



Wallis Lake Fishermen's
Co-operative Ltd

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)



WALLIS LAKE ESTUARY-GENERAL FISHERY

Prepared by the Wallis Lake estuary general fishers and SeaNet NSW

(A project of Ocean Watch Aust. Pty Ltd)



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1. Introduction

Wallis Lake Fishermen's Co-operative (WLFC) members endorsed to work in the Estuary-General fishery recognise that they have a responsibility to harvest seafood on behalf of the community as sustainably as current technology and techniques allow, and to improve as new technology and techniques are developed.

This Environmental Management System (EMS) documents how WLFC estuary fishers are already meeting this responsibility, and how they will continually improve their performance in light of new developments, and how they will cooperate with natural resource managers and the community on the management of Wallis Lake.

WLFC estuary fishers have a unique understanding of the Wallis Lake system and depend on its health and sustainable harvest for their livelihood. They hold much knowledge and expertise that would assist in the management of Wallis Lake, should the government, natural resource managers and the community wish to draw on them.

1.1. Commercial fishing on Wallis Lake

Commercial fishing on Wallis Lake dates back to the early 1900's with the Wallis Lake Fishermen's Co-operative being established in 1947 (Great Lakes Historical Society, pers. comm).

Wallis Lake is part of Region 4 of the NSW Estuary General Fishery (extending from The Entrance on the Central Coast in the south to Diamond Head in the north [see figure 1]), and is open to commercial fishing for those who hold an estuary general licence to operate in this region.

There are approximately 68 commercial fishers operating on Wallis Lake (NSWF, 2003a) however, closures in the region that are not accompanied by a commensurate level of licence buy-outs (as occurred on the Manning River and Lake Macquarie) often lead to effort concentration in areas that remain open such as Wallis Lake. The majority of "non-local" fishers come from the Manning River where commercial fishers operate under their own EMS and fish with the same level of responsibility described in this plan.

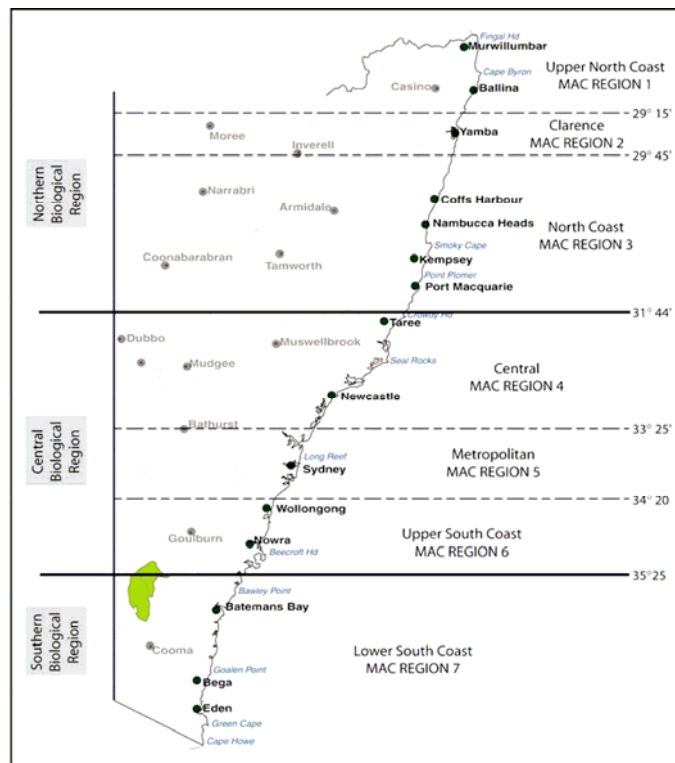


Figure 1 Map of NSW showing the seven zones within the NSW Estuary General Fishery (taken from NSWF, 2003).

1.2. General impacts on estuaries

Estuaries are highly complex, dynamic and fragile environments containing a wide range of habitats and ecosystems.

Potential impacts on estuaries include:

- Heavy metal and oil pollution from urban runoff, industrial sites, and boating activities;
- Elevated nutrient, chemical, bacteria and virus levels from agricultural and urban runoff, sewage effluent discharges, and leaks from septic tanks;
- Habitat destruction as a result of development and reclamation;
- Changes to flows (i.e. ground water use, weirs, dams and water extraction) to provide water to industry, agriculture and homes, leading to unnatural sedimentation, changes in salinity and tidal flushing, and barriers to fish passage;
- Direct use of the waterway by a large number of different users (commercial estuary fishing boats comprise less than 0.8% of all boat registrations in NSW (NSW Fisheries, 2002));
- Acid pollution from acid sulphate soils exposed to air due to agricultural practice, water extraction, dredging and development activities;
- Elevated levels of sediments from agriculture, land clearing, land reclamation and urban runoff;
- Changes to hydrology from dredging and armouring for boat passage;
- Gross pollutants (litter) and leachate from dumped waste; and
- Removal and redistribution of marine organisms by recreational and commercial fishers.

1.3. Recreational Fishing

NSW has an estimated 998,501 ± 33,686 recreational fishers. The participation rate of recreational fishing in NSW country regions is twice as high as the rates observed in the Sydney metropolitan area. Almost half the State's recreational fishers live in Sydney, The Hunter (131,348 fishers), Mid North Coast (74,441 fishers) and Illawarra (73,686 fishers) follow in importance as recreational fishing communities (NSWF, 2002). Due to the large numbers participating in the sport, prominent species such as Bream, Flathead, Tailor, Mulloway and Kingfish harvested by both fishing groups are taken in greater numbers by recreational fishers (NSWF, 2002).

In December 2000, the NSW Government implemented changes to the law¹ to ensure that fishing activities in NSW are managed in an environmentally sustainable manner (DPI, 2005). The changes require that environmental assessment of fishing activities must be carried out in accordance with requirements laid down in the *Environmental Planning and Assessment Act 1979 (EP&A Act)*. Most of these assessment provisions² apply to designated fishing activities that are defined³ under the *Fisheries Management Act 1994 (FMA)*(DPI, 2005). NSW environmental assessments are presented in the form of an Environmental Impact Statement (EIS), the structure of which is based on guidelines issued by the Department of Planning (DoP)(DPI, 2005). In addition, the assessment and approval provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, that provide for assessment of activities likely to significantly impact matters of national environmental significance must also be met in the EIS (DPI, 2005).

Because of these legislation changes, each of the nine major commercial fisheries in NSW have been required to complete an EIS, upon which fishery specific management strategies (Fishery Management Strategies or FMS's) are based. EIS's for all NSW commercial fisheries and the associated FMS's have been completed or are in the process of being completed with the cost of

¹ Fisheries Management and Environmental Assessment Legislation Amendment Act 2000 No 86

² Division 5 of the *Environmental Planning and Assessment Act 1979*

³ Schedule 1A of the *Fisheries Management Act 1994*

the studies being funded by the commercial fishers of each fishery. There is no legislative requirement for an EIS to be completed for recreational fishing activities in NSW, however as major resource users it seems reasonable that this sector should also undergo the same sustainability assessment process as the commercial fisheries.

1.4. Commercial estuary fishing impacts

The Environmental Impact Statement (EIS) for the NSW Estuary General Fishery describes the methods used in the Estuary General Fishery as passive, or non-destructive to habitats, and that there are numerous cases of seagrass loss throughout Australia, including NSW, however commercial fishing techniques have not been included as a factor thought to be causing the declines (NSW Fisheries, 2002). The National Oceans Office (1997) states, "Increased sedimentation and nutrients from catchments have been linked with massive die-back of seagrasses in many areas."

Estuaries provide a range of nursery habitats necessary for the life cycle of many estuarine and also marine species. It is estimated that around 60% of fish breeding habitat has been lost in NSW due to activities such as drainage, clearing, and development (Craig Copeland, DPI, pers. comm.). More than any other user group, fishers depend on estuaries and the extent and health of seagrass to support the ecosystem on which their livelihoods depend.

Wallis Lake, with around 30 km² of seagrass, has a greater area of seagrass than any other estuary in NSW. Seagrass species include *Posidonia australis*, *Zostera capricornia*, *Z. muelleri*, *Heterozostera tasmanica*, *Halophila ovalis*, *H. decipiens*, and *Ruppia*.

All seagrasses found in Wallis Lake, with the exception of *P. australis*, have relatively high growth rates, respond rapidly after disturbance and are considered 'ephemeral' in that the extent, density and composition of beds changes naturally over time. *Posidonia australis* has a relatively low growth rate, responds slowly after disturbance, and beds are persistent rather than ephemeral. (Otway and Macbeth, 1999; Centre for Marine Studies UQ).

Although there is still debate on the effect of hauling, the WLFC has introduced a number of precautionary actions to minimise the potential environmental impacts of hauling (Action 1.1 and Action 1.2).

In terms of the stocks of harvested species, the Department of Environment and Heritage reports "Total catch [in the NSW Estuary General Fishery] has remained relatively stable over the past 50 years, except for slightly higher catches in the late 80s and early 90s" (DEH, 2003).

The average catch in the estuary general fishery over the last five years from Wallis and Smiths Lake collectively is 485 tonnes (DPI, 2005) with the total NSW estuary commercial catch being around 4800 tonnes (NSWF, 2003a). The commercial catch from the lakes is seasonal and dominated by mullet, flathead, luderick, bream, whiting, blue swimmer and mud crabs, school, greasyback and king prawns. Over 50% of the estuary general catch is sold to the local community and local wholesalers.

1.5. Management of the Estuary General Commercial Fishery

Estuary General fishing operations are tightly controlled via the *Fisheries Management Act 1994*, and *Fisheries Management (General) Regulations 2002*. The Department of Primary Industries, NSW Fisheries is responsible for the management, majority of research relative to the fishery, legislation and compliance. Regulations are complex having been developed over a long time frame, with differences specific to individual estuaries and regions. Basic regulatory requirements for major methods used in the Wallis Lake are outlined in section 1.6.

The Estuary General Management Advisory Committee (EGMAC) is an advisory body to the Minister and NSW Fisheries, providing a forum for consideration of new management initiatives and issues affecting the fishery. The committee is chaired by an independent and consists of industry representatives from each region (two from zone four, one north one south, see figure 1)

as well as recreational, conservation and indigenous representatives. EGMAC generally meets three to four times a year.

1.6. Methods used in the Estuary General Commercial Fishery

Estuary general fishing operations are the most diverse of the nine major commercial fisheries in NSW (nine fisheries; *Estuary General, Estuary Prawn Trawl* (Hawkesbury, Hunter and Clarence Rivers), *Ocean Prawn Trawl, Ocean Fish Trawl, Lobster, Abalone, Ocean Trap and Line, Ocean Hauling*, and the *Inland Restricted Fishery*). Each estuary general licence carries endorsements that dictate by what methods the holder is entitled to fish. Endorsements were issued based on historical catch returns during the period 1986-1990 (i.e. if the licence holder during this period concentrated on meshing, mud crab trapping and prawning, those are the endorsements the licence carries today). The diversity of endorsements allows fishers to use a range of methods to suit seasonal fluctuations, locations fished and species targeted. Although many fishers hold multiple endorsements, licenses cannot be split or different endorsements leased to other operators, restricting fishers' effort to one method at a time.

A summary of endorsement types is listed in Table 1 and a description of the major methods used in the Wallis Lake estuary general fishery and regulations relevant to each technique are outlined in the following pages. A summary of regulations for each method was kindly provided by Michael Koukoulas (Wallis Lake District Fisheries Officer).

Table 1 Activities Endorsed in Estuary General Fishery

<u>Endorsement</u>	<u>Endorsement Description</u>
Meshing	This endorsement authorises the commercial fisher to use a meshing net and a flathead net to take fish for sale from estuary waters
Category 1 Hauling	This endorsement authorises the commercial fisher to take fish for sale from estuary waters using any of the following nets: general purpose hauling net, trumpeter whiting net, pilchard, anchovy and bait net, garfish hauling net, garfish bullringing net, bait net
Category 2 Hauling	This endorsement authorises the commercial fisher to take fish for sale from estuary waters using any of the following nets: garfish hauling net, garfish bullringing net, bait net
Trapping	This endorsement authorises the commercial fisher to use a fish trap and a hoop or lift net to take fish (other than eels or mud crabs) for sale from estuary waters
Eel Trapping	This endorsement authorises the commercial fisher to use an eel trap to take eels for sale from estuary waters
Mud Crab Trapping	This endorsement authorises the commercial fisher to use a crab trap to take mud crabs for sale from estuary waters
Hand Gathering	This endorsement authorises the commercial fisher to take beachworms, pipis, cockles, yabbies, mussels, and nippers for sale from estuaries and open ocean beaches by hand picking
Handlining and Hauling Crew	This endorsement authorises the commercial fisher to use to take fish for sale from estuaries using a handline or by assisting another commercial fisher with a category one or category two hauling endorsement (using hauling methods only)
Prawning	This endorsement authorises the commercial fisher to use a prawn hauling net, prawn seine net, prawn set pocket net, prawn running net, hand-hauled prawn net, push or scissor net and a dip or scoop net to take prawns for sale from estuary waters

Source: Fishery Management Strategy for the Estuary General Fishery, NSW DPI.

Note: In addition to requiring specific endorsements, fishers must also register each individual net used for the various methods (eg. prawn hauling and seining nets, flathead and meshing nets).

1.6.1. Prawn Hauling

Prawn hauling is one of three methods used to harvest prawns in the Wallis lake region. Researchers consider it, especially the “anchor out” method as having some of the lowest bycatch rates in the world. Hauling for prawns is concentrated in the upper reaches of the estuary, and is generally done over a sand or mud bottom.

The “anchor out” prawn hauling method involves hauling the net back to a boat in the body of the river instead of onto the riverbank. This eliminates the possibility of impacts to seagrass that may occur in the shallows.

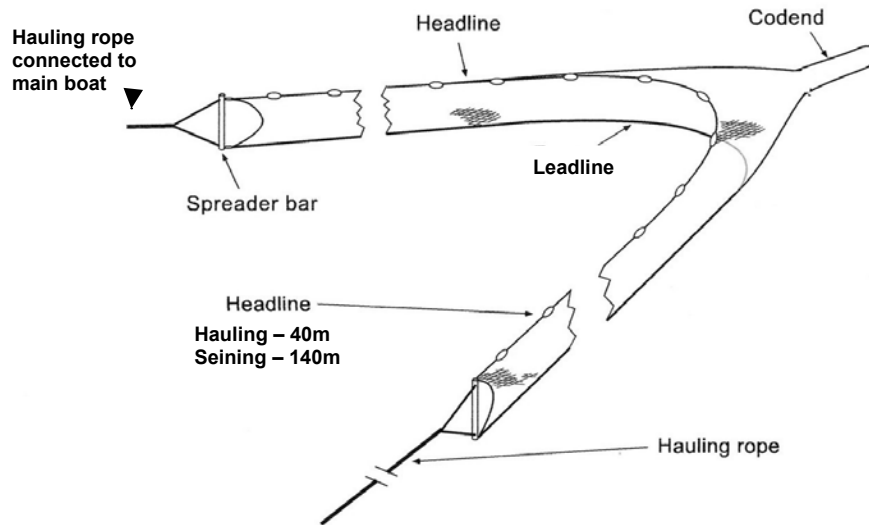


Figure 2 Configuration of prawn hauling and seining net (adapted from Broadhurst et. al, 2004).

Regulations prescribe that the total length of a prawn hauling net must not exceed 40m and mesh throughout be not less than 30mm nor more than 36mm. The hauling rope attached to the first leg of the net must not exceed 200m and marker buoys must be attached every 50m. The hauling rope from the opposite end of net to main boat is restricted to 50m. Spreader poles are permitted to be used at each end of the net, and hauling ropes are fitted with a bridle (figure 2).

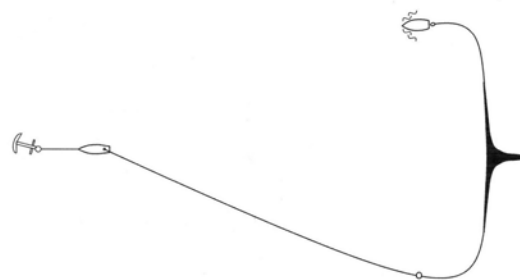


Figure 3 Winch punt is anchored and main boat shoots hauling rope then net

The winch punt is anchored at the end of the intended shot or “dig” and the main boat (with outboard) motors away laying out the hauling rope along desired contour, along which the net will be hauled (figure 3). When the start of the net is reached a semi-circular arc is steered and at half way the codend or “bag” is tossed over and arc continued (figure 3 diagram).



Figure 4 Net is kept square by main boat staying inline with marker buoy

The main boat then continues back toward the winch punt with its course determining the path net will follow. When main boat comes level with the marker buoy on main hauling rope, a signal is given to the winch punt to commence winching. The main boat maintains its speed equal to the winching rate by staying in line with marker buoy (figure 4) to keep the net square.



Figure 5 Boats come together and winching continues at same speed



Once the boats come together the hauling rope from main boat is transferred to the winch’s capstan and hauling is continued at equal speed (figure 5).

When the net is reached, the spreader bars are lifted onboard and hauling continues by hand (figure 6). The wings of the net are shaken whilst hauling by hand, condensing the catch into the codend, and when it is reached it is brought alongside. “Washing” is the term given to the process of repetitive dunking and lifting of the codend, allowing the diamond meshes to open fully, permitting small prawns and fish to escape (figure 7).

The combination of the slow passage of the net through the water, and that each shot is relatively short (approx. 10-15 min) allows a high survival rate of the small amount of bycatch encountered with this fishing method. Figure 8 shows the catch just after the codend was untied. Two silver biddies were caught and were returned alive to the water. The prawns are then cleaned of any leaf or stick material, iced and covered prior to being taken to the co-op for distribution.



Figure 6 Hauling is continued by hand until codend is reached



Figure 7 “Washing” codend to remove smaller prawns and fish



Figure 8 Codend is untied and catch is ready for sorting

1.6.2. Set Pocket Netting

Set pocket netting is another method used in Wallis Lake to target prawns and involves staking a specifically designed net across various channels in the lower reaches of the lake (figure 9). Designated points or “pegs” that provide a fixed point to attach the net and are allocated to fishers via a prawn draw conducted on the full moon at the commencement of the season. The first prawn draw usually occurs late September and on each full moon thereafter until the season ends (March - May, depending on rainfall intensity and timing). Some pegs regularly catch more than others, and the draw is conducted to give each crew a fair chance at being in the best position. There are 23 pegs over 5 locations and each dark has a new draw relative to the amount of crews fishing (for example, if 14 crews are fishing, the best 14 pegs are allocated via the draw). Crews generally start fishing five days after the full moon (called the first night of dark) and continue, if prawns are consistent for the next 10 - 12 nights. Each night crews move forward one peg (can move more if pegs in front are vacant) to ensure fair rotation over the period of the dark.

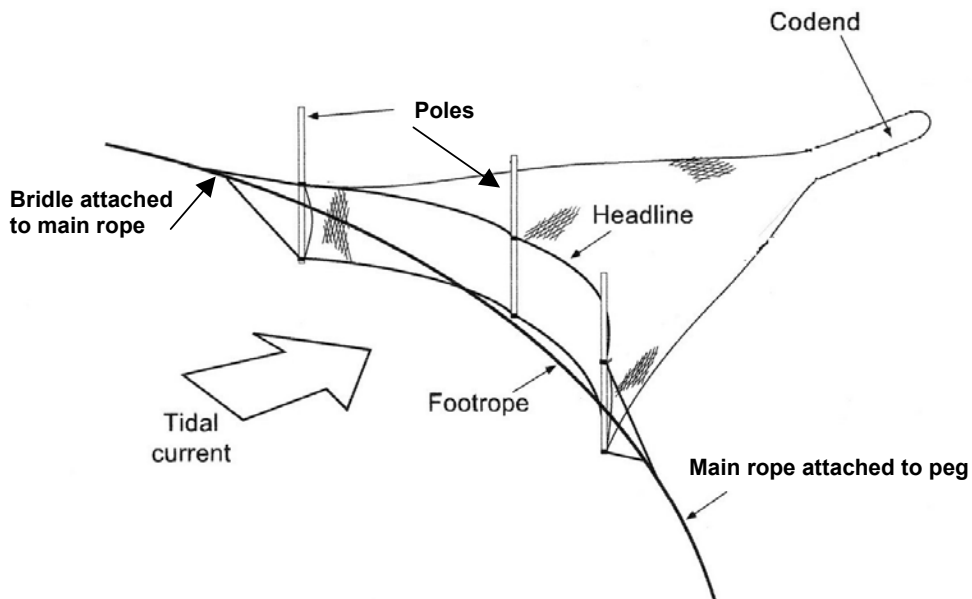


Figure 9 Configuration of Set Pocket Net (adapted from Broadhurst et. al, 2004).

Set pocket netting is conducted during the ebb (outgoing) tide targeting school and king prawns running toward the mouth of the estuary. Due to strong tidal flows in the areas fished, the net is set during slack water at the top of the tide. Pegs are a permanent fixture, generally a large hardwood post. The main rope (figure 9) is attached to the peg and laid out across the channel (figure 10) and secured to another fixed point on the opposite side of the channel (another peg or tree). Once the main rope is tensioned the net is attached via a bridle consisting of the headline and footrope (figure 11). Positioning of the bridle determines which section of the channel the net will fish, as the prawns may travel through different parts depending on tide and wind conditions.



Figure 10 Main rope being laid out across channel after being fixed to peg

Once the bridle is attached, the net is slowly shot out of the punt and attached the same way to the main rope at the opposite end. Poles are then used to open up the net through which the tide will flow (see figure 9 and figure 12). The poles are notched at the bottom to fit over the footrope and then ropes attached to the poles are used to go around the headline and tension the net in an open position. The net is held open so that the footrope is on the bottom and the headline is just below the surface. Although the majority of king prawns run on the surface, the headline must be kept below it so that it does not become encumbered with detached weed also travelling in the current. Due to the strong tidal flows experienced in Wallis Lake there is considerable pressure on the main rope if the net or headline become clogged with weed. As tidal flow increases through the middle of the ebb tide, weights are added to the top of the poles to keep the footrope on the bottom. Weights are removed as tide slows and ropes around headline are slackened to keep it below surface.

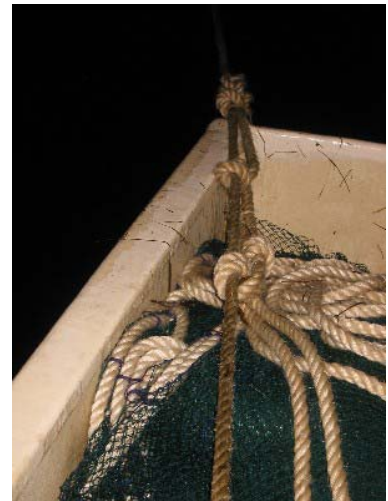


Figure 11 Bridle attaching net to main rope



Figure 12 Fitting the poles after net has been attached to main rope

Fishing usually continues for the entire runout tide with crews (2 fishers) tying to the centre pole, monitoring pole weights, headline height, and checking codend periodically depending on the quantity being caught. A lazy line runs down the centre of the net and is attached to the front of the codend. Fishers untie from the stake and drift back along the line, tie off near the end so the codend can be lifted up and the catch removed. The codend is washed (see prawn hauling) to remove small prawns and then emptied into fish boxes onboard the punt for sorting.

Bycatch is minimal with this method, as the net does not move and fish are capable of swimming clear once they realise they are in the inside the wings of the net. Regulations exist on net length (20m) and mesh size (not less than 30mm, nor more than 36mm, see Action 2.4) and that set pocket netting only be conducted at the designated pegs.

Predominately school and eastern king prawns are caught using this method and are marketed as “channel” prawns. Larger tiger prawns are sometimes encountered when certain climatic and environmental factors lead to recruitment stock entering the estuary system (see figure 13 and figure 14).



Figure 13 School prawn (*Metapenaeus macleayi*) top, and Eastern king prawn (*Melicertus plebejus*)



Figure 14 “Channel” prawns consist of a mixture of school and eastern king prawns. Large tiger prawns (*Penaeus esculentus*) are occasionally caught

1.6.3. Prawn Seining

Prawn seining is the other major method used to target prawns in Wallis Lake and is conducted in the lower reaches of the rivers entering the system and the larger southern and western expanses of the lake. The method predominately targets school prawns in the rivers and greasyback prawns (*metapenaeus bennettiae*) in the main lake. The seining season usually commences in October and can continue through until June. The configuration of a prawn seining net is similar to that used in prawn hauling (see figure 2) though regulations permit a longer headline length of 140m and hauling ropes up to 140m. Mesh size regulations are equivalent to other methods, requiring mesh throughout to be not less than 30mm, nor more than 36mm.

There is no regulated minimum size for prawns. Instead, prawns are measured in terms of the number of prawns per 500g – a “prawn count” – a higher count indicating a smaller average prawn size. DPI has introduced a process to close an estuary to prawning if school prawns from that estuary are found to number more than 180 per 500g at the first point of sale. When catches include over 10% of eastern king prawns the prawn count drops back to 125 per 500g.

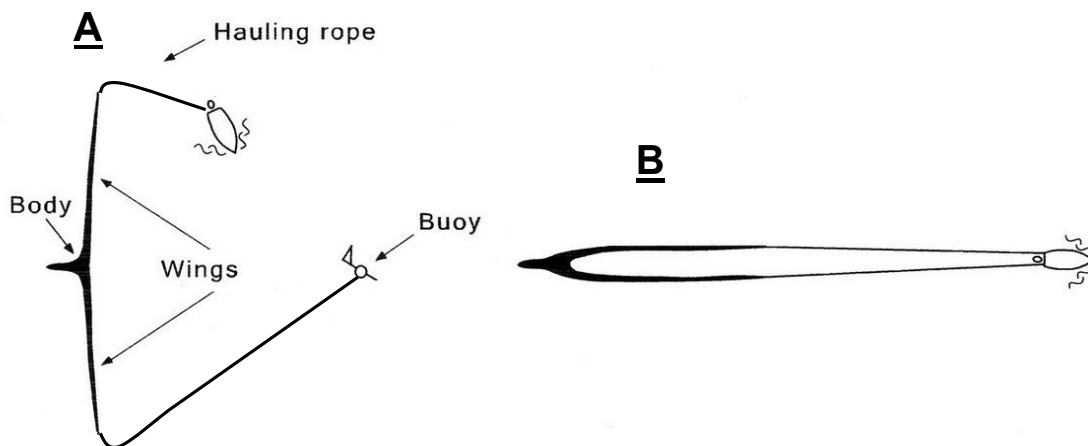


Figure 14 Method used to deploy (A) and retrieve (B) prawn seine net (adapted from Broadhurst et. al, 2004).

Due to the expanse of some areas fished using this method, fishers are permitted to use a try net to locate shows of prawns. Try nets must also comply with regulations (60x50cm frame supporting no more 2m of 30-36mm net) and are towed then frequently retrieved to locate concentrations of prawns (figure 15).

At the commencement of the shot, one end of the hauling rope is deployed with a float attached. The boat then shoots the hauling rope then net in a triangular arc with the aim of returning back to the float with the end of the other hauling rope (figure 14 A and figures 16 & 17). Once the float is reached the two lines are brought together and the boat motors forward to fold in the wings of the net (figure 14 B and figure 18). The boat then continues slowly motoring forward until all slack has been removed from the hauling ropes and net.



Figure 15 Try nets are used to locate concentrations of prawns



Figure 16 Shooting hauling rope after deploying float at the commencement of the shot



Figure 17 Net being shot after the hauling rope. Once net is shot the boat is steered toward the starting point, laying out other hauling rope



Figure 18 Both hauling ropes are connected to the boat and it continues forward to remove the slack from the hauling ropes and net

Removal of the slack from hauling ropes condenses the catch into the codend, and retrieval of the net and catch is done by releasing one of the attached floats (figure 18) and motoring back toward the net on the outside of the hauling line still attached. The vessel is stopped near the start of the net allowing the slack hauling rope to be retrieved and laid out in preparation for the next shot. Retrieval of the net is continued by hand, pulling the vessel along as the wings of the net are laid onboard the boat until the codend is reached. The codend is then washed, lifted on board and the catch deposited into fish boxes for sorting. The remaining half of the net and hauling line is retrieved by hand, arranging it in preparation for the next shot (figure 16).

“Clover leafing” is the term given to the method where the entire net is not retrieved before initiating the next shot and is conducted under Permit, (issued annually and subject to conditions), for three areas devoid of seagrass in Wallis Lake (The Drain, Snakey Gutter and Piper’s Bay). This method is generally conducted at night with strobe lights fitted to the floats, including one marking the centre of the net (codend) to assist the process, and to alert other fishers as to the location of gear.

1.6.4. Meshing Net

The use of meshing nets is a commonly used method that is generally carried out at night, targeting a wide range of species. Fishers are entitled to use two methods in working mesh nets, *set meshing* and *splashing*.

For *set meshing*, as the name implies the net is set and is not dragged or moved through the water and capture of fish relies on fish swimming into the net. In region 4 (see figure 1), of which Wallis Lake is a part, regulations specify that at the completion of a shot; the net can be *set* between sunset and sunrise from the 1st June to the 30th September, and for the period 1st February to the 31st May and during October and November a *3 hour limit* applies to setting times. In both instances the net must be retrieved or in the process of being retrieved before sunrise. No *setting* of meshing nets is permitted during December and January, or daylight hours at any time of year.

The method of *splashing* (depicted below) is permitted at any time providing that shooting the net, splashing and retrieval is a continuous operation. Splashing (figure 19) is done to encourage fish to move, and subsequently find the net, and is carried out immediately after the net has been shot. Fishers splash according to how the net is set, generally working either side of the net by dragging oar blades across the surface of the water while stamping on the floor of the punt (figure 19).

Mesh size regulations are aimed to increase size and species selectivity of meshing nets and stipulate that mesh throughout be not less than 95mm nor more than 100mm when the net is set for longer than 3 hours, and for 3 hour sets and splashing, 80mm mesh is permitted. Fishers are entitled to use more than one net, however total length of a single net must not exceed 725m.

The majority of fishers in Wallis Lake use flat-bottomed punts when working these nets, the shallow draft enabling them to access shallow areas where mullet and other species lay without disturbing the bottom or seagrass beds. At each end of meshing nets floats are attached to the corkline and a weight fixed to the leadline. Shooting begins by placing weight and float over the side and rowing the punt away, laying the net out over the stern of the boat. Fishers shoot the net according to the area being worked (along edges, flats or around structures) and the target species.

Retrieval of the net (set or splashed) is done by hand, with the net providing enough resistance to pull the punt along (figure 20). Fishers lay the net in preparation for the next shot after removing the catch from meshes and sorting it into fish boxes.



Figure 19 “Splashing” is done by letting oar blades drag across the water on the back strokes during rowing, and stamping of foot on the punt floor



Figure 20 Hauling the net is done by hand, fish are untangled as they come aboard and the net is laid out ready for next shot

1.6.5. Flathead Net



Figure 21 Flathead net being shot at dusk. Some fishers shoot nets using an outboard powered boat but a large proportion of fishers still prefer to row nets out

Flathead netting is similar to set meshing, in that nets are set and rely on the movement of fish not the net. They are used to target dusky flathead, however any other legal size catch may be retained, with the exception of bream and sand whiting.



Figure 22 Regulations specify that flathead nets must be retrieved, or be in the process of being retrieved by sunrise

Nets are also shot in a similar fashion with some fishers using outboard powered boats (figure 18) while others prefer to shoot via a rowing punt. Regulations permit the use of a flathead net from 1st March to the 30th November providing it is set after sunset and retrieved before sunrise. Fishers are entitled to use more than one net, however total length of a single net in Wallis Lake must not exceed 725m (325m in Smith's Lake). If more than one net is set, fishers must still retrieve nets by sunrise or be in the process of retrieving the last one.

Flathead nets differ from meshing nets in that they cannot be deeper than 16 meshes (0.8m) and floats on the corkline are regulated (floats must be no bigger than 40x25mm and be at least 3.5m apart), to ensure net stays below the surface. Labelled floats (300mm) and weights are required at each end of the net and that mesh throughout be not less than 80mm.

Flathead nets are shot along drop offs and bank edges targeting fish moving from shallow to deeper water overnight. Nets are set at dusk and left until retrieval commences pre dawn. Hauling is done by hand, pulling the boat or punt along the length of net. Catch is removed from the net and sorted into boxes and net laid out in preparation for next set.

1.6.6. Fish Hauling

The basic configuration of a fish hauling net is similar to that of a prawn hauling net (see figure 2) differing though in mesh size, headline and hauling rope length. Fish hauling regulations require that nets be no longer than 500m in Wallis Lake and 375m in the upper reaches of the rivers entering the system. Hauling rope length is also regulated (1000m in the Lake, 375m in rivers) along with mesh size (30–50 mm in the bunt of the net (the area toward the codend), and 80mm in the wings), however Wallis Lake fishers have a permit available to them to use 57mm mesh in the centre-piece of the bunt to reduce the meshing of undersized sand whiting. Fish hauling is restricted to one shot per day (for 500m nets), and no fish hauling is permitted over *Posidonia* seagrass beds.

To shoot the net, one end of the hauling rope is attached to a winch punt and the rope, followed by the net is shot around the area thought to contain fish. Once shot, the net is then gradually hauled into a shallow area using the winches mounted on the winch punt and boat. The net works by slowly corralling the fish toward the bunt of the net, rather than meshing them and is worked toward a stake net, which acts as a barrier to enclose the area being fished. The stake net is also regulated and must not exceed 50m and be comprised of 25mm mesh.

Mesh size in the codend allows smaller fish and juveniles of target species to escape and the remaining catch is sorted in the water to maximise the survival of non-target species. The target species are removed from the codend, distributed into fish boxes and iced and the codend is then fully opened, allowing the remainder of the catch to be released whilst still in the water.

Photos depicting fish hauling methods will be included in future versions of this EMS.

1.6.7. Bullringing

The method of bullringing also falls under the hauling endorsement and is used to target garfish, however this net differs from other hauling nets in that it is a straight net that has no codend. The net is worked by shooting it around patches of garfish and returning back to the start of net, from where both ends of the net are retrieved together. The net is continually shortened from both sides, working towards the middle section of the net and condensing the catch in the process so that it can be collected and sorted. A bullringing net in Wallis Lake must not exceed 275m and consist of mesh no more than 36mm or less than 28mm. Hauling lines at either end of the net must not exceed 25m and use of a bullringing net is not permitted on weekends or public holidays.

Photos depicting bullringing will be included in future versions of this EMS.

1.6.8. Hand Gathering

Hand gathering methods are also endorsed under an estuary general fishing licence. Target species must be harvested by hand or with the assistance of the following implements:

- A pump or similar device having a cylinder or barrel with a diameter of not more than 85mm
- Tube or cylinder (whether or not fitted with a cap at one end) with a length not more than 250mm and a diameter not more than 85mm
- Single blade knife with a blade that is longer than it is wide
- Spade or fork (except in a seagrass bed, mangrove or salt marsh area or for the taking of pipis)
- Pliers

Species such as beach worms (*Australonuphis teres* and *A. parateres*) and pipis (*Donax deltoides*) gathered using this method have historically been sold for recreational fishing bait, however diversifying cooking techniques and an increasing multicultural population have increased market demand for some products (eg. pipis for human consumption and export) as well as created markets for other products.

One such species is the “Sydney” or “Blood” Cockle (*Anadara trapezia*) a bivalve mollusc, which is hand collected in the lake by snorkelling during the summer months. This method is only employed by a few of the Wallis Lake estuary general fishers and services a small niche market that exists in Sydney and Melbourne. The small market helps to regulate quantities of cockles harvested, as too much product can flood the market, significantly lowering the price. Supplying small regular quantities of cockles ensures a better return for the fishers.

Hand gathering is a non-destructive fishing method, causing little disturbance to the substrate, selectively taking only the target species and no bycatch. Attempts to mass harvest (such as mechanical diggers or dredges) should be discouraged as it increases the potential to over-exploit resources currently collected sustainably by hand.

1.6.9. Trapping (Crab, Fish, Eel)

Trapping is another method used by estuary general fishers to target fish, crabs, and eels in Wallis Lake and the estuaries entering the system. Endorsements are separated into three categories: *trapping*, *mud crab trapping*, and *eel trapping* (see Table 1). Each method has different regulations on trap configuration specific to the endorsement, however for fish traps, crabs trap dimensions are often used for ease of construction with the only variance being orientation of the entrance funnels. Construction generally consists of either wire mesh over a timber frame or self-supporting heavier weld mesh. In both cases sacrificial anodes are fitted to prolong the life of the trap.

Fish Trap: Maximum 2m length x 1.5m width x 1m height with mesh not less than 50mm

Crab Trap: Maximum 1.2m length x 1m width x 0.5m height or a diameter of 1.6m if round with mesh not less than 50mm

Eel Trap: Maximum 2m length x 0.5m width x 0.5m height, or 1m length x 1m width x 0.5m height. Mesh must be between 20mm and 40mm with an entrance funnel not more than 100mm in diameter.

Fishers are permitted to set 10 mud crab traps and 10 fish traps plus (ten hoop nets are also allowed but are seldom used). Regulations also provide for the use of an additional 10 fish traps to be used (per endorsement holder), in the waters of 'The Broadwater' to take advantage of the robust nature of the blue swimmer fishery there. Trap floats are required to be marked with the fishers file no# followed by "F" or "C" to identify it as a fish or crab trap.

Baited traps are set adjacent to fish holding structures or areas the target species are thought to occupy. Bait used in the traps is generally self sourced from other methods (damaged or non-marketable product and scraps from processing) and replaced daily during times of high catches, every 2-3 days otherwise. Fish and crab traps are worked year round though blue swimmer crabs (*Portunus pelagicus*) and mud crabs (*Scylla serrata*) are more common during the warmer months (September – June).

Fishers endorsed to target eels generally work further upstream in the estuaries of Wallis Lake. Long-finned Eels (*Anguilla reinhardtii*) are targeted and can bring high prices when exported live to Asian markets. Regulations restrict fishers to 10 eel traps in estuarine waters and none can be set in running fresh water. Some fishers are allowed to work farm dams and impoundments under a permit arrangement and a limit of 25 traps applies in these waters.



Figure 20 Example of a weld mesh crab trap. Fish traps are often made with similar dimensions



Figure 21 Traps are retrieved and catch emptied into fish boxes, rebaited and returned to a similar position if successful. Undersized catch is returned to water alive

Environmental Management System

1.7. EMS development

This EMS was developed by the Estuary General fishers of WLFC, with the assistance of OceanWatch Australia, the Nature Heritage Trust, the Fisheries Research and Development Corporation and Seafood Services Australia.

This EMS has been written with regard to *AS/NZS ISO 14001:1996 Environmental management systems – Specification with guidance for use*.

A risk assessment based on elements of *AS/NZS 4360:2004 Risk Management* was used to identify environmental risks associated with the fishery. The results of the risk identification and assessment were used in the development of this EMS and are included in Appendix 2.

1.8. EMS scope

The scope of this EMS is limited to:

1. The environmental aspects of commercial fishing operations on Wallis Lake; and
2. The ways in which WLFC and commercial fishers of Wallis Lake can work with other stakeholders on improving the environmental quality of Wallis Lake.

1.9. EMS in relation to other management mechanisms

This EMS is designed to complement the large number of regulations and management mechanisms that relate to fisheries and natural resource management. Those relating to fisheries generally include:

- *Estuary General Fishery Management Strategy*,
- *NSW Estuary General Fishery Code of Practice*,
- *Fisheries Management Act 1994*,
- *Fisheries Management (General) Regulation 2002*,
- *Environmental Protection and Biodiversity Conservation Act 1999*,
- *Environmental Protection and Biodiversity Conservation Regulations 2000*,
- *Protection of the Environment Operations Act 1997*
- *NSW Threatened Species Conservation Act 1995*, and
- Various species specific and area specific closures (see http://www.fisheries.nsw.gov.au/gen/closures/home_closures.htm).

Those relating to Wallis Lake and the surrounding region include

- *Wallis Lake Estuary Management Plan (DRAFT)*,
- *Wallis Lake Catchment Management Plan*, and
- *The Hunter and Central Rivers Catchment Action Plan* (in development).

1.10. EMS review and communication

Objective 6 in our Environmental Policy in Section 2, and the actions in Section 3 that relate to this objective outline how we will report on and review this EMS, and seek input from stakeholders.

1.11. EMS emergency response

The risk assessment process (Appendix 3) did not identify any potential risks from the operations of WLFC estuary fishers to lead to an environmental emergency (i.e. a significant environmental impact that occurs over a short period of time).

Some may consider entanglement of, or interaction with a threatened or protected species as an environmental emergency. This is covered under policy objective 3 and related actions.

WLFC estuary fishers are unlikely to contribute significantly to water pollution, but Action 1.8 is the response to a water pollution emergency whether it is due to WLFC estuary fishers or otherwise.

1.12. EMS contravention

This EMS is not enforceable. It is a voluntary commitment to document and maintain environmental best practice among WLFC estuary fishers.

Responsibilities are assigned to each action, while the WLFC manager is responsible for the overall implementation of the EMS.

Incidents where WLFC estuary fishers fail to reasonably comply with the Environmental Policy or Action Plan must be reported to the WLFC manager, either by those members responsible or witnesses to the event. It is then the responsibility of the WLFC manager to investigate whether the failure was

- intentional or unintentional,
- a indication of inappropriate policy or actions in the EMS,
- due to highly unusual circumstances, or
- some combination of the above.

Responses might include no action, a review of the EMS, and/or training for fishers.

Any EMS contravention will be noted in the following EMS report.

WLFC cannot be responsible for the actions of non-members, but will encourage all commercial fishers operating on Wallis Lake to work within this EMS.

2. Wallis Lake Estuary General Fishers Environmental Policy

Wallis Lake Fishermen's Cooperative Estuary General Fishers Environmental Policy

Our vision:

To continue to harvest seafood on behalf of the community in a manner that is environmentally sustainable, commercially viable and universally respected.

We will identify continual improvements in environmental best practice relevant to our operations and work to adopt them.

In addition to complying with all relevant regulations and management mechanisms Wallis Lake Fishermen's Cooperative estuary fishers will meet the following policy objectives.

1. Protect and enhance the habitat of Wallis Lake.
2. Harvest seafood in a manner that ensures stocks of fish and other species are maintained.
3. Minimise the level and impact of interactions with protected and threatened species, and species of particular community concern.
4. Minimise resource consumption, waste production and pollution associated with fishing and Co-op operations.
5. Recognise and protect the cultural values associated with Wallis Lake.
6. Conduct environmental management in a transparent and cooperative manner.
7. Contribute to scientific research and management innovation relevant to aquatic environments and commercial fishing.

These policy objectives form the structure of the action plan in our Environmental Management System.

3. Action plan

Objective 1. Protect and enhance the habitat of Wallis Lake.

Seagrass and river bank protection

Note: The Environmental Impact Statement (EIS) for the NSW Estuary General Fishery states, “the methods used in the Estuary General Fishery could largely be described as passive, or non-destructive to habitats, with the possible exception of hauling, the effects of which are not clearly understood. There are numerous cases of seagrass loss throughout Australia, including NSW, however commercial fishing techniques have not been included as a factor thought to be causing the declines” (NSW Fisheries, 2002).

Action 1.1. Continue to conduct all prawn hauling using the “anchor out” method.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Proportion of prawn haul shots conducted using “anchor out” method	100%	Current and ongoing

Background

Regulations currently prohibit prawn hauling of any kind over all beds of the seagrass *Posidonia australis*.

Prawn hauling is concentrated in the upper reaches of the estuary, and is generally done over a sand or mud bottom, not seagrass.

The “anchor out” prawn hauling method involves hauling the net back to a boat in the body of the river instead of onto the riverbank. This eliminates the possibility of impacts to seagrass that may occur in shallows. This method has also been found to further reduce the already low levels of bycatch associated with conventional prawn hauling (Gray, 2003).

Action 1.2. Minimise fish hauling activity over all seagrass beds. Investigate potential for monitoring changes to seagrass beds in the immediate vicinity of fish haul shots.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Maps established with DPI Fisheries to limit hauling to specific areas	Yes	12 months (dependant on DPI NSW)

Background

Unlike prawn hauling, the potential size of the catch when fish hauling means the catch cannot be hauled onto a boat. Instead, it must be hauled onto shallow areas.

Regulations currently prohibit fish hauling over beds of the seagrass *Posidonia australis*.

Hauling over hardy seagrasses such as *zostera*, *halophilla* and *rupia* is not ideal and generally avoided as the net is light and can be held up by seagrass, allowing fish to escape. Accumulation on nets is often the result of naturally detached free-floating weed as well as seagrass uprooted by feeding swans rather than dislodged by the hauling process.

Hauling is performed on a limited number of sites and WLFC fishers are currently working with DPI Fisheries on the development of maps to limit hauling to these sites.

Bank rehabilitation

Action 1.3. Continue to sit on Wallis Lake Estuary Management Committee. Assist rehabilitation activities where appropriate.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager	Continue to sit on Wallis Lake EMC	Yes	n/a
WLFC manager	Projects assisted	n/a	12 months and ongoing

Background

A WLFC representative sits on the Wallis Lake Estuary Management Committee and will continue to support the protection on the estuary on behalf of the commercial fishing industry in this capacity.

WLFC fishers will offer their knowledge and understanding of the estuarine environment to assist projects currently underway or planned by groups such as the Hunter and Central Rivers Catchment Management Authority, Landcare, Rivercare, Coastcare, Great Lakes Council and local community groups.

Currently WLFC contributes directly via funding a Great Lakes Council project involved in the repurchasing, rezoning and rehabilitation of the Frogella Swamp/Dharawank Creek wetland area. The project aims to remove agricultural drains that have been identified as a potential acid sulphate source.

A memorandum of understanding also exists between the Wallis Lake estuary fishers, NSW Maritime (formerly Waterways), riverside caravan parks and ski groups regarding the creation of designated water ski zones to combat bank erosion on the Wallamba River.

Bird habitat

Action 1.4. Provide information to conservation and management organisations regarding important bird habitats. Pass on information to other relevant user groups.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and estuary fishers	Intellectual knowledge provided to relevant organisations to identify key habitat areas	Yes	Current and ongoing

Background

Estuaries such as Wallis Lake provide important habitat for nesting and breeding birds, including migratory species. Wallis Lake fishers have a unique understanding of the environment in which they work and will assist organisations such as The World Wildlife Fund's Shorebirds Association and National Parks and Wildlife Service if required to identify areas known to provide important habitat.

The Environmental Impact Statement for the NSW Estuary General Fishery states that existing closures on Wallis Lake probably prevent disturbance to waders and their habitat (NSWF, 2002). The closures prevent commercial fishing methods around the islands and sand-flats toward the mouth of the lake. A map showing the closed waters is available in appendix 4.

Bird entanglements

Action 1.5. Report incidents of bird entanglements to DPI.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of incidents reported	n/a	Immediate and ongoing

Background

Birds can become entangled in litter and lost fishing line. Gear used in commercial estuary fishing is very rarely lost, and therefore very rarely leads to bird entanglement. Diving birds such as Cormorants and Shags can pose problems when they identify food sources above or below water. These scavengers have been known to steal bait from traps and risk potential drowning. The use of more rigid weld mesh nozzles that prevent them from forcing access to bait has rectified the problem.

Commercial fishers spend extended periods of time on the water, and are in an ideal position to report bird entanglements. The W.I.R.E.S (Wildlife Information and Rescue Service) contact details will be clearly displayed at WLFC and fishers will be encouraged to program the details into mobile phones.

Marine pests

Action 1.6. Ensure that marine pest identification material developed by DPI is circulated amongst all WLFC estuary fishers. Report, with a sample if possible, any detection of an unusual plant or animal. Follow requirements of government agencies in combating marine pests.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and SeaNet NSW	ID cards circulated	Yes	6 months
WLFC estuary fishers	Number of marine pests or unusual plants or animals reported	n/a	Immediate and ongoing

Background

Translocation of marine pests and subsequent settlement is an increasing risk in Australian waters as populations become more mobile and exposure to potential sources increases (eg. contaminated bilge water from merchant vessels, translocation of species from other regions by travelling fishers). Introduction of such species can have severe impacts on native species and lead to a total deterioration of ecological processes.

Education in the identification of pest species and correct reporting mechanisms of those with a unique understanding of the marine environment, such as commercial fishers will greatly assist in early identification of such species, a key process in preventing the spread of marine pests. Currently a National System for the Prevention and Management of Marine Pest Incursions is being developed by the National Introduced Marine Pest Coordination Group (NIMPCG), which includes members from Commonwealth and State agencies, scientific organisations, and industry representatives. Part of the project objectives is the development and dissemination of educational material to commercial fishers, which will be incorporated into future versions of this EMS upon completion. A draft version of the *National Best Practice Guidelines For Domestic Commercial Fishing Vessels In Relation To Managing Marine Pests* is contained in Appendix 5.

Litter

Action 1.7. Ensure no littering by WLFC estuary fishers. Retain all litter collected during fishing operations (including removal of disused traps), and report to Great Lakes Council any significant litter incidents.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Proportion of encountered litter collected or reported.	100%	Immediate and ongoing
WLFC estuary fishers, other waterway users and GL Council	Organise group cleanup during quiet part of fishing season	Yes	12 months

Background

The nature of the fishing industry having to conduct their operations depending on weather conditions, fish movement and other environmental factors (lunar cycles/tides etc.) makes it difficult to schedule group activities or gatherings. This is further complicated in the estuary general fishery given the different operating times due to the diversity of methods used. Past attempts to participate in 'Clean-up Australia Day' have been unsuccessful due to the scheduled date falling during prawn runs (set pocket). There is potential to organise a group clean-up day, possibly in conjunction with other waterway users during quieter fishing times or during periods of prolonged bad weather. Assistance could be sought from Great Lakes Council to encourage participation by waiving dump fees or providing a discard/pick-up point at a convenient location.

Water pollution incidents

Action 1.8. Report all suspected pollution incidents to DPI and Department of Environment and Conservation (DEC), formerly Environment Protection Authority.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of incidents reported	n/a	Immediate and ongoing

Background

Agricultural and urban runoff, acid sulphate soils, fuel and chemical spills may lead to water pollution incidents. Fishers have a unique understanding of their fishing grounds, and an ability to identify point sources of pollution.

Responsibility in the event of a fuel spill falls upon local council and NSW Maritime, however the Wallis Lake fishermen's co-op is equipped with a spill containment kit, which enables the user to quickly inhibit the spread of the pollutant and provides absorbents to clean the affected area.

Wallis Lake estuary fishers also benefit from the rigorous water quality testing already conducted by the oyster industry. Constant monitoring is essential to meet strict food safety guidelines, and recently Wallis Lake oyster growers were accredited to directly harvest from their three harvest areas when water quality is within certain parameters (Steve Verditch, pers.comm.). The combination of a community education program and the construction of seven macrophyte wetlands (retention ponds) as part of Great Lakes Council's "Healthy Lakes Project" have largely contributed to reducing the amount of nutrients entering Wallis Lake.

Objective 2. Harvest seafood in a manner that ensures stocks of fish and other species are maintained.

Note: Total catch in the NSW Estuary General Fishery has remained relatively stable over the past 50 years except for slightly higher catches in the late 80s and early 90s (DEH, 2003; NSWF, 2002). “The long term historic catch trends, combined with the high proportion of species reaching sexual maturity before harvest, and the broad age distribution of key species in the commercial catch, indicate that the fishery is fairly resilient to change.” (DEH, 2003)

Bycatch

Note: *Fish hauling.* Of those methods permitted in Wallis Lake, the recent Environmental Impact Statement (EIS) for the NSW Estuary General Fishery considers only fish hauling to have a high risk of potentially unacceptable levels of bycatch (NSWF, 2002). Reducing bycatch associated with this method is addressed under Action 2.1 and Action 2.2.

Prawn hauling. Bycatch rates associated with prawn hauling, particularly the “anchor out” method, are considered to be some of the lowest in the world (Gray et al, 2003). See Action 1.1 for background.

Mesh netting (including flathead netting). While the EIS considers mesh netting to have a medium risk of unacceptable levels of bycatch (NSWF, 2002), an extensive study has found that bycatch accounted for only 3.3% (by weight) for this method in NSW estuaries (Gray et al, 2003a). Nets used in this method are species and size selective and heavily regulated concerning net length and height, mesh size and setting times.

Prawn seining. The bycatch associated with this method is very low outside of flood events, and no impact on seagrass due to the area in which it is conducted.

Set pocket netting. Bycatch associated with this method is recognised as low outside of flood events. As the net does not move through the water, the survival of returned bycatch is high (NSWF, 2002).

Bullringing. Bullringing is performed only in deep water in Wallis Lake and targets garfish. Such use of this method results in very low bycatch (NSWF, 2002).

Trapping. Trapping methods are considered to have an extremely low bycatch risk (NSWF, 2002).

Fish hauling (meshed bycatch)

Action 2.1. Continue to use larger mesh in fish haul nets to minimise the incidence of meshed undersize sand whiting.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of fishers not using 50mm mesh in bunt of haul nets	100%	Current and ongoing

Background

Of their own initiative WLFC estuary fishers were concerned that undersize sand whiting (i.e. less than 27cm) occasionally become enmeshed in the centrepiece of the bunt (i.e. lower section) of haul nets when using the regulation mesh size of 50 mm.

As a result, NSW Fisheries (now DPI) introduced a permit system allowing fishers to use mesh up to 57mm, rather than a maximum of 50mm, in the centrepiece of the bunt of haul nets. Although this may lead to a slight reduction in catch, the large majority of sand whiting meshed in 57mm mesh are over 27cm in length, reducing the capture of undersized fish.

Although haul nets also encircle large numbers of bream and other species, due to the slow hauling speed described below (see Action 2.2), rates of meshing or entanglement for these species is relatively low.

Fish hauling (captured bycatch)

Action 2.2. Continue to sort fish haul catches in water to minimise bycatch mortality.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	All fish haul catches sorted in water.	Yes	Current and ongoing

Background

Fish hauling is performed on a limited number of sites in Wallis Lake and works to herd fish rather than entangle them in the mesh. One end of the net is attached to fixed point and a boat then unravels (or “shoots”) the net to encircle the area thought to contain fish. The net is then gradually hauled into a shallow area, slowly corralling the fish toward the bunt of the net. The net is then slowly snigged up further, moving the encircled fish into the codend which is the “sock” at the end of the net where the catch collects. Mesh size in the codend allows smaller fish and juveniles of target species to escape. The remaining catch is not herded densely for significant periods, only leaving the water momentarily during the sorting process allowing high survival rates of released bycatch.

Bird scavenging

Action 2.3. Investigate the effectiveness of discard chutes in minimising scavenging of returned bycatch by birds. Investigate other techniques to minimise scavenging.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers and SeaNet	Findings of investigations	n/a	12 months

Background

Scavenging of discarded bycatch by birds such as gulls, shags and pelicans contributes to bycatch mortality at times.

DPI currently requires that fishers using meshing or flathead nets (from one hour before sunrise to one hour after sunset) return all non-retained catch to the water via a discard chute. The chute extends approximately 40cm below the surface of the water and aims to provide fish with a recovery area protected from birds.

Fishers throughout NSW continue to question the effectiveness of chutes. For example, chutes concentrate the source of returned bycatch to a single point, which is soon discovered by birds.

Fishers will continue to investigate way to minimise bycatch mortality from scavenging. For example, some offshore tuna fishers are experimenting with tuna oil as a bird deterrent, and this method may be applicable to estuary fishing.

Small prawn catch

Action 2.4. Further investigate the potential to introduce square mesh codends for prawn hauling/seining and set pocket netting to reduce the catch of small prawns.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Researchers assisted in further development of square mesh codends	n/a	12 months
WLFC estuary fishers	Encourage all fishers to “wash” prawns	Yes	Current and ongoing

Background

There is no regulated minimum size for prawns. Instead, prawns are measured in terms of the number of prawns per 500g – a “prawn count” – a higher count indicating a smaller average prawn size. DPI has introduced a process to close an estuary if school prawns from that estuary are found to number more than 180 per 500g at the first point of sale. Current prawn counts for school prawns in Wallis Lake are around 80-150. When catches include over 10% of king prawns the prawn count drops back to 125 per 500g.

In an effort to minimize the capture of small prawns, Wallis Lake fisher’s of their own initiative moved from the minimum of 30mm mesh to using 32mm diamond mesh in their codends. Success of this method in reducing the capture of small prawns resulted in the now current legislation, which requires the use of no smaller than 32mm diamond mesh in the codends of set pocket nets. Fishers may desire to use 32mm in the cod-end of prawn hauling and prawn seining nets if they choose, however, this is not a legal requirement in these two nets, at present.

Wallis Lake fisher’s also use the method of “washing” prawns, which involves repetitive dunking of the codend following the capture of prawns. The process opens the diamond meshes allowing unwanted small prawns and fish to be released.

The codend is the “sock” at the end of the net where the catch collects. Conventional mesh is hung “on the diamond” and closes when pulled (consider pulling a single square of mesh hung from one corner. Square mesh is designed to remain open, or square, when pulled (consider pulling a single square of mesh hung from two corners). Square mesh allows small prawns to escape through the meshes of the codend more easily.

WLFC fishers have been working closely with researchers on testing the effectiveness of integrating square mesh into their operations. Results of a comprehensive study recently completed in Wallis Lake found that selectivity was improved using square mesh codends when small quantities of prawns were caught. Comparatively however, techniques currently used by Wallis Lake fisher’s were more successful at reducing the amount of small prawns caught when dealing with larger catches.

Objective 3. Minimise the level and impact of interactions with protected and threatened species, and species of particular community concern.

Note: It is highly unlikely that any estuary general fishing operations will interact or harm any protected or threatened species, whales, dolphins or turtles (NSW Fisheries, 2003).

Note: Protected and threatened species include those listed, at a state level, under Part 2 Div 1 of the *Fisheries Management (General) Regulation 2002*, and Schedules 1 and 2 of the *Threatened Species Conservation Act 1995*. At a Commonwealth level, approximately 2000 species are listed under the Environment Protection and Biodiversity Conservation Act 1999. The map tool found at <http://www.deh.gov.au/erin/ert/epbc/imap/map.html> can be used to find those relevant to Wallis Lake.

Minimise harm to protected or threatened species, whales, dolphins or turtles

Action 3.1. Suspend fishing immediately in the event of an interaction with a protected or threatened species, whale, dolphin or turtle. Allow the animal to escape without harm.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of interactions with protected or threatened species, whales, dolphins or turtles	0	Immediate and ongoing

Background

Whilst it is noted above that estuary general operations are highly unlikely to interact with protected or threatened species, Wallis Lake is a unique environment being a large barrier estuary with permanent deep water access to the ocean, frequented by dolphins and turtles.

Although interactions with threatened or protected species are rare, occasionally turtles are encountered during fish hauling operations. As described in Action 2.2 processes involved in fish hauling involve slowly corralling the catch rather than meshing resulting in a high survival rate of bycatch. Because the catch is only concentrated in the codend for a short period (in shallow water allowing turtles to breath), fishers can release turtles quickly and without harm. This process will be improved by circulating *Protected Species Handling Manuals* amongst fishers (Action 3.2) to ensure they are handled correctly to reduce stress imposed on the turtles in the rare event of their capture.

Estuary Cod are a protected fish that may occasionally be taken in crab and fish traps and must be returned to the water.

Australian Bass are a fish protected from commercial harvesting. They are sometimes encountered in meshing nets, particularly following 'freshes' in late winter. Regulations require that these fish must be returned to the water.

Protected Species Education

Action 3.2. Ensure that copies of The Protected Species Handling Manual and The Protected Marine Species Identification Guide are circulated amongst all WLFC estuary fishers.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and SeaNet NSW	All WLFC estuary fishers familiar with both publications	Yes	6 months

Background

Both publications are available from Ocean Watch Australia.

Interaction reporting

Action 3.3. Continue to report interactions to DPI. Establish a process to report interactions to other WLFC estuary fishers as soon as possible.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager	Internal interaction reporting process established	Yes	6 months

Background

Any interaction with protected or threatened species must be reported to DPI. The WLFC manager will ensure that this information is also shared among WLFC estuary fishers. Protected, threatened and pest species sighting forms will be made available at the WLFC.

Objective 4. Minimise resource consumption, waste production and pollution associated with fishing and Co-op operations.

Fishing Operations

Outboard motors

Action 4.1. Upgrade all outboard motors to meet the current USEPA fuel efficiency and emissions standards.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Proportion of outboard motors in use that meet USEPA emissions standards.	100%	36 months

Background

The Department of Environment and Conservation (formerly the EPA) currently adopts the USEPA emissions standards as a means of rating the environmental performance of outboard motors. Motors meeting these standards have significantly lower air and water emissions than conventional outboard motors. They are also more fuel efficient and more durable.

Australia does not manufacture any outboard motors and subsequently we have no control over the development of standards specific to Australian conditions. Fortunately the levels set in other countries is quite high, however the OEDA (Outboard Engine Distribution Association) in Australia is currently having discussions with the Department of Environment and Heritage (DEH), to form a rating benchmark (similar to energy ratings seen on electrical appliances). This will increase the marketing opportunities of manufacturers that produce motors with a lower emission rating than required by the standards and allow consumers to make choices based on environmental performance.

Noise

Action 4.2. Respect lakeside residents by minimising noise during night operations.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of reasonable complaints	0	Current and ongoing

Derelict fishing nets

Action 4.3. Continue to make old nets available for other uses before sending them to landfill. Investigate potential for recycling net material.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Number of old nets collected for re-use or recycling.	n/a	12 months and ongoing

Background

Old fishing nets can be reused for decoration, sporting field nets, or orchard protection. The WLFC already makes nets available for this purpose.

SeaNet, an environmental organisation that supports the commercial fishing industry, is currently investigating the potential to recycle old fishing gear.

Land based Co-op operations

Water

Action 4.4. Minimise water use. Measure water use to document any changes.

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Monthly water use recorded	Yes	Immediate and ongoing
WLFC staff	Annual reduction in water use	2.5%	24 months

Background

Salt water is used for the majority of cleaning and processing operations at Wallis Lake Co-op. Actions identified below aim to further reduce the amount of fresh water used.

Action 4.5. Regular checks of piping for water leaks

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	No water leaks	n/a	Current and ongoing.

Action 4.6. Continue to collect fish processing waste before hosing

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	n/a	Current and ongoing.

Background

All fish processing waste is collected and used for trap bait (see Action 4.18)

Action 4.7. Maintain trigger nozzles on fresh water hoses

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	n/a	Current and ongoing.

Action 4.8. Continue to use a tub instead of continuously flowing water when filleting.

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	Yes	Current and ongoing.

Action 4.9. Install flow restrictors/aerators on taps

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Flow restrictors or aerators installed	Yes	24 months

Action 4.10. Always use salt water for thawing

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	Yes	Current and ongoing

Energy

Action 4.11. Continue to check refrigeration door seals on a weekly basis

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	n/a	Current and ongoing.

Action 4.12. Minimise energy use. Measure energy use to document any changes.

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Monthly energy use recorded	Yes	Immediate and ongoing
WLFC staff	Annual reduction in energy use	2.5%	24 months

Action 4.13. Continue to check heat exchangers on refrigeration equipment are clean on a weekly basis

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	n/a	Current and ongoing.

Action 4.14. Install signage to ensure refrigeration equipment doors are kept closed

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Signage installed	Yes	1 month

Action 4.15. Investigate installing energy efficient lighting and reflectors

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Energy efficient lighting and reflectors installed	Yes	12 months

Action 4.16. *Install on-demand gas water heater*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Heater installed	Yes	Completed

Waste

Action 4.17. *Investigate possible uses for remaining offal associated with processing. Possible recipients may include aquaculture feed and fertilizer manufacturers.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff and SeaNet	Manufacturers contacted	Yes	12 months

Action 4.18. *Continue to use frames as trap bait*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Reduction of waste deposited in landfill	n/a	Current and ongoing.

Action 4.19. *Continue to wash and reuse polystyrene boxes*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Reduction in purchasing of new boxes	n/a	Current and ongoing.

Action 4.20. *Investigate reusable and recyclable packaging options with NSW Food Authority*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Waste minimised, packaging options investigated	Yes	Current and ongoing.

Action 4.21. *Continue to recycle all paper and cardboard, and use recycled paper.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	n/a	Current and ongoing.

Action 4.22. *Dispose of cooking oil through appropriate recycling facilities.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	N/a	Yes	Current and ongoing.

Action 4.23. *Provision of used engine oil depot.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Oil depot provided	Yes	Completed

Action 4.24. *Provision of monofilament disposal facility.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Monofilament disposal facility provided	Yes	Completed

Pollution

Action 4.25. *Install pollution trap and pump-out facilities at slipway to Department of Lands specifications.*

Responsibility	Performance indicator	Target	Timeframe
WLFC staff	Pollution trap and pump-out facility installed	Yes	24 months
OceanWatch/SeaNet and Hunter and Central Rivers CMA	Funding opportunities investigated for this action and other land based co-op operations concerning water use and/or quality	Yes	12 months

Background

Wallis Lake Fishermen's Co-op is currently developing a proposal to submit to Great Lakes Council for approval concerning a pollution trap and associated pump-out facility for the co-op slipway. At present buffers from a spill containment kit are used to prevent contaminants entering the waterway but the co-op is investigating ways that will further minimise the potential of pollution during all aspects of slipway operations.

The co-op slipway does not require an EPA licence as this is only applicable to slipways capable of servicing vessels over 25m, however the proposal will be developed with regard to the *Environmental Guideline: Best Management Practice for Marinas and Slipways*, to minimise pollutants from the facility entering the waterway and to ensure all relevant legislative requirements are met and best management practices are adopted.

Community Water Grants are available through the Australian Government Water Fund and there is potential for fish co-operatives to benefit from this program – eg. installing water efficiency devices – dual flush toilets, high pressure hoses, alternative wash down technology, water tanks, water recycling etc. Funding for actions that improve receiving water quality such as pollution traps and pump-out facilities may also be granted.

Objective 5. Recognise and protect the cultural values associated with Wallis Lake.

Other users

Action 5.1. Respect other users of Wallis Lake

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers	Complaints made to WLFC or DPI regarding conduct of WLFC estuary fishers	0	Current and ongoing

Background

Wallis Lake commercial fishers realise the importance of maintaining and promoting a harmonious relationship with the other uses of region 4 waterways, whether they be other commercial fishers, recreational anglers or tourists. Many misconceptions exist concerning commercial fishing operations and WLFC estuary fishers will be happy to educate the broader community and give a detailed explanation of their fishing operations to interested people.

Indigenous culture

Action 5.2. Respect the indigenous culture of Wallis Lake

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and estuary fishers	Conduct fishing operations with respect to the indigenous population of Wallis Lake region	Yes	Current and ongoing

Objective 6. Conduct environmental management in a transparent and cooperative manner.

EMS report and review

Action 6.1. Report on progress of EMS annually. Allow stakeholders to comment on EMS report. Review EMS annually.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and estuary fishers	Annual EMS report documented and circulated	Yes	12 months and ongoing
WLFC manager and estuary fishers	Annual EMS review conducted	Yes	Subsequent to report

Background

Continual improvement is fundamental to any EMS, and requires regular reports and reviews of the EMS.

Each year, WLFC will report on the progress or maintenance of each action in relation to its responsibility(ies), performance indicator(s), target(s) and timeframe(s).

All EMS reports and the current version of the EMS will be made available via the Ocean Watch website. The website address will be published in the local media.

Stakeholders will be informed of EMS reports and reviews (see Action 6.2).

Following circulation of the report, WLFC will review the EMS, considering

- the EMS report,
- stakeholder comments (see Action 6.2),
- an assessment of the adequacy and relevance of the policy changes in fishing technology and management, and
- emerging issues in the environmental management of Wallis Lake and its catchment.

One or more of these issues may trigger a review outside of the annual review process.

In response to a review, any part of the EMS may be changed.

Reports and past versions of the EMS will be kept as records.

Stakeholder communication

Action 6.2. Provide a process for all stakeholders to comment on the EMS generally and the annual EMS report.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager	Comments received	n/a	Immediate and on ongoing

Background

Stakeholders are those people or Agencies that are either directly involved with, or have shown an interest in, the management of commercial fishing on Wallis Lake. They include

- Department of Primary Industries (formerly NSW Fisheries),
- Great Lakes Council
- WLFC estuary fishers, and
- Community members/recreational fishers

WLFC will establish an email contact list of all stakeholders and forward EMS reports and new versions of the EMS to encourage them to comment.

WLFC will consider communication other than by email if necessary.

Community education

Action 6.3. Establish a process to give the community information on the operations and environmental initiatives of WLFC estuary fishers.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and estuary fishers	Methods may include, but are not limited to, the following - brochure - community events - Wallis Lake Pro-Am committee - media activity - EMS promotion and circulation - EMS report - others	n/a	12 months

Background

To encourage relevant and effective input, the WLFC will ensure that stakeholders are given the opportunity to become informed on the operations and environmental initiatives of WLFC estuary fishers.

Objective 7. Contribute to scientific research and management innovation relevant to aquatic environments and commercial fishing.

Science and management innovation

Action 7.1. Provide all possible information and assistance to research projects investigating fishing techniques and management of aquatic environments.

Responsibility	Performance indicator	Target	Timeframe
WLFC manager and estuary fishers	Number of projects assisted	n/a	Current and ongoing.

Background

Government agencies such as the Department of Primary Industries (DPI, formerly NSW Fisheries) and the Department of Infrastructure Planning and Natural Resources (DIPNR) are primarily responsible for research and management policies surrounding natural resources.

This EMS provides a platform to introduce and manage industry initiatives that can be effectively administered at a regional level, rather than a state or agency level.

Manning Shelf Bioregion Marine Parks

Action 7.2. Engage with the establishment of a Marine Park for the Manning Shelf Bioregion.

Responsibility	Performance indicator	Target	Timeframe
WLFC estuary fishers and manager	Active involvement in decision making processes	Yes	Current and ongoing.

Background

There is a proposal to introduce marine parks in the Manning Shelf Bioregion of which Wallis Lake is a part. The bioregion encompasses marine and estuarine environments between Stockton to the south and Nambucca Heads to the north. The proposal is currently (August 2006) at a draft zoning plan stage and submissions are being sought as part of the community and stakeholder consultation process. Zoning allocation of marine park areas involves community and stakeholder consultation and commercial fishers should be considered as a key stakeholder and information resource for the process so that it is done in an inclusive and equitable manner.

WLFC fishers support efforts to conserve marine biodiversity as they rely on the productivity of the area for their livelihood, but believe there are alternatives such as enhancing significant or degraded habitat areas and restricting lakeside development rather than excluding access to historically productive fishing grounds. Wallis Lake fishers are also concerned that if creation of the park in other areas is not met with a commensurate level of license buyout, then fishers from other areas will be forced to work in Wallis Lake if it remains open to commercial fishing. Many NSW fisheries are currently assessed by DPI NSW Fisheries as fully exploited and therefore there is little or no potential for other areas to absorb displaced effort if access to current fishing grounds is removed.

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Appendix 2. Risk Ranking

The following tables were used to generate the rankings for the risk assessment

Likelihood Ranking

Likelihood	Score	Definition
Remote	1	Never heard of, but not impossible
Rare	2	May occur in unusual circumstances
Unlikely	3	Uncommon, but has occurred in the past
Possible	4	Some evidence to suggest this may occur
Occasional	5	May occur
Likely	6	Expected to occur

Consequence Ranking

Consequence	Score	Definition
Negligible	0	Insignificant impact on env/fishery, unlikely to be measurable
Minor	1	Minimal impact on env/fishery
Moderate	2	Maximum acceptable impact on env/fishery, recovery in months/years
Severe	3	Wider and longer term impact on env/fishery, recovery in years
Major	4	Very serious impact on env/fishery, recovery in years/decades
Catastrophic	5	Permanent severe impact on env/fishery

Risk ranking (likelihood and consequence combined)

Likelihood	Consequence					
	Negligible	Minor	Moderate	Severe	Major	Catastrophic
Remote	0	1	2	3	4	5
Rare	0	2	4	6	8	10
Unlikely	0	3	6	9	12	15
Possible	0	4	8	12	16	20
Occasional	0	5	10	15	20	25
Likely	0	6	12	18	24	30

Management (EMS) Responses

Risk rank	Management response
Insignificant 0	Nil
Low 1-6	Specific management response not required
Moderate 7-12	Specific management response required
High 13-18	Specific management response required very soon
Extreme 18-30	Specific management response required immediately

Appendix 3. Risk Assessment

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
Pre-fishing	Refuelling	Fuel spillage	Failing to follow correct procedure	1	- Loss of habitat - Reduced WQ	1	1			- Tanks filled at service stations and co-op, very rarely done near water - environ certified fuel supplier
	Travelling to fishing grounds	Interference with migratory bird habitat	Travelling near migratory bird habitat	1	Loss of biodiversity	1	1		- Work with Shorebirds Association and/or similar - Compile info on migratory bird habitat in open waters - develop guidelines to minimise impact - pass on to other users	Migratory bird habitat thought to be in closed waters
	"	Boat wash damaging banks	Travelling at mid-speed	3	Loss of habitat, sedimentation of water, reduced WQ	2	6		Large fishing boats (very rare) to travel at less than 4 knots	- Generally EG fishing boats are small and light, and rarely travel at mid-speed
	"	Water pollution	Emissions from motors	3	Reduced WQ	1	3		Introduce EPA approved engines	- Some "old-timers" may need some time to change over - EMS incentives scheme can subsidise - Current fuel prices reduce unnecessary use

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
Fishing	All methods	Interference with migratory bird habitat	Fishing near migratory bird habitat	1	Loss of biodiversity	1	1		<ul style="list-style-type: none"> - Work with Shorebirds Association and/or similar - Assist in compiling info on migratory bird habitat in open waters - Pass on to other users 	Migratory bird habitat thought to be in closed waters
	"	Interaction with cetaceans, turtles or threatened species, populations and ecological communities	Random interaction		Stress on animals			Reporting to DPI	<ul style="list-style-type: none"> - Formal commitment to release animal without harm - Process to alert other fishers to incident 	
	"	Harm cetaceans, turtles or threatened species, populations and ecological communities	Knowledge gaps in fishers on ID and handling	4	Unnecessary harm	1	4	Basic education by DPI NSW	<ul style="list-style-type: none"> - Invite NPWS to present to fishers on local issues - Copies of TS books and ID cards circulated to fishers 	
	"	Transfer marine pests	Nets/boats "infected" in other estuaries and then used in Wallis Lake	1	Marine pests introduced	3	3	<ul style="list-style-type: none"> - Regulations - Zoned licences 	Marine pest ID material circulated	<ul style="list-style-type: none"> - Very unlikely - many rec users more likely to travel greater distances

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	"	Scavenging by birds	Presence of birds	6	- Increased mortality of bycatch - Loss of catch	1	6	- Discard chutes must be used for meshing and flathead nets	- Investigate effectiveness of chutes - investigate methods such as tuna oil	In some circumstances chutes condense released bycatch creating easy prey for birds
	Prawn hauling	Bank/seagrass damage	- Accessing bank - Hauling back to bank	0	Loss of habitat, sedimentation of water	3	0	- Prawn hauling prohibited in vicinity of all seagrass - all fishers use anchor out method		- Likelihood = 0 because all fishers use anchor out method, i.e. net is hauled back to a boat in body of lake where seagrass is not found - prawns not caught in seagrass
	"	Unacceptable levels of bycatch	Presence of non-target individuals	1	Unnecessary impact on stocks	1	1	- Anchor out method lowers already very low bycatch rates		- Bycatch known to be low for prawn hauling - even lower for anchor out method
	"	Unacceptable levels of small prawns caught	Presence of small prawns	5	Unnecessary impact on stocks	1	5	- Most fishers use 32mm mesh instead of the regulated 30mm - "Gentlemen's agreement" on not weighing in small prawns	- Further investigate use of square mesh codends - Encourage all fishers to "wash" prawns	- Prawn counts to be observed by DPI - The process of "washing" prawns is effective at removing small prawns and bycatch from conventional diamond mesh

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	Fish hauling	Bank/seagrass damage	- Accessing bank - Hauling back to bank	3	- Loss of habitat and seagrass - Sedimentation of water	2	6	- Regulations on net length (500m in lake, 375m in rivers) and haul line length, mesh size, 1 shot/day - Generally avoid seagrass as fish able to escape through weed as lead-line is held off bottom	- Minimise haul shots over weed - No hauling over <i>Posidonia</i> - monitor seagrass beds (potentially a uni honours project)	DPI NSWf soon to introduce designated haul sites in cooperation with fishers
	"	Unacceptable levels of bycatch	- Presence of non-target individuals - Mesh size	6	Unnecessary impact on stocks	1	6	Continue to sort catch in water	Increase mesh size (subject to DPI NSWf approval)	- Vast majority of bycatch encircled in net and is returned alive as sorting done in water - Meshed bycatch is more of a concern as return requires significant handling
	Mesh netting (including flathead netting)	Habitat damage	Net set over habitat	1	Loss of habitat	1	1			Net is very light, does not move, and sits gently on bottom (if at all), hence unlikely to cause any damage

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	"	Unacceptable levels of bycatch	Presence of non-target individuals	1	Unnecessary impact on stocks	1	1	Regulations on net length (725m) and height (0.8m) for flathead mesh size as well as duration net can be set	- Set nets in accordance to regulations - Encourage all fishers to sort in water so bycatch survival is high	Bycatch low as mesh nets require fish to be caught in mesh, they are highly size and species selective
	Seining (prawns)	Habitat damage	Net set over habitat	1	Loss of habitat	1	1	Not permitted near seagrass		
	"	Unacceptable levels of bycatch	Presence of non-target individuals	2	Unnecessary impact on stocks	1	2			Bycatch generally low
	Bullringing (garfish)	Habitat damage	Net set over habitat	1	Loss of habitat	1	1			Net does not touch the bottom so no habitat damage
	"	Unacceptable levels of bycatch	Presence of non-target individuals	1	Unnecessary impact on stocks	1	1			- Bycatch very low as shoals of garfish are targeted, Silver Biddies sometimes caught - Sorted in water so bycatch survival is high
	Set pocket netting	Habitat damage	Net set over habitat	1	Loss of habitat	1	1	- Done over sand - Net does not move		

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	“	Unacceptable levels of bycatch	Presence of non-target individuals	2	Unnecessary impact on stocks	1	2	- Generally very low - Stop when fish start to come on		
	“	Unacceptable levels of small prawns	Presence of non-target individuals	3	Unnecessary impact on stocks	1	3	Prawn count legislation	- Encourage all fishers to “wash” prawns - Further investigate use of square mesh codends	The process of “washing” prawns is effective at removing small prawns and bycatch from conventional diamond mesh
	Trapping	Habitat damage	- Traps laid on habitat	2	Loss of habitat	1	2			Traps do not move so only small “footprint” of impact
	“	Unacceptable levels of bycatch	- Non-target species entering traps	2	Unnecessary impact on stocks	2	4		- Release Estuary Cod - Weld mesh used for nozzles to stop shags entering traps	-Bycatch generally low for trapping -Recent amendments to legislation allows for buoyant rings to be used in eel trap codends to reduce bycatch mortality
	Cultural issues	Fishing offensive to indigenous culture	Unaware of customs	1	Offend indigenous people	3	3	Conduct fishing operations with respect to indigenous population		

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	"	Conflict with amateur fishers and other waterway users	Disrespect	3	Public opposition	1	3		- All fishers to show respect for shared resources - Refer all concerns/comments to EMS process	
Post-fishing	Engine maintenance and efficiency	Unnecessary burning of fossil fuels	Inefficient motor	3	- Poor use of resources - Emissions - Costs	1	3	Ensure motors running as efficiently as possible	Introduce EPA approved motors	- May take "old timers" some time to change over - Current fuel prices reduces unnecessary use
	Old net disposal	Unnecessary use of landfill	Old nets disposed of rather than recycled	6	- Use of precious landfill space	2	12		- SeaNet working to ID net recyclers - Investigate use by orchard farmers or for decorations	
	Hull maintenance	Water pollution	Inappropriate chemicals used	1	Poor WQ	1	1	Wash with fresh water	Major cleans with chemicals done away from water	Safe food regulations specify that bleach should be used for cleaning. This increases the chance of contaminants entering the waterways
	Boat cleaning	Water pollution	Inappropriate chemicals used	1	Decreased WQ	1	1	- Very little boat cleaning with chemicals - Mainly just fresh water - Rarely done on water		Must work within NSW Food Authority regulations and DEC regulations

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	Oil disposal	Water pollution, ground water pollution	Oil disposed of inappropriately (i.e. down drain, onto ground)	1	- Decreased WQ - loss of habitat	2	2	Oil depot at Wallis Lake Co-op		Oil disposal often responsibility of premises where serviced
External risks	Illegal fishing	- Stock declines	- Unmanaged impacts on stocks	6	- Uncontrolled impacts on ecosystem - stock declines blamed on commercial fishers	3	18	Recent report on illegal fishing	Report incidents of illegal fishing to DPI 1800fisherieswatch	Black market fishers operate above management and regulatory restrictions, can have detrimental effect on stocks
	Rec boating	Boat wash damaging banks	- Travelling at mid speed - wake boats	6	Loss of habitat, sedimentation	3	18	- Ski zones	- Lobby waterways for no wash zones	MoU exists between various user groups on the Wollamba River
	"	- Infringe on migratory bird habitat	Proximity of fishers and boaters	3	Loss of biodiversity	1	3		Share guidelines with other users	
	"	Damage to seagrass	- Knowledge gaps - access and anchoring	6	Loss of habitat	2	6	Harm to marine vegetation regulated by DPI	Encourage hire boat companies to issue maps on seagrass areas	
	Urban runoff	Poor WQ	Pollutants on roads and gutters	6	Broad ecosystem damage	2	12	Laws	- Representation on EMC - Support CMP initiatives	

Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	Ag runoff	Poor WQ, sedimentation	Poor farming practice	6	Broad ecosystem damage	2	12		- Representation on EMC - Support CMP initiatives	
	Pollution	Poor WQ	Licensed (unlicensed?) discharges	3	Broad ecosystem damage	2	6		- Feed into existing works, or initiate new WQ testing studies - report incidents	
	Development, drainage and reclamation	Loss of habitat, sedimentation, poor WQ, ASS activation	Inappropriate land mgt.	6	Ecosystem damage	3	18	Development control, erosion control	Report pollution incidents	
	Littering	Litter in waterways	Poor behaviour	5	Loss of habitat, direct impact on marine life (ingestion etc.)	1	5	POEO fines	- No littering/retain collected litter Remove abandoned traps	
	"	Bird and animal entanglement	Litter and fishing line in waterways	2	Bird death	1	2		Report entanglements	
	Vegetation and riverbank quality	Poor quality	Poor management	3	Sedimentation, loss of habitat, poor WQ	2	6	Laws	- ID poor quality riverbanks - assist/initiate rehabilitation works - lobby for no wash zones	
	Sewerage treatment plants discharge	Poor WQ, nitrification		6		2	12	Discharge licences	- Representation on EMC - Support CMP initiatives	

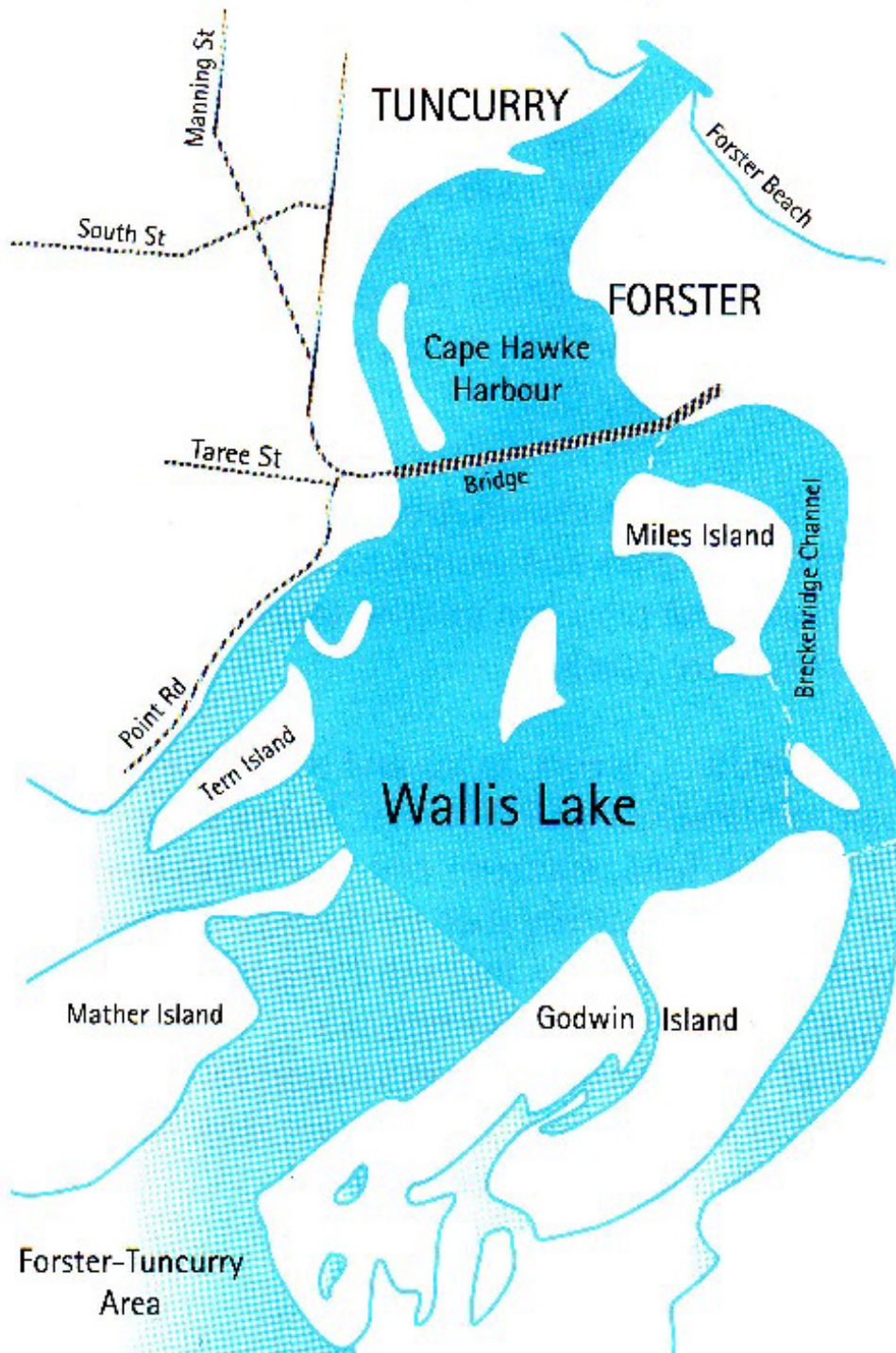
Aspect	Activity/issue	Risk	Cause of risk	Like'hd (rank)	Impact	Cons. (rank)	Risk rank	Current control measures	Additional control measures in EMS	NOTES
	Water extraction	Insufficient environmental flows (esp. in drought)	Poor water allocation decisions	4	Broad ecosystem damage	2	8	Water sharing plans	Submissions to Catchment Management Authority	
	Scientific knowledge gaps	Poor mgt	Necessary information not gathered	4	Fishery operating at less than best practice	2	8	Scientific research ongoing	<ul style="list-style-type: none"> - Fishers assist research - Advise scientists of potential/needed research topics -Inform Fisheries Officers of any 'unusual' sightings 	NSWF responsibility

Appendix 4. Wallis Lake waters closed to commercial fishing

CLOSED WATERS



The only methods permitted are rod & line, handline, bait trap, prawn scoop-net.



Adapted from the NSW Fisheries production: *Fishnote*, December 2001

NATIONAL BEST PRACTICE GUIDELINES FOR DOMESTIC COMMERCIAL FISHING VESSELS IN RELATION TO MANAGING MARINE PESTS

The key to preventing marine pests from entraining (ie. attaching to), or being translocated (ie. moved around) by fishing vessels is good vessel maintenance, cleanliness and effective antifouling. The following biofouling guidelines are intended to assist vessel owners, skippers, engineers and crews to apply best management practice to reduce the risk of entrainment and translocation of marine pests, regardless of their origin, through fishing industry activities.

Biofouling means the attachment of marine organisms to any part of a vessel, or any equipment attached to or on board the vessel, aquaculture equipment, mooring devices and the like.

A: VESSEL MAINTENANCE

1. Maintaining non-trailerred vessels and vessels that have Raw Water internal water systems (IWS):

- a. Clean and scrape hull
 - i. Conduct hull scraping at a designated on-shore facility (e.g. marina or slipway with waste trapping facilities).
 - ii. Contain all biological matter that is removed from the vessel and all water that is used for cleaning. Dispose of it using onshore waste management services, as it must not be returned to a waterway.
 - iii. Discourage in-water cleaning by diving or careening (see the *Code of Practice for Antifouling and In-water Hull Cleaning and Boat Maintenance* (ANZECC⁴ 1997)).
- b. Clean, and dry if possible, potential refuge spaces that could harbour pests. (e.g. live wells, anchor wells, propellers, sacrificial anodes, strainer boxes, around external keel pipes, raw water intakes, sea chests etc).
- c. Inspect and clean, and dry if possible, gear & equipment, including a freshwater rinse of topside spaces that could harbour pests (e.g. anchor wells).
- d. Treat IWS by physical cleaning at access points and by periodic flooding with freshwater.
 - i. Clean IWS intakes on the slip.

⁴ Australia and New Zealand Environment and Conservation Council

- ii. Remove biological matter from the system at access points such as strum boxes.
- iii. Flood IWS with freshwater to kill inaccessible entrained organisms. This can be done by flushing the raw water system with freshwater while a vessel is out of the water.
- iv. NIMPCG best practice protocols to be added once finalised
- e. If vessel is immobile for a prolonged period, assess the effectiveness of antifouling coating. Clean and re-apply if necessary just prior to proceeding to sea.

2. For vessels that use antifouling coatings:

- a. Select the best antifouling coating system appropriate for your vessel based on:
 - vessel operating location (tropical vs temperate)
 - vessel type/operating conditions;
 - vessel construction (e.g. wood, steel, aluminium); and
 - voyage profile.

Consult your supplier for advice. Remember antifouling products containing tributyltin (TBT) cannot be used in Australia.

- b. Surfaces not usually antifouled (such as propellers) can be coated with commercially available greases or other coatings specified for this application to help keep them clean.
- c. Apply and remove antifouling products at approved facilities.
 - These premises should comply with the *Code of Practice for Antifouling and In-water Hull Cleaning and Boat Maintenance* (ANZECC⁵ 1997)
 - Procedures for applying and removing antifouling products should be in accordance with manufacturer's instructions and also follow the ANZECC Code.
- d. Apply antifouling coatings with appropriate frequency.
 - Antifouling should be renewed according to the "lower duration of the period of effectiveness specified by the manufacturer", i.e. in the case of a paint specified by the manufacture to be effective for 12-18 months from its date of application, that paint should be reapplied at 12 months after its application.
- e. Keep relevant records.
 - Keep records of hull maintenance and antifouling coatings in the vessels operations and maintenance manuals. Records may include antifouling product invoices (brand and type), place and date of application, date for renewal and a record of any official inspection carried out (survey).

⁵ Australia and New Zealand Environment and Conservation Council

3. Disposing of Wastes and Effluent from hull maintenance activities:

- a. Contain biofouling and antifouling runoff
 - i. Use facilities that have waste containment receptacles built in.
 - ii. All biofouling removed during hull cleaning must be contained, collected, treated and disposed of appropriately (see below).
 - iii. Never release a known marine pest back into the water.
- b. Dispose of biofouling and antifouling runoff in waste facilities
 - i. Water contaminated by fouling organisms should not be allowed to run back into the marine environment.
 - ii. If cleaning in a marina or boatyard, make use of facilities provided for waste disposal (e.g. bins).
 - iii. If conducting hull servicing independently, collect and dispose of waste to an appropriate site after gaining relevant permits.
 - iv. Try to select slipping facilities for vessel maintenance that have waste and runoff collection and disposal facilities.

4. Actions for trailer vessels:

- a. Check for, and remove entangled or attached biological matter from the boat and trailer (eg seaweeds). Dispose of this matter in bins or landfill so that it cannot return to the water.
- b. Check outboard and hull fixtures for water that could harbour potential pests (eg. Trim outboard down to let water out of gearbox housing).
- c. Rinse the boat inside and out with fresh water, drain and allow to dry if possible.
- d. Periodically remove slime from the hull to prevent the build-up of heavier secondary biofouling.
- d. Never release a known marine pest back into the water.

B: VESSEL OPERATIONS

5. During normal deck activities:

- a. Clear decks and any refuge areas on deck that may harbour a pest, such as spaces under winches and around deck fittings.
- b. Clean and dry mooring lines that have biofouling attached.
- c. Clear warps and anchors of biological matter and mud/sand as they are hauled.
- d. Periodically clean anchor and chain wells and lockers.
- e. Rinse vessels with fresh water whenever possible.
- f. Never release a known marine pest back into the water.

6. During fishing activities:

- a. Divers ensure that biological material entangled in dive gear is not transported to other sites.
 - b. Rinse trailer vessels with fresh water if moving between locations within 48 hrs.
 - c. Use locally sourced bait wherever possible to prevent the introduction of pests and diseases.
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- d. Return bycatch to the sea as near as possible to the point of capture where it is legal to do so.
 - e. Retain bycatch on board if cleaning gear away from fishing grounds if it is legal to do so. Keep it as ordinary rubbish.
 - f. Dispose of bycatch in land based facilities if cleaning gear in port.
 - g. Be aware of encounters with unusual organisms, known pests or potential pests that may lead to the accidental movement of species.
 - h. Never release a known marine pest back into the water.
 - i. Foreign fishing vessels should adhere to AQIS protocols on international small vessels.
7. Managing the use of raw water, including brine tanks, live tanks and wells, and ballast systems.
- a. Ballast systems should be managed in accordance with the Australian Ballast Water Management Framework, including relevant Australian Government and State/Territory legislation.
 - b. Ballast water, including brine tank water should be exchanged offshore so that water collected from one port is not discharged into another port.
 - c. If water is transported long distances for any reason, effort should be made to exchange in an offshore location (high risk of translocation in water transported between ports).
 - d. Live tanks, live wells and well holes should be regularly checked for marine life and cleaned if necessary.

C: MONITORING AND EMERGENCY RESPONSES

8. Emergency pest incursion situations

- a. If a pest incursion occurs, additional measures such as reporting of voyage plans or restrictions to specific ports or areas may be required. These would be broadcast by relevant state authorities and may be managed on a fleet-by-fleet basis. You will be informed of the details of the particular pest and the incursion.
- b. You may be enlisted to help in the event of a response to an emergency situation (a pest outbreak) eg. abalone divers in clearance activities

9. Reporting interactions with Marine Pests.

- a. Be able to identify known pests and report any new sightings of these species or any other unusual species to the relevant authority.
 - b. Be aware of pest infestations in your fishing areas and undertake measures to minimise the risk of translocating these species.
 - c. If in doubt, keep a sample of the pest of concern. Freeze the specimen and hand it to a fisheries or wildlife officer as soon as possible.
 - d. Time, date, location, depth and population details should be recorded when a suspected incursion in a new area is noticed.
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