomplished through management of the Ramsar Wetlands by Environment ACT.

In 1993, in compliance with the *Land (Planning and Environment) Act 1991*, the Territory Plan was gazetted. This Plan, particularly *Section C2 Water Use and Catchment Policies*, is a key document, establishing permissible human activity within the Cotter Catchment and the area encompassed by the Ginini Ramsar site. Provisions of the Territory Plan relevant to the management of the Ginini Flats Wetlands are:

i) Objectives of the Water Supply Water Use and Catchment policies:

- to ensure that water catchment and land uses are consistent with maintaining a safe and reliable water supply (protection of quality and quantity) and other values of the catchment; and
- to make provision for a range of other water uses and environment values which are compatible with use of the water for domestic water supply.

ii) Policies

a) Water Use and Environment Values

- Water within the Water Supply Catchments should only be used for purposes set out in Schedule 3, and in accordance with the location of water uses or prescribed environment values set out in Schedule 4.
- Aquatic habitat—wetland (natural and modified) (*Schedule 3*).
- Aquatic migration corridor (*Schedule 3*).
- Corin Dam to Bendora Dam: Domestic water supply—disinfection.
- Waterscape, Aquatic habitat (*Schedule 4*).

The Territory Plan C2 spells out relevant Protection Policies:

b) Protection of Water Quality

- Land and water uses and protection measures shall be consistent with maintaining water quality appropriate to the relevant Water Uses and Environment Values set out in Schedule 4.
- Residential use and camping shall be excluded from the catchment.
- Discharge of wastewater shall not be permitted within the catchment.
- Construction activities shall be consistent with minimising erosion and discharge of sediments.
- Recreation activities shall be controlled such as to minimise the potential of pollution of waters.

c) Protection of Stream Environs

- Land uses and protection measures within reservoir and stream environs and floodplains shall be consistent with the protection of the floodplains.

While the responsibilities defined in the Namadgi National Park Plan of Management (Department of Territories, 1986) relate to management strategies and programs for sustainable use of the Park, they have no legal status because they were drafted before the passage of the *Land (Planning and Environment) Act 1991*. Nevertheless, the Plan does establish the overall principles of park management until a revised Namadgi National Park Plan of Management comes into force.

Provisions within the Namadgi National Park Management Plan relevant to the management of the Ginini Flats Wetlands are:

d) Location within the Special Scientific Area (Section 8.2.3)

For the Cotter catchment the Plan states that *'Paramount considerations in management of the area will be to maintain its ecosystems in an undisturbed state for future reference'*, and more specifically, *'to give strict protection to the most significant of biological communities of the park (e.g. sub-alpine bogs and swamps)'*.

e) Water Catchment Values (Section 8.1)

About 85% of domestic water for Canberra-Queanbeyan comes from the Cotter Catchment. The *Cotter River Ordinance* of 1914 concerning the banning of access and picnicking in the Cotter Catchment *'without Ministerial consent'* has proved to be unworkable and is largely ignored. Low level use of this kind is accepted by the plan which re-emphasises the critical importance of a protected catchment by limiting any developments to those which first pass through an Environmental Impact Assessment process. This includes the proposition in the Plan to allow for *'appropriate low-key picnic sites of small capacity (2-3 cars) which may be provided at a few suitable sites along Mount Franklin Road, subject to environmental assessment and consultations with the NSW National Parks and Wildlife Service which manages the adjoining Bimberi Nature Reserve'*.

As well, this Section of the Plan states, *'Day walks to specific features such as Ginini Falls will continue to be permitted'*. However, Section 8.1 re-emphasises strict control of human activity within the Cotter Catchment.

f) Arboreta (Section 8.3.3)

Arboreta are generally *'of considerable cultural and scientific interest'* and *'Stockyard Creek Arboretum will be maintained for these values and will be subject of an interpretive program'*. However, Section 8.2.2 suggests that it may be necessary to assess the significance of this arboretum as it provides for the spread of wildings into the surrounding natural communities.

The policy of maintaining arboreta, particularly the Stockyard arboretum should be reviewed as part of the management actions arising from this Plan.

g) Exotic Animals and Weeds (Section 9.5)

Highest priority is given to the control and hopefully the eventual eradication of pigs and the control of rabbits. *'Priority is given to the Special Scientific Area because of its outstanding value for nature conservation, research and for the supply of high quality water particularly in sensitive ecological sites. The use of chemicals (in control strategies) will be strictly limited All park visitors are expected to carry all rubbish home for disposal in municipal waste systems'*.

h) Mount Franklin Road (Section 8.6)

The Mount Franklin Road is mentioned many times and is seen fulfilling numerous

roles including, as a *‘most appropriate interstate route for walkers’* along the Brindabella Range as well as to the ACT’s sub-alpine country, and as a *‘vehicle’* for park interpretation programs. A quite specific intention is stated to provide an interpretive walk to Ginini Flats and Ginini Falls so as to *‘provide a more definite destination for the road’*.

It also stated that a set of picnic areas should be constructed in association with the NSW National Parks and Wildlife Service along the road.

i) Education (Section 8.5)

Education at all levels from Primary, Secondary, Tertiary to the general public is seen as a major function of the National Park. It will be aimed *‘to foster interest in and awareness of the environment and of resource management’*. Section 8.6 of the Plan states that *‘interpretive signs and appropriate walking surfaces will be provided where there is already good access such as to Mt Ginini and Ginini Flats’* (for alpine, sub-alpine and swamp environments). All such options will be preceded by the environmental assessment procedures, as in Section 9.1 of the Plan of Management, to assess likely environmental consequences so as to modify the programs if necessary.

j) Research (Section 9.2)

The ACT Parks and Conservation Service will co-ordinate and control all appropriate research activities in the Park. Research and other permits that may be required when dealing with protected flora and fauna will be issued so as to ensure minimal disturbance by the research activity. Research, particularly that which contributes to management oriented outcomes will be encouraged.

k) Recreational Activity (Section 8.6)

All recreational activity is envisaged as being light in nature. No intensive activity is envisaged for the Brindabella Range primarily due to the special status of the Cotter Catchment. Specifically in relation to skiing, the Plan states, *‘Cross country skiing will continue from suitable places along Mt Franklin Road’*. The Plan further states *‘it does not consider that any specific facilities other than appropriately marked ski trails are justified’*.

l) Fire Management (Section 9.3)

A detailed Fire Management Plan is to be prepared for the Park based on a quantitative assessment of the biophysical parameters influencing fire behaviour. The ACT Parks and Conservation Service is to continue to prepare an annual fire action plan to formalise preparedness for public safety and deployment of equipment and personnel.

1.5 Agreements Relevant to the Management of the Ginini Flats Wetlands Ramsar Site

1.5.1 The Australian Alps National Parks Agreement

On 4th July 1986 Commonwealth, State and Territory Government Ministers responsible for the management of the Alps National Parks in Victoria, New South Wales, and the ACT, signed a Memorandum of Understanding (MOU) in relation to the Co-operative Management of the Australian Alps Parks. The MOU emphasises the importance of joint planning of management programs across borders and near-border areas to circumvent problems of park management such as those concerning fire, recreation, access, wildlife and ecosystem management. For example the Ginini wetlands are the northern extent of a sequence of subalpine bogs extending from Mt Buffalo and Baw Baw mountains in Victoria to Namadgi in the ACT. Their scientific value is of interest to all of the Alps National Parks management agencies, particularly as the wetland bogs provide the habitat for the remnant but declining populations of both species of Corroboree Frog (*Pseudophryne corroboree* and *P. pengilleyi*).

The Corroboree Frog and other threatened species issues activate responsibilities of the ACT Flora and Fauna Committee established under the ACT *Nature Conservation Act* of 1980. Where the issues extend across borders as with the conservation of the Corroboree Frog the NSW *Threatened Species Act* and the Commonwealth *Endangered Species Protection Act*, 1992 also apply. Under the Commonwealth Act, funds are provided for the preparation of Species Recovery Plans.

1.5.2 International Agreements

Australia has bilateral Agreements with the Governments of Japan and China for the protection of migratory birds. These are the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA) which commit the governments of Australia, Japan and China to protect endangered and migratory bird species, and their habitats listed in the agreements.

Apart from the Ramsar Convention these two other international agreements must be considered when planning the conservation and management of the Ginini Flats Wetlands. Japanese or Latham's Snipe (*Gallinago hardwickii*) use the wetlands as an over-wintering destination and are listed under both the JAMBA and CAMBA.

1.6 Significance of the Site

The Ginini Flats Wetlands has the following characteristics that make it a wetland of

International Importance (Environment Australia, 1999):

- It is one of the largest, deepest and least disturbed subalpine *Sphagnum* bogs in mainland south-eastern Australia. Such wetlands have a very limited distribution in the Australian Alps.
- The wetland complex has a diverse assemblage of subalpine flora and fauna that is restricted to this wetland type.
- The Ginini Flats wetland complex is at the northern biophysical limit of this habitat type, and is of importance in maintaining the genetic and ecological diversity of a number of endemic and restricted species found in subalpine wet heaths and bogs.
- The Ginini Flats complex provides important breeding habitat for the vulnerable Corroboree Frog (*Pseudophryne pengilleyi*), a rare species confined to the Southern Highlands of New South Wales and the Australian Capital Territory. The area also supports the largest population of this species in the Brindabella Range.

2. THE NATURAL ENVIRONMENT

A description of the site can be found at the Environment Australia web page (Environment Australia 1999). This chapter provides more detail on the characteristics of the site.

2.1 Physical Aspects

The relief of the Ginini wetlands catchment ranges between 1,500m near Stockyard Creek Arboretum and the summit of Mt Ginini at 1,763m, with a local relief of 263m. The broad (500m wide) central part of the Ginini wetlands has a drainage fall of 25m; while the narrower (250m wide) western part, a fall of 45m and Cheyenne Flats, a fall of 55m.

At the time of preparation of this Plan of Management (July 1999) the central part was the driest, while the narrower western Flat had the deepest *Sphagnum*/Wet Heath bog and was much wetter. The interconnected 'flats' are a complex of sub-alpine *Sphagnum* bogs with associated wet heath and wet herbfield. Apart from two small areas mined for living *Sphagnum*, which have recovered to a near-natural stable condition, and a peat trench dug in 1938 (Costin pers. com 1999) for research purposes (also largely stabilised), both located in the western part of the wetlands, the area is relatively undisturbed. Costin, (1972), concludes that the Ginini 'bog complex' is one of the deepest and best preserved *Sphagnum* bog communities on mainland Australia. These bogs are at the northern limits of *Sphagnum* in the Australian Alps.

2.1.1 Climate

On-site meteorological data is not available for Mt Ginini. Daily records from Bulls Head, collected by the CSIRO Division of Forest Research, are modified in the light of incomplete records from several closer sites in the Brindabella Ranges (Bureau of Meteorology, 1968; Adomeit *et al.*, 1987). Osborne, (1990) has interpreted the rainfall from resulting climatic maps and concludes that average annual rainfall is about 1,250mm. McPherson (1998) sets the mean minimum temperature at 4.2°C and mean maximum at 13.4°C. It is likely that the extremes in temperature and the length of snowfall and drought have the greatest impact on the organisms living on the Range.

Normal months of snowfall are from June to September with south-westerly and westerly blizzard conditions coming with winter and early spring fronts and low pressure air masses. Heavy snow-falls arising from southern pressure systems occur infrequently and are known as the 'tree crackers'—falls where snow builds up rapidly on the trees and branches break off under the snow load. With most snows streaming from the west, the woodland covered easterly lee slopes intercept and hold drifts of snow cover for long periods. Freezing conditions to -20°C occur from about 1,450m upwards. These are made more severe where snow cover is very light and where depressions-cold air drainage sites-hold chilled air. There is a 10 hour lag between minimum air temperature and ground minimum 5cms below the surface. Average ground temperature on Mt Ginini at 5cm soil depth was -0.5°C in July (McPherson, 1998).

Where the ground is covered with a dense unbroken grassy understorey it remains considerably warmer. McPherson, has also described the past and current periglacial processes on the north-west aspect of Mt Ginini. Seepage into the edge of the thickly

vegetated Flats from beneath the upslope overlying metasediments continues throughout the winter ‘drought’.

Rainfall is uniform throughout the year, with summer easterly and southerly rains being supplemented by orographic rain and thunder storms, many of which are embedded in easterly moving weather fronts. Dry storms accompanied by lightning represent a major source of ignition of mountain fires. Most summer days are mild to warm but occasionally sequences of hot days of 35°C occur. Periods of drought dry out the Flats with the broad central part being most susceptible. Because of the altitude, ultra-violet (UV) radiation is extremely high in summer but is ameliorated in the cooler months by increased cloudiness.

The implications for management of the above are:

- The cold-generated ‘physiological drought’ slows organic functioning throughout the colder months.
- Freezing conditions in the soil surfaces, rich in fines (i.e. particles 0.06mm or less) causes needle ice to develop and destabilises the soil surface. Coarser soils such as those derived from granites suffer more from frost heave through segregation by ice formation.
- Disturbances such as fires reduce insulating ground cover and increase the impact of freezing temperatures on soil destabilisation.
- Extended drought conditions can cause plant disfunction, death and loss of available water for animal metabolism.
- A sequence of effective growing seasons followed by drought followed by dry storms is a scenario for major wildfire events.

2.1.2 Geology

Two types of rock dominate the landscape of the Brindabella Range and the Ginini wetlands. Underlying the range at the Flats are Silurian granitic rocks — the intensively deformed McKeahnie Adamellite and Ginini Leucoadamellite, are overlain by intensively folded Ordovician Nungar beds of metasediments, consisting of fine quartz arenite, siltstone and slate with some hornfels beds (Owen and Wyborn, 1979; Ollier and Wyborn 1989). These marine metasediments had their origins as masses of fine sediments slipping down a continental slope as turbidity slides (turbidites) into deep abyssal areas. Sections of these fine masses have been metamorphosed into highly impervious slates and hornfels which readily break into sharp blocks and platy masses. The McKeahnie Adamellite is foliated and on exposure tends to weather into massive curved slabs, otherwise the granitoids weather deeply under areas of impeded drainage with residual tors at the surface. Some faulting has occurred in the vicinity of the conjunction of the adamellites.

The significance of the geology in terms of the wetlands, is that the internal texture of fractured alternating impervious and semi-impervious metasediments, allows deep penetration by water until the surface of massive underlying granitoids is reached. Water then follows the slope of this interface until breaking the surface at the edge of the metasediments as seepages and springlines forming environments potentially suitable for the continuous growth of *Sphagnum* and other wetland plants. Drainage tends to pool onto the more level gradients of the ‘flats’ which has probably been caused by more resistant rock above the break in slope. While ever the springlines exist and the geology of the ‘flats’ remains stable

there would seem to be no threat to the long term existence of the bogs from geological processes.

Where exposed, slabs of McKeahnie Adamellite provide shelter for wildlife and for penetration by plants. Deep weathering of the granitoids in areas of impeded drainage tends to round off the landscape and emphasise the development of broad valley floors and flats. Faulting may have affected the alignments of Stockyard and Ginini Creeks. McPherson (1998) shows that the blocky and platy breakdown product of the erosion of hornfels and slates on Ginini are readily moved to the surface in the active periglacial processes there, inverting the soil profile and causing patterned ground. Implications of McPherson's work indicates that stability of the bog catchments is affected by disturbance caused by the initiation of periglacial processes by wildfire burning the ground cover allowing deeper penetration of freezing temperatures. However such disturbance while exposing surfaces for erosion and slope wastage also creates a rougher surface, retarding runoff.

2.1.3 Geomorphology

Jennings (1976) suggests that the Ginini Flats are remnants of a once much more widespread early Miocene (20 million yrs BP) land surface, equivalent to surfaces further south and covered with basalt flow. Spasmodic uplift of the south-east (Ollier and Wyborn, 1989) constantly rejuvenates the river valleys, the highest nick points being Ginini Falls and the rise at the lower end of the central Ginini Flat. Overall slope retreat continues and is much more active on the steeper slopes of the metasediments, where it is accelerated by fire and subsequent surface frost-heave during the following winter.

Fire records (Banks, 1981 and 1989) indicate north Mt Ginini has experienced fires in each decade since 1850, while south Mt Ginini has had substantially fewer fires over the same period, and none over at least the past 40 years. Aerial photos (Run 1; Ginini-Snowy-Cheyenne Flats; 27.2.88) and ground survey clearly indicate heavier tree cover of Snow Gums (*Eucalyptus pauciflora*) on the south aspect bordering on roads and tracks. The central Ginini Flat creek gully at its bottom end, almost hidden beneath the tussock, is at least a metre deep and appears to be actively course cutting. As there does not appear to be another record of this process, baseline measurements could be made to allow future change to be measured and corrective measures to be taken, if deemed necessary.

The 80m trench cut in 1938 by the then Australian Forestry School has obviously caused some localised change in the water regime of the western wetlands. This trench appears to have changed only slightly in form since it was cut, with much of its length now partly filled with peat. At one point a shaded 'raw' bank is exposed and needle ice has continued to cause frost heave. However there appeared to be a high percentage of organic matter in the peaty substrate to provide for continuation of the recovery process.

In the 1950's a north-south ski-run was constructed from near the summit of Mt Ginini, through the car park and part way down the access track to the wetlands.

McPherson (1998) has described active periglacial processes at work on almost bare surfaces on Mt Ginini, apparently activated by the intense scorching of the ground during the 1939 wildfire. He has measured considerable lateral and vertical movement of surficial boulders and blocks of metasediments and the inversion of the soil profile, where clay and humic layers lie below the rocky surface. Such movement makes the substrate a very difficult

surface for plant colonisation. The resulting broken surface however, allows for a more rapid penetration by water than the scorched surface left by fire.

Areas of ground disturbance particularly in the woodlands and the wet herbfields indicate that pigs are a continual source of damage.

The implications for management of the above are:

- Field observations show that the ground surface within the Ginini Flats bog complex is generally of low gradient, is well vegetated and currently creates little risk of erosion.
- The main gully through the complex appears to be actively course cutting and should be monitored to determine if remedial action is required.

2.1.4 Soils

The soils are dominated by alpine humus soils under the woodland communities, lithosols on the higher, steeper slopes and on metasediment areas; and ground-water soils and peat occur on the flats and in wetland bog communities.

An important feature of alpine/sub-alpine humus soils is that they are acidic (low pH) and nutrient poor. These soils are able to support woodlands and shrublands only by the rapid recycling of nutrients through decomposition of organic matter. If this cycle of decomposition, nutrient release, nutrient uptake, litter fall and decomposition is frequently broken by major disturbances such as prescribed burning, the organic soils lose their capacity (through loss of nutrients) to sustain woodland and shrubland growth. If prescribed burning was implemented in the *Sphagnum* bog areas, physical destruction of the *Sphagnum* beds could result (Horwitz *et al.*, 1998).

Experience at Kosciuszko has shown that under regular burning regimes, bogs ultimately burn down to mineral layers leaving gravelly pools and runnels, with erodability accentuated by accelerated runoff promoting erosion and deposition of mineral fractions over otherwise undamaged beds downstream (Costin, 1980; Good, 1976). Nutrient regimes become unstable in response to fire and if the bogs are damaged their buffering effect ameliorating such instability is reduced. Such damage to the catchment would cause a deterioration in water quality and stability of flow. Infrequent wildfire is all that these areas can accept.

The old cleared ski-runs and tracks on the surrounding steeper slopes are a source of sediment that could affect the physiological functioning of the bog complex.

The implications for management are:

- Physical disturbance of the soil must be kept to minimum—particularly that resulting from fire and feral animals.
- Soil or fill brought in for any track hard-facing or road making should be from a similar soil or fill environment, ensuring similar pH and chemical constituents, be free from weed disseminules and pathogens and aesthetically similar.
- A stable vegetative cover must be maintained and where exposed soils occur these must

be rehabilitated and revegetated with indigenous native species.

2.2 Vegetation

The vegetation of Ginini Flats Wetlands can be categorised into seven communities relating to soils and drainage characteristics, aspect, light, wind and snow cover. Surrounding the wetlands is a low open woodland of *Eucalyptus pauciflora* with a mixed grass, herb and shrub understorey. Most continuously wet areas are colonised by *Sphagnum* bog, interspersed with wet herbfield, and in places by mixed wet heath dominated by *Epacris paludosa*. On the edge of any open water a sedgeland of *Carex gaudichaudiana* exists. Adjoining the woodlands in shallow drier locations is dry heath of *Bossiaea foliosa* and *Oxylobium alpestre*. Where this community extends into more permanently moist sites it is replaced by tall wet heath, dominated by *Leptospermum lanigerum*.

2.2.1 Low Open Woodland

The dominant Snow Gum *E. pauciflora* is susceptible to wildfire damage but will regenerate from the lignotuber, and en-mass from seed. South east of the ski run the woodland supports many trees that are post-1939 wildfire regrowth. These have a much denser canopy than the more scattered trees to the north. Snow Gum is present on drier elevated granite rises in the centre of the Flats.

A large amount of heavy litter is scattered on the floor of the woodland. The dominant grass is Snow Grass tussock (*Poa sp*) and the most common shrubs (< 1m) are the legumes *Bossiaea foliosa*, *Oxylobium alpestre* and *Daviesia ulicifolia*. Numerous herbaceous species and non-grass species occur within the wet herbfield.

The last fires which had a major impact on the surrounding woodlands were in 1939 and 1944. These fires have lead to extensive lignotuber regrowth following the death of above ground trunks and presently a 'mallee-like' structural form of the trees exists. Numerous large logs now occur throughout the surrounding woodlands. The post-fire period of very active *Acacia* and leguminous regrowth has passed, with the understorey now an open grassland/herbfield with a variety of tall heath plants scattered through grassland. Protection of the woodlands from fire will maintain this stable open understorey.

2.2.2 Dry Heath

Below the margin of the woodland on drier slopes derived from metasediments and granite is a shrub community of leguminous shrubs of *Bossiaea foliosa*, *Oxylobium alpestre*, *Daviesia ulicifolia*, *D. mimisoides* and a number of other xeromorphic species. These provide a hard and dense ground cover.

2.2.2 Tall wet Heath

Where seepage water appears at the surface just below the metasediments, the environment changes sharply and *Sphagnum cristatum* occurs within tall shrubs of *Leptospermum lanigerum*.

2.2.4 Wet Herbfield

Large areas of Wet Herbfield, particularly over the slightly higher areas of the middle Ginini Flat and smaller pockets in the Cheynne and Morass Flats, cover the ground. They appear at first to be areas solely of heavy Snow Grass tussocks, (*Poa costiniana*, and *P. clivicola*) but closer investigation shows many other species including low *Epacris microphylla* and *E. brevifolia* and clumps of *Arthropodium milleflorum*. The heavy grassy layer hides numerous water-filled channels. This community is susceptible to drying out on the main Flat.

2.2.5 Wet Heath

Down slope from both the Tall Wet Heath and the Wet Herbfield is the Wet Heath, a dense mixture of *Epacris paludosa*, *Baeckea gunniana* and *Callistemon ptyoides* under which are hummocks of *Sphagnum* and other mosses, lichens and ferns.

2.2.6 Sedgeland

In the lowest parts of the wetlands, in pockets of very wet environments, frequently with pools of water, sedgeland occurs dominated by *Carex gaudichaudiana* and *Ranunculus* species. An excellent example exists in the lower section of western part of the wetlands in the area where peat mining occurred in 1940.

2.2.7 Bog

The *Sphagnum cristatum* communities in the wetlands are, according to Costin (1972), the largest best preserved examples of such communities in mainland Australia (National Capital Development Commission, 1984; National Capital Planning Authority, 1989) whose origin dates back some 3,300 years ($3,280 \pm 70$ yr BP; Hope, 1997). This age is quite young compared with ages that Hope (1996 and 1997) reported for the Cotter source bog ($9,040 \pm 80$ yr BP) and Clark (1986) reports for Rotten Swamp ($5,500 \pm 90$ yr BP).

Kershaw and Strickland (1989) postulate that there was a period of optimal peat bog development under wet conditions until about 4,000 years ago. McPhail and Hope (1985) noted that there was an increase in peat accumulation after 3-2,000 years ago, suggesting cooler or moister summer conditions. If this is so, then the age of the wetlands peatbeds roughly coincides with this later period of accumulation. There appears to be no reason to assume that the topographic, geomorphic or climatic environment that existed during the older development phases for the other bogs would not also have been conducive to the development of peat bogs in the Ginini Flats Wetlands. Evidence of earlier peat development and/or loss in the Ginini wetland peatbeds remains to be discovered, emphasising the paucity of data relating to the history of the peatbeds.

The peatbeds rest on gravelly slope deposits of probable late Pleistocene age (Hope, 1996 and 1997). The mire is a mosaic of bog, bog pondages, wet herbfield, wet heath and sedgeland the location of these units is probably related to the underlying gravel beds, clay lenses, exposures of granite boulders, and the lower depth of weathered granite which affects drainage. The ponds are a critical feature in the life history of the northern Corroboree Frog and the crustaceans, *Euastacus* sp., and provide important drought feeding and refuge habitat for transient Latham's Snipe during drought conditions. The hummocky surface of the bog, most of which has vascular plants growing through it, covers an estimated 50 hectares or about two-thirds of the Ginini Flats.

Surveys by Clark (1980 and 1986) indicate that the area of *Sphagnum* has increased since 1944, consistent with higher rainfall since the 1940s. Most of Clark's work has been done on the narrower western Ginini Flat where her studies have shown that the peat bog below varies greatly in depth, up to 2 metres. Probes along a transect of *Sphagnum* hummocks gave an

average depth for the moss of 76cm. Computed average depth growth in the peat mass was 0.07cm per year. Actual growth of *Sphagnum* was 15cm in length per year, while at Snowy Flats, Carr and Turner (1959a) showed that the growth rate there was 20cm per year.

The Ginini Flats Wetlands and surrounding vegetation have experienced many major fires including the 1939 wildfire, but the vegetation remains vigorous and in good condition. This may indicate that the saturated nature of the *Sphagnum* bog protects the core of the wetlands system from severe fire impact. While there is no direct evidence which indicates that the Ginini bog communities have been burned, there is evidence elsewhere that wildfire can destroy such systems (e.g. parts of Wingecarribee Swamp and a number of subalpine peat bogs in the Kosciuszko area).

Richea continentis, *Restio australis*, *Grevillea australis* and *Hakea microcarpa* are other prominent bog plants.

The main growth period of *Sphagnum* is from October to May and hummocks are compressed in winter. In the cold months, evaporation is reduced, water is retained in a frozen layer in the hummock and snow often covers the surface. Clark (1980) also found that in hot and dry weather lack of water causes the hummock to shrink and become more compact. There was no correlation seen in her work between *Sphagnum* growth and rainfall, but there was some correlation with temperature. The nett gain in height of hummocks in 1978-1979 was over 9mm, while in 1979-1980 there was none due to heavier winter compression by snow. Sexual reproduction of *Sphagnum*, when it occurs, takes place from November and over summer.

2.2.8 Exotic Plant Species

Apart from some peripheral invasion in disturbed areas of the Flats, the main body of the wetlands remains almost free of weeds. It would appear that the existing weeds have entered via vehicles and visitors, emphasising the importance of controlling vehicle and visitor access. There are several weed species with severe invasive potential such as Broom and St Johns Wort, that have become major problems in other sub-alpine areas such as Barrington Tops and Kosciuszko National Park.

The implications for management are:

- The various plant communities, either singly or in association with other communities, are critical for the maintenance of animal species by providing food, shelter and special space requirements.
- Any disturbance producing bare soil and increased light aids weed spread, and if that disturbance is fire, the impact will retard re-establishment of some species' populations while encouraging the more fire-adapted species.
- The surrounding open woodland is susceptible to wildfire and removal of the protective vegetative cover could result in soil and other material moving onto the bog area.
- It is important that a better understanding of the successional stages of significance for component wildlife, and fire impact on the Snow Gum population be developed. This will help to develop appropriate fire regimes for management in the future. These burns however, are likely to be limited to small area mosaic burns, if deemed necessary at all.
- Vegetation regrowth at the Spaghnum mining sites and the peat trench site suggest natural regenerative processes are sufficient to stabilize these areas.
- If access is provided to Ginini Falls below the Flats, the access route should be sited out of the

catchment of the western Ginini Flats and any soft/wet areas protected by boardwalks.

- Long term monitoring and research programs into the dynamics of 'mature habitat' ecology, is required to provide base-line data to guide the management of the wetland and Snow Gum communities in the Ginini Flats and surrounding woodlands.

2.3 Fauna

For wildlife, the Ginini Flats and the wooded catchment provides at least seven habitats used singly or in combinations by native animals. **Figure 2** shows the typical location of these habitats on a scaled profile of the land north east of Mt Ginini, while **Figure 3** shows some of the wildlife species' relationships with these habitats. Bars indicate the range of animals across these habitats.

In a subalpine area such as at Ginini Flats, space which provides shelter from low temperatures, is particularly critical. This space may be soils suitable for burrowing, or thick mats of vegetation or rotting logs. Logs, loose bark, boulders and slabs of rock provide a variety of micro-habitats that allows for greater biological diversity.

Other crucial elements to consider are density and form of tree canopy; cover and height of the understorey; ground cover; micro-habitat; soil penetrability and moisture (Catling and Newsome, 1981). For instance, reptiles require an area where food resources such as invertebrates will be found, a safe thermal space where they can warm their bodies in sunlight, hibernating space, and a nesting space.

Quite clearly, the greatest modifying force so far as habitat is concerned, is that of fire, which affects all aspects of habitat, food supply, shelter and the reservoirs of species. Like the successional return of plants and plant diversity, animals re-establish. The fire regime of intensity, timing (season) and frequency of fire, determines the actual faunal impact of any particular fire.

The vegetation and habitats of the Ginini Flats area are now in a stable if not yet mature state, as it is more than 50 years since the last fire that had a major detrimental impact on the area. The number of animal and plant species and populations has, no doubt, declined as stable and more mature ecological conditions have evolved. As shown in the continuing research at Nadgee Nature Reserve by Lunney and Newsome, the plant and animal species which were most common soon after the 1971 and 1982 fires, have now much reduced populations while others have re-established dominance. However, it is important to consider that the Ginini Flats are a very minute part of the great sweep of montane and sub-alpine systems ranging from the Brindabellas to Mt Baw Baw in Victoria. Over the substantial area the scale of timing, intensity and regularity of fires will always produce a diverse mosaic of fire-phased systems. One significant role for the Ginini Flats area in the environmental management of subalpine and alpine areas of Australia, could well be the maintenance of mature habitat

phases.

Figure 2: Ideal habitat cross section N-E from Mt Ginini

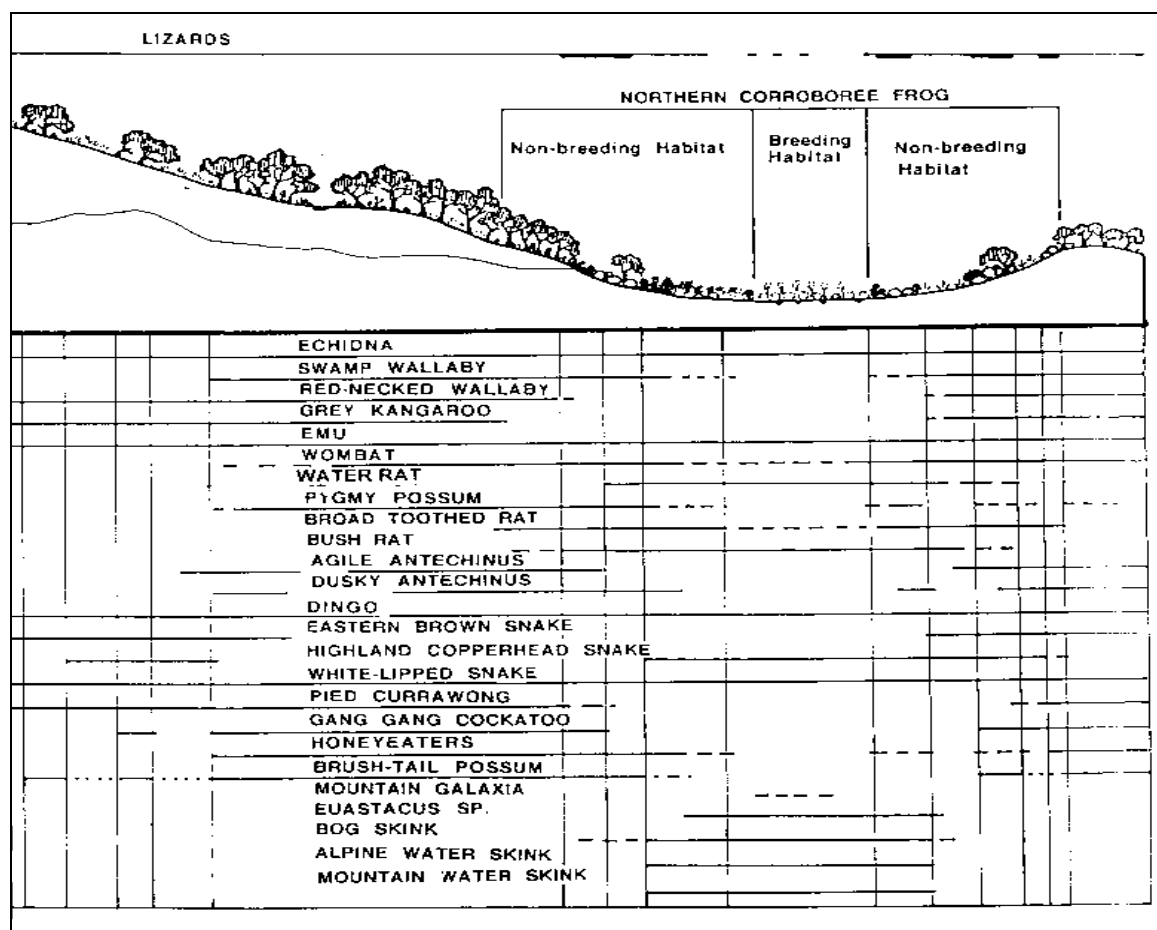
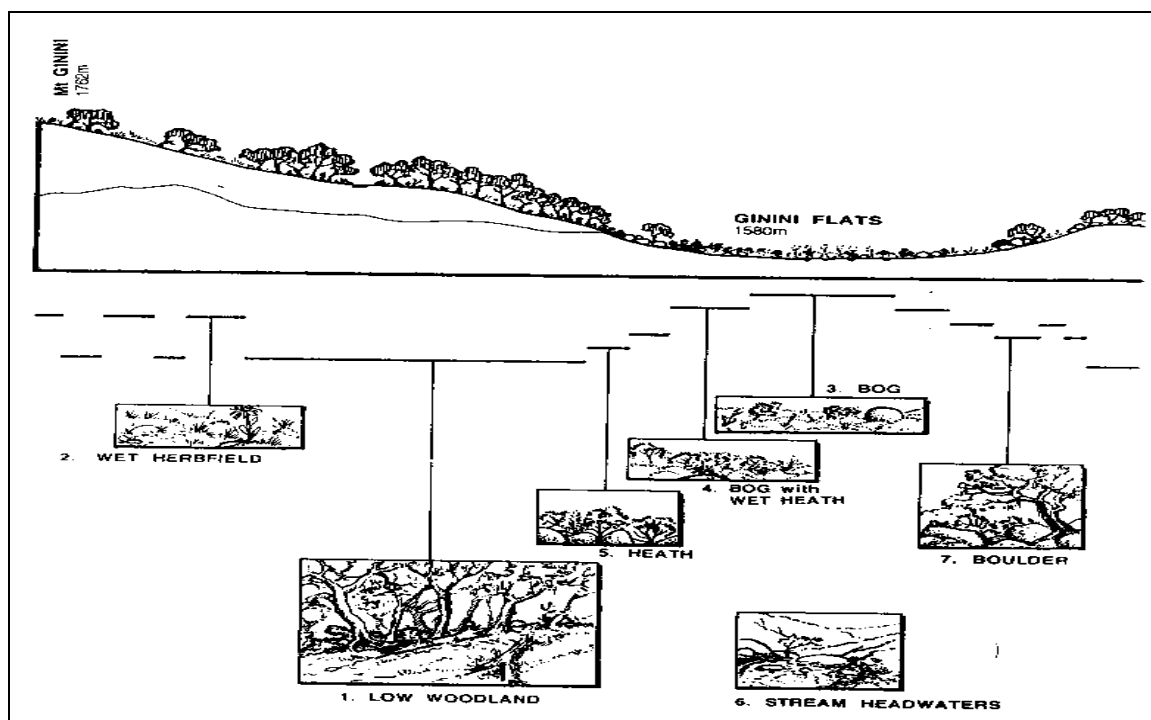


Figure 3: Some wildlife habitats



2.3.1 Invertebrates

Most invertebrate species in the Ginini Flats area are undescribed and most are considered 'yet to be discovered' (Osborne, 1984). Eight hundred and forty species of insects and arachnids have been recorded in the Kosciuszko National Park, an adjacent similar environmental area, and many of these would predictably occur in the Ginini Flats area. It is considered (Osborne, 1984) that many species of this distinctive fauna, such as the Metallic Bog Cockroach (*Polyzsteria virridisima*), the Mountain Grasshopper (*Acripeza reticulata*), Spotted Grasshoppers (*Yeelanna* sp) and Alpine Thermocolour Grasshopper (*Kosciuscola tristis*) and Alpine Wolf Spider *Lycosa* sp., are at the northern limits of their biophysical ranges in the Brindabella Range. As a result of topographic barriers these populations are somewhat isolated from populations further south (Green and Osborne 1994). Because of the very significant role that invertebrates play in the life of vertebrates as food supply and pathogenic vectors, much research into the ecological role of invertebrates remains to be undertaken.

Greenslade (1997) considers that most fire regimes currently being implemented and/or occurring are inappropriate for the maintenance and conservation of native invertebrate populations. This is not an issue in the Ginini Flats Wetlands and surrounding vegetation as few fires have occurred in the area in recent years and no planned burning is proposed at this time.

2.3.2 Reptiles and Amphibians

The most significant animal of the area is the northern species of Corroboree Frog (*Pseudophryne pengilleyi*). This myobatrachid frog has habitat which covers less than 60 sq. km. in the Brindabellas and Fiery Range (**Figure 4**), with one of the highest and most studied populations being in and about the Ginini Flats (Osborne 1984, 1989b, 1990, 1991 and ACT Govt 1997). Until the 1980s only one species was recognised viz *Pseudophryne corroboree* and hence a number of references make note of only this one species, which is now recognised as the southern species.

Breeding habitat relies on flat to gentle slopes with a high water table or ground seepage areas supporting wet grassland, wet heaths and *Sphagnum* bogs which contain temporary ponds. The Corroboree Frog lays its eggs in the *Sphagnum* hummocks during late summer and autumn, and in terrestrial situations that flood in winter. Males may be counted at this time as they call, particularly in overcast weather, they also respond to recorded frog calls at this time. Changes in weather pattern norms also impact on the breeding period. The tadpoles metamorphose in December with adult frogs moving from the bog communities to surrounding woodland areas. They shelter in the ground-litter, vegetation mats and in rotting logs returning to the bog to breed. The frogs take up to three years to mature, and as such, post drought recruitment may not show up in the declining population counts for three years or more.

Drought reduces the number and size of ponds which reduces tadpole habitat. The *Sphagnum* dries out which reduces success of the eggs and delays the movement of females to woodland breeding areas. Pengilley (1973) demonstrated that drought in 1965 over the Coree Flats habitat reduced the population there to less than one percent of pre-drought numbers while the slightly later breeding time of the Ginini population nullifies to some degree the impacts of drought. (Pengilley, 1966, 1971a, 1971b and 1973; Green and Osborne, 1994; Colefax, 1956; Jacobson, 1963; Woodruff, 1975; Osborne, 1984, 1989a, 1989b, 1990 and 1991).

Both species of the Corroboree Frog, *Pseudophryne corroboree* and *P. pengilleyi*, were abundant in 1955-66 and relatively common until the end of the seventies. By 1984 there had been a dramatic but unexplained decline in population numbers. In 1988 the population of male *Pseudophryne pengilleyi* was estimated to be 2-3,000. Both species (often described as a single species) are listed as being a vulnerable species by the International Union for the Conservation of Nature (IUCN) and are considered threatened in NSW and the ACT. In accordance with Section 21 of the ACT *Nature Conservation Act 1980*, the Corroboree Frog was declared a vulnerable species on 15th April 1996 and in response, Action Plan No. 6 has been prepared for the protection and survival of the species.

Two other frogs occur in the sub-alpine woodlands in the vicinity of Ginini, namely the Common Eastern Toadlet (*Crinia signifera*) and Southern Toadlet (*Pseudophryne dendyi*).

Reptiles are well represented by the Mountain Dragon (*Amphibuluris diemensis*), Brown Woodland Skink (*Leiopisma entrecasteuxii*), Bog Skink (*L. rawlinsoni*), Three-lined Skink (*L. dupereyi*), Alpine Water Skink (*Sphenomorphus kosciuskoi*), Mountain Water Skink (*S. tympanum*), White's Skink (*Egernia whitii*), *Leiopisma coventryi*, *Leiopisma guichenoti* and Spencer's Skink (*Pseudemoia spenceri*), the Highland Copperhead (*Austrelaps ramsayi*) and White-lipped Snake (*Drysdalia coronoides*) (Jenkins and Bartell, 1980; Carman, 1990). However little research has been undertaken on the reptiles in the area.

2.3.4 Avifauna

The Brindabella Ranges regional bird list contains 266 species, and according to Frith (1976) the fauna is not distinctive. Later work by Osborne and Green differ in this view (Green and Osborne 1994). However the Latham's or Japanese Snipe, protected under the JAMBA, CAMBA and the *Commonwealth's Environment Protection and Biodiversity Conservation Act 1999*, does regularly use the area during its intercontinental migration. The most important bird habitat in the area for the greatest number of species is the Woodland and Tall Wet Heath (Catling and Newsome, 1981; Newsome et al, 1975).

Common avifauna species of the area include the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*), Wedge-tailed Eagle (*Aquila audax*), White-throated Tree Creeper (*Cormobates leucophaea*), Olive Whistler (*Pachycephala elegans*), Crimson Rosella (*Platycercus elegans*), Grey Currawong (*Strepera versicolor*) and Flame Robin (*Petroica phoenicea*).

2.3.4 OTHER NATIVE VERTEBRATES

A noteworthy mammal in the area is the Broad-toothed Rat (*Mastacomys fuscus*) which inhabits the hummock grasslands, wet heath and bog complex. This species is replaced by the Bush Rat (*Rattus fuscipes*) as the slopes increase and habitats get drier. Other small mammals common to the area are the Dusky Antechinus (*Antechinus swainsoni*), Agile Antechinus (*A. agilis*), and the Eastern Pygmy Possum (*Cercartetus nanus*). The large mammals are represented by the Eastern Grey Kangaroo (*Macropus giganteus*), Swamp Wallaby (*Wallabia bicolor*), Red-necked Wallaby (*Macropus rufogriseus*), Echidna (*Tachyglossus aculeatus*), Mountain Brushtail Possum (*Trichosurus caninus*), Ringtailed possum (*Pseudocheirus peregrinus*) and Wombat (*Vombatus ursinus*). All are relatively common along the Brindabella Range. Green and Osborne (1994) report the Lesser Long-eared Bat (*Nyctophilus geoffroyi*), Gould's Wattled Bat (*Chalinolobus gouldii*) and the Chocolate Wattled Bat (*Chalinolobus morio*) have been observed above 1,500 metres in the ACT, and predictably these and other species would be expected to occur in the Brindabella Range.

The only fish native to the sub-alpine area, the Mountain Galaxia (*Galaxias olidus*) has been observed above Ginini Falls (A.Fox, pers.com.).

2.3.4 Feral Animals

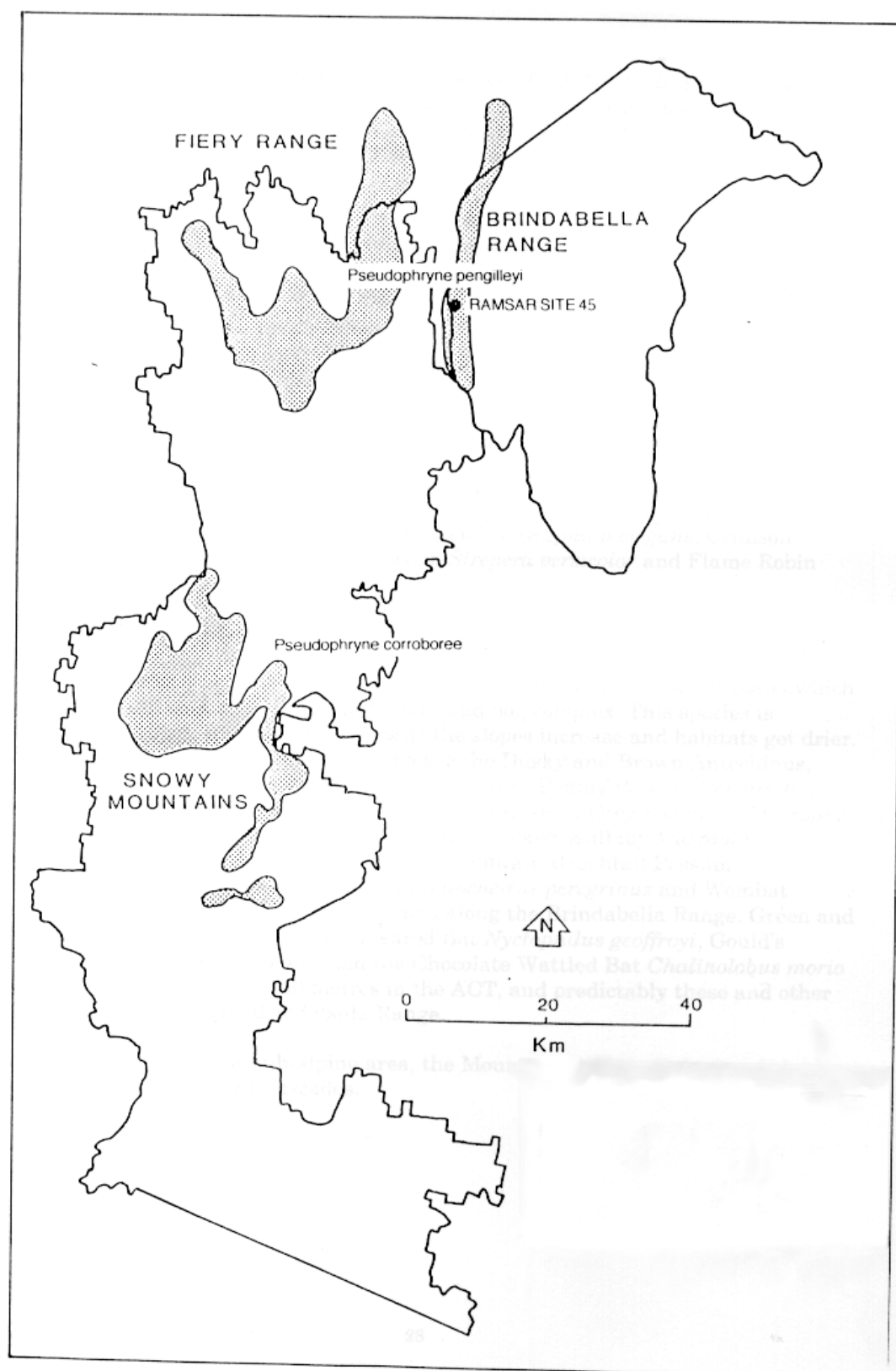
Exotic animals that currently frequent the Site include pigs, rabbits and foxes. Pigs dig around the hummocks and ponds within the bog complex, rabbits destroy vegetation and dig borrows in the surrounding woodland while foxes eat many native animals. In the past brumbies used the site and while they have not been seen in the area for many years it is possible that they may recolonise from adjacent areas. There have been sightings of goats, deer and cats in the Brindibilla Ranges and along the Murrumbidgee and it is possible that these animals may move into the Ginini Flats area and cause damage to the Site.

The implications for management are:

- No management action should take place in the Ginini Flats Wetlands or the catchment which changes the water regime of the peatbogs or the habitat values of the surrounding woodlands. The health of the Corroboree Frog populations may be an index of the health of the Ginini Flats Wetlands ecosystems.
- The potential introduction of frog disease pathogens by visitors needs also to be assessed (refer to the Corroboree Frog Action Plan).
- Research is required into the role of invertebrates within the wetland ecosystems.

- Further surveys into the presence, distribution, ecology and role of the reptiles, mammals and birds of the area, are required.
- Trampling of the wetland communities and other impacts of visitors will in the long-term severely threaten the habitat and through that wildlife species inhabiting those areas—particularly the Corroboree Frog and the Alpine Water Skink.
- The presence of feral and native animals can cause disturbance to the peat and *Sphagnum* beds. Other animals such as rabbits, deer and goats can cause damage in the surrounding woodland while foxes can affect populations of small native animals.
- Feral pigs are causing considerable disturbance in the woodland community and large areas exist as potential openings in the grass sward for weed invasion. Pigs are known to selectively feed on a number of inter-tussock herbs particularly *Acaena novae-zelandiae* and *Microseris lanceolata* (Hope, 1997). The overall and long-term impact of the existing pig population in the area on the plant/animal community is not known but it is recognised that any disturbance of the wetlands by pigs is unacceptable.

Figure 4: Distribution of Corroboree Frogs



3. THE CULTURAL ENVIRONMENT

3.1 Aboriginal Aspects

Prior to the disruption of traditional life by white settlers after 1825, Aboriginal people from many different groups throughout the southern tablelands and slopes converged on the high country above 1,300m. This was often to harvest the Bogong Moth (*Agrotis infusa*) which congregate in millions beneath boulders and in rock crevices in early summer. Because the gathering of so many people from many groups occurred, this time of Bogong Moth harvesting was an ideal time to hold ceremonies, including initiation and marriages and to conduct trade. Different groups seem to have camped in different areas and it is probable that visits to particular sites became traditional and were 'owned' by individual groups (Flood, 1980).

Mt Ginini lies within the Walgalu country and the Brindabella Range was visited by Ngunawal and Ngarigo people (Tindale, 1974). According to recent research Aboriginal people had utilised the high country for at least 5,000 years. However, as Aborigines have a dated presence in south western NSW of some 62,000 years ago, it would seem surprising that the alpine country was ignored by these people until 5,000 years ago (Hope, 1996).

The nearest known Aboriginal sites are a campsite 4kms south of Ginini Flats and at Little Ginini, as well as moth hunting sites on Mt Gingera. The summit of Mt Ginini consists of fractured metasediments, with only small blocks and rubble, most of which was grass and tree covered. It is unlikely that it constituted a moth site particularly when nearby to the south were many ridges and mountains covered with granite tors and slabs more attractive to the moths. However the Flats and surrounding woodlands would probably provide other foods and the ridgeline an access track to more productive sites.

The conservation of the Aboriginal culture values and artefacts of the Ginini area is as important as that of the conservation of the natural values and hence, and are considered to be a significant issue in the management of the Ginini Flats Wetlands.

The implications for management are:

- It is appropriate that the Ngunawal Aboriginal community representatives be consulted about the significance of wetlands and other related sites prior to the review of the Namadgi Management Plan.
- The Ngunawal Aboriginal community to be advised of the potential impacts of any future proposal to modify in any way the living and physical resources of the Ginini Flats Wetlands and surrounding shrublands and woodlands of the Flats.
- The Ngunawal community has expressed a particular interest in the maintenance of an Aboriginal fire regime in the woodlands of the Ginini area. This will require careful consideration, as such a regime could not be contemplated and implemented until a stable woodland ecosystem is reached in about 50 to 60 years.

3.2 Historic Aspects

The following chronology sets out a framework for considering the recent historic significance of the Mt Ginini and Ginini Flats Area.

1820	John Wild working for the Throsbys of Moss Vale first views the Brindabella Range under snow.
1826	Campbell and Brooks run cattle on the Monaro.
1834	John Lhotsky recorded the name Namadgi.
1839	TA Murray of 'Yarralumla' travels with six companions across the Brindabellas to the Goodradigbee River and opened northern stockroutes.
1840	John Ryrie describes the 'good grass' beneath the Snow Gums in the sub-alpine area of the Brindabella Range and Snowy Mountains.
1851	Major bushfires burn the Mt Ginini/Ginini Flats area.
1859	Gold was discovered at Kiandra by the Pollocks which encouraged prospecting along the Brindabella Range.
1861	The first <i>Robertson Land Act</i> , which was to encourage selectors and small farmers—an attempt to develop closer settlement of the land.
1860 - 80s	Intensive use of subalpine pastures from south of Kosciuszko to Scabby area with lighter use of woodland and 'plains' north of Scabby during drought years.
1875	Major fire burnt the Mt Ginini/Ginini Flats area.
1885	Severe drought occurred across the region.
1889	'Snow Lease' arrangements were established in the NSW <i>Crown Lands Act</i> for pastoralists.
1893	Richard Helms attacks the pastoralists habit of burning rough pasture for the 'green pick'. He points to the drying up of bogs and erosion of the high country.
1899	Major fire in the Mt Ginini/Ginini Flats area.
1911	Declaration of the Cotter catchment.
1913	Last 'official' grazing of the Ginini Flats—These were never heavily grazed, although Brindabella pastoralists ran stock in the high country s from time to time after that date.
1913-14	ACT-NSW border survey was undertaken.
1918	Major fire again burn the Mt Ginini/Ginini Flats area.
1920	Severe drought — the Ginini area may have been used for some drought relief grazing.
1925	Major fire again burn the Mt Ginini area.
1934	Planting of the Arboreta in the Brindabellas and elsewhere in the ACT.

1938	Trench cut in west Ginini Flat by Dr. Jacobs and students from the Australian Forestry School for the study of peat profiles.
1939	Extensive wildfire burns much of South-East NSW and the ACT including the Mt Ginini/Ginini Flats area.
1940	<i>Sphagnum</i> from west Ginini Flat was cut for use as filters in vehicle gas producers during World War II.
1940	Stockyard Creek arboretum was planted.
1944	Severe fire in the nearby ranges may have reached Mt Ginini area.
1950s	Ski-run cleared by the Royal Military College Ginini Ski Lodge group.
1952	Corroboree Frogs discovered and described from Round Mountain, Kosciuszko National Park.
1960s	Brumbies common in the Brindabella Range.
1960s	Northern and southern forms of Corroboree Frog recognised.
1971	Ramsar Convention ratified by Australia.
1984	Declaration of Namadgi National Park.
1990s	<i>P. corroboree</i> and <i>P. pengilleyi</i> recognised as separate species.
1996	Ramsar listing of Ginini Flats wetlands.

3.3 European Features of the Area

There are several features remaining that reflect past and present European occupation and activity in the area. The most obvious of these is the air navigation and radio relay station, utilised by several ACT and NSW management and emergency service agencies, which is located within a fenced area at the top of Mt Ginini. It is immediately adjacent to and on the western boundary of the Ramsar site. The Mt Franklin Road with its road barriers and interpretive signs is arguably the most obvious feature of European activity. The road was constructed in the early settlement/grazing period and is now an important access route into the Brindabellas. The road approximates the ACT/NSW border for much of its length. A cleared track designated as a ski run, the Stockyard Creek Arboretum and its access track, and the remnant peat study trench in the wetlands are also significant evidence of European activities. Remnants of old fencing and stockyards, and a number of border markers established in 1914 have also been located in the area.

The Stockyard Creek arboretum has an historic value although Fearnside (1980) considers this not to be significant. The arboretum does reflect a significant part of the work of one of the regions most notable foresters and botanists, that of Professor Lindsay Pryor. Any proposal for removal of the arboretum should be considered in terms of:

- its cultural values;
- its potential to impact on the area through the establishment of wildings;
- the aesthetic impact of a plantation of exotic northern hemisphere tree species on the native vegetation landscape; and
- the need for continuing on-going access for management purposes.

The implications for management are:

- There are a number of features reflecting past and present European activity in the area, which need to be considered in the planning for the conservation of natural aspects of the wetlands, although most occur beyond the wetlands and even outside the catchment of the wetlands.
- The maintenance of the Mt Franklin Road for management and visitor use.
- The remaining rock cairns and survey markers defining the border are significant historical entities.
- The track and ski slope area below the present public road terminus parking area remains susceptible to erosion.
- The value of the Stockyard Arboretum needs to be resolved before its removal is undertaken.
- The Arboretum track is a management track but also provides an access route for use by mountain bikes and illegal use by trail bikes.
- The 1938 study trench is recognised as having caused little impact on the wetlands over the past 60 years, and natural processes have rehabilitated the trench to a relatively stable state. However, low-key restoration may be required to repair erosion activated by fire or a storm event.
- The present public road terminus and parking area places visitors within the catchment of the Ginini Flats wetlands. Possible withdrawal of the road terminus back along the Mt Franklin Road beyond the catchment boundary of the Ginini Flats could provide a more appropriate terminus area and car park in terms of vehicle access and visitor management. This issue needs considerable review and investigation.
- The Ramsar Site and the values of the wetlands are poorly known and recognised. A simple interpretive display detailing what a Ramsar wetland site means in terms of visitor responsibilities, and information explaining why the Ginini Flats Ramsar Site is significant, should be considered. This information could be placed within the Namadgi National Park Visitor Centre.
- An accidental fuel spill from the radio relay station area remains as a potential threat to the area.

- Intact historical features should be conserved/restored as required under the *Land (Planning Environment) Act 1991*.
- Any human activity in the wetlands can cause considerable damage to *Sphagnum* communities and an increase above present visitor levels could have a detrimental affect.

4. MANAGEMENT OF VALUES

4.1 Context and Scope

The Namadgi National Park Plan of Management makes reference to management issues in the Brindabella Range, however, no specific management activities for the Ginini Flats Wetlands are identified. As has been noted previously, this Ginini Flats Wetlands Plan of Management has been prepared to address specific wetland management issues, as required under the Convention on Wetlands. The Convention requires Contracting Parties to *‘formulate their planning so as to promote the conservation of wetlands included in the List and as far as possible, the wise use of wetlands in their territory’*. The wise use of wetlands is their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem.

The following management program and specific management activities are planned to meet the ACT Government’s obligations under the Convention, and to ensure the conservation and maintenance of the Ginini Flats wetlands and their appropriate ‘wise use’. Implementation of the management plan will conserve the ecological character of the site as defined under the Convention on Wetlands as ‘the sum of the biological, physical and chemical components of the wetland ecosystem and their interactions which maintain the wetland and its products, functions and attributes’. The management actions in the Plan will protect the site from any change in ecological character as defined under the Convention on Wetlands as ‘the impairment or imbalance in any biological, physical or chemical components of the wetland ecosystem or in their interactions which maintain the wetland and its products, functions and attributes’.

4.2 Access Management

Specific Management Objectives

- Provide and maintain appropriate access and facilities to enhance visitor experiences that minimise damage to the natural and cultural environment.
- Provide and encourage safe visitor behaviour and protect visitors from unreasonable hazards.
- Develop guidelines and a Code of Conduct for access and interpretation as outlined and detailed in Action Plan No.6.
- Provide interpretive material for permanent interpretation signboards to increase community awareness of the conservation values of the area (see suggested interpretive themes, Section 4.9).
- Assess the need and location for an environmentally protective circular route alignment within the woodlands surrounding the wetlands. This walking access in the vicinity of the wetlands to provide for education, research and enjoyment as outlined in the *Australian Ramsar Management Principles* set out as Regulations under the EPBC Act.

4.2.1 Background—Access Management

The Mt Franklin road along the Brindabella Range from Piccadilly Circus to Mt Ginini is a popular recreational route for many Canberra and district residents. This is particularly popular in the summer months, when bushwalking to Mt Gingera, and beyond, is pursued by many visitors. Vehicular access to the recreational nodes and trackheads at Bulls Head, Mt Franklin and Mt Ginini is via this road. The road is closed at Mt Ginini and hence this is the terminus for vehicular access and a focal point for many visitors to the area. This situation contributes to several processes posing some potential threats to the wetlands, as the road and the carpark are above and within the catchment of the wetlands.

Runoff and erosion from the road and carpark is minimal at present but with increasing interest in the area for winter and summer recreation, and possibly as a response to listing of the wetlands, erosion from these sites potentially may increase. From the Ginini carpark an old track, which in earlier years provided access to the Stockyard Creek Arboretum, passes through part of the wetlands. This track provides vehicular access for management and a walking route for bushwalkers. The cleared track alignment doubles as a low use ski-run during the winter months. As snow cover is generally poor in all but a few years, erosion of the track downslope from the carpark is always likely to occur. This is evident each winter, when skiing activities on very thin snow often disturb the remnant vegetation of the track/ski run resulting in erosion from melting snow runoff.

The road will remain open for the foreseeable future to the present Mt Ginini location. This may require control of visitors and limits on car numbers at the carpark in the future as visitor numbers increase. An interpretation board or stand at the carpark should be erected explaining the significance of the area and why visitors should not enter or traverse the wetlands.

Increasing use of the area will require the carpark and existing track to be properly formed and drained. If damage becomes evident (track erosion, sedimentation of adjacent ground) consideration will have to be given to closure of the road at an appropriate point further north of the Ramsar site and outside the catchment of the wetlands. This would place the carpark outside the immediate catchment of the wetlands, which would be a more appropriate site. Such a site would also be a better site for the installation of interpretation signboard shelters, while still providing reasonable walking access to the wetlands and beyond.

If the road was to be closed, the road section to the radio facilities at Mt Ginini would be maintained providing limited vehicle access for servicing of the facility and for park management purposes. The use of fuels at the radio relay facility needs to be determined and appropriate arrangements made to minimise the effect of an accidental spill.

Within the management guidelines of the Ramsar Convention either action will require

consideration of the extent and location of any walking routes from the road terminus/carpark to the wetlands and/or other natural features of the area. The use of any walking tracks and roads by mountain bike riders also needs careful consideration. While this is not an issue at the present time there is potential for a major problem to develop.

4.2.2 Management Actions—Access Management

- 1) Leave the Mt Franklin road closed to vehicular traffic at the existing gate, but consider other road termination locations if the road or its usage is having an effect on the health of the wetlands and its catchment.
- 2) Continue to allow walking from the carpark to the wetlands, but erect interpretation sign(s) explaining the fragile nature of the site (see also Action 31).
- 3) Monitor informal track development to assess the need to define a specified route to and around the wetlands.
- 4) If a defined track is required, the route to be low-key, marked with guideposts and only hard-surfaced where instability problems occur.
- 5) Determine quantities and type of fuel used at the radio facility on Mt Ginini and put in place measures to mitigate the effect of a spill on the wetlands and its catchment.

Note: The development of a walking route around the wetlands but at a distance from them, through the surrounding Snow Gum woodlands, will provide viewing/experience of the wetlands but will ensure that the wetlands are not traversed. The track would be a low-key route, the alignment being identified only by markers such as short wooden pickets. The track will be properly formed where necessary, across watercourses or wet areas

4.3 Fire Management

Specific Management Objectives

- To protect the natural features of the wetlands and surrounding woodlands from the damaging impacts of fires.
- Maintain the biological diversity of the wetlands and surrounding/fringing ecosystems.
- To have in place contingency plans for the implementation of appropriate fire suppression activities in the event of a wildfire.
- To protect visitors from the impacts of all fires.

- To include the role of fire in any wetlands interpretation program (covering fire ecology, fire impacts on the vegetation, fire regimes and the role of visitors in fire management).
- To assess the feasibility of providing emergency water supply points.

4.3.1 Background—Fire Management

An unplanned fire occurring within the wetlands or in the adjacent Snow Gum woodlands is arguably the greatest threat to the integrity and maintenance of the wetlands. The Mt Ginini/Mt Franklin part of the Brindabella Range has been identified as an area of high lightning activity, with more than 50 lightning strikes per annum (advice from ACT Emergency Services). Fortunately, very few lightning strikes in the past have lead to fire ignitions, as they tend to occur in woodlands where fuel moisture levels are relatively high. Unplanned fires have been relatively infrequent and have burnt only relatively small areas.

While the surrounding Snow Gum woodland fuel levels are high, in the order of 30 tonnes per hectare, few high intensity wildfires have occurred in the area over the past 70 years. Fire spread is low as a response to the relatively high humidity levels which prevail at that elevation in all but the most severe summer fire weather conditions (i.e. protracted drought), and the high fuel moisture conditions that exist through most summers. (Good 1982). The high rainfall along the Brindabella Range contributes to the maintenance of fuel moisture levels (>20%) in excess of that which provides for fire ignition following a lightning strike. The low frequency of fire occurrence in older age class (>100 years) Snow Gum woodlands has been documented by Good (1982, 1992a, and 1992b) in Kosciuszko National Park and Banks (1989) in the Brindabella Ranges. This situation of high fire ignition potential but low to very low fire occurrence is noted in the attached fire hazard maps prepared by the ACT Emergency Services in 1998.

The existing Snow Gum and heath communities in the near vicinity of the Ginini Flats Wetlands reflect the fire history since European occupation in the high country. The woodlands are generally of one age group with very few old mature Snow Gums which, as noted by Good and Banks (op. cit.) should not be burnt for at least another 50 years. Costin (1980) noted that there is a need for long-term (up to a century or more) planning for ecological management to allow systems to reach late phases of succession, and this should always be foremost in considering any planned burning. As the Ginini woodlands were last burnt over 60 years ago, they are well on the way in terms of age, to meeting this objective. This situation is relatively rare in subalpine areas and hence the woodlands of the Ginini Flats and surrounding areas should be maintained unburnt for at least another 50 years, if possible. Any fire research should not be undertaken in the Ginini area but on other parts of the Brindabella Range. Fire should therefore be excluded from the snow gum woodlands and, as a consequence, excluded from the wetlands.

While the fuel levels may be considered as high to very high, planned prescribed burning should not be countenanced. As has been found through research in the subalpine area of the nearby Kosciuszko National Park, a prescribed burning program is very difficult to implement due to the very narrow ‘window of opportunity’ in terms of weather conditions. The ‘window’ is a maximum of 15 to 17 days per year at elevations above 1,500 metres.

If a need for fuel reduction was identified to provide protection for the wetlands from the impacts of wildfire or accidental fire resulting from visitor activities, it needs to be recognised that fuel level reduction may actually increase fire ignition potential. This occurs as a result of removal of the heavy mulch effect that heavy fuels provide, and the high fuel moisture conditions which are retained in high elevation litter fuels. For example a reduction of fuel levels from 30 to 10 tonnes per hectare in Snow Gum woodlands can result in fuel moisture levels in the summer months declining from around 60% to less than 20% with a consequent rise in fire ignition potential (Good, 1982).

Planned burning for vegetation management may be an issue in the future but will not be a management consideration in the life of this plan. The woodland and wetland vegetation, particularly the *Sphagnum* hummocks are still in a recovery phase following domestic stock grazing undertaken earlier this century and by brumbies up to the 1970s. The effective recovery and recolonisation of large areas of the wetlands by *Sphagnum* is crucial to the survival and increase in Corroboree Frog populations. As has been recorded in Kosciuszko National Park, *Sphagnum* recovery requires a very long period of minimal physical disturbance from any source, particularly from planned or unplanned fire events.

As a fire ignition potential from lightning strikes and/or accidental escapes from visitor activities exists each summer, a basic fire suppression capacity should exist in the Mt Ginini area. This could be the provision of a water supply at the terminal carpark and/or near the radio facilities such as, water tanks attached to the radio communications buildings and a small dam possibly located in the open grassland near the radio facilities. Use of the existing rainwater tanks at the Mt Franklin Chalet and disused small dams along the Mt Franklin Road should also be considered. This could be a joint planning issue with the NSW National Parks and Wildlife Service.

4.3.2 Management Actions—Fire Management

- 6) Implement and contribute to the Bushfire (Fuel) Management Plan in conjunction with other land managers.
- 7) Pursue a no management burns policy for the 7-year life of this Plan as a part of the no-fire policy for the Cotter catchment.
- 8) Undertake, as necessary, fire fuel level reduction measures along access routes and carpark.
- 9) Participate with the Bush Fire Service in the control of bushfires and continue employee participation in training programs.
- 10) Investigate sources of water for fire fighting purposes-such as a water supply tank at the Mt Ginini facility site, reinstatement of small dams along the Mt Franklin Road and/or use of tank water stored at the Mt Franklin Chalet.

Note: The Ginini Flats Wetlands and the surrounding woodlands lie in close proximity to the ACT/NSW border, with management of the Bimberi wilderness area in both the ACT and NSW, having a major influence

on fire management in the general area. Cognizance must be taken of the fire management programs across the border to ensure they do not potentially impact upon or threaten in any way the integrity of the wetlands. Cross-border liaison does occur on management issues and this must be maintained with specific respect to fire management and its potential impact on the conservation and maintenance of the wetlands.

4.4 Exotic Plant and Weed Control

Specific Management Objectives

- To minimise disturbance to the stable native vegetation so as to mitigate against the establishment of any new weed species which may be introduced by visitors.
- To minimise disturbance in the wetlands to reduce the potential for spread of exotic plant species which have become naturalised in the Ramsar site such as *Rumex acetosella*.
- Monitor the occurrence and spread of pest plants and take appropriate control action.

4.4.1 Background—Exotic Plant and Weed Control

Exotic weed species are not a major problem in the wetlands at the present time but remain a potential threat to the integrity of the wetlands. Any disturbance of the stable native vegetation provides the opportunity for weed establishment as weed seed sources occur in close proximity to the wetlands.

Vegetation damage by feral pigs exists in and around the wetlands and weed species such as *Hypochaeris radicata* and *Picris hieracioides* are evident in these disturbed areas. Patches of introduced pasture grasses and legumes also remain in old stock campsites following the removal of domestic grazing and feral horses. Fortunately these weed species are not aggressive colonisers at the elevation of Ginini Flats and in prevailing weather conditions, and hence are unlikely to invade and to become established in the wetlands.

A number of other weed species including Aaron's Rod (*Verbascum spp.*) and Yarrow (*Achillea millefolium*) occur along the shoulders of the Mt Franklin road and these do have a potential to spread to the wetlands and surrounding flats. *Achillea* is an invasive coloniser, and has the potential and capacity to establish in areas of stable but sparse native groundcover vegetation, as is presently occurring in the Kosciuszko National Park alpine and sub-alpine areas. *Achillea* is actively spreading, and unless management is vigilant in monitoring the spread of this species it could reach the Mt Ginini area and invade the fringes and drier parts of the wetlands themselves.

Woody weed species, particularly Blackberry (*Rubus fruticosus*) pose a continual threat to native bushland communities including the Ginini Flats Wetlands. Blackberries are widespread in the Brindabella Range and once established in the wetlands would be very difficult to eradicate. They have fortunately not established in the wetlands at the present time.

Plantation pine forests to the east and west of the Brindabella Range are only a relatively short distance from Ginini Flats Wetlands. The plantations to the west in NSW pose a considerable threat to the wetlands and surrounding woodlands in terms of potential establishment of pine wildings. In the nearby Kosciuszko National Park pine wildings arising from the adjacent pine plantations have been recorded up to 20kms from the plantation seed source (Spate, pers. comm.). These plantations pose the greatest threat in this regard as they

occur to the west from where the prevailing winds arise and are downslope of the wetlands, the latter providing the opportunity for long-distance carriage of seed under orographic uplift.

A number of arboreta have been established in the Brindabellas. An assessment of the value and condition of the arboreta was undertaken by Fearnside in 1991. The arboreta require active management to maintain and prevent wildings invading adjacent areas. The Stockyard Arboretum was assessed as being of low value and could be removed without any significant loss to the cultural values of the remaining arboreta.

The chemical control of weed species in the wetlands is not appropriate as any chemicals would have an impact on non-target native plant and animal species and pollute the waters of the wetlands. The effect of chemicals on the Corroboree Frog population is not known, but as their survival is precarious, any use of chemical weedicides within or near the wetlands could contribute to their possible extinction. Consequently the use of herbicides and pesticides at any time in the catchment must be carefully considered, before embarking on even small-scale chemical control programs. The management authority will need to be cognisant of damage that can occur through using chemicals for pest and weed control and will need to consider the deleterious effects of chemicals before using them.

As weed infestations in the sub-alpine area are mainly a response to disturbance of the stable natural vegetation weed control programs must be based on controlling any disturbance factor.

4.4.2 Management Actions—Exotic Plant and Weed Control

- 11) Introduce rust cultivars to the Brindabella Range, particularly the Ginini Flats Wetlands area, if Blackberries become established.
- 12) Use a non-chemical program to control, where feasible, exotic plant species.
- 13) Undertake a yearly or biennial survey of pine wildings to determine the extent of the problem followed by wildling removal if required.
- 14) Undertake manual removal of weeds in disturbed areas (eg trackside and pig digging sites) prior to rehabilitation measures.
- 15) Improve, where appropriate, native plant cover to encourage competition for non-invasive weed species. (In most situations this will occur naturally if the external disturbance factors are removed or at least reduced, such as walking route use, pig numbers etc.)
- 16) Remove the Stockyard Arboretum in line with the recommendation of the Fearnside and Lea Report (1991) and rehabilitate the site using local native species.

Note: Blackberry rust was introduced to forest areas in the ACT in the early 1980s but was not effective in reducing the Blackberry population. This was due to the lack of appreciation at the time, of the specific nature of the rusts to sub-species/varieties of Blackberry. This is now appreciated and recent introductions into the high country of Kosciuszko National Park have been effective, albeit slow to spread.

The planned ‘seeding’ of the area with blackberry rust is not only the most appropriate control mechanism but falls within the “blackberry rust” program for the Alps, initiated by the Australian Alps Liaison Committee in early 1990. It is expected that the rust species introduced to Kosciuszko National Park will eventually spread to the Brindabella Range but this may take some years. A survey of the sub-species of blackberry present in the Ginini area will have to be carried out, as the rust *Phragmidium violaceum* produces five types of spores which are very effective on four blackberry subspecies, only partially effective on two species and not effective on the other species (Parsons and Cuthbertson, 1992).

4.5 Feral Animal Control

Specific management objectives

- To control exotic animal populations, especially pigs, at levels that avoid unacceptable disturbance to native plant communities.
- To develop strategies for the monitoring of feral animal populations in the wetlands and surrounding vegetation communities.
- To ensure as far as possible that no further introductions of exotic animals to the Ginini area occur, particularly to the wetlands.

4.5.1 Background—Feral Animal Control

Feral animals have been a greater problem in the past than that which now exists, although the continued existence of wild pigs remains a major threat to the integrity of the wetlands. Wild horses were a major problem and sensitive management issue up to the 1970s. With the establishment of Namadgi National Park and the implementation of brumby control programs, the impact of brumbies on the native vegetation and habitats of the Park, including the Ginini Flats Wetlands has almost disappeared.

Sphagnum is a very palatable stock feed (Good, 1976) and the many years of grazing by domestic stock, wild horses, and wild pigs greatly reduced the areas of *Sphagnum* in the wetlands. The *Sphagnum* hummocks are the breeding habitat of Corroboree Frogs, and the current low population numbers of the frogs may be partly a result of the continuing grazing and damage being caused by wild pigs.

Goats, deer, foxes and rabbits have also been recorded in and around the Ginini wetlands Flats area. Recent control programs have seen a reduction of these feral animals although there is evidence of rabbit activity near the wetlands. Feral cats are an increasing problem in all national parks in close proximity to urban areas or where extensive public access to parks is available. Namadgi National Park is in this situation and while feral cats have not been observed in the Mt Ginini area, they have recently been seen in the vicinity of the Mt Franklin carpark, only a relatively short distance from the Ginini Flats Wetlands.

Fox scats are common in the woodlands around the wetlands and it can be assumed that foxes find a part of their food supply in and around the wetlands. The capture of small crustaceans by foxes has been recorded in the higher sub-alpine and alpine areas in NSW (Green and Osborne 1981) and this is probably also the case in the Ginini Flats Wetlands. Foxes are now considered to be at least as great a problem for wildlife as are feral cats. The level of impact of foxes on the Corroboree Frog and other small native animals is unknown but they must be recognised as an unacceptable threat to the native fauna populations. Foxes are also known to be a major vector in Blackberry seed dispersal.

A superficial examination of fox scats near the wetlands indicates the consumption of small native animals (including invertebrates) whose habitat is the wetlands. Foxes as such are having a considerable but undefined impact on the wetlands and the surrounding native animal habitats.

Wild pigs are visibly active in and near the wetlands, with extensive areas of diggings, vegetation damage and faecal pollution. As a result pigs pose the greatest threat to the health and integrity of the wetlands, and as a consequence the faunal populations of the area.

Feral animals should be managed to reduce their impact on the wetlands so as to provide the maximum opportunity for the wetland plant and animal species to recover and the functional capacity of the peat bed areas to regenerate.

4.5.2 Management Actions—Feral Animal Control

- 17) Reduce pig populations in the general area of Mt Franklin-Ginini using appropriate methods.
- 18) Destroy the small number of rabbit burrows in the general area of the wetlands and surrounding forest.
- 19) Monitor and undertake action as necessary to control any deer, goats, brumbies and cats.
- 20) Participate in and/or support the fox control trials being conducted by CSIRO (possibly through the Alps Parks MOU for cooperative management).

4.6 Recreation Management

Specific Management Objectives

- To foster appreciation of the significance of the wetlands by visitors.
- To minimise the impacts of any recreational activities in the wetlands.
- To identify visitor/recreational destinations in the Mt Ginini area.
- To monitor visitor numbers and recreational activities in the Ginini Flats Wetlands area.
- To control, if necessary, visitor numbers to the Ginini wetlands.

4.6.1 Background—Recreation Management

The recreational opportunities in the Ginini Flats area of the Brindabella Range are mainly those of a passive form with some more active pursuits such as mountain biking, as well as skiing in the occasional years of heavy winter snow. Bushwalking and self-reliant camping, with educational and inspirational enjoyment as part of these two activities dominate, and hence need greatest consideration in terms of the impact of recreation on the Ginini Flats Wetlands.

The management of recreation in the area is very much linked with access and the identification of ‘destinations’ of people undertaking day or overnight bushwalking trips in the Ginini Flats and Brindabella Range area. The wetlands are a popular destination and this will probably continue to increase as knowledge of the wetlands and their listing as a Ramsar site increases. Determination of the maximum or desired number of visitors to Ginini Flats and the wetlands will have to be made. This will also provide a guide as to the possible need for marked walking route alignments. If this is not done the threshold between carrying capacity and track degradation will be reached and hard-facing of walking routes will be required, even if not desired.

The existing vehicle track from the Ginini carpark, which doubles as a walking track during summer and ski-run during winter should be rehabilitated and revegetated but retained for management access. The limited skiing on the track alignment during winter has little impact when a good snow cover exists and should be retained as an appropriate recreation use, if the times of use can be effectively managed. Skiing contributes to erosion when skiing continues on a poor snow cover, and at the beginning and end of the season when similar poor snow cover exists.

To raise awareness about the fragile nature of the wetlands and its ecological and hydrological values, an educational and interpretation program is required. This aspect is discussed further in Section 4.9.

4.6.2 Management Actions - Recreation Management

- 21) Continue enforcement of the prohibition on overnight camping in the catchment of the wetlands.
- 22) Determine the threshold of degradation between visitor (bushwalker) numbers and carrying capacity of preferred/desired track alignments using techniques such as photo points and degree of soil erosion (—see also Action 3 and Action 29).

- 23) Consider introducing a visitor access permit system if and when it is apparent that visitation is causing degradation of the wetlands.
- 24) Explore the role of concessionaires/licensees in providing environmental awareness programs and other ecotourism orientated activities.

4.7 Native Fauna Management

Specific management objectives

- To maintain the integrity of the wetlands such that they provide seasonal habitat for migratory birds, particularly Latham's Snipe.
- To minimise disturbance of native fauna environments within the wetlands and to enhance, where possible, the habitat of rare or threatened species, particularly the Corroboree Frog.
- To consider further fauna surveys and/or monitoring to ascertain population numbers of native fauna, particularly small mammals, reptiles and frogs.

4.7.1 Background—Native Fauna Management

An ACT Corroboree Frog Action Plan is in place and currently being implemented. An inter-State Recovery Plan team is currently investigating habitat management requirements of the frog to ascertain any specific management activities to be implemented so as to enhance the population and ensure its survival. The Recovery Plan should be implemented as soon as possible as an integral part of this plan.

The Ginini wetlands have been listed under the Ramsar Convention principally as a reflection of the significance of the wetlands in terms of the peat bog communities which the wetlands retain (Lintermans and Ingwersen 1996). The wetlands also make a contribution to Australia's commitment to international migratory bird agreements—JAMBA and CAMBA. It is a requirement under these agreements for the management agency to ensure the maintenance of suitable habitat for migratory birds. Latham's Snipe is the only species which regularly visits high country wetland habitats during their international spring/summer migration. The wetlands are presently in a condition which provide good feeding and refuge habitat for the small numbers of Snipe that visit the area. This habitat is provided through the structural, age and species diversity of the wetland vegetation. Maintenance of this diversity will require no anticipated active manipulation during the timeframe of this management plan, provided other management programs, such as fire and feral animal control are effectively implemented. Planned and unplanned fire in the wetlands during a dry summer would have detrimental impacts on the diversity of habitat conditions that currently exist, and are to be excluded as far as possible.

As considered previously, disturbance by feral animals is a deterrent to migratory birds and other native avifauna utilising the wetlands and hence the disturbance factors must be reduced or removed.

4.7.2 Management Actions - Native Fauna Management

- 25) Implement a fauna monitoring program and consider the need for further fauna surveys in the wetlands to provide additional guidance to management programs (—see also Action 30).
- 26) Implement the Corroboree Frog Recovery Plan currently being developed by the National Recovery Team.

4.8 Research and Monitoring

Specific Management Objectives

- To review and document all past and current research and survey projects undertaken in the Ginini Flats Wetlands to provide a guide to defining management actions, visitor numbers etc.
- To establish an appropriate baseline monitoring program to assess the success of the actions of this Plan of Management and the health of the wetlands.
- To establish appropriate research and survey programs on aspects of wetland ecology, particularly on *Sphagnum* recovery and the status and conservation of threatened species. In particular, to address the impact of feral animals and human visitation/disturbance.

4.8.1 Background – Research and Monitoring

Research and monitoring is fundamental to an understanding of the relationships within ecosystems; the diversity of habitats; the conservation status of fauna and flora; the functional role of the wetlands and the hydrological conditions which prevail in the peatbeds/wetlands. Some research specific to these wetlands has been undertaken over the past three decades, however few results or data from other studies provide much guidance as to management of the wetlands. Research and monitoring programs to address identified specific management issues should be promoted with Universities and other research institutions.

Environment ACT will support, assist and encourage long-term research coordinated by the Corroboree Frog National Recovery Team (Action Plan No.6).

Control and management of research programs is necessary, so as to maximise the possible benefits to management, as well as to control what, where, and when activities are undertaken. Multiple or continuous visits by research personnel to the wetland area may in fact have undesirable impacts, particularly if vehicle access is required to, or into the wetlands. The latter should be considered as undesirable and not permitted. Criteria to assess research proposals should be determined and applied as soon as possible.

The establishment of a monitoring system to assess the effectiveness of the implementation of management activities will be necessary. This may be as simple as regular multi-point photography at selected sites, or more complex water quality monitoring, habitat assessment, soil stability measurements, track entrenchment rates etc. The University of Canberra is conducting research into reasons for the decline of the Corroboree Frog and through this process provides feedback on the condition of the Site. Various community groups regularly visit the Site and also provide information on factors affecting the Wetlands. This information is forwarded to Namadgi National Park staff who take appropriate action to rectify issues.

4.8.2 Management Actions—Research and Monitoring

- 27) Use the knowledge gained from research programs to assist and guide management programs.
- 28) Establish a set of criteria for approval of research programs and for licencing of the research, including access to the wetlands.
- 29) Establish an appropriate baseline monitoring program to assess the health of the wetlands and the success of the actions of this Plan of Management, including photographic reference points to provide a visual reference of condition over time (-see also Action 22).
- 30) Determine appropriate research and survey programs on aspects of wetlands ecology, particularly on *Sphagnum* recovery and the status and conservation of threatened species including extent of impact of threatening processes such as feral animals and human visitation/disturbance.

4.9 Community Awareness, Education and Involvement

Specific Management Objectives

- To promote appreciation of the values of the Ginini Wetlands and its significance as a Ramsar site.
- To promote an understanding of wetland ecology and the cultural history of the Ginini site.
- To promote the ‘wise use’ of the Wetlands for recreation and inspirational experiences.
- To foster appreciation in the community of management programs implemented to conserve and protect the wetlands.
- To promote community involvement in the conservation of the wetlands.

4.9.1 Background –Community Awareness, Education and Involvement

The Brindabella Range is a popular recreation area for Canberra residents but very few people have an understanding or appreciation of the scientific significance and conservation values of the Range. The significance of the Ginini Flats Wetlands in relation to its hydrodrogy and ecological values and the potential adverse impact from human visitation is even less well known (National Parks Association – pers. com.). This has created a dilemma for management in that there is a need to promote the internationally significant wetlands to the general community, while endeavouring to reduce or maintain an acceptable level of impact from visitors to the area.

A community awareness and education program needs to be developed including a field interpretation program and a display that can be used at various venues. Themes include:

- The Ramsar Convention.
- Why are wetlands important?
- What other Australian Ramsar sites are there and where do they occur?
- Why are the Ginini Flats on the Ramsar List of Wetlands of International importance?
- What is the role of bog complexes in the hydrology of mountain ecosystems?
- Geology and geomorphology ‘underlying’ the Flats.
- What are bog complexes?
- 3000 years in the making – the story of the past.
- Bogs as habitat – *Sphagnum* the key.
- The story of the Corroboree Frog.
- Fire and other threats to *Sphagnum* and the peatbeds.
- Aboriginal and European use of the Brindabella/Ginini Flats area.
- Namadgi National Park providing for human needs—recreation, clean water supplies, clean air, biodiversity and genetic resources, space and educational and inspirational experiences.

The offer of assistance from some community groups to assist in undertaking management actions in the Wetlands will be explored by Environment ACT.

4.9.2 Management Actions – Community Awareness, Education and Involvement.

- 31) Develop a community awareness interpretation program including a portable educational display, information leaflets and on-site signboards (-see also Action 2).
- 32) Restrict, as necessary, the use of the area for educational purposes by academic institutions.
- 33) Involve, as appropriate, community organisations in the management of the site.

4.10 Rehabilitation Activities

Specific Management Objectives

- To rehabilitate degraded areas of the site.
- To reduce the incidence of soil erosion.

- To avoid introducing exotic species.

4.10.1 Background—Rehabilitation Activities

As has been noted in this Plan, a number of sites (tracks, road and carpark areas) will require rehabilitation and/or revegetation. The most important area is the management vehicle track used in winter as the ski-run. This track should be withdrawn from regular use for management purposes if or when the arboretum or other management activities are completed. The track alignments thereafter, should be restricted to use as a walking track and for emergency search and rescue, fire control and feral animal control purposes only.

The carpark area and the track should be properly drained and reshaped before planting with native species. This will require some topsoiling or the use of sods taken from appropriate locations near to the track. These should be flat sites that can be readily revegetated after removal of the sods. The hard-surfaced area around the edge of the Ginini carpark will require ripping or some manual disturbance before the planting of native plant stock.

Considerable expertise has been developed in alpine and sub-alpine rehabilitation and revegetation programs using native plant species and sterilised commercial mulching materials (Good, 1976 and 1992a). The assistance of soil conservation staff at Kosciuszko National Park should be sought through the Alps Liaison Committee, if this knowledge is not held within Environment ACT.

All plant material used in revegetation programs should be sourced from the Ginini Flats area and propagated in numbers to provide sufficient plantings and adequate groundcover in the first growing season after rehabilitation and revegetation works.

Maintenance of all rehabilitation and revegetation works will be required for several years after completion to ensure a stable vegetative cover is established, while reducing the pressures of visitation and other impacts, including adverse weather conditions in the early growing seasons (Good, 1976).

4.10.2 Management Actions – Rehabilitation Activities

- 34) Use direct seeding techniques and propagate local native species for use in rehabilitation programs.
- 35) Draw up a works program to address soil erosion at the Mt Ginini carpark and the management track/ski-run (—see also Action 20).
- 36) Use sterilised hay, local vegetative material or commercially available products eg. ‘environet’ and ‘soil saver’ when using mulch in rehabilitation programs

5. IMPLEMENTATION/EVALUATION OF MANAGEMENT ACTIONS

5.1 Implementation of Actions

A table listing the management actions identified in this Management Plan, their priority and expected duration is presented at **Appendix 2**.

To ensure management actions from other plans pertinent to the management of the Wetlands such as the Bushfire Fuel Management Plan and Action Plan No. 6 for the Corroboree Frog *Pseudophryne corroboree* are integrated with the activities identified in this Management Plan an Implementation Program will be compiled. This program will assign overall priorities and identify responsibilities, completion dates, performance measures and include a column to record progress in meeting actions.

When a revised management plan for the Namadgi National Park is produced there will be a commitment to compile an Implementation Plan that draws together management actions for the park. The actions from the Ginini Flats Wetlands Management Plan and its Implementation Program will be incorporated into a revised Namadgi National Park Management Plan and its Implementation Plan.

Management actions will be implemented within the context of the wider management program for Namadgi National Park and that the wetlands lie within catchment of the Cotter River which is the principle source of Canberra's potable water.

5.2 Evaluation

The Implementation Plan will be reviewed/updated annually and will be subject to scrutiny by the Nature Conservation and Namadgi Sub-committee of the Ministerially appointed Environment Advisory Committee. The Sub-committee comprises scientific, government and community organisation representatives and provides expertise on natural resource management in the ACT.

The Ramsar site is also of interest to the ACT Flora and Fauna Committee (a scientific advisory committee) who will maintain a watching brief in its management. Several community groups are interested in the site and will assist in its management by providing advice and participating in on-ground activities.

Reports from these sources will be passed to Environment ACT and will act as a basis for determining the success of management actions.

GLOSSARY

Age structure: the representation of a population by the division of its individuals into age groups.

Aquatic migration corridor: a number of wetland areas linked across a landscape which provide for the movement of aquatic dependent species from one site to another.

Arboreta: small plantations of exotic trees established for horticultural study purposes.

Association: a plant community designated by species, often described by the dominant species.

Biological control: the use of organisms to control weeds or other pests.

Biomass: the mass of living matter (plants and /or animals) in a particular area.

Botanical significance: vegetation of scientific importance, often due to its restricted distribution, rarity or degree of threat.

BP: before present.

Carrying capacity: the number of visitors an area or track can support before degradation becomes evident.

Climax community: a fully developed plant community that ends a succession and has reached stability under the prevailing environmental conditions.

Cold-air drainage: the descent of cold denser air into high-country valleys on a diurnal basis, such that a temperature inversion develops.

Colonisation: the establishment of a plant or animal population in an area, particularly with reference to a disturbed site.

Controlled burning: the application of a prescribed fire for management purposes under predetermined and defined weather conditions.

Concessionaire: one to whom a commercial concession licence or permit has been given to provide services or facilities for visitor use and enjoyment.

Decomposition: the physical and chemical breakdown of organic matter.

Dry heath: a shrub community growing in dry environments, often on shallow free-draining soils or gravelly substrate sites.

Ecological stability: the capacity of an ecological system to resist change or to return to its original condition if disturbed.

Ecology: the study of the way organisms interact with each other and their abiotic environment.

Endangered species: a native plant or animal species whose continued existence is insecure in an area.

Epicormic buds: dormant organs of vegetative growth on a stem of a eucalypt species.

Exotic: a plant or animal introduced from another region.

Feral: a domestic or exotic animal released into or living in the wild.

Fire regime: the frequency, intensity, and season of burning.

Frost heave: the diurnal formation of ice crystals in the surface of damp soils which physically lifts the soil and plants during sub-zero temperature conditions.

Geomorphology: the study of the Earth's physical surface features and the way they have formed.

Lignotuber: the enlarged root of some tree species, particularly eucalypt species which have specialised buds which grow after damage/destruction of the above-ground parts of the tree.

Micro-climate: the climate in different components of a habitat that an organism encounters in the course of its activities.

Mire: European term for a bog, fen or groundwater community.

National Capital Plan: a document produced and administered by the National Capital Planning Authority, pursuant to the Australian Capital Territory (Land and Planning) Act 1998.

Natural resource: the native flora, fauna and landscape values of an area.

Pathogenic vector: an animal or plant that carries and disperses a pathogenic organism from one plant or animal to another.

Peat: organic material which has at least partially decomposed under anaerobic conditions, as occurs in groundwater communities.

Periglacial: landscape features formed under cold conditions where ice action is a dominant force.

Population: a group of individuals of a single species.

Recreational node: a central point from which visitors disperse to pursue a range of recreational activities.

***Sphagnum*:** a moss like plant which grows in continuously wet sites, which, on death and decomposition, contributes to the organic peat substrate—the *sphagnum* peat.

Species: a group of individuals that are capable of interbreeding and producing fertile offspring.

Territory Plan: a document administered by the ACT Planning Authority in response to requirements of the Commonwealth Government's Australian Capital Territory (Planning and Land Management) Act, 1988.

Threatened species: native plant or animal whose continued survival is threatened by external processes. See also Endangered and Vulnerable species.

Understorey: in a vegetation association, the smaller or less dominant species that do not either form part of the canopy or ground cover.

Vulnerable species: a plant or animal which is vulnerable to changes in the environmental conditions in which it lives and for which it is threatened, unless the conditions are modified or returned to normal.

Waterscape: the wetland features and components of the landscape.

Wet heath: a shrub community growing in moist or wet soil conditions.

Wet herbfield: a community of grasses and other herbaceous plants growing in moist soil conditions.

Wilding: an exotic plant growing outside its management area—generally applied to plantation pines that spread beyond the plantation.

Xeromorphic: morphological features of plants growing in areas where climatic or edaphically induced dry conditions or drought regularly occur.

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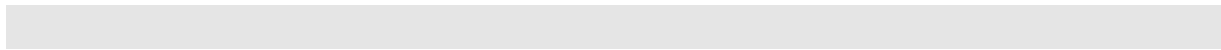
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APPENDIX 1. COMMUNITY GROUPS/INDIVIDUALS INVOLVED IN THE DEVELOPMENT OF THE MANAGEMENT PLAN
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Canberra Bushwalking Club Inc.
Mr Matthew Higgins
Conservation Council of the SE Region and Canberra
National Parks Association of ACT
Canberra Alpine Club
Mr Steve Hill
Ngunawal ACT and District Aboriginal Council of Elders Association Inc
Ngunnawal ACT and District Indigenous Peoples Association
Ngunnawal Elders Council Inc
Kosciusko Huts Association
Field Naturalists Association of Canberra
National Trust of Australia -ACT
Environment Centre
Wilderness Society- ACT Branch



APPENDIX 2. LISTING OF MANAGEMENT ACTIONS BY PRIORITY

PLAN REF.	ACTIONS	PRIORITY	DURATION
4.2.2 Access Management	1) Leave the Mt Franklin road closed to vehicular traffic at the existing gate, but consider other road termination locations if the road or its usage is having an effect on the health of the wetlands and its catchment. 2) Continue to allow walking from the carpark to the wetlands, but erect interpretation sign(s) explaining the fragile nature of the site (—see also Action 31). 3) Monitor informal track development to assess the need to define a specified route to and around the wetlands. 4) If a defined track is required, the route to be low-key, marked by guide posts and only hard-surfaced where instability problems occur. 5) Determine quantities and type of fuel used at the radio facility on Mt Ginini and put in place measures to mitigate the effect of a spill on the wetlands and its catchment.	High High Medium Low Medium	On-going On-going On-going Short Short
4.3.2 Fire Management	6) Implement and contribute to the Bushfire (Fuel) Management Plan in conjunction with other land managers. 7) Pursue a no management burns policy for the 7-year life of this Plan as a part of the no-fire policy for the Cotter catchment. 8) Undertake, as necessary, fire fuel reduction measures along access routes and the carpark. 9) Participate with the Bush Fire Service in the control of bushfires and continue employee participation in training programs. 10) Investigate sources of water for fire fighting purposes—such as a water supply tank at the Mt Ginini facility site, reinstatement of small dams along the Mt Franklin Road and/or use of tank water stored at the Mt Franklin Chalet.	Low Medium Medium High Low	On-going On-going On-going On-going Short
4.4.2 Exotic Plant and Weed Control	11) Introduce rust cultivars to the Brindabella Range, particularly the Ginini Flats Wetlands area, if Blackberries become established. 12) Use a non-chemical program to control, where feasible, exotic plant species. 13) Undertake a yearly or biennial survey of pine wildings to determine the extent of the problem followed by wildling removal if required. 14) Undertake manual removal of weeds in disturbed	High High Low Medium	Medium Short On-going Short

PLAN REF.	ACTIONS	PRIORITY	DURATION
	<p>areas (eg trackside and pig digging sites) prior to rehabilitation measures.</p> <p>15) Improve, where appropriate, native plant cover to encourage competition for non-invasive weed species. (In most situations this will occur naturally if the external disturbance factors are removed or at least reduced, such as walking route use, pig numbers etc.)</p> <p>16) Remove the Stockyard Arboretum in line with the recommendation from the Fearnside and Lea (1991) report and rehabilitate the site using local native species.</p>	<p>High</p> <p>High</p>	<p>On-going</p> <p>Medium</p>
4.5.2 Feral Animal Control	<p>17) Reduce pig populations in the general area of Mt Franklin-Ginini using appropriate methods.</p> <p>18) Destroy the small number of rabbit burrows in the general area of the wetlands and surrounding forest.</p> <p>19) Monitor and undertake action as necessary to control deer, goats, brumbies and cats.</p> <p>20) Participate in and/or support the fox control trials being conducted by CSIRO (possibly through the Alps Parks Memorandum of Understanding for Cooperative Management).</p>	<p>High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>	<p>On-going</p> <p>Short</p> <p>On-going</p> <p>Medium</p>
4.6.2 Recreation Management	<p>21) Continue enforcement of the prohibition on overnight camping in the catchment of the wetlands.</p> <p>22) Determine the threshold of degradation between visitor (bushwalker) numbers and carrying capacity of preferred/desired track alignments using techniques such as photo points and degree of soil erosion (—see also Action 3 and Action 29).</p> <p>23) Consider introducing a visitor access permit system if and when it is apparent that visitation is causing degradation of the wetlands.</p> <p>24) Explore the role of concessionaires/licensees in providing environmental awareness messages in their ecotourism orientated activities.</p>	<p>Medium</p> <p>High</p> <p>Low</p> <p>Low</p>	<p>On-going</p> <p>Short</p> <p>Short</p> <p>Short</p>
4.8.2 Research and Monitoring	<p>25) Use the knowledge gained from research programs to assist and guide management programs.</p> <p>26) Establish a set of criteria for approving research programs and for licencing of the research, including access to the wetlands.</p> <p>27) Establish an appropriate baseline monitoring program to assess the health of the wetlands and</p>	<p>Medium</p> <p>Medium</p> <p>High</p>	<p>Short</p> <p>Short</p> <p>Short</p>

PLAN REF.	ACTIONS	PRIORITY	DURATION
	<p>the success of the actions of this Plan of Management, including photographic reference points to provide a visual reference of condition over time (—see also Action 22).</p> <p>28) Determine appropriate research and survey programs on aspects of wetlands ecology, particularly on <i>Sphagnum</i> recovery and the status and conservation of threatened species including extent of impact of threatening processes such as feral animals and human visitation/disturbance.</p>	Medium	Medium
4.9.2 Community Awareness and Education	<p>29) Develop a community awareness interpretation program including a portable educational display, information leaflets and on-site signboards (—see also Action 2).</p> <p>30) Restrict, if necessary, the use of the area for educational purposes by academic institutions.</p> <p>31) Involve, as appropriate, community organisations in the management of the site.</p>	<p>High</p> <p>Medium</p> <p>High</p>	<p>Short</p> <p>On-going</p> <p>On-going</p>
4.10.2 Rehabilitation Activities	<p>32) Use direct seeding techniques and propagate local native species for use in rehabilitation programs.</p> <p>33) Draw up a works program to address soil erosion at the Mt Ginini carpark and the management track/ski-run (—see also Action 20).</p> <p>34) Use sterilised hay, local vegetative material or commercially available products e.g. ‘environet’ and ‘soil saver’ when applying mulch in rehabilitation programs.</p>	<p>High</p> <p>High</p> <p>High</p>	<p>Short</p> <p>Short</p> <p>Short</p>