Australian Capital Territory

Action Plans for endangered species

Disallowable instrument DI2003—149

made under the

***Nature Conservation Act 1980*, section 23C (Preparation of action plan)**

I have prepared Action Plans for the following declared species as attached to this instrument.

Action Plan No. 25 Ginninderra Peppercress (*Lepidium ginninderrense*)
Action Plan No. 26 Silver Perch (*Bidyanus bidyanus*)

Maxine Cooper
Conservator of Flora and Fauna
28 May 2003

ACTION PLAN No. 25

In accordance with section 21 of the *Nature Conservation Act 1980*, the **Ginninderra Peppercress *(Lepidium ginninderrense)*** was declared an **endangered** species on 4 September 2001 (Instrument No. 192 of 2001). Section 23 of the Act requires the Conservator of Flora and Fauna to prepare an Action Plan in response to each declaration. This is the Action Plan for:

Ginninderra Peppercress
Lepidium ginninderrense

Preamble

The *Nature Conservation Act 1980* establishes the ACT Flora and Fauna Committee with responsibilities for assessing the conservation status of the ACT's flora and fauna and the ecological significance of potentially threatening processes. Where the Committee believes that a species or ecological community is threatened with extinction or a process is an ecological threat, it is required to advise the responsible Minister, and recommend that a declaration be made accordingly.

Flora and Fauna Committee assessments are made on nature conservation grounds only and are guided by specified criteria as set out in its publication '*Threatened Species and Communities in the ACT*', July 1995.

In making its assessment of the Ginninderra Peppercress, the Committee concluded that it satisfied the criteria indicated in the adjacent table.

An Action Plan is required in response to each declaration. It must include proposals for the identification, protection and survival of a threatened species or ecological community, or, in the case of a threatening process, proposals to minimise its effect.

This Action Plan was prepared by the Conservator of Flora and Fauna in accordance with the Nature Conservation Act, in consultation with the Flora and Fauna Committee and after the statutory period for public comment.

While the legal authority of this Action Plan is confined to the Australian Capital Territory, management considerations are addressed in a regional context.

Criteria Satisfied

1.2 The species is observed, estimated, inferred or suspected to be at risk of premature extinction in the ACT region in the medium-term future, as demonstrated by:

1.2.4 Severely fragmented distribution for a species currently occurring over a small range or having a small area of occupancy within its range.

Species Description and Ecology

DESCRIPTION

The Ginninderra Peppercress *Lepidium ginninderrense* N. H. Scarlett (Figure 1) is a perennial herb to a maximum height of about 20 cm, with one to six branched stems arising from a rootstock. Stems are striate and moderately papillose. Leaves are thick and fleshy, glabrous and shiny on the upper surface. Rosette leaves are widely spaced and very narrow (1.5 to 2.0 mm wide) and 15-55 mm long. The inflorescence is an elongating raceme with a maximum length of 15 cm. Flowers are small, 2 mm wide and 1.5 mm long. Sepals are less than 1 mm long and about 0.5 mm wide, green and with scarious margins. Petals are absent (Scarlett 2001). *Lepidium ginninderrense* flowers in late spring. It sets seed mainly in December and the majority of seed is dispersed before August (Avis 2000).

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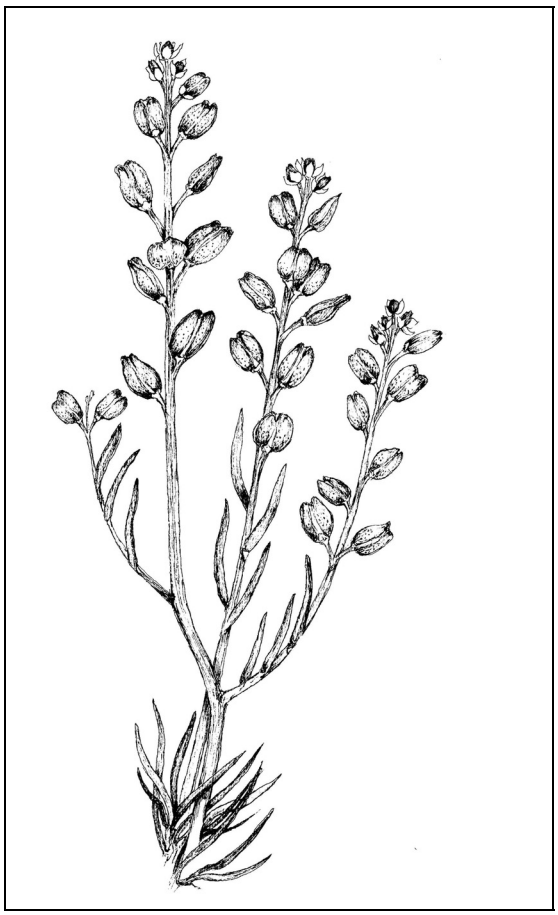

Figure 1: Ginninderra Peppercress *Lepidium ginninderrense*.

DISTRIBUTION

The only known extant population of *L. ginninderrense* occurs in the north-west corner of Belconnen Naval Transmission Station in the suburb of Lawson in the Australian Capital Territory (which is the type locality). The population at the type locality is currently c. 2000 plants, occupying an area of 90 x 30 metres (Avis 2000).

A second record of *L. ginninderrense* is from 1952 in the suburb of Reid, however, a subsequent search failed to rediscover the species in this area (M. Gray pers. comm. cited in Scarlett 2001).

Lepidium ginninderrense has been recorded only from these two cited localities in the ACT and is not known from outside the ACT. The species is remarkably disjunct from all other members of the allied *Lepidium* section *Papillosa* in south-eastern Australia, which are mainly confined to the inland plains west and north of the Eastern Highlands (Scarlett 2001).

HABITAT

At the type locality *L. ginninderrense* grows on the flood plain of Ginninderra Creek, in Natural Temperate Grassland dominated by *Austrodanthonia* spp. and *Bothriochloa macra.* Associated herbaceous species include *Plantago gaudichaudii, Juncus filicaulis, Triptilodiscus pygmaeus, Parentucellia latifolia* and *Calocephalus citreus* (Scarlett 2001).

Avis (2000) has shown that *L. ginninderrense* grows in areas with relatively low perennial grass cover, often with indications of past soil disturbance.

The soil type over most of the site is a shallow red earth, with patches of colluvium on the footslopes (Crawford and Rowell 1995a cited on page 41 Lowe 1996). The population occurs at an altitude of c. 580 metres.

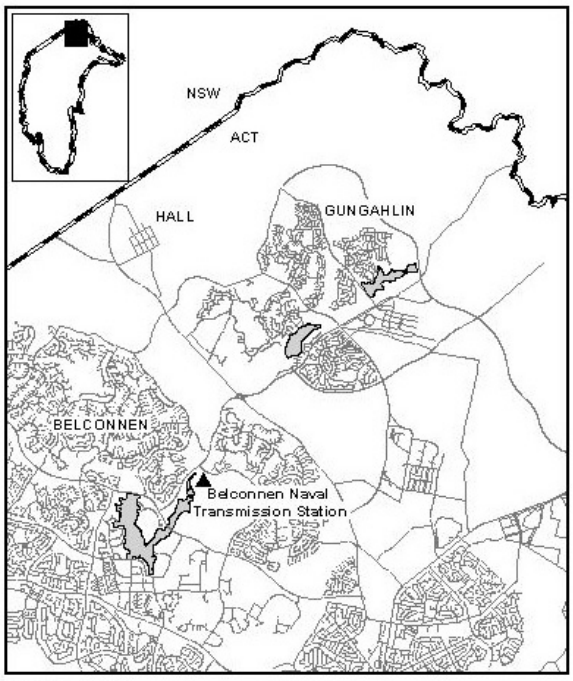

Figure 2: ▲ Known location of the Ginninderra Peppercress *(Lepidium ginninderrense)*.

Conservation Status

Lepidium ginninderrense is recognised as a threatened species in the following sources:

National

Recommended in October 2001 for listing as endangered under the Environment Protection and Biodiversity Conservation Act 1990 (EPBC Act).

Australian Capital Territory

Endangered—Section 21 of the *Nature Conservation Act 1980*, Disallowable instrument No. 299 of 2001.

Special Protection Status Species—Schedule 7 of the *Nature Conservation Act 1980,* Disallowable instrument No. 42 of 2002.

Threats

The main threat to the survival of this population and therefore the species is likely to be urban infill, and deliberate or unintended actions associated with visitor and/or land management activities in the local area.

Observations by Avis (2000) suggest that the species grows well in locations where competing grass tussocks and other plant growth is short and open and subsequently there is little competition for space and light. Thus, inappropriate management leading to loss of such habitat may also be a threat to the species, and it is important to determine management practices that are most conducive to the maintenance of the population at this site.

Major Conservation Objectives

The objectives of the Action Plan are to:

- preserve the existing ACT population as it is the *only known location* where the species survives; and
- manage the habitat so that natural ecological processes continue to operate.

Conservation Issues and Intended Management Actions

SURVEY/MONITORING/RESEARCH

It is unlikely that the species exists anywhere else in the ACT, given the number of similar sites already surveyed. Consequently, surveys aimed solely at finding specimens beyond the immediate area are not economically justified.

⇒ Environment ACT (Wildlife Research and Monitoring—WR&M) will make field workers, interested naturalists and conservation groups aware of the species in order to obtain further records of its presence.

⇒ Environment ACT (WR&M) will liaise with the NSW National Parks and Wildlife Service to encourage surveys of potential habitat outside the ACT.

⇒ Environment ACT (WR&M) will monitor the existing population on an annual basis, and encourage research into the species.

REQUIRED MANAGEMENT ACTIONS

Due to the small size and fragmented distribution of the species, management actions will be directed towards maintaining existing conditions and ensuring that activities occurring nearby do not adversely affect the site. Management of the site should take in to consideration the following:

- Avoiding incompatible activities such as development of facilities, recreational use or access tracks in or near the site.
- Maintaining a low profile for the site where the species is located. The appropriateness of signage and fencing will need careful consideration.
- Incorporating appropriate statements of management actions in relevant plans and strategies.
- Seeking expert advice on best practices with regard to management of the species, particularly regarding maintenance of an open habitat, and putting in place specific management actions as indicated by monitoring.

Existing plants of *L. ginninderrense* support high seed set, allowing opportunities for translocation and ex-situ conservation (Young 2001). Environment ACT will undertake the following actions which have been recommended by Young (2001):

⇒ Collect open-pollinated seed from a wide range of individuals (collecting a small amount of seed from every individual would be most successful for capturing existing genetic diversity).
⇒ Use some of the seed to establish new populations at other apparently suitable locations.
⇒ Store remaining seed under appropriate conditions (eg. at the Australian National Botanical Gardens) to act as a core for *ex-situ* genetic conservation. Seed will need to be replaced at intervals to be determined by seed longevity.

Any translocation and *ex-situ* conservation program should take into account principles as outlined in the Australian Network for Plant Conservation ‘Guidelines for the Translocation of Threatened Plants in Australia’ (ANPC 1997a) and ‘Germplasm Conservation Guidelines for Australia’ (ANPC 1997b).

Protection

The area in which all the plants occur lies within the Belconnen Naval Transmission Station, which is classified under the Territory Plan as Commonwealth Land. The closure of the Belconnen Naval Transmission Station in the near future and further development of the suburb of Lawson will require the protection of the population in a reserve.

⇒ Environment ACT will advise the Australian Heritage Commission of the occurrence of *Lepidium ginninderrense* at Belconnen Naval Transmission Station with a view to amending the existing citation of the site.

⇒ Environment ACT will support reservation of the Lawson grassland including the location of *Lepidium ginninderrense* as part of the planning for the new suburb of Lawson.

Socio-economic Issues

The conservation and management of *L. ginninderrense* is currently the responsibility of the Department of Defence. A Memorandum of Understanding is in place between the Department of Defence and Environment ACT and Environment Australia for the conservation and management of the site.

A planning study for the suburb of Lawson undertaken during 2001-02 is the joint responsibility of the Commonwealth Department of Defence and the ACT Department of Urban Services (Planning and Land Management). The area of grassland habitat containing the population *of L. ginninderrense* is proposed to be reserved and protected from development.

Establishment of a reserve will provide open space near to residential developments, and it will be necessary to manage public access in a manner which protects sensitive habitat areas.

Legislative Provisions

The following legislation is relevant to conservation of flora and fauna in the ACT:

Nature Conservation Act 1980

The Nature Conservation Act provides a mechanism to encourage the protection of native plants and animals (including fish and invertebrates), the identification of threatened species and communities, and the management of Public Land reserved for nature conservation purposes. Specified activities are managed via a licensing system.

Native plants and animals may be declared in recognition of a particular conservation concern and increased controls and penalties apply. Species declared as endangered must also be declared as having special protection status (SPS), the highest level of statutory protection that can be conferred.

Lepidium ginninderrense is listed as a SPS species and any activity affecting such a species is subject to special scrutiny. Conservation requirements are a paramount consideration and only activities related to conservation of the species or serving a special purpose are permissible.

The Conservator of Flora and Fauna may only grant a licence for activities affecting a species with SPS where satisfied that the act specified in the licence meets a range of stringent conditions. Further information on licensing can be obtained from the Licensing Officer, Environment Protection, Environment ACT, telephone 6207 6376.

Other Relevant Provisions

The Nature Conservation Act provides authority for the Conservator of Flora and Fauna to manage Public Land reserved for conservation of the natural environment. Activities that are inconsistent with nature conservation objectives are controlled. Special measures for conservation of a species or community of concern can be introduced in a reserved area, including restriction of access to important habitat.

Land (Planning and Environment) Act 1991

The Land (Planning and Environment) Act is the primary authority for land planning and administration. It establishes the Territory Plan, which identifies nature reserves, national parks and wilderness areas within the Public Land estate.

The Land (Planning and Environment) Act establishes the Heritage Places Register. Places of natural heritage significance may be identified and conservation requirements specified.

Environmental Assessments and Inquiries may be initiated in relation to land use and development proposals.

Consultation and Community Participation

As the area supporting this species is within the Belconnen Naval Transmission Station it is currently a low usage zone. However, it is expected that with the development of the new suburb of Lawson recreational use of open spaces in the area will increase. Opportunities to involve the local community in Park Care activities will be explored with the ACT Parks and Conservation Service.

Implementation, Evaluation and Review

RESPONSIBILITY FOR IMPLEMENTATION

Environment ACT (Wildlife Research and Monitoring) will have responsibility for coordinating implementation of this Action Plan subject to government priorities and resources and the continued cooperation of the Department of Defence.

EVALUATION

The Action Plan will be reviewed after three years. The review will comprise an assessment of progress using the following performance indicators:

- completion of commitments that can reasonably be expected to be finalised within the review timeframe (e.g. introduction of a statutory protection measure for a species; development of a management plan);
- completion of a stage in a process with a time line that exceeds the review period (e.g. design or commencement of a research program);
- commencement of a particular commitment that is of a continuing nature (eg. design or commencement of a monitoring program for population abundance); and
- expert assessment of achievement of conservation objectives of the Action Plan.

The review will be reported to the ACT Flora and Fauna Committee. This will provide Environment ACT and the Flora and Fauna Committee an opportunity to assess progress, take account of developments in nature conservation knowledge, policy and administration and review directions and priorities for future conservation action.

The following conservation actions will be given priority attention:

⇒ assessment of *ex-situ* conservation measures; and

⇒ putting protection measures in place.

Acknowledgments

The illustration of the species (Figure 1) was prepared for Environment ACT by Kim Neubauer.

References

ANCP, 1997a. Guidelines for the Translocation of Threatened Plants in Australia. Australian Network for Plant Conservation Translocation Working Group. ANPC, Canberra.

ANPC, 1997b. Germplasm Conservation Guidelines for Australia—An Introduction to the Principles and Practices for Seed and Germplasm Banking of Australian Species. Australian Network for Plant Conservation Germplasm Working Group. ANPC, Canberra.

Avis, K., 2000. Monitoring of *Lepidium ginninderrense* at the Belconnen Naval Transmission Station Lawson ACT. Canberra Institute of Technology, Bruce Campus.

Lowe, C. R., 1996. HMAS Conservation Management Plan for HMAS Harman Bonshaw and the Belconnen Naval Transmitting Station.

Scarlett, N. H., 2001. *Lepidium ginninderrense* (Brassicaceae), a new species from the Australian Capital Territory. *Muelleria* 15: 69-73.

Young, A., 2001. Issues and Options for Genetic Conservation of Small Populations of Threatened Plants in the ACT. CSIRO Plant Industry, Canberra.

List of Action Plans—May 2003

In accordance with Section 23 of the *Nature Conservation Act 1980,* the following Action Plans have been prepared by the Conservator of Flora and Fauna:

No. 1: Natural Temperate Grassland—an endangered ecological community.

No. 2: Striped Legless Lizard (*Delma impar*)—a vulnerable species.

No. 3: Eastern Lined Earless Dragon (*Tympanocryptis lineata pinguicolla*)—an endangered species.

No. 4: A leek orchid (*Prasophyllum petilum*)—an endangered species.

No. 5: A subalpine herb (*Gentiana baeuerlenii*)—an endangered species.

No. 6: Corroboree Frog (*Pseudophryne corroboree*)—a vulnerable species.

No. 7: Golden Sun Moth (*Synemon plana*)—an endangered species.

No. 8: Button Wrinklewort (*Rutidosis leptorrhynchoides*)—an endangered species.

No. 9: Small Purple Pea (*Swainsona recta*)—an endangered species.

No. 10: Yellow Box - Red Gum Grassy Woodland—an endangered ecological community.

No 11: Two-spined Blackfish (*Gadopsis bispinosus*)—a vulnerable species.

No. 12: Trout Cod (*Maccullochella macquariensis*)—an endangered species.

No. 13: Macquarie Perch (*Macquaria australasica*)—an endangered species.

No. 14: Murray River Crayfish (*Euastacus armatus*)—a vulnerable species.

No. 15: Hooded Robin (*Melanodryas cucullata*)—a vulnerable species.

No. 16: Swift Parrot (*Lathamus discolor*)—a vulnerable species.

No. 17: Superb Parrot (*Polytelis swainsonii*)—a vulnerable species.

No. 18: Brown Treecreeper (*Climacteris picumnus*)—a vulnerable species.

No. 19: Painted Honeyeater (*Grantiella picta*)—a vulnerable species.

No. 20: Regent Honeyeater (*Xanthomyza phrygia*)—an endangered species.

No. 21: Perunga Grasshopper (*Perunga ochracea*)—a vulnerable species.

No. 22: Brush-tailed Rock-wallaby (*Petrogale penicillata*)—an endangered species.

No. 23: Smoky Mouse (*Pseudomys fumeus*)—an endangered species.

No. 24: Tuggeranong Lignum (*Muehlenbeckia tuggeranong)*—an endangered species.

No.25: Ginninderra Peppercress (*Lepidium ginninderrense*)—an endangered species.

No. 26: Silver Perch *(Bidyanus bidyanus)*—an endangered species.

FURTHER INFORMATION

Further information on this Action Plan or other threatened species and ecological communities can be obtained from:

Environment ACT
(Wildlife Research and Monitoring)
Phone: (02) 6207 2126
Fax: (02) 6207 2122

Environment ACT Website:
www.environment.act.gov.au

This document should be cited as:

ACT Government, 2003. Ginninderra Peppercress (*Lepidium ginninderrense*)—an endangered species. Action Plan No. 25. Environment ACT, Canberra.

ACTION PLAN No. 26

In accordance with section 21 of the *Nature Conservation Act 1980*, the **Silver Perch *(Bidyanus bidyanus)*** was declared an **endangered** species on 4 September 2001 (Instrument No. 192 of 2001). Section 23 of the Act requires the Conservator of Flora and Fauna to prepare an Action Plan in response to each declaration. This is the Action Plan for the:

Silver Perch
Bidyanus bidyanus

Preamble

The *Nature Conservation Act 1980* establishes the ACT Flora and Fauna Committee with responsibilities for assessing the conservation status of the ACT's flora and fauna and the ecological significance of potentially threatening processes. Where the Committee believes that a species or ecological community is threatened with extinction or a process is an ecological threat, it is required to advise the Minister for the Environment, and recommend that a declaration be made accordingly.

Flora and Fauna Committee assessments are made on nature conservation grounds only and are guided by specified criteria as set out in its publication '*Threatened Species and Communities in the ACT',* July 1995.

In making its assessment of the Silver Perch, the Committee concluded that it satisfied the criteria indicated in the adjacent table.

An Action Plan is required in response to each declaration. It must include proposals for the identification, protection and survival of a threatened species or ecological community, or, in the case of a threatening process, proposals to minimise its effect.

The Flora and Fauna Committee will conduct an evaluation of the progress made in implementing this Action Plan every three years (see page 9 for details). This is due to first take place in 2004, which will bring it in line with the review of progress in implementing Action Plans for other declared aquatic items.

While the legal authority of this Action Plan is confined to the Australian Capital Territory, management considerations are addressed in a regional context.

Criteria Satisfied

1.2 The species is observed, estimated, inferred or suspected to be at risk of premature extinction in the ACT region in the near future, as demonstrated by:

- 1.2.1 Current severe decline in population or distribution from evidence based on:
  - 1.2.1.1 Direct observation, including comparison of historical and current records.
  - 1.2.1.2 Severe decline in rate of reproduction or recruitment; severe increase in mortality; severe disruption of demographic or social structure.
  - 1.2.1.4 Very high actual or potential levels of exploitation or persecution.
  - 1.2.1.5 Severe threats from herbivores, predators, parasites, pathogens or competitors.

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Links with other Action Plans

Measures proposed in this Action Plan complement those included in the Action Plans for other threatened aquatic species, such as the Two-spined Blackfish (*Gadopsis bispinosus*), Trout Cod (*Maccullochella macquariensis*) Macquarie Perch (*Macquaria australasica*) and Murray River Crayfish (*Euastacus armatus*). Action Plans are listed at the end of this document.

Species Description and Ecology

The Silver Perch *Bidyanus bidyanus* is a member of the family Terapontidae, which contains the freshwater grunters or perches. The family contains a total of about 22 species in eight genera in Australian freshwaters, of which one species, the Silver Perch, is found in the ACT and surrounding area. The majority of terapontids occur in northern Australian streams.

DESCRIPTION

B. bidyanus is a moderate to large fish (maximum length of about 500 mm and a maximum weight of around 8 kg) which commonly reaches 300-400 mm and 0.5-1.5 kg in rivers (Figure 1). The body is elongate and slender in juvenile and immature fish, becoming deeper and compressed in adults. The head is relatively small, jaws are equal in length, and eyes and mouth are small. The scales are thin and small (compared to Macquarie Perch or Golden Perch) and the tail is weakly forked. The lateral line follows the profile of the back. Colour is generally silvery grey to black on the body, with the dorsal, anal, caudal fins also grey. The pelvic fins are whitish (Merrick 1996, Merrick & Schmida 1984).

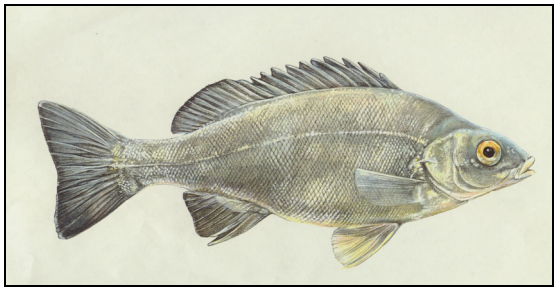

Figure 1: Silver Perch (*B. bidyanus*). Scale: Approximately one-fifth natural size.

HABITAT

B. bidyanus is found over a broad area of the Murray-Darling Basin and is often found in similar habitats to Murray Cod (*Maccullochella peelii*) and Golden Perch (*Macquaria ambigua*), ie. lowland, turbid rivers. There are some reports that suggest that *B. bidyanus* prefers faster, open water, but the general scarcity of information on the habitat preferences of the species makes generalisation difficult. The species is not found in the cool, fast-flowing, upland rivers of the Murray-Darling Basin.

BEHAVIOUR AND BIOLOGY

B. bidyanus is slow-growing and long-lived in rivers, with a greatest age of 17 years recorded from the Murray River and 27 years recorded from Cataract Dam. A 1.4 kg fish could be 17 years old (Mallen-Cooper *et al*. 1995, 1997). Growth rates in dams are much faster with a 2.3 kg fish from Googong Reservoir being approximately 6 years old (M. Lintermans unpublished data).

B. bidyanus matures at 3–5 years and spawn in spring and summer after an upstream migration. They school in large numbers during the upstream migration and research conducted at Torrumbarry Weir demonstrated that large numbers of immature fish were part of this migration (Mallen-Cooper *et al*. 1997).

This species is bred artificially in a number of government and commercial hatcheries and is widely stocked in farm dams and reservoirs, however, it rarely breeds in impoundments. The species is currently the subject of considerable interest in terms of its potential as an aquaculture species (Kibria *et al*. 1998).

B. bidyanus is omnivorous, consuming aquatic plants, snails, shrimps and aquatic insect larvae. Reports that the species becomes mainly herbivorous once they reach lengths of 250 mm are incorrect, at least for lake populations, as their diet in Googong Reservoir shows little change with fish size (M. Lintermans unpublished data).

DISTRIBUTION

Formerly widespread over much of the Murray Darling Basin (excluding the cooler upper reaches), the species has declined over most of its range. Numbers of *B. bidyanus* moving through a fishway at Euston Weir on the Murray River have declined by 93% between 1940 and 1990 (Mallen-Cooper 1993). The ACT probably represented the upstream limit of the species distribution in the Murrumbidgee catchment, but it could not be considered as a vagrant because it was a regular component of the recreational fishery.

In the Canberra region the species has been recorded from the Murrumbidgee River where numbers recorded in a fish trap at Casuarina Sands between 1980 and 1991 declined noticeably from the mid 1980s (Lintermans

2000). Monitoring of the Murrumbidgee fishery in the ACT since 1994 has failed to capture any *B. bidyanus* (Lintermans 1995, 1997, 1998). In the last decade there have been a small number of angler reports of *B. bidyanus* from the Murrumbidgee River in the ACT.

Formerly a 'run' of *B. bidyanus* from Lake Burrinjuck migrated upstream to the lower reaches of the Murrumbidgee River in the ACT in spring/summer, but this migration has not been recorded since the late 1970s/early 1980s (Lintermans 2000). In the ACT, *B. bidyanus* has not been recorded further upstream than Kambah Pool (Lintermans 2000). There have been occasional angler reports of *B. bidyanus* from the Murrumbidgee River at Bredbo, but these are thought to have originated from releases into local farm dams.

Greenham (1981) reported anecdotal angler records of *B. bidyanus* from the Molonglo River in the 1940s and 1950s but no contemporary records are known from this river (other than stocked fish). There are no records of the species from the Paddys, Naas, or Gudgenby Rivers. There are occasional angler records of *B. bidyanus* from the Queanbeyan River below Googong Reservoir but these fish are assumed to be stocked fish displaced downstream from the reservoir.

In the Canberra region *B. bidyanus* is also known from four other locations. These are:

- a stocked population in Googong Reservoir on the Queanbeyan River;
- a stocked population in the Yass weir pool on the Yass River;
- a stocked population in Lake George; and
- a population of unknown size in Burrinjuck dam (which is supplemented/maintained by stocking by NSW Fisheries).

B. bidyanus is also regularly stocked into farm dams by land-holders in the Canberra region.

Conservation Status

B. bidyanus is recognised as a threatened species in the following sources:

National

In August 2000, the Australian Society for Fish Biology Threatened Fishes Subcommittee listed *B. bidyanus* as nationally 'vulnerable' (under ASFB categories) and 'endangered' (under IUCN categories). However, there has been no formal nomination of *B. bidyanus* as a threatened species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

A Recovery Plan for the species was prepared by Clunie and Koehn (2001a) for the Murray-Darling Basin Commission. The plan recommends that the species may satisfy the criteria to be classified as 'Critically Endangered' under the IUCN categories.

Australian Capital Territory

Endangered—Section 21 of the *Nature Conservation Act 1980,* Disallowable Instrument No. 299 of 2001.

Special Protection Status Species—Schedules 6 and 7 of the *Nature Conservation Act 1980*, Disallowable Instrument No. 42 of 2002.

New South Wales

Vulnerable—Schedule 5 of the *Fisheries Management Act 1994* in NSW.

Victoria

Threatened taxon—Schedule 2 of the *Flora and Fauna Guarantee Act 1988*.

Cadwallader *et al*. (1984) listed *B. bidyanus* as 'Vulnerable' in Victoria and this categorisation was retained by Koehn and Morison (1990) when they reviewed the conservation status of Victorian fish. The species is currently listed as critically endangered in Victoria (NRE 2000).

Queensland

The species is considered 'insufficiently known' in Queensland (Wager 1993).

Threats to Populations in the ACT Region

Alteration or destruction of fish habitat is widely regarded as one of the most important causes of native fish decline in Australia (Cadwallader 1978; Koehn and O'Connor 1990a,b; Lintermans 1991a; Hancock 1993) and overseas (Moberly 1993; Maitland 1987). The impacts of introduced fish species are also considered to have had an impact on populations of *B. bidyanus* nationally and locally. However, the specific contributions of these impacts to the species' decline are not well understood as the threats are likely to have acted in concert.

In an exercise to rank the threats to *B. bidyanus*, the members of the national recovery team considered the top three threats to the species were alteration of flow regimes, barriers to fish movement, and introduced species (Clunie & Koehn 2001b).

ALTERATION OF FLOW REGIMES AND OTHER IMPACTS OF DAMS AND WEIRS

The construction of dams has a severe effect on the quality of fish habitat through the modification of the natural flow regimes and water quality of rivers below impoundments. The effect of some impoundments (e.g. Corin Reservoir and Lake Burrinjuck) on downstream river flows is to partially reverse the seasonal nature of flows as water from spring and autumn rains is collected and stored for release in summer.

Other impoundments such as Bendora, Cotter and Googong reservoirs and Lake Burley Griffin have a different impact in that insufficient water is released to maintain suitable environmental conditions in the river downstream.

The quality of water released is also a problem in that it may be released from the lower levels of the reservoir and is much colder than the surface waters. The release of a cold slug of water during the breeding season is thought to inhibit spawning behaviour of *B. bidyanus* and other native fish species.

The large areas of still water created by dams may also impact egg and early larval stages of *B. bidyanus*. The drifting semi-buoyant eggs and newly hatched larvae may settle in unfavourable habitats such as the backed up waters of dams and weir-pools, making them susceptible to sedimentation and low oxygen levels.

BARRIERS TO FISH MOVEMENT

Construction of dams and weirs prevents recolonisation of streams by preventing fish passage. Consequently, the construction of Burrinjuck dam in the early 1900s effectively isolated the upper Murrumbidgee catchment from downstream *B. bidyanus* populations. Similarly the construction of Lake Burley Griffin in 1963 isolated the Molonglo and Queanbeyan rivers from the Murrumbidgee River and has prevented any recolonisation.

INTRODUCED SPECIES

The establishment of introduced fish species is often cited as a cause of native fish decline in Australia, although much of the evidence is anecdotal. This is because the majority of introduced species became established in the mid to late 1800s when the distribution and abundance of native fish was poorly known or documented. Introduced fish species such as Carp (*Cyprinus carpio*) and Redfin Perch (*Perca fluviatilis*) have only recently become established in the Canberra region (Lintermans *et al.* 1990, Lintermans 1991b) and may compete for food with *B. bidyanus*, and *P. fluviatilis* may prey on juveniles of *B. bidyanus.*

Another potentially serious impact of introduced species is their capacity to introduce or spread foreign diseases and parasites to native fish species. *C. carpio* or *P. fluviatilis* are considered to be the source of the Australian populations of the parasitic copepod *Lernaea cyprinacea* (Langdon 1989a). *C. carpio*, Goldfish (*Carassius auratus*) or Eastern Gambusia (*Gambusia holbrooki*) are implicated as the source of the introduced tapeworm *Bothriocephalus acheilognathi* which has recently been recorded in native fish species (Dove *et al*. 1997). This tapeworm causes widespread mortality in juvenile fish overseas.

The most serious threat from introduced fish species to *B. bidyanus* may lie in the impacts of an exotic disease Epizootic Haematopoietic Necrosis Virus (EHNV). This virus, unique to Australia, was first isolated in 1985 on the introduced fish species *P. fluviatilis* (Langdon *et al*. 1986). It is characterised by sudden high mortalities of fish displaying necrosis of the renal haematopoietic tissue, liver spleen and pancreas (Langdon and Humphrey 1987).

Experimental work by Langdon (1989a,b) demonstrated that *B. bidyanus* was one of several species found to be extremely susceptible to the disease. EHNV was first recorded from the Canberra region in 1986 when an outbreak occurred in Blowering Reservoir near Tumut (Langdon and Humphrey 1987). Subsequent outbreaks have occurred in Lake Burrinjuck in late 1990, Lake Burley Griffin in 1991 and 1994, Lake Ginninderra in 1994 and Googong Reservoir, also in 1994 (Lintermans 2000). Its relatively resistant characteristics and the ease with which it can be transmitted from one geographical location to another on nets, fishing lines, boats and other equipment have aided the spread of EHNV. Langdon (1989b) found that the virus retained its infectivity after being stored dry for 113 days. Once EHNV has been recorded from a water body it is considered impossible to eradicate.

The Murrumbidgee and the Googong Reservoir populations of *B. bidyanus* have been exposed to the virus.

REDUCTION OF INSTREAM HABITAT

In the ACT there has been little direct removal of instream habitat (such as the removal of

logs from rivers and channelisation) as has occurred in lowland streams. Indirect causes of instream habitat reduction include sedimentation, clearing of riparian vegetation and the narrowing of stream channels below impoundments. Streams are often narrower and shallower below dams because of the storage capacity of the impoundments.

REDUCTION IN WATER QUALITY

The major reductions in water quality which are most likely to have affected the species in the Canberra region are sediment addition and changes to thermal regimes, either from the operation of impoundments or the clearing of riparian vegetation which shades streams.

Major Conservation Objectives

The major conservation objective of this Action Plan is to maintain in the long term, viable, wild populations of *B. bidyanus* as a component of the indigenous biological resources of the ACT and as a contribution to regional and national conservation of the species. This includes the maintenance of the species' potential for evolutionary development in the wild.

The objective is to be achieved through the following strategies:

- Improving understanding of the biology and ecology of the species as the basis for managing its habitat.
- Protecting sites and habitats that are critical to the survival of the species.
- Managing activities in the Murrumbidgee catchment in the ACT to minimise or eliminate threats to fish populations.
- Increasing community awareness of the need to protect fish and their habitats.

Conservation Issues and Intended Management Actions

GENERAL ISSUES

Habitat Rehabilitation

The majority of riverine ecosystems in eastern Australia have been affected by human impact with a resultant substantial modification of aquatic habitats. Significant effects on the rivers of the ACT region include irrigation extraction, dam construction and agricultural practices. Poor land management practices in the mid to late 1800s in the upper Murrumbidgee catchment resulted in extensive soil erosion and sediment addition to rivers. Also, clearing of the riparian zone removed nearly all the large eucalypts which were previously common, hence there remains no source of large woody debris (snags) to provide structural complexity and habitat diversity for both fish and invertebrate populations.

⇒ Environment ACT will investigate options for rehabilitating critical fish habitats. These options include the selective removal of sand to restore critical pool/riffle habitats and provision of additional cover such as snags or boulders.

⇒ Environment ACT will investigate mechanisms for rehabilitating and improving the protection of riparian vegetation along the Murrumbidgee River in the ACT.

Rehabilitation of fish habitat is costly and therefore requires a significant commitment of funds. Environment ACT will seek opportunities to secure external funding partnerships.

Environmental Flows

Increasing attention worldwide is being focussed on the need to provide water allocations for the environment. When the three impoundments on the Cotter River were constructed, little thought was given to how the abstraction or diversion of water would affect the animals living in the river. It is now known that to stimulate breeding activity, many native fish species require environmental stimuli or triggers such as an increase in water flow and water temperature. Reservoirs have severely disrupted downstream flow and temperature patterns, with consequent deleterious impacts for fish communities.

To address these issues, the ACT Government has developed Environmental Flow Guidelines that prescribe minimum flows to be achieved in the Cotter River above and below Bendora Reservoir, and include provisions for baseline flows as well as providing higher flows in spring to encourage fish spawning. ActewAGL is responsible for the operation of ACT water supply reservoirs and the release of water from them.

Provision of additional water and a more natural flow regime under the Environmental Flows Guidelines should contribute to enhanced fish habitat in the Cotter and downstream reaches of the Murrumbidgee River.

⇒ Environment ACT will liaise with ActewAGL to ensure that the appropriate flows under the Environmental Flows Guidelines are released from storages operated by the company.

SURVEY

Knowledge of the distribution of *B. bidyanus* in the upper Murrumbidgee catchment is largely complete. However, the status of the Lake Burrinjuck population has not been assessed since the mid 1980s when concerns were expressed about the impacts of an expanding *P. fluviatilis* population (Burchmore and Battaglene 1990). As the ACT *B. bidyanus* population is thought to be largely dependent on the status of the Lake Burrinjuck population, further investigations in Lake Burrinjuck are necessary to place the ACT population into a regional context.

⇒ Environment ACT (Wildlife Research and Monitoring (WR&M)) will liaise with NSW Fisheries about the possibility of assessing the status of the Lake Burrinjuck *B. bidyanus* population.

MONITORING

The decline of *B. bidyanus* in the Murrumbidgee River raises concerns about the long-term viability of this population. A long-term monitoring program capable of detecting changes in distribution and abundance of the species, which are outside the normal variation expected in these parameters in natural populations, is required.

⇒ Environment ACT (WR&M) will continue to monitor the fish population in the Murrumbidgee River in the ACT. Monitoring techniques will include those suited to detecting the presence of *B. bidyanus*.

⇒ Environment ACT (WR&M) will liaise with Victorian and NSW fisheries agencies to ensure that there is exchange of relevant information on the species.

RESEARCH

There is some existing information on the biology and ecology of *B. bidyanus*, (Mallen-Cooper 1994; Gehrke 1990; *Guo et al*. 1995; Lake 1967a,b; Reynolds 1983) although much of the information remains unpublished. Diet, movement and reproduction have all been studied to some degree, but many studies are conducted in aquaculture ponds or laboratories, with few 'wild' studies available (see Barlow *et al.* 1987; Rowland *et al*. 1983; Allan & Rowland 1992). However, there are still some critical knowledge gaps which need addressing.

Effects of Introduced Carp and Redfin Perch

The effects of introduced *C. carpio* and *P. fluviatilis* on *B. bidyanus* (and many other native fish species) is unknown. Increasing *C. carpio* abundance is often correlated with decreasing aquatic macrophyte abundance and other food chain alterations such as reduced zooplankton and increased phytoplankton. How such ecosystem alterations affect native fish species warrants further investigation.

Effects of EHN Virus in the Wild

P. fluviatilis in the Canberra region is known to be infected with EHN Virus. This virus has been shown to infect *B. bidyanus* in laboratory experiments but there have been no studies of how this virus affects wild populations.

⇒ Environment ACT will encourage research into a number of priority areas with key information gaps. These include effects of introduced *C. carpio* and *P. fluviatilis*, and effects of EHN Virus in the wild.

EDUCATION AND LIAISON

Large sections of the general community are unaware of the reasons for the decline of native fish, and the actions that can help to halt this. Provision of such information will enhance community understanding and engender community support for research and management actions. Options for providing this information include the Internet (Environment ACT Website), development of curriculum materials, as well as pamphlets and signs.

Some anglers either cannot, or choose not to discriminate between threatened and non-threatened fish species. Consequently some individuals of threatened species are not returned unharmed to the water after accidental capture. On-site identification aids at locations where threatened fish are likely to be caught may reduce the incidence of mis-identification of threatened fish species. Environment ACT has provided signage along the Murrumbidgee and Cotter rivers in the ACT to assist anglers identify other threatened fish species.

⇒ Environment ACT will investigate options for the provision of information to the public on the reasons for fish declines. The most appropriate and effective measures will be implemented where possible.

⇒ Environment ACT will investigate how to incorporate information on *B. bidyanus* into the existing threatened fish signage. The most appropriate and effective measures will be implemented where possible.

OVERFISHING

Overfishing is cited as one of the contributing factors in the decline of several native Murray-Darling fish species such as Trout Cod (*M. macquariensis*) (Douglas *et al*. 1994; Berra 1974) and Murray Cod (*M. peelii peelii*)

(Rowland 1989; Jackson *et al*. 1993) and Macquarie Perch (*M. australasica)* (Cadwallader 1978; Harris and Rowland 1996).

Overfishing is unlikely to have played a major initial role in the decline of *B. bidyanus*, either nationally or locally. However, once a population has declined, even relatively low levels of fishing can pose a threat to recovery of the species. There is anecdotal evidence that local anglers targeted the spawning run of *B. bidyanus* from Lake Burrinjuck. The current protective management regimes by NSW Fisheries (which prohibits the taking of *B. bidyanus* in rivers and imposes bag and size limits in dams) and Environment ACT (which prohibits the taking of *B. bidyanus* in any public waters) are considered appropriate.

⇒ Environment ACT will continue to prohibit the taking of *B. bidyanus* in public waters until the local population has recovered to levels which are assessed to be capable of sustaining recreational harvest.

⇒ Environment ACT (WR&M) will continue to liaise with NSW Fisheries to ensure that the there is consistency in the relevant fishing regulations for *B. bidyanus*.

STOCKING AND GENETIC INTEGRITY

Hatchery-bred fish used in fish stocking programs are usually derived from a small number of brood fish, and so may lack the normal range of genetic variation present in wild populations. An investigation into the genetic variability of *B. bidyanus* in rivers and dams within the Murray-Darling Basin has revealed that stocked populations have less genetic diversity than wild populations (Keenan *et al*. 1996). The introduction of hatchery-bred fish into remnant wild populations may lead to reduced genetic variability in the population as a whole, and reduce its adaptive capacity.

The remnant population of *B. bidyanus* in Lake Burrinjuck has been augmented with hatchery-bred fish for many years, and it is unknown whether 'wild' levels of genetic diversity remain in this population. The ACT Government does not stock streams for recreational purposes, preferring to concentrate its stocking program on lakes and dams (ACT Government 2000). There is provision for stocking streams for conservation purposes, but only when strict criteria are satisfied.

⇒ Environment ACT will encourage investigations into the identification of genetic composition of the Lake Burrinjuck population of *B. bidyanus*.

⇒ Environment ACT will not consider stocking *B. bidyanus* into the Murrumbidgee River in the ACT until the status and genetic composition of the Lake Burrinjuck population is known.

CONSERVATION STATUS

A recent review of the conservation status of fish in the Murray-Darling Basin has proposed that *B. bidyanus* be listed as nationally endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Morris *et al*. 2001). It is likely that the species will be formally nominated for this status in the near future.

⇒ Environment ACT will support the listing of *B. bidyanus* as endangered under the EPBC Act.

Protection

Before its declaration as an endangered species in the ACT, *B. bidyanus* was unprotected. In a review of recreational fishing in the ACT (ACT Parks and Conservation Service 1995), it was proposed to create a dedicated Fisheries Officer position in an effort to curb illegal fishing and better protect the ACT's fish resources. This proposal received widespread public support (ACT Parks and Conservation Service 1996) and the ACT Government now has a dedicated fisheries officer.

Socio-economic Issues

The main social benefit of conserving representative populations of *B. bidyanus* is meeting community concerns that further loss or extinction of native species is prevented.

Management of the Cotter catchment for conservation of threatened fish species, including provision of environmental flows, has previously been of concern to ActewAGL in terms of the security of water supply and pricing of domestic water. Compliance with the Environmental Flow Guidelines may have some impact on the urban water supply potential of the Cotter catchment. This may result in greater use of the higher cost water from Googong Dam which currently supplements water supply from the Cotter catchment during periods of high demand.

Legislative Provisions

The following legislation is relevant to conservation of flora and fauna in the ACT region:

AUSTRALIAN CAPITAL TERRITORY

Nature Conservation Act 1980

The Nature Conservation Act provides a mechanism to encourage the protection of native plants and animals (including fish and invertebrates), the identification of threatened species and communities, and the management of Public Land reserved for nature conservation purposes. Specified activities are managed via a licensing system.

Native plants and animals may be declared in recognition of a particular conservation concern and increased controls and penalties apply. Species declared as endangered must be declared as having special protection status (SPS), the highest level of statutory protection that can be conferred.

As an endangered species, *B. bidyanus* must be declared a SPS species and any activity affecting such a species is subject to special scrutiny. Conservation requirements are a paramount consideration and only activities related to conservation of the species or serving a special purpose are permissible. The Conservator of Flora and Fauna may only grant a licence for activities affecting a species with SPS where satisfied that the act specified in the licence meets a range of stringent conditions. Further information can be obtained from the Licensing Officer, Environment Regulation, Environment ACT, telephone (02) 6207 6376.

Fisheries Act 2000

The new *Fisheries Act 2000* is consistent with the corresponding NSW fishing legislation. The Act now has adequate provisions to protect native fish species by providing for bag, size and gear limits as well as being able to declare closed seasons or total protection for fish species.

Land (Planning and Environment) Act 1991

The *Land (Planning and Environment) Act 1991* is the primary authority for land planning and administration. It establishes the Territory Plan, which identifies nature reserves, national parks and wilderness areas within the Public Land estate.

The Territory Plan also provides for flora and fauna guidelines which list criteria for the assessment of the potential impact of a land use proposal. These focus on a range of aspects of the ACT's ecological resources, including the protection of vulnerable and endangered species along with their habitats. The conservation requirements of threatened species and their habitats are considered specifically during this process.

The Act also establishes the Heritage Places Register. Places of natural heritage significance may be identified and conservation requirements specified.

Environmental Assessments and Inquiries may be initiated in relation to land use and development proposals.

NEW SOUTH WALES

Fisheries Management Act 1994

The *Fisheries Management Act 1994 includes* provisions covering the identification, assessment and listing of endangered species, populations and ecological communities, vulnerable species and key threatening processes. They also provide for identification of critical habitat, mandatory impact assessment in the land use planning process and active recovery management.

Consultation and Community Participation

In 1995, a discussion paper on recreational fishing in the ACT was widely circulated for public comment (ACT Parks and Conservation Service 1995). The purpose of the paper was to outline current fisheries management in the ACT and present a series of proposed changes to management practices. A total of 194 submissions representing the views of 1290 individuals was received on the discussion paper with the majority of respondents supporting increased protection of aquatic resources (ACT Parks and Conservation Service 1996).

Representatives from Environment ACT (WR&M; ACT Parks and Conservation Service) maintain regular contact with officers from Planning and Land Management in the Department of Urban Services, fishing clubs and the ACT Sport and Recreational Fishing Council to raise awareness of issues involving fish communities.

A number of land management practices have the capacity to adversely affect fish populations, especially urban development, agricultural pursuits and forestry operations. These can generate soil erosion which leads to habitat destruction and deterioration in water quality. Environment ACT representation on appropriate intra- and interdepartmental committees and working groups will continue to provide opportunities for liaison on these matters.

⇒ Environment ACT will encourage community groups such as fishing clubs and the Australia New Guinea Fishes Association (ANGFA) to assist in the conservation of ACT fish populations and their habitats. Anglers will be encouraged to report any catches of threatened fish.

Implementation, Evaluation and Review

RESPONSIBILITY FOR IMPLEMENTATION

Environment ACT (WR&M; ACT Parks and Conservation Service; Environment Planning and Legislation) have responsibility for coordinating implementation of this Action Plan. Implementation itself, will be a collaborative exercise between government agencies, land-holders and the community generally. NSW participation will be critical in some situations.

Specific actions on Territory Land will be subject to the availability of Government resources. Primary responsibility for conservation and management of the species on Territory Land will rest with Environment ACT.

EVALUATION

The Flora and Fauna Committee will review implementation of this Action Plan after three years. The review will comprise an assessment of progress using the following performance indicators:

- completion of commitments that can reasonably be expected to be finalised within the review timeframe (e.g. introduction of a statutory protection measure for a species; development of a management plan);
- completion of a stage in a process with a time line that exceeds the review period (e.g. design or commencement of a research program);
- commencement of a particular commitment that is of a continuing nature (e.g. design or commencement of a monitoring program for population abundance); and
- achievement of conservation objectives of the Action Plan.

The review will provide an opportunity for both the Flora and Fauna Committee and Environment ACT to assess progress, take account of developments in nature conservation knowledge, policy and administration, and review directions and priorities for future conservation action.

The following conservation actions will be given priority attention:

⇒ establishment of a monitoring program to allow the detection of trends in relative population size at a number of sites; and

⇒ subject to resources, commencement of a research program, especially on priority topics, and encouragement of research by others.

Acknowledgments

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The illustration of the species (Figure 1) was provided by the Murray-Darling Basin Commission.

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List of Action Plans—May 2003

In accordance with Section 23 of the *Nature Conservation Act 1980,* the following Action Plans have been prepared by the Conservator of Flora and Fauna:

No. 1: Natural Temperate Grassland—an endangered ecological community.

No. 2: Striped Legless Lizard (*Delma impar*)—a vulnerable species.

No. 3: Eastern Lined Earless Dragon (*Tympanocryptis lineata pinguicolla*)—an endangered species.

No. 4: A leek orchid (*Prasophyllum petilum*)—an endangered species.

No. 5: A subalpine herb (*Gentiana baeuerlenii*)—an endangered species.

No. 6: Corroboree Frog (*Pseudophryne corroboree*)—a vulnerable species.

No. 7: Golden Sun Moth (*Synemon plana*)—an endangered species.

No. 8: Button Wrinklewort (*Rutidosis leptorrhynchoides*)—an endangered species.

No. 9: Small Purple Pea (*Swainsona recta*)—an endangered species.

No. 10: Yellow Box-Red Gum Grassy Woodland—an endangered ecological community.

No 11: Two-spined Blackfish (*Gadopsis bispinosus*)—a vulnerable species.

No. 12: Trout Cod (*Maccullochella macquariensis*)—an endangered species.

No. 13: Macquarie Perch (*Macquaria australasica*)—an endangered species.

No. 14: Murray River Crayfish (*Euastacus armatus*)—a vulnerable species.

No. 15: Hooded Robin (*Melanodryas cucullata*)—a vulnerable species.

No. 16: Swift Parrot (*Lathamus discolor*)—a vulnerable species.

No. 17: Superb Parrot (*Polytelis swainsonii*)—a vulnerable species.

No. 18: Brown Treecreeper (*Climacteris picumnus*)—a vulnerable species.

No. 19: Painted Honeyeater (*Grantiella picta*)—a vulnerable species.

No. 20: Regent Honeyeater (*Xanthomyza phrygia*)—an endangered species.

No. 21: Perunga Grasshopper (*Perunga ochracea*)—a vulnerable species.

No. 22: Brush-tailed Rock-wallaby (*Petrogale penicillata*)—an endangered species.

No. 23: Smoky Mouse (*Pseudomys fumeus*)—an endangered species.

No. 24: Tuggeranong Lignum (*Muehlenbeckia tuggeranong)*—an endangered species.

No.25: Ginninderra Peppercress (*Lepidium ginninderrense*—an endangered species.

No. 26: Silver Perch *(Bidyanus bidyanus)*—an endangered species.

FURTHER INFORMATION

Further information on this Action Plan or other threatened species and ecological communities can be obtained from:

Environment ACT
(Wildlife Research and Monitoring)
Phone: (02) 6207 2126
Fax: (02) 6207 2122

Environment ACT Website:
www.environment.act.gov.au

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