

Annual status report 2008

Queensland Eel Fishery



The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

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Introduction

The Queensland Eel Fishery (QEF) targets the long fin eel, *Anguilla reinhardtii*, and the short fin eel, *Anguilla australis*, in rivers and freshwater impoundments. The QEF is unique in that the resource is harvested at two stages in the lifecycle—the adult stage (eels > 30 cm) and the glass eel/elver stage (eels < 30 cm) for both species. Commercial adult eel trappers collect adult eels from impounded waters¹; whereas commercial juvenile eel (JE) fishers take glass eels and elvers from rivers and supply seed stock for grow-out in aquaculture facilities.

The majority of Queensland's wild caught adult eel catch is exported live to Asia, principally Hong Kong and Taiwan, with a small percentage of adult eels being sold frozen to European markets.

This report covers the 2007 calendar year.

Fishery profile – Adult eel fishery

Commercial harvest: approximately 22 t

Recreational harvest 2005: negligible

Indigenous harvest 2000: negligible

Charter harvest: none reported

Commercial Gross Value of Production (GVP): approximately \$220 000

Number of licences: 31 as of August 2008

Commercial fishers accessing the fishery: 17 during 2007

Fishery season: January – December

Fishery profile – Juvenile eel fishery

Commercial harvest (weight): approximately 390 kg

Commercial harvest (number of individuals)²: approximately 2 166 770

Recreational harvest: negligible

Indigenous harvest: negligible

Charter harvest: none reported

Commercial Gross Value of Production (GVP): no estimate available³

Number of licences: 13 as of 20 August 2008

Commercial licenses accessing the fishery: 4 during 2007

Fishery season: January – December

¹ Impounded waters are defined in the Fisheries (Freshwater) Management Plan 1999.

² Based on 2006 estimate

³ GVP is based on price paid to fisher for the juvenile eel product. Some juvenile eel fishers supply their own grow-out facilities and so are only paid upon export of adult eels.

Description of the fishery

Fishing methods

In Queensland, commercial capture/harvest of adult eels is only permitted using baited eel traps or round traps which are usually set on the bottom of the impoundment. Adult eel traps consist of a single entry mesh funnel and a floated cod-end to hold the captured eels and ensure that captured eels are not over stressed and that air breathing non-target species may access the water surface to breathe. Traps are generally baited with pilchards or mullet.

Specifications on net design and setup are stipulated in the Fisheries (Freshwater) Management Plan 1999:

- the maximum size of an eel trap is 2.0 x 0.6 x 0.6 m when set.
- the maximum size of a round trap is a diameter of 1 m and a height of 0.6 m.
- the frame of the trap must be made of a rigid material.
- a trap (other than its pocket) must have a mesh size of at least 25 mm, any rigid mesh on the trap must be at least 22 mm in each of its dimensions.
- a float of at least 150 mm in each of its dimensions must be attached to each trap.
- the trap and trap float must be marked with authority number and full name of the authority holder.
- the tail of the cod end must also be attached to a float or buoy of adequate size so that at least part of the cod end floats at the surface to allow trapped animals access to surface air.

The juvenile component of the QEF targets juvenile eels using a variety of different gear types, including fyke nets, dip nets and flow traps. Juvenile traps must contain bycatch reduction devices to minimise impacts on non-target species. The maximum total amount of fishing gear allowed to be used under an authority is:

- one small mesh eel fyke net:
 - with a maximum of two wings (length \leq 15 m)
 - the fyke net must not exceed 4 m in height, width or diameter
 - the ends of the wings and the cod-end of the net must be marked with a reflective float bearing the holder's name and address
 - the net may be fixed by anchor or supported on stakes
 - a float must be attached to the cod-end to ensure that incidentally captured air-breathing animals can access air to breathe.
- three small mesh dip nets
- three flow traps with an effective bycatch excluder that have been approved by the chief executive prior to use.

Fishing area

The long fin eel is distributed along the east Queensland coastline and found throughout eastern states of Australia. The abundance of long fin eel is greatest in Queensland and New South Wales.

The short fin eel is at its northern distribution limit in southern Queensland. The species is more abundant in southern Australian states such as New South Wales, Victoria and South Australia.

Adult eel

The adult eel fishery allows fishing in all Queensland East Coast Drainage Division catchments with the exception of all coastal island catchments (Figure 1). Within this area, trapping of adult eels is only permitted in:

1. artificially created private impoundments in those catchments listed on an eel authority (for example, a farm dam).
2. an impoundment formed by a dam that is specifically listed on an eel authority (for example, a public owned impoundment such as Cressbrook Dam).

The majority of public impoundments are not open to commercial harvesting, and as such, the fishery comprises mainly private impoundments.

Juvenile eel

The juvenile eel fishery allows fishing in river basins associated with 21 rivers along the east coast of Queensland, which represent less than 10% of Queensland river systems. Fishing is permitted in the Albert, Barron, Brisbane, Burdekin, Burnett, Burrum, Caboolture, Coomera, Currumbin, Fitzroy, Johnstone, Kolan, Logan, Maroochy, Mary, Mooloolah, Mulgrave, Nerang, Noosa, Pine and Tully rivers (Figure 2). Within these basins, juveniles may only be collected at, or downstream of, the most downstream dam or weir⁴ and up to 200 m either side of the mouth of the approved rivers. Collecting is also allowed in tributaries that enter the approved rivers downstream of the most downstream dam or weir for a distance of 1 km upstream of the confluence.

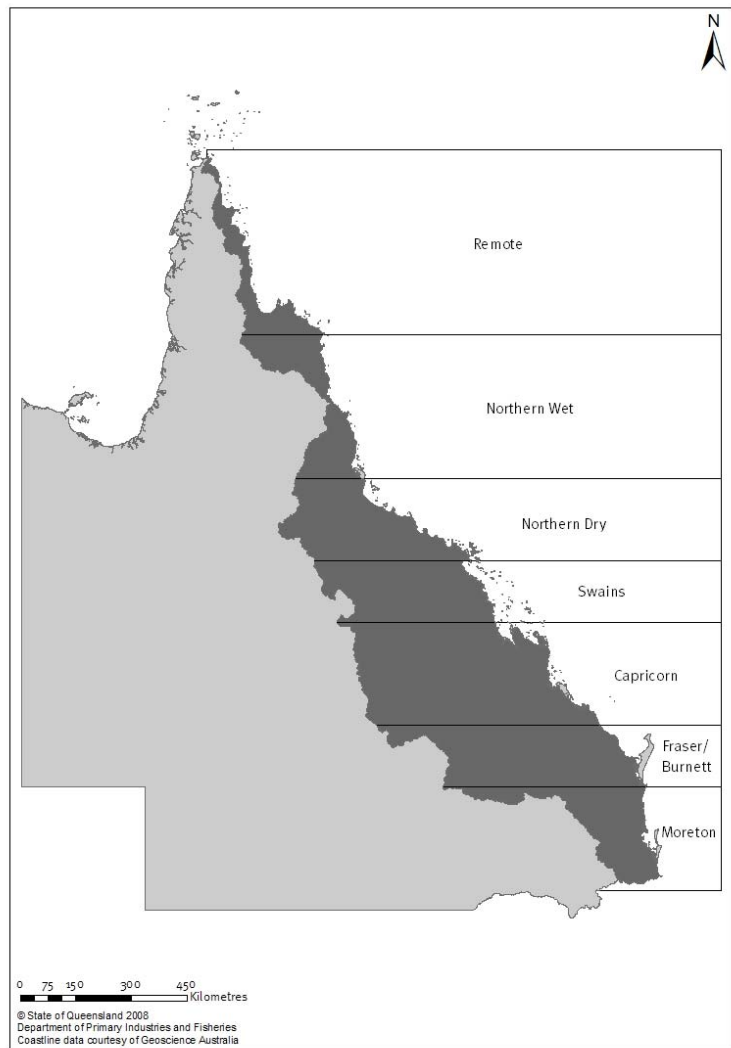


Figure 1: Area open to adult eel trapping including regional delineations.

⁴ A tidal barrage is not considered a weir for the purpose of these conditions.

Main management methods used

The Department of Primary Industries and Fisheries (DPI&F) manages the QEF in accordance with ecologically sustainable development principles. The fishery management methods differ between the adult and juvenile components of the QEF.

The adult wild caught eel component of the fishery is managed under the Fisheries (Freshwater) Management Plan 1999, which is subordinate legislation to the Queensland *Fisheries Act 1994*. Fishing activity in this component of the fishery is also controlled by the Fisheries Regulation 2008.

The collection and grow-out of juvenile eels is currently controlled through conditions attached to Commercial Harvest Fishery Licenses under the *Fisheries Act 1994*, Development Approvals for Aquaculture under the *Integrated Planning Act 1997* and the 'Policy for Management Arrangements for the Commercial Harvesting and use of Juvenile Eels' (The Juvenile Eel Policy). A range of input and output controls are in place to manage the harvesting of eels including:

- a minimum size limit (30 cm) for commercial adult eel collectors and recreational fishers
- a recreational in-possession limit for freshwater eels (combined limit of 10 for all species)
- restrictions on which waters are open to collection activities
- a limit on the number of authorities issued to access the fishery:
 - the adult eel fishery has 39 authorised fishers and is closed to new applicants
 - the juvenile eel fishery is restricted to 13 authorities
- restrictions on the type and design of apparatus and number of each gear type that can be used (Figure 3)

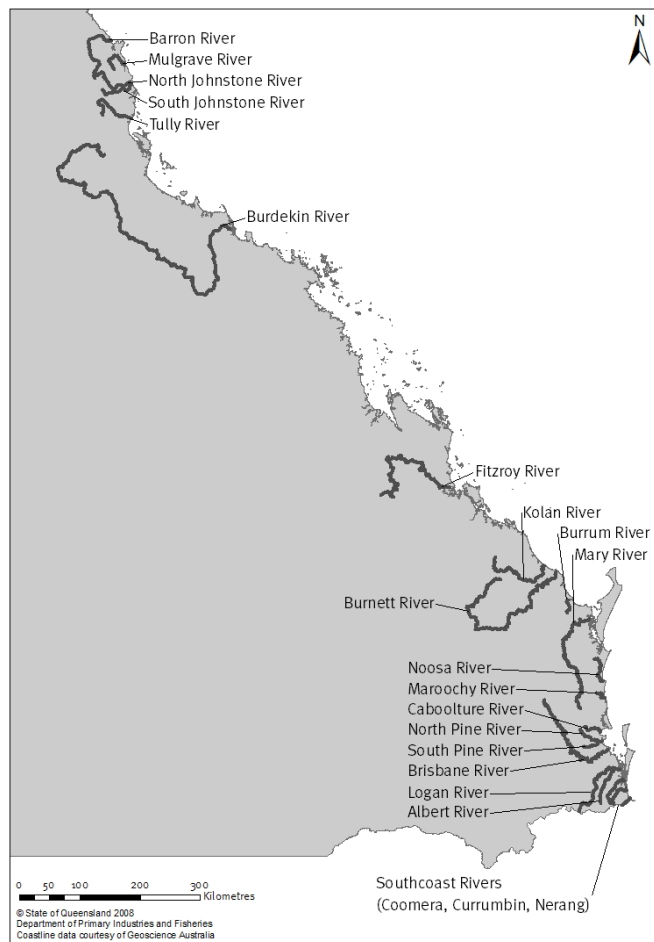


Figure 2: Map of permitted juvenile eel fishing rivers.

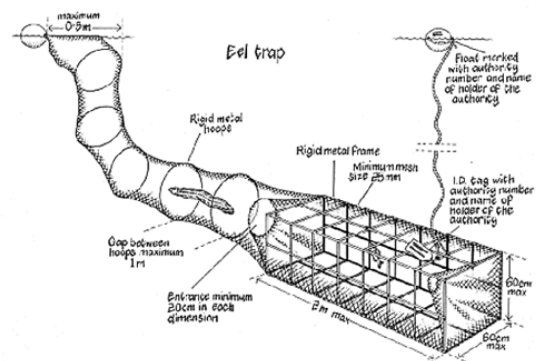


Figure 3: Eel trap used by adult eel trappers.

- restrictions on the use of juvenile eels (may be sold to authorised aquaculture facilities within Australia only).

Approximate allocation between sectors

The Queensland eel fishery is predominately a commercial fishery. The Recreational harvest of eel reported in the 2005 Recreational Fishing Information System (RFISH) diary survey indicates six individual eels were retained and 24 released. Previous Indigenous surveys recorded negligible levels of adult eel harvest (Henry and Lyle 2003). There have been no updates to these estimates by DPI&F but the level of take is not thought to have changed significantly.

Fishery accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The Queensland eel fishery was granted a five-year exemption from export requirements of Part 13A of the Australian Government EPBC Act on 6 November 2004 and expires 22 September 2009. The exemption acknowledges that the fishery is being managed in an ecologically sustainable manner and allows the export of eel harvested from Queensland waters.

Catch statistics

Commercial – Adult eel

Commercial catch data are maintained by DPI&F in the Commercial Fisheries Information System (CFISH) via compulsory monthly catch returns in the fishery logbooks.

Annual reported catch of adult eel rose from approximately 17 t in 2006 to 22 t in 2007 (Figure 4).

This recent rise in catch follows a continual decline in annual reported catch over the previous four years.

The rise in catch is due to the increase in effort expended in the fishery (fishing days).

Following several years of declining effort in the fishery, 2007 saw a significant increase in effort (Table 1). This spike in effort can be attributed to the

continued reduction in fishable waters brought on by drought, and the associated reduction in opportunities for eels to migrate into impoundments making it increasingly harder to obtain the desired amount of eel. Therefore trappers are fishing more often to meet desired catch levels.

Catch per unit effort (CPUE) in the adult fishery has been declining over the past three years (Figure 4). The decreasing CPUE is not representative of natural adult

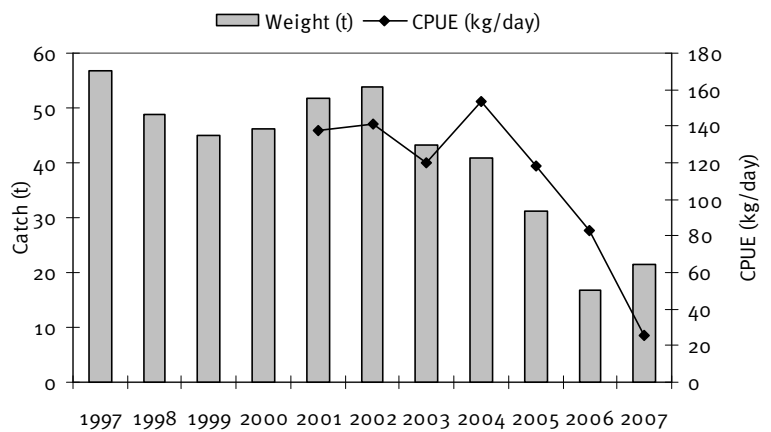


Figure 4: Queensland adult eel reported annual catch and CPUE 1997–2007 (Source: DPI&F CFISH database as at 25 August 2008).

Table 1: Boats and days fished in the adult eel fishery 1997-2007 (Source: DPI&F CFISH database as at 25 August 2008).

Year	Boats	Days	Weight (t)
1997	48	146	35
1998	6	12	3
1999	21	75	17
2000	21	65	9
2001	29	377	52
2002	24	381	54
2003	22	361	43
2004	19	267	41
2005	18	263	31
2006	17	200	17
2007	14	836	22

eel stocks as adult eels are harvested only from artificial impoundments. The downward trend is likely to be caused by Queensland's extended drought which may have:

- lead to a reduction in fishable impoundments through evaporation, and
- reduced connectivity and mixing between the artificial impoundments and natural waterways thereby restricting the replenishment of adult eels. Eels migrate to the ocean to breed and so cannot produce young within an artificial impoundment. Eel numbers in impoundments are therefore directly related to the number of eels able to migrate into the impoundment.

Recreational

Negligible levels of freshwater eels are retained by the recreational sector. The RFISH 2005 diary survey indicates that approximately six individual freshwater eels were retained and 24 released. These data are substantially less than those estimated in The National Recreational and Indigenous Fishing Survey (NRIFS)(Henry and Lyle 2003) from 2001 (7766 ± 2728 individuals). The NRIFS estimated recreational catch of eel is an estimate of all eel species harvested in Queensland, including *Conger* spp. (saltwater) in addition to the *Anguilla* species targeted by the commercial fishery.

Indigenous

Indigenous community fishing activity was analysed for Queensland as part of the NRIFS conducted in 2001 (Henry and Lyle 2003). In Queensland, 869 eels were reported as being taken by Indigenous fishers. These eels would have included other marine and estuarine species (e.g. *Conger* spp.) in addition to the *Anguilla* species targeted by the commercial fishery.

Commercial – juvenile eel

Annual reported catch of juvenile eel increased from approximately 325 kg in 2006 to approximately 390 kg in 2007 (Figure 5). The catch of juvenile eels has fluctuated greatly since 1997, with total reported annual catches between 0.9 kg and 390 kg (Figure 5).

CPUE (kg/day) has been fairly stable in the past five years, with a slight rise in 2007 (Figure 5).

Fluctuations in annual catches of juvenile eels are normal. The juvenile eel fishery is temporal in nature with seasonal, weather and tidal cycles imposing natural restrictions and significant variation in both catch and fishing effort. The variation in total catch from year to year is related to the high variability in abundance of juvenile eels entering individual river systems.

There were 13 approval holders in the juvenile eel fishery in 2007. Of these, four were actively fishing. The increase in effort expended in the fishery reported from 2002–06 may be due to

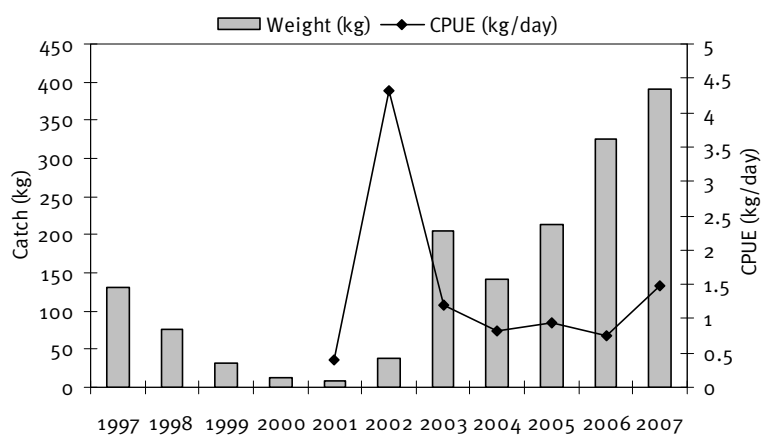


Figure 5: Total reported commercial catch (kg) and effort (days fished) in the Juvenile Eel Fishery 1997–2007 (Source: DPI&F CFISH database as at 25 August 2008).

several factors, including the market opening up to interstate sale, an increase in demand from aquaculture farms for on-growing and an increase in market demand from Asia, where the majority of the produce is exported live.

Spatial issues/trends – Adult eels

During 2007, the majority of adult eel catch and effort occurred in the Fraser-Burnett and Moreton regions (Figure 1). This is similar to spatial patterns seen in each of the past ten years.

Spatial issues/trends – Juvenile eels

The collection of juvenile eels is concentrated at specific river locations that favour collection (such as waterway barriers). In 2007 juvenile eels were harvested from four of the 21 rivers where collection is permitted. To protect the confidentiality of the active license holders in 2007, DPI&F cannot report the specific rivers that were fished.

Socio-economic characteristics and trends

The majority of eels, including wild-caught adult eels and juvenile eels grown on farms to export size, are exported live to Asia. In 2007, fishers were typically paid \$10/kg for wild-caught adult eels and 13/kg to \$16/kg for juveniles that have been grown to a marketable size in captivity⁵. Prices have remained fairly stable in recent years.

Fishery performance

The adult eel fishery operates within impounded waters and as such the potential impact of the fishery on natural waterways is minimised. Seventeen licence holders fished in the 2006 and 2007 seasons. Since 1999 the number of active operators has declined as fishers retired and rescinded their licenses, which has generally resulted in reduced effort and a subsequent reduction in reported annual catch. However, in 2007 there was a significant increase in effort in the adult eel fishery as discussed earlier (refer to Catch statistics; Commercial – Adult eel).

The juvenile eel fishery operates at a very small scale, with four active licenses in the 2007 season. In 2007 the total reported catch and CPUE increased from 2006 (Figure 5). This may be a result of favourable weather, tidal and market cycles. Catch in the juvenile eel fishery generally fluctuates due to the temporal nature of the fishery.

Anecdotal evidence and past research suggests that bycatch in both the adult and juvenile eel fishery is low. The gear utilised in the adult eel fishery is highly selective and observed bycatch in the juvenile eel fishery has been mostly limited to abundant and common species of glassfish (Gooley and Ingram 2002). A Species of Conservation Interest (SOCI) logbook was implemented in both the juvenile and adult eel fisheries in November 2006 and the resulting data are discussed in the Interactions with Protected Species section of this annual status report.

In 2006, an ecological risk assessment (ERA) was undertaken for the fishery, and subsequently a performance measurement system (PMS) developed to ensure the fishery continues to be managed in an ecologically sustainable manner. The outcomes of the ERA and PMS are included in later sections within this annual status report.

⁵ Based on consultation with commercial fishers.

Progress in implementing Department of the Environment, Water, Heritage and the Arts (DEWHA) recommendations

DEWHA made a range of recommendations to DPI&F during its assessment of the fishery in 2004 in order to address any perceived risks or uncertainties. Details of the progress DPI&F has made in implementing each of these recommendations are provided in Table 2.

Table 2: Implementation of recommendations.

Recommendation	Progress
DPI&F to inform DEWHA of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on bycatch, protected species or the ecosystem.	<p><i>Ongoing</i></p> <p>No changes were made to management arrangements during the reporting period.</p>
By the end of 2006, DPI&F to revise fishery specific objectives for the adult and juvenile eel fisheries to ensure that they specifically recognise the need to manage impacts on bycatch, protected species and the ecosystem. DPI&F to also develop performance indicators and performance measures for target, bycatch, protected species and impacts on the ecosystem.	<p><i>Complete</i></p> <p>The Queensland Eel Fishery Performance Measurement System (PMS) has been adopted in the fishery following submission to DEWHA in February 2007.</p> <p>The PMS is a key component of any enhanced management arrangements for the eel fishery, as it provides a set of transparent and verifiable measures against which DPI&F can assess and report on the performance of the fishery.</p>
DPI&F to monitor the status of the adult and juvenile fisheries in relation to the performance measures once developed. Within 3 months of becoming aware of a performance measure not being met, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.	<p><i>Ongoing</i></p> <p>One performance measure was triggered by fishing in the 2007 calendar year. Descriptions of the trigger event can be found in the 'Performance against fishery objectives' section of this document.</p> <p>As part of DPI&F's commitment to sustainable fisheries management, performance of the fishery against the identified objectives is analysed and reported publicly on an annual basis. A timetable for the implementation of appropriate management responses arising from any performance measure trigger will be developed within three months of DPI&F becoming aware.</p>
DPI&F to conduct a risk assessment of compliance and enforcement activities in the adult and juvenile eel fisheries. Outcomes of the risk assessment will be used to develop a compliance and enforcement strategy for the fisheries, including a timetable for the implementation of key components of the strategy.	<p><i>Complete</i></p> <p>In March 2007 the Queensland Boating and Fishing Patrol (QBFP) completed the compliance risk assessment for the Queensland eel fishery.</p> <p>Detailed strategies to address the risks identified by this assessment have been developed through the QBFP strategic and operational planning processes that are reviewed annually.</p> <p>Through identification and prioritisation of compliance risks associated with the fishery, planning and operational processes at the district level may be improved and risks mitigated.</p>
From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure once developed.	<p><i>Ongoing</i></p> <p>This annual status report is the fourth to be completed for the Queensland Eel Fishery.</p> <p>DPI&F has an ongoing commitment to publicly report on the fishery annually.</p>

Recommendation	Progress
<p>DPI&F to undertake fishery independent monitoring of representative impounded rivers on an annual basis to enable trends in adult eel abundance indicative of any declining recruitment to be identified.</p>	<p><i>Under review</i></p> <p>Fishery independent monitoring of freshwater species (including eels) occurred annually through the Long Term Monitoring Program (LTMP) between 2000 and 2006. Due to recent resourcing limitations, this program was not undertaken in 2007/08 and its future is currently under review.</p> <p>The 'Monitoring programs and results' section of this document presents trends in adult eel abundance between 2000 and 2006 as reported by the LTMP.</p>
<p>DPI&F to develop and implement sustainability indices for eel stocks within 3 years to ensure some assessment of the proportion of adult eels that can be sustainably harvested is conducted on an annual basis. The annual assessment of the adult eel resource will incorporate assessment of the impacts of environmental variability, where possible.</p>	<p><i>In progress</i></p> <p>A DPI&F and the Fisheries Research and Development Corporation (FRDC) project showed that fishery independent CPUE data obtained from LTMP surveys was suitable to use as an index of abundance of adult eels and sustainability indicator. LTMP surveys were conducted annually from 2000-2006. The program is currently under review in light of changes to DPI&F resourcing.</p> <p>In March 2007 DPI&F developed a performance management system for the fishery. The fishery is assessed against the measures annually.</p>
<p>In the event that the current genetic study on Long Fin Eels reveals that eel stocks harvested in the fishery are not panmictic, DPI&F will investigate alternative management arrangements with a view to implementing management measures that ensure that catchment fidelity is adequately taken into account. A program for the collection of fishery dependent and independent data to inform management will also be investigated.</p>	<p><i>Complete</i></p> <p>Postgraduate research was undertaken at Southern Cross University (SCU) in NSW on the genetic population structure of long fin eels. Unpublished conclusions from this research suggest that long finned eels are panmictic (Moore 2008).</p> <p>In addition to the SCU study, recently published research has found genetic trends which suggest panmixia within juvenile eel populations along Australia's east coast (Kang-Ning and Wann-Nian 2007).</p> <p>Fishery dependent data continues to be collected through compulsory monthly log books.</p> <p>Fishery independent monitoring occurred annually from 200-2006 and is currently under review in light of budgetary limitations.</p>
<p>DPI&F to conduct a cost-benefit analysis on methods to facilitate juvenile eel recruitment upstream past waterway barriers. If an appropriate mechanism is identified, DPI&F to implement the mechanism and/or encourage relevant authorities to put in place measures to facilitate ongoing juvenile eel recruitment past waterway barriers.</p>	<p><i>In progress</i></p> <p>A literature search and preliminary discussions with DPI&F's fisheries economists have begun.</p>
<p>Within three years, DPI&F to undertake a risk analysis of the bycatch species, including protected species, taken in the fishery to identify those species vulnerable to fishing. Management measures to mitigate threats to any species found to be at high risk from fishing operations should be developed and implemented in a timely manner.</p>	<p><i>Complete</i></p> <p>An ecological risk assessment (ERA) of the Queensland Eel Fishery was undertaken in September 2006. The ERA was submitted to DEWHA in July 2007.</p> <p>The ERA showed that risk posed to bycatch and protected species by the fishery is negligible to minor.</p>

Recommendation	Progress
	An ERA is one aspect of DPI&F's commitment to progress sustainable fisheries management.
DPI&F to implement the Species of Conservation Interest logbook in the adult and juvenile eel fisheries within 12 months to enable ongoing recording and monitoring of protected species interactions.	<p><i>Complete</i></p> <p>A Species of Conservation Interest (SOCI) logbook for both the adult and juvenile components of the Queensland Eel Fishery was implemented in November 2006.</p> <p>DPI&F and the Queensland fishing industry are committed to minimising the impacts of fishing on protected species. SOCI logbooks will enable DPI&F to monitor and mitigate interactions with Queensland's protected species, which will further support DPI&F's commitment to sustainable fisheries management.</p>

Performance against fishery objectives

DPI&F applied the Queensland Eel Fishery Performance Measurement System (PMS) to the adult and juvenile eel fishery following submission to DEWHA in February 2007. The PMS was developed in consultation with representatives from the commercial fishing sector, other fishery stakeholders, fishery managers, researchers and assessment and monitoring staff to ensure that objectives were meaningful, defensible, precautionary and measureable against available data. The performance measurement system was approved by a delegate of the Chief Executive and is a formal instrument for measuring the performance of this fishery.

The designated performance measures and the fishery's adherence to them are outlined below in Table 3.

Table 3: Performance measures in the juvenile and adult eel fisheries.

Element of eel fishery	Performance Measure	Performance
Juvenile eels	The proportion of nominated rivers fished exceeds the highest historical proportion of rivers fished (2002-05), for both elvers and glass eels.	<i>Not triggered</i>
Juvenile eels	Annual catch exceeds the highest historical annual catch (2002 – 05), for both elvers and glass eels.	<i>Triggered</i> In 2007, 390kg of juvenile eels were harvested. This exceeds the highest historical annual catch of 325 kg (Figure 5).
Juvenile eels	Annual effort per river shows a continual increasing or decreasing trend for three consecutive years, for both elvers and glass eels.	<i>Not Triggered</i>
Juvenile eels	The risk ranking assigned to bycatch species issues in the ERA process increased from the previous assessment of the juvenile eel fishery.	<i>Not measured</i> The ERA was finalised in July 2007. It is proposed that the ERA be reviewed every three years.

Element of eel fishery	Performance Measure	Performance
Juvenile eels	Interactions with threatened, endangered or protected species (TEP species) show an increasing trend over three years in the juvenile eel fishery.	<i>Not triggered</i> There have been no reported interactions with protected species since the introduction of SOCI logbooks in November 2006.
Juvenile eels	The risk ranking assigned to TEP species issues in the ERA process increased from the previous assessment of the juvenile eel fishery.	<i>Not measured</i> The ERA was finalised in July 2007. It is proposed that the ERA be reviewed every three years.
Juvenile eels	For each river monitored in the LTMP Freshwater Surveys (east coast only) in which the JE Fishery operates - there is a consistent decreasing trend in the number of fish species recorded annually in the LTMP over a three year period.	<i>Not measured</i> LTMP freshwater surveys were not conducted in 2007.
Adult eels	Total annual catch of adult eels exceeds the highest reported historical annual catch (from 1996 to 2005).	<i>Not triggered</i> Figure 4 in this document demonstrates that annual catch of adult eels in 2007 remained below the highest reported historical annual catch.
Adult eels	Annual effort in the adult eel fishery shows a continual decreasing trend for three consecutive years.	<i>Not triggered</i>
Adult eels	The risk ranking assigned to bycatch species issues in the ERA process increased from the previous assessment of the adult eel fishery	<i>Not measured</i> The ERA was finalised in July 2007. It is proposed that the ERA be reviewed every three years.
Adult eels	Interactions with TEP species show an increasing trend over three years in the adult eel fishery.	<i>Not measured</i> SOCi log books were introduced in November 2006. Hence there is only one full fishing year of TEP data (2007).
Adult eels	A risk ranking for TEP species in the ERA increases from the previous assessment of the adult eel fishery.	<i>Not measured</i> The ERA was finalised in July 2007. It is proposed that the ERA be reviewed every three years.

DPI&F became aware of one trigger event in September 2008. Within three months of becoming aware that a review event has been triggered, DPI&F is required to finalise a clear timetable for implementation of appropriate management responses. This process is currently underway and will be reported on in the 2009 annual status report.

Responses to 2006 triggers

The 2007 annual status report for Eel identified four performance measures triggered by activity in the 2006 fishing year. DPI&F have considered the factors contributing to the triggers in consultation with the Freshwater Management Advisory Council (Freshwater MAC) including fisheries scientists, recreational fishers, conservation and industry members) and found that they do not currently present an immediate risk to the sustainability of the eel fishery in Queensland. No further management action regarding the triggered performance measures is required at this stage.

Resource concerns

There is some concern about the effect of waterway barriers on eel migration. Glass eels have been known to enter fishways however they are yet to be recorded successfully negotiating the fish passage devices currently in operation in Queensland. Larger eels are more likely to be able to negotiate fishways. As part of DPI&F's management of this issue, a cost-benefit analysis of the possible solutions to this issue is being attempted.

Ecosystem

Non-retained species/bycatch

There are no by-product species taken in the Queensland Eel Fishery as eels are the only freshwater fish permitted to be taken for trade or commerce. Adult eel traps have been designed to minimise the likelihood of interactions with non-target species and to reduce the impacts on any individuals captured.

Previous research demonstrated that bycatch in the juvenile eel fishery is generally low and consists of small, abundant and common species (Gooley and Ingram 2002).

Interactions with protected species

A Species of Conservation Interest (SOCl) logbook was adopted within both the adult and juvenile eel fishery in November 2006 to facilitate reporting of any interactions with protected species.

Adult eel fishery

In 2007 there were a total of 10 877 reported interactions with freshwater turtles, and one with a water rat. Of the freshwater turtles, 98% were released alive. The water rat was found dead (Table 4).

The majority (84%) of the interactions with fresh water turtles occurred in the Ross River catchment in North Queensland. Options for amending eel trap design, with the aim of reducing interactions with SOCl, will be considered during the review of the Fisheries (Freshwater) Management Plan 1999 scheduled to occur in 2009.

Table 4: Interactions with species of conservation interest reported during 2007.

Common Name	Number released alive	Numbers released dead	Total number of interactions
Freshwater turtle	10 877	182	11 059
Water rat	0	1	1

Juvenile eel fishery

In 2007, there were no reported interactions with species protected under the EPBC Act.

Fishery impacts on the ecosystem

The impact of the eel fishery on the ecosystem is considered to be low. The apparatus used is considered to have only a minimal impact on the physical environment and non-target species. Restrictions on the number of traps and the locations in which they can be used in are implemented to minimise potential impacts. The use of apparatus designs that are sensitive to the environment and non-target species is encouraged. The trapping of adult eels occurs mainly in artificially created environments (e.g. farm dams) and therefore the adult eel fishery has negligible impact on the ecosystems of natural waterways.

Other ecosystem impacts

Man-made barriers such as dams or weirs may affect migration of fish to a variable degree, from short delays to complete obstruction depending on the dimensions and characteristics of the barriers, the hydrology of the river and species-specific features, such as swimming capacities and timing of migration (Northcote 1998). In Queensland, barriers to eel passage upstream such as dams, weirs and barrages have the potential to reduce recruitment into upstream freshwater environments where female eels develop and grow. DPI&F has initiated a cost-benefit analysis of the potential to facilitate juvenile eel recruitment upstream past waterway barriers.

Research and monitoring

Recent research and implications

No recent research has been undertaken by DPI&F in the Queensland Eel Fishery since DPI&F/FRDC project 1998/128 completed in 2004.

A recently published study suggests possible panmixia in juvenile eel populations (Kang-Ning and Wann-Nian 2007). The study found that there were no significant variances in genes from juvenile eel samples along the east coast of Australia. However, advice from an expert geneticist within DPI&F (Broderick 2007) suggests that the level of resolution inherent in the study methods could have resulted in a lack of detection of subtle genetic differences between populations.

Postgraduate research was undertaken at Southern Cross University (SCU) in NSW on the genetic population structure of long fin eels. Unpublished conclusions from this research also suggest that long finned eels are panmictic (Moore 2008).

The findings from these studies have implications for co-management of eel populations along the east coast of Australia. It also further supports the extrapolation of LTMP stock monitoring/assessments across Queensland's river basins.

Monitoring programs and results

Long Term Monitoring Program

Freshwater Long Term Monitoring Program (LTMP) results from 2000–06 can be found in the previous annual status report for the eel fishery. The freshwater component of LTMP was suspended in 2007/08 and its future is currently under review. DPI&F is considering feasibility of alternatives focused on the eel fishery.

Collaborative research

No further collaborative research has been undertaken since the completion of the DPI&F and FRDC project in 2005 (Hoyle *et al.* 2005). The project results supported DPI&F's assertion that the management arrangements in place for the Queensland Eel Fishery are conservative and the best option for ensuring the sustainability of the fishery.

Fishery management

Compliance report

Compliance and enforcement in the Queensland Eel Fishery is the responsibility of the DPI&F, Queensland Boating and Fisheries Patrol (QBFP).

During 2007, thirteen units were inspected in the Queensland Eel Fishery including six commercial fishing vessels. No offences were detected, implying a very high level of compliance in this fishery.

A compliance risk assessment was conducted for this fishery in March 2007 in order to determine compliance priorities and allow the most effective use of QBFP resources.

The assessment identified the following activities in the Queensland Eel Fishery as having the highest level of risk. The Queensland Boating and Fisheries Patrol will therefore direct their compliance resources to addressing:

- Taking eels from waters other than those permitted in the authority (adult eel fishery)
- Use of unauthorised gear in the commercial adult eel fishery (e.g. type, number).

There are also a number of activities rated as having moderate risk, which will be addressed, but at lower priority. Detailed strategies to address the risks identified by this assessment have been developed through the QBFP strategic and operational planning processes that are reviewed annually.

Changes to management arrangements in the reporting year

No changes to management arrangements were made within the adult or the juvenile eel fishery in 2007.

In June 2008, DPI&F introduced the *Policy for the Removal of Excess Fishing Capacity in Queensland's Line, Crab, Beam Trawl and Eel Fisheries*. This policy is designed to enhance sustainability through the reduction of latent effort in a number of fisheries including the adult eel fishery. DPI&F will monitor the effectiveness of this Policy on the adult eel fishery and report on this in the next annual status report.

DPI&F plans to review the management arrangements for the adult eel fishery once the removal of latent effort process has been undertaken (currently underway and anticipated to be completed by the end of 2008).

Complementary management

Formal discussions with New South Wales and Victorian fisheries agencies in regards to complementary management have not yet occurred. However, officers from different jurisdictions regularly participate in informal contact.

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Image

Long fin eel – *Anguilla reinhardtii*

