

OCEAN HAULING EIA REPORT

**Prepared for:
NSW Fisheries**

October 2001

Prepared by:



**SMEC Australia Pty Ltd
ACN 065 475 149**

Project Number: 31229.001



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1 INTRODUCTION

1.1 BACKGROUND

NSW Fisheries is currently preparing fishery management strategies for the State's commercial marine fisheries. Concurrently, environmental assessments are being prepared under Division 5, Part 5 of the *Environmental Planning and Assessment Act 1979*. The assessments will estimate the level of pressure on the environment from the fishing activities and predict the likely impacts of implementing the draft fishery management strategies. The guidelines for the preparation of the environmental assessments issued by the Department of Urban Affairs and Planning (DUAP) requires that among other issues NSW Fisheries must address noise, light, air quality, and energy and greenhouse issues.

SMEC Environment was commissioned by NSW Fisheries to prepare assessments addressing noise, light, air quality, and energy and greenhouse issues for three commercial fisheries, Estuary General, Ocean Hauling and Estuary Prawn Trawl. This report presents the assessment for the Ocean Hauling Fishery.

1.2 METHODOLOGY

Ocean Hauling Fishing:

- involves five different fishing methods;
- is undertaken by about 375 fishing businesses;
- occurs on beaches and in waters along the entire NSW coastline; and
- involves over 17 species.

This complexity has made it impossible to assess each activity and region in the Ocean Hauling Fishery separately. The methodology adopted involved:

- consultation with NSW Fisheries, members of the fishing industry and local councils;
- broadly describing each method of fishing and identifying the activities that may generate noise, light or air emissions;
- identifying the types of land use that occurs surrounding beaches where Ocean Hauling Fishing is conducted;
- combining the above two factors to identify whether there was any potential for significant adverse effects; and
- identifying mitigation measures to minimise or reduce identified areas of impact.

Greenhouse and energy issues were considered by examination of the fishing fleet and methods of fishing.

To present the findings of the investigations this report contains four sections:

1. this brief introduction;
2. a description of the fishing activity and estuarine environment;
3. an impact assessment for noise, light and air quality issues; and

4. a consideration of greenhouse and energy issues.

1.3 CONSULTATION

To facilitate an understanding of the Ocean Hauling Fishery and relevant environmental issues consultation was undertaken with members of the Ocean Hauling Management Advisory Committee (OHMAC), Local Councils and the staff of NSW Fisheries.

i Consultation With OHMAC Members

A number of members from OHMAC were contacted regarding issues in the Ocean Hauling Fishery. These members of OHMAC serve as industry representatives for commercial fishing operators in the Ocean Hauling Fishery, and have first-hand experience of the fisheries' issues.

The Ocean Hauling Fishery is subject to a large number of restrictions, the majority of which are imposed by NSW Fisheries. The National Parks and Wildlife Service (NPWS) also imposes some restrictions in areas that are bounded by National Parks, and particularly beaches where access is through National Parks. Local councils play a limited role in controlling commercial fishing activities, with their input generally limited to access controls on beaches.

Responses from OHMAC members indicate that the noise, light, air quality, and energy and greenhouse issues relating to Ocean Hauling tend to be fairly limited. Most commercial fishermen undertaking Ocean Hauling activities tend to be responsible and implement necessary measures to mitigate any possible impacts.

The following list outlines the issues raised regarding noise, light and air quality/energy and greenhouse issues.

- **Noise Issues**
Noise is probably the main issue arising from Ocean Hauling activities. However, these issues are fairly limited. For the most part, Ocean Hauling activities that generate any substantial noise, such as motors or winches, tend to occur a reasonable distance from the coast. Hauling that occurs on beaches is most commonly done by hand, and so generates very minimal noise. Generally, Ocean Hauling occurs during daytime hours when noise considerations are less pertinent. Although not addressed as an issue, some Ocean Hauling fishers do access the beaches with four wheel drive vehicles equipped with winches. These would generate substantial levels of noise.
- **Light Issues**
Ocean Hauling is predominantly a daytime exercise and as such, there are very few light issues associated with Ocean Hauling. Any Ocean Hauling that occurs during the night tends to be in open waters well removed from any residential areas.
- **Air Quality/Energy and Greenhouse Issues**
The air quality and energy issues were considered to be minimal. Where hand beach hauling is concerned, there are no air quality or energy issues, except vehicle emissions associated with gaining access to the beach. Emissions in relation to the use of four wheel drive based winches for hauling were not raised. Boat based hauling does generate some issues through the use of motors, but these are considered to be minor.

ii Consultation With Local Councils

Questionnaires were sent to seven local councils, Eurobodalla Shire Council, Maclean Shire Council, Great Lakes Council, Lake Macquarie City Council, Port Stephens Council, Greater Taree City Council and Richmond Valley Council. A copy of the questionnaire is included as Appendix A. These councils were selected because there is a diverse range of commercial fishing carried out within their areas, including Ocean Hauling.

Three responses were received, from Eurobodalla Shire Council, Greater Taree City Council and Port Stephens Council. The responses were, on the whole, very similar with all indicating that these Councils had very little to do with commercial fishing management, largely because the Councils do not have the staff expertise to effectively deal with fishery issues. As a result, management of commercial fishing is left to NSW Fisheries.

No public complaints had been received at the three Councils about noise, light, air quality or energy issues in relation to commercial fishing activities.

iii Consultation With Regional Offices of NSW Fisheries

Regional offices of NSW Fisheries were contacted to determine the number and type of complaint received concerning commercial fishing activity.

Very few complaints are received concerning commercial fishing operations and, for the most part, the complaints that are received relate to noise issues.

2 OCEAN HAULING FISHERY

2.1 FISHERY WATERS

2.1.1 Description

There are a number of defined waters in which Ocean Hauling may occur. These waters include:

- ocean waters within three nautical miles of the natural coastline;
- the waters of Jervis Bay;
- the waters of Botany Bay; and
- the waters of Coffs Harbour.

Ocean Hauling activities occur on beaches and in waters along the entire New South Wales coastline, though it should be noted that not all ocean beaches and ocean waters are open to Ocean Hauling Fishing. There are various beaches and waters that are closed to Ocean Hauling activities.

Where ocean waters meet estuary waters, there can be some conflict over where boundary exists. As Ocean Hauling must occur in ocean waters, this boundary can have some implications for the fishery.

2.1.2 Surrounding Land Uses

A diverse range of land uses can be found in areas where Ocean Hauling occurs. When Ocean Hauling activities occur further out to sea, their impact on surrounding land uses is minimal. However, Ocean Hauling from, or in close proximity to, land including ocean beaches can have a much greater impact on surrounding land uses.

Where beaches are used for Ocean Hauling activities, they are often fairly remote, and sometimes are only accessible by four-wheel drive. In these cases, surrounding land uses are dominated by National Parks or other nature reserves, and residential use is generally limited to isolated dwellings or possibly a small village. The existence of National Parks or other nature areas often results in restrictions being placed on Ocean Hauling activities, predominantly through beach access controls.

There are many coastal townships where commercial fishing, including Ocean Hauling, provides a backbone of the economy. These include places such as Byron Bay, Ulladulla, Narooma, Nambucca Heads, South West Rocks and Yamba. In these areas, residential land uses are prominent and the growth of the tourism industry has created greater conflicts with commercial fishing operations.

Jervis Bay contains large areas of National Park, as well as a number of small villages that the Ocean Hauling activities operate from, Huskisson being one such village. Botany Bay in sharp contrast is dominated by industrial and port uses, but still has some surrounding residential land use and areas of nature reserve and National Park. Ocean Hauling operations near the Kurnell Peninsula and the Botany Bay National Park are boat based due to area's rocky headlands.

2.2 FISHERY DESCRIPTION

The Ocean Hauling Fishery involves the taking of finfish from ocean waters, using a number of methods. These methods include hauling nets to ocean beaches, boat based activities where nets are hauled to a boat, and ocean purse seine operations that generally use larger boats and occur further out to sea. These general fishing methods are illustrated in Figures 2.1 and 2.2, with a more detailed description provided in Table 2.1. Table 2.1 also outlines environmental implications of each of these fishing methods for the areas of noise, light, air quality, and energy and greenhouse issues.

The Ocean Hauling Fishery targets a range of species, using netting techniques to catch near-shore schooling species along the coast and bait species in deeper waters. The main species caught in the fishery include sea mullet, blue mackerel, yellowtail scad, Australian salmon, pilchards, sea garfish, and luderick.. Figure 2.3 identifies the proportion of the principle species making up the total Ocean Hauling landings by all Ocean Hauling methods averaged over fiscal years 1997-1998 to 1999-2000.

In the past, the fishery was dominated by beach based activities, but technological advances have seen a rapid increase in use of boats. The boats used are generally small ‘run-about’ or ‘punt’ style vessels ranging from three to six metres. However, there is also use of larger, faster ‘jet boat’ style vessels with motors up to 35 kilowatts. These type of boats are generally used more in purse seine operations, or Ocean Hauling that occurs further out to sea.

Ocean Hauling has been a restricted access fishery since 1995, with commercial fishermen being required to have licences to operate commercial Ocean Hauling activities. There are three class endorsements within the Ocean Hauling Fishery, being Class A (skipper), Class B (crew) and Class C (purse seine). At present, 374 business hold one or more endorsements in the fishery, with the fishery including 184 Class A endorsements, 203 Class B endorsements and 26 Class C endorsements. 92% of Ocean Hauling businesses also hold endorsements in other commercial fisheries with the Estuary General Fishery, in particular, being closely linked to Ocean Hauling.

In 1998/99, the Ocean Hauling Fishery contributed approximately 16% of the total catch from waters within New South Wales.

Table 2.1 Fishing methods and environmental implications

Method	Catch	Noise	Light	Air	Energy/ Greenhouse
<p>Hauling Net – General Purpose</p> <p>The net is “shot” from a set point while the boat encircles the target species. The net is then hauled to the shore or the boat, either by hand or by motorised haulers.</p>	Sea mullet, luderick, yellowtail scad, pilchards, sea garfish	Boat engine, winches and other hauling equipment, beach based 4WD vehicles (if used), crew members’ instructions	Occasional lights from boats and from beach based operations (if net is hauled to shore) at night and in the early morning	Boat engine, 4WD vehicles (if used)	Boat engine, 4WD vehicles (if used)
<p>Hauling Net – Pilchard, anchovy and bait net</p> <p>Used for smaller species of fish. Generally used directly from beach, but now being used more from boats.</p>	Pilchards, anchovy, whitebait, blue mackerel	4WD vehicles, winches and other hauling equipment, boats (if used to set the net), crew members’ instructions	Occasional lights from beached based operations and boats (if used) at night and in the early morning	4WD vehicles, boat engine (if used)	4WD vehicles, boat engine (if used)
<p>Hauling Net – Garfish</p> <p>Specifically designed to catch garfish, positively buoyant to target surface schooling fish.</p>	Sea garfish	Boat engine, winches and other hauling equipment, crew members’ instructions	Occasional lights from boats at night and in the early morning	Boat engine	Boat engine
<p>Garfish Bullringing Net</p> <p>A net designed specifically for garfish, using a slightly different method than the hauling net</p>	Sea garfish	Boat engine, winches and other hauling equipment, crew members’ instructions	Occasional lights from boats at night and in the early morning	Boat engine	Boat engine
<p>Purse Seine Net</p> <p>A wall of netting that is set around a school of fish</p>	Pilchards, yellowtail scad, blue mackerel	Boat engine, winches and other hauling equipment, crew members’ instructions	Occasional lights from boats at night and in the early morning	Boat engine	Boat engine

Figure 2.1 Beach based Ocean Hauling Fishery method

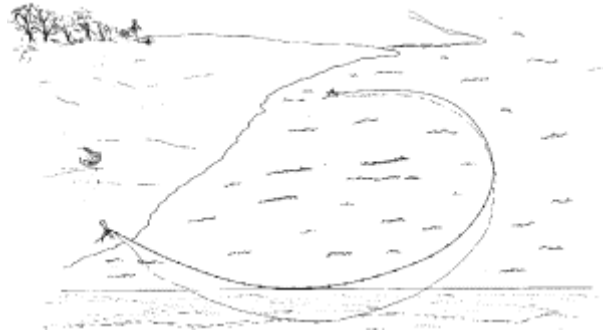


Figure 2.2 Boat based Ocean Hauling Fishery method

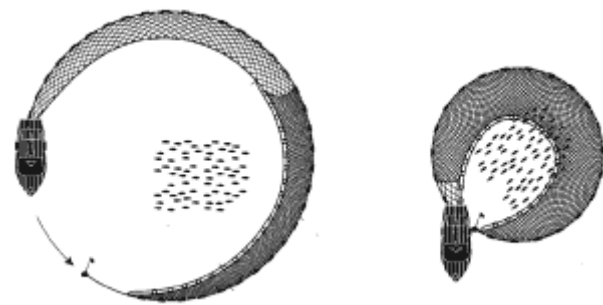
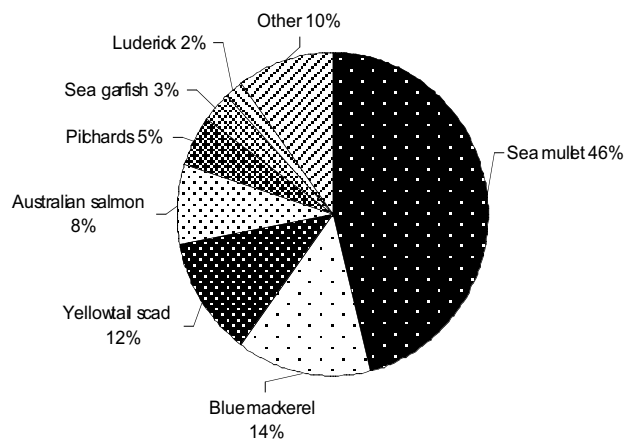


Figure 2.3 Ocean Haul Fishery: principle species catch 1997-1998 and 1999-2000



Source: Data supplied by NSW Fisheries

2.3 OCEAN HAULING CONTROLS

The Ocean Hauling Fishery is managed entirely via input controls. These are controls that limit the resources that can be used by commercial fishermen, thus indirectly controlling the catch size. There are no direct restrictions on catch size or quotas. Input controls include restrictions on the number of licences available, the size and engine capacity of boats, the length and mesh size of nets and the locations and times that can be worked. NSW Fisheries is responsible for the majority of controls imposed on the Ocean Hauling Fishery, although the NSW National Parks and Wildlife Service also imposes some controls, as do various local councils.

An overview of the controls is provided below.

2.3.1 Limited Entry

As mentioned above, the Ocean Hauling Fishery is a restricted access fishery. A licensing system and the endorsement system provide a mechanism for controlling the number of commercial operations undertaking Ocean Hauling.

2.3.2 Permits

There are a range of different permits that allow commercial fishermen to undertake certain activities that would normally be prohibited in the Ocean Hauling Fishery. These include permits for net variations, permits that allow certain species to be caught and permits for research.

2.3.3 Equipment Controls

Controls on equipment make up the greatest number of controls imposed with the Ocean Hauling Fishery. These controls include:

- boat replacement policy. This is designed to prevent increases in the size of vessels within the commercial fishing fleet. The policy essentially prevents fishermen from replacing their existing boats with larger boats;
- engine controls. These limit engines being used for Ocean Hauling to 45 horsepower (33 kilowatts);
- net registration. All nets being used in the Ocean Hauling Fishery must be registered. There is currently a freeze on registration of new nets, thus preventing any expansion in the number of nets being used within the fishery; and
- net size. All nets must comply with length and design guidelines, and must meet requirements for mesh size.

2.3.4 Closures

There are a range of closures imposed on the Ocean Hauling Fishery. The closures can be categorised as location closures, preventing Ocean Hauling activities from occurring in certain areas, or time closures, preventing Ocean Hauling activities from occurring during certain periods of the year or certain times of day. There are currently around 30 closures in the Ocean Hauling Fishery within New South Wales.

2.3.5 Size Limits

These apply to certain species taken within the Ocean Hauling Fishery, and prevent fish below a specified size from being retained.

2.3.6 Zoning

Zoning controls are designed to restrict commercial operators to within a single region (one of the seven fishery regions) in order to minimise conflicts arising from ‘travelling crews’.

2.3.7 Code of Conduct

Commercial operators within the Ocean Hauling Fishery are bound by a Code of Conduct. The Code of Conduct deals with issues such as beach access points, vehicle speed limits on beaches, avoiding environmental damage and working with local councils.

3 IMPACT ASSESSMENT

3.1 NOISE

3.1.1 Impact Assessment

Potential sources of noise impact were identified in Table 2.1. These include:

- boat engines. This applies to those vessels that are engine powered (28% of Ocean Hauling Fishery vessels are powered by oars). The median motor size is 29.8 kilowatts (40 horsepower) and 90% of the motor powered fleet has motors sized 96.9 kilowatts (130 horsepower) or less;
- hauling winches and other hauling equipment (these may be four wheel drive vehicle based on the beach);
- other fishing activities such as water release and general noise; and
- crew members talking/instructions.

These activities can occur at any time of the day or night.

For noise to have an effect there must be a receptor who or which would be disturbed by the noise. For Ocean Hauling Fishing these receptors are either people who live adjacent to beaches or wildlife.

i Residents Adjacent to Beaches

Noise from Ocean Hauling Fishing may cause adverse effects to residents where houses are close enough to the beach front for the fishing activity to cause disturbance. Given the type of activity and likely low sound power level of the potential noise sources, except in the case where winches on four wheel drive vehicles are used for hauling on the beach, it is probable that there is only a potential for disturbance during night-time operations. The potential for disturbance would be determined by a number of factors, including:

- size of boat motor and whether it is an outboard or in-board motor;
- duration and type of fishing activity;
- number of other operators in the same area;
- where beach based hauling is done from winches on four wheel vehicles, the number of four wheel drives operating winches simultaneously (ie occasionally more than one vehicle may operate together on the same beach);
- position of the house, both its distance from the activity and intervening topography; and
- land-based activity in the vicinity of the house. A house in a coastal town or close to a main road could be expected to have a higher background noise level compared to an isolated farm house.

A brief description of land uses surrounding areas of Ocean Hauling fisheries was given in Section 2. Given that Ocean Hauling Fishing occurs on beaches and in waters along the entire

NSW coast, there will be areas where the activity causes disturbance to nearby houses, whether these are houses in villages or towns, or isolated farm or holiday houses.

ii Wildlife

Noise from Ocean Hauling Fishing activities would only affect wildlife when:

- fishing is undertaken in areas where wildlife that is sensitive to noise is present; and/or
- noise from fishing activities disturbs wildlife either due to the volume or type of noise generated.

Noise impacts could result from hauling activities, fisherman's voices, the sound of equipment contacting boats, motors, trucks on the beach and the splashing of water. Wildlife that could be affected may include birds and terrestrial mammals from beach based activities, and aquatic mammals and non-target fish from other aspects of the fishery. Any such wildlife that is disturbed may:

- remain in the area but become inactive (ie hide);
- temporarily move away from the area to return when the disturbance has ceased; or
- may permanently move away from the area (this is more likely if the disturbance is prolonged or occurs frequently).

During the daytime, fauna that is sensitive to noise is more likely to occur at secluded locations. These areas are likely to be fringed by native plant communities such as coastal scrub, sclerophyll forest and woodland or rainforest. Such locations are likely to be relatively free of human activity and are more likely to harbour noise sensitive species. Noise sensitive wildlife may also occur in developed areas if these are relatively quiet and support suitable habitat.

During the night-time, background noise levels are reduced. The area affected by noise and the severity of the noise impacts would be greater. A greater range of species is likely to be affected during the night-time. This would include diurnal species disturbed from their sleep and nocturnal species whose behaviour is altered as a result of noise from fishing activities.

In general, noise sensitive species may be encountered at night-time over a greater area than during the daytime. Accordingly, the area affected by noise from Ocean Hauling Fishing and the severity of the noise impacts would be greater at night. Also a greater range of species is likely to be affected during the night-time. This would include diurnal species disturbed from their sleep and nocturnal species whose behaviour is altered as a result of noise from fishing activities.

Impacts on sleeping diurnal species would only occur where fishing is sufficiently close to their habitat to disturb such species. Fishing would impact upon sleeping diurnal birds and terrestrial mammals where fishing is undertaken from the beach or near aquatic vegetation.

The significance of the disturbance to wildlife would vary depending on the species and on the timing of the disturbance. The greatest impacts could be expected during the nesting or breeding season. At these times, any disturbance could impact upon the reproduction of a species and may endanger the viability of local populations. This would be particularly be the case if the disturbance was a frequent, regular or on-going activity.

Species most likely to be impacted by commercial fishing during the nesting or breeding season would include birds that nest in aquatic or riparian vegetation, or in vegetation near the water's edge. Non-target fish could similarly be impacted if fishing is undertaken near nurseries or breeding habitat such as areas of seagrass.

3.1.2 Mitigation Measures

A potential for adverse effects caused by noise from Ocean Hauling Fishing on people and wildlife has been identified. This potential is not a new, as Ocean Hauling Fishing has been a continuing industry for more than 100 years. There are a number of existing controls on the industry (which are outlined in full in Section 2.3) that have relevance to the mitigation of noise impacts from the fishery. These include:

- limited entry controls;
- equipment controls;
- total closures; and
- codes of conduct.

These controls were instigated for a number of reasons, including conservation and to prevent disturbance to people living close to areas where Ocean Hauling Fishing occurs.

It is also proposed to continue to monitor the levels of complaint received concerning noise levels from the Ocean Hauling Fishery. Two authorities currently receive complaints, local councils (who tend to refer these to NSW Fisheries) and regional offices of NSW Fisheries. The number and type of complaints should be used as an input into reviewing the existing controls.

3.2 LIGHT

3.2.1 Impact Identification

i Residents

The only potential for adverse effects from lights used in the Ocean Hauling Fishery would be from spotlights used in the fishing process. Navigation lights, deck lighting or lights used for visibility purposes from beach based activities would not have a potential for significant adverse effect. Spotlights would only cause an adverse effect where these were shone into houses adjacent to the beach. The activities of the Ocean Hauling Fishery (Table 2.1) generally do not require intensive use of spotlights nor high strength lights. It is not anticipated that this type of lighting would have a potential for significant adverse impacts.

ii Wildlife

Impacts from light upon wildlife are unlikely to be significant unless light beams repeatedly or continuously affect the same individuals. The severity of this impact would increase with the intensity of the light.

Wildlife most susceptible to impacts from light would be those occurring in the water, on aquatic vegetation or near the water edge. Species would include aquatic mammals, non-target fish, terrestrial mammals and birds. Nocturnal species would be most likely to be impacted. However, diurnal species disturbed from their sleep could also be impacted.

3.2.2 Mitigation Measures

Mitigation measures outlined for noise impacts are generally applicable for reducing the potential for adverse effects from lighting. In summary these were:

- existing controls to limit the location of fishing; and
- monitoring of levels of complaint.

3.3 AIR QUALITY

The two identified sources of air pollution from the Ocean Hauling Fishery are emissions from boat engines and from four wheel drive vehicles where they are used for beach based hauling. These emissions do not have a potential to significantly affect air quality, as they:

- do not represent a concentrated source of inputs as they occur along the NSW coast;
- vary according to both season and time of day; and
- are, in the case of the boats, generally from relatively small engines.

Mitigation measures to reduce air quality emissions are the same as those proposed to reduce energy and greenhouse inputs. These are discussed in the Section 4.

4 ENERGY AND GREENHOUSE ISSUES

4.1 DESCRIPTION OF FISHING FLEET

The majority of boats used in the Ocean Hauling Fishery are small ‘run-about’ or ‘punt’ style vessels generally of aluminium, wood or fibreglass construction powered either by oars (28%) or petrol and diesel marine engines/motors. In some cases two motors are used per boat, with one of smaller capacity used to enable navigation of the vessel at low speed during the process of shooting hauling nets. Some larger and faster vessels also participate in the industry. These are of two types: ‘jet boat’ style vessels with motor sizes up to 35 kilowatts; and larger vessels used in the Ocean Trap and Line Fishery by fishers who hold endorsements for the Ocean Hauling Fishery as well. In fact, the majority of the vessels involved in the Ocean Hauling Fishery are also used in other fisheries with only ten vessels currently licensed for Ocean Hauling alone in New South Wales. Smaller Ocean Hauling vessels are often used in the Estuary General Fishery.

Table 4.1 contains a summary of the characteristics of the Ocean Hauling Fishing fleet. The median figure represents the size above or below which 50% of the fleet lies. The 80% range indicates the size range within which 80% of the fleet lies, while the range indicates the smallest and largest size in the fleet. Most engines are powered by petrol (80%) with smaller numbers using diesel (20%).

Beach based hauling may be done via winches based on for wheel drive vehicles. A typical vehicle has a 3 litre engine capacity and an aluminium tray table top (NSW Fisheries).

No data were available for the typical use of boats or four wheel drive based winches in terms of hours used and distance travelled. This would vary according to the fishing business, the beaches and waters where Ocean Hauling is undertaken and the time of year. Similarly, there was no quantitative information on the catch/effort characteristics of the different methods of Ocean Hauling Fishing.

Table 4.1 Fishing fleet characteristics

Characteristic	Number Registered	Median	80% Range	Range
Motor Size (kilowatt)	550	29.8	11.2 – 96.9	2 – 820.3
Boat Length (m)	765*	5.05	4 – 6.79	3 – 22.7

*The total number of registered vessels involved in the Ocean Hauling Fishery is 765. There are 550 motor-powered vessels (20 of these have two motors) and 215 oar-powered vessels.

Source: Data supplied to SMEC by NSW Fisheries

Maintenance is the responsibility of the fishing vessel and four wheel drive owner. Manufacturers’ maintenance instructions should be followed to ensure engine efficiency and emission control systems work properly. Lack of compliance by vessel and four wheel drive owners with instructions can result in lower levels of energy efficiency (ie fuel wasting) and higher greenhouse emission rates. There is no specific information on ‘typical’ marine engine maintenance practices but given the size and type of the industry there is likely to be a varied response to maintenance.

Petrol and diesel fuels have similar CO₂ emission factors as shown in Table 4.1. On that basis the fuels are not dissimilar in their potential greenhouse impact although this would depend on other factors such as comparative efficiency between diesel and petrol motors and motor size availability.

Table 4.2 CO₂ emission factors

Fuel	CO ₂ Emission Factor (kg CO ₂ /GJ)
Petrol	65.3
Diesel	69.0

Source: *Factors and Methodologies, The Greenhouse Challenge* (Australian Greenhouse Office 2001)

4.2 ENERGY AND GREENHOUSE ASSESSMENT

Energy and greenhouse effects are considered together as the only potential for greenhouse gas inputs is from the energy consumed in the boat motors and four wheel drive motors where winches are used for hauling from the beach. Overall, the numerical size of the fleet and the size of the boats and motors used means that the overall consumption of energy resources and subsequent greenhouse gas emissions is not significant. The Ocean Hauling Fishery consists predominantly of many small businesses operating in a low technology environment. Potential measures to reduce energy and greenhouse emissions may not be practicable for many of these ventures due to initial cost.

There are range of possible methods for reducing energy use and also greenhouse gas emissions. These include the use of alternative power sources and measures to maximise energy efficiency and these are discussed below. One principal mitigation measure would be on-going education to members of the Ocean Hauling Fishing industry of these and other mitigation measures. This could be achieved in a number of ways, including the distribution of information through industry associations or the boat and fishing licence registration system.

Renewable energy for fishing vessel operation is already used by 28% of the fleet through the use of oars. Further renewable energy use could include solar and wind energy. However utilisation of these energy alternatives is not currently considered viable for Ocean Hauling commercial fishing vessels.

Potential measures to maximise energy efficiency and hence minimise the emission of greenhouse gases for commercial fishing vessels involved in Ocean Hauling Fishing have not been investigated in detail in Australia. These measures fall into two main areas, material and technology selection, and operational practice. Specific measures applicable to each of these aspects of commercial fisheries are outlined below.

i Material and Technology Selection

Material and technology selection options may significantly affect energy usage and greenhouse gas emissions. Opportunities for the reduction of greenhouse impacts and improvement of energy efficiency include:

- Improved performance marine engines.

The State of California Environmental Protection Authority (EPA) Air Resources Board (ARB) (<http://www.arb.ca.gov>) and the US EPA (<http://www.epa.gov/oms/marine.htm>) introduced parallel regulations commencing in 2001 requiring manufacturers to market improved performance marine engines. According to the ARB the regulations were introduced due to concerns that many conventional two-stroke marine engines burn fuel inefficiently and ‘discharge up to 30 percent unburnt fuel into the environment’; the ARB recommend switching from a two-stroke to a more efficient four-stroke marine engine. ARB analysis shows that advanced technology marine engines burn up to 30 percent less fuel and oil.

- High strength lightweight polyethylene trawler nets.

Fuel savings of 10 to 20 percent per vessel, 40 percent drag reduction and very short term paybacks in fuel cost savings can be achieved with the use of strong high performance polyethylene smaller diameter fibre in trawl nets.

- Selection of equipment with low embodied energy content.
- Energy use minimisation control equipment, including timer controls, thermostats, and sensors and controls to optimise flow rates, temperatures, pressures and other energy relevant variables.
- Matching equipment size and machinery to fish catch and journey requirements to minimise energy utilisation.
- Use of energy efficient lighting systems and controls.
- The potential use of the Australian appliance energy rating system. California’s ARB has also introduced a marine engine and watercraft labelling system to indicate to purchasers which vessels ‘meet’, ‘exceed’ or ‘greatly exceed’ their new regulatory requirements. The potential use of the Australian appliance energy rating system (<http://www.energyrating.gov.au>) to assist consumers in selecting energy efficient marine engines and vessels is one way in which this could be translated to the fishing fleet.

ii Operational Practice

A number of decisions made during operational practice can have significant impact on energy efficiency and greenhouse gas emissions. Relevant facets of operational practice include:

- development of systematic and cyclic maintenance programs;
- implementation of energy and greenhouse management processes, such as:
 - employee energy conservation training;
 - energy and greenhouse audits; and
 - ongoing consideration of new technologies as they become available and economically viable.

5 REFERENCES

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California Air Resources Board (2001). Off-Road Mobile Source Emission Reduction Program. Recreational Marine Vehicles. <http://www.arb.ca/msprog/marine/marine.htm> ; accessed July 2001.

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Appendix A

Questionnaire to Councils

Commercial Fishing Questionnaire

This questionnaire is concerned with any Council involvement in the regulation of commercial fishing, specifically commercial fishing activity in estuaries and from ocean beaches.

Estuary fishing is fishing that occurs in tidal estuary waters, such as lagoons and rivers. It includes the removal of finfish, shellfish and prawns from estuary waters using a variety of methods, such as trapping and netting. Ocean Hauling Fishing is fishing using nets from open ocean beaches.

1. Are you aware of any commercial fishing in estuaries and/or from beaches within your area?

Yes

No

2. Does Council have any formal controls on commercial fishing in estuaries and/or from beaches within your area?

Yes

No (skip to Q.3)



2a. What do these controls deal with? *(Tick all that apply)*

Location of commercial fishing

Operating hours of commercial fishing

Other – please specify: _____

2b. Can you please provide an overview of the nature of any of these controls

3. Are there any joint arrangements between Council and NSW Fisheries for the management of commercial fishing in estuaries and/or from beaches in your area?

Yes

No (Skip to Q.4)



(Answer Q.3a overleaf)

3a. Please outline these arrangements:

4. Does your Council have any records of complaints about commercial fishing in estuaries and/or from beaches?

Yes

No (Skip to Q.5)



4a. Approximately how many complaints have been received?

Less than 5

5-10

10-50

More than 50

4b. What do these complaints specifically relate to? *(Tick all that apply)*

Noise pollution

Air pollution/air quality

Water pollution

Other – please specify: _____

4c. Can you provide some brief comments on the nature of these complaints:

5. Any other relevant comments you would like to add:

Name: _____

Thank you for your time, it is most appreciated.