

FISH PROTECTION MEASURES

to ensure Fish For The Future

by
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FISHERIES MANAGEMENT PAPER No. 141



FISHERIES
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June 2001

ISSN 0819-4327

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1.0 INTRODUCTION

1.1 General

Western Australia has a long coastline which spans 12,500 km, located in both tropical and temperate climatic regions and home to a rich diversity of aquatic animals, plants and habitats. Over 1,500 fish species are recorded in the State's waters, many of which occur nowhere else in the world. As our aquatic environments are facing increasing pressure from a wide variety of user groups, great importance must be placed on protecting these values, to ensure their conservation, now and in the future.

The protection of Western Australia's aquatic animals, plants and habitats is important for many reasons. Fish, and many aquatic invertebrates, have significant commercial, recreational and social importance. Aquatic habitats provide food, refuge and breeding areas for fish and other animals. In addition, some habitats, such as rocky reefs and seagrass meadows, act as nursery sites for juvenile animals. Some habitats and their inhabitants (such as coral reefs) also have aesthetic values which support economically and socially important industries, such as tourism.

Fish Protection Measures (FPMs) play a key role in protecting and enhancing these values in Western Australia. Fish Protection Measures use regulations under the *Fish Resources Management Act 1994* to control fishing and associated activities and some other human activities which may damage the aquatic environment. The system of measures is diverse in its nature and capabilities - a necessary element of a system which is to be applied to such a diverse range of situations.

Fish Protection Measures are a different category of protection from Marine Conservation Reserves, such as the Shark Bay and Marmion Marine Park. Both Fish Protection Measures and Marine Conservation Reserves have significant conservation value and together they form an holistic management arrangement.

1.2 Purpose of this Document

This paper will:

- Explain the roles and responsibilities of Fisheries WA's aquatic resource protection and management in Western Australia;
- Outline the policy framework for the establishment of Fish Protection Measures;
- Discuss the objectives and functions of Fish Protection Measures and the relation between the objectives and the design of measures;
- Provide examples of the diversity of Fish Protection Measures used in Western Australia.

2.0 ROLES AND FRAMEWORK FOR MARINE CONSERVATION IN WESTERN AUSTRALIA

2.1 Roles and Responsibilities

Fisheries WA is responsible for the management of the State's fish resources and pearling industry. It is also responsible for the management of the majority of fish resources within the Western Australian sector of the Australian Fishing Zone (200 nm from the WA coast) through the Offshore Constitutional Settlement (OCS) arrangements with the Commonwealth Government. Fisheries WA administers two Acts of Parliament - the *Fish Resources Management Act 1994* and the *Pearling Act 1990*.

Under the Fisheries legislation, 'fish' refers to all aquatic organisms of any species excluding mammals, reptiles, birds and amphibians. Thus, Fisheries WA manages and is responsible for a great range of organisms in addition to finfish, including, coral, algae, crustaceans, molluscs and many more.

The proclamation of the *Fish Resources Management Act 1994* has enabled Fisheries WA to take a more pro-active role in the environmental management of marine, estuarine and freshwater aquatic ecosystems. This role is fostered by the Fish & Fish Habitat Protection Program, established to become directly involved in environmental management on behalf of the community.

The Fish & Fish Habitat Protection Program is one of four programs operated by Fisheries WA. The other programs are Commercial Fisheries, Recreational Fishing, and the Aquaculture & Pearling Program. The Fish & Fish Habitat Protection Program works closely with the other programs to ensure that environmental protection, ecological sustainability and habitat protection are incorporated in the management of all fishing and aquaculture activities.

All Marine Conservation Reserves are vested in the Marine Parks and Reserves Authority. The Authority's prime role is to oversee the development of marine reserve policies and management plans. The Department of Conservation and Land Management (CALM) manages the reserves vested in the Marine Parks Reserves Authority, and is responsible for preparing and implementing management plans for each conservation reserve. In addition to the management of marine reserves, CALM has specific responsibility for the management of aquatic organisms which are not defined as 'fish' under the *Fish Resources Management Act 1994* - that is, birds, reptiles, mammals and amphibians.

Fisheries WA manages all recreational and commercial fishing, pearling and aquaculture in marine conservation reserves.

2.2 Policy Framework for the Development of Fish Protection Measures (FPMs)

As stewards of the State's fish resources, Fisheries WA have a particular responsibility to lead and coordinate the development of appropriate sustainable management mechanisms. This is illustrated in Fisheries WA's strategic direction (as stated in the 1997-2002 Strategic Plan), which is 'enhanced environmental management and protection of the aquatic environment in response to growing human populations and increasing activities in, or near, the State's estuarine and marine ecosystems'.

In the development of FPMs around the State, Fisheries WA has demonstrated its commitment to, and fulfilment of obligations under state, national and international agreements and policies. These are outlined below:

Fish Resources Management Act 1994

The creation and management of FPMs provides mechanisms to fulfil the objects of the *Fish Resources Management Act 1994*, in particular the following:-

1. to conserve fish and to protect their environment;
2. to ensure that the exploitation of fish resources is carried out in a sustainable manner; and
3. to enable the allocation of fish resources between users of the resource.

Australia's Oceans Policy

The creation of FPMs aid in achieving the vision for Australian's oceans, as stated in the Australia's Oceans Policy (Commonwealth of Australia, 1998) - 'Healthy oceans: cared for, understood and used wisely for the benefit of all and in the future'.

State of the Environment Report for Western Australia

FPMs contribute to the fulfilment of the following objectives, relating to the issue of degradation of marine habitats, in the State of the Environment Report for Western Australia (Department of Environmental Protection, 1998):

- ensure there is no further significant human-induced loss or degradation of marine habitats;
- ensure that the management of all marine habitats is ecologically sustainable; and
- to protect and enhance all environmental values of marine habitats.

Fisheries WA considers these overriding principles and objectives when developing FPMs.

3.0 FEATURES OF FISH PROTECTION MEASURES AND THEIR BENEFITS

3.1 Features of Fish Protection Measures

There are hundreds of Fish Protection Measures currently operating in Western Australian waters. Although the design, objectives and features of these measures are quite diverse, they may be categorised on several basis, including:

- their size and spatial extent;
- whether they are species specific or activity specific, and
- according to their primary objectives.

3.2 Size and Spatial Extent

With respect to the size and spatial extent, there are two main categories of protection. These are ‘defined-boundary measures’ and ‘state-wide measures’. As the name suggests, ‘defined-boundary measures’ are those in which fishing activities are managed in a particular area. The size and shape of the area is determined by the features of the habitat or species to be protected, and on the objective of the measure. These types of measures are a form of what are commonly known as ‘marine protected areas’.

‘State-wide measures’ are restrictions which apply throughout all of Western Australia’s waters. These include the total prohibition of the undertaking of certain activities and the prohibition on the taking of certain species. In terms of abundance, ‘defined-boundary measures’ are currently far more numerous than ‘state-wide measures’.

3.3 Species Specific or Activity Specific

FPMs may be species specific or activity specific. Species specific measures control the taking of a particular species, or type of aquatic organism. Activity specific measures prohibit a certain fishing activity, e.g. dredging. These two types can be used together, for instance, where catching of a fish species using a certain fishing gear, is prohibited.

3.4 Primary Functions

FPMs can be separated based on their primary objective. In fact, the answer to the question - “Why manage this area/species/habitat?” is the most important element in the process of developing protection measures. In order to answer this question, details will be required about the values of the area or species, biological and ecological characteristics of the area or species to be managed, the user groups associated with this, and the current and future threats. This information is used to develop the objective and primary function of the measure, and to determine how best to meet those objectives.

Fisheries WA establishes FPMs with a variety of objectives including:

- Conservation - to protect or conserve fish, habitats, areas or other values;
- Stock management - to ensure the sustainable harvesting of a species or group of species; and/or to ensure resource sharing of a stock;
- Scientific study - to allow for the scientific investigation of fish and fish habitats; and

- Observation and ecotourism - to provide areas for the appreciation of natural areas through observation and ecotourism pursuits.
- Health Protection - to protect the health of people against contaminated or inedible fish.

A comparison of measures established under each functional groups is provided below:

3.4.1 Conservation

Fisheries WA is responsible for the conservation of all fish species (refer to Section 2.1 for definition) in Western Australian waters. Protection measures which fulfil conservation objectives include state wide prohibitions of the taking of vulnerable species and state wide bans on the use of destructive fishing gears, for example, scallop dredges, poisons and explosives. Other types of measures which are designed for conservation purposes include the protection of important nursery and spawning habitats, the protection of threatened habitats (for example, intertidal reef communities), and the protection of habitats of vulnerable species (for example Whale Sharks and Leafy Sea Dragons).

3.4.2 Fisheries Management

Fisheries WA manages the stocks of recreationally and commercially important fish species. There are two key objectives under fisheries management. The first is to achieve an sustainable yield. Sustainable yield is based on the idea that given certain management arrangements, a given amount of fish should be able to be harvested each year, without depleting the population. FPMs which serve the purpose of achieving an ecological sustainable yield include those which protect nursery grounds to ensure juveniles survive to the reproductive phase, those which prevent the taking of undersized fish to allow them to reach sexual maturity prior to harvesting, and measures to restrict the number of fish taken to ensure a base population to produce new recruits for future seasons.

The second objective of fisheries management is effective resource-sharing. The fish in Western Australian waters belong to all Western Australians, although we tend to use this resource in different ways. For example, to a commercial fisher the fish are a source of income. But to divers, fish are part of the visual experience associated with this underwater sport. Given the number of user groups, it is necessary to implement measures which ensure the resource is shared fairly, both within and between members of the various user groups.

Measures designed to promote resource-sharing or 'partitioning' include setting aside separate defined areas for recreational and commercial fishers, defining the type of gear that may be legally used in a fishery and placing quotas on the number of fish that can be taken per person or licence.

3.4.3 Observation

Areas of Western Australian waters have been set aside to allow the general public the opportunity to enjoy and appreciate Western Australia's marine environment through observation.

Areas protected from fishing for observational purposes may achieve supplementary conservation objectives through providing a refuge for certain species. Well known examples of measures established for the primary function of observation are the Reef Observation Areas of the Abrolhos Islands and the *HMAS Swan* wreck off Dunsborough.

3.4.4 Scientific Study

Without a doubt, one of the biggest obstacles to the effective management of Western Australia's marine resources is the lack of data on which to base important management

decisions. This is not a problem unique to Western Australia. Protection measures of various kinds allow comparisons to be made of various areas in order to determine the effectiveness of such management measures. Although no FPM has been introduced in Western Australia for a purely scientific purpose, monitoring and scientific study is carried out within the development of these measures.

3.4.5 Health Protection

Fisheries WA prohibits harvesting of fish stocks suspected to be contaminated. Recent examples include closing fishing in Cockburn Sound in 1999 following the detection of an arsenic spill, and the closure of fishing in the Swan River estuary in 2000 during a toxic algal bloom.

3.2 Instruments for designing a Fish Protection Measure

The *Fish Resources Management Act 1994* provide Fisheries WA with a number of instruments which form the basis of the development of Fish Protection Measures. The instruments fall into three categories - input controls, output controls and other measures.

Input controls use mechanisms to control how you fish or where you fish. Specifically, these are:

- gear restrictions;
- effort restrictions; and
- temporal (time) controls.

Output controls directly regulate the amounts and type of fish that may be taken. Output controls may be used to manage a given species by controlling the number of fish which may be harvested.

Apart from input and output controls there are several other instruments which can be used to develop FPMs. These include:

- prohibiting the take of individuals in certain life stages through imposing size limits and other controls;
- prohibiting harvesting for commercial purposes; and
- total protection of species from harvesting.

The nature of each instrument is discussed in Chapter 4.

3.3 Process for a Fish Protection Measure

The process for developing a FPM is relatively simple. An example of the operation of this process is depicted in the Figure 1 - Flow Diagram of Process for Establishing an FPM at Cowaramup Bay.

The process commences with identifying a need to manage a particular value (step 1). From undertaking investigations into the biological and physical characteristics, user groups, and value, and threats (step 2), the primary function of the proposed measure to protect the value can be determined (step 3). Based on the primary function and a knowledge of the issues, a clear and specific objective for management can be established (step 4). Consulting with user groups about the proposed fish resource protection measure (step 5) is an important element in the process. This step generally involves advertising the proposal, writing and liaising with relevant stakeholders, and considering the views expressed by these groups in the

determination of the final management action. This completes the most crucial part of the planning process.

Following this, instruments are selected which can most effectively achieve the defined objective (step 6), and the design of the measure is finalised and formalised (step 7).

Figure 1 - Flow Diagram of Process for Establishing an FPM at Cowaramup

STEP 1

Identify the Need

Locals concerned about overuse and damage to Cowaramup Bay Reef Areas

STEP 2

Gather Background Information & Assess Situation

Through consideration of physical and biological features of the reef area, the user groups, the values and threats to the area, it was determined that the community wanted to conserve the area for observation. It was determined that the main threat to this value was the overturning of rocks and the removal of reef top organisms such as urchins, and octopus and algae.

STEP 3

Determine Primary Function

From the information gathered in Step 2, it was determined that maintenance of the reef top for OBSERVATION was to be the primary function of the measure, although it was likely that other values of the area would also be maintained, and as such a dual function of conservation was recognised.

STEP 4

Establish the Objective

From the understanding gained in Step 2, and with the overriding function of OBSERVATION, the following objective was established - "To preserve the reef top ecosystem for observation by tourists and for educational purposes, by preventing damage caused by people overturning rocks and harvesting benthic organisms during low tides."

STEP 5

Consultation

The proposal to establish a closed area was widely advertised in the local papers and the West Australian. The local community obtained letters of support for the proposal from a number of state and local government agencies and other government organisations. In addition, they collected a petition reflecting strong support for the proposal.

STEP 6

Select Appropriate Instrument

It was determined that the overturning of rocks was the major threat. As this activity is mainly associated with foraging and harvesting, it was determined that prohibiting fishing through foraging would prevent this threatening activity.

STEP 7

Determine the Measure

The resultant measure is "a person must not engage in fishing in Cowaramup Bay other than for Abalone, Blue Manna Crabs, Cuttlefish, Finfish, Rock Lobster and Squid."

3.4 The Benefits of Fish Protection Measures

There are several benefits of the Fish Protection Measures which allow the system to have far reaching applications. These are outlined below:

3.4.1 Tailor-made

The planning and development of an effective FRPM involve consideration of the ecology and biology of the species or habitat to be managed, and current or potential threats. The variety of instruments which are available provides for a system which allows the protected areas to be created in a manner which is consistent with the intended function and objective. This detailed analysis is important because this allows the design of protective mechanisms to reflect an understanding of the biology of the species, fishing and other environmental pressures and/or the ecology of the habitat to be managed.

3.4.2 Flexibility

Fish populations may be highly variable and change markedly in numbers and distribution from year to year. FPMs have the flexibility to be altered from time to time to reflect changes which may enhance the protection and management of fish species and their habitats.

3.4.3 Reduces the Need for Complete Closures

During the planning of FPMs, all potential activities are assessed and determined if they are in conflict with the intended function and objectives. FPMs can allow areas to be created which protect certain values, while still allowing other fishing activities to continue so long as they are compatible with the objectives. This approach reduces the need to completely close areas to all forms of fishing.

3.4.4 Multiple Benefits

Some FPMs may have multiple benefits. For example, prohibiting fishing around the spawning ground of a commercially important species can contribute to the conservation of the spawning grounds for other species which use the area.

3.4.5 Versatility

The many instruments which are used to create FPMs have a number of applications. For example, some instruments, which have traditionally been used for the purpose of fisheries management for many years, are now being used for the purpose of species and habitat conservation. Also, each of the instruments may be employed independently or in combination with others, to create a measure which best meets the requirements of each unique situation.

4.0 RELATING INSTRUMENTS TO MEASURES

4.1 General

This section describes the diversity, nature and application of instruments and FPMs. For each instrument a description of the capabilities is provided followed by a table which displays the diversity of measures which can be achieved with the instrument. The table has the following format:

- **Column One:** Functional Group States the range of primary functions which can be achieved.

- **Column Two:** Objective States the range of specific objectives.

- **Column Three:** Explanation Provides a rationale for the establishment of a measure to achieve the given function and objective.

- **Column Four:** Example Provides an example of the application of the measure in Western Australian waters.

4.2 Input Control Measures

4.2.1 Gear Restrictions

Gear is the term which refers to the equipment, implement, device or apparatus used for, or in connection with, a fishing operation (for example, trawl nets, gill nets, hook lines, crab pots). Fisheries WA can control the types of gear that can be used to fish either in a particular area, or for a particular fish. Examples of gear restrictions include:

- specifying legal mesh size on a trawl net;
- specifying the number of hooks permitted on a long line;
- specifying the construction of a crab pot.

In the extreme circumstance, a gear type can be totally prohibited.

Gear restrictions are applied to all forms of fishing including recreational fishing, commercial fishing and aquaculture, and are enforced statewide or within defined areas, including particular habitats, licence areas (in the case of commercial fishing) and other areas as necessary.

4.2.2 Effort Restrictions

Effort is the amount of fishing taking place, usually described in terms of gear type and frequency or period for which it is used e.g. 'number of hook sets', 'trawl hours', 'searching hours'.

Effort is closely related to other instruments, as it is a function of a range of other fishery parameters including:

- boat/nights operated;
- boat size and capability;
- engine horse power;
- design and condition of gear;
- quantity of gear (e.g. number of crab pots), and
- skill and experience of skippers and crews.

Improvements in technology has meant that increasing fishing effort is being applied to stocks globally. For example, navigational and eco-sounding equipment have increased the ability to locate and catch schools of fish, and commercial fishing boats have become bigger allowing more fish to be stored on board and allowing fishers to fish for longer and further afield.

This increased efficiency places threats of overfishing on many of our fish populations. Fisheries WA uses controls on the amount of effort permitted to be extended, in order to indirectly control the amount of fish taken.

Input Controls - Gear Restrictions

FUNCTION	OBJECTIVE	EXPLANATION	EXAMPLE
Conservation	To prevent destruction of habitats	Some gear can have destructive influences on certain habitats. Alterations of habitats may have negative effects on the many species that use that habitat either for shelter, food, protection for their juveniles and a variety of other purposes. Gear restrictions can be applied in areas to control these impacts.	<ul style="list-style-type: none"> Dredging, the use of dynamite and cyanide, all of which are highly destructive means of fishing, are prohibited in all WA waters. Areas of seagrass within Shark Bay have been set aside as nursery grounds in which no trawling is permitted to prevent possible disturbance of these areas by the trawl nets and otter boards. Protection of these important habitats is a critical mechanism for ecosystem management within Shark Bay.
Conservation	To reduce the amount of Bycatch	Due to the relatively unselective nature of some fishing gears, fishing activities often collect numbers of untargeted species. Gears can be designed, or modified, to reduce the amount of bycatch generated.	<ul style="list-style-type: none"> Fisheries WA has recently commenced the development of specific Bycatch Action Plans for Western Australian fisheries. The Shark Bay Prawn Trawl Managed Fishery is the first to be addressed through this process. In association with the development of the Bycatch Action Plan, trials of gear modified to reduce bycatch have been undertaken in the fishery. A modified gear designed to reduce bycatch is being fully introduced into the fishery. Shark Bay is closed to gillnetting to protect the World Heritage recognised dugong populations which could become entangled (as bycatch) in this kind of net.
Conservation	To protect juvenile fish	Some fishing gear can be very selective at catching certain sized fish. Particularly, a net with a small mesh size can be very efficient at catching large number of smaller/juvenile fish. When these nets are used in creeks and estuaries, which are nursery areas containing many	<ul style="list-style-type: none"> Very strict rules apply to recreational netting within the State. The majority of estuarine waters are closed to netting to protect juvenile fish stocks, and no netting is permitted in freshwater. The specification of the type, length and mesh size are also rigorously controlled in

FUNCTION	OBJECTIVE	EXPLANATION	EXAMPLE
		<p>juveniles, they are able to significantly impact on the number of juveniles and therefore threaten the future of those populations.</p>	<p>areas where netting is permitted.</p>
<p>Conservation/ Stock Management</p>	<p>Prevention of Overfishing</p>	<p>Very efficient fishing gears need to be regulated to prevent the rapid depletion of fish stocks where these are used.</p>	<ul style="list-style-type: none"> • Fish traps are a very efficient way of catching large numbers of fish. Recreational fishing with fish traps is banned in all of Western Australian water in order to prevent over fishing by this gear type. • Three types of gear are permitted to be used in the Marron Recreational Fishery. The gear types are designed to prevent over fishing.
<p>Stock Management</p>	<p>To ensure Resource Sharing <i>within</i> a Fishery</p>	<p>Specifying the type of gear that may be used is a way of ensuring equal fishing opportunity for operators in a recreational or commercial fishery. In this way, no one operator has a distinct advantage over another in terms of the fishing gear used.</p>	<ul style="list-style-type: none"> • In the West Coast Purse Seine Managed Fishery, licensed boats may only take their catch by means of lampara nets or purse seine nets, no more than 350m in length, with a mesh size not less than 18 millimetres. Regulating the type of gear which fishers can use ensures that all fishers have an equal opportunity to land fish.

Input Controls - Effort Restrictions

FUNCTIONAL	OBJECTIVE	EXPLANATION	EXAMPLE
Stock Management	To ensure Sustainable Yield	Fisheries researchers generally estimate the level of effort required to catch the maximum sustainable number of fish. Effort is then regulated to be marked at or below this level to sustain the stocks.	<ul style="list-style-type: none"> • Licensees of the Abalone Managed Fishery are able to have only one diver to collect abalone during the season. This indirectly limits the amount of fishing time available to each licensee and therefore the number of abalone harvested. • In the Pilbara Fish Trawl Fishery, a given number of trawl hours are permitted in separate areas of the fishery. The permitted number of hours relate to the amount of fishing which that area can support. • In the Cockburn Sound (Line and Pot) Managed Fishery, fish may only be taken by means of a maximum of 3 hand lines, each line having no more than 3 gangs (of 3 hooks or less) of hooks. Similar restrictions also apply to catching squid, octopus and cuttlefish in this fishery. All these regulations limit the amount of effort to ensure a sustainable yield.
Stock Management	To ensure Resource Sharing within a Fishery	Fisheries managers attempt to ensure that all fishers in the fishery have equal opportunity to catch fish. One mechanism is to ensure that the fishers have compatible gears.	<ul style="list-style-type: none"> • Regulations on effort apply equally across all licences within a fishery and across all recreational fishers. For example, pot entitlements apply to licensees in the Esperance Rock Lobster Managed Fishery which restrict the number of allowable pots to 60 for those with an A Class, and 30 pots for those with a B Class licence.

Input Controls - Temporal Closures

FUNCTIONAL GROUP	OBJECTIVE	EXPLANATION	EXAMPLE
Conservation	To manage bycatch	In some fisheries, certain species of bycatch are greater at a certain time of day or year. Prohibiting fishing at those times can prevent bycatch.	<ul style="list-style-type: none"> In the Commonwealth Longline Fishery fishing before 5pm is prohibited to reduce the number of seabirds getting caught in the nets. Similar measures may evolve in Western Australia.
Stock Management	To protect stocks prior to spawning	Seasonal closures allow spawning populations to reproduce before being susceptible to fishing. This is important to ensure the continuance of the population.	<ul style="list-style-type: none"> The Western Rock Lobster season is open from 15 November to 30 June each year. This provides protection for females prior to spawning.
Stock Management/ Conservation	To provide protection to threatened stock	Fisheries are closed temporarily when it appears that the stock is under threat of being depleted. These actions achieve both conservation and fisheries management objectives.	<ul style="list-style-type: none"> A major decline in the Pink Snapper stocks in the eastern gulf of Shark Bay has occurred as a result of high pressure and overfishing by recreational fishers. Fisheries WA has closed the eastern gulf to pink snapper fishing in order to allow the stocks to recover. Similarly, the West Coast Purse Seining fishery was closed following the infection of this stock causing mass fish kills at the end of 1998/beginning of 1999.
Fisheries management	To reduce effort	Temporal fishing measures such as legal fishing seasons can be put in place to limit the fishing effort allowed to be exhausted on the stock by limiting the number of days available to fish. This is commonly enforced in both commercial and recreational fisheries.	<ul style="list-style-type: none"> Examples of recreational fisheries with limited seasons include marron, abalone and rock lobster. Examples of commercial fishing seasons include rock lobster, prawn trawling, abalone and estuarine fishing.

4.2.3 Temporal (Time) Controls

Fisheries WA can regulate fishing activities within defined times. This may include time of day and also time of year. This type of instrument is known as a 'temporal control'.

Temporal controls are implemented when management arrangements or protective measures are only required at a certain time. This may be a result of a biological or ecological characteristic of the area or species being managed, or a result of seasonal pressures on that resource. These controls can also be used to facilitate resource sharing. Temporal controls are used commonly within both commercial and recreational fisheries.

4.3 Output Restrictions

Bag limits and quotas emphasise that fish stocks are finite and are introduced as a management tools for biological reasons, resource sharing or both.

'Bag limit' is the term referring to the control of recreational fishing catch, while 'quota' generally refers to the limits imposed on commercial fisheries.

The idea of a commercial catch quota is that a specific catch tonnage or proportion of total catch of a fish is set as a ceiling, beyond which the commercial sector ceases harvesting, usually on an annual basis. These types of output controls are uncommon in Western Australia's commercial fisheries.

On the other hand, output restrictions are used commonly to control the recreational fishing. Bag limits apply to many popular fish targeted by recreational fishers. Bag limits specify the maximum quantity of fish of a specified class that a person may take, or bring onto land in one day. Generally, these bag limits are consistent throughout the State.

Output controls can also be used in a particular area to protect one or more species which need special care in that area. This is done by prohibiting the output of that species in the area or setting its bag limit at zero.

4.4 Other Instruments

4.4.1 Fish Habitat Protection Areas

Provisions in the *Fish Resources Management Act 1994* allow Fisheries WA to set aside aquatic environments as Fish Habitat Protection Areas (FHPAs). FHPAs are a special form of measure and provide a higher level of protection than other closed areas.

The major difference between FHPAs and other FPMs is that management regulations within a FHPA may provide for any matter necessary for the protection or management of the area, and is not limited to the regulation of fishing activities. Thus, management regulations may include the prohibition or regulation of:

- entry to an area by persons, boats, aircraft or other things;
- fishing or aquatic eco-tourism in an area or any other activity that may affect the area;
- moorings, jetties, rafts and other constructions in an area.

Setting aside a FHPA requires a management planning and public involvement process which is not required of the other instruments. This enables interested groups and individuals to have a direct say in how the area should be managed to protect fish resource values.

Output Controls

FUNCTIONAL GROUP	OBJECTIVE	EXPLANATION	EXAMPLE
Conservation	To conserve exploited <i>commercial</i> species	Based on an understanding of stock dynamics, fisheries managers can predict what percentage of the fish stock must remain at the end of a season to ensure sustainability for future years. Placing quotas on commercial catches is one way of minimising the chance that the stock is over-fished below this level.	<ul style="list-style-type: none"> Commercial catch quotas are unusual in Western Australia and apply to only two fisheries: the Abalone Managed Fishery and South Coast Purse Seine Managed Fishery which primarily fishes for pilchards.
Stock Management	To ensure resource sharing	Daily bag limits have been set to help share the available catch among the many fishers who concentrate on these species.	<ul style="list-style-type: none"> Catch limits are applied equally across the fishing sector and throughout the State.
Conservation	To conserve exploited <i>recreational</i> species.	Coastal species which are readily accessible to recreational fishers can be subject to over-exploitation. Bag limits minimise this threat by limiting the number of fish able to be caught.	<ul style="list-style-type: none"> Western Australia's shellfish are often slow growing and extremely vulnerable to overpicking from inshore reefs. A mixed bag of two litres of whole edible shellfish applies unless a separate bag limit is specified.
Conservation	To ensure conservation of rare species	Individual bag limits may be set as a conservation strategy for species considered rare or vulnerable to overfishing.	<ul style="list-style-type: none"> Western Blue Groper has a daily bag limit of 1, an attempt to limit the harvesting of this rare species.

Observation/ Conservation	To protect vulnerable species groups and habitats	Permanent closures can be established to protect vulnerable or important habitats. Vulnerable habitats include those which are readily accessible, for example intertidal reefs. Important habitats include nursery grounds and breeding grounds. These areas can also achieve fisheries management objectives as they may protect critical areas for commercial or recreational species.	<ul style="list-style-type: none"> • Cowaramup Bay reef, an intertidal reef area heavily used by tourist and locals, has been protected from disturbance by prohibiting the take of many of the benthic organisms in the area. • Yallingup Reef has also been protected by prohibiting the collection of most animals and plants other than finfish.
Conservation	To protect rare or significant species	Special management arrangements can be applied to a particular area inhabited by vulnerable or significant species. In these areas special output controls can help protect these species.	<ul style="list-style-type: none"> • Lake Clifton was closed to all fishing after a unique strain of bream was discovered in the lake. Similarly, after an endemic gastropod species was found at Gantheaume Bay, the taking of all species of gastropods in the Bay was prohibited to ensure the protection of this unique species*.
Observation	To allow for the passive observation of natural marine ecosystems.	As more areas of the marine environment are becoming affected by human activities, it is more difficult to enjoy and observe natural marine ecosystems. Observation Areas are put aside for the passive observation of areas through activities such as SCUBA diving, snorkelling and viewing through glass bottom boats. These areas effectively have zero output	<ul style="list-style-type: none"> • Closed areas established for observation and ecotourism include the Abrolhos Island Reef Observation Areas, <i>Sanko Harvest</i> wreck site off Esperance, <i>Gudrun</i> wreck in the Gascoyne and the <i>HMAS Swan</i> wreck off Dunsborough.

*Since the establishment of this closure, the species has been found elsewhere. However, the closure will remain in place as it is functioning as an effective reserve for many species.

Fisheries WA is in the process of setting up a system of FHPA for:

- the conservation and protection of fish, fish breeding areas, fish fossils or the aquatic ecosystem;
- the culture and propagation of fish and experimental purposes related to that culture and propagation; or
- the management of fish and activities relating to the appreciation of fish.

Fisheries WA has established FHPAs in the State waters of the Houtman Abrolhos Islands and in the Lancelin Island Lagoon. Other FHPAs may be proposed for parts of Shark Bay World Heritage Area, Miaboolya Beach and Cottesloe Reef.

A guideline including criteria for the establishment of FHPAs is currently being prepared and will be realised in 2001.

4.4.2 Protection of Specified Life Stages

Fisheries WA can provide increased protection for fish while they are in vulnerable life stages.

Where specific visual characteristics allow a person to identify a certain life-stage, this can be readily managed. For example, the taking of female crabs or female western rock lobster with eggs or spawn attached underneath its body, and the taking of marron with eggs, spawn, larvae or young marron attached beneath its body, is prohibited. Also the taking of setose or tarspot (that is, in breeding condition) western rock lobster is prohibited.

For other life stages which are not so easily identified, size limits are used. Fisheries WA can set minimum and/or maximum size limits. Minimum size limits set the smallest size at which a particular fish species can be legally retained if caught. Increasing the size at which fish can be caught increases or maintains the size of the spawning stock.

Maximum legal size limits are applied for species where the contribution to the spawning activity increases with growth. In some cases the spawning contribution of large individuals is disproportionately high, thereby accentuating the need for enhanced protection for that section of the population.

Restrictions can apply differently to males and females of a species. An example of where this might be used is in the management of species which change gender throughout their life cycle. In this case, in order to prevent the selective taking of one gender, size limits would need to be specified for each gender. This instrument is being used in other jurisdictions and is currently being considered for use by Fisheries WA.

4.4.3 Commercially Protected Species

Commercially protected species are protected from all forms of commercial fishing. Currently the following are commercially protected species in State waters:

- all freshwater aquatic organisms other than sooty grunter and catfish of the Family *Ariidae*
- billfish, sailfish and spearfish

Other Measures - Protection of Specific Life Stages

FUNCTIONAL GROUP	OBJECTIVE	EXPLANATION	EXAMPLE
Conservation/Stock Management	To reduce the catch of spawning populations	Individuals or cohorts which are in spawning phase are important for the continuance of the populations. Where there are mechanisms for recognising these individuals or cohorts, restrictions can be placed on the catch and retention of these individuals.	<ul style="list-style-type: none"> Retention of pre-spawning 'setose' Western Rock Lobster is prohibited. These can be distinguished by an obvious tar spot between the last set of legs.
Conservation/Stock Management	To prevent recruitment over fishing	When insufficient individuals reach spawning size, this can dramatically reduce the size of spawning populations and reduce the number of recruits produced from that spawning stock. This is known as recruitment overfishing and can lead to the depletion of a stock.	<ul style="list-style-type: none"> Size limits are common for important commercial and recreational species, and include (contact Fisheries WA for details on how to correctly measure various species): <ul style="list-style-type: none"> samson fish: min size 600mm red emperor: min size 600mm tailor min size 250mm flathead min size 300mm blue manna crab min size 127mm

4.4.4 Totally Protected Species

Some of Western Australia's fish species are particularly vulnerable or highly threatened. Fisheries WA can provide protection by totally prohibiting the harvesting of threatened species.

Totally protected species within Western Australia waters are:

- Potato Cod (*Epinephelus tukula*) - Potato Cod are solitary fishes and generally resident on particular reefs for long periods of time, often many years. This species' territorial behaviour, large size and relatively slow growth rate means it is particularly vulnerable to overfishing.
- Leafy Sea-dragon (*Phycodurus eques*) - This rare and vulnerable relative of the sea-horse grows to approximately 45 centimetres long and resembles a little dragon.

Unique to the southern waters of WA and South Australia, the leafy sea-dragon's home is inshore areas of seagrass. Unfortunately, these are under increasing threat from environmental changes which result in loss of seagrass.

This is not the only danger faced by the sea-dragon. Although having no known predators amongst the marine world, it has become the target of unscrupulous 'collectors' who have denuded the more accessible seagrass areas of this creature. The extent to which this occurs in Western Australia is currently unknown.

- Whale Shark (*Rhincodon typus*) - Western Australia is privileged to be one of the only places in the world known to be visited by the mysterious whale shark (*Rhincodon typus*) on a regular basis. Each year, just days after the mass spawning of corals on the Ningaloo Reef (near Exmouth) in March and April, whale sharks appear in the waters along the front of the reef, remaining for up to a month.

Tourism based on whale shark watching has increased dramatically in the last few years and Government agencies have taken steps to protect these animals.

Fisheries Western Australia and CALM have combined to declare an indefinite closed season for this species under the *Fish Resources Management Act 1994* and the *Wildlife Conservation Act*.

- Maori Wrasse (*Cheilinus undulatus*) - The Humphead Maori Wrasse is one of the largest coral reef dwelling bony fish and the largest known species of wrasse. The Maori Wrasse is primarily a solitary species located in warmer tropical waters. This species is vulnerable for many reasons. There is currently limited habitat to support this species, which is restricted in steep outer slopes and gutters of tropical reefs. Individuals are slow growing and long-lived, which means they are slow to achieve sexual maturity. This species also has a high market value which makes it vulnerable to overfishing. These fish spawn in aggregations at fixed locations, at which time they are particularly vulnerable to fishing pressure.
- Great White Shark (*Carcharodon carcharias*) In Australia and throughout the global distribution of the white shark there are strong concerns that the numbers of white sharks have been steadily decreasing and have now reached a point where the species' existence may be threatened.

The Great White Shark has been protected in Australia since 1997 when concerns were raised at a national conference on the status of this species. As a top order predator the white shark plays a crucial role within the marine environment. This species has evolved to perform this role and if lost in a relatively short period of time from 'human instigated' mortality a large hole in the ecosystem would result.

The Grey Nurse Shark has been protected under Department of Conservation and Land Management legislation and there are several more shark species that are under consideration for total protection under fisheries legislation.

5.0 OTHER INITIATIVES

FPMs are one strategy within a broader framework of environmental management which is undertaken by Fisheries WA. Other key environmental initiatives fostered by the agency are:

- bycatch management through the development of bycatch actions plans in recreational and commercial fisheries;
- the development of a transparent process for the incorporation of environmental management measures within commercial and recreational fisheries;
- the development of Regional Fisheries Environmental Management Reviews which provide an assessment of issues and future planning requirements on a regional basis;

5.1 Bycatch Management

Fisheries WA is embarking on a project to address bycatch in our Western Australian fisheries. The process is guided by the introduction of the Western Australian Policy on Fisheries Bycatch which was adopted by the then Minister for Fisheries in June 1999. Fisheries WA is preparing Bycatch Action Plans for fisheries with significant bycatch issues in need of resolution and management. This will involve a thorough examination of the scientific, environmental, social, industrial and resource sharing issues and the determination of priority issues for management. The Bycatch Action Plans will recommend management action necessary to address the priority issues.

5.2 Formalising the Principles of ESD in Fisheries Management Practices

Although the principles of ESD are an objective of the Fish Resources Management Act and environmental management practices are already an integral component of our fisheries management practices, formalisation of broad-level principles into practical measures has been absent. As part of a national FRDC (Fisheries Research and Development Commission) funded project, Fisheries WA is developing a system to assess and report on fisheries in terms of ESD principles.

5.3 Fisheries' Regional Environmental Management Reviews

Fisheries WA is preparing a series of Fisheries Environmental Management Reviews (FEMRs). The objectives of the FEMRs are to:

- outline the status of fisheries and aquaculture in the region;
- identify environmental effects associated with fishing and aquaculture activities and develop recommendations for their management;
- identify potential threats to fish and their habitats; and
- identify areas in need of fish and fish habitat protection.

A FEMR will be produced for the following regions:

- Northern (NT/WA border to Rocky Point);
- Gascoyne (Rocky Point to Kalbarri);
- South West (Kalbarri to Augusta); and

- South Coast (Augusta to SA/WA border).

The first FEMR, for the Gascoyne, was released in May 2001. Work has begun on the FEMR for the Northern Region of Western Australia.