



**Australian Government**

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**Department of the Environment and Heritage**

# **Assessment of the New South Wales Estuary General Fishery**

Wildlife Trade and Sustainable Fisheries Branch  
Department of the Environment and Heritage  
**January 2003**

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# Assessment of the ecological sustainability of management arrangements for the New South Wales Estuary General Fishery

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## EXECUTIVE SUMMARY

### Process followed in the assessment

NSW Fisheries has provided a submission for the Estuary General Fishery (EGF) addressing the Commonwealth's *Guidelines for the Ecologically Sustainable Management of Fisheries*, (hereafter referred to as the *Guidelines*) to seek exemption from the export controls of the *Environment Protection and Biodiversity Conservation Act (Part 13A)* (formerly the *Wildlife Protection (Regulation of Exports and Imports) Act 1982*). The NSW Fisheries submission comprises an Environmental Impact Statement (EIS) and Fishery Management Strategy (FMS). The EIS contains the draft FMS and environmental impact assessment (EIA)<sup>1</sup> (see figure 1). Over the period of consultation while the FMS was under development, NSW Fisheries undertook a complete review of the operational rules for the fishery. Environment Australia (EA) provided a number of formal comments and meetings occurred between EA and NSW Fisheries during which preliminary drafts were refined. EA acknowledges the significant changes that NSW Fisheries has made to the FMS as a result of consultation with our Department as well as other stakeholders.

New processes under the *Environmental Planning and Assessment Act 1979* require NSW Fisheries, on behalf of the commercial fishers, to prepare a draft FMS and environmental assessment. The guidelines issued by Planning NSW (previously the Department of Urban Affairs and Planning) to develop the EIS package in line with the *Environmental Planning and Assessment Act 1979* are complementary to the *Guidelines*, allowing NSW Fisheries to submit these documents to EA for export assessment. This document reports on the assessment of the New South Wales Estuary General Fishery against the *Guidelines*.

NSW Fisheries released the Estuary General EIS for public comment on 16 November 2001. Stakeholders, interested parties and other members of the public were invited to comment on the EIS. The public comment period ended on 18 January 2002 with a total of thirty-eight (38) written submissions received. NSW Fisheries identified 194 comments within the 35 submissions. The source of the submissions was distributed as follows:

Estuary General Fishers	8
Other Commercial fishing industry	3
Recreational Fishers	6
Advisory Body	2
Government (Local, state)	9
Other	7
	<b>35</b>

The most frequently mentioned comments (10 or more comments) in relation to the ecological sustainability of the fishery can be grouped into the following broad categories:

- External influences on the fishery
- General comments on the quality and accuracy of the document
- Adequacy of the assessment of the impact on the biophysical environment
- Additional suggestions for future management of the fishery
- Suggested closures for the fishery

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<sup>1</sup> The Estuary General EIS is available on the NSW Fisheries Website <http://www.fisheries.nsw.gov.au/commercial/Estuary-General/est-gen-eis.htm>

- Information used for the management of the fishery
- Administration of the EIS and the public exhibition process.

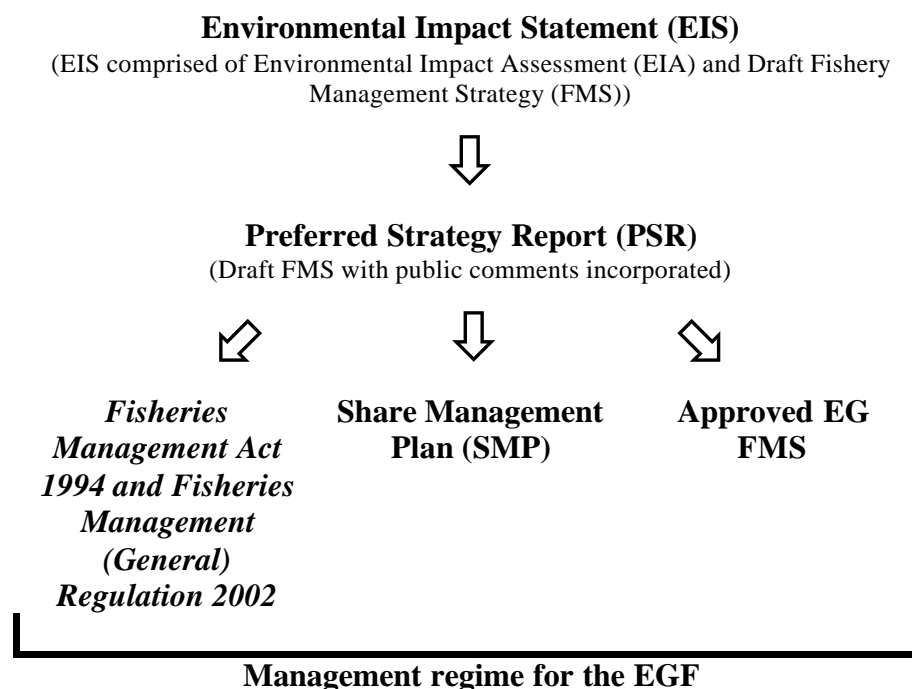
A Preferred Strategy Report (PSR) was prepared in February 2002 by NSW Fisheries following public exhibition of the EIS. The PSR is prepared as a draft of the FMS and takes into consideration comments made during the public exhibition period.

The NSW Minister for Fisheries made a formal determination under the NSW *Environmental Planning and Assessment Act 1979* in July 2002 with respect to the EGF, which in effect allows the fishery to continue in accordance with the FMS, subject to a number of modifications being made to the FMS. Those modifications were subsequently made, and in January 2003 the NSW Minister for Fisheries formally approved the Estuary General Fishery Management Strategy.

Following the public comment period, EA drafted this assessment report of the New South Wales Estuary General Fishery submission against the *Guidelines*. In addition to the submission and associated documents, public comments and NSW Fisheries responses informed EA's assessment.

The Recreational and Charter Boat fisheries, which also operate within NSW estuaries, will be assessed under the *Environmental Planning and Assessment Act 1979* under separate EIS reports developed by NSW Fisheries.<sup>2</sup>

**Figure 1** Documents produced for development of the Estuary General Fishery management regime



<sup>2</sup> For more information on Environmental Assessments and Commercial Fishery Strategies in NSW see the NSW Fisheries Web site <http://www.fisheries.nsw.gov.au/commercial/env-assess.htm>

## Background

The Estuary General Fishery (EGF) is the most diverse commercial fishery in NSW. Approximately 99% of the catch by total landed weight comprises 45 species, taken from approximately 100 estuaries along the NSW coast, using 17 types of fishing gear. The fishery also includes hand gathering of species such as beach worms and pipis from ocean beaches. The gear ranges from large hauling nets to relatively small traps and gathering by hand. NSW Fisheries have records of reported estuarine commercial fishing catches for the last 50 years.

The EGF, which is one of nine major commercial fisheries in NSW, has a large number of participants, with approximately 722 fishing businesses endorsed to operate in the fishery (as of August 2002). The EGF is the most important fishery in NSW in terms of the volume of catch and number of authorised fishing businesses and the second most important in terms of value.

Many fishers in the EGF are also endorsed to fish in other fisheries. Only 54% of fishers with Estuary General (EG) endorsements fished solely in the EGF in 2000/2001. The remaining 46% of EG fishers also fished and obtained income from other fisheries or recorded no catch in 2000-2001. There is also a large variation in the levels of participation of fishers. Some fishers operate on a full time professional basis, while others operate on a part time basis and maintain other non-fishing forms of employment. The fishery is currently managed using a complex set of gear and fishing time specifications, closed areas and seasons, minimum net mesh sizes and minimum fish size regulations. A summary of the EGF is provided in Table 1.

The FMS is the strategy for achieving the objectives of the NSW *Fisheries Management Act 1994*. The FMS contains the objectives for the fishery, a detailed description of the way the fishery operates and describes the management framework for at least the next five years. It also outlines a program for monitoring the environmental performance of the fishery, establishes trigger points for the review of the FMS and requires annual reporting on performance in order to determine if the objectives set out in the strategy have been met. The regulatory controls included in the FMS will be made by amendment to the *Fisheries Management Act 1994*, incorporated into the Estuary General Share Management Plan (SMP) or by amendment to the *Fisheries Management (General) Regulation 2002* (see figure 1).

The NSW Fisheries SMP, which will be implemented by December 2003,<sup>3</sup> provides a legislative structure for the class or classes of shares and the rights of shareholders under the EGF. During the transition to full share management, criteria for the allocation of shares and an allocation formula are decided. Based on the criteria and applications received, provisional shares are issued. A limited access stage then commences in which a licensed fisher must hold at least one provisional share in the fishery to be eligible to hold an endorsement. A SMP for the fishery is prepared and put into regulation, final shares are issued and the fishery commences as a full share management fishery. The SMP will also bring into operation a number of aspects of the fishery described in the FMS, including fish species that may be taken, areas for taking fish, times or periods for operating in the fishery, the protection of fish habitats, the use of boats and fishing gear and the use of bait in the fishery. The SMP will include objectives and performance indicators that will be consistent with the FMS. At present the EGF is at the stage of consulting over the criteria for allocation of shares.

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<sup>3</sup> MR 5.3(a)

A number of other NSW Government initiatives also impact on the management of the EGF, including the implementation of Recreational Fishing Havens (RFHs), the Marine Protected Area program<sup>4</sup> and the development of an Indigenous Fisheries Strategy.

A fee is collected from recreational fishers in NSW. A major initiative funded by this fee is the creation of Recreational Fishing Havens involving the buy-out of commercial licences in those areas and surrounding areas to reallocate the fisheries resources between user groups. 30 recreational fishing havens were declared in 2002. These havens, created after two years of community consultation involving thousands of public submissions, mean 27% of estuarine waters are free of commercial fishing, compared to 3% before their introduction. The voluntary buyout process reduced the number of fishing businesses authorised to operate in the EGF to 722 (as at August 2002) from 944 (July 2001).

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<sup>4</sup> Marine Park Authority Website [www.mpa.nsw.gov.au](http://www.mpa.nsw.gov.au)

**Table 1** Summary of New South Wales Estuary General Fishery

<b>Area</b>	May occur in 102 estuaries - primarily 24 estuaries (comprise 95% of the catch) of the state's 130 major estuaries. These estuaries are also subject to fishing closures and gear restrictions. Also includes the ocean beach for the pipi fishery.
<b>Gear</b>	Nine endorsement types which includes 14 net types and 3 types of traps – mesh and haul the most common: Fish trapping                      Crab trapping Eel trapping                         Hand lining and Hauling crew Hand gathering                      Prawning Meshing                                2 categories of hauling.
<b>Fishing units</b>	722 (August 2002) (half of the state's commercial fishing businesses) - the largest of the state's fisheries.
<b>Target Species</b>	The fishery is limited to 83 permitted species. Top 10 species comprise 95% of the catch: sea mullet                      river eels                      dusky flathead                      blue swimmer crabs luderick                         sand whiting                      pipis yellow fin bream                      school Prawns                      silver biddy
<b>Bycatch species</b>	Bycatch occurs in haul and mesh nets – levels of bycatch are generally unknown
<b>Management Controls</b>	Primarily input controls and some output controls (see table 2 for detail)
<b>Export</b>	A developing export market for mullet roe to markets in South-East Asia and the Middle East; small market for blue swimmer crabs and eel live to China. Generally the fishery is described as an artisanal (a subsistence) fishery
<b>Endangered/Threatened/Protected species interactions</b>	Platypus and tortoise in eels traps, bass in mesh nets, estuary perch
<b>Value</b>	2000-01 5,043 tonnes at a value of approximately \$19 million at point of sale, <sup>5</sup> 50% of fishers take 90% of the revenue (fishery has a sizeable lifestyle component)
<b>Catch Trend</b>	Total catch has remained relatively stable over the past 50 years except for slightly higher catches in the late 80s and early 90s.
<b>Recreational component</b>	Very significant for most estuaries and species. The outcome of the National Recreational and Indigenous Fishing Survey (NRIFS) is expected to provide valuable information for management of the fishery. Managed through bag and size limits, recreational licence and gear controls.
<b>Indigenous Component</b>	Unknown – awaiting outcome of the NRIFS
<b>Charter Operators</b>	195 Authorisations for Estuary waters in August 2002.

<sup>5</sup> based on Sydney Fish Market average monthly prices does not take into account export, interstate or local markets where higher prices may be obtained

## **Overall assessment**

This assessment reports on the major management responses, triggers, performance indicators and monitoring programs as they relate to the *Guidelines*. Refer to the FMS for more detail.

The material submitted by NSW Fisheries for assessment of the EGF (the submission) suggests that, despite the lack of quantitative data available on the fishery, the management responses and initiatives of the FMS should provide for a greater degree of confidence in the conservative management of the EGF in the short to mid term. On the basis of the material submitted by NSW Fisheries EA suggests that the fishery operates in accordance with the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*.

### ***Management arrangements***

Although the mix of input and output control management has provided a fair level of protection for fish stocks during the past 100 years that the fishery has been in operation, and overall, reported catches have been relatively stable, EA considers that the fishery would have faced a number of high environmental risks if it had continued to operate without any change. EA consider that the FMS adequately addresses these concerns through its seven major long-term goals for the management of the fishery, underpinned by 35 specific objectives and 108 management responses, including immediate actions, development of future management and enforcement measures and scientific research and monitoring programs.

EA is satisfied that the FMS has strong reporting requirements and built in feedback loops.

Latent effort identified in the fishery is being reduced through a range of measures including zoning and minimum entry requirements.

### ***Stock status and recovery***

EA agrees with NSW Fisheries that the current fishery dependent monitoring through the logbook program is insufficient to achieve the goals identified in the FMS. The two additional monitoring initiatives will enhance NSW Fisheries ability to obtain information for assessing achievements of the goals of the FMS. The first is an observer program funded by the commercial fishing industry to gather information to validate commercial logbooks and document bycatch. The second is the development and implementation of a fishery independent sampling regime to provide information required for on-going stock assessment.

The EGF is categorised as being a multi-species, multi-gear fishery with a wide geographical range and a large operator base. Given that the EGF operates within a data poor environment, the exploitation rate of many of the species is uncertain and biological information on the majority of the species taken is lacking, the FMS is substantially based on precautionary management measures. The long term historic catch trends, combined with the high proportion of species reaching sexual maturity before harvest, and the broad age distribution of key species in the commercial catch, indicate that the fishery is fairly resilient to change. As a result, any adverse affects from harvesting should be medium term and reversible through appropriate management initiatives.

### ***Ecosystem impacts***

Bycatch reduction is a key component of the FMS and is to be principally achieved through a range of initiatives including regulatory changes to some of the apparatus used in the fishery and the spatial area of the fishery.

The FMS identifies that performance indicators need to be developed to monitor biodiversity impacts at the species, community and ecosystem levels. NSW comments that the development of these performance indicators will involve extensive scientific collaboration and is likely to take some time. EA acknowledges the steps NSW has taken to achieving this outcome.

EA acknowledges that the EGF management regime has moved from a fishery managed under the broad objectives of the *Fisheries Management Act 1994* and the relevant regulations in the *Fisheries Management (General) Regulation 2002* to a Fisheries Management Strategy with fishery specific goals, objectives and management responses. EA considers that NSW Fisheries, in implementing these changes, has made a significant step forward in minimising the risk of the fishery being ecologically unsustainable in the short term to mid term. NSW Fisheries is introducing mechanisms that should control the ecological impact of the fishery, in the short term, to its current impacts with strategies to move to ecologically sustainable management in the long term.

EA is satisfied that the combination of existing and new management arrangements should ensure the fishery is managed in an ecologically sustainable manner. EA is confident, given the comprehensive implementation process that outlines clear timeframe, responsibility and authority, that these management actions will be implemented. EA's primary concern is, given that a large number of the management measures have yet to be implemented, that these will be effective in managing the level of take in the fishery and the impacts of the fishery on the environment. However, EA is satisfied that the effectiveness of these management measures, once implemented, should be adequately monitored through the triggers and performance indicators. The EIA identifies that, whilst the relevant responses in the draft FMS can be expected to (for example) reduce mortality of bycatch or improve habitat condition, there is no way of predicting the extent to which such benefits will offset adverse influences from the many external factors affecting the fishery.

The NSW submission comments that there is an incomplete understanding of the status of particular stocks and their associated ecological interactions and the wide range of external influences (both anthropogenic and natural) affecting the environment in which the fishery operates. Given this lack of understanding it is impossible to predict the precise effect of the FMS's implementation on the resource status of the principal retained species taken in the EGF or its impact on the environment. EA concludes that it is reasonable to assume that the strategy's responses in combination should lead to the maintenance of fish stocks.

On balance, EA finds that the EGF employs sound management strategies aimed at minimising the environmental impacts of the fishery and concludes that the fishery is managed in an ecologically sustainable way. EA recommends that the export of product taken in the Estuary General Fishery should be exempt from the export permit requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in five years. As the fishery does not operate in the Commonwealth marine area, a part 13 accreditation under the EPBC Act is not required.

EA recognises the significant advances NSW Fisheries has made in the management arrangements for this fishery with the implementation of the FMS. NSW Fisheries has committed to a number of management responses (MR) in the FMS, the implementation of which EA considers is crucial to the long-term sustainable management of the fishery as outlined below. The implementation, within the management strategy's timeframes, of these

commitments made by NSW Fisheries in the submission will be reviewed as part of the next Commonwealth review of the fishery in five years time. These are as follows

- NSW Fisheries to inform Environment Australia of any future amendment to the management regime for the Estuary General Fishery.
- Introduce an industry funded scientific observer program by December 2003 (MR 1.1f)
- Conduct a risk assessment of the impacts of the fishery on the ecosystem and initiate appropriate management programs (e.g. monitoring) based on the outcomes of that process by December 2004 (MR 1.3(c))
- Develop a system for and conduct a formal stock assessment of the primary species within five years and review the assessment at least every three years thereafter (MR 2.1.1(c))
- Develop an objective system for defining and setting trigger points to detect concerning trends in landings of all species permitted to be taken in the Estuary General Fishery annually from 2003 (MR 2.1.4(c))
- Identify the active level of effort (as opposed to latent effort) in each endorsement type and region, and implement minimum shareholdings over set time periods to ensure that the level of active effort does not exceed historical levels (provided that those levels are biologically sustainable) by December 2003 and ongoing (MR 2.2(b))
- Where the fishery is a major harvester of an overfished species, develop and implement a recovery program for the species within a specified timeframe (MR 2.5(a))
- Develop and implement fishery-independent surveys for use in future stock assessments of species that inhabit estuarine waters by July 2005 (MR 7.3(c))

## PART I - MANAGEMENT ARRANGEMENTS

The NSW Estuary General Fishery (EGF) is managed by NSW Fisheries. NSW Fisheries is primarily responsible for administration of the *Fisheries Management Act 1994* and associated regulations. NSW Fisheries also jointly administers the *Marine Parks Act 1997* with the NSW National Parks and Wildlife Service.<sup>6</sup> The EGF will be managed under the EG Fisheries Management Strategy, the EG Share Management Plan and the *Fisheries Management (General) Regulation 2002*. Collectively, these will be referred to as the management regime (*see Figure 1*). Additionally the fishery is subject to the overall fisheries management objectives contained in the *NSW Fisheries Management Act 1994*. All NSW legislation is available on the Internet and from NSW Fisheries offices.

Ideally, management arrangements for fisheries affecting a single stock should be under a single jurisdiction or at least be complementary. If this is not achievable, management arrangements should, as a minimum, take into account the harvest and management regimes in other jurisdictions fishing the same population, particularly when assessing stock status and availability for harvest. NSW has undertaken to establish formal arrangements with the Queensland Fisheries Service, the Victorian Fisheries Division and the Commonwealth, to establish joint monitoring and assessment of shared stocks with a view to developing future collaborative management arrangements. These meetings will be held at a minimum every two years and will be linked with a stock assessment review. These meetings with management and research staff will consider consistency and innovation in research and monitoring and management programs for species. EA considers that the FMS provides effective mechanisms to ensure that the management regime takes into account arrangements in adjacent fisheries jurisdictions.

There are no regional or international management regimes, to which Australia is a party, of specific relevance to the EGF. The prime international regime affecting the fishery is the United Nations Convention of the Law of the Sea. The management regime essentially complies with this.

EA is satisfied that sufficient opportunity is provided to all interested and affected parties, including the general public, to contribute to the development of the management regime. An appropriate range of expertise and community interests are involved in the fishery management committee and during the stock assessment process.

Public comments were sought on the EIS. The EIS and other documentation was widely available to the public by placing them on the NSW Fisheries web site<sup>7</sup>, providing copies at Fisheries Offices throughout the State and targeted mail outs to key stakeholders. Opportunity to comment was advertised in regional and national newspapers.

The Estuary General Management Advisory Committee (EGMAC) provided advice to NSW Fisheries on the development of the FMS. The EGMAC includes elected representatives of the commercial Estuary General fishers (an industry representative for each of the seven coastal regions in the fishery, with two in region 4 to account for the greater expanse of area and number of fishers in that region) as well a representative of recreational and indigenous fishers and the Nature Conservation Council (the peak umbrella organisation for around 120 conservation and environment groups in NSW). Input on the draft strategy was also sought

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<sup>6</sup> The *Marine Parks Act 1997* established the Marine Parks Advisory Council to advise the Minister for the Environment and the Minister for Fisheries as well as the Marine Parks Authority on matters relating to the care, control and management of marine parks in NSW.

<sup>7</sup> NSW Fisheries Web Site [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au)

from all fishers in the Estuary General Fishery, the Minister for Fisheries' advisory councils on commercial fishing (ACCF), recreational fishing (ACoRF) and fisheries conservation (ACFC) and the Fisheries Resource Conservation and Assessment Council (FRCAC). Other government agencies, including EA and Planning NSW (previously the Department of Urban Affairs and Planning) and professionals in the fields of aquatic research and environmental impact assessment, were also consulted by NSW Fisheries during the drafting of the EIS.

A preferred strategy report (PSR) was prepared as a revised draft of the FMS, taking into consideration comments made during the public exhibition period. The PSR was forwarded to EA, Planning NSW, FRCAC, ACCF, ACoRF, ACFC and EGMAC in March 2002 for comment.

NSW has drafted an Indigenous Fisheries Strategy<sup>8</sup> that contains aims, strategic actions and specific initiatives that will be advanced over a two-year period commencing in 2002. One of the strategic actions includes improving the fisheries consultation and communication framework for Indigenous people. EA commends the NSW government on working towards developing a strategic approach to indigenous fishing issues and encourages NSW Fisheries to take into account and incorporate indigenous fishing interests in the development of fisheries management arrangements.

A catch and effort working group, convened by NSW Fisheries, undertakes an annual workshop with stakeholders (including members of management advisory committees, the Seafood Industry Council and the Nature Conservation Council) during which catch data from the previous year are reviewed to detect concerning trends and identify areas where future research should be focused.

EA considers that the FMS is strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements is measured. The FMS has a vision and seven supporting fishery goals. No public submission regarding the goals of the FMS were received. EA considers that the goals are appropriate. The seven major long-term goals for the management of the fishery are underpinned by 35 specific objectives and 108 management responses, including immediate actions, development of future management and enforcement measures and scientific research and monitoring programs. The management goals are monitored through a series of performance indicators, trigger points and associated monitoring programs. This monitoring scheme ensures that the effectiveness of the management responses under each goal can be reviewed and modified if it is found that the goals are not achieved.

The FMS has been prepared taking into account and ensuring consistency with the objectives of the *Marine Parks Act 1997*.

EA is satisfied that the FMS provides a range of management measures that should be capable of controlling the level of harvest in the fishery. The fishery is predominantly managed through input controls and a number of output controls as outlined in Table 2.

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<sup>8</sup> <http://www.fisheries.nsw.gov.au/ifs/html-ifs.htm>

**Table 2** Input and output controls in the NSW Estuary General Fishery

<b>Output controls</b>	
<ul style="list-style-type: none"> <li>• TAC committee to set a maximum level of effort that may be applied to prawn stocks from 2003 (n)</li> <li>• Introducing minimum legal lengths for the primary finfish species at a size where at least 50% of the individuals have a high probability of spawning prior to capture</li> <li>• Daily catch limit for Australian salmon and tailor</li> <li>• Some fish totally protected from commercial fishing such as estuary cod, blue grouper, estuary perch and Australian Bass</li> </ul>	
<b>Input controls</b>	
<ul style="list-style-type: none"> <li>• Limited entry – access limited to eligible fishers since 1997</li> <li>• Licensing arrangements</li> <li>• Time and area closures</li> <li>• Controls on fishing gear and boats</li> <li>• National licence splitting policy</li> <li>• Transfer Policies (licence fishing boats and fishing business entitlements)</li> <li>• Net registration</li> <li>• Training licences</li> <li>• Permits for research</li> </ul>	<ul style="list-style-type: none"> <li>• Zoning scheme restricting movement of fishing effort between 7 coastal regions by December 2002 (n)</li> <li>• Share-based restructuring program to cap number of fishers at historically active levels provided those level are biologically sustainable by December 2003 (n)</li> <li>• Owner-operator rule - Policy preventing nomination of another person to operate a fishing operation thus preventing the activation of inactive entitlements. (n)</li> </ul>

(n) – new management measures introduced with the FMS

The NSW submission asserts that this mix of input and output control has provided a fair level of protection for fish stocks during the past 100 years or so that the fishery has been in operation, and overall, reported catches have been relatively stable. It is acknowledged that the input management strategies used until now may not be sustainable in the long-term and as such NSW Fisheries are moving towards more efficient methods of effort controls as indicated by the new management responses above.

The FMS has defined the species that can be taken in the fishery, reducing the number from approximately 143 species to 83 species.<sup>9</sup> EA considers that defining the species that can be taken in the fishery is a significant step forward in the management of the fishery allowing a refinement for research and management.

Information about the impacts of harvesting by other fishing sectors (such as recreational and charter fishing) is also provided in the submission, however the rules applying to such sectors are dealt with under separate management arrangements and will be subject to separate fishery management strategies. This information, where available, will be factored into stock assessment.

EA considers that effective implementation of any fisheries management regime requires a compliance framework that leads to optimal levels of compliance within that management regime. EA is satisfied that the FMS contains the means of enforcing the critical aspects of the management arrangements.

<sup>9</sup> See table 5 of the FMS

NSW Fisheries has approximately 90 fisheries officers responsible for coordinating and implementing compliance strategies in NSW with 65 of these officers located in areas where the EGF occurs. Consequences of non-compliance can negate the management initiatives introduced to ensure stock sustainability. Measures in the FMS to ensure efficient estuary general compliance programs include:

- Development, in consultation with the EGMAC, of a compliance strategic plan, by December 2002, to provide the direction for education, advisory and enforcement services provided by NSW Fisheries. The plan will be reviewed every three years.<sup>10</sup> To ensure that compliance service is delivered in a consistent manner, quality inspection guidelines will be developed as part of the operational plan for inspections within the EGF. These guidelines will set out a procedural approach to be adopted when undertaking inspections of fishers, fishing gear and other related matters to ensure that all issues requiring compliance by commercial fishers under the FMS are being adhered to.
- Implementation of an endorsement suspension scheme and share forfeiture scheme based on a demerit point scale for serious offences and habitual offenders by December 2003.<sup>11</sup>
- Publishing, where appropriate, successful prosecution results for nominated offences in relevant publications and media to discourage illegal activity on going from 2003.<sup>12</sup>

The performance indicator is the rate of compliance relating to the fishery as indicated by quality inspections conducted by NSW Fisheries with the trigger point being the overall rate of compliance is less than 80% or compliance rate with respect to any offences that may be defined as 'share forfeiture offences' by the SMP is less than 90%.<sup>13</sup>

The FMS provides for a comprehensive review of the performance of the fishery management arrangements and the management strategies, objectives and criteria. Two reports will be produced under the FMS - an annual report on the performance of the fishery with respect to the FMS and a report if a trigger point associated with a performance indicator is breached.<sup>14</sup>

A performance report detailing the situation with respect to progress made in implementing each of the management responses in the FMS must be submitted annually by NSW Fisheries to the NSW Minister for Fisheries. The report will review the progress made in implementing each of the management responses and recommend where the implementation of particular responses need to be expedited. The report will be displayed on the NSW Fisheries website.

The performance indicators will provide an indication of whether the management goals are being attained. A monitoring program<sup>15</sup> will be used to gather information to measure performance indicators. A monitoring program is outlined for each performance indicator and specifies a timeframe for implementation. Trigger points specify when a performance indicator has reached a level that suggests that there is a problem with the fishery and a review is required.

If a performance indicator reaches the corresponding trigger point, a review is to be undertaken of the likely causes for the breach. Any such review is to include consultation with the EGMAC. In some circumstances, the breach may be related to a performance indicator that measures broader cross fishery issues and will require consultation with other

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<sup>10</sup> MR 6.1(a)

<sup>11</sup> MR 6.1 (b)

<sup>12</sup> MR 6.1 (c)

<sup>13</sup> Table 16 of the FMS Goal 6 (1)

<sup>14</sup> For more detail see sections 8(c) of the FMS

<sup>15</sup> Table 16 of the FMS

management advisory committees or Ministerial advisory councils. Cross fishery issues are most likely to involve catch levels of a species that is harvested in more than one fishery. A review report is to be provided to the Minister for Fisheries within three months of the trigger point being breached, and must include the likely reasons for the breach (where known) and any recommendations for remedial actions.

If a review concludes that the reasons for the trigger point being breached are due to the operation of the fishery, or if the relevant fishery management objectives are compromised if the fishery continued to operate unchanged, management action must be taken with the objective of returning the performance indicator to an acceptable range within a specified time period.<sup>16</sup> A report on the review must be forwarded to the NSW Minister for Fisheries within three months of the trigger breach being detected. All reports will be publicly available.

If a review considers that the management objectives or the performance monitoring provisions are inappropriate and need to be modified, the NSW Minister for Fisheries may amend the FMS.

Not more than two and half years from the commencement of the FMS, NSW Fisheries will review the appropriateness of all performance indicators and trigger points.

In addition to the reporting on performance of the FMS and review arising from triggered performance indicators the NSW Minister for Fisheries may order a review and/or make a modification to the FMS in circumstances declared by the Minister as requiring contingency action, or upon the recommendation of the EGMAC. These circumstances may include (but are not limited to) environmental events, results of research programs or unpredictable changes in fishing activity over time.

If new information becomes available as a result of research programs, more appropriate performance indicators and trigger points can be developed and the NSW Minister for Fisheries may amend the FMS accordingly.

The SMP will be reviewed between 5-10 years after the allocation of the 15-year shares. The SMP includes objectives and performance indicators that will be consistent with the goals and objectives of the FMS.

Little information is collected on the impact of the fishery on the broader marine ecosystem and there are no management responses or performance measures currently in place to address the issue. Although there is limited available data, there is an acceptance that the fishery is even now probably having some, as yet unknown, impact on the biodiversity and habitats. For this reason, the FMS has taken a precautionary approach to such issues. Further elaboration of this issue is contained under Principle 2, Objective 3 of the *Guidelines*.

Currently there are no threat abatement plans, recovery plans or bycatch action strategies in place relevant to the activities of this fishery. The FMS strategy outlines that NSW Fisheries will implement in consultation with the EGMAC the provisions of any relevant plans.<sup>17</sup>

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<sup>16</sup> See section 6(c) of the FMS.

<sup>17</sup> MR 3.1(b)

## **Conclusion**

On the whole EA considers that the suite of new and existing management controls should lead to the fishery being well managed in the long term and is generally in accordance with the Commonwealth's *Guidelines for the Ecologically Sustainable Management of Fisheries*.

The management regime is developed through a consultative process, is underpinned by adequate objectives and includes performance criteria aimed at managing the fishery in an ecologically sustainable manner. The management arrangements in place are adaptable, have the ability to control the level of take from the fishery and are reviewable and enforceable.

In recognition that the Queensland, New South Wales and Victoria fisheries operate off a single stock for a number of species and the action of one fishery should be considered in the adjacent fishery, consideration is being given to joint stock assessment and monitoring. EA considers this to be highly important for the effective management of the EGF and looks forward to hearing the outcomes of these deliberations. EA understands that preliminary discussions have been held with Queensland with regard to joint management arrangements.

A more in depth analysis of the management regime is contained in Part II of this report.

## **PART II - GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES**

### **Stock Status and Recovery**

Principle 1: “A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover”

#### **Maintain ecologically viable stock levels**

Objective 1: “The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.”

#### **Information requirements**

Species in the EGF are categorised as outlined in Table 3 below. The primary and key secondary species are categorised according to their commercial importance to the fishery. Through the proposed risk assessment, species of particular vulnerability due to the EGF will also be subject to more rigorous performance monitoring.<sup>18</sup>

**Table 3** Species categories in the Estuary General Fishery

Primary species	those species of major importance to the fishery and consequently they receive a higher management and research priority within the FMS.
Secondary species	those that are retained by the fishery but which do not fall in the primary species category described above. A number of secondary species have been selected as “key secondary species” because they are subject to more rigorous performance monitoring requirements than the remaining secondary species.

Overall EA is satisfied that the management regime incorporates an information collection system appropriate to the scale of the fishery, which encompasses both fishery-dependent and independent information. Fishery-dependent data on commercial catch is obtained through a compulsory catch and effort logbook. Fishery-independent data will be obtained through the fishery independent survey. Stock assessment of estuarine species will involve fishery-independent methods based on stratified randomised surveys of relative abundances and size and age structure of wild populations.

#### ***Fishery-dependent information***

Commercial Fishers in the EGF are required to submit records on a monthly basis detailing their catch and fishing effort. The information includes total landed catch for each species, the effort expended (for each method) to take the catch (i.e. days fished), and the area/s fished (by estuary). Quality control procedures are in place to maximise data quality and reliability of the information provided on catch returns, however the accuracy of the data supplied by fishers cannot be directly assessed and can be variable. Consequently, the commercial catch statistics supplied by fishers and maintained in the commercial catch records database is most accurately described as representing “reported catch”. The FMS includes a number of

<sup>18</sup> MR 1.3(c)

management responses to improve the quality of the catch and effort information collection system.<sup>19</sup>

Accuracy of catch return data will be measured every two years via a comparison of catch return records with market records and the scientific observer surveys (SOP).<sup>20</sup> Entry of catch return information is subject to stringent quality control procedures including a three-month timeframe for data entry following the receipt of a catch return by NSW Fisheries. A policy is being developed to manage the timely receipt and entry of commercial catch return data into the commercial catch records database. EA considers that the SOP is likely to be an effective approach for validation of commercial logbook information.

EA considers that the improvements in accuracy and precision of data supplied by fishers and the timeliness of processing monthly returns is pivotal to the success of the FMS. Any doubts surrounding the data would weaken any stock assessments that are used for future management and would prevent the timely inception of trigger points, which are an overarching tool of the strategy.

Catch information for recreational and indigenous fishing has been collected through the National Recreational and Indigenous Fishing Strategy conducted in 2000-2001 and will be incorporated into stock assessments.<sup>21</sup> Preliminary results show a strong interaction between recreational fishing and the EGF. Information from charter operators is collected via a logbook program.

The current research strategy, developed by NSW Fisheries, is included in the submission documentation.<sup>22</sup> NSW Fisheries will determine, in consultation with stakeholder groups, the priorities for research for the EGF, taking into account the research needs identified in the FMS, in the EIS or arising out of new research results. NSW Fisheries has committed to allocating research resources and where appropriate make grant applications to support research identified in this process.

### ***Fishery-independent information***

Fishery dependent catch information may be unreliable in terms of its accuracy, precision and consistency. The abundance of a species may not be accurately reflected in commercial catch records, particularly when a range of factors such as weather conditions and market values may influence catch levels. Further, such information only concerns species that are actually landed, resulting in little or no information being obtained on small, undersized individuals, bycatch species or other organisms involved in the associated ecosystems. Due to the problems inherent with fishery-dependent information, future stock assessments will involve fishery-independent methods based on stratified randomised surveys of relative abundances and size and age structures of wild populations.<sup>23</sup> This will include completing pilot studies to develop appropriate fishing gears for such surveys and completion of a cost-benefit analysis of pilot surveys to determine the most appropriate sampling regimes. The pilot will be followed by 2 years of sampling to test the developed survey design and allow the preparation of a final design for subsequent surveys. The Fisheries Research and Development Corporation (FRDC) will fund the first 4 years of this work.

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<sup>19</sup> MR 7.4 (a) and (b)

<sup>20</sup> FMS Table 16 Goal 7 (5)

<sup>21</sup> MR (4.1(a))

<sup>22</sup> Section 6 (a) of the FMS

<sup>23</sup> MR 7.3(c) also see section 6(a)(i)

After the initial period it is intended that the program will be continued using funds provided by all users that benefit from these resources. The submission outlines that the fishery-independent survey will also include the provision of fish samples for age determination, information on reproductive biology (which will allow some review of appropriate size limits), recruitment indices and some preliminary examinations of trophic interactions.

### **Assessment**

On balance EA is satisfied that the management arrangements for the EGF include a robust assessment and periodic review of data collected on the dynamics and status of the species/fishery.

The NSW submission details that previous assessments of fish stocks in NSW estuaries have generally been inadequate and mostly reliant on fishery-dependent information. These assessments have made extensive use of reported catch and effort data supplied by commercial landings of key species (including sea mullet and bream since 1995, sand whiting and luderick between 1995-97 and dusky flathead between 1995-97). Stocks of eels are also currently being assessed in a targeted FRDC funded project.

Due to the fact that fishery-dependent information in the EGF is relatively easy to obtain, large, long-term and the best available, it is proposed to continue fishery-dependent age-based assessment of three key fish species in the EGF (sea mullet, bream and dusky flathead) until more robust methods for assessing stocks are developed and implemented as detailed below.

With the exception of some work on king prawns, few stock assessments of other invertebrates (like school prawns, blue swimmer crabs, mud crabs, pipis, beach worms etc.) have been done. Reported catch and effort data on such species will continue to be monitored to assess any changes in relative abundance inferred by the data until better methods for stock assessments are established. Where known, other sources of mortality will be considered in the stock assessment process.

Total annual commercial landings of primary and key secondary species, and other relevant data from adjacent jurisdictions, where available, will be analysed by NSW Fisheries, in consultation with the EGMAC. Where data is available, recreational harvest and catch from other sectors are also taken into account.<sup>24</sup> A standard method of reporting on the exploitation status of fish stocks is used across all commercial fisheries.<sup>25</sup>

Short term and long-term approaches to stock assessment are being employed in the EGF. In the short term, landings of target species will be used to monitor the performance of the fishery. A catch and effort working group, convened by NSW Fisheries, undertakes an annual workshop with stakeholders (including members of management advisory committees, the Seafood Industry Council and the Nature Conservation Council) during which catch data from the previous year are reviewed to detect concerning trends and identify areas where future research should be focused.

In the longer term, a system for formal stock assessment for the primary species will be developed within 5 years (from 2003) and reviewed at least every 3 years thereafter.<sup>26</sup> Stock assessments will be undertaken on a species basis and therefore will be reliant on harvest

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<sup>24</sup> MR 4.1.(a)

<sup>25</sup> See table 10 FMS

<sup>26</sup> MR 2.1.1(c)

estimates from all sectors. Within 12 months of the commencement of the FMS, a stock assessment process for primary species will be proposed. The process needs to be appropriate for the data available and the value of the fishery. The future fisheries independent survey work will contribute more robust data towards stock assessment. This will be the long-term approach that will be used to assess the primary species of this fishery. Two principles will apply to the long-term proposal for stock assessments:

- Assessment methods will be consistent with the data (ie. the assessment program design will not rely on data sources that are not funded)
- Assessment methods will be at least equivalent to approaches for fisheries of similar value in other Australian jurisdictions.

As stock assessments are developed the sustainable level of harvest will be reviewed and monitored, and effort controls adjusted within the management regime accordingly (see background information for MR 2.1.1c). If, for example, a future stock assessment finds that the sustainable level of harvest is below the current harvest level, the FMS provides for the minimum shareholdings established in the SMP to be adjusted accordingly so as to reduce the level of fishing effort upon that stock.

Trigger points will be an integral component of the stock assessment proposal for each species. An independent review of the assessment methods, with specified terms of reference, will be completed within 3 years of the proposal being developed. Species priorities will be determined in consultation with the assessment scientists and the appropriate MAC.

In addition to the 29 principal retained species of which a risk assessment was undertaken in the EIA, there are a further 55 species which are retained in the fishery. These 55 species represent less than 3% by weight of the annual catch in the EGF. Further, of these 55 species a risk assessment for 34 is, or will be, included in the EIS for the NSW Ocean Hauling, Estuary Prawn Trawl, Ocean Trap and Line or Ocean Trawl Fisheries where the species occurs in the principal retained catch. The remaining 20 species, which represent less than 1% of the catch, for which no formal assessment has been undertaken, are considered to be in a very low risk category due to their extremely low and irregular harvest in this fishery. Trigger points for *all* species taken in the EGF to detect concerning trend will be developed and implemented during 2003.

NSW advised that of the key secondary species mulloway is the only species of concern. An FRDC project has just commenced “Arresting the decline of the commercial and recreational fisheries for mulloway (*Argyrosomus japonicus*).”<sup>27</sup>

EA is satisfied that NSW Fisheries through the FMS has implemented a robust assessment process for the primary species and a satisfactory monitoring program for all species taken in the EGF.

The distribution and spatial structure of the stocks harvested in the EGF will be factored into management responses through incorporating catch from adjacent jurisdictions into stock assessments where available. Total commercial landings will be monitored for each estuary fished providing a management tool to detect changes within estuaries.

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<sup>27</sup> <http://www.infoscan.com.au/dbtw-wpd/exec/dbtwpub.dll>

Reliable estimates of commercial and charter operator catch are collected from logbooks and factored into stock assessments. Further detail on information collection of removals is provided under Guideline 1.1.1.

There is currently little reliable information available on the capture rates of Estuary General species taken by recreational and Indigenous fishers in this fishery. Future stock assessments will include data from the National Recreational and Indigenous Fishing Survey, the results of which are expected to be released in 2003. There is currently only a sample size of 63 Indigenous fishers in the survey, which includes both inland and coastal fishers. Although this may provide a preliminary indication of some of the characteristics of aboriginal fishing activity, a consultant report to NSW Fisheries concluded that a more detailed survey and analysis of Aboriginal fishing practises would be needed to draw firm conclusions about the nature of participation of Aboriginal fishers in the coastal fishery.<sup>28</sup>

A management response in the FMS is to estimate as far as practicable, the size of the non-commercial catch (including illegal catch) for use in stock assessment models, and the relative impact of such harvesting on the resource, taking into account the results of the National Recreational and Indigenous Fishing Survey.<sup>29</sup> If estimates of the catch of primary and key secondary species for all non-commercial sectors are not available three years from commencement of the FMS a review is triggered.<sup>30</sup>

The submission provides a qualitative statement on the exploitation of stock levels for 8 of the species,<sup>31</sup> however no sound estimate of the potential productivity of the fished stocks and the proportion that could be harvested is provided. NSW, in the short term, will rely on managing catch through maintaining historical catch levels until biological reference points can be determined.

### **Management responses**

Basic biological information is lacking for the majority of species that are harvested in the EGF. As such, monitoring changes in commercial landings will be used as a primary monitoring tool until species stock assessments have been developed for primary species and for those species that do not have a better estimate of stock status. As biological reference points are established from stock assessments, monitoring based solely on landings will be phased out.

The FMS provide a comprehensive trigger point system for stocks taken within the EGF with a clearly defined review process once a trigger is breached. "Single year triggers", including upper and lower trigger points, are provided for the first year of the FMS for primary and key secondary species only.<sup>32</sup> The single year trigger is designed to cause a review when commercial landings change dramatically from one year to the next. Details of the review process are provided in the management arrangements section of this report. The change that triggers a review is not an unprecedented change but rather a change that is well within the normal range of variation but expected infrequently (perhaps once every five to ten years). The single year triggers are based on the variation on year-to-year changes in the historical catch data. Trigger points are set at the level of changes that occur less than 20% of the time. In other words, changes that are at least as large as the largest 20% of historical changes will

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<sup>28</sup> See p 27 of Report at Appendix CH2 of the NSW Ocean Hauling EIS.

<sup>29</sup> MR 4.1(a)

<sup>30</sup> Table 16 Goal 4(1)

<sup>31</sup> Table E1 of the EIS

<sup>32</sup> See Table 17 of FMS

trigger a review. The reference level of the short-term trigger will be the landing levels from the previous year.

An objective system for defining trigger points that detects concerning trends in landings will be developed and tested during the first nine months of the FMS and applied to *all* species taken in the EGF at the first annual review.<sup>33</sup> The assistance of a statistical expert has been sought to develop this system. The system will take into account several different measures, including the steepness of the trend and the period over which the trend occurs. This system to detect undesirable changes in landings will be used while stock assessments are being developed for target species. This primary monitoring tool is likely to be in place for an extended period of time for the many species of low value (and/or catch) that do not have better estimates of stock status. As biological reference points become available from stock assessments, monitoring based solely on landings will be phased out.

NSW Fisheries will review, and where appropriate, implement minimum legal lengths for the primary finfish species to give a high probability that at least 50% of the fish of each particular species landed have reached reproductive maturity.<sup>34</sup> Minimum legal lengths will also be considered for key secondary and secondary species.<sup>35</sup>

Additionally, there are specific indicators and triggers relating to managing harvest, which will trigger a review,<sup>36</sup> including:

- Landing of eels in catchments, where catch contributes greater than 10% of the total eel landings, change by at least 45% from the reference year 1998/99
- Commercial landings of sea mullet in estuary and ocean waters changes in the same direction by at least 10% per year in each of two consecutive years.
- Total commercial landings from each estuary fished changes by at least 50% between any two consecutive years.
- Total days fished for any estuary general method in any estuary increases by 20% between any two consecutive years.
- Total Estuary General Fishery annual landings of each secondary species (other than key secondary species) are outside the range of catch for two consecutive years, with the range calculated from the period 1984/85 to 1998/99.
- Total effort (days fished for any estuary general method) will be monitored and a review will be triggered if total effort in any estuary increases by 20% between any two consecutive years.

The *Guidelines* suggest that a biological bottom line and/or catch or effort upper limit should be set beyond which the stock should not be taken. This has not been specifically provided in the proposed management regime. Instead, if a catch trigger is breached and urgent action is required, closures can be implemented.

EA is satisfied that there are adequate management strategies in place capable of controlling the level of take in the EGF as detailed below. The overall impact of the EGF on the level of take is largely unknown. The FMS manages this uncertainty by managing the level of take through a series of precautionary management responses. Current and new input and output management strategies employed in the FMS assist in controlling the level of take. These

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<sup>33</sup> MR 2.1.4(c)

<sup>34</sup> MR 2.1.1(a)

<sup>35</sup> MR 2.1(e)

<sup>36</sup> Outlined in Table 16 of the FMS

strategies, which imply a high level of control over commercial operators, are summarised in Table 2. The management arrangements also include the implementation of a strong compliance program, including a penalty points scheme and share forfeiture scheme for serious and/or habitual offenders.

As the fishery is managed predominantly via input controls, the key issue identified in the assessment with respect to controlling the level of harvest is controlling the amount of fishing effort that is applied to the stock. The current levels of effort in the EG fishery are not considered to be excessive, however a large number of fishing businesses operate at a fairly low level or not at all. If this latent effort became activated there would be a significant increase in pressure on stocks, jeopardising the sustainability of the fishery. The Zoning and Share Management Schemes are intended to control this latent effort.

EG fishers have historically had access to all estuaries not closed to commercial fishing. Although allowing flexibility, this has caused conflict resulting from fishers travelling out of their local estuaries to fish in other regions and disregarding local conduct rules. Stage 1 of the Zoning scheme for the fishery commenced in 2001. The coast was divided into seven regions to promote harmony within the fishery, as well as focusing management and research on regionally based biological aspects of the fishery. Stage 2 involves finalising and implementing the zoning rules.<sup>37</sup> Because the number of operators in each region of the zoning is capped, programs for effort control will be developed regionally.

It is the NSW Government's intention to create a full time professional fishery. Between 2005 and 2008, the Estuary General Fishery will undergo a transition to full cost recovery. Operators will need to be in a position from that time to afford to pay for the attributable costs of management from their fishing revenue. One of the benefits of having a viable full time fishing industry is that viable fishing businesses have a greater incentive to support long-term management decisions that are needed now and into the future. The level of active effort (as apposed to latent effort) in each endorsement type (9 endorsements) and region (7 regions) will be identified and minimum shareholdings over a set time period will be implemented under the SMP to ensure that the level of active effort does not exceed historical levels (provided that these levels are ecologically sustainable).<sup>38</sup> Cost recovery is a recognised principle of ESD and the removal of government subsidies is a key aim of global effort reduction schemes such as the FAO Plan of Action for the Reduction of Fishing Capacity.

EA is satisfied that the FMS provides management responses to ensure that active effort levels will be managed adequately as well as preventing the activation of latent effort by new entrants.<sup>39</sup>

EA is satisfied that fishing undertaken under the FMS is conducted in a manner that does not threaten stocks of byproduct species. Total EG landings of each secondary species (other than key secondary species) will be monitored and a review will be triggered if landings are outside the range of catch for two consecutive years with the range calculated from the period 1984-85 to 2000-01. Although some secondary species have been reported as zero in previous years, a zero catch recorded in any future year will be considered as outside the acceptable range specified in the FMS. As discussed previously, if the review concludes that the reasons for the trigger point being breached are due to the operation of the fishery, or if

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<sup>37</sup> MR 2.2(a)

<sup>38</sup> see MR 2.2(b), 2.3(b) and 5.2(a)

<sup>39</sup> MR 2.3(a) and (b)

the fishery objectives are compromised if the fishery continued to operate unchanged, management action must be taken with the objective of returning the performance indicator to an acceptable range within a specified time period. Additionally, the objective system for defining trigger points that detect concerning trends in landings, as discussed previously, will apply to all species retained in the EGF. The risk assessment will determine whether particular species (other than primary and key secondary species) require more rigorous monitoring. Although there is a clear management focus on the primary and key secondary species, EA considers that the responses outlined are effective for ensuring that all by-product species taken are monitored.

The total commercial catch in the EGF has remained relatively stable for the past 50 years. It is argued that the fishery is fairly resilient to change as demonstrated by this long term historic catch trend combined with both the high proportion of species reaching sexual maturity before harvest and, for the key species, the broad age distribution of fish in the commercial catch. Taking into account the increasing external pressures on the fishery, additional management measures are proposed, including capping effort levels, total allowable effort controls for prawn stocks and zoning the fishery. Based on the available data EA suggests the proposed harvest strategies will maintain stock sustainability. Where uncertainty is highest, the FMS takes a conservative (precautionary) approach to future harvesting arrangements and places increased emphasis on performance measures, monitoring and research programs. EA considers that the proposed management arrangements should be sufficient to maintain stock sustainability. As there are a large number of new management measures in the FMS it will be difficult to determine their effectiveness until they have been implemented for a period.

EA consider that the proposed management responses are considered adequate to address potential negative impacts that may arise during the period of data collection and analysis associated with improved stock assessment and that the level of risk of the fishery being ecologically unsustainable in the short term is low.

## **Conclusion**

NSW Fisheries' submission asserts that the stable long-term historic catch trends combined with the high proportion of species reaching sexual maturity before harvest, and the broad age distribution of key species in the commercial catch, indicate that the fishery is fairly resilient to change. As a result any adverse effects from harvesting should be medium term and reversible through appropriate management initiatives. EA considers that the harvest strategies in the FMS should maintain stock levels. Where uncertainty is highest, the FMS proposes conservative parameters for future harvesting and management regimes as well as increased focus on performance measures and monitoring and research programs.

The management regime ensures that there are mechanisms in place to ensure that stock levels do not fall below defined reference points, relating to total catches in individual estuaries to total catches of individual species, without a review. EA considers that this approach should be sufficient during the period of data collection and analysis associated with improved stock assessment and that the level of risk of the fishery being ecologically unsustainable in the short term is low.

Although the total commercial estuary catch has remained relatively stable over the past 50 years, EA has concerns regarding changes within individual species catches. There is a range

of new measures in the FMS to monitor these changes and EA considers that they are adequate.

EA acknowledges that NSW Fisheries has made significant advances in the management arrangements for species retained in EGF during the preparation of the FMS. The proposed changes in the information collection system, stock assessment process and management arrangements are likely to maintain ecologically viable stock levels with acceptable levels of probability and are consistent with Objective 1 of the Guidelines. However, the effectiveness of a range of the new management measures will not be able to be determined until they have been implemented for a period. EA is liaising with NSW Fisheries to monitor effectiveness of the new measures.

### **Promote recovery to ecologically viable stock levels**

Objective 2: *“Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.”*

#### **Management Responses**

EA considers that NSW Fisheries has an adequate and precautionary recovery strategy development and review process in place for overfished species. The strategy specifies management actions, or staged management responses, which are linked to reference points. Although a strong development and review process proposed, a recovery strategy has yet to be put in place and its adequacy tested.

NSW Fisheries has standardised criteria for determining the exploitation status of a fish stock.<sup>40</sup> In determining the exploitation status, NSW Fisheries will consider advice from fisheries scientists as part of the annual assessment of the status of the fish stocks in NSW, “Status of Fisheries Resources”. If a species is the subject of a formal stock assessment process, the indication of overfishing is likely to come from having some performance indicator outside acceptable parameters. Other species status will be reviewed on the basis of the best available biological and catch information.

The FMS requires that, where the EGF is a major harvester of an overfished species as defined by the exploitation status, NSW Fisheries, in consultation with EGMAC, must develop and implement a recovery program for the species within a specified timeframe.<sup>41</sup> Implementation of a recovery program must involve consultation with all relevant harvest sectors and include a description of the actions proposed to return, to acceptable levels, those parameter(s) that have led to the determination of the species being overfished. The recovery program must set out a timeframe for that process and may specify further appropriate action should recovery targets not be met.

Where the EGF is a minor harvester of an overfished species, NSW Fisheries, in consultation with EGMAC, will contribute to the development of a recovery program for the species and adopt any measures required by that program.<sup>42</sup>

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<sup>40</sup> See Table 10 of the FMS

<sup>41</sup> MR 2.5(a)

<sup>42</sup> MR 2.5(b)

NSW Fisheries and the EGMAC will contribute to the development of a recovery program for silver trevally (which will be developed under the ocean fish trawl fishery) and sea garfish (which will be developed through the ocean hauling fishery) and will implement actions as needed under those programs.<sup>43</sup>

During the development of a recovery program, NSW can implement precautionary actions, for example in the event that a species is determined to be recruitment overfished and urgent action is needed to prevent the risk of a stock collapse. Those actions include, but are not limited to, total harvest controls, reductions in effort, implementation of closures, bycatch management provisions or gear changes.<sup>44</sup>

## **Ecosystem impacts**

Principle 2: *“Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.”*

### **Bycatch Protection**

Objective 1: *“The fishery is conducted in a manner that does not threaten bycatch species.”*

### **Information requirements**

EA considers that the FMS requires an adequate and reliable information collection system for information on the composition and abundance of bycatch, appropriate to the scale of the fishery. The estuaries where the EGF operates have a high diversity of species. Bycatch occurs as other species are inadvertently caught in the gear while it is being used to catch marketable fish. Knowledge of bycatch composition (in terms of species and size classes) is acceptable for the major bycatch generating methods used in the EGF (hauling and meshing).<sup>45</sup> Several research programs have been conducted in the NSW EGF to quantify the level of bycatch taken in hauling and meshing nets and to examine techniques for reducing bycatch, with some success. Quantification of bycatch will not be possible for all fishing methods until the Scientific Observer Program commences. The EIS identifies the main fish and invertebrate species liable to be taken as bycatch by the various methods used in the EGF, along with main method of capture, types of area/habitat where caught, main size classes affected and key aspects of the biology of the invertebrates.<sup>46</sup>

The industry funded scientific observer program will be implemented (by December 2003) to collect information on the quantity and composition of bycatch species for methods where little or no information is available.<sup>47</sup> The program will be periodically repeated (every 5 to 10 years) for all methods in the fishery, in order to maintain a “watching brief” on bycatch levels in the fishery. The level of observer coverage will be sufficient within strata to detect differences among them. This will require a pilot estimate of variation to be made early in the observer program. The design of the observer program is to be determined in consultation with the relevant MAC established for each fishery. NSW has committed to consulting with EA during the development of the parameters for the observer programs.

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<sup>43</sup> MR 2.5.1(a) and 2.5.2 (a)

<sup>44</sup> MR 2.5(c)

<sup>45</sup> eg. Grey 2001; Gray et al 2001

<sup>46</sup> EIS Tables E9, E10 and E11

<sup>47</sup> MR 1.1(f) Also see detail in Section 6(a)

Additionally, if specific changes to operations occur, such as the introduction of the new flathead net to the fishery in 2003, this should be accompanied by an observer survey during the ensuing fishing season. Baseline information relating to seasonal changes in bycatch will also be obtained through the observer program. Bycatch research will involve starting observer-based surveys on crab and eel trapping and specific haul nets in 2002-03. EA considers that the SOP is likely to be effective in monitoring bycatch levels.

Knowledge gaps remain on the quantity and composition of bycatch in the Estuary General Fishery for a few fishing methods and little information is available on the fate of discards from bycatch for most methods in the fishery. Without such information, the estimates of future catches and the capacity of stocks to recover from fishing pressure could be over-estimated. NSW Fisheries are involved in the FRDC funded project "National Strategy for the survival of released line caught fish" project. There is no quantitative information on bycatch related mortality due to other commercial fisheries or other fishing sectors for many of the fish and invertebrates commonly taken as bycatch in the EGF.

### **Assessment**

NSW Fisheries, through a workshop involving key stakeholders and experts, will conduct a risk assessment of the impact of the fishery on the ecosystem, and initiate appropriate management programs based on the outcomes of that process (by December 2004). The risk assessment used will be the National Reporting Framework for Ecologically Sustainable Development developed by the Sustainability Indicators Working Group of the Standing Committee on Fisheries and Aquaculture. The risk assessment will determine the level of management or reporting necessary for each component of the ecosystem, including bycatch.

The EIS provides a comprehensive method based assessment of potential impacts on bycatch species that assesses the direct capture, physical contact without capture and lost gear (ghost fishing) impacts of the six main categories of fishing method.<sup>48</sup>

### **Management responses**

The FMS includes a range of management measures to avoid capture and mortality of bycatch species as well as measures to develop suitable technology if none is available. This includes significant changes to the use of gear to minimise the impact of the fishery on bycatch and fish habitat. These include:

- Increasing the minimum mesh sizes in set mesh nets and flathead nets (to complement the increase in the minimum legal length of flathead) (November 2003) (1.1(a))
- Use of best available knowledge and appropriate technology to modify fishing practices to reduce the impacts of the fishery on bycatch. These measures are to be implemented through conditions on the relevant fishing endorsement, codes of conduct or other regulatory control depending on the nature of the change. (1.1(b))
- Implementation of discard chutes by July 2003 to facilitate return of fish removed from mesh nets (1.1(b))
- Use of best practice handling techniques, including the prohibition by December 2002 on the use of fish spikes, clubs or implements that could unduly harm incidentally captured organisms during sorting. (1.1(c))

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<sup>48</sup> pp 220-246, EGF EIS, November 2001

- Phasing out setting of mesh nets with a mesh size less than 95mm between sunset and sunrise over winter (November 2003) (1.1(d))
- Reducing the maximum length of fish hauling nets in some of the larger estuaries from 1,000 meters and 750 meters to 500 meters and restricting the number of times each day a fisher or crew may shoot a 500m net in those estuaries, to ensure an overall reduction in area swept by the net. (December 2002) (1.1(e)). Although currently there is no scientific evidence of the environmental benefit of reducing the length of large haul nets, from a precautionary basis this seems justifiable.
- Banning the discarding of cooked prawns (December 2002) and investigating the sustainability of grading uncooked prawns (April 2005). (1.1(i))
- Prohibiting all hauling over beds of the strapweed seagrass (*Posidonia australis*) (December 2002 (1.2(a)(i))). It is known that these beds are slow to recover from disturbance. Two public submissions agreed with this response and one disagreed.
- Defining designated landing sites for fish hauling nets to avoid interference with seagrass (July 2003(1.2(a)(ii)))
- Using fishing closures to reduce bycatch by identifying areas of seagrass that should be closed to prawn hauling and prawn seining (December 2003(1.2(a)(iii))). Available information suggests bycatch rates are higher (in terms of abundance and number of species) in seagrass compared with bare areas. Two public submissions stated that there was no research suggesting that hauling was harmful to seagrass and one suggesting more research should be done.
- Using fishing closures to reduce bycatch in areas and at times of high abundance of jellyfish or juvenile fish (July 2003) (1.2(a)(iv)).

When specific bycatch and discarding problems are identified via the SOP, targeted research will be directed at ameliorating the identified problems.

In March 2001 NSW Fisheries established a Conservation Technology Unit to examine conservation-based gear technology in commercial and recreational fisheries. Research will assist in identifying the most appropriate gear to be used in the fishery and ensure that future changes to gear regulations can be based on accurate scientific information.

The SOP will determine estimates of total quantity of bycatch taken by each method with increases between surveys triggering a review.<sup>49</sup> The SOP will also monitor the ratio of prohibited size fish of primary and key secondary species with increases between consecutive observer surveys triggering a review.<sup>50</sup> The ratio of bycatch compared with total landings by method may assist in detecting broad changes in ecological relationships.<sup>51</sup> With these triggers, the magnitude of the increase needed to trigger a review and the timeframe in between consecutive observer surveys will be provided after the design phase of the SOP is completed.

The NSW submission concludes that, on the basis of the information provided, the proposed measures relating to bycatch described in the FMS are acceptable and will minimise adverse impacts from the EGF.

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<sup>49</sup> Table 16 Goal 1 (3)

<sup>50</sup> Table 16 Goal 2 (7)

<sup>51</sup> Table 16 Goal 1 (4)

## Conclusion

NSW Fisheries has a responsibility to manage bycatch issues in accordance with the National Policy of Fisheries Bycatch and this policy acknowledges the progress already made with respect to the Estuary General Fishery. The associated management responses relating to bycatch in the FMS are expected to result in:

- improved knowledge of the quantity and composition of bycatch species
- changes to gear specifications that will result in reduced bycatch rates
- modified fishing practices, including the adoption of BRDs
- use of best practice techniques for the handling of bycatch (including banning fish spikes)
- Closures of specific seagrass areas known to support large numbers of juvenile fish.

The NSW submission details that the bycatch management measures in the FMS are strongly supported by the management of other NSW commercial fisheries and sectors and by the management of activities in general that might impact on fish or fish habitats.

The submission concludes that the FMS will address all of the more important impacts associated with bycatch and those which are not able to be fully addressed will most likely be sporadic, short-term and readily reversible by natural mechanisms. Following analysis of the submission, supporting documents and other relevant information EA considers that the EGF has proposed an appropriate range of measures that should reduce the impact of the fishery on bycatch species. However, the effectiveness of the management actions relating to bycatch, specifically the SOP, will not be able to be measured until implemented and monitored. EA will continue to liaise with NSW Fisheries to determine the effectiveness of these management actions.

EA considers that the proposed measures relating to bycatch in the FMS are likely to be acceptable in terms of minimising adverse impacts.

## Protected species and threatened ecological community protection

Objective 2: *“The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities.”*

### Information requirements

Although there is currently no firm data on the impact of the EGF on threatened species, populations and ecological communities, it is thought to be small. NSW Fisheries will immediately modify the catch and effort returns, in consultation with the EGMAC, to collect and monitor information on sightings and captures of threatened and protected species.<sup>52</sup> The reliability of the information that will be collected is unknown. The SOP will also record any interactions with threatened and protected species. EA considers that the SOP will be unlikely to detect instances of interactions with rare or threatened species that may occur infrequently but may be significant for the population of those species. The FMS acknowledges this, however recognises that any data collected may provide spatial overlap information between the fishery and threatened or protected species. EA considers that the

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<sup>52</sup> MR 3.1(a)

FMS provides for a sufficient information collection program for recording interactions with endangered, threatened or protected species and threatened ecological communities.

NSW Fisheries proposes to develop targeted short term research projects on a threatened species, population and/or ecological community basis that examine the biology and ecology of those species, populations and ecological communities, to assess the potential impacts of many factors, one of which would be the EGF.

### Assessment

There appears to be little or no substantive data that suggests the fishery has any adverse impact (directly or indirectly) on any threatened species or their habitats. An analysis by NSW Fisheries of the threatened species distribution and ecology indicates that the EGF has the potential to impact approximately 42 species, one population and one community. An analysis of the potential impact due to direct capture or disturbance using the Eight Part Test<sup>53</sup> found that the FMS will not have a significant effect on any threatened species, populations or ecological communities or their habitats. There is a high degree of uncertainty associated with this assessment due to the paucity of quantitative data, and reliance upon anecdotal or speculative information.

There are currently no threatened ecological communities identified in the fishery area, consequently no information collection system or assessment is currently required.

### Management response

Measures in place to avoid capture and/or mortality of endangered, threatened or protected species include:

- Using fishing closures to avoid direct interactions with threatened species, populations or threatened ecological communities.<sup>54</sup> One public submission was received supporting improved management of threatened species-commercial fishing interactions and one nominating that the capture of any threatened species by a commercial fisher is a concern that requires a management response.
- Ensuring that the provisions of any threatened species recovery plans or threat abatement plans are adopted and any necessary changes to the operation of the fishery are made. A review will be triggered if the NSW Director of Fisheries considers that the response is not adequately provided for in the FMS.<sup>55</sup>
- Developing a code of conduct for the fishery,<sup>56</sup> which provides guidance for EG fishers when operating in the vicinity of listed Ramsar wetlands or known JAMBA<sup>57</sup> and CAMBA<sup>58</sup> migratory bird habitat to minimise any disturbance (by December 2003).
- The introduction of discard chutes that decrease the interaction of the fishery with birds.<sup>59</sup>

No measures are currently in place to prevent air-breathing animals, such as freshwater turtles, platypus and water rats, from being drowned in eel traps. A review is underway to examine issues of bycatch reduction in the eel fishery, specifically to exclude mammals and freshwater turtles. The outcomes of this review will be implemented once finalised.<sup>60</sup>

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<sup>53</sup> Section 5a of the *Environmental Planning and Assessment Act 1979*

<sup>54</sup> MR 1.2(a)(vi)

<sup>55</sup> MR 3.1(b)

<sup>56</sup> MR 1.2(c)

<sup>57</sup> Japan-Australia Agreement for the Protection of Migratory Birds, Birds in Danger of Extinction and their Environment (JAMBA)

<sup>58</sup> Agreement between Australia and the Peoples Republic of China for Protection of Migratory Birds and their Environment (CAMBA)

<sup>59</sup> MR 1.1(b)

<sup>60</sup> MR .1.2 (c)

Half of the estuaries in NSW have existing closures that probably protect many areas of habitat for protected species. The FMS includes several measures to further mitigate any impact, including complementary departmental initiatives to expand the range of marine protected areas, closures and research programs, and creation of Recreational Fishing Havens.

EA considers that there are precautionary management measures in place in order to ensure fishers avoid capture and mortality of endangered, threatened or protected species.

## **Conclusion**

Given the wide distribution of the EGF and the variety of techniques used, the fishery has the potential to affect a diversity of non-target species, including those broadly described as threatened.

The risk of the fishery impacting on protected species and ecological communities is generally unknown. In terms of threatened and protected species, the EIS concludes that the FMS is expected to achieve the desired outcomes, partly because the available evidence suggests that the fishery currently has little overall impact on these species. The proposed measures in relation to threatened and protected species are primarily precautionary in nature. EA is satisfied that the NSW management framework is adaptive to change in the event that impacts are identified and found to be unacceptable.

EA acknowledges that NSW Fisheries has gone further than implementing measures to avoid capture and/or mortality of endangered, threatened or protected species and on threatened ecological communities and has introduced measures to minimise disturbance.

As there are no ecological communities identified in the fishery area, the development of an information collection system, risk assessment and management arrangements are not required. EA understands that should such a community be identified, NSW Fisheries will take appropriate management action in a timely manner.

EA considers that the management strategies detailed above should be adequate to mitigate any future potential impacts due to the fishery and should remove a large degree of the uncertainty associated with existing data. Most of the responses are reliant on data collection from the observer program and studies of the biology and ecology of certain species. Failure to adequately fund those programs as well as having research undertaken by organisations independent of the fishery could reduce the confidence associated with achieving their aims.

EA considers that the EGF contains management measures that should avoid mortality of, or injuries to, endangered, threatened or protected species and avoid or minimise the impacts on threatened ecological communities. However, until data is collected detailing interactions between fishers and threatened species, there will be a risk that species are being negatively impacted upon without management actions being enacted.

## Minimising ecological impacts of fishing operations

Objective 3: *‘The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.’*

### Information requirements

Data collection related to fauna within the fishery is described under objectives one and two of principle two. To date there has been no formal information collection system dedicated to determining the impact of the fishery on the ecosystem or broader environment. Although there is some basic knowledge about the general biology of species caught there is little knowledge about how the species interact. This interaction is particularly important in a multi-species fishery.

The EGMAC will provide advice to NSW Fisheries, commencing in 2002 (and reviewed every five years), to assist in the mapping of key habitat areas for the fishery that require rehabilitation and will provide information concerning the historical significance of these habitats and the species which once used them.<sup>61</sup>

The aquatic reserves program and marine parks program<sup>62</sup> have specific objectives in terms of looking at biodiversity differences between fished and non-fished areas. The primary goal of the NSW representative system of marine protected areas is to establish a comprehensive, adequate and representative system of marine protected areas that includes a full range of marine biodiversity at ecosystem levels (e.g. estuaries, coastal lakes, islands, rocky reefs), habitat levels (e.g. sponge gardens, mudflats and coral communities), and species levels (e.g. seabirds, fish, corals and turtles).<sup>63</sup> The NSW Marine Parks Authority is currently assessing NSW marine bioregions to identify candidate marine protected areas. The Framework for a Representative System of Marine Protected Areas in NSW entails scientific assessments of the biodiversity in each bioregion prior to the selection of marine protected areas in the state’s five marine bioregions and one province. An integrated system will be developed, using marine parks, aquatic reserves, national parks and nature reserves to achieve the optimum conservation of biodiversity and habitat protection.

A range of research programs are underway following the commencement of new fishing exclusion zones in NSW marine parks and aquatic reserves which will provide information to help assess the influence of highly protected areas on biological diversity. There are several research projects in progress in the Solitary Islands and Jervis Bay Marine Parks, and a major project examining the effect of the Cabbage Tree Bay Aquatic Reserve in Manly. The programs vary in extent and scale, however there is a general focus on the following indicator species or groups of organisms: mud-crabs, reef-fishes, estuary-fishes, and rocky-shore invertebrates.

EA considers that information collection for analysing the impact of the EGF on the ecosystem and environment generally is currently not satisfactory. However, EA acknowledges that NSW has made significant steps in implementing management responses to collect this information.

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<sup>61</sup> MR 1.5 (a)

<sup>62</sup> Web site for the Marine Parks Authority NSW <http://www.mpa.nsw.gov.au/>

<sup>63</sup> The Marine Parks Authority came into existence in 1997 with the particular aim of managing marine parks for conservation of marine biodiversity and to maintain ecological processes. The Authority reports to both the NSW Minister for the Environment and the NSW Minister for Fisheries.

## Assessment

The arrangements for bycatch assessment are outlined in objective one of principle two.

NSW Fisheries produces an annual “Status of Fisheries Resources” report that summarises information about each of the major fisheries and aquatic habitats. The status report section for conservation follows a “state-pressure-response” format. The report plays a major part in the effort to ensure that the research conducted by NSW Fisheries is not only relevant and utilised in the management of the aquatic resources of NSW but can demonstrate that it is doing so. The report will also facilitate the development of performance indicators.

As detailed previously, NSW Fisheries will conduct a risk assessment of the impact of the fishery on the ecosystem, and initiate appropriate management programs based on the outcomes of that process. The risk assessment will determine the level of management or reporting necessary for each component of the ecosystem.

There is a poor understanding of the food chains and predator-prey relationships operating in the fishery area. The magnitude of any trophic structure effects is likely to vary considerably among methods used in the fishery, essentially in accordance with the likely amounts of bycatch involved. Hauling, meshing and some types of gathering by hand are much more likely to cause trophic effects than are trapping or hand lining. In the case of gathering by hand, any effects would be extremely localised, essentially relating to small organisms killed or displaced by trampling or use of implements. The submission outlines that the fishery-independent survey will also include some preliminary examinations of trophic interactions.

It is not known whether increased food supplies associated with certain fishing operations (eg discarding of bycatch) actually result in increased populations of the attached species or just locally increased abundances.

The FMS proposes to reduce the likelihood of this fishery changing species, populations and ecological communities in a manner, which threatens ecosystem integrity by:

- Collaborating with other institutions to improve the understanding of ecosystem functions and how they are affected by fishing practises.<sup>64</sup>
- Contributing to relevant biodiversity monitoring programs to develop a performance measure of biodiversity impacts at the species, community and ecosystem levels.<sup>65</sup> This is unlikely to be developed within the life of the FMS. However, EA considers that sufficient information will be collected during the timeframe of the FMS to contribute to monitoring, assessing and interpreting impacts of the EGF on biodiversity.
- Allowing the EGMAC the opportunity to comment on the selection and ongoing management of marine protected areas in estuarine waters.<sup>66</sup>
- Promoting research on the impacts of Estuary General fishing on the general environment, in particular, pursuing the research priorities identified in the FMS.<sup>67</sup>
- Conducting a preliminary examination of trophic interactions through the fishery independent survey.

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<sup>64</sup> MR 1.3(a)

<sup>65</sup> MR 1.3(b)

<sup>66</sup> MR 1.3(d)

<sup>67</sup> MR 1.3(e)

An ecosystem management based research project, to be undertaken in a partnership between NSW Fisheries and the University of British Columbia, will use whole-ecosystem simulations based on *Ecospace*, a spatially-explicit modelling technique, to forecast the results of alternative policy options for the marine and estuarine fisheries in NSW. One of the key objectives of this ecosystem research project is to critically evaluate the preliminary model with respect to its role in ecosystem-based fisheries management in NSW, including an investigation of the indicators and trigger points (reference points) used to monitor the performance of management strategies. This research may contribute towards the development of a performance indicator to monitor biodiversity at the ecosystem level, or identify alternative or surrogates for such an indicator. It is anticipated that this project will bring many benefits to ongoing management of coastal fisheries in NSW, with possible flow-on benefits Australia wide.

The EGF uses a range of fishing gear types, some of which are passive, while others are actively pulled through the water and across the bottom of estuaries to catch fish. A study on the impacts of hauling over *Zostera* seagrass has been completed. The impacts on other habitats of other fishing gears have not been investigated and potential impacts have generally been inferred from studies undertaken elsewhere. NSW Fisheries proposes to address the significant information gaps about the physical impacts of various fishing methods on habitats via targeted projects involving manipulative field experiments on specific problems. Specific issues will be prioritised and funding sought. If problems of physical damage on habitats are identified, it is proposed to undertake projects on ways to reduce such effects through gear and/or operational modifications and/or spatial and temporal closures in sensitive areas.

Pollutants generated by the EGF are likely to be low in magnitude and of low to moderate frequency. The collective potential for pollution from an EG vessel is only a small fraction of that associated with boating generally. EA considers that the risk to water quality associated with fishing operations in the EGF is very small and does not require any further management, given existing controls administered by the NSW Waterways Authority and the NSW Environment Protection Authority.

EA is satisfied that NSW is committed to moving towards collecting information and undertaking a risk analysis, appropriate to the scale of the fishery and its potential impacts, into the susceptibility of ecosystem components of the fishery.

### **Management responses**

EA is satisfied that NSW Fisheries is moving towards implementing management measures to ensure significant damage to ecosystems does not arise from the impacts of the fishery. Like most fisheries around the world, the overall direct impact of the EG fishery on the wider environment is poorly understood and indirect effects are unknown. The FMS manages this uncertainty through a series of precautionary management responses, as detailed below, as well as promoting research on the impacts of fishing on the general environment.

A code of conduct for EG fishers is being developed by NSW Fisheries in consultation with the industry (by December 2003), which will include guidelines and performance measures for:<sup>68</sup>

- operating on or near river banks, seagrass, saltmarsh or mangrove habitat and in any other area of environmental sensitivity in a manner that minimises environmental impacts in those areas.
- operating in the vicinity of listed Ramsar Wetlands or known JAMBA and CAMBA migratory bird habitat in a manner that minimises disturbance.
- operating in the vicinity of threatened species, populations and ecological communities.

The Code will be enforceable through the SMP.

The removal of large woody debris from rivers and streams in NSW was declared a key threatening process in November 2001 under the threatened species provisions of the Fisheries Management Act (FM). EG fishers will continue to be prohibited from this practice<sup>69</sup> as well as the prohibition on wilfully damaging marine vegetation.<sup>70</sup>

Fishing closures will be used to control the time and area fished to protect key fish habitat, specifically prohibiting the use of all hauling nets over beds of strapweed grass (December 2002) and determining designated landing sites for fish hauling nets in estuaries where seagrass exists around shorelines (by July 2003).

A number of strategies will be implemented to prevent the introduction and translocation of marine pests and diseases, including:

- Implementing, in consultation with the EGMAC, measures required in accordance with any marine pest or disease management plans.<sup>71</sup>
- Continuing the prohibition of taking or selling declared 'noxious fish'.<sup>72</sup>
- Zoning the fishery, which will also minimise the translocation of pests and disease.

External influences on the EGF, such as pollution, catchment land use practices were the most frequently raised issue in the public submissions. In order to minimise the impacts of activities external to the EGF on the resources harvested by the fishery and on fishery related habitats, NSW Fisheries intends to:

- Continue to review, provide relevant advice and, where appropriate under the FM Act, impose conditions in order to minimise impacts on fisheries resources from coastal developments.<sup>73</sup>
- Ensure that EGMAC will consider the impacts on fishery resources of activities external to the fishery and bring any detrimental impacts to the attention of NSW Fisheries and/or the relevant managing agency.<sup>74</sup>
- Along with commercial fishers, contribute to the development of policies or legislation established by the NSW Government to ensure that fish stock and habitat issues are properly considered in other environmental planning regimes.<sup>75</sup>

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<sup>68</sup> MR 1.2(c)

<sup>69</sup> MR 1.2(e)

<sup>70</sup> MR 1.2(d)

<sup>71</sup> MR 1.4(a)

<sup>72</sup> MR 1.4(b)

<sup>73</sup> MR 2.4(a)

<sup>74</sup> MR 2.4(b)

<sup>75</sup> MR 2.4(c)

EA considers that the NSW Fisheries management responses are adequate to ensure that significant damage to the ecosystems in which the fishery operates does not arise from the impacts of the EGF.

Given the current lack of knowledge and understanding of the impacts of the EGF on the ecosystem, there are currently no decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.

The FMS identifies that performance indicators need to be developed to monitor biodiversity impacts at the species community and ecosystem levels. The development of these performance indicators will involve extensive scientific collaboration and is likely to take some time.

Overall the FMS provides a range of methods to minimise the impacts of the EG fishery on the ecosystem and environment generally. The submission concludes that the range of management measures contained within the FMS aimed at reducing bycatch and controlling overall exploitation levels should be sufficient to safeguard community integrity. However, the jurisdictional context of the FMS limits its ability to reduce external impacts.

## **Conclusion**

The existing operation of the EGF has the potential to impact on the ecosystem by, for instance, reducing the stock abundance of retained and bycatch species, modifying the physical estuarine environment, and the provision and translocation of biological material.

The numerous fishing closures that currently limit Estuary General fishing to specific estuaries or part of estuaries already provide some level of protection for fish habitats. Although the FMS cannot directly control the impacts of other activities on key habitats, such as damage due to contact with boats, propellers, anchor ropes and chains, as well as natural events such as storms, promoting habitat conservation or rehabilitation are important initiatives.

EA acknowledges that in the estuarine environment there are multiple user groups, each of which has some unknown degree of impact upon species, and there are many external factors over which NSW Fisheries, though the FMS, has limited control. External influences on the EGF, such as pollution, catchment land use practises were the most frequently raised issue in the public submissions.

While there are no firm data, the impact of the EGF on threatened species, populations and ecological communities is anecdotally small. EA acknowledges that the management framework in the FMS is adaptive to change in the event that impacts are identified and found to be unacceptable.

There is a lack of understanding of food chain relationships and the subsequent impact on predator prey relationships.

The range of information needs identified in the submission is a positive step towards obtaining more information on the fishery impacts on the environment, however, there are no specific timeframes for completing this research and no source of funding identified.

## References

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**Table 4** Acronyms

ACRONYM	NAME	INFORMATION
ACCF	Advisory Council on Commercial Fishing	
ACFC	Advisory Council on Fisheries Conservation	
ACRF	Advisory Council on Recreational Fishing	
AFMA	Australian Fisheries Management Authority	
CAMBA	Agreement between Australia and the Peoples Republic of China for the Protection of Migratory Birds and their Environment	
EA	Environment Australia	
EG	Estuary General	
EGF	Estuary General Fishery	
EGMAC	Estuary General Management Advisory Committee	
EIA	Environmental Impact Assessment	
EIS	Environmental Impact Statement	A document including the FMS and the EIA
FM Act	Fisheries Management Act	
FMS	Fisheries Management Strategy	Contains all the management rules and objectives for the fishery as well as a detailed description of the way the fishery operates and describes the management framework for the next five years. It also outlines a program for monitoring the environmental, social and economic performance of the fishery, establishes trigger points for the review of the strategy and requires annual reporting on performance in order to ensure the objectives set out in the strategy are met.
FAO	Food and Agriculture Organisation	
FRCAC	Fisheries Resource Conservation and Assessment Council	
FRDC	Fisheries Research and Development Corporation	
JAMBA	Japan-Australia Agreement for the Protection of Migratory Birds, Birds in Danger of Extinction and their Environment	
MAC	Management Advisory Committee	Includes elected representatives of the commercial estuary fishers as well as representatives of recreational and Indigenous fishers and the Nature Conservation Council.
MPA	Marine Protected Area	
MR	Management Response	
NSW	New South Wales	
NRIFS		National Recreational and Indigenous Fishing Survey
PSR	Preferred Strategy Report	
RFH	Recreational Fishing Havens	
SMP	Estuary General Share Management Plan	A legislative structure for the class or classes of shares and the rights of shareholders under the share management fishery. It will also bring into operation a number of aspects of the fishery described in the draft FMS including fish that may be taken, areas for taking fish, times or periods for operating in the fishery, the protection of fish habitats, the use of boats and fishing gear and the use of bait

		in the fishery. A SMP must include objectives and performance indicators.
SOP	Scientific Observer Program	