Fisheries Victoria

Victorian Eel Fishery Management Plan

Fish for the Future

State Government Victoria
Department of Natural Resources and Environment

Victorian Eel Fishery Management Plan

July 2002

Victoria
The Place To Be

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Small photos from left - DNRE, DNRE, Kim Elton, DNRE

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Foreword

I am pleased to be able to release this Management Plan for the Victorian Eel Fishery. This is the second management plan for this fishery, however the first plan was developed in the early 1990s prior to the introduction of the current Fisheries Act which establishes a more formal planning process based on the principles of ecologically sustainable development (ESD).

The eel fishery is a relatively small but important export fishery for the State. While greatly affected by seasonal factors, production averages around 280 tonnes per year with a value of $1.4-4.7M. The catching and processing sectors of the fishery employ up to 70 people across Victoria in a good season.

The first eel fishery management plan, declared in 1995, introduced some important changes to management of the fishery including transferable commercial fishery licences and improved security of access to major fishing waters. The purpose of this plan is to consolidate the progress made in the first plan, and to ensure that the fishery continues to be managed on a sustainable basis into the future.

This plan is part of the Bracks Government's vision for Victoria as a State where protecting the environment and using our resources sustainably is built into everything we do.

An important new development that has occurred since the first plan was declared is the interest in collection and utilisation of glass eels for both stock enhancement and intensive aquaculture purposes. The wild eel fishery is fully developed and any increase in eel production in the foreseeable future is likely to come from stock enhancement or aquaculture.

This plan sets the direction for development of stock enhancement and aquaculture based on glass eels.

Consistent with the Bracks Government's commitment to effective community engagement, the development of this Plan has been achieved through extensive negotiation and consultation with key stakeholder groups. The planning process has been overseen by the Fisheries Co-Management Council and effective stakeholder input was achieved through a Steering Committee with representatives from all major groups. A Draft Plan was released for broader public comment prior to the preparation of the final Plan

This Plan sets future management directions and strategies with a five year time horizon and beyond. However, it should not be regarded as a rigid document, inflexible to the need to evolve in response to new information and technologies or changing community attitudes. The Plan will be reviewed as necessary to ensure that it adapts to changing circumstances as they arise.

I congratulate all those involved in the development of the Victorian Eel Fishery Management Plan.

Candy Broad
Minister for Energy and Resources

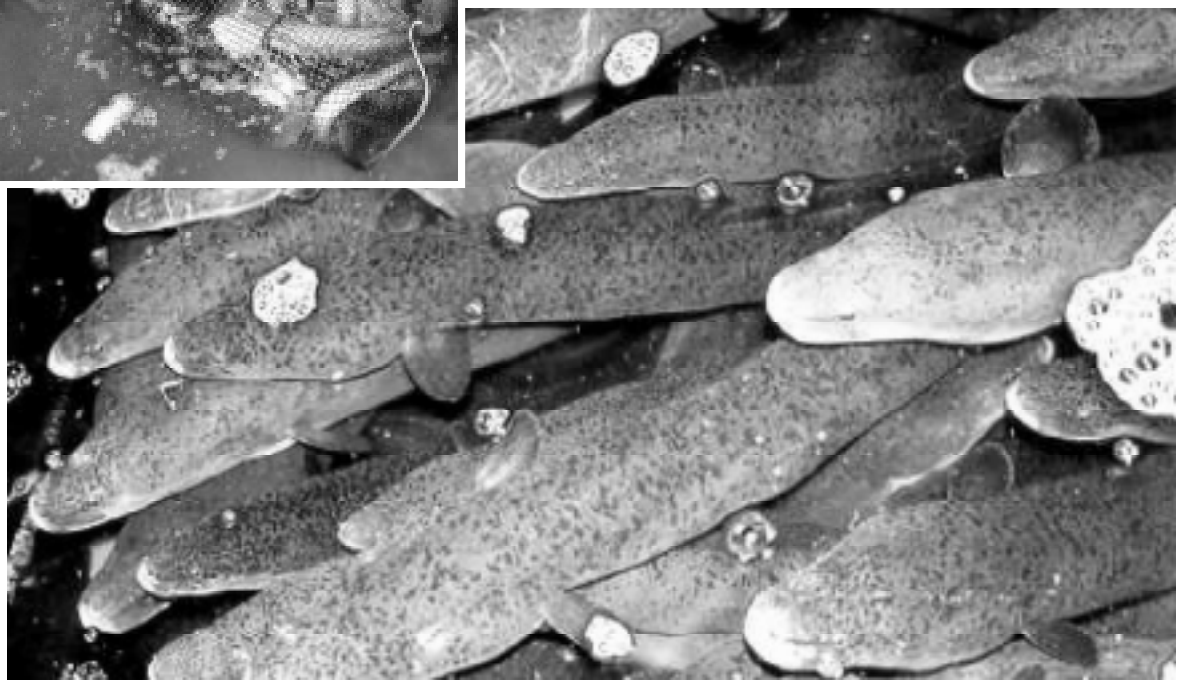
Contents

Vision

The Victorian eel fishery will develop, with increasing self-management, as an ecologically sustainable export industry comprising both wild eel, stock-enhanced, and intensively cultured product.

◀ *Bag of newly caught shortfinned eels (DNRE).*

▼ *Longfinned eels awaiting live export to Asia (Kim Elton).*



Introduction

Eel biology and life history

The genus *Anguilla* comprises 15 recognised species worldwide, four of which occur in Australian freshwaters. Victoria's eel fishery is made up of the shortfinned eel (*Anguilla australis*) and longfinned eel (*A. reinhardtii*).

All species of anguillid eels are catadromous, spending the majority of their life cycle in fresh water or estuaries and reproducing once only in the ocean before dying. Spawning of both species is thought to occur in the vicinity of the Coral Sea in the South Pacific Ocean, but no precise spawning location for either species has been identified. Eggs are thought to be pelagic and hatch after about two days.

The newly hatched larvae, or leptocephali, survive on the resources of their yolk sac for about five days before commencing exogenous feeding. As the leptocephali feed and grow, they are transported toward the eastern Australian coastline by the South Equatorial Current, and then along the coast by the East Australian Current.

Metamorphosis to the glass eel is thought to occur along the continental shelf, and tidal currents transport the glass eels, which are also actively swimming, toward and into the embayments and estuaries of the eastern Australian continent. Glass eels are between 50-60mm in length and weigh between 0.1-0.2g each. Shortfinned glass eels migrate mainly in the winter and spring, while longfinned glass eels migrate mainly during summer and autumn, although glass eels of each species may continue to arrive at some estuaries throughout the year.

The respective distributions of shortfinned and longfinned eel are extensive, and overlap considerably. Shortfinned eels are distributed from subtropical Queensland to western Victoria, Tasmania and New Zealand. Longfinned eels are found from far north Queensland to eastern Victoria and Tasmania. Specimens of the Australian longfinned eel have also been recently recorded from New Zealand.

As for other anguillid eels, both the shortfinned and longfinned eel species are thought to belong to respective panmictic genetic stocks. That is, a single genetic stock exists for each species, and recruitment to any river or lake within the respective distribution of each species is random.

Eels live in a variety of habitat types, ranging from the open ocean to estuaries, rivers, lakes, swamps, creeks and farm dams, sometimes appearing in places which have no recognisable connective waterways.

Generally, shortfinned and longfinned eels are restricted to the North East Coast and South East Coast Drainage Divisions, and do not occur inland, however occasional shortfinned eel specimens have been recorded from the Murray-Darling Drainage Division, probably due to migration by glass eels as far west as the Murray River mouth in some years.

Eels are opportunistic feeders, utilising multiple levels of the food chain, including phytoplankton, insects and crustaceans, fish and other prey. Sex determination in eels is dependant on several factors, including salinity, temperature, diet, population density and other environmental factors. Generally speaking, the proportion of females in eel populations increases as population density decreases.

Little has been documented on the spawning migration of adult eels in Australia, particularly that of longfinned eel. Eels mature at 10-20 years of age and shortfinned eels undertake their oceanic migration from January to March. Female shortfinned eels range in size from 80-130cm in length and may

reach over 6kg. Males are considerably smaller at maturation, reaching up to 50cm in length and 250g. Female longfinned eels reach 165cm and 22kg while males are much smaller, reaching 65cm and 600g.

Status of the eel fishery in Victoria

History of the eel fishery

Traditional eel fishery

It is well documented that it was common practice in parts of Victoria for traditional Aboriginal societies to harvest and even ranch eels. Extensive and complex channel, embankment and trapping networks were constructed for the manipulation of water in the swamps around Toolondo and Mount William, in western Victoria, in particular. Such sophisticated works and water management systems were used to support the control, ranching and harvesting of eel populations. Stone weirs were also constructed in areas such as Lake Condah in western Victoria. These were used to guide migrating eels into nets or basket traps. Spears were also used to harvest eels.

Eel fishing seasons at such locations extended for 1-2 months per year, with individual family groups harvesting from their own weir. Large numbers of Aborigines often gathered for "eel feasts", with attendances of up to 2500 recorded. It is acknowledged that Aboriginal people utilised the shortfinned eel resource in western Victoria, the exploitation and management of which is reflected in the archaeology of the area.

The use of stone in the construction of shelters and fish traps is indicative of the semi-permanent lifestyle of the local Aboriginal groups. The networks of channels and weirs among wetlands and the main river for the managed exploitation of eels indicate an unusually high degree of labour investment for people who were essentially hunter-gatherers. It is also thought that eels were an important component of a barter system in western Victoria.

Development of the commercial eel fishery in Victoria

Prior to the 1950s, the commercial utilisation of eels by European Australians was limited, although eel resources supported a small but significant recreational fishery, as they do today.

The first commercial catches of eel were recorded in 1914 and until the 1950s the commercial eel fishery was based on supplying bait to the rock lobster and long-line shark fisheries. The early eel fisheries were conducted in Lake Bolac, Lake Purrumbete and the Gippsland Lakes at Paynesville, with smaller fisheries operating at Lakes Entrance, Lake Tyers, Tamboon Inlet, Mallacoota, Western Port and Port Phillip Bays.

Annual eel catch was generally around 9-12 tonnes until the 1950s, during which the commercial fishery for eels for human consumption began in Gippsland, supplying smoked eels to European migrants in Melbourne. By 1961 there were 15 licensed eel fishermen in Victoria producing around 44 tonnes of eels annually.

Export of frozen shortfinned eels to Europe commenced in the early-mid 1960s. The company Eels Pty Ltd, based in Skipton, was subsequently formed and the majority of active eel fishermen were supplying eels to this company by the late 1960s. At this stage, the feasibility of extensively "culturing" eels by stocking undersized eels and elvers into lakes in western Victoria was examined and this practice now comprises a substantial proportion of the eel fishery in Victoria.

By 1982, the number of Victorian eel fishermen had declined from 28 to 19, largely due to the removal of inactive fishermen through the "show cause" provision of the 1968 Fisheries Act. By the mid 1980s, up to 450 tonnes of eel (shortfinned and longfinned) were produced in Victoria annually, with wild shortfinned eel predominating, and extensively cultured shortfinned eel comprising up to 40% of the total catch.

In addition to "size" eels, significant quantities of juvenile eels, in particular elvers and undersized eels, and to a lesser extent glass eels, were captured, primarily as "bycatch" in the adult eel fishery, and utilised for stock enhancement purposes in "culture waters". Although records of specific quantities of stocked eel are not available, several tonnes of elvers were recorded from Victorian waters each year in the 1980s as well as 135kg of glass eels in 1986/87.

Exploratory elver and glass eel fishing through the late 1970s to the early 1980s was undertaken by Eels Pty Ltd, primarily as an attempt to identify any sources of high yields of juvenile eels in Victoria which could be exploited for restocking purposes. Weirs and other obstructions to elver and glass eel migration were targeted across Victoria but yields were generally low, and were not considered to be commercially viable in terms of providing significant quantities of juvenile eels.

A large source of elvers was identified in the Tamar River, Tasmania in the 1980s when elvers were observed climbing through the drains of the Trevallyn power station in Launceston. Hundreds of kilograms of elvers were subsequently sourced from Tasmania on an annual basis and stocked into Victorian lakes during the 1980s and 1990s. These were initially collected by Eels Pty Ltd using glass eel nets set in the power station tailrace, for which a nominal royalty was paid to the Tasmanian Government.

In 1994/95, the Inland Fisheries Commission assumed control over the collection of elvers from the Trevallyn tailrace, and commenced the sale of elvers through an expression of interest process. Shortfinned elvers are now harvested on an annual basis from both the Trevallyn tailrace using glass eel nets, and Meadowbank Dam on the Derwent River upstream from Hobart, using a permanent flow trap.

Current fishery

Commercial fishery

The Victorian commercial eel fishery is an important fishery for the State, comprising two species, the shortfinned eel and longfinned eel, producing between 125-450 tonnes (average 280 tonnes), worth approximately $1.4-4.7M annually. Overall, the shortfinned eel makes up approximately 95% of total eel production.

The eel fishery has been relatively stable, in terms of production, over the last two decades, however the fishery is strongly affected by seasonal factors, and recent drought conditions have resulted in relatively low production in successive years.

A large component of eel production continues to be stock enhancement, whereby elvers and small eels (snigs) are stocked into selected lakes for extensive ongrowing under natural conditions. In most years the commercial catch is roughly comprised of up to 40% stock-enhanced cultured shortfinned eel product, however protracted drought conditions since 1994 have resulted in a significant decrease in both stock-enhanced, and wild shortfinned eel production (Figure 1). By contrast, longfinned eel production has been maintained at between 10 and 30 tonnes annually and appears to be increasing at present (Figure 1).

The wild shortfinned and longfinned eel components of the fishery are comprised largely of migrating adult eels. The reliance of the existing commercial eel fishery in Victoria on this component of the fishery is consequently very great, particularly during periods of drought when productivity from stock-enhanced waters is low. There are currently 18 Eel Fishery Access Licence (EFAL) holders in Victoria, and the industry directly employs around 30 full-time, and up to 70 part-time people across Victoria.

Most eels are exported frozen to Europe (mainly shortfinned eels) or live to Hong Kong and Korea (mainly longfinned eels). There is a limited domestic market for eel in Australia at present.

The commercial fishery is input managed, with limited entry, gear restrictions and water allocation the main input restrictions. A minimum legal length for both species of eel currently exists and is set at 30cm. There is no Total Allowable Catch (TAC) set.

Fyke nets are the only gear permitted for use by EFAL holders and only holders of an EFAL may use or possess fyke nets. A small quantity of eel is also taken commercially in bay and inlet fisheries by haul seine operators. Restrictions on the use of fyke nets include: mesh size of not less than 15mm and not greater than 39mm, and a maximum of three wings, each of 46m maximum length, 67cm maximum drop and meshes of no more than 32mm. Currently, each licence holder may use up to 50 fyke nets and nets must be cleared at least once every 48 hours. A fyke net when set must not occupy more than half of the width of a watercourse, and may not be within 5m of another net. Some EFAL holders are permitted to use oversize fyke nets specifically for targeting migrating sea run eels.

Fishery status of Victorian waters
The status of most major Victorian waters with respect to eel fishing has evolved through the 1970s and 1980s, with the allocation of waters to EFALs based largely on which waters had been historically fished and previously shared amongst fishers. However, a number of waters were closed to eel fishing due to the potential threat of netting to platypus and native fish populations in those waters, and others fall within the boundaries of State or National Parks. The sections of streams open to commercial eel fishing are generally restricted to the downstream/estuarine reaches where platypus populations do not usually occur.

Some waters previously fished commercially, such as those draining to Port Phillip and Western Port Bays, are no longer fished. Some waters east of the Snowy River (Brodribb River, Cann River and Cabbage Tree Creek) were previously considered as part of a "conservation reserve" to "maintain adequate breeding stocks of eels" and were apparently closed to eel fishing for that reason. Other major rivers in East Gippsland, such as the Bemm and Snowy Rivers are not open to eel fishing as these waters were not listed in the former Schedule of Waters in the Fisheries Regulations.

At present the only waters open to eel fishing are those listed in the 1995 Eel Fishery Management Plan (EFMP), which were cited directly from the former Schedule of Waters in the Regulations. All other waters are consequently closed to eel fishing.

Recreational fishery
There is limited information on the level of recreational eel fishing in Victoria, however anecdotal evidence suggests that the recreational take of both species of eel is significant.

The recreational eel fishery is restricted to a bag limit of 10 eels per fisher per day, and all other rules under the Recreational Fishing Licence apply. A minimum legal length for eel currently applies to the recreational eel fishing sector, as it does to the commercial eel fishing sector. Recreational eel fishing is permitted in all Crown waters which are open to recreational angling.

Traditional fishery
Aboriginal people continue to fish for eels in the Hopkins River, Mount Emu Creek and other waters in the Hopkins Basin. Stone eel traps are common and each year different family groups continue to harvest eels from specific traps. Nine stone eel traps are in use on one small section of the Mount Emu Creek alone. Eels continue to form an integral part of the culture and tradition of the people of Framlingham, and are recognised as a key theme in the Framlingham Aboriginal Trust Management Plan.

Socio-economic benefits of the eel fishery

The Victorian eel fishery presently employs about 30 full-time, and up to 70 part-time people across Victoria. For example, in the Lake Learmonth/Lake Burrumbeet area alone, 8-10 full-time staff, plus several casual staff, are

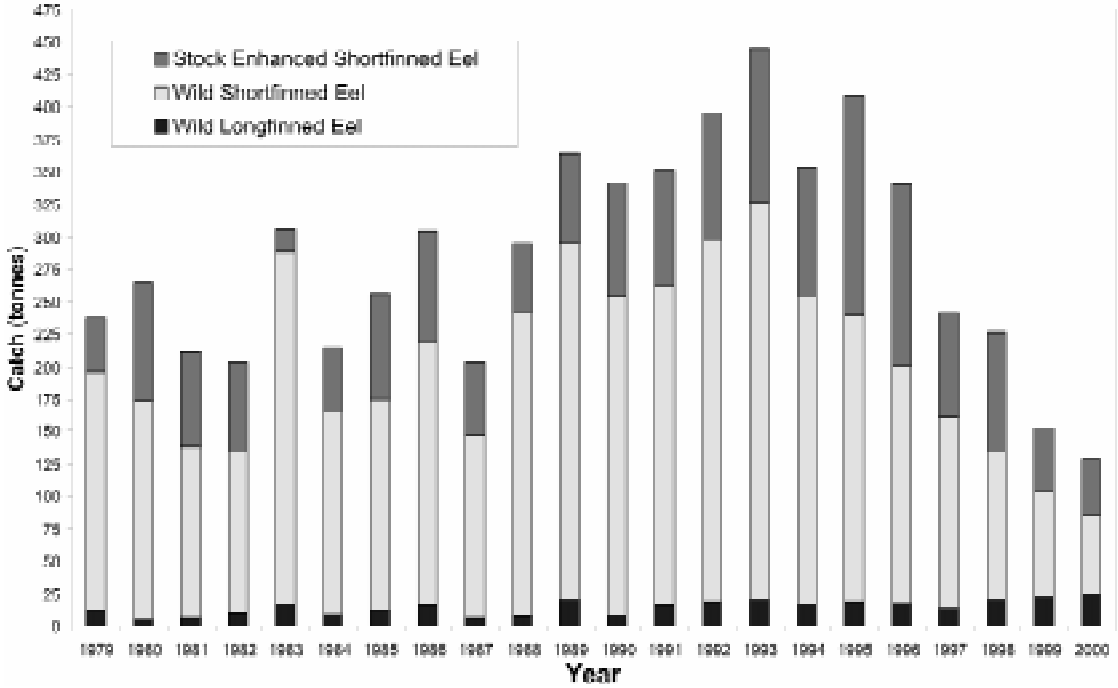


Figure 1. Total Commercial Victorian Eel Catch, 1979–2000.

employed directly in the eel fishery. In particular, the stock enhancement practices of the Victorian eel fishery have significant flow-on effects to recreational fishing and associated business. Stocking of eels into Crown waters provides seedstock which supports what is considered to be a significant recreational fishery. The Victorian eel fishery therefore generates further socio-economic benefits to local businesses and communities through the enhancement of recreational fishing opportunities in rural areas.

Management of eel fisheries outside Victoria

Commercial fishing for anguillid eels occurs in all Australian states where eels are naturally abundant. Both shortfinned and longfinned eel are targeted throughout their range, with shortfinned eel dominating commercial catches in Victoria and Tasmania, and longfinned eel dominating catches in Queensland and NSW. Although shortfinned eel occurs in south-eastern South Australia, no commercial fishery for eel exists there.

There are currently 30 eel capture licences in Queensland, and the fishery produced 42.3 tonnes in 2000. The commercial trap fishery is restricted to impounded waters and licences are being progressively withdrawn to reduce fishing pressure. Glass eel collection and eel aquaculture is developing in Queensland, with over 40 tonnes of eel produced from aquaculture in 1999/2000.

The eel fishery in NSW currently produces around 150 tonnes annually. There are presently over 200 commercial fishers with endorsements for taking eel in NSW. Nine permit holders are able to catch glass eels from a total of 18 catchments which are open to glass eel fishing. A TAC of 300kg is set for glass eels (both species combined), with a TAC of 30kg per catchment, however demand for glass eels is presently low. Eel production from aquaculture is currently low in NSW, with less than 10 tonnes per year presently produced. Eel aquaculture is likely to focus on pond production of longfinned eel in the future.

In Tasmania, 12 licence holders presently catch 40-60 tonnes of predominantly shortfinned eels per year. Elvers, and small quantities of

glass eels, are made freely available to the Tasmanian industry by the Inland Fisheries Service (IFS) for restocking commercially fished catchments. In addition, elvers are restocked by the IFS into unfished catchments for conservation purposes. Elvers are also offered for sale outside Tasmania through an expression of interest process. It is anticipated that an Eel Fishery Management Plan will be drafted for the Tasmanian eel fishery in the near future, and the expansion of the industry through intensive eel aquaculture is being given favourable consideration.

Shortfinned eels comprise approximately two-thirds of the New Zealand eel fishery, (total annual catch 1000-1500 tonnes). Most of the catch is exported to Europe and is worth about $10M. Management tools in the New Zealand fishery include: size and gear restrictions, limited entry, and the maintenance of some closed catchments. A management plan exists for the South Island, which has been divided into six eel management areas. Eels are included in the quota management system, in which 20% of the TAC for eels allows for customary take. The entry of eels in the North Island into the quota management system is expected to be delayed for a further two years (D. Jellyman pers. comm.). Eel culture in New Zealand is restricted to fattening of wild caught large eels. At present there is no commercial culture of eels in New Zealand using glass eels as seedstock, although potentially large glass eel resources are known to exist.

The Australia and New Zealand Eel Reference Group (ANZERG), formally established in 1997 reports to the Standing Committee for Fisheries and Aquaculture on eel management, research and compliance issues relating to Australia and New Zealand. The Terms of Reference for ANZERG are:

- To develop a coordinated approach to the management of eel stocks.
- Develop strategies for:
  - Stock allocation
  - Management and administration of the glass eel catching sector
  - Eel industry development (in collaboration with Aquaculture Committee)
  - Compliance (in collaboration with Compliance Committee)
- Promote cooperative research on eels between states.
- Advise on management policies to assist the promotion and enhancement of the eel aquaculture industry.
- Facilitate communication and coordination between eel fisheries management, aquaculture management and research staff.

ANZERG membership includes all Australian states plus New Zealand, consisting of one eel aquaculture representative (government) and one eel fisheries representative (government) person per state.

Due to the panmictic nature of eel stocks, and the distribution of both commercially important eel species across state and national boundaries, management of the Victorian eel fishery must be undertaken with the knowledge of other statutory management regimes, and vice-versa. That is, a consistent national, and where appropriate, international, approach to the management of eels is required. It is the role of ANZERG to facilitate and ensure such consistency of management.

Review of policies and strategies contained in the 1995 Eel Fishery Management Plan

After several years of consultation, a Management Plan for the eel fishery in Victoria was declared in 1995 by the then Minister for Natural Resources, as the key policy document for the management of the Victorian eel fishery. This Plan served to help stabilise the eel fishery, through the provision of transferable licences, and greater security of access to major fishing waters.

The 1995 Plan aimed to introduce measures that would:

- Provide secure access to major fishing waters.
  - The 1995 Plan has provided for secure access to major fishing waters. These waters were referred to as "Scheduled" waters, which were open to commercial eel fishing, as listed in the former Schedule of Waters in the Fisheries Regulations and were allocated to individual EFALs. Most major waters are allocated singly to EFALs, however some waters, such as the Gippsland Lakes, are shared amongst a small number of EFAL holders. A number of waters are shared amongst all EFALs and six waters in western Victoria are shared amongst four EFAL holders. Three licences have no specific allocated waters. In addition, some Wildlife Reserves are able to be fished under permit, renewable upon application on an annual basis. Allocated waters, waters for which current eel fishing permits are held, and waters closed to eel fishing are listed in the Appendices.
- Manage recruitment into the industry.
  - The 1995 Plan provided for the transferability licences. This has given capital value to licences and enabled recruitment of fishers into the industry. Licences were made transferable under 1995 Fisheries Act subject to provisions of Fisheries Regulations and Ministerial directions. Provision in the 1995 Fisheries Act for the employment of operators on Access Licences was made available to the eel fishery with the promulgation of the 1998 Fisheries Regulations. A total of eight of the 18 transferable licences have changed hands since the 1995 Plan; two of these have changed hands twice.
- Provide for uniform, open and responsible management and operation of the fishery.
  - Representatives of DNRE meet on a bimonthly basis with the Victorian Eel Fishers' Association and Seafood Industry Victoria to discuss and resolve management issues as they arise.
- Remove "surplus nets" from the fishery.
  - Application of "show cause" provisions of the *Fisheries Act, 1968* to underutilised licences was unsuccessful. Two "B" Class licences were issued but were converted to "A" Class licences following successful appeals to the Licensing Tribunal.
- Encourage movement of fishing activity from wild to cultured stocks.
  - The limited availability of restock eels has resulted in no initiatives undertaken by Management to facilitate this.

Need for a new Eel Fishery Management Plan

The 1995 Plan however, did not include provision for the commercial collection and utilisation of glass eels. As a result, the then Minister for Agriculture and Resources issued guidelines for the preparation of a new Management Plan for the Victorian eel fishery in August 1999.

According to these guidelines as issued under Section 28(2) of the *Fisheries Act, 1995*, in addition to a review of all policies and strategies in the 1995 Eel Fishery Management Plan, issues to be addressed in the new Eel Fishery Management Plan include:

- The level of fishing effort in specified Crown waters that are open to eel fishing, particularly those specified waters that are unallocated.
- Access to Crown waters that are not specified for eel fishing, including Wildlife Reserves.

- The level of fishing effort in all Crown waters that are specified for eel fishing in relation to recreational fishing, traditional fishing and conservation interests.
- The entitlements of an Aquaculture Licence for a Crown water (culture water) in relation to the operator of the licence and the gear that can be used.
- Opportunities for commercial utilisation of Victoria's glass eel resource, and issues relating to access and allocation of this resource.
- The appropriate level of fees, levies or royalties to be charged for the different components of the eel fishery.

The ecologically sustainable development of the Victorian eel fishery

The objectives of the Victorian Fisheries Act (1995) clearly state the role of ecologically sustainable development (ESD) in the conduct and management of Victoria's fisheries (*Fisheries Act, 1995*, s.3). Under the Fisheries Act, Management Plans must be consistent with the objectives of the Act (s.28(6)(a)), and to specify policies and strategies for the management of the fishery on an ecologically sustainable basis (s.29(1)).

ESD is defined as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased" (National Strategy on Ecologically Sustainable Development, 1992).

The Standing Committee on Fisheries and Aquaculture (SCFA) is also pursuing a national framework for ESD of fisheries by developing a national system to report on ESD for all Australian fisheries and aquaculture. With respect to fisheries, ESD can be subdivided into a number of components including target (retained) species, the ecosystem, social and economic issues and management arrangements. The proposed SCFA process will cover all components to fully meet the commitment to ESD.

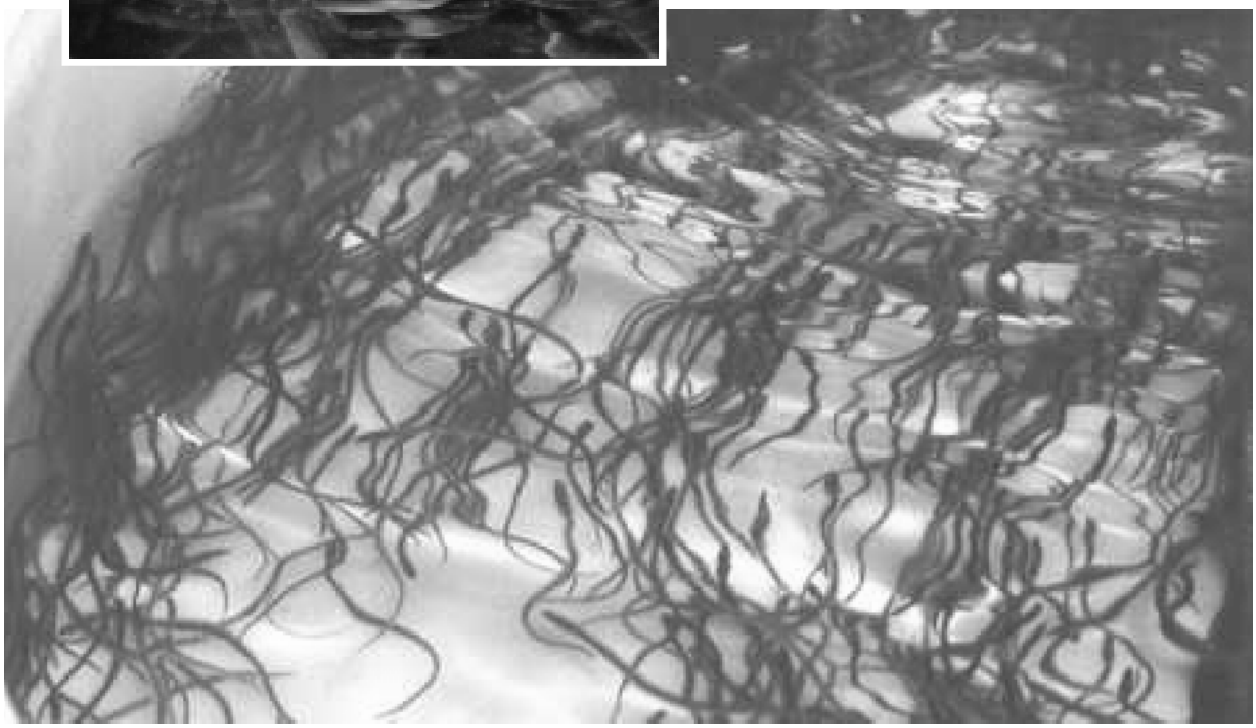
In addition, all export fisheries, which includes the Victorian Eel Fishery, must demonstrate that they are being managed sustainably, in accordance with Environment Australia guidelines, by December 2003, in order to retain exemption from export permit requirements under Schedule 4 of the *Wildlife Protection (Regulation of Exports and Imports) Act, 1982*. An audit of the Victorian Eel Fishery Management Plan against the ESD guidelines of Environment Australia will be undertaken separately to the process of developing this Plan.

Objectives of the Victorian Eel Fishery Management Plan

1. To establish a management framework for the ecologically sustainable development of the fishery.
2. To provide for the expansion of eel production through stock enhancement and aquaculture.
3. To encourage an increased level of self-management within the fishery.

◀ *Cultured shortfinned eels feeding (DNRE).*

▼ *Shortfinned elvers in an intensive recirculating system (DNRE).*



Management tools/strategy

For Objective 1:
- Set biological reference points for the sustainable development of the fishery.
- Establish management response system for the fishery.
- Optimise escapement of sea-run eels.
- Develop bycatch action plan as a priority.

For Objective 2:
- Maintain wild fishing at present levels.
- Develop glass eel fishery and associated intensive and extensive aquaculture (stock enhancement).
- Open up new growout waters.
- Develop eel translocation policy as a priority.

For Objective 3:
- Continue evolution of water allocation to individual licences.
- Move toward allocation of waters on catchment/Basin scale.
- Reduce level of regulation in the industry.
- Review application of regulations to take account of local requirements within separate waters/catchments.

Overall:
- Establish industry development (including R&D) strategy for eel fishery.
- Fund through industry levy.
- Encourage partnership development between commercial and traditional eel fishery sectors.

▼ *Longfinned glass eels (Kim Elton).*

Licensing criteria

Current licensing arrangements

Presently two types of Eel Fishery Access Licences are referred to in the Fisheries Regulations: "A" and "B" Eel Fishery Access Licences. The major difference between these two licence types is that an "A" licence is transferable and a "B" licence is not. These classes of licence were devised in the planning process for the 1995 Eel Fishery Management Plan, however no "B" licences continue to exist. The total number of Eel Fishery Access Licences is 18, all of which are transferable. Therefore, reference to "A" and "B" Eel Fishery Access Licences in the Fisheries Regulations should be removed.

Eel Fishery Access Licence

In accordance with the Fisheries Regulations (1998), an Eel Fishery Access Licence authorises the licence holder to:

(a) take for sale eel, carp (including goldfish), roach and tench; and

(b) use a fyke net; and

(c) use the assistance of one or more people to carry out any activity authorised under the licence, in the waters specified in the licence.

- A "fyke net", as described in the Fisheries Regulations (1998), means a collapsible, conical net with:
  (a) meshes measuring no less than 1.5 centimetres and not exceeding 3.9 centimetres; and
  (b) 2 or more internal compartments; and
  (c) no more than 1 entrance; and
  (d) a maximum of 3 leaders or wings attached with each leader or wing being no longer than 46 metres, having a drop of no more than 67 centimetres and being made of meshes not exceeding 3.2 centimetres;
- Eel Fishery Access Licences are transferable, and the maximum number of licences that may be issued is 18.
- A minimum size limit for both species of eel is currently set at 30cm.

Licence conditions

According to the Fisheries Regulations 1998:

(1) An Eel Fishery Access Licence is subject to the conditions specified in this regulation, in addition to any other conditions imposed on the licence by these Regulations and by the Secretary under section 52 of the Act.

(2) The licence holder:
  (a) must not use any equipment other than a fyke net to take eels, carp, roach or tench; and
  (b) must ensure that every fyke net used is clearly marked with:
    (i) a surface float marked with the access licence number; and
    (ii) a net identification tag issued to that licence holder by the Secretary; and
  (c) must not use or possess on board a boat in, on or next to Victorian waters, more than 50 fyke nets; and
  (d) must ensure that all fish are cleared from nets at least once in every 48 hour period; and
  (e) must return fish other than eel, carp (including goldfish), roach, tench or any noxious fish to the water immediately;
  (f) when using any fyke net in a river, stream, creek or other watercourse must ensure that:
    (i) the fyke net or any fleet of fyke nets is not set so as to block more than half of the total width of the stream or more than half of the width of the main channel of the river; and
    (ii) no more than 3 fyke nets are tied together to form a fleet of nets; and

(iii) any fyke net or fleet of fyke nets is not set within 5 metres of any other fyke net or fleet of fyke nets.

An Eel Fishery Access Licence is also subject to the conditions of every fishery Access Licence as specified in the Fisheries Regulations 1998 (see Appendices).

Allocation of waters
Licence conditions also include waters which are able to be fished on each licence. The allocation of waters to specific licences is detailed in Table 1 (see page 14).

In addition, unspecified waters which can be commercially fished for eels by holders of EFALs and their nominated operators include:

1) All Crown lakes, dams, swamps, marshes and morasses south of the Great Dividing Range*, except:
   a) Lake Wendouree,
   b) those water bodies forming part of any Wildlife Reserve unless specified in a permit issued by the Executive Director, Fisheries,
   c) any water allocated to another licence holder,
   d) any water subject to a Fish Culture Permit under the *Fisheries Act, 1968* specifying eels, or an Aquaculture Licence under the *Fisheries Act, 1995* specifying eels.
2) All rivers, creeks, channels and drains downstream of the South Gippsland Highway between Dandenong and the junction of the South Gippsland and Bass Highways.
3) All rivers, creeks, channels and drains downstream of the Bass Highway between the junction of the South Gippsland and Bass Highways, and Wonthaggi.

* Crown lakes, dams, swamps, marshes and morasses located in the Portland and Glenelg River Basins may only be fished under Licence Nos. 2, 8, 9 & 10.

The allocation of the Fitzroy, Moyne, Surrey and Shaw Rivers, and Darlot Creek, all downstream from the respective bridges on the Princes Highway, and Belfast Lough is shared amongst Licence Nos 2, 8, 9 and 10. The only specified waters which are allocated to all licences are the Franklin and Agnes Rivers downstream from the South Gippsland Highway respectively.

Recommended changes to Eel Fishery Access Licence conditions

Water allocation

The present values of EFALs reflect the value of the fishery, and the degree of optimism for its future, but may vary between licences depending on the allocation of waters to licences. There are 18 transferable Victorian EFALs issued by Executive Director Fisheries, renewable on an annual basis. Waters allocated to individual licences are listed on each licence and may only be fished commercially by the holder of the EFAL, or by nominated operator(s). Other unallocated Crown waters, including Wildlife Reserves, may currently be fished under permit issued by Executive Director Fisheries. On renewal of, or application for permits for eel fishing in Wildlife Reserves, Fisheries Victoria is required to consult with Parks Victoria as the land manager of Victorian Wildlife Reserves to ensure the inclusion of any special conditions where required. Permits may also be issued to EFAL holders for the use of oversized fyke nets to take migrating adult eels, and for the use of glass eel nets to take glass eels in allocated or unallocated waters. Conditions on all permits are determined on a case by case basis. Aquaculture licences (Crown land) are issued to EFAL holders for the stocking of juvenile eels into specified Crown waters for ongrowing.

Under s.54(1a) of the *Fisheries Act, 1995*, the Secretary may vary licence conditions "to give effect to a management plan declared under section 28...". It is proposed under this Management Plan that all waters fished by Eel

Table 1. Allocation of waters to Eel Fishery Access Licences

Eel Fishery Access Licence No.	Allocated Waters	Basin Name (Basin No.)
1	Tarwin River downstream from Mardon Rd Bridge (West Branch).	South Gippsland (27)
	Albert River downstream from the railway bridge 2.4 km west of Alberton.	South Gippsland (27)
	Gippsland Lakes.	
2	Eumerella River downstream from the Princes Highway Bridge, including Lake Yambuk.	Portland (37)
	Shared allocation (see below).	
3	Lake Purrumbete.	Otway Coast (35)
4	Lower Barwon River between Queen's Park and Grab Hole Drain.	Barwon (33)
	Reedy Lake Section of Lake Connewarre.	Barwon (33)
	Lake Connewarre.	Barwon (33)
5	Lower Barwon River (inc. section of Connewarre Game reserve).	Barwon (33)
6	No specific allocation.	
7	Tarra River downstream from Pound Rd Bridge.	South Gippsland (27)
	Gippsland Lakes.	
	Lower Lake Mallacoota.	East Gippsland (21)
8	Shared allocation (see below).	
9	Lake Gillear.	Hopkins (36)
	Shared allocation (see below).	
10	Merri River (inc. Kelly Swamp), downstream from the Wollaston Weir.	Hopkins (36)
	Shared allocation (see below).	
11	No specific allocation.	
12	Aire River downstream from the Great Ocean Road.	Otway Coast (35)
	Lake Corangamite.	Lake Corangamite (34)
13	Hospital Swamp.	Hopkins (36)
	Lake Learmonth.	Hopkins (36)
14	No specific allocation.	
15	Deep Lake.	Hopkins (36)
	Lake Tooliorook.	Hopkins (36)
16	LaTrobe River downstream from Yallourn Storage Dam to the Swing Bridge at Sale.	LaTrobe (26)
	Moe Drain downstream from the Princes Highway Bridge.	LaTrobe (26)
	Gippsland Lakes.	
17	No specific allocation.	
18	Curdies River downstream from "The Narrows".	Otway Coast (35)
	Curdies Inlet.	
	Gellibrand River downstream from the Great Ocean Road.	Otway Coast (35)

Fishery Access Licence holders be listed as conditions on each licence. This includes all waters open to commercial eel fishing, including specified Crown waters presently allocated to licences, and unspecified Crown waters, including Wildlife Reserves, currently fished under permit. It is proposed under this Management Plan that the Secretary will vary EFALs, under s.54(1a) of the *Fisheries Act, 1995* to reflect this. Such streamlining will require an audit of all currently fished waters, and may incorporate the development of a GIS linked database. A further step to streamline the allocation of waters and their listing upon licences is to allocate all fished waters on a catchment or Australian Water Resources Council (AWRC) Basin basis.

The collective allocation to an individual licence of all waters open to eel fishing within the catchment of any one stream or lake would be expected to foster and promote self-management within the industry. Monitoring of compliance with licence conditions and fishery regulations will, however continue in the fishery. A licence upon which allocated waters within a catchment or AWRC Basin are listed would entitle the holder of the relevant licence to exclusively fish all open Crown waters and, ideally, all private waters, within a particular catchment or Basin. DNRE would encourage and where possible, facilitate the consolidation of waters in a particular catchment or Basin on to one EFAL, or group of licences owned by a company, when opportunities arise. Alternatively, the cooperative management of eel resources between EFAL holders who are entitled to fish in waters allocated to their respective licences in the same catchment or Basin, would be strongly encouraged.

Proposed changes to other licence conditions

- Requirement to mark every fyke net with surface float, unless otherwise negotiated with relevant DNRE office.
- Replace blanket of 50 fyke net maximum with requirement to negotiate appropriate number of fyke nets for each water fished with relevant DNRE office. Criteria to be determined as part of the implementation of the Management Plan.
- Remove minimum legal length for both shortfinned and longfinned eel.
- Increase maximum fyke net wing drop of 67cm to 100cm.

Guidelines for the issue, renewal, variation and transfer of Eel Fishery Access Licences

Licensing guidelines

Under s.28(6d) of the *Fisheries Act, 1995*, the Management Plan must include guidelines for the criteria to be used in respect to the issue of licences and permits and in respect of the renewal, variation or transfer of licences

Guidelines for the issue of Eel Fishery Access Licences

It is proposed that the Management Plan should state that under no circumstances should the Secretary consider the issue of new or additional Eel Fishery Access Licences. Under s.51(4) of the *Fisheries Act, 1995*, the Secretary must refuse the issue of a EFAL if the issue would be inconsistent with the Management Plan.

Guidelines for the renewal of Eel Fishery Access Licences

The *Fisheries Act, 1995* does not provide for the Secretary to take into account any guidelines which may be written into a management plan regarding the renewal of Fishery Access Licences.

Guidelines for the variation of Eel Fishery Access Licences

The Fisheries Regulations 1998 state that all waters fished must be listed as conditions on licences. The management plan recommends the identification of all waters fished commercially for eel, and the listing of these

waters as conditions on licences. It is proposed under the Management Plan that the Secretary vary each Eel Fishery Access Licence, under s.54(1a) of the *Fisheries Act, 1995*, to specify all waters fished by Eel Fishery Access Licence holders respectively, as a condition on each licence. Under the Fisheries Act 1995, s.54(1a) provides the Secretary with the mechanism to vary licences to implement the above recommendations.

Guidelines for the transfer of Eel Fishery Access Licences

Under s.56 of the *Fisheries Act, 1995*, the Secretary will grant an application for the transfer of an Eel Fishery Access Licence, subject to the conditions outlined in s.56(3). The Secretary will not grant an application for the transfer of a licence if the transfer would be inconsistent with the Eel Fishery Management Plan.

▼ *Setting fyke nets, Curdies Inlet (DNRE).*

Sustainability of Victorian eel stocks

Risk of overfishing

It is Victorian government policy that all fisheries, including the commercial Victorian eel fishery, demonstrate ecological sustainability. This is also required by Environment Australia in order for the fishery to retain exemption from export permit requirements under Schedule 4 of the *Wildlife Protection (Regulation of Exports and Imports) Act, 1982*.

Eels are relatively long-lived fish, maturing at 10 to 20+ years of age. It is thought that eels sustain high natural mortality in the early life stages, which becomes progressively lower in older life stages. Thus in principle, from an ESD perspective, sufficient spawning stock should be protected from commercial harvesting, whilst exploitation of juvenile stages, such as glass eels, could potentially be harvested in relatively large quantities without significantly affecting recruitment to the fishery.

However, the bulk of the Victorian commercial eel fishery currently is comprised of adult eels at various stages of migration, so substantially reducing this component of the fishery would impinge greatly on the existing commercial eel fishery in Victoria, and be inconsistent with the objectives of the Management Plan.

It is important for harvesting of adult eels and glass eels to be balanced in order to maintain sustainability. For example, the commercial harvesting of glass eels and adult eels from the same river may require offsets in effort to manage the risk of overfishing in that river.

Figure 2 details the distribution of eels in Victoria by AWRC Basin. There are 16 AWRC Drainage Basins in coastal Victoria comprising 48 major river catchments, plus tributaries, of which 27 sustain commercial eel fishing, either as allocated waters as listed on all EFALs, stock-enhanced waters, or under permit. The remaining 21 catchments include 16 declared rivers, plus all rivers draining into Port Phillip and Western Port Bays, which are closed to eel fishing. Other waters as listed in the former schedule of regulations may be commercially fished for eels, and may include private and Crown waters. At least 12 entire river catchments support no commercial eel fishing. Of the allocated waters fished, and waters fished under permit, the majority are able to be fished only in the downstream reaches, the upper limits clearly defined by major landmarks (see Table 1).

Table 2 shows the total length of all major streams and their tributaries in each coastal Victorian River Basin, and the relative proportion of allocated streams which may be commercially fished under an EFAL.

There are approximately 13,500km of major rivers and streams in southern Victoria in which eels of either or both species occur. Of this, less than three percent is open to commercial eel fishing.

In addition to the waters listed in Table 2, there are approximately 77,500Ha of lakes and swamps throughout southern Victoria, including the Gippsland Lakes (38,000Ha) and the extensive western Victorian lakes in the Lake Corangamite Basin (33,500Ha), which are mostly open to commercial eel fishing as allocated waters, stock enhanced waters, or Wildlife Reserves fished under permit. Of these waters, approximately 12,000Ha, are stock-enhanced. Lake Corangamite (23,300Ha), although an allocated water, is generally not fished commercially for eels, due to its naturally high salinity concentration. This leaves approximately 42,000Ha of lakes and swamps open to commercial eel fishing, which do not receive anthropogenic stock enhancement, relying on natural recruitment only.

Overall, commercial eel fishing is undertaken in a relatively small proportion of Victorian coastal waters, and a significant number of catchments are not fished at all. Thus the potential for escapement of spawning stock from Victorian waters, and the subsequent recruitment of glass eels to Victorian rivers, is very high, while the risk of overfishing and stock collapse in the Victorian eel fishery is minimal.

As far as is understood, both the shortfinned and longfinned eel species belong to single genetic (panmictic) stocks respectively. That is, a single genetic stock exists for each species, and recruitment to any river or lake is random. It is quite conceivable that the parent stock of immigrating longfinned glass eels into a Victorian catchment may have originated as far distant as northern Queensland, and that of short finned glass eels, as far distant as New Zealand. Thus fishing mortality in any one catchment or Basin is not expected to affect the long-term viability of the eel population within that catchment or Basin, or over the species' respective ranges.

Overfishing will of course affect the short term viability of an eel fishery. The natural mortality of glass eels is very high and migrating eels are removed from the fishery through spawning migrations, therefore, in principle, the standing crop of eels in any one Basin is expected to be relatively unaffected by the commercial removal of glass eels and migrating eels. Such practices can only be sustainable however, if protection of some stocks of migrating eels and glass eels occurs, and that a consistent, national approach to eel management is maintained.

In keeping with ESD objectives and principles, the complete closure of a number of Victorian Basins to commercial eel fishing, including all Crown and private waters within these Basins, should be undertaken to permit optimal recruitment of glass eels, and escapement of migrating adult eels. The protection of both immigrating glass eel stocks and emigrating adult eel stocks in waters and catchment or Basins which are not open to commercial eel fishing is expected to contribute significantly to the overall sustainability of eel resources in Victoria.

It should be noted however, that waters which may otherwise be closed to commercial eel fishing may provide valuable glass eel resources. As glass eel resources continue to be identified, and the fishery for these resources develops, such waters should not necessarily be closed to developmental glass eel fishing until such time as Victorian glass eel resources have been more fully quantified. Access to the glass eel resources in these waters and catchment or Basins should be held by the Crown and tendered out under contract where appropriate, or undertaken as part of an extensive scientific evaluation of all Victorian glass eel resources.

To help offset the risk of overfishing and to ensure the industry's sustainability and meet ESD requirements of Fisheries Victoria, SCFA and Environment Australia, a minimum of 10% by number of harvested glass eels taken from any Victorian water, including allocated waters, must be returned to the respective water as on-grown elvers (minimum individual weight 2.0g), at the operator's expense.

The management of the Victorian eel fishery, as detailed in this Plan, follows the "Precautionary Approach" by restricting commercial eel fishing to defined waters and by conservatively managing the balanced harvest of glass eels and adult eels, while encouraging the industry to develop through stock enhancement and aquaculture.

Figure 2. Distribution of eels by AWRC River Basin in Victoria

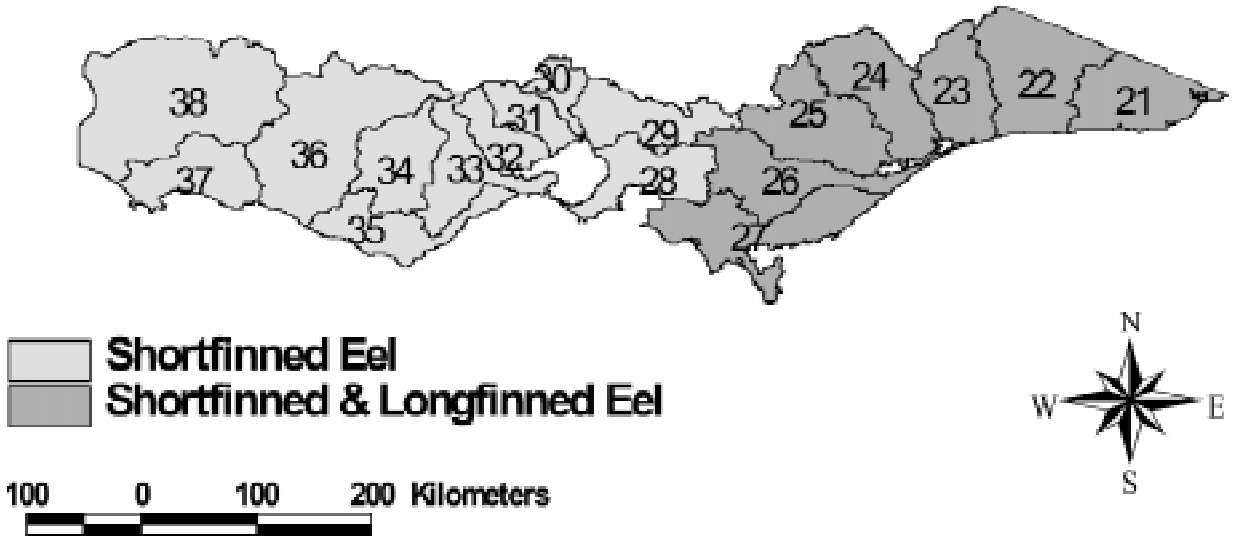


Table 2. Total length of major streams and tributaries within each River Basin, and proportion of length fished commercially for eels

Basin Name	Basin No.	Total Stream Length (km)	Approx. Total Length of Stream Open to Commercial Fishing (km)	% Total Stream Length Commercially Fished
East Gippsland	21	746	5	0.67
Snowy	22	932	0	0.00
Tambo	23	669	15	2.24
Mitchell	24	844	0	0.00
Thomson	25	1213	0	0.00
LaTrobe	26	1052	40	3.80
South Gippsland	27	1049	110	10.49
Bunyip	28	336	22	6.55
Yarra	29	874	0	0.00
Maribyrnong	30	458	0	0.00
Werribee	31	496	0	0.00
Moorabool	32	500	0	0.00
Barwon	33	558	30	5.38
Lake Corangamite	34	490	0	0.00
Otway Coast	35	556	40	7.19
Hopkins	36	1146	15	1.31
Portland	37	428	50	11.68
Glenelg	38	1096	0	0.00
Total		**13,443**	**327**	**2.43**

Ecosystem critical components and threats

Potential threats to the eel fishery

Ocean-climate effects

Eel leptocephali, and to a lesser extent glass eels, rely heavily on ocean currents for passive, or flow-assisted migration for their transport toward land and freshwater habitats. In addition, changes in sea surface temperatures due to such phenomena as the El Niño Southern Oscillation may affect food availability to leptocephali. Changes in ocean currents and sea temperature can therefore drastically affect eel leptocephalus survival and migration of glass eels, consequently impacting on eel recruitment to freshwater. The effects of ocean-climate change on the oceanic migration of silver eels is largely unknown, but any negative impact on spawning success of adult eels will ultimately affect recruitment.

Habitat modification

Eels utilise a variety of habitat types, ranging from the open ocean, to estuaries, rivers, lakes, swamps, creeks and farm dams. Specific habitat attributes required at the differing life stages of eel are not defined, however, with respect to estuarine and freshwater habitats and in relation to the Victorian eel fishery, the presence of physical instream habitat features such as woody debris, vegetation and rock is known to be important. The removal, alteration or destruction of instream habitat, including the channelisation of streams, are therefore potential threats to the eel fishery and the aquatic ecosystem in general.

Barriers to migration

Eels are catadromous fish and therefore mature adults undertake spawning migrations downstream to spawn in the ocean, whilst glass eels make the return journey to estuaries and migrate upstream into freshwater as pigmented elvers and yellow eels. Consequently, barriers to upstream and/or downstream migration of eels, such as dams, weirs, barrages or locks, are major threats to eel populations at the catchment level, despite the eel's tenacious ability to negotiate obstacles, and therefore are threats to the eel fishery, as well as to the aquatic ecosystem. Threats to eel migration may be partly mitigated through the use of fishways on such barriers. Barriers to oceanic migration may also occur. Eels rely at least partially on geo-magnetism for migration, thus any alteration to the geo-magnetic field within eels' migration area could affect migration, possibly interfering with spawning and/or recruitment success. Electro-magnetic fields created by submarine electricity cables could potentially affect the orientation of migrating eels.

Water abstraction

The abstraction of water for irrigation, stock and domestic, and other purposes is also a threat to eel fisheries and aquatic ecosystems. Such practice may significantly reduce the habitat available to eels and other aquatic biota, and may create sand bars and expose other barriers such as waterfalls, which may impinge on eel migration. Notable is the complete blocking off of river mouths due to low river flows, which may be exacerbated by water abstraction, which prevents both recruitment of glass eels to freshwater habitats, and the seaward migration of spawning stock.

Pollution and water quality

Pollution of waterways and poor water quality are threats to eel populations, the aquatic ecosystem and the eel fishery. The accumulation of heavy metals and pesticides in eel flesh may potentially be a major threat to the eel industry in particular, but also impacts significantly on the aquatic ecosystem. A recent extensive survey of mercury and pesticide concentrations in eels from allocated waters undertaken by MAFRI showed that these contaminants are presently not a major issue for the eel fishery in the waters sampled. Eutrophication of waterways due to excess nutrient accumulation may lead to algal blooms and potential crashes resulting in hypoxic conditions. The concentration of nutrients due to drought can also create adverse conditions for eels, such as occurred in late 1999 in Lake Gnarpurt, western Victoria, where an estimated 100 tonnes of eels perished following an algal bloom exacerbated by drought conditions.

Translocation

The translocation of exotic organisms, including fish and plant species, diseases, chemicals etc., through the movement of fish, including eels, between water bodies can have potentially serious impacts on the eel fishery and the aquatic ecosystem. The broad issues relating to the translocation of aquatic organisms are being dealt with in an overarching Departmental translocation policy. The utilisation of glass eels for stock enhancement under this Management Plan requires glass eels to be ongrown in closed, intensive rearing systems prior to stocking in natural waterways. Such systems would be required to conform to Best Practice Environmental Management Guidelines for closed systems, currently being prepared by DNRE. An eel translocation policy is required to address issues relating to the translocation of eels other than glass eels or cultured seedstock.

Other

Other threats to eels, the eel fishery and the aquatic ecosystem include sedimentation of streams, thermal pollution, and drought. The majority of threats to eels and the eel fishery with respect to the critical components of the aquatic ecosystem are listed under the Victorian Flora and Fauna Guarantee (Table 3).

Potential threats to the ecosystem from the eel fishery

Bycatch

It is Victorian government policy that management of the Victorian eel fishery must comply with the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. In addition, biodiversity conservation and management, as detailed in Victoria's Biodiversity Strategy, is an integral part of the Victorian Government's environment policies and a fundamental element of NRE's integrated programs. The incidental catch (bycatch) of aquatic animals including fish, mammals, reptiles and birds, may occur in the commercial eel fishery. EFAL holders and nominated operators are only permitted to use fyke nets to take eels, and restrictions on the size of mesh to be used in fyke net construction (15-39mm) results in such nets being considered to be relatively benign in terms of damage or destruction of other fish species. Most fish bycatch species caught in fyke nets will remain alive and generally uninjured for extended periods of time. Some smaller species such as tupong, gudgeons and galaxiids, as well as juveniles of larger species such as bream and estuary perch, may become meshed in the fyke net material itself and may consequently perish. Rivers in

Table 3. List FFG Potentially Threatening Processes, relevant to the Eel Fishery. Nomination number is a sequential number and represents the order in which nominations for listing were received by the Scientific Advisory Committee.

Potentially Threatening Process *Flora and Fauna Guarantee Act, 1988*	**FFG Nomination Number**
Alteration to the natural flow regimes of rivers and streams	197
Alteration to the natural temperature regimes of rivers and streams	230
Degradation of native riparian vegetation along Victorian rivers and streams	354
Increase in sediment input into Victorian rivers and streams due to human activities	181
Input of organotins to Victorian marine and estuarine waters	313
Input of petroleum and related products into Victorian marine and estuarine environments	315
Input of toxic substances into Victorian rivers and streams	263
Introduction and spread of Spartina to Victorian estuarine environments	312
Introduction of live fish into waters outside their natural range within a Victorian river catchment after 1770	204
Prevention of passage of aquatic biota as a result of the presence of instream structures	292
Removal of wood debris from Victorian streams	118
The introduction of exotic organisms into Victorian marine waters	201

which populations of platypuses and/or significant populations of estuary perch and/or Australian bass occur, are not open to eel fishing for those reasons. Potential bycatch species such as platypuses, water rats, tortoises and water birds may not survive extended immersion in water whilst trapped inside fyke nets, however bycatch reduction grids are used, as a permit condition, on fyke nets used in Wildlife Reserves for the purpose of preventing the capture of aquatic animals other than eels.

In combination, the gear used, including bycatch reduction grids, and the closure of waters in which eel fishing is considered a risk to other aquatic fauna, contributes to sustainable eel fishing in terms of bycatch minimisation. In addition, at least two eel fishing codes of practice for bycatch minimisation are presently being developed by individual licence holders, and bycatch management throughout the industry will be addressed through the development of a bycatch action plan for the eel fishery within the life of this Management Plan. It is a recommendation of the Eel Fishery

Management Plan that periodic inspections of commercial fishing operations, as conducted by DNRE compliance officers, specifically include monitoring of bycatch.

Potential impacts of the fishery on the environment

Environmental impacts of activities undertaken as part of the fishery are minimal. Potential impacts may include damage to riverine habitats, riparian and instream vegetation, and disturbance of the substrate and river banks due to deployment and retrieval of gear and the use of four-wheel-drive vehicles, boats, and water pollution due to the operation of outboard motors. Vehicles employed in the eel fishery use only formed roads and tracks for access to waters, and boats are launched at established launching ramps. Fyke nets are set with timber poles and/or steel pickets driven into the substrate (2-3 per net or fleet of nets) and/or removable weights, and as such interfere little with instream or riparian habitat, and disturbance of the substrate is minimal. The partial or complete loss of nets, and subsequent effects of "ghost fishing" rarely occurs and is not considered to be an environmental issue in the eel fishery. Boats used in the fishery are generally aluminium punts powered with outboard motors 40HP or less. Vessels are maintained and operated in such a way as to have minimal impact on the environment in terms of wash or pollution from leaking fuel or oil. The gear used in the commercial eel fishery, and the methods employed to operate it, are managed in such a way as to have minimal impact on the environment and thus are considered to be relatively benign.

Translocation

As outlined in the preceding section, a policy addressing the issues and processes for dealing with eel translocation is required as a recommendation of this Management Plan.

Level of fishing effort in Crown waters

Crown waters are all Victorian waters that, under section 8 of the *Fisheries Act, 1995*, are within the limits of the State.

All nets used by eel fishers should be identifiable by the use of individual net tags or stamp. The use of surface buoys to mark nets increases the risk of interference with gear, and/or theft of nets and eels, however, the marking of set gear in some way should be maintained. It is proposed that the use of surface buoys continue as described in the 1995 Plan, unless a suitable arrangement is negotiated with the relevant Regional Office. It is considered essential that the local regional officers must know when and where any fyke nets are set in any agreed instances where surface buoys are not used. Alternatives to using a surface buoy to mark each net may include bank markers or buoys set within a certain distance upstream and downstream of a fleet of nets.

The current blanket cap of a 50 net maximum per operator is no longer considered to be appropriate for all waters in managing the eel fishery on a catchment/Basin basis. It is proposed that the optimum number of nets which can be adequately serviced by each EFAL holder in each catchment/Basin, or water fished, be negotiated with the relevant Regional Office of the Department. The amount of fishing effort which can be sustained by the standing crop of eels within a particular water will depend on many factors, including the size of the water. For example, the maximum combined fishing effort in the six western Victorian waters currently allocated on a shared basis between four EFAL holders is considered to be unsustainable. In this situation, the optimum amount of fishing effort needs to be determined for each shared water, based on a number of factors, including the productivity of each water. It is recommended that the limits on the number of nets and/or operators used by holders of Aquaculture Licences (Crown waters) in stock enhanced waters be removed.

The clearing of nets at least once every 48 hours is to be maintained in all waters. This will partly address bycatch reduction/survival and will reduce the risk of inadvertent overfishing.

Level of fishing effort with respect to recreational, traditional and conservation interests

Recreational fishery

Eels are important recreational target species in Victoria, however the level of recreational eel fishing effort and the quantity of either species of eel taken in the recreational fishery are difficult to estimate. Anglers must hold a valid Recreational Fishing Licence and are restricted to a bag limit of 10 eels per day. A 30cm minimum size limit currently applies to eels retained in Victoria. The commercial eel fishery may impact on both the recreational eel fishery and recreational fisheries for other species, however a significant part of the recreational eel take is from stock-enhanced waters such as Lake Colac, Lake Bolac and Lake Burrumbeet.

The major areas of potential impact of commercial eel fishing upon recreational fisheries at the level of fishing effort described under this plan, are:

- Potential for competition for food and habitat between stocked eels and recreational target species
- Unlicensed commercial eel fishing
- Sustainability of concurrent glass eel fishing and sea run eel fishing

Under the Eel Fishery Management Plan, the bag limit of ten eels per day of either or both species per Recreational Fishing Licence Holder will remain. The 30cm minimum size limit is to be removed from both the commercial and recreational fisheries as there is little scientific basis for its retention. The removal of the 30cm size limit is also consistent with providing for the commercial harvest of glass eels.

Traditional eel fishing

Many Aboriginal people continue to fish for eels in southwest Victoria. Eel traps and other fishing methods continue to be used to catch eels which are a prized resource. It is unlikely that the methods employed by Aboriginal people in harvesting eels, and the quantities harvested, would impact on the sustainability of the resource. Management of eel resources, including glass eels and elvers, in areas where Aboriginal use of the resource occurs could conceivably be undertaken through partnership arrangements between those communities and local commercial fishers.

Conservation interests

Neither the shortfinned or longfinned eel is listed, or has been nominated for listing as a threatened species in Victoria or in Australia, thus neither species is considered to be "in a demonstrable state of decline which is likely to result in extinction or ... significantly prone to future threats which are likely to result in extinction" (*Flora and Fauna Guarantee Act, 1988*). Conservation issues relating to bycatch in the eel fishery, and impacts on the environment from the eel fishery will be dealt with specifically in a Bycatch Action Plan, as addressed above.

Of the waters commercially fished for eels, one allocated water (Lake Corangamite) and three aquaculture (Crown land) waters (Lakes Murdeduke, Gnarpurt and Colongulac) are listed collectively, along with five other lakes in the Western District, as a Wetland of International Importance or "Ramsar Site". In the Western District Lakes Ramsar Site Draft

Strategic Management Plan, the eel fishery in these lakes is recognised as an important economic contributor to the local area, but that the impacts of the stocking and harvesting of eels on the environmental values of these lakes are currently unknown. The document suggests that stocked eels may impact on other native fish species, in particular spotted galaxias (*Galaxias truttaceus*) and Yarra pygmy perch (*Nannoperca obscura*) which are found in Lake Corangamite. Because Lake Corangamite is an allocated water and not a licensed Aquaculture (Crown land) water, no eel stocking occurs there, so any impact of eels on these particular species would be from eels recruiting naturally to the lake.

Resource use, which includes the commercial eel fishery, is considered to pose a medium priority risk under the Western District Lakes Ramsar Site Draft Strategic Management Plan if conducted inappropriately. Impacts from inappropriate resource utilisation, with respect to the eel fishery, may be addressed through the enforcement of EFAL conditions. The Management Strategies of the Western District Lakes Ramsar Site Draft Strategic Management Plan indicates an ongoing priority for the management of the commercial eel fishery at the site, which is the responsibility of DNRE as the lead agency. The recommendations made in the Victorian Eel Fishery Management Plan will ensure a management regime which is in sympathy with the values of Ramsar sites.

Aquaculture

Aquaculture licences for eels are currently issued for Crown waters (Lake Reserves, but not Wildlife Reserves) and private land. Licences issued for Crown waters authorise the extensive culture, or stock enhancement, of eels stocked as elvers or larger juvenile eels (snigs, restock eels). Licences issued for private land may include extensive stock enhancement of private waters, such as farm dams, and intensive and semi-intensive eel culture using glass eels or elvers as seedstock. Both Crown land and private land aquaculture licences allow the stocking of eels in multiple water bodies located on one property or defined Crown land area or allotment. Aquaculture licences specifying eels are also subject to the conditions of every aquaculture licence (see Appendices).

Aquaculture (Crown land) licence entitlements

An Aquaculture (Crown land) Licence authorises the holder, on the Crown land and in or on the protected waters covering that land specified in the licence:

(a) to use, form or create a habitat for hatching, rearing, breeding, displaying or growing fish (other than bivalve shellfish for human consumption) or fishing bait specified in the licence for sale or other commercial purposes; and

(b) to hatch, rear, breed, display or grow fish (other than bivalve shellfish for human consumption) or fishing bait specified in the licence for sale or other commercial purposes; and

(c) to use commercial aquaculture equipment specified in the licence.

Aquaculture (Crown land) Licence conditions

(1) The holder of an Aquaculture (Crown land) Licence and the holder of an Aquaculture (Crown land) Type A Licence are subject to the conditions specified in this regulation, in addition to any conditions imposed on the licence under these Regulations or by the Secretary under section 52 of the Act.

(2) The licence holder must, subject to the conditions of any Crown land lease covering the area, not use in, or introduce into, the area specified in the licence or its surrounds or any place where it may flow into the licensed area, any food, chemical or artificial diet other than in accordance with the licence conditions.

Translocation of restock

At present, stock enhancement of Crown waters is undertaken under an Aquaculture Licence (Crown land) issued to EFAL holders which entitles the holder to restock Crown waters with juvenile eels for the purpose of ongrowing under natural conditions. Although this practice has in the past been referred to as aquaculture, it is, in practice, more correctly stock enhancement, as generally no husbandry of the stocked fish or manipulation of the environment is undertaken, unless specified as a licence condition. The only means of licensing the activity of stock enhancement presently available is through the issue of aquaculture licences. Certain anomalies arise under this situation, including the fact that the waters for which eel aquaculture licences are issued are Crown waters, not private, consequently access to such waters and stock is not the sole privilege of the licence holder and ownership of stock cannot easily be partitioned. Access to both the Crown waters

and the stock is shared between the licence holder and other users, including recreational fishers, and in some cases other EFAL holders. There is therefore a requirement for other licensing arrangements to be developed, which specifically cater for stock enhancement of eel fisheries in Crown waters.

The conditions of an Aquaculture Licence (Crown land) should be consistent with those of an EFAL in that an appropriate number of nets be negotiated between the licence holder and relevant DNRE regional office, for a water for which an Aquaculture Licence (Crown land) is held. All other existing licence conditions will remain.

Aquaculture in private waters

An Aquaculture (Private land) Licence authorises the holder, on the private land and in or on the protected waters covering that land specified in the licence:

(a) to use, form or create a habitat for hatching, rearing, breeding, displaying or growing fish or fishing bait specified in the licence for sale or other commercial purposes; and

(b) to hatch, rear, breed, display or grow fish or fishing bait specified in the licence for sale or other commercial purposes; and

(c) to use the commercial aquaculture equipment specified in the licence.

An Aquaculture Licence (Private land) is the only means by which glass eels may be held and/or reared to elver/restock size, or to final product size. The translocation of restock eels, including elvers, from either an aquaculture facility producing on-grown glass eels, or from wild sources, into Crown waters for stock enhancement purposes should require a separate translocation authorisation, as described above.

Commercial utilisation of glass eels

The only means available at present of expanding and developing the eel fishery in Victoria is through aquaculture and stock enhancement. There is no scope at present for the expansion of the wild fishery in terms of increasing effort or increasing the number of specified wild fishing waters. Recent work by the Marine and Freshwater Resources Institute (MAFRI) has identified the potential for the utilisation of local glass eel resources for aquaculture, and is also developing a national eel aquaculture industry development strategy, focussing on the utilisation of glass eels nationally. Access to, and exploitation of glass eel stocks, on an ecologically sustainable basis, in specified waters should be encouraged in order to allow the development of eel aquaculture and stock enhancement.

Victorian glass eel resources can potentially be put to three major uses:

- Intensive aquaculture to market size
- Intensive aquaculture to stocker (elver) size for stock enhanced fisheries
- Export interstate or overseas

Decisions upon how glass eel resources are utilised should be made as required, in the best interest of the Victorian eel fishery and aquaculture sectors, but consistent with management implications on a national basis of a genetically uniform stock. It is important to note that international trade in glass eels is almost universal, and options for the Victorian industry to participate in both export, and import where appropriate, of glass eels should be considered. Any seedstock exported from Victoria could be listed in Appendix III of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Such listing provides for monitoring and inspection at both ports of departure and arrival through the use of permits which indicate that a legal harvest has taken place.

The use of wild caught elvers for stock enhancement should also continue where practicable, but stock enhancement using glass eels directly should not occur. Supply of glass eel seedstock from Victorian waters may be limited, so the importation of shortfinned glass eels and longfinned glass eels from interstate or New Zealand should be considered as a long-term goal for the industry and subject to stringent quarantine measures and associated bio-security requirements for the translocation of eels. Trade in glass eels would subsequently be driven by prevailing market forces. It should be noted that the importation of live fish is generally prohibited by AQIS, however any application for the importation of glass eels would be considered by AQIS, subject to a risk assessment process. Such an application may take a number of years to fully evaluate.

A stock enhancement strategy similar to that used for the recreational fishery should be developed whereby a database is kept on the collection, importation and translocation of glass eels, and the quantities of cultured elvers stocked in culture waters. This information would be used in conjunction with catch effort data for the adaptive management of the eel fishery to optimise yield. The translocation of seedstock in stock enhanced waters would be enabled via a separate permit to the EFAL.

The position of the Department, in respect of glass eel stocks, is to pursue the ecologically sustainable harvest and utilisation of both longfinned and shortfinned glass eels in the manner which is considered to be in the best interests of the eel fishery and aquaculture sectors. It is the view of the Department that stewardship of glass eel resources in allocated waters remain with EFAL holders for the life of the EFMP. EFAL holders must undertake a genuine attempt in each season during this timeframe to harvest glass eels from their respective allocated waters, or demonstrate why harvesting could not occur, in order for exclusive access to the glass eel resources in these waters to continue. It is a requirement of the Eel Fishery Management Plan that fair and equitable access to glass eel stocks be provided to all Victorian aquaculture licence holders, and that glass eels must be made available at a fair market price. Contractual arrangements between glass eel suppliers and eel culturists must guarantee access to a proportion of the total glass eel catch, and provide for advance supply of glass eels as required by the culturists, recognising the seasonal nature of the availability of the resource, and the possibility of non-supply due to the inherent natural variability in the abundance of glass eels. Such an arrangement is the most equitable in terms of resource access and allocation, and addresses the objective of the Department to develop the glass eel fishery and eel aquaculture. Access to glass eels from unallocated or closed waters, including the Snowy and Brodribb Rivers, will be at the discretion of the Crown and harvesting thereof may be tendered out accordingly.

Guidelines for the issue of aquaculture licences

Aquaculture licences are the only means present of enabling the translocation of juvenile eels and subsequent extensive ongrowing in Crown waters. The issue of aquaculture licences for both extensive and intensive eel culture will be at the discretion of the Executive Director Fisheries, and applications for aquaculture licences (Crown or private land) specifying eel will be examined on a case by case basis.

Guidelines for the issue of permits for the collection of glass eels

For the duration of the plan, general permits for glass eel collection will be issued exclusively to EFAL holders for access to glass eels in allocated waters. In unallocated Crown waters open to eel fishing, and in any closed waters in which substantial glass eel resources occur, access to glass eels will be at the discretion of the Crown, and may be tendered out accordingly.

Catch effort reporting

The reporting of catch and effort data needs to be improved overall. In particular, catch and effort returns are required to be of a high standard for the adaptive management of the fishery, which should be undertaken on an annual basis. Catch and effort information will be required to be reported on a catchment/AWRC Basin basis, and accurate identification of individual waters fished will be required. At present, several problems exist with the structure of the reporting logbooks, identification of waters fished, the permit system for waters fished which are not allocated on licences, reporting of catch by gear type and the reporting of the translocation of eel restock. It is recommended that catch-effort reporting logbooks/returns be reviewed to improve the accuracy and value of fishery-dependent data.

Performance indicators, targets and monitoring

Monitoring

Ongoing monitoring of fishery and review of the Management Plan

The performance of the Management Plan will be measured by the degree to which management recommendations and implementation targets are reached. The management regime and implementation targets and processes as set out in the Management Plan should be monitored and reviewed annually. Ongoing monitoring of the fishery, including implementation of the Management Plan and operation of the management response system, will be undertaken through the formation of a subcommittee comprising members of the Inland Fisheries Committee of the Fisheries Comanagement Council, Regional DNRE Officers, MAFRI, Fisheries Victoria and Seafood Industry Victoria.

Fishery-dependent management response system

Historical catch data indicates the production from the Victorian eel fishery is highly variable and depends on many factors, including anthropogenic factors such as fishing pressure and habitat degradation, and environmental effects such as drought. Figure 1 indicates the variable production of the fishery, ranging from 125–450 tonnes since 1979. Since 1994 production of shortfinned eel, from both the wild fishery and from stock enhancement, has declined steadily. This is due largely to persistent drought conditions in the western district of Victoria, in which over 70% of shortfinned eel production occurs. This protracted drought period has resulted in an estimated loss of 60% of productive eel waters.

Although current low production levels in the fishery are clearly a result of prevailing environmental conditions (drought), It is proposed that a management response system is set in place whereby a production trigger point be established for the eel fishery, below which a review of the fishery is initiated. Such a review will examine the decline in the fishery, determine the reason for the decline, and recommend options for the management of the decline in the fishery.

Process

It is proposed that a trigger point be set for the fishery at 20% reduction in catch, based on the mean catch for the preceding three years. The trigger will be set for each component of the fishery (wild shortfinned eel, wild longfinned eel and stock-enhanced fishery), for the combined catch in the fishery, and for each AWRC Basin respectively. Once the trigger point is reached for any component of the fishery, the Secretary will initiate a review of the fishery which will be undertaken by DNRE, Industry and the Fisheries Comanagement Council. The review will examine the decline in the fishery and provide advice within a period of three months to the Minister, including recommendations and options for management. The proposed improvements to the data reporting and management system will enable the rapid identification of any decline in the fishery, and subsequent management response.

Fishery-independent monitoring

Independent monitoring of the eel fishery is included in Environment Australia's requirements for the demonstration of ESD in export fisheries. Specifically, requirements under Principle 1 of Environment Australia's guidelines for assessing the ecological

sustainability of fisheries management regimes include: an appropriate mix of fishery dependent and fishery independent research and monitoring, a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected, a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested, and reference points (target and/or limit), that trigger management actions. To date, routine independent monitoring of the Victorian eel fishery has not been undertaken as part of an ongoing management strategy for the fishery.

Most biological reference points require information on several population parameters including age structure, growth, natural mortality, spawning stock size and recruitment size. Many of these parameters are difficult to estimate for eel, however among the most important management issues for eel fisheries around the world are escapement of spawning eels and the establishment of spawner escapement limits and targets, and eel recruitment. In the management of eel fisheries, the assumption that recruitment is dependent on spawning stock size is consistent with the "Precautionary Approach" to fisheries management. It is critical that the Victorian eel fishery maintain step with best practice management and develop, as a minimum, mortality rate reference points and spawning stock biomass limits for the future management of the fishery.

Process

The Management Plan recommends that precautionary limit and target reference points for fishing mortality and for spawning biomass be set, and that a low risk of exceeding such limits is ensured. A review of relevant current and past research into eel population biology in Victoria should be undertaken as a matter of priority to identify information deficient areas, and that a research and monitoring strategy for the Victorian eel fishery be proposed, in order to effect the establishment and application of biological reference points for eel management.

Research and Development needs

In the fisheries research strategy document for 2000/01–2004/05, compiled by the Research Committee of the Fisheries Comanagement Council, research needs and priorities relating to the eel fishery include:

1) Commercial and Recreational Fisheries - Freshwater
   a) Fisheries assessment and biology
   i) Quantitative assessment of glass eel resources
   ii) Evaluation of stock enhancement
   b) Habitat and ecology
   i) Evaluation of the impact of aquatic habitat restoration, operational river improvement works and environmental flows on major freshwater commercial and recreational species
   ii) Critical habitat requirements
   iii) Development of robust environmental sustainability indicators
   c) Socio-economics and management
   i) Economic assessments of inland fisheries
   ii) Use of GIS systems to inventory and integrate existing information on fisheries and habitat for management
2) Aquaculture - Freshwater
   a) Development
   i) Improved understanding of the availability of glass eel seedstock
   ii) Development of intensive culture of glass eel stocks and the diet and husbandry required to cost-effectively produce product
   iii) Provision of aquaculture production models
   iv) Planning and evaluation of stock enhancement programs

3) Aquatic Ecology and Environment - Freshwater
   a) Habitat and ecology
   i) System-based studies of the ecosystems of important fisheries
   ii) Assessment and monitoring of key aquatic environments
   iii) The impact of aquatic habitat restoration, operational river improvement works and environmental flows on the riverine and estuarine environments
   iv) Development of cost-effective environmental monitoring protocols
   b) Socio-economics and management
   i) The impact of catchment management on the riverine and estuarine environments
   ii) Development of environmental sustainability indicators

In recent years, DNRE has, in partnership with industry, the Fisheries Research and Development Corporation (FRDC) and a number of state agencies, invested significant funds into the development of the commercial eel fishery and aquaculture sector in Victoria and within Australia. Most notably, two major R&D projects, managed by the Marine and Freshwater Resources Institute in Victoria, have investigated aspects of glass eel stock assessment and aquaculture. These projects have involved extensive collaboration between MAFRI, Deakin University and the Queensland Department of Primary Industries, NSW Fisheries and the Tasmanian Inland Fisheries Service. Projects investigating aspects of the wild eel fishery in Queensland, NSW and Tasmania are also underway.

A strategic five-year plan for research and development is being developed through funding from FRDC which will emphasise R&D priorities for the eel sector on a national basis. The Australia and New Zealand Eel Reference Group (ANZERG) is overseeing the development of the R&D strategy, and will supervise the implementation and management of the strategy in the long term. The draft areas for R&D on a national basis in order of priority are:

1 Impacts of impoundments
2 Sustainability criteria
3 Fisheries development, policy and management
4 General biology, ecology and stock assessment
5 Habitat requirements
6 Heavy metal impacts
7 Bycatch reduction

The national eel R&D priorities above are generally consistent with those determined for Victoria, although the immediate effects of impoundments on the migration of eels in Victorian streams are generally not considered to be as great as in other states where impoundments on coastal streams are prevalent. However, both the upstream migration of juvenile eels, and the seaward migration of adults may be impacted by the smaller barriers, such as weirs and causeways, more common on Victorian coastal streams. The effects of barriers on the escapement of migrating eels is of particular concern, and is of high priority for the Victorian eel fishery. Also, in line with the draft R&D priorities on a national scale, R&D into sustainability of stocks, fisheries development, policy and management and general biology, ecology and stock assessment are of major importance to the Victorian eel fishery.

Specific areas requiring R&D in the eel fishery in Victoria are:

- Biological
  - Size and age of eels at maturation
  - Assessment of mortality
  - Stock composition and sex ratio of adult eels over time and space
  - Escapement rate of migrating adult eels
  - Mapping and dynamics of glass eel resources
  - Production in stock enhanced eel fisheries
  - Monitoring of on grown elvers stocked into wild fishery waters
- Environmental
  - Habitat assessment
  - Optimising yield in culture waters
- Marketing & business development
  - Ongoing residue monitoring
  - Food safety
  - Demand vs farmed product
  - Extensive culture vs intensive growout (cost benefit), elvers vs cultured glass eels
  - Role of Aboriginal community in eel management

Implementation of the Eel Fishery Management Plan

Policies to be developed as a priority

The Eel Fishery Management Plan has identified the need for a bycatch action plan for the eel fishery, a translocation policy for eels into and within Victoria, and a fishery research and monitoring strategy. A bycatch action plan needs to be developed in line with government policy and to comply with the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. The translocation of eels, in particular glass eels, elvers and restock eels, for the purpose of aquaculture and stock enhancement of eel fisheries, is expected to continue to be a widely practised activity in the Victorian eel fishery. It is necessary that a policy for the translocation of eels be developed to streamline and facilitate the expansion of the eel industry in Victoria, in line with the Draft Victorian Policy and the National Policy on the translocation of aquatic organisms. A research and monitoring strategy is required for the determination of biological reference points for the sustainable management of the eel fishery (see below). All policies and strategies developed as part of the Management Plan's recommendations will be done so in consultation with industry and the relevant peak bodies.

Other related policies and plans to be developed independently

A national eel industry business development strategy, and an Australian and New Zealand eel research and development plan, funded largely by the FRDC, are in preparation. These plans will set priorities for the strategic development of the eel aquaculture industry in particular, including glass eel resources, and for research and development in eel biology and management on a national and international scale. The relevance of these plans to the Victorian eel industry is significant, and will help in developing the industry in line with national priorities (Table 4).

There is a clear need for the close involvement of ANZERG to provide the forum for wider consultation and input of expertise during the preparation of these policies and plans. As stated, the development of eel management regimes must be cognisant of management regimes in other Australian States, and internationally where appropriate, to ensure a consistent approach to eel management throughout the geographic distribution of each species.

Table 4. Recommendations and implementation targets to be achieved.

Recommendation/Target	Priority
Draft Bycatch Action Plan for eel fishery	High
Draft Translocation Policy for eel fishery and aquaculture industry	High
Audit and classification of all waters fished	High
Propose research and monitoring strategy for eel fishery	High
Commence fishery management response system	High
Revised catch-effort reporting logbooks/returns in use	High
Removal of 50 net cap in parallel with negotiation of local operating arrangements	Low
Removal of minimum legal size limit for commercial and recreational eel fishery	Low
Consolidation of all scheduled, allocated and permit waters as conditions on licences	Ongoing
Negotiation of level of fishing effort in Crown waters on individual basis	Ongoing
Negotiation of need for use of surface float on nets	Ongoing
Closure of catchments/waters identified in water audit to commercial eel fishing	Ongoing
Commitment to glass eel fishing and development in allocated waters	Ongoing
Negotiation, where applicable, of eel resource equity agreements with identified Aboriginal communities	Ongoing
Bycatch monitoring by compliance officers	Ongoing

Resources required to implement the Victorian Eel Fishery Management Plan will be provided by DNRE.

Specific processes to be undertaken in the implementation of the Management Plan

Conduct audit of waters fished

Purpose

To improve the knowledge base of commercial eel fishing activities and to identify fishing pressure across the State. It is not the intention of the water audit to close waters routinely fished commercially for eels.

Process

- Consult eel fishermen both collectively, and individually on a confidential basis, to identify all waters routinely fished commercially for eels.
- Waters of interest are all waters open to commercial eel fishing including allocated waters, waters fished under permit, and any unspecified Crown waters which are routinely fished.
- List all waters fished as conditions on licences.
- All waters identified will be catalogued in a GIS linked database.
- Fishing effort in all waters to be negotiated with relevant regional Departmental office.

Timelines

The audit is to be completed within first year of the Management Plan's implementation.

Anticipated outcomes

- Comprehensive database of waters routinely commercially fished for eels.

- Identification of catchments not fished for eels, and closure of these catchments to commercial eel fishing.
- Improved catch-effort reporting capacity.

Determination of appropriate level of fishing effort

Purpose
To negotiate the appropriate level of fishing effort by water and/or catchment fished.

Process
- Develop criteria index for negotiation.
- Negotiation of appropriate number of nets for each water fished between EFAL holder and relevant Departmental Fisheries Officer/Manager.
- Remove 50 net cap from Fisheries Regulations.

Timelines
Ongoing throughout life of the Management Plan.

Anticipated outcomes
- Increased degree of self-management within the fishery.
- Objective determination of fishing effort.
- Reduced risk of overfishing.

Revise catch-effort reporting logbooks/returns

Purpose
To improve the accuracy of catch and effort reporting, in particular production data by water, including the productivity of stock enhanced eel fisheries.

Process
- In consultation with the Eel Fishers' Association, revise catch and effort return forms/logbooks to include water audit code.
- Include eel receiving information and disposal as exported, sold on the domestic market, or translocated.

Timelines
Complete within first year of the Management Plan's implementation.

Anticipated outcomes
- Improved accuracy of catch-effort data
- Improved capacity to monitor fishing pressure and effects on individual waters and Basins
- Improved management response system
- Ability to monitor and maximise productivity of stock-enhanced eel waters

Access to glass eel resources in unallocated Crown waters

Purpose
To provide for fair and equitable access to glass eel resources in unallocated Crown waters.

Process
- Executive Director Fisheries to advertise for Expressions of Interest from suitable applicants to collect glass eels from specified unallocated Crown waters, for a predetermined period of time.
- Tender would be awarded to the most suitable applicant depending on a range of suitability criteria including a demonstrated knowledge and experience in the collection of glass eels, and the applicant's level of commitment to the development of the industry.
- Conditions of tender would include, but not be limited to:
  - Utilisation of glass eels is for the benefit of eel production in Victoria.
  - Glass eels may only be utilised in culture systems approved by Executive Director Fisheries.
  - Glass eels must be made available to all eel culturists approved by Executive Director Fisheries.
- As for the utilisation of glass eels from allocated waters, eel culturists will be guaranteed access to a proportion of the total glass eel catch, and provision for

advance supply of glass eels as required by the culturists will be made, recognising the seasonal nature of the availability of the resource, and the possibility of non-supply due to the inherent natural variability in the abundance of glass eels.

- The process for determining access to glass eel resources in unallocated Crown waters will consider opportunities for Aboriginal communities to benefit from utilisation of the resources.

Timelines
Review annually.

Anticipated outcomes
- Optimal use of glass eel resources.
- Increased eel production through intensive aquaculture and stock-enhancement.

Implementation targets requiring amendments to legislation

- Removal of minimum size limit for commercial and recreational eel fishery.
- Removal of 50 net cap per licence.
- Removal of mandatory marking of each fyke net with surface float.
- Closure of catchments/waters identified in water audit to commercial eel fishing.
- Listing all waters able to be commercially fished as conditions on licences.
- Introduction of translocation permit to replace aquaculture licence.
- Removal of reference to "A" and "B" Eel Fishery Access Licences from the Fisheries Regulations.

Fees, levies and royalties

Any fees, levies or royalties imposed on the commercial eel fishery will be determined through a separate government process considering all fisheries, and consistent with the National Competition Policy Review.

▼ *3-winged fyke net (DNRE).*

Consistency with National Competition Policy

National Competition Policy (NCP) is the outcome of agreements between the Commonwealth and all State and Territory governments. It was intended to advance, on a national basis, a range of competition reforms considered capable of delivering significant public benefits. National Competition Policy contains a number of reforms to enable and encourage competition. It also addresses reforms in some other areas that are critical to the long term sustainability of Australian industries. The reforms are briefly outlined as:

- The extension of Trade Practices laws prohibiting anti-competitive activities (such as the abuse of market power and market-fixing) to all businesses – previously most government-owned and some private businesses were exempt.
- The introduction of 'competitive neutrality' so that privately-owned businesses can compete with those owned by Government on an equal footing.
- The review and reform of all laws that restrict competition unless the benefits of the restriction to the community as a whole outweigh the costs and the restrictions are needed to attain the benefits.
- The development of a "National Access Regime" to enable competing businesses to use nationally significant infrastructure (like airports, electricity cables, gas pipelines and railway lines).
- Specific regulatory reforms to the gas, electricity, water and road transport industries.

The Victorian Eel Fishery Management Plan will ensure that the eel fishery in Victoria will be managed in a way which conforms with the National Competition Policy.

Appendix 1
Submissions received

Internal
Parks Victoria,
East Region

Geoff Gooley,
Marine & Freshwater Resources Institute

Alan Baxter,
Fisheries Victoria

Gus Fabris,
Marine & Freshwater Resources Institute

Bill O'Connor,
Parks, Flora & Fauna

External
VRFish

Lake Burrumbeet Advisory Committee Inc.

Mick Thomas,
Melbourne

East Gippsland Estuarine Fishermen's Association Inc.

Lake Learmonth Advisory Committee

Late submission
Richard Stuart,
Linton

Appendix 2

Conditions of every commercial fishery licence

(1) Every commercial fishery licence is subject to the conditions specified in this regulation, in addition to any other conditions imposed on the licence by these Regulations and by the Secretary under section 52 of the Act.

(2) The licence holder or any person acting under the licence—

(a) must ensure that any information provided to the Secretary, whether in a prescribed form or otherwise, is provided clearly, legibly, truthfully and accurately; and

(b) must notify the Secretary within 28 days of any change to his or her residential address or postal address or, in the case of a corporation, the registered office address; and

(c) must not use more people to assist in a fishing operation than the number specified in his or her licence (if any); and

(d) must ensure that the licence or a true and accurate copy of the licence is retained on board the boat, or in the case of licensed premises, on those premises, at all times; and

(e) must keep any document issued to the licence holder under the Act or these Regulations in a safe place at all times; and

(f) if any document issued to the licence holder under the Act or these Regulations is lost, damaged or destroyed, must as soon as practicable notify the Secretary;

Appendix 3

Conditions of every access licence (other than Abalone Fishery Access Licence)

(1) Every access licence (other than an Abalone Fishery Access Licence) is subject to the conditions specified in this regulation, in addition to any other conditions imposed on the licence by these Regulations and by the Secretary under section 52 of the Act.

(2) The licence holder—

(a) must ensure that a monthly catch and effort return is completed on the form provided by the Secretary showing all details required by the form; and

(b) must ensure that the catch and effort return completed under paragraph (a) is sent to the Secretary by the 14th day of the month following the period of the return; and

(c) must retain a copy of every catch and effort return completed under paragraph (a) for a period of 3 years; and

(d) must, at any reasonable time when requested to do so by an authorised officer, produce copies of a catch and effort return for inspection by the officer; and

(e) must at all times when in charge of crew during a fishing operation—

(i) ensure that the crew are in his or her actual physical presence; and

(ii) be in control of those crew; and

(iii) ensure that those crew are not engaged in a separate fishing operation; and

(f) must ensure that any fish taken that are not required to be retained, other than noxious aquatic species, are immediately returned to the water with the least possible injury or damage; and

(g) must not take, possess, retain on board a boat or land from a boat, more than the catch limit of fish of the taxa specified in regulation 504; and

(h) must not take, possess, retain on board a boat or land from a boat, more than a total of 400 kilograms of fish of the taxa specified in regulation 504; and (i) must not take, possess, retain on board a boat or land from a boat, any fish of the following taxa—

Bass, Bass groper and Hapuku;

Gemfish;

Southern bluefin tuna, Northern bluefin tuna, and Bill fish;

King dory;

Ox-eye oreo;

Smooth oreo;

Spiky oreo;

Warty oreo;

Blue grenadier;

Black oreo;

Orange roughy.

Appendix 4

Conditions of every aquaculture licence

(1) The holder of an aquaculture licence is subject to the conditions specified in this regulation, in addition to any conditions imposed on the licence under these Regulations or by the Secretary under section 52 of the Act.

(2) The licence holder—

(a) must maintain a book of account for any priority species showing details of the goods in relation to that species produced in the ordinary course of the business while acting under the licence; and

(b) must keep the book of account for a period of 3 years after the last entry was made in it; and

(c) must make the book of account available for inspection by an authorised officer at any reasonable time; and

(d) must—

(i) within 24 hours of the outbreak of any notifiable disease in an aquaculture crop, notify the Secretary by telephone; and

(ii) within 5 days of the outbreak of any notifiable disease in the crop, notify the Secretary in writing; and

(e) must not sell, remove, discharge, dispose of or transfer any fish, sea water or equipment from an area that is affected by a notifiable disease or toxic algae to any other area; and

(f) must complete an aquaculture crop production return on the form approved by the Secretary for the periods—

(i) 1 July to 31 December in each year; and

(ii) 1 January to 30 June in each year—

and forward the original return to the Secretary within 30 days of the end of each period; and

(g) must ensure that any fish or protected aquatic biota taken that are not to be retained (other than noxious aquatic species) are immediately returned to the water with the least possible injury or damage.

Appendix 5

Summary of waters commercially fished

Allocated Waters	**Waters Fished under Permit**	**Aquaculture Waters** (Crown)	**Aquaculture Waters** (Private)	**Glass Eels** (2001 Only)	**Elvers**	**Oversized/ Modified Gear**
Tarwin River	Macleod Morass State Game Reserve	Fiery Creek	2 dams, "Bon Nerrin" property	Tarwin River	Maffra Weir	Gippsland Lakes
Albert River	Jack Smith Lake State Game Reserve	Lake Bolac	6 dams, "Wongetta" property	Tarra River	Lake Wellington	Powlett River
Gippsland Lakes	Clydebank Morass State Game Reserve	Lake Murdeduke	Paddy Lake	Albert River		Tarwin River
Eumerella River	Heart Morass State Game Reserve	Lake Oundell	Lake Woolongoon	Little River		Barwon River
Lake Purrumbete	Lake Curlip Wildlife Reserve	Martins Lake		Bream Creek		Curdies Inlet
Barwon River	Lake Corringle Wildlife Reserve	Lake Linlithgow		Yarra River		
Lake Connewarre	Dowd Morass	Lake Buninjon		Lower Lake, Mallacoota		
Tarra River	Lake Coleman Nature Conservation Reserve	Lake Gnarpurt				
Lower Lake Mallacoota	Sale Common State Game Reserve	Lake Burrumbeet				
Lake Gillear	Lake Rosine Wildlife Reserve	Lake Modewarre				
Merri River	Burrumbeet Creek	Lake Colongulac				
Kelly Swamp	Lake Oundell	Lake Colac				
Aire River	Lake Jollicum Wildlife Reserve	Lake Bullrush				

Summary of waters commercially fished (cont'd)

Allocated Waters	**Waters Fished under Permit**	**Aquaculture Waters** (Crown)	**Aquaculture Waters** (Private)	**Glass Eels** (2001 Only)	**Elvers**	**Oversized/ Modified Gear**
Lake Corangamite	Woady Yaloak Flood Plain	Mill Swamp				
Hospital Swamp	Lake Eyang Wildlife Reserve	Tremaine Swamp				
Lake Learmonth						
Deep Lake						
Lake Tooliorook						
LaTrobe River						
Moe Drain						
Curdies River						
Gellibrand River						
Fitzroy River						
Surry River						
Moyne River						
Shaw River						
Darlot Creek						
Franklin River						
Agnes River						

Appendix 6

Waters specifically closed to eel fishing

Barham River

Yarrowee (Leigh) River

Avon River

Nutting Creek

Thomson River

Freshwater Creek

Glenelg River

Hopkins River

Mitchell River

Nicholson River

Tambo River

Snowy River

Brodribb River*

Cabbage Tree Creek*

Cann River*

Port Phillip Bay & Western Port Bay streams**

Wingan River**

Any water not specified in the former Schedule of Waters in the Regulations.

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* Originally considered as part of a "conservation reserve" to "maintain adequate breeding stocks of eels".

** Previously open to eel fishing

Appendix 7
Acronyms

ANZERG	The Australia and New Zealand Eel Reference Group
AQIS	Australian Quarantine and Inspection Service
AWRC	Australian Water Resources Council
CITES	Convention of International Trade in Endangered Species of Wild Flora and Fauna
DNRE	Department of Natural Resources and Environment
EFAL	Eel Fishery Access Licence
EFMP	Eel Fishery Management Plan
ESD	Ecologically Sustainable Development
FFG	Flora and Fauna Guarantee
FRDC	Fisheries Research and Development Corporation
GIS	Geographic Information System
IFS	Inland Fisheries Service, Tasmania
MAFRI	Marine and Freshwater Resources Institute
NCP	National Competition Policy
R&D	Research and Development
SCFA	Standing Committee on Fisheries and Aquaculture
TAC	Total Allowable Catch
VRFish	Victorian Recreational Fishing Peak Body