

Action Statement

Flora and Fauna Guarantee Act 1988

No. 77

Giant Gippsland Earthworm *Megascolides australis*

Description and Distribution

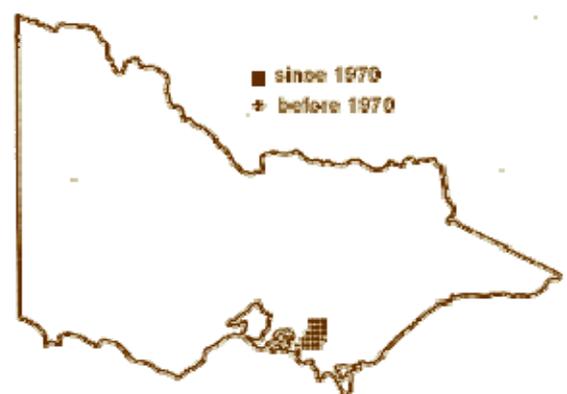
The Giant Gippsland Earthworm (*Megascolides australis* McCoy) is one of the largest earthworms in the world, with an estimated average length of 80 cm and a diameter of 2 cm (Yen *et al.* 1990). It has 300 to 500 body segments. The front third of the body (including the head) is dark purple and the remainder is a pinkish-grey.

Since its description by McCoy (1878), most of the published information on the Giant Gippsland Earthworm involves morphology (Spencer 1888; Bage 1909), physiology (Weber and Baldwin 1985), and general observations by naturalists (Barrett 1931, 1938; Eve 1974). However, some of the earlier published information on the species was based on the incorrect application of the known biology of European earthworms (Van Praagh *et al.* 1989). The most detailed study on the biology, ecology and distribution of this species was undertaken as a PhD study (Van Praagh 1994), some of which has been published (Van Praagh *et al.* 1989; Van Praagh 1991, 1992) or incorporated into other reports (Yen and Van Praagh 1994).

The Giant Gippsland Earthworm is hermaphroditic; two individuals are required for fertilisation to occur. The mating season is spring and early summer. Individuals lay a single amber coloured egg capsule each year that ranges in size from 4 to 8 cm in length, is 2 cm in diameter and contains one embryo. Eggs take over 12 months to hatch. The earthworms are presumed to have a slow growth rate; it is estimated that individuals take 4.5 years to reach adulthood after hatching. The species may be long-lived; populations have a relatively stable age structure dominated by adults



Giant Gippsland Earthworm (*Megascolides australis* McCoy) Illustration by Alexis Beckett



Distribution in Victoria (DSE 2002)

and a low rate of recruitment (Van Praagh 1992, Yen and Van Praagh 1994).

The worms live in complex and extensive permanent burrow systems, the structure of which has been studied by Kretzschmar and Aries (1992). The worms spend their entire life underground, feeding on roots and soil organic matter, although they may occasionally feed on surface plant material by poking their heads out of the burrows. Unlike most other earthworms, which are surface casters, the Giant Gippsland Earthworm deposits its cast material below ground. The worms move by alternately contracting and expanding their head and tail ends. This movement produces a loud gurgling or sucking noise, a distinguishing characteristic that is used to detect the presence of worms in an area. There are no known natural predators (Yen and Van Praagh 1994).

The Giant Gippsland Earthworm is endemic to South and West Gippsland. Its approximate distribution was determined by questionnaires completed by local residents (Smith and Peterson 1982). It is restricted to only 100,000 hectares in an area bounded approximately by Loch, Korumburra and Warragul. However, the range of suitable habitat is only a fraction of this area and the distribution is extremely patchy. Populations are found in very small areas, generally in blue-grey clay soils on flats near the banks of streams or along soaks and watercourses on south or west-facing slopes (Van Praagh *et al.* 1989, Yen *et al.* 1990). The density of adult worms within these populations is generally low — about two per cubic metre (Yen and Van Praagh, 1994).

There are no estimates of the size of remnant populations. Within its known range it can be locally abundant in small areas. Over several years, approximately 500 sites within suitable habitat were surveyed, but worms were recorded at only 42 of these sites (B. Van Praagh, *pers. comm.*).

Conservation Status

Current Status

Commonwealth Endangered Species Protection Act 1992	vulnerable
CNR (1995)	vulnerable
IUCN (1994)	vulnerable
SAC (1991)	threatened

The Giant Gippsland Earthworm has been listed as a threatened taxon on Schedule 2 of the *Flora and Fauna Guarantee Act 1988*.

Reasons for Conservation Status

The Giant Gippsland Earthworm occurs over a relatively small range and its habitat within this area is patchy. Since European occupation most of this habitat has been converted from native forest to exotic pastures. There are worm populations on public land, however most occur on private land. The species has disappeared from areas where it was previously known to occur and has decreased in numbers in others.

The Giant Gippsland Earthworm has a low recruitment rate, slow growth rate and poor dispersal ability. These population traits make it very susceptible to threats, including:

- changes in existing land uses that involve cultivation of the soil;
- alteration to local drainage patterns;
- earthworks;
- urbanisation;
- the use of soluble biocides (pesticides and weedicides);
- the collection of individual worms at levels in excess of the natural population growth; and
- fragmentation of range and isolation of populations.

In its final recommendation, the Scientific Advisory Committee (1991) determined that the Giant Gippsland Earthworm is:

- in a demonstrable state of decline which is likely to result in extinction;
- significantly prone to future threats which are likely to result in extinction; and
- very rare in terms of abundance and distribution.

Major Conservation Objectives

The major conservation objectives are to:

- identify 20 populations on private land throughout the range of the species over the next five years, and protect these populations, ameliorating any threats;
- identify all populations on public land within five years, and protect these populations, ameliorating any threats;
- increase the awareness of public authorities, land managers and the community of the conservation requirements of the Giant Gippsland Earthworm;
- ensure that any collection does not threaten the survival of local populations;
- undertake further research into the biology and ecology of the Giant Gippsland Earthworm to gain more information for conservation management.

Management Issues

Ecological Issues Specific to the Taxon

The Giant Gippsland Earthworm is a difficult species to study because of its subterranean habits and physical fragility. Consequently, many questions about its biology and ecology remain unanswered.

Habitat Changes

The native forests that originally covered the habitat of the Giant Gippsland Earthworm have been removed almost entirely and converted to exotic pasture, mainly for dairy farming. The effects of this change on populations of the earthworm are not understood fully, but are likely to have contributed to its decline.

Soil Disturbance

Direct disturbance of the soil kills earthworms and destroys their burrows. Giant Gippsland Earthworms are very fragile organisms and lack the ability to recover from even slight wounds. On farmland within their known range, earthworm populations tend to be restricted to areas such as steep hillsides and gullies in which the soils are not ploughed. Increases in the frequency and extent of any forms of soil cultivation could easily cause further local extinctions of the earthworm.

Other activities destructive to earthworm habitat are road-making, dam building, deep ripping and cable laying.

Drainage Patterns

Giant Gippsland Earthworms inhabit moist soils, and their movements within the soil profile may be controlled by seasonal fluctuations in moisture content of the soil and depth of the water table. Alterations to drainage patterns may affect its survival.

Urbanisation

Subdivision of private farmland for suburban development has the potential to permanently destroy earthworm habitat through road and building construction and other disturbances.

Chemical and Effluent Input into Soils and Waterways

As decomposers, the earthworms are low in the food chain and may be susceptible to accumulations of biocidal agents in the environment. Giant Gippsland Earthworms respire through their skin and may also be at risk from direct poisoning by chemicals. The effects of high levels of effluent discharge and fertiliser run-off

into waterways on Giant Gippsland Earthworms and their habitat are unknown.

Collection and Use

In the past, Giant Gippsland Earthworms have been collected for a number of reasons; including ad hoc collecting by individuals, collecting for commercial purposes (including public display) and collecting for scientific research. Collection has ranged from incidental to extensive. The impact of collection has not been monitored, and continues largely unchecked.

The only known method of collecting the worms is to dig them out of the ground. Digging destroys burrow systems and often injures and kills worms; in addition, their skins can burst as the worms try to escape capture (Van Praagh 1994). Recent research (McCarthy *et al.* 1994) indicates that collection depletes local populations, and the removal of even small numbers of the worms may, over time, cause the extinction of the populations from which they have been taken.

Giant Gippsland Earthworms are not suitable for keeping in captivity. In previous scientific attempts to keep these worms in captivity, the majority of specimens died within several weeks (Van Praagh 1992). No successful breeding has been achieved in captivity (Van Praagh 1992). Attempts to breed other species of giant worms have also been unsuccessful (Dr K. Lee, CSIRO, *pers. comm.* 1991; Dr R. Blackmore, University of Queensland, *pers. comm.* 1992; Dr P. Lavell, ORSTOM, *pers. comm.* 1993).

Wider Conservation Issues

Land Protection

Conservation of the earthworm and its habitat has wider implications, primarily for land and water protection. The fencing of Giant Gippsland Earthworm habitat to exclude stock has many benefits to landowners. Retention of natural streamside vegetation is important for protecting highly productive creek flats, preventing stream degradation and improving water quality for stock and domestic use. Retaining vegetation on steep slopes and gullies also improves water quality and minimises erosion hazards. The activities of the earthworms themselves may well have beneficial effects on soil structure and fertility.

Streamside vegetation is vital to the functioning of stream ecosystems and provides natural linkages through the environment. Seven species of native fish and five species of native burrowing crayfish that occur within the range of the Giant Gippsland Earthworm are under threat in Victoria. These species would also benefit from the protection of streamside vegetation, as they are all detrimentally

affected by siltation and loss of wood debris from their instream habitat.

Scientific Values

Given its large size, the Giant Gippsland Earthworm is of special scientific value in its potential to assist in understanding the biology and ecology of the world's large earthworms.

Social and Economic Issues

The protection of the Giant Gippsland Earthworm has important implications for regional planning, land management, agriculture and tourism in South and West Gippsland.

Community Attitudes

The Giant Gippsland Earthworm has become part of the folklore of South Gippsland. Most landowners speak with pride about the presence of Giant Gippsland Earthworms on their properties. The 'Karmai' or Giant Gippsland Earthworm Festival, held annually at Korumburra, has been running for nearly 20 years and is one of the largest country festivals in Victoria.

While holding positive feelings towards the Giant Gippsland Earthworm, many local people do not believe that its existence is threatened because it seems to occur over a wide area and its movements are frequently heard. A major challenge is to reconcile this view with the evidence of its declining distribution and numbers, and to ensure that community education on this issue is effective.

Animal welfare issues may also arise because collection involves burrow destruction, injury to and death of worms during collection, and death of collected worms in captivity after a short time. Many people, and organisations such as the RSPCA, attach great importance to such issues when associated with mammals and birds of an equivalent size. People also may not be aware that it is an offence to collect, possess or display the Giant Gippsland Earthworm without an appropriate licence, permit or authority issued by NRE.

Private Land

Conservation of this species relies largely on farmers maintaining areas of suitable habitat on their properties, and appropriately managing activities that might otherwise adversely affect the Giant Gippsland Earthworm. Because of its association with particular soil types that have a very patchy distribution, it is unlikely that the worm occupies more than 5 to 10% of any one property. Landowners may need assistance in identifying these areas.

Of the 642 agricultural establishments in the area that approximates the distribution of the Giant Gippsland Earthworm, farms with dairy cattle (413) and/or beef cattle (581) predominate, with some growing potatoes (24), vegetables (32) and fruit (8). Of these, up to 100 properties might contain earthworm habitat (ABS 1993).

While not necessarily the only way to protect earthworm habitat, fencing out streamsides and wetter hillsides is probably the most effective. Farmers would be removing only limited areas from direct production while gaining from reduced erosion risks and improved shelter; the wider community would benefit from protection of water quality.

With costs increasing faster than product prices, most farmers are under pressure to expand production. However, because the worms are found in small, isolated patches, farmers will usually be able to include habitat protection in their plans (e.g. for pasture development, fence lines, tracks, drainage, dam construction). The development of property management plans will help farmers maximise the benefits from relatively less intensive management of areas of Giant Gippsland Earthworm habitat, while at the same time intensifying the use of other areas of the farm.

Planning

The planning decisions of municipalities, Catchment and Land Protection Boards and regional planning bodies will influence the long-term survival prospects of the Giant Gippsland Earthworm. If the habitat requirements of the Giant Gippsland Earthworm are considered early in all relevant planning, it is unlikely that development opportunities will be adversely affected.

Subdivision and Small Properties

An increasing area of West and South Gippsland has been subdivided for hobby farming and rural residential living. Further subdivision is highly likely as farmers age or sell out for other reasons. The loss of prime agricultural land is of concern and has led to proposals for better planning and management of such development (WRPCC 1994). This is entirely compatible with protection of Giant Gippsland Earthworm habitat. Mechanical disturbance associated with subdivisions (e.g. construction of dwellings, dams, tracks or effluent disposal systems) can lead to loss of habitat as well as altering local hydrological regimes. These matters need to be addressed through effective planning.

Tourism

Interest in the Giant Gippsland Earthworm has been exploited by the local tourist industry. Thousands of visitors each year are attracted to Korumburra's Karmai festival, to the Coal Creek Historical Park, which houses a small, static display on the earthworm, and to 'The Giant Worm Museum' at Bass. This last facility houses a series of interactive exhibits and educational displays, as well as live Giant Gippsland Earthworms. Despite the original expectations of the owner to breed earthworms in captivity, regular collection of earthworms continues. The live display is no longer a focal point to the extent that it was when the museum was established in 1987, as the complex now also displays live Common Wombats, Emus and other wildlife, among other attractions.

Previous Management Action

- NRE, World Wide Fund for Nature, the Australian Heritage Commission and the Museum of Victoria provided field and financial support for studies on the ecology and distribution of the earthworm. .
- Land for Wildlife Note No. 11, Giant Gippsland Earthworm — Nature's Plough, detailed steps landowners can take to conserve the habitat of the earthworm..
- Habitat on Crown Land along the Bass River and its tributaries has been rehabilitated by eradicating weeds and restoring native vegetation..
- A register of known localities of the earthworm has been developed and maintained by the Museum of Victoria..
- The Museum of Victoria has helped the Coal Creek Historical Park to develop an attractive educational display not requiring live Giant Gippsland Earthworms..
- NRE has helped landowners to fence out and revegetate known habitat areas on private property..
- NRE commenced a community education program on the habitat requirements of the Giant Gippsland Earthworm..
- The Museum of Victoria contacted many landowners during survey and research efforts..
- Private land with habitat of Giant Gippsland Earthworm has been listed on the Register of the National Estate.
- A population viability analysis that investigated the impact of collecting on the species has been completed (McCarthy et al. 1994).

Intended Management Action

Habitat Protection

1. Prepare guidelines for identifying, protecting and managing Giant Gippsland Earthworm habitat and managing threats to habitat on private and public land, to be used by landowners, public utilities, local government and NRE. (FF)
2. Achieve protection of 20 or more populations on private land within five years by working with Landcare groups, landowners and extension officers:
 - to identify and agree upon these 20 or more populations (these should be spread across the total distribution of the species, allow for recolonisation of adjacent areas and linking of local populations, and represent high-density populations);
 - to identify and implement actions required for site protection (fencing, tree planting, covenants, etc.);
3. to identify and obtain assistance needed by landowners through grants schemes. (PP, GI) Ensure that leasehold arrangements for relevant public land stream frontages contain appropriate conditions, developed in conjunction with leaseholders, to protect Giant Gippsland Earthworm habitat. (PP, GI)
4. Ensure that all populations on land managed by NRE are identified and protected through site protection measures and appropriate management plans. (PP, GI)
5. Liaise with agencies responsible for managing other public land and waters, and for infrastructure development (e.g. power, telecommunications, roads) to ensure that Giant Gippsland Earthworm habitat is protected. (FF, PP, GI)

Catchment Management and Regional Planning

6. Liaise with regional authorities and the Port Phillip and West Gippsland Catchment and Land Protection Boards about incorporating the protection of earthworm habitat into local planning schemes and management plans. (FF, PP, GI)

Survey and Monitoring

7. Assist the Museum of Victoria to maintain its sites register. (FF, PP, GI)
8. Over the next five years, monitor all known sites to determine the presence of Giant

- Gippsland Earthworms, using landowner questionnaires, field surveys, etc. (FF, PP, GI).
9. Encourage landholders and others to report sightings of the Giant Gippsland Earthworm to local NRE officers and have them recorded in the Atlas of Victorian Wildlife. (PP, GI).
 10. Determine whether the Giant Gippsland Earthworm has survived in, or recolonised, sites where it has been collected previously. (FF, PP, GI)

Liaison and Community Education

11. Prepare information brochures targeted at property owners, agricultural consultants, contractors and local government on conserving the Giant Gippsland Earthworm and its habitat. (FF)
12. Promote Giant Gippsland Earthworm conservation through NRE extension programs such as Land For Wildlife, FarmCare, FarmSmart, and Landcare. (FF, PP, GI)
13. Use NRE farm sites where possible to demonstrate protection and management of Giant Gippsland Earthworm habitat. (PP, GI)
14. Provide up-to-date material on the Giant Gippsland Earthworm to commercial and educational displays so that public information is consistent with current scientific knowledge. (FF, PP, GI)
15. Investigate the possibility of forming a 'Friends of the Giant Gippsland Earthworm' group. (PP, GI)

Regulation of Collection and Display

16. Publicise the fact that collecting and keeping Giant Gippsland Earthworms requires appropriate permits issued by NRE under the Wildlife Act 1975. (FF, PP, GI)
17. Ensure that permits to collect Giant Gippsland Earthworms are issued only if this activity does not harm the survival of those populations and where the benefits to conservation outweigh any destructive impacts of collection. (PP, GI)
18. Develop guidelines for collecting Giant Gippsland Earthworm for inclusion as conditions attached to permits. (FF).
19. Collect information on the extent of taking (number of worms, area of habitat affected, purpose of taking, longevity in captivity, etc), and encourage landholders and others to report relevant information. (PP, GI)
20. Complete a review of collection from the wild within two years, providing opportunity for all concerned parties to have input. (PP, GI)

Research

21. Support research to further define the habitat characteristics of the Giant Gippsland Earthworm, in order to provide improved information on likely locations for the worms, for conservation management. (FF, PP, GI)

Recovery Team

22. Establish a recovery team, with membership from groups, to guide the implementation of this Action.

Other Desirable Management Action

Research

23. Encourage scientific organisations to conduct further research into the biology, distribution and ecology of the Giant Gippsland Earthworm. Emphasis should be on in situ conservation of the species. In particular, research is required on the effects on the earthworm of changes in land management practices over time (including altered drainage, effluent management and fertiliser and chemical use), the effects of damage to burrow structures, and the species' response to site protection measures. (FF)
24. Investigate social issues that are obstacles to the conservation of the species, including factors that make it difficult for local people to accept scientific research about the limited distribution and abundance of the earthworm, and determine the requirements for community education if this is to be addressed. (FF)
25. Encourage and support research on the contribution of Giant Gippsland Earthworms to soil structure and fertility. (FF)

Legislative Powers Operating

Legislation

Local Government Act 1958 — provides for local council by-laws and conservation regulations (e.g. permit requirement for land clearing).

Flora and Fauna Guarantee Act 1988 — provides for the protection of native flora and fauna in Victoria.

Planning and Environment Act 1987 — provides regulations on the clearing of native vegetation on both private and public land.

Catchment and Land Protection Act 1994 — provides a legal framework for protecting catchments, including soil and water management and control of noxious weeds and vermin.

Water Act 1989 — provides protection for the environmental qualities of waterways.

Wildlife Act 1975 — provides for the protection and management of wildlife (vertebrate animals other than fish and Flora and Fauna Guarantee-listed invertebrates) and includes controls over the handling of protected wildlife. The status of the Giant Gippsland Earthworm as 'protected wildlife' makes the taking, destruction, display and sale of it an offence under the Act unless an appropriate authority has been obtained. The *Wildlife Regulations 1992* make it an offence to wilfully damage, disturb or destroy any wildlife habitat.

Licence/Permit Conditions

With the listing of this species under the *Flora and Fauna Guarantee Act* 1988 the Giant Gippsland Earthworm became 'protected wildlife' according to the provisions of the *Wildlife Act* 1975. As such, it is an offence to collect, possess, or display the Giant Gippsland Earthworm without an appropriate licence, permit or authority issued by NRE. The *Wildlife Regulations 1992* make it an offence to wilfully damage, disturb or destroy any wildlife habitat. Therefore a person destroying burrow systems when searching for the worms may be guilty of an offence.

Available scientific evidence indicates that collection of Giant Gippsland Earthworms represents a threat to the species' long-term survival. NRE will therefore only grant permits or licences to collect, keep or display Giant Gippsland Earthworms for scientific and conservation purposes.

Consultation and Community Participation

Organisations that have been or will be consulted in the preparation and implementation of the Action Statement include: the Museum of Victoria, the Poowong Landcare Group Inc., private museums with displays of the Giant Gippsland Earthworm, the West Gippsland and Port Phillip Catchment and Land Protection Boards, local municipalities, and farming organisations such as the United Dairy Farmers of Victoria.

Implementation, Evaluation and Review

The Managers of NRE's Gippsland and Port Phillip Regions will coordinate the implementation of this Action Statement. Primary responsibility for the implementation and assessment of the effectiveness of the management actions lie with the Flora and Fauna Guarantee Officers within the Gippsland and Port Phillip Regions.

Contacts

Management

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Biology

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Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

This Action Statement was first published in 1997 and remains current. This version has been prepared for web publication. It retains the original text of the action statement, although contact information, the distribution map and the illustration may have been updated.

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