

**GASCOYNE DEMERSAL SCALEFISH
RESOURCE
DRAFT HARVEST STRATEGY
2016 – 2021**

Version 1.0

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Gascoyne Demersal Scalefish Resource Draft Harvest Strategy 2016 – 2021
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1 INTRODUCTION

Harvest strategies for aquatic resources managed by the Western Australian Department of Fisheries (the Department) are formal documents prepared to support the decision-making processes and ensure these processes are consistent with the principles of Ecologically Sustainable Development (ESD; Fletcher 2002) and Ecosystem Based Fisheries Management (EBFM; Fletcher et al. 2010). The objectives of ESD are reflected in the objects of the *Fish Resources Management Act 1994* (FRMA), Section 3, and the draft *Aquatic Resources Management Bill 2015* (ARMB), Clause 9, which will replace the FRMA once enacted.

The publication of harvest strategies is intended to make the decision-making considerations and processes for the management of specified aquatic resources publicly transparent and provide a basis for informed dialogue on management actions with resource users and other stakeholders (Department of Fisheries 2015a).

These strategies provide guidance for decision-makers, but do not derogate from or limit the exercise of discretion required for independent decision-making under the FRMA by either the Minister for Fisheries, the Chief Executive Officer of the Department of Fisheries or other delegated decision-makers in order to meet the objects of the FRMA.

Harvest strategies make explicit the objectives, performance indicators, reference levels, and harvest control rules for each defined ecological asset taken into consideration by the Department of Fisheries when preparing advice for the Minister for Fisheries (Department of Fisheries 2015a). They also indicate the scope of management actions required in relation to the status of each resource in order to meet the specific long- and short-term management objectives and the broader goals of ESD and EBFM.

1.1 Review Process

The Western Australian harvest strategy policy (Department of Fisheries 2015a) recognises that fisheries change over time and that a review period should be built into each harvest strategy to ensure that it remains relevant. This harvest strategy will remain in place for a period of five (5) years, after which time it will be fully reviewed; however, given that this is the first harvest strategy for this resource, this document may be subject to review and amended as appropriate within this five year period.

2 SCOPE

This harvest strategy relates to the Gascoyne Demersal Scalefish Resource of Western Australia and all fishing activities that impact these resources. The overall resource comprises around 60 demersal scalefish species that inhabit the inshore and offshore waters of the Gascoyne Coast Bioregion (Figure 1).

Demersal scalefish in open marine waters are primarily harvested by the commercial sector within the Gascoyne Demersal Scalefish Managed Fishery (GDSMF; Figure 2) and the recreational and charter fishing sectors within the Gascoyne Coast Bioregion (Figure 3).

Commercial vessels in the GDSMF fish with mechanised handlines and mainly target two demersal species; pink snapper (*Chrysophrys auratus*) and goldband snapper (*Pristipomoides multidens*).

In addition, three state-managed commercial trawl fisheries; the *Shark Bay Prawn Managed Fishery*, the *Shark Bay Scallop Managed Fishery* and the *Exmouth Gulf Prawn Managed Fishery*, and a small number of operators in the Pilbara Line Fishery, also retain small quantities of demersal scalefish in the Gascoyne Coast Bioregion. Commercial vessels in the Commonwealth-managed *Western Deepwater Trawl Fishery*, which operate outside of the 200 m isobath, may also retain demersal scalefish but primarily target deepwater bugs. All catches from these fisheries are accounted for in other harvest strategies (Australian Fisheries Management Authority [AFMA] 2011; Department of Fisheries 2014a; Department of Fisheries 2014b; Department of Fisheries 2016c in prep.).



Figure 1. Gascoyne Coast Bioregion in Western Australia.

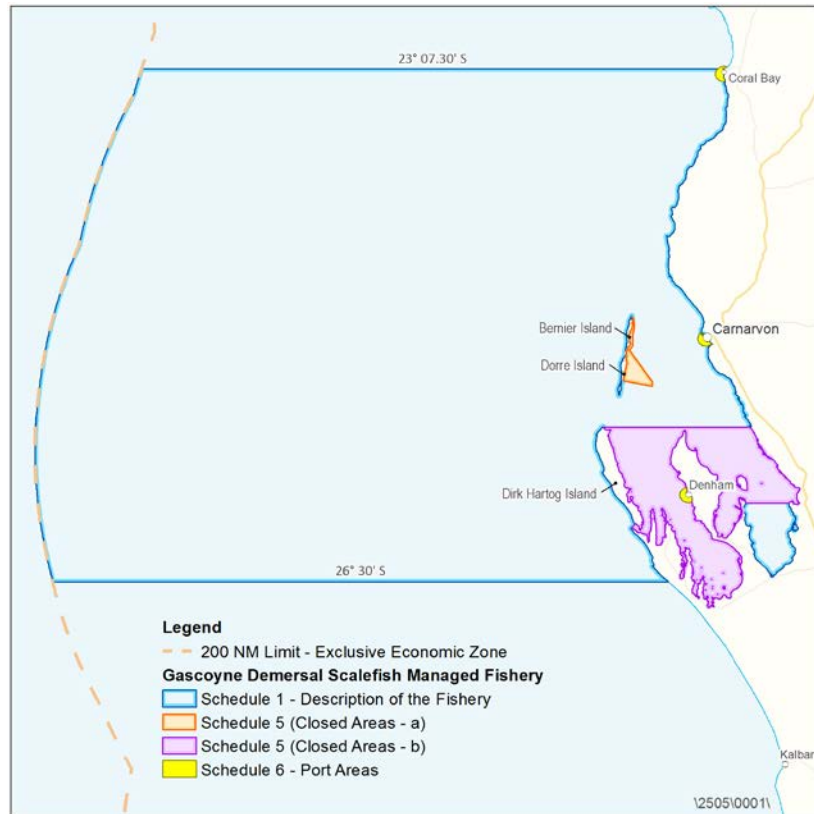


Figure 2. Boundaries and management areas of the Gascoyne Demersal Scalefish Managed Fishery in Western Australia.

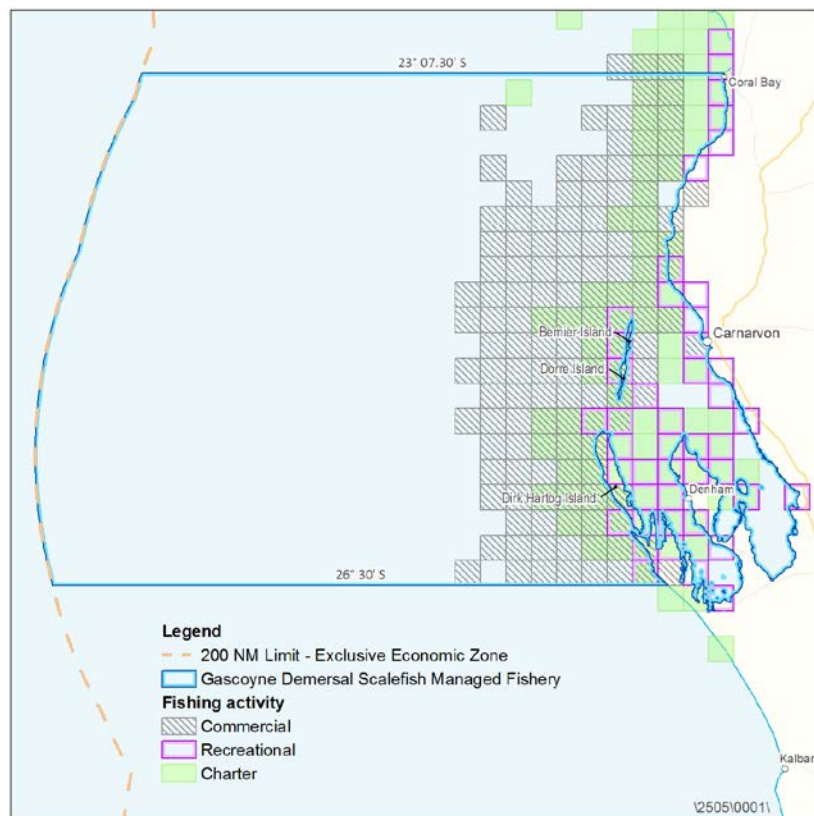


Figure 3. Areas fished by the GDSMF and charter sector (2011-2015), and randomly selected RFBL holders during the 2011-12 and 2013-14 state-wide recreational surveys.

Monitoring and assessment of the demersal scalefish resource in the Gascoyne Coast Bioregion is based on identification and sustainability evaluation of indicator species (Department of Fisheries 2011). Indicator species are determined using a risk-based approach that calculates the ‘sustainability risk’ of the stocks (based on the inherent vulnerability and the current risk to the wild stock) and the current or likely future ‘management risk’ of the species / stock to the community (measured as a combination of the current management information requirements, and their economic and social values). The status of these fished stocks is subsequently used as a robust indicator of the sustainability status and risks within the suite of inshore demersal scalefish exploited in that region. In accordance with this approach, the focus of this harvest strategy is on the target stocks of the two predominate indicator species for the Gascoyne Coast Bioregion — pink snapper and goldband snapper. Periodic assessments of selected non-indicator species are also undertaken to validate the indicator species approach and ensure that the status of other retained species remains at acceptable levels.

This harvest strategy has been developed in line with the Department’s over-arching *Harvest Strategy Policy for Aquatic Resources* (Department of Fisheries 2015a; Fletcher et al. 2016) and is consistent with relevant national policies / strategies (ESD Steering Committee 1992) and guidelines (e.g. Sloan et al. 2014). It also sets out and summarises matters relevant to independent third-party certification assessment of the GDSMF against the Marine Stewardship Council (MSC) standard for sustainable fishing and should be read in conjunction with other documentation relevant to this assessment.

In addition to considering fishing impacts from all fishing activities on the retained species, this harvest strategy also covers impacts on bycatch¹, endangered, threatened and protected (ETP) species, habitats and other ecological components to ensure any risks to these elements are managed effectively. As the MSC assessment of the GDSMF is a key driver in formalising this initial version of the harvest strategy, the waters of Shark Bay’s inner gulfs are not currently in the scope of this harvest strategy. Likewise, the impacts on the ecological components other than the retained species from other commercial fisheries, namely the Shark Bay Prawn and Scallop Fisheries, the Exmouth Gulf Prawn Fishery, the Pilbara Line Fishery and the Western Deepwater Trawl Fishery, are not within the scope of this document. Future versions may be expanded to include these impacts where relevant.

This document has been developed by an independently chaired working group with representation from the commercial and recreational fishing sectors and the Department of Fisheries.

¹ *Bycatch* is described as the part of the catch which is returned to the sea (usually referred to as non-retained or discarded) either because it has no commercial value or because legislative requirements preclude it being retained.

2.1 Environmental Context

The Gascoyne Demersal Scalefish Resource includes species that inhabit inshore (shelf) waters of 20-250 m depth and offshore >250 m depth in the Gascoyne Coast Bioregion of Western Australia. The marine environment of the Gascoyne Coast Bioregion represents a transition between the tropical waters of the North West Shelf and the temperate waters of the west coast. The coastline is characterised by fringing coral reefs in the north, changing to high cliffs in the south. The northern part of the bioregion is seasonally influenced by tropical cyclones during summer. Although these cyclones occur very infrequently in the southern end of the bioregion, the region is affected at times by river outflows from inland cyclone-based summer rainfall. The limited local rainfall comes mostly from the northern edge of winter storm fronts.

The waters off the Gascoyne coast are also strongly influenced by the southward-flowing Leeuwin Current, generated by flow from the Pacific through the Indonesian archipelago. The low productivity associated with the Leeuwin Current restricts total finfish production off the Western Australian coast to a globally modest level (Molony et al. 2011).

There are two areas of internationally recognised conservation value located in the Gascoyne, the Shark Bay World Heritage Property and the Ningaloo Coast World Heritage Area.

2.2 Indicator Species

The two indicator species selected for assessing the inshore demersal scalefish suite in the southern Gascoyne Coast Bioregion are pink snapper and goldband snapper. These two species represent approximately 80% of the total demersal scalefish catch taken in oceanic waters of the Gascoyne Coast Bioregion in 2014 (Jackson et al. 2015).

2.2.1 Pink Snapper

Pink snapper are distributed around southern Australia from northern Queensland to north-west Western Australia (Kailola et al. 1993) and around the north island of New Zealand (Parsons et al. 2014). Stock structure of this species within Australian waters is complex particularly in Western Australia where six biological stocks/management units are currently recognised (Jackson et al. 2012), four of these in the Gascoyne. The GDSMF targets the Shark Bay ‘oceanic’ pink snapper stock. Juveniles typically inhabit inshore waters while adults and sub-adults inhabit waters of the continental shelf out to depths of more than 300 m. Pink snapper are long-lived (maximum age around 40 years), mature around 3-5 years of age and, in the oceanic waters of the Gascoyne, form spawning aggregations on nearshore reefs during May-August.

2.2.2 Goldband Snapper

Goldband snapper are widely distributed throughout the Indo-Pacific from Samoa to the Red Sea and from southern Japan to Australia (Allen 1985). In Australia, goldband snapper stocks in the Kimberley and Northern Territory were found to be genetically distinct and otolith chemistry analysis indicated that adults remained sedentary on individual reefs (Lloyd et al.

1996; Newman et al. 2000; Ovenden et al. 2002). No studies of the genetic stock structure of goldband snapper have been undertaken in the Gascoyne. For the purposes of stock assessment, Marriott et al. (2012) assumed that goldband snapper within the Gascoyne Coast Bioregion constitute one genetic stock. Goldband snapper inhabit hard bottom mostly in depths of 80-150 m (Allen 1985; S.J. Newman, unpubl. data). Goldband snapper are long-lived (30+ years), mature around 4-5 years of age, and spawn predominantly in March-May in the Gascoyne.

2.3 Other Retained (non-indicator) Species in the Resource

For other retained species, annual risk (including vulnerability) assessments are undertaken to identify if there have been any substantial changes particularly in the catches of these species, relative to historical levels. If an increase in risk is identified, a review is triggered to investigate the reasons for the variation. If the increase in risk is considered significant a higher level of monitoring and assessment of the species is necessary (e.g. collection of an age sample to allow for estimation of fishing mortality and/or some other proxy for biomass of the stock).

2.4 Fishing Activities

2.4.1 Governance

The Gascoyne Demersal Scalefish Resource is targeted by the commercial, recreational and customary fishing sectors. These fishing sectors are managed by the Department of Fisheries under the following legislation:

- *Fish Resources Management Act 1994* (FRMA, will be replaced by the ARMB once enacted);
- *Fish Resources Management Regulations 1995* (FRMR);
- FRMA Part 6 — *Gascoyne Demersal Scalefish Managed Fishery Management Plan 2010*; *Shark Bay Prawn Limited Entry Fishing Notice 1993*; the *Shark Bay Scallop Limited Entry Fishing Notice 1994*; and the *Exmouth Gulf Prawn Management Plan 1989*;
- FRMA Section 43 - *Prohibition on Commercial Fishing for Demersal Scalefish (Pilbara Area) Order 1997*;
- *Gascoyne Demersal Scalefish Managed Fishery Automatic Location Communicator Approved Directions 2010*.

Fishers must also comply with the requirements of other legislation, including:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Western Australian Marine Act 1982*;
- *Western Australian Wildlife Conservation Act 1950*; and

- Western Australian *Conservation and Land Management Act 1984*.

2.4.2 Commercial Fishing

Commercial line fishing in oceanic waters of the southern Gascoyne Coast Bioregion is managed as the GDSMF. Demersal scalefish are caught using gunwhale-mounted hydraulic or electric powered reels (up to 10 per vessels) rigged with 15-30 snoods and circle hook(s) baited with mullet, sardines and squid.

This present-day multi-species fishery evolved from a line-fishery that targeted pink snapper in the waters off Shark Bay since the early 1900s (Moran and Jenke 1989; Moran et al. 2005). The pink snapper fishery developed in the 1950s, with rock lobster boats heading north during winter from Geraldton and Fremantle to fish alongside local (Denham-based) vessels. Trap fishing for pink snapper began around 1957 (Moran and Jenke 1989). Following years of conflict between the line only and trap fishing sectors, trap fishing effort was progressively reduced between 1961 and 1987 when due to lower market prices for trap caught fish, the fishery returned to being a line-only fishery.

Following the increase in catch and effort in the Snapper fishery in the early 1980s culminating in the peak 1300 tonne catch in 1985, a limited entry fishery was proposed and a closed season in July was implemented in 1986 (Department of Fisheries, 1985). The Shark Bay Snapper Limited Entry fishery came into full effect in 1987 which included different class access holders, peak season quotas and area/time closures (Department of Fisheries 1995). During the late 1980s to mid-1990s, fishing efficiency improved significantly with the adoption of new technologies including mechanised (hydraulic) hand lines, colour sounders and GPS (Marriott et al. 2012). To provide for simpler and more explicit management of pink snapper, a formal Individual Transferable Quota (ITQ) system was introduced in 2001, followed by the introduction of Vessel Monitoring System (VMS) requirements in 2008.

As the pink snapper component of the fishery developed into a fully managed, year-round fishery, operators in the fishery, as well as “wetliners” (without access to snapper) moved offshore to explore deeper waters (greater than 120-150 m) and target a wider range of demersal species (including goldband snapper). Consequently, the Shark Bay Snapper Managed Fishery expanded to become the Gascoyne Demersal Scalefish Managed Fishery in 2010.

Due to the highly selective nature of line fishing, bycatch and interactions with endangered, threatened and protected species are negligible. Any impacts on habitats through anchoring have previously been assessed as low risk (Department of Fisheries 2002; Department of Environment and Heritage 2004).

2.4.3 Recreational Fishing

Recreational (and charter) fishing for demersal scalefish in the Gascoyne Coast Bioregion is mostly line-based fishing from boats. Fishers operate out of Denham, Carnarvon, Gnaraloo

Bay, Coral Bay, Tandibiddi and Exmouth and catch a similar range of demersal species as the commercial GDSMF.

Estimated recreational boat-fishing effort in the Gascoyne Coast Bioregion has ranged between approximately 212,000 hours fished in 2013/14 and 254,000 hours fished in 2011/12 (Ryan et al. 2015). An estimated 16-26 t of pink snapper (oceanic stock, i.e. excluding inner gulfs of Shark Bay) and 7-22 t goldband snapper was retained by boat-based recreational fishers in the Gascoyne in 2013/14 (Ryan et al. 2015). The reported Gascoyne charter catches of (oceanic) pink snapper and goldband snapper in 2014 were 11 t and 8 t, respectively (Jackson et al. 2015).

2.4.4 Customary Fishing

Although there is no quantitative information available on the customary catch of demersal scalefish in the Gascoyne Coast Bioregion, customary catches of pink snapper and other demersal scalefish from oceanic waters are likely to be negligible (in contrast to inner Shark Bay).

2.5 Catch-Share Allocations

The Gascoyne Demersal Scalefish Resource in Western Australia is fished by commercial and recreational sectors without any explicit catch share allocation between sectors. A formal sectoral allocation process (designated as Integrated Fisheries Management, IFM, in Western Australia) to define and assign long-term sectoral shares of the permitted catch of the resource has not yet been undertaken.

3 HARVEST STRATEGY

3.1 Long-term Objectives

In addition to ensuring the biological sustainability of all captured aquatic resources (through the use of the indicator species approach), this harvest strategy includes broader ecological objectives for each ecosystem component relevant to the GDSMF currently undergoing MSC full assessment, as well as social and economic objectives for each fishery as a whole. It is important to note that the social and economic objectives are applied within the context of ESD.

3.1.1 Ecological Sustainability

- 1) To maintain spawning stock biomass of each retained species at a level where the main factor affecting recruitment is the environment;
- 2) To ensure fishing impacts do not result in serious or irreversible harm² to bycatch species populations;

² Serious or irreversible harm relates to a change caused by the fishery that fundamentally alters the capacity of the component to maintain its function or to recover from the impact.

- 3) To ensure fishing impacts do not result in serious or irreversible harm to endangered, threatened and protected (ETP) species populations;
- 4) To ensure the effects of fishing do not result in serious or irreversible harm to habitat structure and function; and
- 5) To ensure the effects of fishing do not result in serious or irreversible harm to ecological processes.

3.1.2 Economic and Social Benefits

- 1) To provide flexible opportunities to ensure fishers can maintain or enhance their livelihood, within the constraints of ecological sustainability; and
- 2) To provide fishing participants with reasonable opportunities to optimise cultural, recreational and lifestyle benefits of fishing, within the constraints of ecological sustainability.

3.2 Operational Objectives

Longer-term management objectives are often operationalised by using shorter-term (e.g. annual or periodic) fishery-specific objectives for which one or more performance indicators (that can be measured) are identified which enables performance to be assessed against pre-defined reference levels. Consequently, both the commercial and recreational fisheries that access the Gascoyne Demersal Scalefish Resource have operational objectives designed to maintain each resource / component above the threshold level (and, where relevant, close to the target level), or rebuild the resource if it has fallen below the threshold or the limit levels.

3.3 Harvesting and Management Approaches

The current harvesting strategy for the GDSMF is based on a *constant catch approach* (where catch is kept constant) where a stock is in recovery, and a *constant exploitation approach* (where the catch varies in proportion to variations in stock abundance) where the stock is above the target.

In line with this harvesting approach, the main commercial fishery that targets this resource (GDSMF) is primarily managed using output controls via an ITQ system. There are two types of quota in the GDSMF: a separate pink snapper Total Allowable Commercial Catch (TACC), and a combined TACC for other demersal scalefish species. The fishers also have to comply with gear restrictions, spatial closures and size limits that are in place for some species.

The recreational and charter fishery in the Gascoyne Coast Bioregion is also primarily managed using output controls, including size limits for some species, and daily bag and possession limits. Recreational fishers operating from a boat are required to hold a current Recreational Fishing from Boat Licence (RFBL). Unlicensed fishers on boats can fish if at least one other person on board has an RFBL, provided the total catch of everyone on board

stays within the bag limits of the licenced fisher(s). Charter operators are also required to hold a Fishing Tour Operators Licence.

3.4 Performance Indicators, Reference Levels, Control Rules & Tolerance Levels

Suitable indicators have been selected to describe performance of fisheries for demersal scalefish in the Gascoyne Coast Bioregion in relation to each management objective, with a set of reference levels established to separate acceptable from unacceptable performance. Where relevant, these levels include:

- A target level (i.e. where you want the indicator to be);
- A threshold level (i.e. where you review your position); and
- A limit level (i.e. where you do not want the indicator to be).

Control rules define what management actions should occur in relation to the value of each indicator approaching or crossing the limit, threshold or target levels. A summary of the management objectives, performance indicators, reference levels and control rules for the resource is provided in Table 3.

3.4.1 Identifying Performance Indicators & Reference Levels

3.4.1.1 Indicator Species & Non-Indicator Species

The primary performance indicator used to evaluate the stock status of indicator species and non-indicator species in the Gascoyne Coast Bioregion is spawning biomass (B), or an appropriate proxy (see Table 1). For each stock, the performance indicator is estimated periodically (at least every 5 years) and compared to associated reference levels (B_{Target} , $B_{\text{Threshold}}$ and B_{Limit} , Table 1) that are consistent with those used by the Department in other similar assessments and are based on internationally accepted benchmarks for moderate to long-lived fish species (Mace 1994; Caddy and Mahon 1995; Gabriel and Mace 1999; Wise et al. 2007).

For pink snapper, a secondary performance indicator is the annual standardised commercial catch rate in the GDSMF, which is assumed to be indicative of the overall pink snapper (oceanic) stock abundance. A threshold reference level of 500 kg pink snapper/standard boat day was established in 2003 (Department of Fisheries 2002; Department of Fisheries 2011; Marriott et al. 2012).

For the non-indicator species, risk-based reference levels have also been set to differentiate acceptable fishery impacts from unacceptable fishery impacts (see below).

Table 1. Performance indicators and associated reference levels used to evaluate the status of indicator species and non-indicator species in the Gascoyne Coast Bioregion

Performance Indicator	Reference Levels		
	Target	Threshold	Limit
Spawning biomass (B)	B_{40}	B_{30}	B_{20}
Spawning potential ratio (SPR)	SPR_{40}	SPR_{30}	SPR_{20}
Fishing mortality (F), relative to natural mortality (M)	$2/3M$	M	$1.5M$

3.4.1.2 Risk Assessments

Other ecological assets incorporated in this harvest strategy include bycatch and ETP species, habitats and ecosystem processes. As explained in Section 2, only impacts of fishing by the commercial GDSMF and the recreational (and charter) fishing sector on these ecological components are currently assessed within this harvest strategy. Reference levels used to monitor the performance of the GDSMF and the recreational sector against management objectives relating to these assets have been set to differentiate acceptable fishery impacts from unacceptable fishery impacts according to the risk levels defined in Fletcher (2012).

3.4.1.3 Economic and Social Benefits

In line with the principles of ESD, this harvest strategy also includes objectives and performance indicators for the economic and social amenity benefits of fishing which have been developed by a stakeholder working group (see section 3.5.2.4). It is important to note that management actions relating to these objectives are to be applied within the constraints of meeting objectives for ecological sustainability.

The economic and social benefit objective for the GDSMF is to provide flexible opportunities to ensure fishers can maintain or enhance their livelihood, within the constraints of ecological sustainability and having regard for the objectives of the recreational fishing sector. This may include considering commercial fishing sector initiatives aimed at maintaining or enhancing livelihood or whether fisheries management arrangements impose constraints, for reasons other than ecological sustainability, on access to livelihood opportunities.

Gross Value of Production (GVP) has been chosen as a performance indicator to evaluate whether fishers in the GDSMF have been able to maintain or enhance their livelihood. GVP is calculated by multiplying the landed catch (kg) by the state-wide average beach price (\$/kg). GVP has been estimated on an annual basis for all species landed by the GDMSF since 2011/12 for the purpose of determining commercial access fees. Based on current capacity for pink snapper and non-pink snapper (505 tonnes combined) and an industry aspiration of achieving an average beach price of \$10 kilogram, the target reference level (GVP_{Target}) has been set \$5 million with the threshold reference level ($GVP_{\text{Threshold}}$) set at \$3

million. This may need to be revised following any changes in management arrangements which impact on performance such as changes in the TACC.

The economic and social benefit objectives for the recreational fishing sector is to provide fishing participants with reasonable opportunities to optimise cultural, recreational and lifestyle benefits of fishing, and to optimise the flow of economic and social benefit from the fishery to the broader community within the constraints of ecological sustainability and having regard for the objectives of the commercial fishing sector.

Recreational boat based fishing participation (hours fished) and fishing tour participation (client days) has been chosen as a performance indicators used to evaluate the recreational fishing sector objectives.

Recreational boat based participation has been estimated through two state-wide boat-based recreational fishing surveys completed in 2011/12 (Ryan et al. 2013) and 2013/14 (Ryan et al. 2015). The target reference level ($\text{Participation}_{\text{Target}}$) has been set at the upper participation estimate for recreational boat fishing for demersal scalefish in the Gascoyne Coast Bioregion between the 2011/12 and 2013/14 surveys with the threshold reference level ($\text{Participation}_{\text{Threshold}}$) set at 20% above and below the target. This may be revised once a number of further surveys are completed.

Fishing tour participation has been recorded through statutory logbook information since 2002. The target reference level ($\text{Client Days}_{\text{Target}}$) has been set at *TBD* with the threshold reference level ($\text{Client Days}_{\text{Threshold}}$) set at *TBD*.

3.4.2 Control Rules

A review of management arrangements is triggered if evaluation against the operational objectives indicates the potential need for a management response (i.e. when the threshold level is breached). This allows for a precautionary approach to management, with potential issues recognised and addressed in a timely manner prior to the following fishing season.

When a threshold or limit reference level is breached, management responses are likely to vary depending on the extent and circumstances related to the variation. Examples of management responses for the commercial fishery include reducing quota, restricting effort via spatial, temporal or additional gear restrictions. Examples for the recreational fishery these may include reducing bag or boat limits, or introducing spatial or temporal closures. The ability to, and timeframe for, implementing these changes depends on the legal instrument under which the management measure occurs, and further information on the management measures in place for this fishery is provided in Section 4.

3.4.3 Annual Tolerance Levels

Defining annual tolerance levels provides a formal but efficient basis to annually evaluate the effectiveness of current management arrangements in delivering the levels of catch (or effort), for quota-managed fisheries, specified by harvest control rules and where relevant, any sectoral allocation decisions (Fletcher et al. 2016). If the annual catch and effort remains

within the 'tolerance range' (based on historical variations in recruitment and/or fishing operations) the fishery is considered to be operating 'acceptably' with no need to adjust the management settings. Where the annual catch or effort falls outside of this range and this cannot be adequately explained (e.g. clear environmental or market induced impacts), this may result in adjustments to management settings, adjustments, further review of the cause and potentially a revision of the tolerance levels.

For the Gascoyne Demersal Scalefish Resource, the current catch tolerance ranges used to assess annual recreational fishery performance within the Gascoyne Coast Bioregion are currently under development.

The current catch tolerance ranges used to assess annual commercial fishery performance are evaluated by 1) assessing whether the GDSMF has achieved the TACC for each quota group; 2) comparing the annual catch rate of pink snapper with the catch rate tolerance level; 3) comparing annual catch of non-pink snapper quota species within their catch tolerance ranges, and 4) comparing annual effort (fishing days) within effort tolerance ranges. If the status of the resource changes such that the control rules trigger additional management adjustments, the tolerance range for each of these fisheries must also be adjusted accordingly (Fletcher et al. 2016).

The catch tolerance range for the GDSMF is currently defined as achieving between 90% and 100% of the TACC. A catch rate tolerance level based on an annual standardised commercial catch rate of 500 kg pink snapper / standard boat day was established in 2003 (Department of Fisheries 2002; Department of Fisheries 2011; Marriott et al. 2012).

The catch tolerance range for non-pink snapper quota species is currently defined as 100-120 tonnes for goldband snapper and the catch tolerance range of all other species or species group between 1990 and 2013 (Table 2). The effort tolerance range for the GDSMF is currently defined 380 – 540 days for pink snapper based on the period 1975-2002 (Department of Fisheries 2002). If the annual catch or effort falls outside of the catch or effort tolerance ranges, a review is triggered to investigate the reasons for this variation (e.g. regulatory or economic impacts, environmental change etc.).

Table 2. Annual commercial catch tolerance ranges (in tonnes) for non-pink snapper quota species. Goldband snapper range based on mortality assessment. Other species based on historical (1990-2013) catch range.

Species	Catch tolerance levels
Goldband snapper	100-120
Red emperor	2-27
Ruby snapper	0-31
Redthroat emperor	0-27
Eightbar groper	0-16
Cods (combined)	2-30
Mulloway	1-25
Other species combined	37-294

Table 3. Harvest strategy reference levels and control rules for the Gascoyne Demersal Scalefish Resource and associated assets that may be impacted by fishing activities undertaken by commercial (line only) and recreational fishers while targeting demersal scalefish.

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Ecological					
Indicator species	To maintain spawning stock biomass of each retained species at a level where the main factor affecting recruitment is the environment.	Pink snapper Goldband snapper	Primary Periodic estimates of spawning stock biomass (B , or appropriate proxy)	Target: B_{Target} Threshold: $B_{Threshold}$ Limit: B_{Limit}	No management action required for the commercial and recreational sector. If the Threshold is breached (by one or more indicators), a review is triggered to investigate the reasons for the variation. If sustainability is considered to be at risk, appropriate management action will be taken to reduce the commercial and recreational catch by up to 50% If the Limit is breached management strategies to further protect the breeding stock will be implemented (50-100% reduction of the commercial and recreational catch)

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Retained non-indicator species	To maintain spawning stock biomass of each retained species at a level where the main factor affecting recruitment is the environment.	Non-indicator species for which additional monitoring is periodically undertaken (e.g. to undertake an age-based assessment)	1. Annual risk (vulnerability) assessments incorporating current management arrangements, catch levels, species information and available research 2. Estimate of spawning stock biomass (B , or appropriate proxy) if risk is >moderate	Target: B_{Target} ; and Fishing impacts expected to generate an acceptable risk level, e.g. moderate risk or lower. Threshold: $B_{\text{Threshold}}$; and Fishing impacts are considered to generate an undesirable level of risk to any species' populations, i.e. high risk. Limit: B_{Limit} ; and Fishing impacts are considered to generate an unacceptable level of risk to any species' populations, i.e. severe risk.	No management action required. If either Threshold is breached, a review is triggered to investigate the reasons for the variation and consider if the species should become an indicator species. If sustainability is considered to be at risk, appropriate management action will be taken to reduce the total catch by up to 50%. If either Limit is breached, management strategies to further protect the breeding stock of the relevant species will be implemented (50 – 100% reduction of total catch).
Bycatch (non-Endangered, threatened and protected (ETP))	To ensure fishing impacts do not result in serious or irreversible harm to bycatch species	All bycatch species (commercial and recreational sector) ³	Periodic risk assessments incorporating current management arrangements, catch levels, species	Target: Fishing impacts expected to generate an acceptable risk level to bycatch species' populations, e.g. moderate risk or lower.	No management action required.

³ Note that only impacts of line fishing on ecological assets other than the retained species are currently assessed within this harvest strategy (see Section 2).

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
species)	populations.		information and available research	<p>Threshold: Fishing impacts are considered to generate an undesirable level of risk to any bycatch species' populations, i.e. high risk.</p> <p>Limit: Fishing impacts are considered to generate an unacceptable level of risk to any bycatch species' populations, i.e. severe risk.</p>	<p>A review is triggered to investigate the reasons for the increased risk. Appropriate management action will be taken to reduce risk to an acceptable level.</p> <p>Appropriate management action will be undertaken to reduce the risk to an acceptable level.</p>
Endangered, threatened and protected (ETP) species	To ensure fishing impacts do not result in serious or irreversible harm to endangered, threatened and protected (ETP) species populations.	All ETP species ⁴	Periodic risk assessments incorporating current management arrangements, number of reported interactions, species information and available research.	<p>Target: Fishing impacts expected to generate an acceptable risk level to ETP species' populations, i.e. moderate risk or lower.</p> <p>Threshold: Fishing impacts are considered to generate an undesirable level of risk to any ETP species' populations, i.e. high risk.</p>	<p>No management action required.</p> <p>A review is triggered to investigate the reasons for the increased risk. Appropriate management action will be taken to reduce risk to an acceptable level.</p>

⁴ Note that only impacts of line fishing on ecological assets other than the retained species are currently assessed within this harvest strategy (see Section 2).

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
				<p>Limit: Fishing impacts are considered to generate an unacceptable level of risk to any ETP species' populations, i.e. severe risk.</p>	<p>Appropriate management action will be undertaken to reduce the risk to an acceptable level.</p>
Habitats	To ensure the effects of fishing do not result in serious or irreversible harm to habitat structure and function.	All habitats ⁴	Periodic risk assessments incorporating current management arrangements, extent of fishing activities, habitat distribution and available research.	<p>Target: Fishing impacts are considered to generate an acceptable level of risk to all benthic habitats, i.e. moderate risk or lower.</p> <p>Threshold: Fishing impacts are considered to generate an undesirable level of risk to any benthic habitats, i.e. high risk.</p> <p>Limit: Fishing impacts are considered to generate an unacceptable level of risk to any benthic habitats, i.e. severe risk.</p>	<p>No management action required.</p> <p>A review is triggered to investigate the reasons for the increased risk. Appropriate management action will be taken to reduce risk to an acceptable level.</p> <p>Appropriate management action will be undertaken to reduce the risk to an acceptable level.</p>

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Ecosystem	To ensure the effects of fishing do not result in serious or irreversible harm to ecological processes.	Trophic interactions ⁵	Periodic risk assessments incorporating current management arrangements, catch levels, extent of fishing activities, ecosystem information and available research.	<p>Target: Fishing impacts are considered to generate an acceptable level of risk to ecological processes within the ecosystem, i.e. moderate risk or lower.</p> <p>Threshold: Fishing impacts are considered to generate an undesirable level of risk to any ecological processes within the ecosystem, i.e. high risk.</p> <p>Limit: Fishing impacts are considered to generate an unacceptable level of risk to any ecological processes within the ecosystem, i.e. severe risk.</p>	<p>No management action required.</p> <p>A review is triggered to investigate the reasons for the increased risk. Appropriate management action will be taken to reduce risk to an acceptable level.</p> <p>Appropriate management action will be undertaken to reduce the risk to an acceptable level.</p>

⁵ Note that only impacts of line fishing on ecological assets other than the retained species are currently assessed within this harvest strategy (see Section 2).

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
Economic and Social					
Commercial sector	To provide flexible opportunities to ensure fishers can maintain or enhance their livelihood, within the constraints of ecological sustainability and having regard for recreational fishing sector objectives.	All retained species	Gross Value of Production (GVP)	<p>Target: GVP_{Target}</p> <p>Threshold: $GVP_{Threshold}$</p>	<p>No management action required.</p> <p>A review is triggered to investigate the reasons for the reduction in GVP. Consider commercial fishing sector industry initiatives aimed at enhancing livelihood and/or review whether fisheries management arrangements impose constraints, for reasons other than ecological sustainability, on access to livelihood opportunities.</p>
Recreational sector	1. To maintain or improve lifestyle benefits for fishing participants within the constraints of ecological sustainability and having regard for commercial fishing sector objectives.	All retained species	Recreational boat based participation (Hours Fished)	<p>Target: $Participation_{Target}$</p> <p>Threshold: $Participation_{Threshold}$</p>	<p>No management action required.</p> <p>A review is triggered to investigate the reasons for the change in participation. Consider recreational fishing sector initiatives aimed at maintain or improve lifestyle benefits for fishing participants and/or review whether fisheries management arrangements impose constraints, for reasons other than ecological sustainability.</p>

Component	Management objectives	Resource / Asset	Performance Indicators	Reference Levels	Control Rules
	2. Maintain and provide opportunity for improvement of enjoyable recreational fishing experiences and maximise the flow of recreational fishing tourism related economic benefit to the broader community within the constraints of ecological sustainability and having regard for commercial fishing sector objectives	All retained species	Satisfaction and/or economic surveys using recognised social science and/or economic methodologies and measures	Target: To be developed (see section 3.5.1.3)	To be developed (see section 3.5.1.3)
	3. To provide flexible opportunities to ensure charter operators can maintain or enhance their livelihood, within the constraints of ecological sustainability and having regard for commercial fishing sector objectives	All retained species	Charter client days	Target: Client Days _{Target} Threshold: Client Days _{Threshold}	No management action required. A review is triggered to investigate the reasons for the reduction in clients or trips. Consider charter fishing sector industry initiatives aimed at enhancing livelihood and/or review whether fisheries management arrangements impose constraints, for reasons other than ecological sustainability, on access to livelihood opportunities.

3.5 Monitoring and Assessment Procedures

3.5.1 Information and Monitoring

3.5.1.1 Commercial Catch and Effort Information

Commercial catch and effort in the GDSMF has been monitored using statutory daily/trip logbooks (reporting blocks 10 x 10 nautical miles) since 2008. Prior to the introduction of these finer-resolution logbooks, catch and effort information was collected via monthly returns (CAES, 60 x 60 nautical mile blocks). Commercial operators are also required to complete statutory catch disposal records (CDRs) for pink snapper and other demersal scalefish snapper on landing. Vessel Monitoring Systems (VMS) have been used to monitor fishing activity since 2008.

3.5.1.2 Recreational Catch and Effort Information

Estimates of recreational fishing effort and demersal scalefish catches on the Gascoyne Coast Bioregion are available from a number of recreational fishing surveys undertaken by the Department, including creel surveys of boat-based recreational fishing in the Gascoyne in 1998/1999 (Sumner et al. 2002) and 2007/2008 (Marriot et al. 2012).

More recently, biennial survey of boat-based recreational fishing that focus on providing broader-scale and integrated system involving several survey methods has been used to survey boat-based recreational fishers in Western Australia (Ryan et al. 2013). Two state-wide recreational fishing surveys have been completed to date using this methodology, in 2011/12 (Ryan et al. 2013) and 2013/14 (Ryan et al. 2015). A third survey is currently in progress.

Information on charter vessel catches and effort has been routinely collected since 2001, when a compulsory logbook system was implemented.

The recreational and charter catch estimates are used together with the commercial catches estimates to inform the stock assessment of the indicator species.

3.5.1.3 Economic and Social Monitoring

Processor production and value has been monitored using statutory logbooks since 2001. This information provides estimates of weighted average price which when multiplied with total landings produces estimates of GVP of the GDSMF.

The Department's biennial survey of boat-based recreational fishing and other surveys collect economic and social information including expenditure data and fishing satisfaction. This information will be investigated to determine appropriate indicators for future social and economic objectives in the future.

3.5.1.4 Fishery-Dependent Catch Sampling

The age composition of commercial pink snapper catches in the Gascoyne has been closely monitored using a stratified fishery-dependent sampling program since 2003/04. Sampling design is based on the seasonality of pink snapper catches, with larger numbers of otolith samples collected during the months of highest catch. A total of ~500-600 otoliths are collected in each sampling year, based on a target of 25-30 otoliths from 20 separate catches per fishing season.

The age composition of goldband snapper is currently monitored on a periodic basis.

3.5.2 Assessment Procedures

The different methods used by the Department to assess the status of aquatic resources in WA have been categorised into five broad levels, ranging from relatively simple analysis of annual catch levels and catch rates, through to the application of more sophisticated analyses and models that involve estimation of fishing mortality and biomass (Fletcher and Santoro 2015). Irrespective of the types of assessment methodologies used, all stock assessments undertaken by the Department take a risk-based, weight of evidence approach that considers all of the available (fishery-dependent and fishery-independent) information (Fletcher 2015).

3.5.2.1 Pink Snapper

The status of the pink snapper oceanic stock and in the Gascoyne Coast Bioregion is primarily assessed based on estimates of spawning stock biomass relative to internationally accepted reference points (Table 1). Spawning biomass is estimated periodically (at least every 5 years) for the stock using an age- and sex-structured, integrated assessment model that is fitted to available time series of total catches, catch rates (index of abundance) and age composition data. The model takes into account the major features relevant to the biology of pink snapper, including sex-specific growth characteristics, the lengths and ages at which individuals mature, and the selectivity characteristics of the fishing gear used to catch this species.

Standardised commercial catch rates for pink snapper are calculated annually for pink snapper using effort measured as 'standard boat days'. These are defined as the days fished by vessels that caught more than 4 tonnes each of pink snapper by handline fishing during June–July each year (referred to as the 'Moran method').

3.5.2.2 Goldband Snapper & Non-Indicator Species

In the absence of direct estimates of spawning stock biomass, the stock status of goldband snapper and the non-indicator species in the Gascoyne Coast Bioregion is assessed primarily based on estimated proxies for biomass, e.g. spawning potential ratio (SPR) and / or fishing mortality from catch curve and per-recruit analyses. The estimates are periodically compared to specified reference point (Table 1) to determine the status of each stock.

3.5.2.3 Risk Assessments

The Department uses a risk-based Ecosystem Based Fisheries Management (EBFM) framework to assess the impacts of fishing on all parts of the marine environment, including the sustainability risks of retained species, bycatch, ETP species, habitats and the ecosystem. The MSC assessment of the GDSMF has led the development of a periodic risk assessment process, which is used to prioritise research, data collection, monitoring needs and management actions and to ensure that line-fishing activities in the oceanic waters of the Gascoyne Coast Bioregion are managed both sustainably and efficiently.

An ecological risk assessment (ERA) workshop will be held to assess the impacts of commercial line fishing in the Gascoyne Coast Bioregion. The workshop participants will include representatives from the fishing industry, the recreational fishing sector, the Australian Fisheries Management Authority (AFMA), Murdoch University, Department of Parks and Wildlife and the Department of Fisheries. The risk assessment framework applied during the workshop is based on the global standard for risk assessment and risk management (AS/NZS ISO 31000), which has been adopted for use in a fisheries context (see Fletcher et al. 2002). Four aspects are considered for the risk assessment: ecological sustainability, community well-being, external factors and governance (note only ecological sustainability is currently considered as part of this harvest strategy).

Risk assessments will be undertaken periodically (every 3–5 years) to reassess any current or new issues that may arise in the fishery. Risk assessments can be undertaken more frequently if there are significant changes identified in fishery operations or management activities or controls that are likely to result in a change to previously assessed risk levels.

3.5.2.4 Economic and Social Benefits

Economic and social benefit objectives, and their associated performance indicator and controls continue to be developed for Western Australia commercial and recreational fisheries. Provisional economic and social benefit objectives and associated performance indicators and control rules have been developed for the Gascoyne Demersal Scalefish Resource by an independently chaired stakeholder based working group with representation from the Western Australia Fishing Industry Council (WAFIC), Recfishwest, the recreational and commercial fishing sectors, and the Department of Fisheries.

The working group selected GVP as a performance indicator for the GDSMF on the basis that it is factor of two key elements which the affect the economic performance of the fishery; total catch and beach price. Total catch is influenced the annual TACC setting (see Section 4.1.1.1.1) and the capacity for fishers to achieve the TACC (see Section 3.4.3). Beach price is market driven and can be influence by factors such as product quality, continuity of supply and seasonal demand.

Participation (hours fished) was selected by the working group as a performance indicator for the recreational fishing sector on the basis that is a broad measure of the social amenity of recreational fishing for demersal scalefish in the Gascoyne Coast Bioregion. Social amenity

is influenced by a variety of factors including an individual's ability to realise their fishing experience expectations (e.g. catch, catch rate, species composition and access etc.). Participation (client days) was also selected as a performance indicator for the charter sector as a measure of economic performance.

While changes in participation over time provides a measure that the amenity or economic value associated with a recreational fishery may have been affected (in a positive or negative manner), additional tools (such as satisfaction/economic surveys) may be required to determine exactly what factors are driving the change.

3.5.3 Reports and Publications

Information on the current status of Western Australian fisheries and aquatic resources is reported annually in the Department's *Status Reports of the Fisheries and Aquatic Resources of Western Australia: the State of the Fisheries* (e.g. Fletcher and Santoro 2015). Other comprehensive information on fisheries management and the findings and recommendations from research and monitoring activities are also regularly compiled and published in a number of publically-available documents⁶, including:

- The Department's *Annual Report* to Parliament;
- The *Research, Monitoring, Assessment and Development Plan* (e.g. Department of Fisheries 2015b); and
- Fisheries Research Reports, Fisheries Management Papers, Fisheries Occasional Publications, and peer-reviewed scientific journal articles. Examples include:
 - Fisheries Research Report No. 228: *Biology and stock status of demersal indicator species in the Gascoyne Coast Bioregion* (Marriott et al. 2012); and
 - Fisheries Occasional Publication No. 101: *Gascoyne Demersal Scalefish Managed Fishery, an operators' guide to the management arrangements 1 September 2015 – 31 August 2016* (Department of Fisheries 2016).

4 MANAGEMENT MEASURES AND IMPLEMENTATION

There are a number of management measures in place for managing the Gascoyne Demersal Scalefish Resource (Table 4). These measures can be amended as needed to ensure the management objectives are achieved; however, these do not preclude the consideration of other options.

⁶ Departmental reports are available at <http://www.fish.wa.gov.au/About-Us/Publications/Pages/default.aspx>

Table 4. Management measures and instrument of implementation for the Gascoyne Demersal Scalefish Resource.

Measure	Description	Instrument
Quota System	The GDSMF is managed via an ITQ system, with separate TACCs for pink snapper and mixed non-pink snapper catch. A minimum debit rule of 50 kg of pink snapper for each day's fishing applies.	GDSMF Management Plan
Licence Requirements	Operators in the commercial GDSMF must hold a Managed Fishery Licence. Recreational fishers must hold a Recreational Fishing from Boat Licence. Charter operators must hold a Fishing Tour Operators Licence. Licences are renewed annually.	GDSMF Management Plan; FRMR
Bag and possession limits	Daily recreational bag limits apply for all demersal species. There is a recreational possession limit of 2 days' bag limit; or 20 kg of fillets; or one day's bag limit and 10 kg of fillets.	FRMR
Gear restrictions	Operators in the commercial GDSMF are only permitted to fish using handlines and droplines. Commercial fishers are permitted to use up to 10 lines per vessel. Recreational fishers are only permitted to catch demersal scalefish by hook and line or by pointed instrument.	GDSMF Management Plan; FRMR
Processing restrictions	All commercially caught fish must be landed in whole form. All recreationally caught fish must be landed whole; or trunked/filleted with a minimum length of 300 mm and skin and scales attached.	GDSMF Management Plan; FRMR
Species Restrictions	Restrictions on the species permitted to be retained apply to all commercial and recreational fishers (e.g. they may not retain any protected species).	GDSMF Management Plan; FRMR
Size Limits	Minimum size for pink snapper 410 mm (TL). Minimum size for some other bycatch species (e.g. Lutjanids, Lethrinids and Cods) Maximum size for some Cods (>1000 mm TL, Recreational fishery only)	FRMR
Spatial Closures	Commercial closures: Point Quobba, inside Bernier and Dorre Islands, inner gulfs of Shark Bay, and Commonwealth Marine Reserve waters. Recreational and commercial closures: Marine Park sanctuary zones.	GDSMF Management Plan; Marine Park Orders

4.1 Implementing Changes to the Management Arrangements

Decision-making processes can be triggered following the identification of new or potential issues as part of a risk assessment (generally reviewed every 3–5 years), results of research, management or compliance projects or investigations, monitoring or assessment outcomes

(including those assessed as part of the harvest strategy) and / or expert workshops and peer review of aspects of research and management.

There are two main processes for making decisions about the implementation of management measures and strategies for the GDSR:

- Annual decision-making processes that may result in measures to meet the short-term fishery objectives (driven by the control rules); and
- Longer-term decision-making processes that result in new measures and / or strategies to achieve the long-term fishery objectives (i.e. changes to the management system).

However, if there is an urgent issue, consultation with stakeholders may be undertaken to discuss the issue and determine appropriate management action, as needed.

4.1.1 Consultation

Management changes are generally given effect through amendments to legislation, such as the commercial fishery management plan, regulations and orders. These changes require the approval of the Minister for Fisheries. In making decisions relevant to fisheries, the Minister for Fisheries may choose to receive advice from any source, but has indicated that:

- 1) The Department is the primary source of management advice; and
- 2) Peak Bodies (Western Australian Fishing Industry Council [WAFIC] and Recfishwest)

are the primary source of industry advice and representation.

The peak bodies are funded by Government under a funding agreement to undertake their representation / advisory and consultation roles.

4.1.1.1 Commercial Sector Consultation

Under its funding agreement with the Department, WAFIC has been contracted to conduct statutory consultation related to fisheries management plans and the facilitation of management meetings for licensed fisheries.

The FRMA requires the Minister to consult with affected parties when changes to a Part 6 management plan are being considered. In the case of the GDSMF, this includes all licence holders. Management Meetings between the Department, WAFIC and licence holders are generally held in September-October and are used as the main forum to consult with stakeholders and licence holders on the management of the fishery. During these meetings, Departmental staff (research, management and compliance), licence holders and WAFIC discuss current and future management issues and any proposed changes to the management plan including changes to the TACC. Follow-up meetings may be held as required.

The Department also consults directly with industry, where relevant, on specific management and operational issues.

4.1.1.1.1 Capacity Setting and Review Process

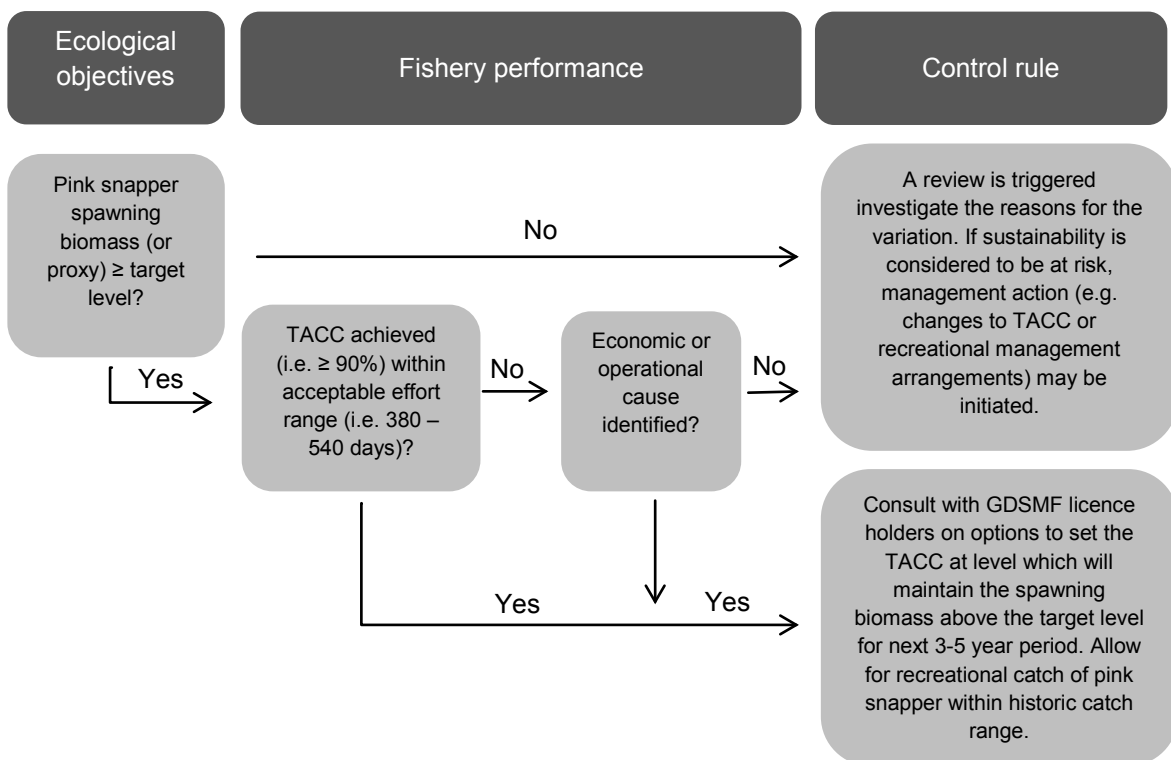
The capacity setting and review process for the pink snapper and combined species (non-pink snapper) quota is undertaken by the Department based on research advice and in consultation with GDSMF licence holders in accordance with the controls rules outlined in this harvest strategy.

The capacity (TACC) for pink snapper quota is reviewed following each periodic assessment of spawning biomass using the integrated assessment model. Where the pink snapper spawning biomass estimate is above the target level, licence holders in the GDSMF are consulted on setting the TACC at a level which will maintain the spawning biomass above the target level for next 3-5 year period. During this process consideration is also given to the fishery performance (see Section 3.4.3), as well as the economic and social benefit objectives (Figure 2).

The TACC for the combined species (non-pink snapper) quota is reviewed periodic following assessments of spawning biomass (or proxy) for goldband snapper and the non-indicator species.

The capacity for the GDSMF is contained in the management plan. A change in capacity is given effect through an amendment to the management plan following statutory with licence holders and the approval of the Minister for Fisheries.

Figure 4. Pink snapper TACC setting process



4.1.1.2 Recreational Sector Consultation

Under the funding agreement with Recfishwest, the Department is required to consult with Recfishwest as the recognised peak body for recreational fishing in Western Australia. Recfishwest is required to engage and consult with recreational fishers as necessary in order to meet its obligations.

4.1.1.3 Consultation with Other Stakeholder Groups

Consultation with non-fisher stakeholders including Government agencies, conservation sector Non-Government Organisations, customary fishers, statutory advisory committees and other affected / interested parties is undertaken by the Department in accordance with the departmental *Stakeholder Engagement Guideline* (Department of Fisheries 2016b). The Department's approach to stakeholder engagement is based on a framework designed to assist with selecting the appropriate level of engagement for different stakeholder groups and includes collaborating with and involving key stakeholders, seeking input from interested parties through a public consultation process and keeping all parties fully informed through the provision of balanced, objective and accurate information. Key fishery-specific documents such as harvest strategies, recovery plans and bycatch action plans are subjected to both formal key stakeholder consultation and public consultation processes.

4.2 Compliance

The primary objectives of the Department regarding compliance is to 1) encourage voluntary compliance through education, awareness and consultation activities, and 2) provide effective deterrence for non-compliance through a penalty based system.

4.2.1 Operational Compliance Plans

Management arrangements are monitored under the Operational Compliance Plan (OCP) for the GDSMF and the recreational sector. An OCP is informed and underpinned by a compliance risk assessment conducted for each fishery. The OCP has the following objectives:

- To provide clear and un-ambiguous direction and guidance to Fisheries and Marine Officers for the yearly delivery of compliance in the fishery;
- To protect the fisheries' environmental values, while providing fair and sustainable access to the fishery's commercial and social values; and
- To encourage voluntary compliance through education, awareness and consultation activities.

The OCP is reviewed every 1-2 years.

4.2.1.1 Compliance Strategies for the GDSMF

Compliance strategies and activities that are used in the fishery include:

- land and sea patrols;
- inspections of scalefish wholesale and retail outlets;
- undertaking covert operations and observations;
- inspections at scalefish processing facilities;
- inspection in port;
- at-sea inspection of fishing boats;
- quota management;
- aerial surveillance; and
- intelligence gathering and investigations.

Inspections may involve:

- inspection all compartments on board the vessels;
- inspection of all authorisations;
- inspection of CDR book and associated paperwork; and
- inspection of catch on board the boat.

4.2.1.2 Vessel Monitoring System

VMS was introduced to the GDSMF in 2008 to allow real time monitoring of the commercial fleet. VMS helps to ensure fishers are working in their designated fishing areas.

Vessels operating within a fishery requiring VMS are fitted with an automatic location communicator (ALC), which is used to track the location of a boat by transmitting information such as the geographical position, course and speed of the boat. Information from the ALC is submitted to the department via satellite to the Department's Marine Operations Centre in Fremantle. The information is processed by specialised software designed to receive, analyse, display and record position reports and messaging via satellites.

4.2.1.3 Compliance Strategies for the Recreational Sector

Compliance strategies and activities that are used in the fishery include:

- Land patrols;
- On-water patrols;
- Catch, licence and gear inspections;
- Covert surveillance of persons of interest under approved operations;
- Road-side checkpoints; and
- Wholesale / retail inspections.

5 REFERENCES

- Allen, G.R. (1985). FAO species catalogue Vol. 6. Snappers of the world: an annotated and illustrated catalogue of Lutjanid species known to date. FAO Fisheries Synopsis, No. 125, Vol. 6. Food and Agriculture Organization of the United Nations, Rome.
- Australian Fisheries Management Authority (AFMA) (2011). Harvest strategy for the Deepwater Trawl Fishery and North West Slope Trawl Fishery. AFMA, Canberra.
- Caddy, J. and Mahon, R. (1995). Reference points for fisheries management. FAO Fisheries Technical Paper 347. FAO, Rome, 84 pp.
- Department of Environment and Heritage (2004). Assessment of the Western Australian Shark Bay Snapper Fishery. Department of the Environment and Heritage, Canberra ACT 2601. <https://www.environment.gov.au/system/files/pages/a701ffd3-982e-46c2-88f3-ce9f2d8d38bc/files/wa-snapper-assessment-report.pdf> Department of Fisheries (1985). Shark Bay Snapper Fishery Working group. Report to the Minister for Fisheries. November 1985. Department of Fisheries, Western Australia
- Department of Fisheries (1995). Management options for the Shark bay Snapper Limited Entry Fishery: Shark Bay Snapper Limited Entry working group. Fisheries Management Paper No 81. Department of Fisheries, Western Australia.
- Department of Fisheries (2002) Application to Environment Australia on the Shark Bay Snapper Managed Fishery Against the Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries December 2002. <https://www.environment.gov.au/system/files/pages/465b0cf8-b852-4db8-91f9-8ada7b6c0ff8/files/snapper.pdf>
- Department of Fisheries (2009). Integrated Fisheries Management - Government Policy. Department of Fisheries, Western Australia.
- Department of Fisheries (2011). Resource Assessment Framework (RAF) for finfish resources in Western Australia. Fisheries Occasional Publication No. 85. Department of Fisheries, Western Australia.
- Department of Fisheries (2014a). Exmouth Gulf Prawn Managed Fishery Harvest Strategy 2014 – 2019. Fisheries Management Paper No. 265. Department of Fisheries, Western Australia.
- Department of Fisheries (2014b). Shark Bay Prawn Managed Fishery Harvest Strategy 2014-2019. Fisheries Management Paper No. 267. Department of Fisheries, Western Australia.
- Department of Fisheries (2015a). Harvest Strategy Policy and Operational Guidelines for the Aquatic Resources of Western Australia. Fisheries Management Paper No. 271. Department of Fisheries, Western Australia.
- Department of Fisheries (2015b). Research, Monitoring, Assessment and Development Plan 2015–2020. Fisheries Occasional Publication No. 122. Department of Fisheries, Western Australia.

- Department of Fisheries (2015c). Status reports of the fisheries and aquatic resources of Western Australia 2014/15. Department of Fisheries, Western Australia.
- Department of Fisheries (2016a). Gascoyne Demersal Scalefish Managed Fishery, an operators' guide to the management arrangements 1 September 2015 – 31 August 2016. Fisheries Occasional Publication No. 101. Department of Fisheries, Western Australia.
- Department of Fisheries (2016b). Guideline for stakeholder engagement on aquatic resource management-related processes. Fisheries Occasional Publication No. 131. Department of Fisheries, Western Australia.
- Department of Fisheries (2016c in prep). North Coast Demersal Scalefish Resource Harvest Strategy 2016-2021. Fisheries Management Paper No. XXX. Department of Fisheries, Western Australia.
- ESD Steering Committee (1992). National Strategy for Ecologically Sustainable Development. Endorsed by the Council of Australian Governments, December 1992. ISBN0 644 27253 8.
- Fletcher, W.J. (2002). Policy for the implementation of ecologically sustainable development for fisheries and aquaculture within Western Australia. Fisheries Management Paper No. 157. Department of Fisheries, Western Australia.
- Fletcher, W.J. (2012). National Application of Sustainability Indicators for Australian Fisheries; Part 2: Ecosystem-based frameworks for aquaculture, multi-fishery and international applications. FRDC Report on Project No. 2000/145. Fisheries Research Report No. 235. Department of Fisheries, Western Australia, 60 pp.
- Fletcher, W.J. (2015). Review and refinement of an existing qualitative risk assessment method for application within an ecosystem-based management framework. *ICES Journal of Marine Science* 72: 1043-1056.
- Fletcher, W.J. and Santoro, K. (eds.) (2015). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15: State of the Fisheries. Department of Fisheries, Western Australia.
- Fletcher, W., Chesson, J., Sainsbury, K., Fisher, M., Hundloe, T. and Whitworth, B. (2002). Reporting on Ecologically Sustainable Development: A “how to guide” for fisheries in Australia. Canberra, Australia, 120 pp.
- Fletcher, W.J., Shaw, J., Metcalf, S.J. and Gaughan, D.J. (2010). An Ecosystem Based Fisheries Management framework: the efficient, regional-level planning tool for management agencies. *Marine Policy* 34: 1226-1238.
- Fletcher, W.J., Wise, B.S., Joll, L.M., Hall, N.G., Fisher, E.A., Harry, A.V., Fairclough, D.V., Gaughan, D.J., Travaille, K., Molony, B.W. and Kangas, M. (2016). Refinements to harvest strategies to enable effective implementation of Ecosystem Based Fisheries Management for the multi-sector, multi-species fisheries of Western Australia. Fisheries Research. <http://dx.doi.org/10.1016/j.fishres.2016.04.014>
- Gabriel, W.L. and Mace, P.M. (1999). A review of biological reference points in the context of the precautionary approach. NOAA Technical Memo NMFS-F/SPO-40, pp. 34-45.

- Jackson, G., Cheng, Y.W. and Wakefield C.B. (2012). An evaluation of the daily egg production method to estimate spawning biomass of snapper (*Pagrus auratus*) stocks in inner Shark Bay, Western Australia, following more than a decade of surveys 1997-2007. *Fisheries Research* 117-118: 22-34.
- Jackson, G., Newman, S.J., Turner, S. and Zilles, H. (2015). Gascoyne Demersal Scalefish Fishery Status Report. In: Fletcher, W.J. and Santoro, K. (eds.), Status Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15: State of the Fisheries. Department of Fisheries, Western Australia.
- Kailola, P.J., Williams, M.J., Stewart, P.C., Reichelt, R.E., McNee, A. and Grieve, C. (1993). Australian Fisheries Resources. Bureau of Resource Sciences, Canberra.
- Lloyd, J., Ovenden, J., Newman, S. and Keenan, C. (1996). Stock structure of *Pristipomoides multidens* resources across Australia. Final Report to Fisheries Research and Development Corporation on Project No 1996/131. Fishery Report No 49. Northern Territory Department of Primary Industry and Fisheries.
- Mace P.M. (1994). Relationships between common biological reference points used as thresholds and targets of fisheries management strategies. *Canadian Journal of fisheries and Aquatic Sciences* 51: 110-122.
- Marriott, R., Jackson, G., Lenanton, R., Telfer, C., Lai, E., Stephenson, P., Bruce, C., Adams, D. and Norriss, J. (2012). Biology and stock status of demersal indicator species in the Gascoyne Coast Bioregion. Fisheries Research Report No. 228. Department of Fisheries, Western Australia.
- Molony, B.W., Newman, S.J., Joll, L., Lenanton, R.C.J. and Wise, B. (2011). Are Western Australian waters the least productive waters for finfish across two oceans? A review with a focus on finfish resources in the Kimberley region and North Coast Bioregion. *Journal of the Royal Society of Western Australia* 94: 323–332.
- Moran, M.J. and Jenke, J. (1989). Effects of fish trapping on the Shark Bay snapper fishery. Fisheries Research Report No. 82. Fisheries Department of Western Australia.
- Moran, M., Stephenson, P., Gaughan, D., Tapp, N. and Moore, J. (2005). Minimising the cost of future stock monitoring, and assessment of the potential for increased yields, from the oceanic snapper, *Pagrus auratus*, stock of Shark Bay. Fisheries Research and Development Corporation Final Report, Project 2000/138. Department of Fisheries Western Australia.
- Newman, S.J., Steckis, R.A., Edmonds, J.S. and Lloyd, J. (2000). Stock structure of the goldband snapper *Pristipomoides multidens* (Pisces: Lutjanidae) from the waters of northern and western Australia by stable isotope ratio analysis of sagittal otolith carbonate. *Marine Ecology Progress Series* 198: 239-247.
- Ovenden, J.R., Lloyd, J., Newman, S.J., Keenan, C.P. and Slater, L.S. (2002). Spatial genetic subdivision between northern Australian and southeast Asian populations of *Pristipomoides multidens*: a tropical marine reef fish species. *Fisheries Research* 59: 57–69.
- Parsons, D.M., Sim-Smith, C.J., Cryer, M., Francis, M.P., Hartill, B., Jones, E.G., Le Port, A., Lowe, M., McKenzie, J., Morrison, M., Paul, L.J., Radford, C., Ross, P.M., Spong,

- K.T., Trnski, T., Usmar, N., Walsh, C. and Zeldis, J. (2014) Snapper (*Chrysophrys auratus*): a review of life history and key vulnerabilities in New Zealand, *New Zealand Journal of Marine and Freshwater Research* 48: 256-283.
- Ryan, K.L., Wise, B.S., Hall, N.G., Pollock, K.H., Sulin, E.H. and Gaughan, D.J. (2013). An integrated system to survey boat-based recreational fishing in Western Australia 2011/12. Fisheries Research Report No. 249. Department of Fisheries, Western Australia.
- Ryan, K.L., Hall, N.G., Lai, E.K., Smallwood, C.B., Taylor, S.M. and Wise, B.S. (2015). Statewide survey of boat-based recreational fishing in Western Australia 2013/14. Fisheries Research Report No. 268. Department of Fisheries, Western Australia.
- Sloan, SR; Smith, ADM; Gardner, C; Crosthwaite, K; Triantafillos, L; Jeffries, B and Kimber, N (2014) National Guidelines to Develop Fishery Harvest Strategies. FRDC Report – Project 2010/061. Primary Industries and Regions, South Australia, Adelaide, March.
- Sumner, N.R., Williamson, P.C. and Malseed, B.E. (2002). A 12-month survey of recreational fishing in the Gascoyne bioregion of Western Australia during 1998-99. Fisheries Research Report No 139. Department of Fisheries, Western Australia.
- Wise, B.S., St John, J. and Lenanton, R. (eds.) (2007). Spatial scales of exploitation among populations of demersal scalefish: Implications for management. Part 1: Stock status of the key indicator species for the demersal scalefish fishery in the West Coast Bioregion. FRDC Final Report on Project No. 2003/052. Fisheries Research Report No. 163. Department of Fisheries, Western Australia, 130 pp.
- Wise et al. (in prep). A risk-based, weight of evidence approach to improve transparency and robustness of fishery stock assessment outcomes.