



**Australian Government**

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**Department of the Environment and Heritage**

**Assessment of the  
New South Wales Ocean Hauling Fishery**

**Department of the Environment and Heritage  
2003**

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# Assessment of the Ecologically Sustainability of Managements Arrangements for the New South Wales Ocean Hauling Fishery

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## Executive Summary

### Process Followed in the Assessment

New South Wales Fisheries (NSW Fisheries) has provided a submission for the NSW Ocean Hauling Fishery (OHF) addressing the Commonwealth *Guidelines for the Ecologically Sustainable Management of Fisheries* (the *Guidelines*) to seek exemption from the export controls of the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) (*Part 13A*). The NSW Fisheries' submission comprises an Environmental Impact Statement (EIS) and Fishery Management Strategy (FMS). The EIS contains the draft FMS and the Environmental Impact Assessment (EIA) (see Figure 1). Formal comments were provided by Environment Australia (EA) at several draft stages 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 final FMS as a result of consultation with our Department and other stakeholders. Over the period of consultation while the FMS was under development, NSW Fisheries undertook a complete review of the operational rules for the fishery.

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 with the Commonwealth *Guidelines* allowing NSW Fisheries to submit these documents to EA for export assessment. This document reports on the assessment of the New South Wales Ocean Hauling Fishery against the Commonwealth *Guidelines*.

The Ocean Hauling EIS was released for public comment from 1 February 2002 to the 18 March 2002. During this time, stakeholders, interested parties and other members of the public were invited to comment on the EIS. NSW Fisheries received a total of 55 + 2 late submissions during public exhibition.<sup>1</sup> A total of 17 form letters were received from various fishing co-operatives, fishing organisations and commercial fishers requesting an extension of 3 months from 18 March 2002 to provide submissions. The sources of submissions were as follows:

Recreational fisher	26	Other commercial fishing industry	3
Government (local, state)	5	Advisory body	2
Ocean hauling fisher	4	Other	15

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 (in order of importance):

- Comment on the sustainability of fish stocks
- Suggested closures for the fishery
- Information used for the management of the fishery and need for research
- Comments relating to the recreational fishery
- Additional suggestions for future management of the fishery
- General comments on the document
- Management of bait (small pelagic) species
- Compliance issues

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<sup>1</sup> See report - *Summary of Submissions: Environmental Impact Statement for the NSW Ocean Hauling Fishery* May 2002

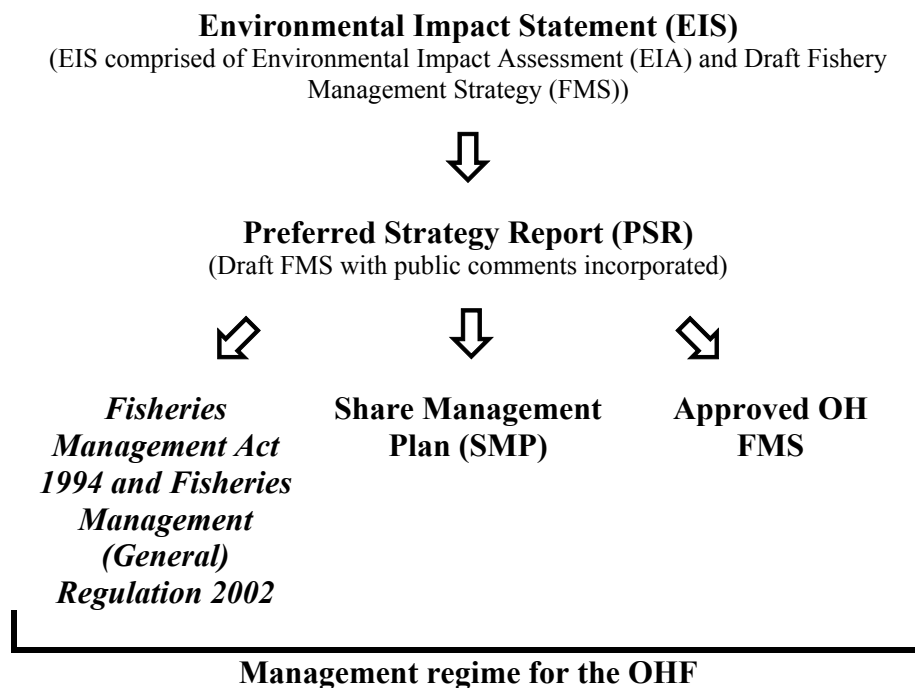
A preferred strategy report (PSR) was prepared by NSW Fisheries as a revised draft of the management strategy that appeared in the EIS and takes into account comments made during the public exhibition period. The NSW Minister for Fisheries signed the determination for the NSW Ocean Hauling Fishery on September 16 2002. The FMS was submitted to the NSW Minister for Fisheries for formal determination under the NSW *Environmental Planning and Assessment Act 1979*. In February 2003 the NSW Minister for Fisheries formally approved the Ocean Hauling Fishery Management Strategy.

The Recreational and Charter Boat fisheries will be assessed under a separate environmental assessment process in accordance with new guidelines being prepared by Planning NSW.<sup>2</sup>

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

As the fishery does not operate in the Commonwealth marine area a part 13 accreditation under the EPBC Act is not required.

**Figure 1** Documents produced by NSW Fisheries for development of the Ocean Hauling 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>

**Table 1** Summary of New South Wales Ocean Hauling Fishery

<b>Area</b>	On NSW ocean beaches and from boats in ocean waters out to three nautical miles.
<b>Gear</b>	General purpose hauling Net                      Pilchard anchovy and bait net Garfish hauling net                                      Garfish bullringing net Purse seine net    Lift net
<b>Management Controls</b>	The fishery is predominantly managed by input controls and a number of output control (see table 2 for details)
<b>Fishing units</b>	333 fishing businesses with one or more endorsements to operate in the ocean hauling fishery (August 2002)
<b>Target Species</b>	Top 5 species account for 95% of the catch Sea Mullet                      Australian salmon Sea garfish                      Luderick Yellowfin bream
<b>Catch</b>	98/99 2463 tonnes 99/00 2767 tonnes
<b>Stock Status</b>	Little is known about the status of the stocks for the majority of retained species within the Ocean Hauling Fishery
<b>Value</b>	1998/99 and 1999/00 estimated average annual value of the fish harvest was \$5.2 million at first point of sale*
<b>Export</b>	Mullet roe, sea garfish
<b>Bycatch Species</b>	Hauling in the OHF is very targeted and bycatch issues are thought to be minimal
<b>Endangered/Threatened/Protected species interactions</b>	None known – discussed in detail under Principle 2
<b>Indigenous component</b>	Awaiting outcome of the National Recreational and Indigenous Fishing Survey
<b>Recreational component</b>	The outcome of the National Recreational and Indigenous Fishing Survey is expected to provide valuable information for management of the fishery. Various regional surveys. Managed through bag and size limits, recreational licence and gear controls.

\* Based on Sydney Fish markets average monthly prices. Does not account for higher prices paid for exports or in other markets.

## Background

The New South Wales Ocean Hauling Fishery (OHF), one of nine major commercial fisheries in NSW, includes the taking of fish in ocean waters by various hauling and purse seine net methods deployed from ocean beaches and from sea-going boats out to three nautical miles. It also includes the use of a lift net by licensed commercial fishers to take bait for tuna operations. The two main methods, general purpose hauling and purse seining, together make about 90% of the catch of the fishery. The most commonly used net in the fishery is the general purpose hauling net deployed from ocean beaches and primarily targets travelling sea mullet as they move north along the coast to spawn. Under a quarter (333)<sup>3</sup> of the NSW commercial fishing businesses are entitled to operate in the OHF.

Although 74 species have been included on recorded landings in recent years, the OHF targets a few main species including sea mullet, sea garfish, luderick, yellowtail, blue mackerel and pilchards. Approximately 99% of the catch by total landed weight comprises less than 20 finfish species. The main focus of the fishery is pre-spawning aggregations of sea mullet, which occur at river mouths and along ocean beaches in late autumn/early winter. At this time sea mullet roe is a valuable export product and has now become one of the State's most valuable commercial finfish fisheries. In recent years, sea garfish have increased in value on export markets, while increased consumption of baitfish species, such as pilchards and blue mackerel has improved the value of these species on the domestic market.

NSW Fisheries has records of reported commercial fishing catches covering the last 50 years. The overall amount of fish reported as taken by the OHF remained relatively stable until the mid-1980s, when the expansion of the catches in the fishery may be attributed to two unrelated factors:

1. the development of a market for mullet roe (eggs) and the consequent expansion of effort in ocean hauling activities targeting the pre-spawning mullet run.
2. Increased marketing of catches from the purse seine fishery for human consumption, specifically targeting blue mackerel and yellowtail.

A summary of the OHF is provided in Table 1.

The FMS is the strategy for achieving the objectives of the NSW *Fisheries Management Act 1994* with respect to the OHF. 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 proposed in the FMS will be made by regulation and incorporated into the Ocean Hauling Share Management Plan (OHSMP) or the *Fisheries Management (General) Regulation 2002* (see figure 1).

The NSW Fisheries OHSMP, which will be implemented by December 2003<sup>4</sup>, provides a legislative structure for the class or classes of shares and the rights of shareholders under the OHF. Under a SMP, 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 that

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<sup>3</sup> As at August 2002

<sup>4</sup> FMS MR 5.3(a)

may be targeted, 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 OHF is at the stage of consulting over the criteria for allocation of shares.

A number of other NSW Government initiatives also impact on the management of the OHF including the implementation of Recreational Fishing Havens (RFHs), the Marine Protected Area program and the Indigenous Fisheries Strategy. Under the RFHs program a fee is being collected from recreational fishers. A major initiative funded by this fee is the creation of RFHs and a buyout of commercial fishing licences in those areas and surrounding areas to reallocate the fisheries resources between user groups. Currently 30 new RFHs have been announced including two (Botany Bay and Womboyn Beach), which directly relate to the OHF.<sup>5</sup>

## **Overall assessment**

### ***Management Arrangements***

The current management focus is on sustainable species catch levels and refinement is required to implement a more system-based approach.

Management responses will ensure that the entitlement structure will be more aligned to how the fishery operates ensuring a more meaningful control over the potential for fishing effort to be activated.

### ***Stock Status and Recovery***

The NSW submission concludes that the OHF is currently fished at levels that leave little scope for expansion. The submission indicates that the management regime is sufficiently cautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while the fishery moves to biological reference points. The management regime ensures that there are mechanisms in place to ensure that stock levels do not fall below a defined reference point without a review.

Refining the species list and description of the gear types that can be used in the fishery has removed the previous open-ended nature of species that could be taken and of the design and operation of the fishing gear. This previously presented a risk to the fishery through unforeseen expansion of how methods were used and which species were targeted.

The FMS implements a range of measures to increase the veracity of the catch recording system vital to the management of the fishery that will, for the majority of the species in the mid to long term, rely on commercial catch returns for monitoring.

EA is satisfied that arrangements are being developed to manage the bait fishery (collection of yellowtail scad, blue mackerel and pilchards).

There is no fishery independent information collected in the fishery but rather relies on improvements to the catch return system to provide more robust estimates of stock abundance and improved measures of fishing effort. Additionally, fishery independent data is being collected on the species in the NSW Estuary General Fishery (EGF), which has considerable overlap with OHF species, augmented with the fishery dependent information being validated via the Scientific Observer Program. If the fisheries independent data collected in the EGF, daily reporting and validation and supplementation of data via the SOP is not sufficient for stock assessment and catch

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<sup>5</sup> A complete list of recreational fishing havens available on the NSW Fisheries website: [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au)

validation then NSW will move towards developing fishery independent data specifically for the OHF.

EA considers that sufficient management responses are in place to move towards the recovery of sea garfish and silver trevally that are currently assessed as over-fished.

### ***Ecosystem impacts***

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

There appears to be little or no data or anecdotal information implicating the fishery in having any adverse impact on threatened, protected or endangered species or their habitats, nor is there any evidence of the fishery accentuating other circumstances that may be having an adverse impact upon them. The industry funded SOP will obtain information about effects due to disturbance, not just direct capture, as this appears to be the most likely form of impact on the majority of threatened and protected species of international significance that the fishery might interact with. The FMS also requires immediate modification to the monthly mandatory catch return forms incorporating reporting by fishers on interactions with threatened and protected species.

The impacts on ocean habitats by the OHF are believed to be minimal, but have not been assessed by any scientific study. The SOP will be used to identify any interactions between habitats and the fishery by cataloguing where and when the fishery uses different gear types. Where broad-scale interactions are identified, physical impacts on habitat will be assessed by targeted, short-term research, which may include manipulative field experiments.

### ***Conclusion***

The OHF can be characterised as a multi-species, multi-gear fishery with a wide geographical range and a large operator base. Given the complicated nature of the fishery, the unknown status and exploitation level of most of the key commercial species and the paucity of biological information available on the majority of the species taken, there is clearly a risk that the fishery is not ecologically sustainable. EA understand that, as a result, the NSW Fisheries intention has been to develop the FMS to provide a framework for management of the fishery substantially based on precautionary input management measures. EA acknowledges the significant progress made with the FMS towards establishing a fishery managed in an ecologically sustainable manner. The majority of EAs concerns relate to the adequacy of the new cautionary measures, without being in a position to assess the effectiveness of these measures until implemented, and the impact of the fishery on the environments in which it takes place.

This assessment process revealed that a number of areas that could be considered a high environmental risk, if the fishery was to continue to operate without any change, including excess fishing effort associated with some methods and the risk of major effort shift. The assessment also highlighted the lack of knowledge about the size of the fish stocks, the sustainability of current harvest levels, bycatch, threatened and protected species interactions and the impact of existing fishing practises on key fish habitats. To address these and other issues the FMS proposes a comprehensive range of management goals, specific objectives and management responses.

On balance, EA finds that the OHF 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 Ocean Hauling 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 Ocean Hauling Fishery
- Design and implement an industry funded scientific observer program (MR1.1 (a))
- Modify fishing practises to reduce the impacts on non-retained fauna (MR 1.1(b))
- Develop a system for formal stock assessment for target species to be developed within 5 years (from 2003) and reviewed at least every 3 years thereafter (MR 2.1.1 (b))
- Develop and implement a policy to manage the harvest of bait for the Commonwealth Tuna Fisheries in NSW waters (MR 2.2(e))
- Establish minimum entry requirements for new entrants at the fishing business level to prevent increases in effort by small businesses by December 2003 (MR 2.3 (a))
- 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 an objective system for defining and setting trigger points to detect concerning trends in landings of all species permitted to be taken in the Ocean Hauling Fishery annually from 2003 (MR 8.1(g))
- Conduct a risk assessment of the impacts of the Ocean Hauling Fishery on the ecosystem and initiate appropriate management programs (e.g. monitoring) based on the outcomes of that process by December 2004.

## Part 1 - Management Arrangements

The New South Wales Ocean Hauling Fishery (OHF) is managed by New South Wales Fisheries (NSW Fisheries). NSW Fisheries is primarily responsible for administration of the *Fisheries Management Act 1994* (the FM Act) and associated regulations. NSW Fisheries also jointly administers the *Marine Parks Act 1997* with the NSW National Parks and Wildlife Service (NPWS). The OHF will be managed under the OH Fishery Management Strategy, the OH Share Management Plan and the *Fisheries Management (General) Regulation 2002*, together that 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 regime in other jurisdictions fishing the same population, particularly when assessing stock status and availability for harvest. NSW Fisheries has committed to holding regular bilateral meetings with adjacent jurisdictions (Queensland, Victoria and Australian Fisheries Management Authority) at a minimum of 2 years to discuss cross-jurisdictional issues. A stock assessment review will be linked to these meetings.

There are no regional or international management regimes to which Australia is a party of specific relevance to the fishery. 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. All fishing operations occur completely within State waters.

EA is satisfied that the management regime is documented, publicly available and transparent and developed through a consultative process providing opportunity to all interested and affected parties, including the general public ensuring that a range of expertise and community interests are involved in individual fishery management committees and during the stock assessment process.

Public comments were sought on the Ocean Hauling Fishery Environmental Impact Statement that included the draft FMS and the EIA. The FMS 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. The EIS and other documentation was widely available to the public by placing them on the NSW web site, providing copies at Fisheries Offices throughout the State and targeted mail outs to key stakeholders.

A consultative process was employed throughout the development of the management regime and has provided sufficient opportunity to all interested and affected parties. The Management Advisory Committee (MAC) for the Ocean Hauling Fishery provided advice to the management agency on the development of the FMS. The Ocean Hauling Management Advisory Committee (OHMAC) includes elected representatives of the commercial OH fishers as well as representatives 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 from all fishers in the Ocean Hauling Fishery, the Minister for Fisheries' advisory councils<sup>6</sup> on commercial fishing (ACCF), recreational fishing (ACoRF) and fisheries conservation (ACFC) and the Fisheries Resource Conservation and Assessment Council (FRCAC). FRCAC represents a wide range of interests and includes representatives from commercial fishing,

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<sup>6</sup> The four Ministerial advisory councils are currently established under the *NSW Fisheries Management Act 1994*

recreational fishing, fish marketing, the fishing tackle industry, charter boat fishing, regional tourism, academic expertise, conservation, aquaculture and Indigenous peoples. This range of consultative bodies provides advice on specific issues as well as facilitating cross-sectorial and cross fishery consultation. Other government agencies and professionals in the fields of aquatic research and environmental impact statement were also consulted 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 OH MAC in May 2002 for comment.

NSW has drafted an Indigenous Fisheries Strategy<sup>7</sup> that contains aims, strategic actions and specific initiatives which 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 in working towards developing a strategic approach in addressing Indigenous fishing issues and encourage NSW Fisheries to take into account and incorporate Indigenous fishing interests in the development of fisheries management arrangements.

EA is satisfied that the management regime for the OHF is strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements is measured. The FMS lists eight major long-term goals for the management of the OHF including conservation of biological diversity, maintaining fish populations at sustainable levels and promote conservation of protected species. These management goals are supported by 31 specific objectives and more than 100 management responses, including immediate actions, development of future management and enforcement measures and scientific research and monitoring programs. Given the complex nature of the OHF performance of the FMS will be measured against the eight goals rather than each individual management response or objective. An annual report will be prepared detailing the progress made in implementing the individual management responses. Performance indicators will provide an indication of whether the management goals are being attained. A monitoring program will be used to gather information to measure performance indicators. 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.

Trigger points specify when a performance indicator has reached a level that suggests that there may be a problem with the fishery and a review is required. The submission details that if a review concludes that the reasons for the trigger point being breached are considered to be due to the operation of the fishery, management action must be taken to ensure that the performance indicator returns to within an acceptable range within a specified time period. If a review considers that the management objectives or performance monitoring provisions are inappropriate and need to be modified, the NSW Minister for Fisheries may amend the strategy itself.

EA considers that the management regime is strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements for the OHF is measured.

The OHF has historically been managed through a series of input and output controls. Input controls used have included limits on the number of commercial fishers, limits on the size and type of gear used, and fishing closures<sup>8</sup> in some areas or at certain times. Output controls, in particular minimum legal lengths for many of the target species, have applied for many years. A number of fish such as blue groper and the great white shark have been totally protected from commercial fishing. Table 2 details current and new input and output management controls.

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<sup>7</sup> <http://www.fisheries.nsw.gov.au/ifs/html-ifs.htm>

<sup>8</sup> Details of fishing closures in NSW can be found on the NSW Fisheries website at [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au)

**Table 2** Input and output controls in the NSW Ocean Hauling Fishery

<i>Input controls</i>	
<ul style="list-style-type: none"> <li>• Time and Area Closures<sup>9</sup></li> <li>• Permits for research</li> <li>• Licences required in the fishery</li> <li>• Limited entry</li> <li>• Fishing endorsement</li> <li>• Controls on fishing gear<sup>10</sup> and boats (Fishing boat licensing, engine controls, net registration)</li> <li>• National licence splitting policy</li> <li>• Transfer of licensed fishing boats</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer of fishing business entitlements</li> <li>• Zoning - restricts fishers to operating on a single nominated zone of the 7 coastal regions</li> <li>• Code of Conduct – as a condition of the licence</li> <li>• Controls on collection of bait for own use</li> <li>• Share management - program to cap number of fishers at historically active levels (by July 2004) (n)</li> </ul>
<i>Output Controls</i>	
<ul style="list-style-type: none"> <li>• Catch limits and quotas (includes daily catch limits for tailor and Australian salmon)</li> <li>• Size limits<sup>11</sup> and protected fish<sup>12</sup></li> </ul>	

(n) – New management measures introduced with the FMS

NSW Fisheries contends that a mix of input and output controls have 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 should be noted that stable catch levels (or catch rates) within the hauling sector are not necessarily indicative of stable stock size, due to targeting of aggregating species, particularly pre-spawning aggregations.

Because the fishery is managed primarily via input controls, the key issue with respect to controlling the level of harvest is controlling the amount of fishing effort that is applied to the stock. As part of the overall management regime, the FMS outlines a number of initiatives to reduce latent effort in the OHF including:

- establishing minimum entry requirements for new entrants at the fishing business level to prevent increases in effort by small businesses<sup>13</sup>
- use of transfer guidelines to replace historical effort rather than active latent effort, and
- restricting the renewal of endorsements for non-payment of annual endorsement fees.

NSW Fisheries considers that there is not significant amount of latent effort in the fishery at present, and that the minimum entry requirements once implemented could be used as a tool to manage effort or catch shifts if they occur in the future. The FMS does, however, propose to change the structure of the fishing entitlements so that the total number of ocean hauling teams working in each region can be capped, whereas currently the limited entry regime relates only to number individual endorsement holders. The NSW submission details that there is little scope for expansion in the fishery so the implementation of the share system is important for capping effort in the future.

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.

<sup>9</sup> Closures affecting the ocean hauling operations are listed under Appendix 2 of the FMS

<sup>10</sup> See Appendix 1 of the FMS

<sup>11</sup> See Table 8 of the FMS

<sup>12</sup> See tables 9 and 10 of the FMS

<sup>13</sup> FMS MR 2.3(a)

NSW Fisheries has approximately 90 fisheries officers responsible for coordinating and implementing compliance strategies in NSW. Approximately 65 of these officers are located in areas along the NSW coast in which the OHF occurs. The NSW submission details that the OHF has a very high level of compliance with a compliance rate of 98.75% for 1999/2000. If the overall rate of compliance with the strategy as estimated by the Director of NSW Fisheries, fall below 85% this will trigger a review. Measures in the FMS to ensure efficient ocean hauling compliance programs include:<sup>14</sup>

- developing, implementing and monitoring compliance operational plans
- implementing an endorsement suspension scheme and share forfeiture scheme based on a demerit point scale for serious fisheries offences and habitual offenders
- publishing successful prosecutions results from nominated offences in relevant publications and media to discourage illegal activity
- continuing the requirement that fish taken in the OHF are marketed through a registered fish receiver or restricted registered fish receiver.

EA considers that the management regime contains the means of enforcing and monitoring critical aspects of the management arrangements.

EA considers that the management regime sufficiently provides for the periodic review of the performance of the fishery management arrangements and the management strategies, objectives and criteria. A performance report detailing the situation with respect to each performance indicator must be submitted annually by NSW Fisheries to the NSW Fisheries Minister. 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. Each report will be available on the NSW Fisheries website.

The performance indicators will provide an indication of whether the management goals are being attained. A comprehensive 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 may be a problem with the fishery and a review is required.

NSW Fisheries will collect and analyse information relevant to the performance of the fishery, such as compliance rates, catch data and other statistics as the information becomes available and prior to the preparation of reports relating to performance monitoring in the management strategy. This will not, however, prevent a review from being conducted at any other time should it become apparent that a performance indicator has breached a trigger point.

Once the relevant information is obtained an initial analysis against the trigger points will be undertaken by NSW Fisheries. Where the data or information indicate that a trigger point has been breached, details will be provided to the relevant fishery MACs and the relevant Ministerial advisory councils. Consultation will then occur with the OHMAC and other relevant advisory bodies either through a meeting or out of session. During this consultation, advice will be sought on performance indicators that have been breached and the suspected reasons for any breaches. During this consultation the MAC will also be able to provide advice on the preparation of any review reports that are required.

The submission details that if a review concludes that the reasons for the trigger point being breached are due to the operation of the fishery, or if the fishery management objectives are compromised if the fishery continued to operate unchanged, management action must be taken with

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<sup>14</sup> FMS MR 6.1(a) – (d)

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

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 Minister for Fisheries may amend the FMS. Additionally, 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 OHMAC. These circumstances may include (but are not limited to) environmental events, results of research programs or unpredictable changes in fishing activity over time. The NSW Minister for Fisheries will review the appropriateness of all performance indicators and trigger points not more than two and a half years from the commencement of the FMS.

The submission details that 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.

A review of the SMP is to be conducted between 5 and 10 years. The SMP will include objectives that are consistent with the goals and objectives of the FMS.

Little information is collected on the impact of the fishery on the broader marine ecosystem. 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, and for this reason, the draft strategy has taken a cautionary approach to such issues. Further elaboration of this issue is contained under Principle 2 of the *Guidelines*.

Currently there are no threat abatement plans or recovery plans in place directly relevant to the activities of this fishery. The FMS requires the fishery to comply with any recovery or threat abatement plan. A review is triggered if the current arrangements do not adequately provide for action or mitigation methods.

## **Conclusion**

On the whole EA considers that the fishery is generally well managed with a suite of new management controls proposed and is generally in accordance with the Commonwealth's *Guidelines for the Ecologically Sustainable Management of Fisheries*.

In recognition that the Queensland, New South Wales, Victorian and Commonwealth fisheries operate off a single stock for a number of species taken in the OHF (eg. yellowtail and mullet) and the action of one fishery should be considered in the adjacent fishery, NSW Fisheries has committed to joint stock assessment and monitoring. This is strongly recommended and is considered highly important for the effective management of the OHF.

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.

The management regime incorporates an information collection system appropriate to the scale of the fishery for the majority of the species. Fishery-dependent data is obtained through a

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<sup>16</sup> FMS section 9(c)

compulsory daily catch and effort logbook. The industry funded Scientific Observer Program will collect information on interactions with protected species as well as bycatch levels.

EA is satisfied that the management regime contains the means of enforcing the critical aspects of the management arrangements in the OHF.

A more in depth analysis of the management regime is contained in the section addressing the *Guidelines*.

## **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 stocks**

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**

#### ***Fishery Dependent Information***

Commercial fishers in the OHF 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 one-degree latitude ocean zones).<sup>17</sup> 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 sometimes 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”. Improvements to the quality of the commercial catch and effort information in the FMS include:

- Regularly reviewing the catch and return forms and ensuring that they are filled in accurately and that they are designed to be easy to use. (Biannually from July 2004)<sup>18</sup>
- Determining accuracy of current reporting of species identification and provide advice to industry to make necessary changes (may need to wait for results of observer survey) (July 2004)<sup>19</sup>
- Used team based daily recording for beach hauling during the mullet travelling seasons (March to July)<sup>20</sup>
- Implementing a daily spotting diary allowing fishers to record all fish observed, including fish not captured<sup>21</sup> (by July 2003)
- Increasing the recording of individual landed species on catch records wherever possible.<sup>22</sup>

The SOP will also estimate the accuracy of reporting using the standard catch returns including both the quantity caught (and released) and the identity of the species recorded (including threatened and endangered species).

NSW Fisheries will continue to undertake and improve detailed monitoring of the landed catch, including length and age of target species and species composition which will be fed into stock assessments. This monitoring provides a basis for cross comparison and validation of the size and composition of the commercial landings, independent of mandatory commercial catch returns.<sup>23</sup>

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<sup>17</sup> The NSW coast is divided into 10 catch reporting zones - see Map 1 in the FMS

<sup>18</sup> FMS MR 8.2(b)

<sup>19</sup> FMS MR 8.2(c)

<sup>20</sup> FMS MR 8.2(d)

<sup>21</sup> FMS MR 8.2(e)

<sup>22</sup> FMS MR 8.2(f)

<sup>23</sup> FMS MR 2.1.1(a)

Currently there is a strong reliance on commercial landings and effort information reported on the monthly catch return forms. EA considers that the improvements in accuracy and precision of data supplied by fishers and the timeliness of processing monthly returns is considered 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 Survey and information from Charter operators is collected via a logbook program. Information collected from these sectors, where appropriate, will be incorporated into stock assessments.<sup>24</sup>

The current research strategy, developed by NSW Fisheries, is included in the submission documentation.<sup>25</sup> NSW Fisheries will determine, in consultation with stakeholder groups, the priorities for research for the OHF, taking into account the research needs identified in the FMS, in the EIS or arising out of new research results. NSW has committed to allocate research resources and where appropriate make grant applications to support research identified in this process.

### ***Fishery Independent Information***

The FMS proposes no specific fishery independent surveys to enhance current stock assessment programs but rather relies on improvements to the catch return system to provide more robust estimates of stock abundance and improved measures of fishing effort. Relative abundance indices for a number of important species in the OHF will become available as part of the fishery-independent survey proposed in the NSW Estuary General FMS. This includes sea mullet, luderick, yellowfin bream and sand whiting. The stock assessment process for these species will greatly benefit from that survey and the flow of benefits will accrue to all sectors harvesting these species.

EA understands that collection of fishery independent information about stock structure will be limited in the OHF due to the selectivity of fishing gear. However, it has been identified that there is the potential to monitor the abundance of some target species within the fishery through the use of aerial or acoustic surveys although these methods may prove to be prohibitively expensive. If the fisheries independent data collected in the EGF, daily reporting and validation and supplementation of data via the SOP is not sufficient for stock assessment and catch validation then NSW agreed to develop an appropriate fishery independent data collection system, in consultation with the OHMAC, specifically for the OHF.

### **Assessment**

NSW Fisheries has standardised criteria for determining the exploitation status of fish stocks.<sup>26</sup> Similarly the reliability of the assessment that was used to determine stock status is defined based on the combination of the stock assessment method used and the confidence that NSW Fisheries have in the data that were utilised in the assessment. Categories for stock levels and spawning stock levels are also standardised.<sup>27</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.

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

<sup>25</sup> Section 6 of the FMS

<sup>26</sup> See Table 11 of the FMS

<sup>27</sup> See pp. 6-8 of the NSW Fisheries Status of Fisheries Resources 2000/2001

The NSW submission outlines that while information is available for some of the more important target species, little is known about the status of the stocks for the majority of retained species within the OHF. Of the 16 target species five species (yellowfin bream, sea mullet, sand whiting, yellowtail and silver trevally) have undergone stock assessments using fishery dependent indices of abundance and ancillary information such as age structures<sup>28</sup> but the data has not yet been incorporated into a formal model. The stock assessments for a further three species (eastern sea garfish, luderick and blue mackerel) are still under development, or have been completed only at an elementary level. The stock of the remaining eight target species (Australian salmon, pilchard, sweep, sprat, dart, jack mackerel, anchovy and bonito) has not been assessed. The monitoring of commercial catches forms the full or partial basis for stock assessment of all species targeted by the OHF. The EIS provides a description of the status of the target species in the fishery including stock assessment reliabilities and levels of confidence in making predictions regarding stock status.<sup>29</sup> The level of confidence in making predictions regarding stock status is low for many of the target species taken in the OHF. Levels are somewhat higher (“moderate”) for only five of the target species. Improvements in the confidence level associated with the stock assessments are dependent on the implementation of the proposed monitoring and assessment programs.

Recent declines of catch rates for sweep and pilchards are addressed in the FMS through stock assessment, performance monitoring, species closures and net restrictions (ensuring the general purpose haul net is not used in offshore waters) in order to prevent the overfishing of species during spawning migrations along the coast.

It was identified that while sea mullet are classified as fully fished, trends in both catch and catch per unit effort should be closely monitored due to the recent sharp declines in total commercial landings which followed pronounced increases in the historical catch level largely due to the development of an export market for roe to Asia. The combination of these effects has the potential to place significant pressure on the long-term sustainability of the resource. Six submissions in the public comment period raised concerns with regards to the intensive fishing of pre spawning aggregations of mullet since the advent of the roe fishery. Five submissions raised concerns with the decline in presence of bream and luderick along the NSW coast.

The targeting of spawning aggregations by the OHF is often of concern to the public who associate the practise with overfishing. The submission argues that biologically the timing of capture relative to the spawning period is much less important than the proportion of the stock taken particularly for long lived species such as yellowfin bream and luderick. The NSW submission argues that the fact that these species remain popular target species, despite being subject to these sorts of practices for 100 years, suggests that these practices are probably sustainable.

Of the 16 target species (which make up 97% of the retained catch by weight) the exploitation status of half these species is unknown and no formal stock assessment has been undertaken (Australian salmon, pilchards, sweep, sprats, dart, jack mackerel, anchovy and bonito). Even for the species about which something is known the NSW submission suggests using considerable caution when making conclusions at least until stock assessments are better developed.

1	overfished	1	moderately to fully fished
1	fully to over fished	2	moderately fished
3	Fully fished	8	unknown (50%)

To improve the knowledge base and thus the management of the various fisheries under their control, NSW Fisheries has commenced stock assessments for numerous species occurring in the

<sup>28</sup> see Gray *et al* 2000a

<sup>29</sup> Table E1 of EIS

State's coastal waters, including several within the OHF. The FMS outlines that a system for formal stock assessment for the 16 target species will be developed within 5 years (from 2003) and reviewed at least every 3 years thereafter. Stock assessments will be undertaken on a species basis and therefore will be reliant on harvest estimates from all sectors. Within 12 months of the commencement of the FMS a stock assessment process for target species will be designed. The FMS has listed the 16 target species in order of priority for the OHF for stock assessment according to:

- Size of catch level and value within the fishery
- Trends in total and fishery catch
- Biological knowledge
- The extent to which it is targeted by other fisheries

The NSW submission notes that the stock assessment process needs to be appropriate for the data available and the value of the OHF. This will be the long-term approach that will be used to assess the target species of this fishery. Two principles will apply to the long-term proposal for stock assessments:

- Assessment methods will be consistent with the data (i.e. 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.

Vulnerability of the target species to fishing pressure based on the species biological and habitat attributes was assessed in the EIS using species information and references with additional expert opinion from fisheries scientists. The risk assessment identifies that of the 16 target species in the fishery, one is at extreme risk of overfishing and 12 are a high risk of overfishing without immediate management measures. The NSW submission suggests that the FMS proposes appropriate management responses to reduce these risks. Conditional target species were not assessed in the risk assessment or in previous stock assessments of this fishery. The Commonwealth and State fisheries that are the primary harvesters of those species will be responsible for the overall management and development of stock assessments for those species. Leadenall and Diamond Fish are primarily harvested by the OHF, but are unlikely to receive formal stock assessments in the near future due to current low catch levels. Their status will be monitored via the objective system being developed for defining trigger points.

NSW Fisheries uses a standard method of reporting for the exploitation status of fish stocks across all commercial fisheries. Where there are data the impacts of other harvesters, such as recreational, Indigenous and Charter operators, is also taken into account. Information on fisheries resource statistics is published annually in the New South Wales Commercial Fisheries Statistics reports and NSW Fisheries Status of Fisheries Resources reports.

Total commercial landings of each species from each gear type within each of the seven regions fished will be monitored with landings outside the range of any 2 consecutive years changing by 50% triggering a review. This trigger may allow changes in targeting or species composition to be more easily detected at a regional level. While there are broader and more conservative species level triggers, EA is concerned that this regionally based trigger may be set too high. NSW has committed to review the triggers within two and half years and will amend the trigger if it is found to be inappropriate. Additionally, even if a trigger is not breached the FMS provides the flexibility for remedial action to be implemented if it is deemed appropriate.

Commercial catch information is collected through a compulsory logbook program, the details of which are discussed further under Principle 1 Objective 1. There is currently little reliable information available on the capture rates by recreational and Indigenous fishers in this fishery.

Stock assessment 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 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>30</sup>

A management response is to estimate as far as practicable, the size of the non-commercial catch and the relative impact of such harvesting on the resource, taking into account the results of the National Recreational and Indigenous Fishing Survey. Steffe *et al* (1996a) found that the catches on beaches of yellowfin bream and tailor were considerable and in excess of commercial catches in the northern region of NSW. Thus it is important that available data from all sectors when they become available will be factored into stock assessments.

There is a qualitative statement made in the EIS on the exploitable level of stocks.<sup>31</sup>

### **Management responses**

There is a lack of basic biological information for the majority of species that are harvested in the OHF. 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.

NSW Fisheries has committed to conduct, through a workshop involving key stakeholders and experts, 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 will determine the level of management or reporting necessary for each component of the ecosystem.

“Single year triggers”, including upper and lower trigger points, are provided for the first year of the FMS for target 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. The change that triggers a review is not an unprecedented change but rather a change that was 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 trigger a review. The reference level of the short-term trigger will be the landings level from the previous year.

Additionally, there are specific indicators and triggers relating to managing harvest, which will trigger a review, including:

- Proportion of catch comprised of target species below 95% of the total landings for any method. This provides a means of detecting shift in targeting.
- Total annual landings of each species other than target species are outside the range of catch for two consecutive years.

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<sup>30</sup> See p 27 of Report at Appendix CH2 of the EIS.

<sup>31</sup> See table E1 of EIS

<sup>32</sup> See table 16 of FMS

- Total commercial landings of each species from each gear type within each region change by at least 50% between any two consecutive years. Changes in targeting or species composition may be more easily detected at a regional level.
- Total commercial landings of non-target species (conditional target and byproduct) exceeds 5% for any method in any region per year.

An objective system for defining trigger points that detect concerning trends in landings will be developed and tested during the first nine months of the FMS and applied to all target and conditional target species at the first annual review. 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.

The *Guidelines* require 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.

Current and new input and output management strategies employed in the OHFMS which assist in controlling the level of take and which imply a high level of control over commercial operators are outlined in Table 2. As the fishery is managed primarily via input controls, the key issues with respect to controlling the level of harvest is controlling the amount of fishing effort that is applied to the stock. Restraints on entitlements (eg transfer rules) will provide for long-term restructuring of fishing effort. The submission details that in the short term, for each method used in the OHF, species based closures will be used as the preferred means of implementing constraints on active fishing effort.<sup>33</sup> It is outlined that OH methods are sufficiently specific that removal of the entitlement to target a species for the duration of the closure should be an effective and efficient control on fishing for that species. Currently the overall impact of the OH fishery on the stocks targeted is largely unknown.

Byproduct is managed by limiting the percent by weight that must comprise target or conditional target species on a statewide, regional and business basis as follows:

- Provision of a compliance rule to prevent targeting of current non-target species, at least 80% by weight of any shot must comprise target or conditional target species.
- Target species for each method must be more than 95% of annual landings, leaving only 5% for conditional target species and byproduct species

EA supports limiting capture of species in the OHF to a defined list of “target” and “conditional target” species for each gear type as detailed in the FMS.<sup>34</sup> EA supports the development of a clear, scientifically supportable, process for including a species on the target species list as proposed in the FMS<sup>35</sup> and suggests that a clear process be developed for adding a new species to the fishery list. EA acknowledges that NSW Fisheries has made a significant step in defining the target and conditional target species but considers that management should be moving towards a defined retained species list. EA does not agree with the proposal to include provisions for the landing of “a by-product limit”. Under this arrangement there is no incentive mechanisms built into the management regime to encourage improving gear types to reduce capture of bycatch when a whole

<sup>33</sup> FMS MR 2.2(c)

<sup>34</sup> Appendix 1 and MR 1.3 (a) of FMS

<sup>35</sup> FMS MR 5.2(d)

suite of species can be taken. Having a clearly defined target species list would also assist in refining the development of stock assessment and monitoring programs.

Of the 74 recorded species being taken in the OHF only the 16 target species will be formally monitored. It cannot be assumed that because a species is being taken at a comparatively lower level to the target species that it is being harvested sustainably or is not a key component of a particular fishers operation and therefore requires direct management. The byproduct and conditional target species are managed by the total byproduct limit with careful monitoring to prevent targeting but are unlikely to be the subject of formal assessment in the near future. Additionally, all the input controls will regulate the take of byproduct species. Should the risk assessment determine that a particular species (other than target and conditional target species) taken in the OHF require more rigorous monitoring it will be subject to annual performance monitoring.

Small pelagic fish species (eg. yellowtail, blue mackerel and pilchards), targeted by the purse seine sector of the OHF as bait, are also targeted by other commercial and recreational fishers. The harvest of bait by NSW line fishers (around 15 fishers) and Commonwealth tuna fishers (around 40) is currently largely undescribed and uncontrolled and is collectively, with the recreational harvest, likely to be a similar magnitude as the harvest by the purse seine sector. The FMS provides a system of regulation that includes the development of a logbook to document all bait harvested by both the NSW line fishers and the Commonwealth tuna fishers operating in NSW waters.<sup>36</sup> NSW Fisheries has advised that the maximum number of bait collection permits available will be restricted immediately to the number currently issued and discussions have already commenced with the Commonwealth in relation to developing a logbook reporting system for bait collection.

## **Conclusion**

EA concludes that the proposed harvest strategies in the FMS will increase the likelihood of long-term stock sustainability based on the available data. 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 is satisfied that the FMS contains a range of measures to ensure the fishery is conducted at catch levels that maintain ecologically viable stock levels in the short to medium term. However, a range of the more vital components of the FMS, such as the requirement to undertake stock assessment for the 16 target species within 5 years, have yet to be implemented and the success of the strategies evaluated. Given the importance of robust stock assessment for the future management of the OHF this appears as the greatest challenge for the future management of the fishery.

## **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.”*

The FMS requires that, where the OHF is a major harvester of an overfished species as defined by the exploitation status, NSW Fisheries, in consultation with the OH MAC, must develop and implement a recovery program for the species within a specified timeframe.<sup>37</sup> Implementation of a recovery plan must involve all harvest sectors and include a description of the actions proposed to

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<sup>36</sup> See FMS MR 2.2 (e) and (f)

<sup>37</sup> FMS MR 2.5(a) and generally in section 3(c)(vii) of the FMS

return to acceptable levels those parameter(s) that have led to the determination of the species being overfished. The recovery plan must set out a timeframe for that process and may specify further appropriate action should recovery targets not be met.

The FMS details that recovery programs for species suspected of having depressed recruitment due to overfishing must include strong precautionary action. The submission details that these actions could include (but may not be limited to) temporary closures or caps on either catch or fishing effort. Recovery programs for recruitment-overfished species may also include changes to the monitoring program for that species and/or require targeted research to improve the assessment of risk to the species in critical areas.

During the period of development any future recovery program for a species that has been determined as being recruitment overfished, the FMS details that NSW Fisheries will implement precautionary actions including but not limited to total harvest controls, reductions in effort, implementation of fishing closures, bycatch management provisions and mandatory gear changes.

Where the OHF is a minor harvester of an overfished species, NSW Fisheries, in consultation with the OHMAC, will contribute to the development of a recovery program for the species and adopt any measures required by that program.<sup>38</sup>

Sea Garfish and Silver trevally have been identified as being overfished. As the OHF is the primary harvester of sea garfish the OHMAC with NSW Fisheries will be the primary drivers of the development of a recovery program for this species.<sup>39</sup> In addition, the FMS proposes specific research and monitoring programs aimed at quantifying the impact of the measures and the impact of certain gear types on the garfish resource. One of the main threats to the recovery of sea garfish is the number of endorsed fishers (87) who may target it. The FMS proposes to limit active effort in the fishery through an increase in minimum shareholdings.<sup>40</sup> EA considers that allocation and restriction of shares within the specified timeframe is vital to the sustainability of the fishery.

As the OHF is a minor harvester of silver trevally, NSW Fisheries and the OHMAC will contribute to the NSW Ocean Fish Trawl Fishery's development of a recovery program for this species and will implement actions as needed under that program.<sup>41</sup>

## **Conclusion**

EA considers that NSW Fisheries has an adequate and precautionary recovery strategy development and review process in place for overfished species, which specifies management actions, or staged management responses, which are linked to clear reference points.

EA considers that, combined with the more general initiatives to promote stock sustainability, the direct measures within the FMS appear to be adequate to improve the sustainability and promote the recovery of eastern sea garfish and assist in the recovery of silver trevally. However, until the management measures are implemented the effectiveness will not be able to be assessed.

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<sup>38</sup> FMS MR 2.5(b)

<sup>39</sup> FMS Objective 2.5.1

<sup>40</sup> FMS MR 2.5.1(h)

<sup>41</sup> FMS MR 2.5(d)

## **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**

The submission outlines that one of the significant knowledge gaps within the fishery is for bycatch. There are currently no data about the composition, quantity and spatial or temporal aspects of bycatch for the OHF. Although the levels of bycatch have not been formally described they are thought to be anecdotally low. Fishers observe schools prior to deploying nets and are thought to be able to determine catch composition with reasonable accuracy. The most likely bycatch is of target species that are less than the legal length requirements. However, the majority of fish captured by hauling nets are generally targeted schools of adult fish and as a consequence, sub adult fish are thought to rarely comprise a significant proportion of the catch. Various species of sharks and rays are occasionally taken in small quantities. EA notes that a low incidence of bycatch may not be an accurate reflection of the ecological significance of the bycatch species.

The FMS addresses the bycatch knowledge gap through the development of an industry funded SOP to assist in quantifying the level of non-retained catch. The SOP program will examine the performance of hauling and purse seining nets. It is intended that the observer surveys be repeated to assess new or modified gear types but otherwise be repeated periodically (5-10 years) to provide a low level of bycatch monitoring. Particular bycatch or discarding problems that are identified by observer surveys will be addressed by further targeted research that may include assessment of the utility of spatial and temporal fishing closures, and/or the development of alternative gear types and fishing practises. 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.

Information will also be gathered through a study, to be completed by July 2003, that will determine the most appropriate mesh size for garfish hauling nets to reduce landings of immature fish whilst meshing of larger fish.<sup>42</sup>

The EIS provides a summary of the impact of direct capture and physical contact without capture and lost gear (ghost fishing) for each of the methods used in the fishery.<sup>43</sup> Ghost fishing is not an issue in the fishery as the methods used are generally active methods whereby the net is continually attended until it is retrieved preventing loss, damage or discarding of the gear.

EA considers that a reliable information collection system, appropriate to the scale of the fishery is being implemented to collect information on the composition and abundance of bycatch.

## **Assessment**

An assessment of the relative susceptibility to injury and possible mortality rate were assessed for species taken in other commercial fisheries/fishing sectors expected to be taken as bycatch or

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<sup>42</sup> FMS MR 2.5k

<sup>43</sup> See p E-219-E-221 of the EIS

affected but not captured in the OHF.<sup>44</sup> An analysis of bycatch taken in the fishery with respect to its vulnerability to fishing will be undertaken as part of the risk assessment of the fishery.

## Management responses

Measures in the FMS in place to avoid capture and mortality of bycatch species and methods to develop suitable technologies include:

- development of an industry funded Scientific Observer Program (SOP) to assist in quantifying the level of non-retained catch.<sup>45</sup>
- using best available knowledge and appropriate technology to modify fishing practices to reduce the impacts of the fishery on non-retained fish, invertebrates, reptiles, mammals and birds.<sup>46</sup>
- using best practise techniques for the handling of incidentally captured organisms.<sup>47</sup>

The *Guidelines* suggest that an indicator group of bycatch species could be monitored with associated decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers. Monitoring an indicator species will also facilitate the best possible use of monitoring resources. Given the paucity of information that currently exists for bycatch within the OHF, EA considers that it would be difficult at present to identify indicator groups or species that could be used to monitor levels of bycatch.

NSW Fisheries contends that given the paucity of data that exists in relation to bycatch within the OHF, it is considered that the management initiatives, as outlined in this objective, are acceptable and will enhance the future management options for the fishery.

## Conclusion

EA acknowledges that although quantitative data are lacking, in the case of most nets used in the OHF, they are generally highly selective with relatively low by-catch rates compared to other commercial fishery methods (e.g. trawling). EA is satisfied that there are specific initiatives within the FMS designed to quantify the level and composition of bycatch within the fishery and measures are in place to implement bycatch reduction measures once the extent of the issue has been quantified.

Although there will be some uncertainty related to the future management of bycatch, measures currently proposed within the FMS that are likely to minimise that uncertainty once bycatch information has been documented. In particular, EA considers that modifying fishing methods, the use of best practise techniques for incidentally captured organisms and the use of closures or gear restrictions to minimise bycatch are likely to lead to improved management of bycatch species. However, the effectiveness of these measures, in particular the SOP, will not be able to be assessed until they have been implemented for a period.

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<sup>44</sup> see table E10 in the EIS

<sup>45</sup> FMS MR 1.1(a)

<sup>46</sup> FMS MR 1.1(b)

<sup>47</sup> FMS MR 1.1(c)

## 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

As discussed previously there is currently very little information on the composition and abundance of bycatch in the OHF. There are no qualitative data on the rates of catches of endangered, threatened or protected species (collectively referred to as protected species) although it is thought to be low for all OHF methods. Except for some of the protected fish and the little penguin, other threatened species are unlikely to be captured by the methods used in the fishery. The NSW submission outlines that turtles and sea snakes could also be caught by most of the methods used in the fishery, but are unlikely to die as a result of capture as they are not towed through the water at a speed or manner which could drown them, and can be released alive. It will be important for the management agency to move quickly to implement management measures to avoid interactions if the SOP and the logbook reporting identify interactions with these species.

Despite this low risk the FMS outlines that NSW Fisheries will immediately modify the commercial catch and effort returns, in consultation with the OHMAC, to collect and monitor information on sightings and captures of threatened or protected species.<sup>48</sup> The industry funded Scientific Observer Program also proposes to obtain information about the effects of fishing operations due to disturbance, not just direct capture, as this appears to be the most likely form of impact on the majority of endangered, threatened or 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 due to the extent of the fishery. The FMS acknowledges this, however recognises that any data collected may provide spatial overlap information between the fishery and threatened or protected species.

There are currently no threatened ecological communities identified in the fishery area, consequently no information collection system or assessment is required. NSW Fisheries have committed to implementing the conditions of any recovery plans for ecological communities that come into effect.<sup>49</sup>

### Assessment

NSW Fisheries considered the eight factors under the relevant sections of the FM Act, NSW *Threatened Species Conservation Act 1995* and the NSW *Environmental Planning and Assessment Act 1979* in deciding whether there is likely to be a significant effect on threatened species, populations and ecological communities or their habitats as a result of the OHF operations. The assessment was based on a review of biological information derived from the various agencies responsible for those species, from published literature and from personal communication. The assessment determined that the FMS would not have a significant effect on any protected species, populations, ecological communities or their habitats. There was, however, a high level of uncertainty associated with the assessment due to the paucity of quantitative data and reliance upon anecdotal or speculative information.

Based on an analysis of the distribution and ecology of protected species, the EIS identified that the FMS has the potential to impact, both directly and indirectly, about 43 species. Potential impacts

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<sup>48</sup> FMS MR 3.1(a) of the FMS

<sup>49</sup> FMS MR 3.1(b)

considered were both direct and indirect such as habitat disturbance, physical obstruction, noise, light and direct competition for food resources. The EIS defined the level of impact, isolated the measures from the FMS designed to mitigate the potential impacts and determined the effectiveness of those measures.

Indirect impacts on threatened species, while not easily quantifiable, include collision with vessels or behavioural modifications although as with most other aspects related to threatened species there are no data to indicate the extent or frequency of such occurrences. Of the threatened species considered in the EIS it was considered unlikely that the behaviour of many of these species are affected by the methods of the fishery and the extent to which the fishery is responsible for such behavioural modifications is unknown. The few possible exceptions could include dolphins and sharks, and some birds such as albatross and petrels. There are no management responses that apply directly to the potential for boat strike or behaviour modifications. However the SOP, biodiversity program and selection of MPAs, assuming they are chosen to protect threatened species, should all prove effective in increasing understanding of these aspects.

There is the potential for the boat based fishers to indirectly affect the little penguin population located within North Harbour Aquatic Reserve, by competing for bait resources and disturbing penguins during feeding. NSW Fisheries contends that at this stage, and until more information is available from the National Parks and Wildlife Service (NPWS) research, it would appear that the OHF is not having an adverse impact upon the little penguin population and the FMS will assist and improve the recovery plan by increasing data collection on bait catches.

Purse seine fisheries similar to those used in NSW are known to have interactions with dolphins in other Australian States (Queensland, Western Australia and South Australia) as well as overseas. The purse seine fishers currently have a voluntary code of conduct that requires that fishers abort a shot if a cetacean is encircled. NSW Fisheries have committed to include this requirement in the Code of Conduct that will be a condition of Ocean Hauling licence.<sup>50</sup>

## Management responses

To minimise any potential impacts on protected species and to collect data to better understand any interactions between the fishery and threatened species, the FMS proposes to:

- Use the SOP to document the likelihood of impacts of OH methods on protected species and to use that data to modify fishing methods where necessary<sup>51</sup>
- Modify fishing practises to reduce the impacts on non-retained fauna<sup>52</sup>
- Use best-practise methods for the handling of incidentally captures organisms.<sup>53</sup>
- Review the established code of conduct, enforceable by conditions on licences, for beach based sector of the fishery which includes rules for appropriate handling methods for incidental catch of marine birds or mammals<sup>54</sup>
- Develop a code of conduct, to be enforceable by conditions on licence, for the boat based sector with respect to the use of best practise handling and release methods for incidental catches of protected fish, birds, reptiles, mammals, plants and algae, including aborting a shot if dolphins become encircled.<sup>55</sup>
- Implement provisions of recovery programs or threat abatement plans<sup>56</sup>

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<sup>50</sup> FMS MR 4.5(c)(ii)

<sup>51</sup> FMS MR 1.1(a)

<sup>52</sup> FMS MR 1.1(b)

<sup>53</sup> FMS MR 1.1(c)

<sup>54</sup> FMS MR 4.5(b)

<sup>55</sup> FMS MR 4.5(c)

<sup>56</sup> FMS MR 3.1(b)

- Modify the catch and effort returns to collect and monitor information on sightings or captures of threatened species<sup>57</sup>
- Continue the prohibition on taking protected fish (s19 of the FM Act) and fish protected from commercial fishing (s20)<sup>58</sup>
- Continue the prohibition of taking any species protected under other jurisdictional arrangements.<sup>59</sup>
- Continue to use fishing closures to control the time and area fished to minimise direct interactions with protected species, populations or communities.<sup>60</sup>
- Participate in the selection and management of marine protected areas in ocean waters
- Define and declare Recognised Fishing Grounds (RFG) through the regional liaison process<sup>61</sup>

In addition to limiting the area and time fished, the liaison process also restricts access to the beaches to specific points, which have been agreed upon through the regional negotiation process, which included fishers, council, NPWS and numerous other stakeholders. External expertise and local knowledge should limit the potential for impacts generally unforeseen by fishers and fishery managers, particularly as it pertains to fauna and habitats beyond those targeted or utilised in the fishery. For example the establishment of RFGs will be important when nesting sites are identified by NPWS.

There are no responses that relate directly to Japan-Australia Agreement for the Protection of Migratory Birds, Birds in Danger of Extinction and their Environment (JAMBA) or China-Australia Agreement for the Protection of Migratory Birds, Birds in Danger of Extinction and their Environment (CAMBA) birds, probably reflecting the perceived lack of interaction with such species. Disturbance is the most likely effect due to the fishery. With the peak of activity for the fishery being in winter, establishment of traditional hauling grounds and the ongoing selection of marine parks the measures included in the FMS should be adequate to minimise potential impacts on JAMBA and CAMBA birds.

The numerous area and seasonal closures that are already in place and those identified in the FMS to strengthen existing closures, although designed to minimise conflict among beach user groups, have inadvertently provided significant protection to habitats and fauna of the fishery, particularly birds under international treaties.

The NSW submission concludes that there appear to be little or no data implicating the OHF in having any adverse impact on any protected species or their habitats and that the FMS contains sufficient measures to identify any impacts and minimise these where they do occur.

## Conclusion

Overall the risk of the OHF impacting on protected species and ecological communities is unknown. 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 at this stage. EA understands that should such a community be identified, NSW Fisheries has committed to take appropriate management action in a timely manner.

EA acknowledges that the FMS proposes numerous management responses to remove the uncertainty in the data and to better estimate what impacts the fishery may be having on protected species. However, the effectiveness of these management responses, specifically the SOP and

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<sup>57</sup> FMS MR 3.1(a)

<sup>58</sup> FMS MR 3.1(c)

<sup>59</sup> FMS MR 3.1(d)

<sup>60</sup> FMS MR 4.5(a)

<sup>61</sup> FMS MR 4.5(d)

compliance with the logbook reporting program, will not be fully realised until these elements have been fully implemented and their success analysed.

## **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 the information requirements under each objective.

Annually NSW Fisheries produces a “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.

Garfish hauling, bullringing, lift nets and purse seine nets are hauled into boats and do not contact the substratum. As such these boat-based methods are unlikely to impact on seagrass, as the nets generally do not reach the seabed. With the exception of areas in Jervis Bay, Twofold Bay, Disaster Bay and Salmon Haul Beach (Port Hacking) beach based methods in the OHF do not occur in seagrass areas. The submission compared the area, methods and timing of the fishery with the fauna and habitats that could be affected and found that there was little likelihood that the fishery would damage habitats, and that any effects were likely to be associated with beach-based hauling methods, as they are the only methods that come into contact with the substratum. There did not appear to be any significant effects on fauna beyond those species targeted in the fishery. Prior to the management strategy being approved, beach based hauling accounted for more than two-thirds of the effort in the fishery and occurred on more than 95% of the sandy shores of the coast: this has now been reduced to 87%.

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.

### **Assessment**

In the absence of data the EIS compared the area, methods and timing of the fishery with the fauna and habitats that could be affected and found that there was limited scope for habitat damage due to the fishery. Although there was a fair degree of uncertainty associated with the assessment of impacts on the biodiversity and habitats of the coastal environment in which the fishery operates.

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

Consistent with measures in the NSW Estuary General Fishery, the strategy for the OHF proposes to ban the use of general purpose haul nets through beds of strapweed (*Posidonia australis*), removing the potential for the fishery to negatively impact seagrass habitats and their fauna. From 1 November 2002 the FMS trebled the area of beaches (including their near shore waters)

permanently closed to the fishery from the current 5% to approximately 17% minimising the total area susceptible to any potential impacts from the fishery.

The NSW coastline plays host to a large number of birds, fish, marine mammals, turtles and invertebrates, all of which could be affected by trophic interactions arising from fishing activities. There is a great deal of uncertainty in relation to trophic impacts associated with fishing and most of the studies which have attempted to examine these impacts have been undertaken in vastly different environments and on different methods and species to those taken in the OHF. Given the limited scope for habitat alteration of sandy beaches, there would appear to be minimal likelihood of such pronounced and permanent trophic changes. The fishery also catches a variety of species that utilise numerous habitats beyond those of ocean beaches and which are extremely mobile, making change specific to an area both unlikely and difficult to discern even if it were occurring.

The OHF target species all spend considerable portions of their lifecycle within estuaries and some utilise rocky reefs therefore any trophic effects could be experienced in these environments. The submission concludes that even in the absence of data about trophic effect, the overfishing of bait species could have serious implications for predators such as Australian salmon, tailor, mulloway, seabirds, turtles, dolphins and sharks.

The degree to which any faunal group, community or species benefits from discards of the OHF is unknown however based on the perceived limited bycatch associated with the fishery it is likely to be minimal.

The assessment outlines that pollutants generated by the OHF are likely to be relatively low in magnitude and of low to moderate frequency. On the basis that the collective potential for pollution from OHF vessel is only a small fraction of that associated with boating generally, the assessment assumes that the risk to water quality associated with fishing operations in the OHF is very small and does not require any further management given existing controls as administered by the Waterways Authority and the Environment Protection Authority. Additionally, as fishing activities are carried out in the high-energy environment of coastal beaches and near shore waters, which are open systems and have a high assimilatory capacity, any potential risk to water quality is likely to be low.

## Management responses

Overall impact of the OHF on the wider environment is unknown. The FMS proposes that an independent industry funded SOP be used to identify any interactions between habitats and the fishery by cataloguing where and when fishery uses different gear types. Where interactions are identified, physical impacts on habitat can be assessed by targeted, short-term research, which may include manipulative field experiments. If a significant impact is found to occur, further targeted research will be conducted to develop alternative gear types and/or fishing practises that minimise the impact. Alternatively, it may be cost effective to implement small-scale closures that achieve the same objective. Additionally, the FMS manages this uncertainty through a series of precautionary management responses including:

- Modify the use of fishing methods that have a detrimental impact on fish habitat, or threatened species populations or ecological communities<sup>62</sup>
- Use best practise methods for handling incidentally caught organisms<sup>63</sup>
- Continue to prohibit damage of marine vegetation, specifically prohibit the use of methods used in areas over the seagrass *Posidonia australis* (strapweed)<sup>64</sup>

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<sup>62</sup> FMS MR 1.2(b)

<sup>63</sup> FMS MR 1.1(c)

<sup>64</sup> FMS MR 1.2(c)

- Participate in the selection and management of marine protected areas<sup>65</sup>
- Involve the OHMAC in the development and review of habitat management policies and activities<sup>66</sup>
- Use fishing closures to control the time and area fished
- Annually review the code of conduct for fishers
- Define and declare Recognised Fishing Grounds (RFG) through the regional liaison process<sup>67</sup>
- Annually review access restrictions imposed by external bodies, eg. National Parks and Wildlife Service and local councils.
- Manage the fishery in a manner consistent with other jurisdictional or natural resources management requirements
- Improve understanding of ecosystem functioning and fishing impacts
- Collaborate with other institutions to understand the concepts of ecosystem function<sup>68</sup>

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.

If the area open to beach hauling increases after the FMS commences this will trigger a review.

The introduction of parasites and diseases as a consequence of translocations can also have implications for both biodiversity and social and economic values. The submission outlines a number of strategies to prevent the introduction and translocation of marine pests and diseases which includes:

- Implementing, in consultation with the OHMAC, measures required in accordance with any marine pest or disease management plans.<sup>69</sup>
- Continue the prohibition of taking or selling declared ‘noxious fish’.<sup>70</sup>
- Zoning the fishery will also minimise the translocation of pests and disease.

NSW Fisheries contends that the methods used in the fishery and the fact that fishers target schooling species suggest that there is likely to be minimal habitat damage, little or no discards and thus limited potential for alteration of the trophic structure of beach or reef ecosystems. The FMS therefore does not propose any specific research programs to examine the effects of methods on habitats and/or biodiversity. NSW Fisheries considers that the fishery is considered to have minimal potential for significant adverse impacts due to light, noise vehicle or boat emissions.

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<sup>65</sup> FMS MR 1.3(d)

<sup>66</sup> FMS MR 1.2(a)

<sup>67</sup> FMS MR 4.5(d)

<sup>68</sup> FMS MR 1.3(b)

<sup>69</sup> FMS MR 1.4(a)

<sup>70</sup> FMS MR 1.3(e)

## Conclusion

EA acknowledges that many areas of the fishery are also affected by recreational and residential activity thereby restricting the capacity of the fishery to manage all potential impacts upon ocean beach environments and fauna.

EA considers that the management responses in the FMS appear to be affective to the extent that is possible for the FMS to monitor or control the translocation of organisms.

EA acknowledges that there are only simple performance measures currently available to give an accurate representation of the impacts of the OHF on biodiversity and that a useful performance measure may be unavailable for some time. The NSW submission concludes, and EA concurs, that the management measures in the FMS are likely to be useful for assessing fluctuations in the composition of catches but are unlikely to significantly aid in the limited understanding of trophic interactions. Such studies would necessarily be far more complex, extensive and expensive than the FMS is likely to accommodate in the near future. EA considers that the responses provided in the FMS are likely to minimise any potential impacts on the biodiversity and habitats of the OHF.

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**Table 3** List of Acronyms

ACRONYM	NAME	INFORMATION
ACCF	Advisory Council on Commercial Fishing	
ACFC	Advisory Council on Fisheries Conservation	
ACoRF	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	
EGF	Exmouth Gulf Fishery	
EIA	Environmental Impact Assessment	
EIS	Environmental Impact Statement	A document including the FMS and the EIA
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999	
FM Act	Fisheries Management Act	
FMS	Fishery 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.
FRCAC	Fisheries Resource Conservation and Assessment Council	
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 Reponses	
NPWS	National Parks and Wildlife Service	
OHF	Ocean Hauling Fishery	
OHSMP	Ocean Hauling Fishery Share Management Plan	
PSR	Preferred strategy report	
Primary Species		Species of major importance
RFH	Recreational Fishing Havens	

RFG	Recognised Fishing Grounds	
SMP	Share Management Plan	Provides 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 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	